

FLIGHT TEST NEWS



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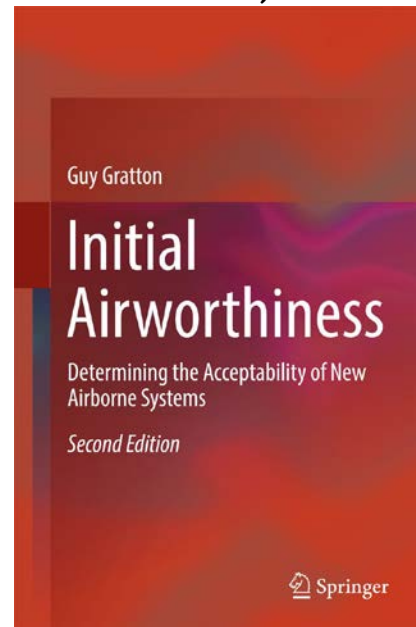
Test Conduct Reference: Letter to the Editor

Earlier this year, Nathan "CAP'N" Cook posted a question in [SFTE's private facebook group](#): Does anyone have references for "fundamentals of test conduct"? I'm not looking for "test techniques" or "crew resource management." I am looking for what it takes to properly pace a test, keeping in mind time, space, energy, data priorities, data quality, safety, etc. Thus began a brief but very productive correspondence: he responded with a detailed explanation of his ideas. With his permission, FTN reprints it here.

Fundamentals of Test Conduct

I have a preliminary concept for what I call the Fundamentals of Test Conduct. Loosely speaking, the flow is as follows: Admin-Setup-Procedure-Recovery-Admin, with entry- and exit-criteria at each transition. The construct is recursive, in that it is applied at multiple levels of conduct, each of which consists of one or more of the lower level units. It starts at the most basic level, the fundamental building block of test conduct, which is a "test point" (defined as the indivisible chunk of procedure that generates data required to partially satisfy a test objective). The next level is the "test mission" (mission is a flight test centric term that groups test points into a quantity that can be completed in the course of a single flight). It also includes the following elements or levels: "test set" (the group of test points sufficient to satisfy a test objective); "test project" (the group of test sets packaged to meet the combined test objectives of a single test plan); "test program" (the group of test projects packaged to achieve a medium- to long-term milestone for the system under test); and so on. *(continued page 3)*

Book Review: Initial Airworthiness, 2d Ed.



First, do no harm. The phrase is both familiar and profound. It comes from the Latin, "*Primum non nocere*," and it evokes images of medical students listening to the sage counsel of a grey-haired surgeon. Many think, perhaps wrongly, that the motto has its origin in the Hippocratic Oath, but most agree that the phrase attempts to inspire the highest standards of ethical behavior in the medical profession.

These thoughts penetrated deep into my mind as I read the first pages of a new chapter on Professional Ethics in the [Second Edition of Initial Airworthiness, by Guy Gratton](#). The reader will immediately recognize the Hippocratic Oath and its great, deep-seated impact on the medical profession. This familiarity will likely even inspire, filling the most pragmatic engineer among us with feelings of hope, memories of pride, and deep thoughts about the higher purpose of our profession.

(continued next page)

SFTE's Rocket City Chapter Unveils Logo



The Rocket City Chapter is located in Huntsville, Alabama; the birthplace of the U.S. Space Program and home of Redstone Arsenal. Taylor Jefferson and Derek Donewar are leading a group of 18 local FTEs on [facebook](#).

Flight Test News

Mark Jones Jr, editor@sfte.org

We have a new Executive Director.

Join me in welcoming Samantha DeLano to our Society. You may contact her by email: edir@sfte.org

facebook.com/groups/SFTE1/
facebook.com/FlightTestEng
[SFTE YouTube channel](#)
linkedin.com/groups/1164057/profile



Shop at [Amazon Smile](#) and Amazon donates to the SFTE Foundation.

