

Link Aviation, A History

I began this history with the intent of learning about Link Aviation, a company that gave my uncle, John C. Clirehugh, long and satisfying employment as an electrical engineer, both in Binghamton, NY and Sunnyvale, CA. My interest is chronology, accurate names, and a consistent level of detail.

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Link Aviation Beginnings

In 1929 Edwin Albert Link, Jr. (1904–1981) invented the Link Trainer, a flight simulator that taught pilots how to fly by instruments (as opposed to watching the ground)¹; his brother George Theron Link (1897–1979) is sometimes cited as a co-inventor. The initial patent application was submitted April 14, 1929 for the “pilot maker” flight trainer. Patent 1,825,462 was filed March 12, 1930 by E. A. Link, Jr. and granted September 29, 1931. Shortly thereafter he formed the Link Aeronautical Corporation in Binghamton, NY to market the trainer. In 1934 he demonstrated the value of instrument flying to a group of Army officers, after which the Army Air Corps ordered six of his trainers. By the time the order was completed other orders started coming in.

The rapid acceptance of Link Trainers and their continued development, due chiefly to the threat of war in Europe and Asia, made it necessary for Link to reorganize and expand his enterprises. In 1935 Link Aviation Devices, Inc., later renamed Link Aviation, Inc., was established to manufacture trainers and other aviation instruments. Link Aeronautical Corp., situated at the Tri-Cities Airport in Endicott, NY by 1933, maintained the flight school, an airplane repair service, and operated charter flights, but returned to Binghamton in December 1934. And Link Manufacturing Company, Ltd. was established in 1937 in Gananoque, Ontario to build trainers for Canadian and UK customers (British contracts required that their trainers be manufactured within the British Commonwealth).

By 1940 trainers had been shipped to over thirty-five countries around the world. In the early 1950s, Link Aviation was buoyed by the acceptance of simulators by commercial airlines and an increase in military expenditures caused by the Korean War. The company continued to develop aviation simulators and trainers, including all of NASA’s manned spaceflight simulators, and came to dominate the military training and simulation industry.

By the mid-1950s Link Aviation was enjoying financial and managerial stability. While others took up the innovations begun by Ed Link leaving him with less involvement and while the business aspects became increasingly complicated, Ed’s interests began to shift. In 1953 he stepped down as president of the company, and took the less active position of Chairman of the Board. Ed believed that to ensure the survival of Link Aviation in an increasingly competitive market, he should merge the company with a

¹ Edwin’s father owned Link Piano Company, an organ and piano manufacturing business in Binghamton, NY incorporated in 1916 and later named Link Organ Company. Drawing from his expertise in air-driven pianos and pipe organs, Edwin used organ parts and compressed air to build the first flight simulator.

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larger, more diverse corporation. In 1954 he and his older brother George Link sold Link Aviation to General Precision Equipment Corporation (GPE), a large holding company.

That sale marked the beginning of a long period of changes in ownership, during which the Link name would be applied to other organizations, both officially and casually. In 1968 Singer Corporation acquired GPE. Twenty years later Singer was subject to a hostile takeover and dismantled.

Edwin Link was president of Link Aviation until 1953 and board chairman until its merger with the General Precision Corporation in 1954. He was president and a director of General Precision until its merger with the Singer Company of Stamford, CT in 1968; he retained chairmanship of Link Aviation while Hermann Place retained chairmanship of GPE. Thereafter, he became a consultant to Singer (1968–1972). After selling Link Aviation, Ed's interests shifted from above ground to underwater. He was fascinated by diving and underwater archaeology and invented a number of diving chambers for sea exploration.

The General Precision Equipment Era (1954–1968)

General Precision Equipment Corporation was headquartered in New York City, New York. GPE was founded June 1936 by Hermann Gauntlett Place as a holding company for a group of theater equipment firms. In addition GPE had a substantial stock interest in 20th Century Fox Film Corp. WW II “with its insatiable demands for the products of American industry” encouraged GPE, with capital to invest, to expand and diversify. Accordingly GPE acquired a number of other businesses beginning in 1941 including Librascope Development Company of Burbank, CA (later of Glendale, CA) in 1941, The Kearfott Company Inc. of Little Falls, NJ and Kearfott Manufacturing Corp. of Wayne, NJ in 1952, and Link Aviation of Binghamton, NY in 1954. In 1955 GPE was ranked 255 in Fortune's list of America's largest corporations. By 1956 the 21 member companies employed 12,000 people in 36 plants in 23 cities. Mr. Place was president and board chairman.

