EASA Professional Pilot Studies

Phil Croucher

"Never allow your ego, self-confidence, love of flying, pressure from a customer, boss or co-pilot, or economic need to interfere with your good judgement during any stage of a flight. There is no amount of pride, no thrill, pleasure, schedule or job that is worth your licence or your life and the lives of your passengers. Complacency kills, and so does being a cowboy." John Bulmer

This book is for Sue

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Table Of Contents

TOC

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0

INTRODUCTION

This book is based on the modular self-study program for the EASA ATPL(A) examinations provided by Caledonian Advanced Pilot Training. However, due to book size restrictions, it does not contain basic maths & physics information - this can be downloaded from www.captonline.com/samplenotes.pdf.

Proper pilot performance is based on knowledge, planning, and anticipation of what the aircraft will do - and you will not be able to achieve that without studying properly. Your real training starts in your first job, and what you learn before then can be very important.

For example, most pilots gain licences from several countries over their careers - if you have a good core knowledge, you will be in and out of the exam rooms a lot quicker. In addition, if you do the minimum work for your exams, by learning the answers rather than the material ☺, it will be painfully obvious to the interview panel when you go for a job.

DIFFERENCES

"The book certainly approaches the ATPL subjects from a rather different angle than I have ever encountered. The humour, wit and undoubted flight experience of the writer come through when discussing the various ATPL exam subjects. My impressions of the book are vary favourable. Having read it twice, it struck me as being very well researched, informative and well laid out."

Rod Parker, BALPA

For people coming to the EASA world from North America, some differences are immediately apparent. First of all, although there are areas where you don't need to speak to anyone on the radio, they are few and far between, and at low level, as almost all airspace is controlled in some way or another (bush pilots take note!) The transition level is also very low, at 3,000 feet in most countries, so get used to those low flight levels.

Next, another barometer setting is typically used for takeoffs, landings and operations within the circuit, called QFE, which is simply one that gives you a reading of zero feet when on the ground at an aerodrome. It isn't used in North America because many aerodromes are at high elevations and the readings would be off the scale. The setting you are used to, the aerodrome setting against mean sea level, is called QNH.

And what about all those Q codes? They are a hangover from the old wireless telegraphy days, and are not officially supposed to be used, although everyone does (the idea was to use short codes instead of commonly used expressions to reduce transmission times. QSY, for example, is "changing frequency"). Flight duty times are much shorter, too, and are not part of the exam. You should also join the circuit overhead and there is no UNICOM.

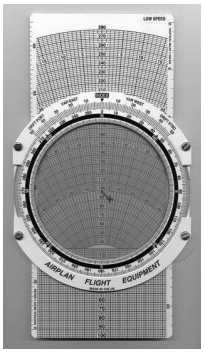
With regard to examinations, it may seem that you are learning a lot of stuff that will not be useful to you. That's certainly true to a certain extent, but the EASA system makes you learn everything you might need for your career before you start, rather than as you go along - in North America, you will likely be exposed to the same material over the years, but from company ground school and various other type rating courses. In Canada, for example, and most other countries, even though it's not part of the pilot exams, you will have to do a Dangerous Goods exam before you start flying for your company. It's just that the Europeans have no guarantee that this will happen and expect you to be a seasoned professional from the start - the original intention behind the EASA exams was to be the equivalent of a BA degree, since people were regarded as joining a profession. As with many other degrees, a lot of the subject matter was included as padding for credibility purposes, and the main purpose was all lost somewhere along the way. Currently, the EASA ATPL, according to Bristol University, has the same standing as two years of a degree-level course.

However, some of the content is there for third party reasons - Human Factors training is an international requirement, and radio theory must be learnt because you have a cut-down version of the amateur radio licence, and you need to know how not to screw up the airwaves.

