By Staff Sgt. Cindy Fisher, HEADQUARTERS MARINE CORPS, Washington

Simulations Add 'Playtime' to Training Cycle

Simulations Take Some of the 'Field' Out of Training.

Though hands-on-been-there-done-that real field experience will always be a vital part of the training cycle, simulated training will play a much larger role in the future, said Capt. Erik Jilson, a modeling and simulation analyst at the Technology Division, Training and Education Command at MCB Quantico, Va. Scenario-driven computer exercises, virtual reality video games and hi-tech equipment simulators are meant to augment live training, saving money, time and lives.

▲ ***Flight Simulators,*** **like the one shown here for the MV-22 Osprey, save time, fuel and aircraft use. Osprey program managers project that using simulators to complete up to 75 percent of initial-level training at the Fleet Replacement Squadron could also reduce the number of MV-22 marked for training from 40 to 20.**

Photo courtesy of Flight Safety International

One Man's Passion
'Link' to Modern Flight Simulator Industry

By Staff Sgt. Cindy Fisher
HEADQUARTERS MARINE CORPS, Washington

THE WRIGHT BROTHERS MADE THEIR HISTORIC FIRST FLIGHT at Kitty Hawk, N.C., Dec. 17, 1903.

That 12-second, 120-foot flight paved the way for aviation, but it wasn't until April 14,1929, that 25-year-old Ed Link, the "father of flight simulation," patented the "Pilot Maker."

The difference between this, the first true flight simulator, and earlier trainers was that it was the "first ground-based training device designed to teach pilots how to fly," according to the Web site About.com.

Link began building his simulator in 1927 while working as a technician at his father's piano and organ factory in Binghamton, N.Y. Aviation fascinated him but the cost of fuel, flight lessons and plane rentals made learning to fly expensive. In the factory's basement, he used various piano and organ parts to create a machine that would "mimic the experiences of flying an airplane without ever leaving the ground."

BINGHAMTON, N.Y. – Ed Link began building his first flight simulator in 1927. By the time World War II began, his idea had evolved into the ANT-18 Basic Instrument Trainer such as the one shown here. During the war, more than 500,000 aviators trained in the Blue Box, as the device came to be called. The Blue Box improved safety and shortened training time, according to the American Society of Mechanical Engineers Web site.

Photo courtesy of L-3 Communications

He continued to modify his simulator and in 1933, he added a hood to enclose the pilot and an instrument panel to the cockpit. The hood forced pilots to rely on the cockpit instrument panel. Instead of teaching pre-flight, his modified trainer provided instrument flight training, according to the University of Houston's Beginning of Flight Simulation Web site.

His big break came when the Army Air Corps began flying the U.S. mail, according to the Link Simulation and Training Web site. Nearly a dozen pilot deaths caused by bad weather in the early days of the Army Air Corps' mail service led Army officers to review Link's trainers, which taught pilots to fly by instrument instead of just by sight. The six Link Flight Trainers the Army Air Corps bought in 1934 were the start of Link Aviation Devices, Inc.

The company first started by Link has changed hands. It now operates as the Link Simulation and Training Division under the parent company of L-3 Communications. The division provides simulator support for all four branches of the armed forces.

Link died in 1981, but the legacy of his Link Flight Trainer continues in today's simulators used in training for commercial, military and space flight. From the Pilot Maker in 1929, the flight simulation field has grown into a multi-bullion dollar industry. M

"The training that takes place before live training has the goal of better preparing Marines. When live training (occurs), less time is spent getting up to speed and the 'in the field' training time is more effective," Jilson said.

Simulators usually take less time and fewer personnel to set up. Scenarios can be played repeatedly through simulations, and many simulators also include an after action reporting process for evaluation.

"The best training is live, but it is costly in training dollars," said Truman C. Preston, assistant chief of staff, G7, II Marine Expeditionary Force, Marine Corps Base Camp Lejeune, N.C.

Repetition is part of training; "the more times you do (something) the better you get," he said. "Simulations are more cost effective ways to build in the repetitions needed to gain experience."

Simulation training also puts no wear and tear on vehicles or aircraft, and it expends no ammunition, fuel or other expendable materials. A 2nd Marine Division commanding general in the mid-80s credited a one-week division-level computer-assisted exercise with saving more than $70,000 in radio batteries alone, Preston said.