In January 1960 Librascope, Kearfott, General Precision Laboratory (GPL), and Link Aviation combined to form a new electronics firm known as General Precision, Inc. to position itself as a prime contractor on systems contracts. GPI's headquarters were in NYC as was GPE's. Each of the founding firms became a division of GPI. GPL was still a subsidiary of GPI in 1967 but had moved to GPS by 1968.

There was another subsidiary, General Precision Systems, which had a facility in Little Falls, NJ. By 1966 it held the Kearfott Group with its Kearfott Products Division. By 1967 it also held a Link Division.

After 1954 Link acquired controlling interests in two British firms, Air Trainers Limited in 1956 and Miles in 1969 (under Singer).

Air Trainers Ltd was formed in 1946 in Leighton Buzzard, Bedfordshire, apparently as successors to J.V.W. Corporation Ltd which, since 1936, had been importing and servicing the American-made Link trainers for the RAF. It moved to Aylesbury in 1946. As well as manufacturing the Link trainer under license, the company pioneered the development of DC analog computing techniques for flight simulators, the first of which was delivered to the RAF in 1953. By 1954 the workforce had grown to 500. In 1956 Link Aviation of New York acquired a controlling interest, Link president Allan Williford joined the Board of Air Trainers, and the name changed to Air Trainers Link Ltd. In 1959 the Link interest was transferred to the parent company, General Precision Equipment Corporation, and the name of the company changed to General Precision Systems Ltd. By 1963 there were 950 employees in Aylesbury occupying 120 000 square feet. In 1967 the firm was sold and became a subsidiary of Redifon Ltd, a

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member of the Rediffusion organization, and was renamed Redifon Air Trainers Ltd. In 1972 production was transferred to the Redifon Flight Simulator Division, Crawley, West Sussex.

In 1965 GPE purchased the operations of ACF's Electronics Division (previously ERCO) at the Riverdale plant and moved it to Silver Spring, MD. (There was more to the Electronics Division than the Riverdale plant.)

Link, as Link Group of General Precision Systems (GPS), had a facility in the defense and aerospace industry of Sunnyvale, CA from as early as 1967, if not before. Link Ordnance Div., General Precision, Inc. of Sunnyvale was cited by NASA as a major subcontractor of Boeing, one who played a major role in the development and production of the Saturn V launch vehicle; Link worked on the propellant dispersion systems.

The Singer Era (1968–1988)

In April 1968 Singer Corporation acquired GPE. Singer originally dropped the Link name, but after three years restored it as Singer-Link, or the Link Flight Simulation Division. During the Singer era Link reclaimed the type of dominance it enjoyed in the WW II period. At its peak, there were about 5000 employees of the Link Division worldwide including Binghamton, NY, Silver Spring, MD, Sunnyvale, CA, and Lancing, England.

ACF's Electronics Division in Silver Spring, MD, bought by GPE in 1965, was renamed Simulation Products Division in 1968. It was renamed Link Division in 1976.

In September 1969 Link bought Miles Electronics Limited of Lancing, Sussex, England and renamed it Link-Miles. Miles Electronics was a subsidiary of F. G. Miles Limited founded in 1948 by Frederick George Miles to produce aircraft. Miles Electronics was involved in the manufacture of flight simulators. US patent 3584429 dated 1971 was held by Link-Miles Limited.

In January 1981, the Singer company announced a split in the Link division:

- Link Simulation Systems Division in Silver Spring, MD was chartered to promote growth in the fields of nuclear and fossil fuel, power plant simulation, industrial process plant simulation, tactical simulation, and for finding new opportunities in other simulation areas.
- Link Flight Simulation Division with operations in Sunnyvale, CA, Houston, TX, Lancing, England, and Binghamton, NY was chartered to expand the company's business in the aircraft and spacecraft industries.

