Ed Link's Industry Turns 75

Across three quarters of a century, the Link name has reached lofty altitudes and suffered near-fatal spiral descents. Today they're straight and level again, celebrating the man who made it possible and a hopeful future. ***Rick Adams*** *comments.*

Above Left
Ed Link in his Blue Box trainer.
Left
A team of instructors observe student performance at an early IOS.

Image credit: Link Simulation & Training

The most famous little flight trainer in the world was almost known as "The Red Box." When Edwin Albert Link conceived the first ground-based pilot training device in the basement of a brick building on Water Street in Binghamton, New York, the original was painted the same color as Baron von Richthofen's revered World War I tri-winged Fokker Dr.I.

Of course, if you've been in the simulation-based military training industry for more than a couple of years, you surely know that Link's legendary instrument flight trainer is beloved as "The Blue Box." Next time you see one of the devices in a museum or at the I/ITSEC show, pause a moment, take off your hat, and thank the ingenuity of Ed Link for your paycheck because when he filed for a patent 75 years ago (April 14, 1929) the inventor also launched a business arena that has provided careers for tens of thousands of us and, moreover, has saved countless military lives the world over.

Most people, unfortunately, know only the "Blue Box" connection to Ed Link, and perhaps the fact that half a million Allied airmen learned how to fly in some 10,000 Link-built devices during World War II. But the simulation industry's founding father achieved far more.

For example, he created the first synthetic visual systems – for the Celestial Navigation Trainer (CNT), circa 1941. At the top of a 40-foot silo, a planetarium-like dome allowed a bomber aircraft navigator to use a sextant to shoot an array of 379 accurately positioned light-point stars. Below and forward, a reproduction of terrain flashed on a movie screen for practice in identifying landmarks during simulated daylight flight. (Link incorporated the "sex sells" approach as well, creating "Star Identification Charts" using photos of models wearing nothing except strategically placed "sparkling stars" to teach RAF airmen the correct shapes of the, er, constellations.)

The CNT also represented the first classified simulation program, as it incorporated the then-secret Norden bombsight.

In 1937, Link signed the industry's first international offset agreement. The Royal Air Force ordered some "D" model Blue Boxes, but on condition they be built within the British Commonwealth. So Ed Link opened a new subsidiary factory in Gananoque, Ontario, not far from his new Perch Island summer home in the St. Lawrence Seaway's Thousand Islands region. Coincidentally, this was also the birth of the simulation industry in Canada.

The litany of Link innovations is lengthy, and includes the first electronic simulator, the first jet simulator (for the F-80 aircraft), the first simulator for a supersonic aircraft (F-102), the first digital simulators, the first helicopter and vertical takeoff trainers, and all of NASA's manned spaceflight simulators.

Industry Dominance

Today, several companies can legitimately claim remnants of the Link lineage, among them CAE, Raytheon, and Thales. It is probably also safe to say that a sizeable majority of people in the military simulation training industry either worked for or were customers of a Link entity at some point in their personal life cycle.

Link Aviation Inc. had some rough times in the early 1950's when the military market nearly dried up and the civil aviation market was flooded with surplus Blue Boxes. In 1954 Link merged with General Precision Equipment Corporation, and shortly after Ed Link pretty much retired from aerospace to pursue his interests in ocean exploration. (He died in 1981.)

In 1968, sewing machine icon Singer, which was transforming itself into a high-technology company, acquired GPS. For a three-year stretch, Singer committed heresy, as some in the subsidiary perceived it, by dropping the Link name, but eventually succumbed to the clamor and restored it as Singer-Link.

Above
F/A-18E/F Tactical Operational Flight Trainer.
Image credit: Link Simulation & Training

For two decades, Singer-Link reclaimed the type of dominance the organization enjoyed in the WWII-era, capturing market share estimated in the 70-80 percent range, including a near-lock on classified programs. It was whispered in those days that because the government was short on simulation expertise, Link marketers and engineers ghostwrote many of the Requests for Proposals, which they then responded to and won.

In the late 1980s, the Defense Advanced Research Projects Agency (DARPA) developed the limited-fidelity SIMNET concept, precursor to today's networked trainers. At first, Singer-Link management resisted this purported "60 percent solution," continuing to push the "big iron" motion-based devices their Binghamton and Houston facilities were geared to manufacture. Competitors started to carve away Singer-Link's market share.

Then in 1987, corporate raider Paul Bilzerian made a "greenmail" junk bond run at Singer, and inadvertently ended up owning the company when no "white knight" rescuer arrived. Since he didn't really want to operate the company, Bilzerian and his banker cronies broke Singer into several pieces to get their money back.

The civil portion of Singer-Link, including Link-Miles in the UK, was sold to Rediffusion, and is now part of Thales Training & Simulation. The winning bid for the military piece (more than $500 million) was made by Canadian competitor CAE, a move they would ultimately regret. Not only did many of the proud Link people resist cooperation and integration with their foreign owners, the US management used the cloak of classified programs – to which the Canadian management could not be privy – to hide a multitude of sins large and small.