"Needless to say, savings in 2005 dollars would be considerably more," said Preston, who retired from the Corps as a lieutenant colonel after more than 28 years.

Simulations allow Marines to make and learn from mistakes in an environment that does not result in deaths. "Using simulations, trainers can inflict casualties on trainees for improper tactics, bad decisions, poor team coordination, etc., and make them bleed, so to speak," he said.

Marines who "bleed" in the simulations, "hopefully won't bleed in actual combat," he said.

NAVAL AIR STATION LEMOORE, Calif. – A Navy F/A-18 pilot at Naval Air Station Lemoore trains in a simulator that was manufactured and maintained by the Link Simulation and Training Division. Link supports and maintains all the Navy and Marine Corps' F/A-18 Hornet and Super Hornet training assets. These assets range from flight simulators to maintenance trainers to computer-based training equipment. The division also built a trainer for the Navy's air cushioned landing craft, known as the LCAC, which is the vehicle often used to bring Marines from ship to shore in amphibious operations.

Photo courtesy of L-3 Communications

Computer-based Programs are the Name of the Game

Increasingly, today' battles are fought in a joint or combined arena. Marines in operations Enduring and Iraqi Freedom are fighting side by side with Army, Navy and Air Force personnel as well as forces from foreign nations.

Marine units must train to operate seamlessly in joint and combined environments, but live joint or combined training exercises are not always feasible. Deployments, operational tempo, time and logistics constraints, or a variety of other reasons are barriers to live training, Jilson said.

Computer-based gaming systems, conducted at modeling and simulation sites throughout the Corps, fill this training void.

Computer simulation training has been in use as far back as 1979 with the Tactical Warfare Simulation Evaluation and Analysis System at Las Flores on Camp Pendleton, Calif., according to Tom Buscemi, director of I MEF's Battle Simulation Center there. TWSEAS was based on a 35 mm slide presentation that illustrated training scenarios.

From this evolved the MAGTF Tactical Warfare Simulation, which was fielded to the Marine Corps again at Camp Flores in 1995, Buscemi said.

SATTAHIP Thailand – Royal Thai and U.S. Marines train together using MTWS Sept. 14, 2004. They used MTWS to enhance interoperability and coalition security relations. MTWS is just one of the many simulation program available at the various modeling and simulation centers through out the Corps. The II MEF Simulation Center uses the Joint Conflict and Tactical Simulation, an entity-level simulation for individual Marines up to small units. The Modeling and Simulations Lab at Marine Corps Air Ground Combat Training Center Twentynine Palms, Calif., offers the Joint Tactical Simulation, in which small units practice combat exercises in rural and urban battlegrounds. The Camp Pendleton and Camp Lejeune simulations center offers Convoy Operations Training, a first-person perspective for convoy commanders and drivers.

Photo by Cpl. Jonathan K. Teslevich

MTWS is the Marine Corps' main staff-planning model, said Preston.

With MTWS, small unit leaders, commanders and their staffs practice command and control procedures, standard operating procedures and techniques, tactics and procedures, said Buscemi.

MTWS produces information to which forces must react. It replicates fire and maneuver, intelligence, logistics, command and control, and force protection – all the war fighting functions. By responding to the scenarios, the various elements within a unit or joint command learn to operate with each other "before the trucks hit the roads, the planes get in the air or the troops go into battle," Buscemi said.

The ability to tailor scenarios to a unit's training needs, allowed 1st Marine Division and I MEF to fight MTWS battles in preparation for Operation Iraqi Freedom four times before they ever went overseas, Buscemi said.

"A senior watch officer who was in Iraq told me that with the exception of the causalities being real, what they experienced in Iraq was very similar to what the simulation produced, which emphasizes the effectiveness of the computer driven combat simulations," Buscemi said.

Let the Games Begin

The Marine Corps' virtual training arsenal has expanded to take advantage of the proliferation of video game technology.

Virtual Battlefield System One allows Marines to practice small unit tactics. TDSs like this feature photo-realistic terrain, user-definable mission scenarios, specialized response tools and tactics, and variable environmental conditions to enhance the team training experience. Training and Education Command has been developing TDSs since 1995. The initiative was given a push in 2001 thanks to a Technology Division research project to investigate technologies for a Deployable Virtual Training Environment to maintain forward-deployed Marines' decision-making skills. VBS-1 was the first modified DVTE simulation introduced after the push.