As early as 1982 the Link Simulation Systems Division had a facility in Columbia, MD. They built nuclear power plant simulators there. The headquarters remained in Silver Spring.

In 1984 Singer formed a new enterprise, Simuflite Training International Inc., to compete with Flight Safety International in the business aircraft pilot training market. Simuflite² was located in Dallas, TX. It used simulators built by Singer-Link.

In January 1987 Singer split the Kearfott Division into Kearfott Guidance & Navigation Division located in Little Falls, NJ, which was sold to the Astronautics Corporation of America in 1988, and the Electronic

² The company's name is sometimes mis-spelled Simuflight. Note that a separate and unrelated company named Simuflight was founded in 1992 in South Africa.

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Systems Division located in Wayne, NJ (originally Kearfott Manufacturing Corporation), which was sold to GEC-Marconi in 1990 and renamed GEC-Marconi Electronic Systems.

In December 1987, the Link Division was incorporated in Delaware as Link Military Simulation Corporation ("Link Corporation"), a wholly owned subsidiary of Singer. In that same month Singer converted the Kearfott Guidance & Navigation Division into a wholly owned subsidiary, which it named Kearfott Guidance & Navigation Corporation.

After Singer, Unstitched (1988 and later)

By 1987 Singer had gotten in financial trouble. It had enormous debt, a \$20 million dollar loss, and its chairman died unexpectedly. In February 1988 it was purchased by Paul A. Bilzerian, a Florida financier known as a corporate raider, for \$1.06 billion. He quickly began to sell off the pieces to pay his debt. He also moved the headquarters from Stamford, CT to Tampa, FL.

In April 1988 the Singer Link-Miles Simulation Corporation surrendered its incorporation in Delaware.

On August 5, 1988 Bilzerian sold Link Corporation in Silver Spring, MD (the old Link Aviation and ERCO groups) to the Canadian firm CAE Industries, Ltd. (previously known as Canadian Aviation Electronics Ltd.) who renamed it CAE-Link Corporation or Link Domestic Simulation and Training Systems Division. In 1995 CAE sold Link to Hughes Electronics Corporation for \$155 million. Two more sales saw Link with L-3 Communications in 2000 (bought for \$160 million), who restored the Link name; it now known as L-3 Link Simulation & Training and is located in Arlington, TX.

In September 1988 the Kearfott Guidance & Navigation Corporation was sold to Astronautics Corporation of America for \$285 million.

On October 12, 1988 Bilzerian, Chairman and CEO of Singer, announced a reorganization of its simulator manufacturing businesses under the name Link-Miles, to consist of two autonomous operating companies, one in the United States and the other in the United Kingdom. The UK company, Link-Miles Limited, located in Lancing, England, was involved in the military flight, airline visual, naval, and ground simulation businesses worldwide. The US company combined the airline simulation activities of the Link-Miles International Simulation Corporation based in Binghamton, NY and the industrial process and power plant business of the Industrial Simulation Corporation³ located in Columbia, MD. [I have found references to Singer Link-Miles Simulation Corporation dated July 1989, so it is not clear how long the Singer name persisted.]

In March 1989 the Singer Sewing Machine Division was sold to Semi-Tech Microelectronics of Canada for \$289 million. This company was owned by James Henry Ting, whose business empire rose and fell meteorically. His Akai Holdings suffered greatly in the 1999 Asian financial crisis. By early 2000, most of his companies had stopped doing business, slid into bankruptcy, or been absorbed by other companies. Semi-Tech bondholders sued Ting in November 2001 for \$578 million. Ting was arrested in 2003 in Hong Kong for falsifying the accounts of Akai to the tune of more than \$38 million. The Singer sewing machine business and trademark were sold in 2004 to Kohlberg & Company.

In June 1989 Bilzerian resigned as chairman and CEO of Singer, hours after the Securities and Exchange Commission filed civil securities fraud charges against him for his takeover of Singer. Joseph J.