CAE got hit with a double-whammy, not of their culpability but at serious cost to reputation and bottom line. One was a whistle-blower lawsuit alleged by a former short-term Singer-Link employee; it resulted in the largest such settlement at the time, $65 million. The second was a series of criminal charges against senior Link executives. Together, those crises nearly led to disbarment from US government contracts.

After seven years of famine, the Canadians unloaded the Link albatross in 1995 (for a mere $155 million) to Hughes

Electronics Corporation. The Link name thereupon disappeared from view.

In 1998 Raytheon acquired Hughes Aircraft's defense electronics operation, including the training business. Two years later, Raytheon sold its Training Devices and Training Services unit to L-3 Communications (though Raytheon kept the NASA program supporting the Space Shuttle and Space Station).

Link Name Returns

L-3 restored the Link name. "L-3 senior management appreciated the fact that our organization has been a simulation and training industry leader for decades, playing a major role in maintaining military mission readiness," explains John McNellis, president of Link Simulation and Training today. "L-3 chose to retain the connection to Link due to the important legacy our organization has had within the training industry for over seven decades. We believe the Link name underscores how our organization is built today on ingenuity and strong customer commitment."

"Our hope," McNellis adds, "is that the Link name – and resultingly our organization – is perceived as one that lives up to its commitments, is innovative in providing systems solutions for today's training requirements, and has substantial resources to develop next-generation training and simulation solutions to meet the services' transformational training requirements."

McNellis notes there's another overlooked "first" that can be attributed to the company's namesake. "Knowing how Ed Link 'borrowed' technology from his father's piano and organ factory to develop the motion system for his first pilot trainer device, I think he would have an avid interest in how Link continues today to largely use commercial-off-the-shelf products to support simulation advancements. Our PC-based image generation system, SimuView, for instance, not only uses COTS personal computers, but also makes use of graphics accelerator cards being developed within the gaming industry. The end result is a very affordable image generation system solution that takes advantage of existing technology to deliver a full range of visual simulation mission features."

The current Link program lineup reflects the multiple branches of its family tree. The B-2 stealth bomber and F-117A stealth fighter simulator programs, the only remaining work in the industry's Binghamton birthplace, are legacies of Singer-Link, as are numerous US Army and international helicopter trainers. The F-22, F/A-18 and F-16 Unit Training Device (UTD) endeavors and the Army's Fire Support Combined Arms Tactical Trainer (FSCATT) were inherited from Hughes. The Army's Aviation Combined Arms Tactical Trainer (AVCATT) and Air Force E-3 aircrew training services deals were won under Raytheon's watch.

Under the L-3 banner, Link has captured the US Army's Flight School XXI, the Canadian Air Forces' F/A-18 Advanced Distributed Combat Training System (in CAE's backyard), the US Navy's F/A-18C Distributed Mission Training system, and the US Air Force C-141 Total Training System programs.

Forward View

McNellis believes interoperability among training devices will continue to be a predominant requirement for both US and international military services. "We're seeing today how the US Army is benefiting from the interoperability between training systems such as AVCATT-A and CCTT, preparing the service's warfighters for combat better than ever before. This interoperability requirement has become the norm for future training devices."

"When you take a look at the next 5 to 10 years you also begin to appreciate how substantially the look and feel of training devices will change in the future. Today's 'big iron' training devices likely will begin to see their market share eroded by the end of the decade. Fast coming will be systems that take advantage of distributed, networked and web-enabled capabilities that support the customers' goals to 'train where you are, train on demand.' To participate in this next-generation trainer market, Link is developing just such systems. A key will be the ability to do different applications – fly a plane or drive a tank – without having to modify software that represents the simulated world. Commonality in interfaces and services will underlie development of next-generation trainers."