Book Review: Initial Airworthiness (2/3)

Ethics

Often the word leaves a bad taste in one's mouth, but when we introduce the subject as the author did with his reference to the Hippocratic Oath, it bypasses the mental defenses conjured by memories of one's philosophy class, large seminar halls, and mind-numbing discussions. For a moment, perhaps, one can imagine a similar nobility of purpose in one's own work, a purpose that resonated with something deep inside, hidden in the same part of our hearts that pauses breathlessly to see the beauty of an aircraft gracing the skies.

Ethics need not be the exclusive domain of the medical profession or even the college professor and hipster student. In his chapter, "Professional Ethics within Airworthiness Practice, the author argues, quite persuasively, that ethics should be a more prominent element of our profession. He also shows that as early as June 1954, the US National Society of Professional Engineers drafted their own code of conduct that included phrases like the following: "To place...the public welfare above all other considerations" [1]. It has echoes of the familiar phrase introduced above by the medical profession. Reviewing this formal declaration together with the requirement to "apply the highest possible standards of professionalism" is how the author formally introduces the discussion [2]. The chapter is a thoughtful review of both ethical decision making and existing codes of conduct—from both sides of the Atlantic—and it concludes with a recommendation that the reader ought to consider adopting such standards and practices for his organization.

Running a Certification Program

The Second Edition also includes a chapter on management of Airworthiness programs. The chapter fills a need left by existing literature to formally describe the process, if only at an introductory level. The author frequently inserts disclaimers about



the depth of material or his lack of credentials to write about such topics such as program management, but I disagreed. In my opinion, his participation, at length, in each aspect of the "Airworthiness" process throughout his career gives him the credibility to address such subjects. Furthermore, that the defined purpose of his book is to introduce the topics also supports inclusion of introductory level chapters such as this one.

Environmental Impact

One more new chapter finds its way into this edition, and it addresses aircraft emissions, which include noise, greenhouse gas, particulates or surface pollutants, and end-of-life considerations. The topic is certainly relevant, and though it is ancillary to airworthiness, it is something in which each reader will find wisdom together with practical and timely commentary on changes in requirements and regulations. The author points out that this subject is necessary and important but may not fall exactly into the domain of "airworthiness"—this is what I mean by "ancillary."

Other Observations

According to the author, "there are two additional 'half chapters'—the stalling chapter is now a much larger 'departures from controlled flight' chapter" which now includes spins and spiral dive. "There is also a half chapter on abandonment, covering parachutes and ejector/ejection seats."

The book includes many photos, like the one above, of projects/aircraft the author has worked on during the initial airworthiness tests.

This expands the former crashworthiness chapter to crashworthiness and escape.

Springer has several digital publishing features on its updated website for the book [here](#). There the reader can preview any section of the book or even purchase a single chapter. A host of informative metrics about the book appear, including citation counts. Finally, both digital and hardcopy versions are available for sale.

[In the review of the first edition](#), one of the things I bemoaned was the lack of a widely accepted standard format for publication. For example, mathematical publishers have adopted standard templates and packages for use in LaTeX publishing software that make the final product more pleasing to the eye, but Springer did not take the time to accomplish this (in the first edition). It is obvious that the publisher invested time in addressing this shortcoming in the Second Edition, giving the tables, figures, and photos a professional appearance. The cost of this edition is less than the first, but it still causes one to gasp. Department managers should certainly consider purchasing this as a reference for the organizational library.

(continued next page)

Book Review: Initial Airworthiness (3/3)

From Springer's book description:

Designed as an introduction for both advanced students in aerospace engineering and existing aerospace engineers, this book covers both engineering theory and professional practice in establishing the airworthiness of new and modified aircraft. Initial Airworthiness includes: how structural, handling, and systems evaluations are carried out; the processes by which safety and fitness for purpose are determined; and the use of both US and European unit systems. Covering both civil and military practice and the current regulations and standards across Europe and North America, Initial Airworthiness will give the reader an understanding of how all the major aspects of an aircraft are certified, as well as providing a valuable source of reference for existing practitioners.