³ I have found no corroboration for this business name. In subsequent reports it was called Link-Miles Simulation Corporation.

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Campanella continued as president and chief operating officer. (Bilzerian eventually agreed to pay \$55 million in fines, but had not done so by 2001 and was jailed.)

By August 1989 all that remained of Singer was Librascope in Glendale, CA, Simuflite in Dallas, TX, Singer Link-Miles (U.S.) in Columbia, MD, and Singer Link-Miles Limited (U.K.) in Lancing, England. The domestic Link-Miles comprised Link-Miles Simulation Corporation in Columbia, MD and Singer Link-Miles Corporation in Binghamton, NY.

On October 16, 1989 Bilzerian adopted the business name of Bicoastal Corporation. Later that year, in November, Bicoastal filed Chapter 11 bankruptcy in Tampa, FL. The company dissolved in 1992.

In May 1990 Link-Miles Simulation Corporation, the domestic simulator business in Columbia, MD, announced a joint venture named General Energy Technologies with NPO Energia of the Soviet Union. General Energy Technologies would be a Soviet enterprise centered in Moscow and would provide Soviet and Eastern European simulation, training, and engineering services in energy related fields including nuclear and fossil fuel power plants, and chemical processing.

In April 1990 Link-Miles Simulation Corporation of Columbia signed a contract to provide nuclear plant simulators to SYPRO of Sweden and Pennsylvania Power & Light Co. Link-Miles also won a contract for an ethylene plant simulator.

In August 1990 Link-Miles Simulation Corporation of Columbia, MD, a manufacturer of nuclear power-plant control room simulators, was renamed S3 Technologies. Before that it was Industrial Simulation Corporation, and even earlier, the Link Simulation Systems Division of Singer. In September 1993 ManTech International bought S3 Technologies.

GSE Systems (Global Simulation & Engineering Systems) was formed on March 30, 1994 to consolidate the simulation and related businesses of S3 Technologies, General Physics International Engineering & Simulation, and EuroSim (Sweden), each separately owned and operated by ManTech International Corporation, GP Strategies Corporation, and Vattenfall AB, respectively. GSE, originally headquartered in Columbia, MD in the offices of the old Link-Miles Simulation Corporation, was subsequently headquartered in Sykesville, MD. In October 2003 controlling interest was acquired by GP Strategies Corporation, whose principal operating subsidiary is General Physics Corporation (founded in 1966 by Robert W. Deutsch). In 2007 GSE Systems developed training solutions for the power, process, manufacturing, and government sectors worldwide. GSE Systems has subsidiaries.

In September 1990 Bicoastal sold Link-Miles Limited, the UK simulator manufacturer, to Thomson-CSF of France for \$100 million. In 1994 Thomson bought Redifussion Simulation from Hughes Aircraft, merged it with Link-Miles, and renamed the company Thomson Training & Simulation; it was located at Crawley, West Sussex. In December 2000 Thomson-CSF changed its name to Thales and the Link-Miles-Redifussion company was rebranded Thales Training & Simulation.

In September 1991 Simuflite was sold to Southern Air Transport, Inc. of Miami, FL. In January 1998 Simuflite was sold to General Electric Capital Services when SAT sold itself to Kitty Hawk Inc. In December 2001 CAE bought Simuflite for \$247 million.

In December 1991 Librascope was sold to Loral Corp. for \$9 million, the last piece of Singer to be sold. It was renamed Loral Librascope. In January 1996 Lockheed Martin acquired Loral including Librascope. On June 30, 2000 Librascope's Glendale, CA facility was closed, and its remaining business was moved to its parent Lockheed Martin division in Manassas, VA.

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All the pieces of Link claim all of its history.

ERCO

In 1930 Henry Berliner founded the Engineering and Research Corporation (ERCO) in Washington, DC to produce tools for the manufacture of metal aircraft and propellers. It was incorporated in MD in 1936. In 1937 it designed and produced the famous Ercoupe airplane. A plant was built in Riverdale, MD in 1938. An adjacent airfield named ERCO Field was built 1942–1943. A total of 112 Ercoupes were produced in Riverdale before the war forced the company to suspend production, thousands of Ercoupes were produced after the war until 1952. In 1949 ERCO built a flight simulator and entered the electronics field.

