

Peter G. Hamel
Gary D. Park

The Learjet History



Beginnings, Innovations
and Utilization

 Springer

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Early Learjet Model 20 Series (*Credit Learjet*)

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Cover Illustrations: Front: Top: Learjet 24 (24-123, N3731)—*Credit*: Paul Bowen; Bottom: Learjet 31A (31-131, N31LR)—*Credit*: Paul Bowen

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Foreword

I first met *Dr. Peter G. Hamel* at M.I.T., where we were graduate students, and maintained professional collaborations over the years since. We both moved into aviation leadership positions, he as Director of the Institute of Flight Systems Technologies (formerly Flight Mechanics) at DLR and I as Director of Research at the NASA Dryden Flight Research Center (DFRC). We served on NATO/AGARD working groups and lecture series about flight vehicle systems identification and *Peter* edited the book “In-Flight Simulators and Fly-By-Wire/Light Demonstrators”. We both served on the M.I.T. Corporation Visiting Committee for the Department of Astronautics and Aeronautics at different times—*Peter* for two terms and I for one term. *Peter* has a personal interest in aviation history and uses his knowledge to enrich technical papers and this book.

The co-authors are eminently qualified to write this book. *Gary D. Park* has published several engineering articles in AIAA technical journals on Learjet flight test data generation, analysis and evaluation. He served on various AIAA Technical Committees; he was on the AIAA National Board of Directors for 6 years, and chairman of the AIAA books sub-committee for the two book series “Education Series” and “Progress in Astronautics & Aeronautics Series”. He was an engineer at Boeing and Learjet and retired from FAA Wichita Aircraft Certification Office.

The AIAA History Technical Committee invited *Gary* to write an AIAA paper on the history of Learjet for the AIAA SciTech Conference in San Diego, and presented it on January 6, 2022. The paper was entitled “Sixty Years of Learjet”, co-authored by *Gary* and *Peter*. The paper presented a rich and extensive history of Learjet. This book, initiated by *Peter*, represents a significant expansion of that paper and covers a compendium of the origins, stages of development, technical modifications and the extensive potential for use of the Learjet family.

This book traces Learjet from its beginnings through the evolution of the company and all Learjet models. The configuration changes, advanced technology applications and innovations are discussed in detail, including *Bill Lear’s* numerous patents. The many special mission Learjets, from research to military applications, are discussed. The history of Learjet’s use in aerobatics, aerial photography and cinematography, and the many international records set are covered. It covers the Business Jet Market

development from its establishment by *Bill Lear* in the 60s to the slow demise of Learjet in 2021. The book ends with collections of special Learjet events and stories that should be told. It is fitting that these unique achievements be placed in a historical context in a book that will provide a lasting memory for the interested aviation enthusiast.

Herman A. Rediess, Ph.D.
Director of Research, NASA DFRC, 1975–1978
Chief Scientist, FAA Technical Center, 1996–1998
Director of Aviation Research, FAA, 1998–2005
Portrait Artist and Sculptor

Preface

On February 18, 2021, *Gary Park* received an email from *Kevin Burns* (representing the American Institute of Aeronautics and Astronautics or AIAA) stating:

“*Gary*, I am the Chair of the History Track for the 2022 event of the annual Aerospace Sciences Meeting (SciTech). Last month the SciTech 2021 event took place with over 4,0000 attendees from all over the world, and with about 3,000 papers presented on all aspects of aviation. The History Sessions are quite popular at these events.”

“With 2022 being the sixtieth anniversary of Learjet coming to Wichita, I believe it would be the perfect opportunity to present a paper on the History of Learjet Production in Wichita. Learjet has made a huge impact on American aviation. Not just as a business or regional jet, but for a long time I worked at Calspan where we had a number of variable stability Learjets, which influenced generations of other aircraft, and also made the cadre of pilots in the nation more aware of how to respond to various stability and control problems. That part of the history has already been recorded in AIAA papers by *myself* and *Norm Weingarten*, but the general history of Learjet in Wichita has yet to be recorded.”

Peter Hamel responded very positively to *Gary's* suggestion to co-author the AIAA Paper 2022–2069 entitled “Sixty Years of Learjet”. With the proposed AIAA paper nearly completed, the authors realized that the paper enormously exceeded the length of an AIAA paper and concluded that the paper would need to be re-written to a shortened version. Later, *Peter* determined that what originally had been written could be further detailed and expanded into a book. *Peter* took the initiative and concluded negotiations with Springer International Publisher for the printing of this book.

Braunschweig, Germany
Wichita, USA

Peter G. Hamel
Gary D. Park

Acknowledgements

If the authors of this documentation have succeeded in portraying the Learjet history over the past sixty years in an appropriate and illustrative form, it was possible only due to the cooperation and support of many aviation enthusiasts. To name each and every one, who has contributed directly or indirectly, in a small or bigger way, to this book is a difficult task, associated with the risk of overlooking one or the other. We take an easier way out, by thanking all of them for support of this endeavor. Nevertheless, a few individuals and organizations need special mention.