This second edition has been updated for changes in regulation worldwide, including UK "E-conditions" and Single Seat De-Regulation, the new part 23 regulations in the USA and Europe, and developments to Extended Range Twin-Engine Operations worldwide. Entirely new sections have been added to explain the management of certification programmes, professional ethics within airworthiness practice, environmental impact of aircraft, and aeroplane departures from controlled flight. This edition also includes many new figures, case studies and references to sources of further information.

Initial Airworthiness: Determining the Acceptability of New Airborne Systems is available on Amazon.com and other places where books are sold. ISBN-13: 978-3319114088 ISBN-10: 3319114085 Hardcover: \$179.00

References

1. Gratton, Guy. Initial Airworthiness, 2nd Edition, page 361.
2. Ibid.

Test Conduct: Letter to the Editor (2/2)

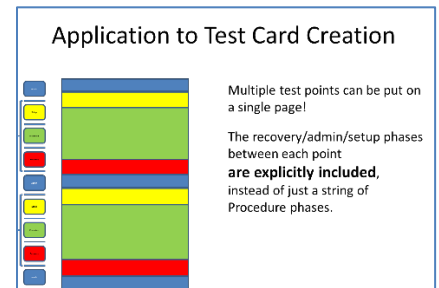
At each level, the entry and exit criteria govern how well the test will go. The transitions are not (inherently) automatic. One observes a sense of "monitor and control" here, not as an abstract concept but concretely as a continuous comparison of the situation to the criteria. The analogy is a "while-loop" in which the criteria serve as the logical gate to break out of the current state and move to the next. These ideas need not be novel concept. Rather, my purpose is to develop a shared, explicit lexicon, built from concepts which experienced testers use various terms for and which are often understood implicitly.

The concept of test discipline (as in a disciplined approach to test, not a technical discipline such as structures or propulsion) also enters in here. How well is the entire test team doing at the following sub-tasks?

- 1) Communicating the current state of the test (which card/run; are we in admin/setup/procedure/recovery or at a transition/pause point);
- 2) Monitoring the exit/entry criteria (is setup complete; are the procedure steps being correctly executed; is a normal recovery or an early termination/abort required, etc.);
- 3) Coordinating the transitions between states (begin setup, start run, recover, next card is).

These ideas bring to mind Boyd's OODA loop, but I haven't delved deeply into the parallels/connections here. This summary gets at the heart of what I'm trying to clarify when I say "fundamentals of test conduct."

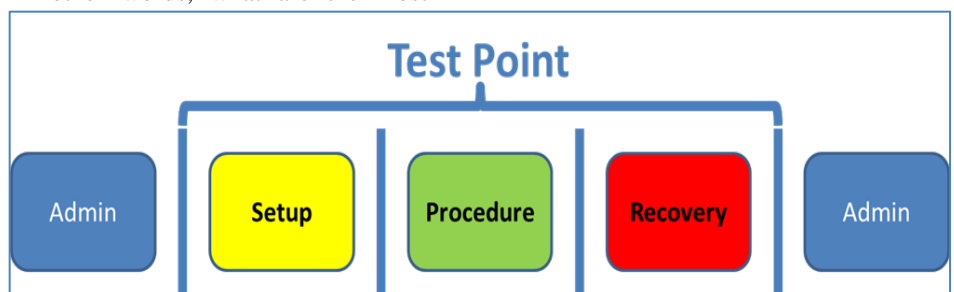
In other words, what are the most



basic concepts that make up test conduct and how do they fit together, and more importantly how can they fall apart? How do we break through the "brute force" method of training and building experience by just "doing a bunch of test" and hoping the basics just "stick"? There's obviously more to this. I've attached a brief that I've been working on for a while. It primarily defines the phases of a test point and highlights the transitions.