In November 1954 the Berliner family sold ERCO to American Car & Foundry Corporation (later known as ACF Industries, Inc.) for \$3 million. ACF was a diversified manufacturing company whose products ranged from railroad equipment to nuclear power equipment. The ERCO operation was renamed as the ERCO Division, ACF Industries Inc. It remained in Riverdale, MD. In 1957 ERCO Division merged with ACF's Nuclear Energy Products Division (previously known as Albuquerque Division) and became known as Nuclear Products, ERCO Division. The Riverdale plant served as the Nuclear Products Division Headquarters. The Nuclear Products group built a number of nuclear power plants.

ACF's Electronics Division was in existence by 1962. I suspect that it encompassed the old ERCO Division without the nuclear group.

In 1965 GPE purchased the operations of ACF's Electronics Division at the Riverdale plant and moved it to Silver Spring, MD. After Singer's purchase of GPE, the division was named Simulation Products Division. It had offices in Sunnyvale, CA until 1972 at the earliest that were used to design nuclear power plant simulators and flight simulators. It also had offices in Houston, TX and Binghamton, NY. In 1976 Singer Simulation Products Division was renamed Link Division.

Time Line

1929	Edwin Link invents and patents the first Link Trainer, forms Link Aeronautical Corporation in Binghamton, NY
1930	Link Flying School organized in Binghamton
1933	Link Aeronautical Corporation moves to Endicott, NY to maintain the flight school, repair airplanes, and operate charter flights
Dec. 1934	Link Aeronautical Corporation returns to Binghamton
1935	Link Aviation Devices, Inc. is formed in Binghamton, NY to manufacture trainers etc.
?	Link Aviation Devices, Inc. renamed Link Aviation, Inc.
1937	Link Manufacturing Company Limited is formed in Gananoque, Ontario to build trainers for Canadian and UK customers
1953	Ed Link steps down as president of Link Aviation
1954	Ed and George Link sell Link Aviation to General Precision Equipment Corporation

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1956	Link Aviation acquires a controlling interest in Air Trainers Limited of England, and changes its name to Air Trainers Link Limited
1959	Ownership of Air Trainers Link Limited is transferred to the parent company, GPE, and the name changes to General Precision Systems Ltd.
1965	GPE buys the operations of the Riverdale, MD plant of Electronics Division of ACF Industries (previously ERCO) and moves it to Silver Spring, MD
1967	Redifon, a member of Rediffusion, buys Air Trainers Link Ltd. and renames it Redifon Air Trainers Ltd.
1968	Singer Corporation acquires GPE. Edwin Link remains as consultant until 1972
1984	Simuflite Training International Inc. is founded by Singer
1987	Singer's Link Division is incorporated as Link Corporation
1988	Paul A. Bilzerian buys Singer Corporation
1988	CAE Industries, Ltd. buys Link Corporation of Silver Spring, MD
1988	Singer's simulation manufacturing business is reorganized under the name of Link-Miles with two companies: Link-Miles Limited located in Lancing, England and Link-Miles International Simulation Corporation based in Binghamton, NY
1989	Singer is renamed Bicoastal Corporation
1989	Bicoastal Corporation files Chapter 11 bankruptcy
1990	Link-Miles Simulation Corporation of Columbia, MD is renamed S3 Technologies
1990	Thomson-CSF of France buys Link-Miles Limited, merges it with Rediffusion Simulation, and renames it Thomson Training & Simulation
1992	Bicoastal Corporation is dissolved
1993	ManTech International buys S3 Technologies
1995	Hughes Electronics Corporation buys CAE-Link
1994	GSE Systems (Global Simulation & Engineering Systems) absorbs S3 Technologies
2000	L-3 Communications buys CAE-Link, renames it L-3 Link Simulation & Training
2000	Thomson Training & Simulation is rebranded as Thales Training & Simulation
2003	GP Strategies Corporation acquires controlling interest of GSE Systems