Thanks to *Lou Knotts* of the Calspan Corporation for the use of documents to illustrate and discuss their world's unique fly-by-wire Learjet 24/25/31 fleet for airborne simulation purposes.

Dr. Ravindra Jategaonkar, former Senior Scientist at DLR, agreed to conduct a critical review of the book's manuscript. Thanks to his remarkable, intelligent, and constructive proofreading; his comments and suggestions have significantly improved the quality of the book's contents.

Dr. Herman Rediess has graciously provided eloquent personal commentary in the "Foreword" attesting to the qualifications of the authors in the writing of this book.

Former Learjet employees acknowledged include *Al Higdon*, *Mike Abla*, *Stan Blankenship*, *Dick Kovich*, *Abe Jibril*, *Dr. TN Baktha*, and *Frank Schick*. *Dick Kovich* reviewed the book diligently and very helpfully. *Mike Abla* and *Al Higdon* reviewed AIAA Paper 2022–2069 that this book has expanded upon.

We are appreciative of *Rick Durdan* for providing his insights from flying the Learjet 24 and the potentially deadly consequences of pilots choosing to override Mmo restrictions using "go-fast" switches. Such common sense articles are published regularly on the Internet in AvWeb's "The Pilots Lounge".

Paul Bowen provided high-quality photographs of Learjets in flight for the front cover. This is particularly appreciated considering *Paul's* extensive association with Learjet, Inc. as described by *Al Higdon*: "In the 1970's, *Paul Bowen* emerged as the nation's pre-eminent air-to-air photographer, based largely, but not exclusively, on his extensive shooting of aerial photos of various Learjet models, which had been his first commercial assignment. His extremely well organized and detailed pre-flight

meetings with all crew members routinely leads to photos of unparalleled beauty, in a totally safe operational environment. *Bowen's* decades-long career has led to his election into several national aviation halls of fame and the publishing of four hard-bound color books featuring his work”.

Computer support has been provided by *Preston Park, PA*.

From the other side of the Atlantic, Swiss engineer *Georges Bridel*, formerly Vice-President for Advanced Development of Combat Aircraft at EADS (today: Airbus Defence and Space), kindly provided some background information on the development and flight testing of the Swiss combat aircraft P-16.

Although not involved with the writing of this book, we acknowledge the support of NASA facilities and researchers who have contributed to the success of the Learjet. Three NASA Research Centers—Langley, Dryden, and Ames—have been awesome with their support of Learjet even after they were bought out by Bombardier, a Canadian company. In particular, *Paul Fay Holloway*, as Director at Langley, supported the wind tunnel flutter testing in their TDT of Learjet Model 45.

Richard Travis Whitcomb designed the winglets for the Learjet 28/29 that were on Learjet 28-001 that *Neil Alden Armstrong* broke 5 world aviation records in 1979. Ames provided computer support that cut significant time off the development of newer Bombardier Learjets. In earlier times, Ames tested Lear Jet 23-002 in their 40- by 80 wind tunnel. Langley and Dryden supported flight test parameter estimation analyses of Learjet Models 35 and 55 with software developed by *Lawrence W. Taylor, Jr.* and *Kenneth W. Iliff*. Detailed acknowledgments are numerous and partially unknown.

Apart from the individual professionals mentioned in the foregoing, the authors particularly appreciate two other individuals: *Gary Park's* wife *Judy*, who had to miss over an extended period of time the normal family life and *Peter Hamel's* wife *Hanni* for going through the same fate. Their support and understanding made the task bearable and have indirectly contributed to this paper.

Finally, the authors would like to acknowledge the interest of Springer International Publisher in publishing this book. We would like to extend our thanks to *Leontina Di Cecco* for the sovereign care and implementation of our wishes in the development of this book project. In addition, we have to sincerely thank *Gowtham Chakravarthy* and his Springer Nature Production Team for patiently and confidently considering and implementing our correction proposals.

Prologue

In 1959, a mere 14 years after the conclusion of World War II, *William Powell Lear* developed a strong interest in building a jet-powered airplane for business and personal use. While living in Switzerland, his son, *Bill, Jr.*, was encouraged to fly the Swiss prototype fighter, FFA P-16. With favorable comments from his son after 5 supersonic flights, *Bill Lear* employed *Dr. Hans Studer*, who designed the P-16, to design the Swiss American Airplane Corporation, SAAC-23 jet.