There is another set of ideas that incorporate test conduct into a larger test management construct. Namely, how does test conduct generate the needed data? What complicates the issue is that a single test point, despite being the fundamental building block of test, can satisfy multiple data requirements or measures of performance. Furthermore, a single data requirement can be satisfied by multiple test points. It's a many-to-many relation.

There is a sense of the test conduct living in one domain, and data requirements living in another. Test conduct is constrained by the realities of operations, whereas the data requirements are not. So the art of test conduct is to optimize the satisfaction of data requirements given the time, material, and personnel constraints. Obviously this is all still a work in progress. [Nathan Cook](#)



Hindsight: 1971 – The 2nd SFTE Symposium

The 49th Annual International Symposium in Savannah hasn't even happened yet, but along with a small group of colleagues, I'm already involved in the early stages of planning for the 2019 event, to be held in Toulouse, France. Unless my first grade math has let me down, that will make it the 50th symposium—wow, a whole half century of rich, technical exchanges about the latest in flight testing! So it seemed somehow appropriate when Al Lawless, Chairman of the Technical Council, recently asked me to look back through the mists of time to see what delegates were talking about five decades ago at the 2nd symposium held in the late summer of 1971.

“International” didn't feature in the title of that meet, held at Saint Mary's College in Maryland, which focused on test and evaluation of automatic control systems. Indeed, a quick glance through the names and affiliations of the speakers reveals the US-based origins of the SFTE. It wasn't billed as an “annual” symposium either. I guess in those early formative years it wasn't easy to predict the health of the fledgling SFTE more than a few months ahead.

Despite those missing two words, the essential spirit of an SFTE symposium was clearly just as present in 1971 as it is today: experts and pioneers in different flight testing domains sharing their experiences—positive or negative, significant or incremental—so that those following on might better perform their task. For sure, looking back with the benefit of nearly 50 years of technological advances, some of the presented ideas and concepts seem incredibly rudimentary: 4NM of precision from the OMEGA long range navigation system was considered impressive and 8K of memory in a digital computer was state-of-the-art. Regardless, 1971 delegates would no doubt have performed their task better in 1972, in turn paving the way for 1973

attendees to further raise the bar, and so on and so forth until the present day.

As such, I wish good luck to the organizing team from the Coastal Empire chapter for the forthcoming symposium and look forward to welcoming you to Toulouse in June 2019 to continue further the good work of the SFTE.

Jim Fawcett, Lead Flight Test Engineer, Airbus Development Flight Test Department, Toulouse, France

Biography

Jim Fawcett is a British-born Lead Flight Test Engineer (LFTE) working for Airbus and based in Toulouse, France.

Jim has nearly 25 years of experience in aerospace, having begun his career in 1994 as an engineering apprentice with British Aerospace in Filton, England. After obtaining a Masters degree in Aeronautics and Astronautics with European Studies from the University of Southampton in 1999, Jim initially specialised in Flight Test Instrumentation.

After training with the Airbus Flight Test School, Jim graduated from the French flight test academy EPNER in July 2008. Following postings in the acceptance flight test departments in Toulouse and Hamburg, he took up a role as a development LFTE specialising in communications and display systems. He is qualified to operate as a LFTE on all Airbus aircraft types and has logged nearly 2500 hours on test flights, including recently leading the successful certification flight test campaign of the A321LR. A member of the Royal Aeronautical Society, the Society of Flight Test Engineers and a Chartered Engineer, Jim also holds a private pilot's licence.

Married with three children, Jim has dual British-French nationality. In rare moments of spare time, he enjoys road cycling and mountain trekking.



FTN asked Jim for advice on attaining and succeeding at the position he holds within AIRBUS. I think the most challenging part of being a Lead FTE for me has been the non-technical parts of the role, in particular interfacing with teams whose technical grasp is somewhat limited (finance, communications, even some program managers, etc.).