Official Marine Corps photo

Today's advanced simulators give pilots the opportunity to fly and manage aircraft systems in a realistic environment. The MV-22 Full Flight Simulator uses the latest technology, such as higher-fidelity visuals, motion and other flight simulator subsystems, to create this more realistic training environment.

Photo courtesy of Flight Safety International

Training and Education Command is poised to unveil the Corps' version of the commercial game "Close Combat: First to Fight" in late spring of this year. The game is a tactical decision simulation, first-person personal computer program designed to train infantry Marines on fire teams.

The Marine Corps worked closely with Destineer Studios during the development of "Close Combat: First to Fight."

The Marine Corps provided thousands of pages of doctrine and more than 40 Marines to work with a Destineer development team to incorporate Marine Corps combat tactics into the game, said Peter Tamte, president, Destineer Studios.

The Corps' contribution of subject matter experts and about $900,000 resulted in a realistic fire team trainer to which the Corps has unlimited distribution rights for Marine Corps use, Jilson said.

The collaboration gives Destineer a game they bill as "the real life experiences of the proud few." They hope it better illustrates to the gaming community the honor, courage and commitment it takes to be a Marine, said Tamte.

The production of an average video game costs between $5 million and $20 million, said Tamte.

Marine Corps input is pervasive throughout the game.

In First to Fight, a player selects three men from a roster of 20 characters to fill his four-man fire team. About 15 of the characters are based on active duty Marines. "We hope that surrounding players with real-life Marines will help create a taste of what it might be like to actually be a Marine in urban combat," said Tamte.

Staff Sgt. Hector "Casanova" Arellano, with 3rd Amphibious Assault Battalion, 1st Marine Division, had just returned from Operation Iraqi Freedom I when he was approached to help with the game.

He provided input on fire team tactics like clearing stairs and rooms and moving under fire, said Arellano, a Los Angeles native who is also featured as one of the characters in the game.

The commercial version, which will

Close Combat:
FIRST TO FIGHT
Mission Brief

Condensed from a scenario by reserve Lt. Col. Raymond Liddy and Destineer

THE TROUBLE SPOT IS LEBANON. MARINES ARE RETURNING to Beirut, the city where 241 Marines and sailors died Oct. 23, 1983, when a bomb-laden truck crashed through the Corps' temporary headquarters and into a building where they slept and detonated.

Today, in the year 2006, several groups of insurgents have taken control of sections of Beirut and the surrounding areas. The largest, best-organized and best-funded of these groups is the radical Atash movement, led by Tarik Qadan, a local religious zealot of considerable influence.

The current Prime Minister of Lebanon, an impressive, strong-willed man, kept the situation in check until he left the country to seek medical care in the United States.

Almost immediately, his aides begin to bicker among themselves and lose control over much of the Lebanese Army based in the city. In this rapidly deteriorating situation, the insurgents strike and Atash begins terrorizing the city.

Akhbar al'Soud, a Lebanese colonel, takes command of the militia in Beirut and declares martial law in the city. Shortly after al'Soud takes control, large battles begin between the radicals and militia forces, as they vie for control of the city and the country. Much of the fighting occurs in and around the Grand Serail, the prime minister's official home and the symbolic seat of government in Lebanon.

The Unites States and NATO decide to intervene and a joint operation, called Operation Preserve Peace, is begun. The 28th Marine Expeditionary Unit (Special Operations Capable) spearheads the operation. With only small skirmishes and no casualties, the vital Beirut airport is quickly brought under U.S. and NATO control. Marines soon take control of the area around Beirut's main port, El Karantina, and establish El Karantina as their primary base for operations.

You're a fire team leader with the MEU. You and your fellow Marines are experts at helicopter borne assaults, maritime raids and urban combat. Your battle has just begun. M

Marines clearing a room in this screen shot from Close Combat: First to Fight use the same weapons and tactics as Marines currently engaged in the Global War on Terrorism. Collaboration between the Marine Corps and Destineer Studios resulted in a realistic video game Marines can use to get the feel of real combat at a lower cost in money and lives.

Although the Corps has been involved with other TDSs like Operation Flashpoint, which was later renamed Virtual Battlefield System One, "usually it is a small-scale program or involves modifications after development is completed," said Jilson. be available for X-Box, Macintosh and Windows, is scheduled for release in March for about $40.