After SAAC moved to Wichita, Kansas, USA, in 1962, it was renamed Lear Jet Corporation, and the airplane became known as the Learjet 23. The first flight occurred on October 7, 1963, and became FAA certified on July 31, 1964, under CAR 3, Small Airplane Category. Learjet 24 was FAA certified on March 17, 1966, under 14 CFR Part 25-Airworthiness Standards: Transport Category Airplanes, as the first business jet certified to this standard. Having sold controlling interest in his company, Lear Jet Industries, to Charlie Gates in 1967, Bill Lear resigned on April 2, 1969. Over the years, many Learjet models were developed using the same type certificate under Gates Learjet Corporation. Learjet 60 was certificated on January 15, 1993, and was the last Learjet certificated using the same type certificate. This occurred under the ownership of Bombardier Aerospace, a Canadian airplane company, after they took over Learjet Corporation on June 29, 1990.

Under Bombardier, Learjet developed an all-new, clean sheet of paper, Learjet 45 that was certified on a new type certificate on September 22, 1997. New Learjet 45 configurations were developed and certificated through 2013. The Learjet 85 program, an all-composite airplane, was cancelled on October 27, 2015, after a loss of \$4.9 billion. Two prototypes were built. The first prototype was flying, and the second was being instrumented for flight testing prior to flight when the program was cancelled.

The earlier events, under *Bill Lear*, were the beginning of a new aviation market that has exploded into numerous jet-powered business airplanes built around the world. The aviation market eventually outpaced the Learjet market with approximately 27,000 total business jets being delivered. Learjet manufacturing ended in the fourth quarter of 2021, having delivered 3056 Learjets to customers.

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About the Authors

Peter G. Hamel received the Dipl.-Ing. and Dr.-Ing. degrees in Aerospace Engineering from the Technical University of Braunschweig, Germany, in 1963 and 1968, respectively, and SM degree from M.I.T. in 1965. Director of the Institute of Flight Systems (formerly Flight Mechanics) of the German Aerospace Center DLR during 1971–2001, he also served as Section Head of Aeronautical Systems at Messerschmitt-Bölkow-Blohm in Hamburg (1970–71), and was appointed Honorary Professor at the Technical University of Braunschweig (1995), where he served as the founding member of three Collaborative Research Centers. Peter Hamel served as the Chairman of the National Working Group on Helicopter Technology (AKH, 1986–1994), Appraiser for the National Aviation Research Program (LuFo, 2010–2020), Manager of DLR’s Rotorcraft Technology Research Program and German Coordinator for the former NATO/AGARD Flight Mechanics/Vehicle Integration Panel (FMP/FVP, 1972–97). He also served on the M.I.T. Corporation Visiting Committee for the Department of Astronautics and Aeronautics (1994–2000). Member of the German Society for Aeronautics and Astronautics (DGLR, since 1961), the American Helicopter Society (AHS, since 1987), and American Institute of Aeronautics and Astronautics (AIAA, since 1988) and AIAA Fellow (since 2001), he is also the recipient of the AGARD 1993 Scientific Achievement Award, AGARD/RTO von Kármán Medal 1998, AHS Dr. A. von Klemm Award 2001, and the prestigious DGLR Ludwig-Prandtl-Ring 2007.

Gary D. Park received his BS in Aeronautical Engineering from Wichita State University in 1967, and MS in Mechanical Engineering from Missouri University of Science & Technology (formerly UMR) in 1973. He served as Boeing Wichita Associate Engineer in cyclic test and 737 design; McDonnell aerodynamics engineer in advanced F-4/F15 performance/S&C; Cessna S&C; Learjet dynamic loads; Boeing Military principal engineer in structural dynamics; and FAA ACO AE. He is an Engineer with 53 years of experience in projects and research related to FAA certification, structural dynamics, accident investigations, S&C, parameter estimation, flight testing, wind tunnel testing, Boeing UAV programs, GVT for B-52 cruise missile launcher, 777/737 programs, NASA Langley TDT and Calspan flutter

testing, maneuver simulations for FAA/JAA, RJ-900 program; FAA oversight of Boeing/Cessna projects, and implementation of Part 26 AASR. Within AIAA, he was Wichita Section Chairman (1987), National Nominating Committee (1987), Region V Director (1989–95), Books Chairman (1997–99), GNC TC (1985–88), AFM TC (1981–84), and History TC (1994–99). During 1981–88, he authored technical papers presented at conferences, Aircraft/GCD Journal publications, Aerospace America AFM/GNC Highlights, and News articles; and was Journal publication reviewer, and organizer of short courses and technical conference sessions. He was named AIAA Associate Fellow (1982). While he was Chairman of the AIAA Wichita Section, the Section received National first place awards for Outstanding Section, Newsletter, Public Policy, and Special Event (1987). He received the AIAA Sustained Service Award (2002), and Boeing recognition for exceptional performance (1989).