
Preface

More than sixty years of international research and development in the field of airborne simulation and electronic Fly-by-Wire flight control systems have left their marks on the advances in aeronautical system design. After all, two generations of aeronautical specialists and generalists have passed during this period. It is likely that this wealth of accumulated knowledge and experience in this complex field of aircraft systems may be difficult to trace, or may even be forgotten, or not efficiently used in the future.

A call from a former test pilot and chief of the flight department of the German Aerospace Research Center (DLR) in Braunschweig resulted in the friendly and collegial suggestion to summarize the knowledge and experience gained by DLR in the supreme discipline of flight research, namely in-flight simulation. This was the occasion to invite a small group of former and still active scientists and engineers from research, academia, and industry to participate in such a project. Embarking on the project on a small scale on February 6, 2013, it evolved into an undertaking of much wider scope, encompassing not only DLR activities in Germany but global view covering all international organizations.

Now, historical retrospect in technical fields is not particularly in demand since past experiences are quickly overtaken. Nevertheless, despite the rapid technological progress, historical technical accounts may become valuable resources and reference points for knowledge refreshing and long-life learning to avoid the pitfalls.

An objective of the book is, therefore, to look back on the development, testing, and utilization of in-flight simulators and Fly-by-Wire technology demonstrators. They have strongly contributed to the current international state of knowledge in designing and evaluating today's modern aircraft, free according to the slogan "without the knowledge of the past, one can neither understand the present nor shape the future".

For the first time, this book attempts to describe, in some depth, chronologically the global complementary research and development activities of in-flight simulation and associated electronic and electro-optical flight control systems (Fly-by-Wire/Light). This task is invariably associated with the risk that equivalent or similar research activities abroad are unintentionally overlooked or not adequately accounted for. Keeping this in mind, the book attempts to maintain a fair balance of presentation of global activities, to avoid any scientific autism.

The authors of this book try to give as objective a description as possible of the activities in this demanding field of research in experimental flight system technologies, with an increased degree of detail in the description of German research and development results. This is particularly evident in the sections of the chapters "In-Flight Simulator VFW 614 ATTAS" and "Helicopter In-Flight Simulator EC 135 FHS". This level of detailing is sometimes useful for the definition phase of a future project by providing the experience and the lessons learned from former project scientists at the beginning of a new project to minimize potential risks.

A further concern of the book is to pass on the knowledge and experience to aerospace students, young scientists, and engineers, thereby stimulating and accelerating the lifelong learning process without repeating mistakes that were made in the past.

The book is also intended as a landmark and reference book for aviation and technology enthusiasts who would like to get an overview of the historical evolution of in-flight simulators and Fly-by-Wire/Light technologies. Sufficient references in the individual chapters are given to the interested reader in order to allow a further deepening of individual scientific and technical aspects as required. For optimum visualization, the number and size of illustrations and graphics were not spared. The technical language was formulated in the most general way possible in order to achieve the desired readability.

Braunschweig, Germany
December 2016

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<http://www.springer.com/978-3-319-53996-6>

In-Flight Simulators and Fly-by-Wire/Light Demonstrators
A Historical Account of International Aeronautical
Research

Hamel, P. (Ed.)

2017, XXIV, 345 p. 595 illus., 451 illus. in color.,

Hardcover

ISBN: 978-3-319-53996-6