"While TDSs are games, when used with a training plan and facilitation they are valuable tools for improving war fighting skills," said Jilson.

The MEF simulation centers and infantry military occupational specialty schoolhouses already using TDSs will be the first to get "Close Combat: First to Fight." Units interested in the TDS should contact their MEF simulation center or the Technology Division of the Training and Education Command.

Training in the Air ...

The next step to more realistic simulation training takes Marines out of the computer room and puts them into equipment simulators.

Pilots at Marine Medium Tilt-Rotor Training Squadron 204 based at Marine Corps Air Station New River, N.C., spend considerably more time in simulators training to fly the MV-22 Osprey than in the actual aircraft, said Col. Joel "Coach" Kane, the commanding officer of the squadron.

During the four-month initial instruction phase of the curriculum, pilots are in the MV-22 Full Flight Simulator 60 hours and in the aircraft 36, Kane said. "Flight simulators do an outstanding job of introducing pilots and aircrew to a specific type, model or series of aircraft."

The Osprey is a tilt-rotor aircraft that takes off like a helicopter. Thanks to the two rotors mounted to its wings that tilt forward, it can convert to fly as a plane. This transition "creates some unique aerodynamic challenges that pilots must work through," Kane said.

In the simulators, a student pilot "gets a feel" for what is required to maintain control of the aircraft "long before ever getting into the seat of an actual MV-22," he said.

A mistake in the aircraft could result in the loss of life and a more than $80 million dollar aircraft. A mistake in the simulator means a reboot by the instructor and students try again.

Modeling and Simulation Sites with MAGTF Tactical Warfare Simulations:

- I MEF, Camp Pendleton, Calif.
- II MEF, Camp Lejeune, N.C.
- III MEF, Camp Courtney, Okinawa, Japan
- MCAGCC Twentynine Palms, Calif.
- MAGTF Staff Training Program, TECom, Quantico, Va.
- Joint Training, Analysis, and Simulations Center, Suffolk, Va.
- Naval Post Graduate School, Monterey, Calif.
- The United Kingdom has also recently acquired MTWS

On Land ...

Marines attending the M-1A1 Main Battle Tank crewman course at the Army's Armor Center at Fort Knox, Ky., know of the demand for M-1A1 Tank Drivers Simulators.

The simulators are mock-ups of tank compartments. The boxed compartments are mounted to mechanical systems so that when students move the controls the compartments move, said Master Sgt. Bernard Prevost, the operations chief at the Marine Corps Detachment there.

Due to the high demand for simulator time, students average only about four hours in the simulators, but those four hours are valuable, Prevost said.

"Tanks are kind of hard to stop and it's better to make your mistakes in the simulators; it greatly reduces your mistakes out in the training field," he said.

Not only do the simulators get first-timer mistakes out of the way, they increase the variety of a student's training experience. The basic tank course is only 53 training days long, but with the simulators a student attending during summer can still learn how to operate the tank in winter conditions, he said.

"The simulators change not just the weather but the terrain; whatever the simulator operators dictate," he said.

... And Sea

Another up and coming vehicle that will rely on equipment simulators during training is the Expeditionary Fighting Vehicle. The EFV, currently in development, is the next generation of AAV.

Seven different types of trainers are planned for specific areas or tasks in the EFV, according to Daniel Dykstra, the division head for Manpower, Personnel, and Training of the Logistics Directorate under the Direct Reporting Program Manager Advanced Amphibious Assault. Planned simulators include a driver simulator, a turret simulator and a weapons station maintenance trainer.

The trainers are still in development and have yet to be tested. They will support a curriculum that is being developed. Based on a study by Program Manager for Training Systems, Marine Corps Systems Command, based in Orlando, Fla., students can expect to spend 20 to 50 hours in the more complex simulators, like the driver and turret simulators, Dykstra said.

Initial operational fielding, the first fielding of limited quantities of EFVs, is scheduled for fiscal year 2010, according to the currently proposed budget. The EFV training systems should arrive at the Amphibian Assault School Battalion at Camp Pendleton in fiscal year 2006.

The value of simulation training to augment live training is apparent. Wherever it is determined that virtual training – simulation – is the correct technology for training, it will be applied, said Jilson. M