In terms of advice, I usually tell people to get out of their office and come and touch some real airplanes, to discuss with real flight crew, to understand what it's really like to operate an aircraft instead of just saying “well, for my ATA chapter, part 25 says it must do (a), (b) and (c).” I think in our design processes we spend too much time ticking regulatory boxes first, instead of making planes that customers really want and then working out how to get around any certification difficulties that may generate.

Then of course, patience is a virtue. It's hard when you're straight out of college and desperate to do what you dream of, but all good things come to those who wait (and sometimes surprisingly quickly!). Sometimes pushing your management too hard to work your way up the tree can be misconstrued as overconfidence, which isn't necessarily a great attribute for FTEs.

As for the future, as long as I'm happy, I don't mind. I'll be working hard to retain a technical, hands-on role rather than getting sucked into the management side. I probably have another 20-25 years of work ahead of me, health permitting, so I've got plenty of time to see what life brings.

[Jim Fawcett](#)

SFTE Annual Symposia: Identifying our Strong Point's Weakness

Undoubtedly one of our Society's strong points (if not *the* strongest) is the Annual Symposium, which is organized every year to give our members the opportunity to share their work, learn from other flight test programs, and network with other flight test professionals. This year we are heading for 49th Annual SFTE Symposium, proving that our Society keeps its tradition marching strong from its birth in 1968 and offering hope for a very promising future.

Personally, I have attended four of the last five Annual Symposia and I have witnessed the very good technical content and professional environment. I have always been impressed by the amount and quality of work put in by the organizing chapters to make the event happen. Yet in discussions with other members of the Society, I get the feeling that in each and every Symposium there are certain points that we can improve.

Let's examine things from the start. SFTE has adopted the approach of circling the Annual Symposium around local chapters each year, in contrast to other Societies which have a dedicated place to hold their

equivalent event. The idea behind this circling is that this strengthens the host chapter in terms of membership and finances. This does really seem to work. So each SFTE Chapter gets to organize the Annual Symposium roughly every eight years or so.

Here is where one of our major challenges lie. The organizing committee is almost never the same, and in my opinion, the lack of continuity that comes with this limits us in a couple of ways. First, the organizing committee has to go every year through a learning curve—sometimes reinventing parts of the wheel or other times receiving no guidance and being left to its own judgment. Second, each Annual Symposium is like a flight test program, it ends up with some lessons learned, which unfortunately are not communicated to members organizing the events in following years.

How can we improve? We have discussed the need for a Symposium Organizing Guide that would include guidelines and the necessary steps to organize an Annual SFTE Symposium. Such a document would vastly assist the organizing committee, communicate effectively the lessons learned, and contribute to higher quality symposia. The reason we do not have such a document, as with so

many things, is our lack of time. I believe it is time to make this a priority—find the time and get started at least with a basic version. We have some members with great experience in organizing such events and their knowledge needs to get documented and passed to others. This way our strongest point will become even stronger and SFTE members will benefit from and enjoy our Annual Symposia even more. [Panos Vitsas](#)

Perlan II Obliterates Altitude Record

The Perlan Project published this on twitter: "Making history! On Sunday, @Airbus Perlan Mission II soared in the stratosphere to a pressure altitude of over 62,000 feet (60,669 feet GPS altitude), passing the Armstrong Line. It's a new #soaring altitude #worldrecord, pending official validation."

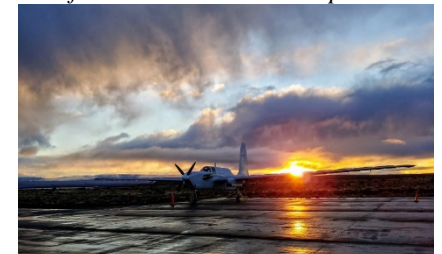
<https://twitter.com/PerlanProject/status/1034115481270198272>

This announcement comes just days after the FAI officially approved last year's record. The team celebrated in grand style and published an update on their blog about the celebration. For more information on last year's flight, see the following:

[3:30 minute video celebrating Airbus Perlan Mission II](#); [1:00 video celebrating the World Record flight](#); [Video "2:00 above 52,000 feet"](#).