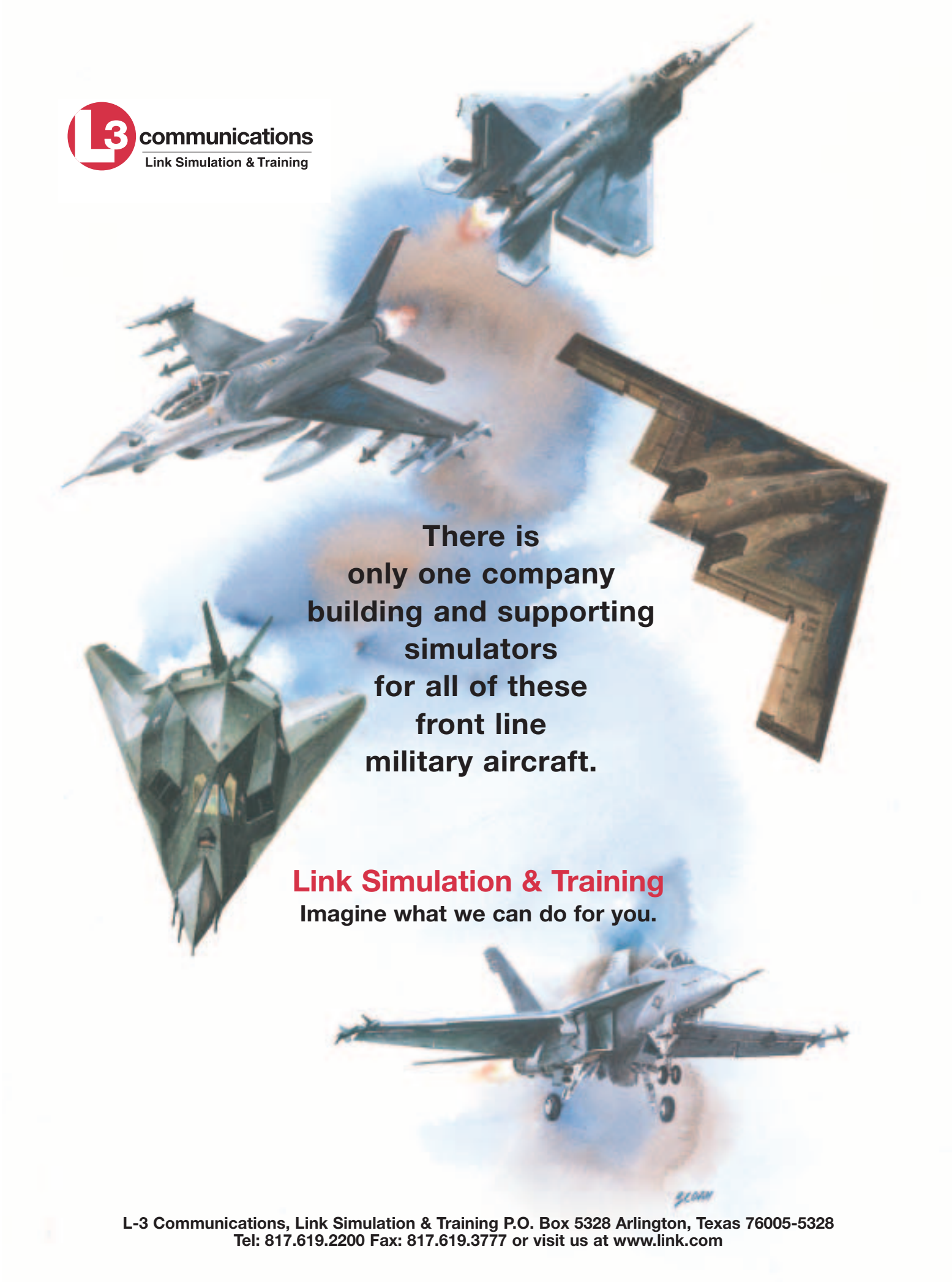
From a contractual standpoint, McNellis expects the trend toward buying training services (rather than equipment) to continue. "There is no doubt that our military customers will continue to expand their reliance on both multi-billion dollar ID/IQ [Indefinite Delivery/Indefinite Quantity] contracts and contractor-supplied training contracts where the focus is not on buying devices but on purchasing training services." He cites Link's E-3 AWACS Flight Crew Training program for the Air Force and the Army's recently awarded Flight School XXI as examples. "We will continue to see all of the military services embrace this services approach to acquiring training, where the winning contractor will have to be both technically capable and able to effectively provide life cycle support for 20 or more years."

Where does he envision L-3/Link playing in the evolving simulation arena? "We do not expect the competitive nature of this industry to change appreciably over the next 10 years. Yes, there will be some companies changing their logos as result of industry consolidation. But, much like we're experiencing today, it will not be out of the ordinary for industry 'competitors' on various programs to elect to team with one another to pursue other major programs where there is advantage to our customers."

"Link will continue to play the roles it has in recent years. Where it makes sense for us to pursue a program as the prime – such as on the AVCATT-A and F/A-22 programs – that is what we'll continue to do. At the same time, we have found great success in positioning Link as a major subsystem provider. On Flight School XXI, the CF-18 Advanced Distributed Combat Training System, and the Australian F/A-18 Hornet Aircrew Training System – all programs awarded over the past year – we are serving as a major subsystem provider."

McNellis says, "Our strategy begins with growing our market share within our traditional fixed- and rotary-wing simulation markets, both domestically and internationally. We also will be looking at entering the military ground, UAV, and command-and-staff training markets, as well as broadening our share of the fee-for-service training market."

"We will not be going it alone," he adds, "but will be striking strategic relationships with organizations worldwide to jointly pursue programs that will benefit from our collective products and services. At Link we will continue to review how we can leverage our products and services against future customer requirements, some that fall within our current lines of business and others that represent entry into new markets that we have identified as strategic for future growth." MS&T


L3 communications
Link Simulation & Training
There is
only one company
building and supporting
simulators
for all of these
front line
military aircraft.
Link Simulation & Training
Imagine what we can do for you.
L-3 Communications, Link Simulation & Training P.O. Box 5328 Arlington, Texas 76005-5328
Tel: 817.619.2200 Fax: 817.619.3777 or visit us at www.link.com