The test campaign during this season included upgrades to the two plane used to carry Perlan II aloft. The Project modified a Grob Egrett, much like the one flown in developmental test by Einar himself, many years ago.

The Egrett aircraft is a highly modified variant used to tow plane.



(Image credit: perlanproject.org.)



Editorial Ethics

During the course of my reading and review of Initial Airworthiness, several things happened. First, it stirred a line of thinking about several prominent events that have taken place in the past year. Second, I sent my draft to several people and asked for their input. Thus, I want to publicly express my gratitude to all of them. I won't identify each by name, but they know who they are.

The review process was very helpful in several ways, and the final product is much better than the early drafts. In one case, I corresponded back and forth with a German FTE to clarify figures of speech and refine my writing. During this interchange, the reader offered several apologies for "being blunt." My response was to tell him, "When I ask for feedback, you have permission to be blunt." I want to put a pin in that thought and revisit it momentarily.

Another reader expressed mild concern about some of the possible implications in my review; in particular, that FTEs do not already consider standards of ethical and professional behavior. I appreciate the comments, and I agree that many FTEs have strong ethical foundations and exemplary professional behavior. My intent was not to suggest otherwise but to encourage us to reconsider the importance of thinking and talking about ethics. Furthermore, I would even suggest that we ought to think carefully about how we model, communicate, and instill ethics amongst ourselves, as well as outward, towards our profession at large and individuals within the profession. Additionally, I believe it's important to consider how we invest in the next generation of FTEs as they establish their ethical foundations. In each of these cases, I believe feedback and discourse must play an important role.

As an editor of our Society's publications, I want to reemphasize to you my commitment to ethical use of our Society's media. I also want to encourage you to provide feedback

whenever you feel it is necessary. At least one person has confronted me in the past year. That kind of feedback is critical to the health of our Society.

Additionally, I want to point out, some of the things we have done, as a Society, to promote accountability and encourage ethical and professional behavior. On facebook, we have multiple administrators, all of whom have editorial responsibility and privilege. Each administrator can publish and edit or delete the content that any other user has posted.

For this publication, the Flight Test News, I frequently solicit input for articles I've written, and for news or editorials provided by others, I always allow the original authors opportunity to review the final draft before publication. This includes his or her content as well as the rest of the complete draft before publication. Each of these steps promotes accountability and contributes to the quality of the issue. Striving for excellence in publication—which is a journey and not a destination—is another editorial commitment I make to you. Ethically then, I ask you all to hold up that goal as our standard and encourage you to provide feedback that will help us reach that goal.

A Super Tucano A-29 aircraft flies over White Sands Missile Range. (USAF Photo by Ethan D. Wagner)



There are other important reasons for this conversation. For example, when accidents happen in our profession, we find that erosion of that ethical foundation may have contributed to the tragedy. I have personally observed what I felt was such an erosion of ethics during the past year within our profession. The crash of an A-29 Super Tucano at Holloman AFB is one tragic example, and I believe we need to have a full conversation (at a later time) about this incident and any ethical issues related to it.

There are other instances that I believe we, as a Society, must confront. In one of these cases, I've sought feedback, first privately and subsequently in small groups. In at least one of those groups, I failed to accomplish what I set out to do. I clouded the issue by the way I asked the question. As it turns out, though, the way I asked the question uncovered a topic that needed to be addressed, an issue that needed feedback. Thus we see again the importance of feedback.

In conclusion, I believe that we can strive, *must* strive, for better. Shared norms are a crucial fiber in the fabric of our professional ethic, and I think we must do better at elucidating those organizational principles, encouraging personal adoption of those ideas, and giving helpful, ethical feedback.