EQUIPMENT REQUIRED

For the UK exams, you will also need:

- The **Jeppesen Student Pilot Route Manual**, used in Flight Planning and Navigation. Random copies of this are exchanged at exam time, so don't write notes on them!
- **Flight computer**. Must be:
  - Jeppesen CR-3
  - Pooleys CRP-5
  - AFE ARC 2



- **Chart plotting gear**, including a clear ruler marked in mm/cm and inches, 18 ins long at least, dividers, square protractor
- Calculator. Must be:
  - Texas Instrument TI-30XS
  - Sharp EL-W531
  - Citizen SR-260
  - Casio FX-83/85 series (available from most supermarkets)
  - Casio FX-300

Tip: The hours, minutes, secs functions can save loads of time and avoid c

The above can be obtained from:

- Transair (www.transair.co.uk)
- Pooleys (www.pooleys.com) - mention CAPT for a discount!
- Airplan Flight Equipment (www.afeonline.com)
- The Flight & Model Store (www.flightstore.co.uk)

"Pure book knowledge should be impeccable - every second of doubt about "what do I do now?" is worth 30% of workload. Mostly because the self-doubt and second-guessing are real time and mental capacity wasters. The more you know flat cold, the easier it is to fly under the gauges"

Nick Lappos

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***Everyone* is responsible for flight safety!**

1

HUMAN PERFORMANCE & LIMITATIONS

The essential problem is that our bodies are not made to cope with the conditions imposed by aviation. In the air, physical and psychological stresses occur on top of the normal stuff of everyday life that should be taken note of in order to do our jobs properly. Minor illnesses, stress, fatigue, alcohol and caffeine can affect your performance, and there are even regulations to cover their use, all discussed later.

Amendment 159 of Annex 1 to the Chicago Convention (see *Air Law)* makes the study of Human Factors a mandatory part of obtaining a professional pilot's licence. Such training is all about the **safety and efficiency of the operation** and the **well-being of the individual**.

Competence is based on the knowledge, skills and attitudes of the pilots involved. ICAO lists 8 core competencies to be mastered by professional pilots:

- Communication
- Aircraft Flight Path Management - Manual Control
- Aircraft Flight Path Management - Automation
- Leadership and teamwork
- Problem solving and decision making
- Application of procedures
- Workload management
- Situational Awareness

Thus, amongst other things, competent pilots must be motivated, team players, good communicators, and be able to manage crews and stress.

As humans are part of the system, they must be medically fit and be certified as such by a physician at regular intervals. Your professional licence is not valid without a Class 1 medical certificate, which is valid for 12 months if you are under 40 and 6 months if you are over, except when multi-crew, when it goes back up to 12 months.

You may not act as flight crew if you know or suspect that your physical or mental condition renders you unfit so to do. In other words, you may not exercise licence privileges once you are aware of a decrease in your medical fitness that makes you unable to safely execute your duties.

EASA Rule **CAT.GEN.MPA.100** (see *Operational Procedures*) states that crew members must not perform duties:

- when under the influence of psychoactive substances or alcohol or when unfit due to injury, fatigue, medication, sickness or similar causes.
- until a reasonable time has elapsed after deep water diving or following blood donation (**due to possible fainting** or **hypoxia** in the latter case).
- if applicable medical requirements are not fulfilled.
- if they are in any doubt of being able to accomplish their assigned duties.
- if they know or suspect that they are suffering from fatigue (see 7.f of Annex IV to Regulation (EC) No 216/2008)* or feel otherwise unfit, to the extent that the flight may be endangered.

**No crew member must allow task achievement/decision making to deteriorate to the extent that flight safety is endangered because of the effects of fatigue, taking into account, inter alia, fatigue accumulation, sleep deprivation, number of sectors flown, night duties or time zone changes. Rest periods must provide sufficient time to enable crew members to overcome the effects of the previous duties and to be well rested by the start of the following flight duty period.*

Medicals are only valid if you meet the initial issuing requirements. A Board of Inquiry or insurance company may interpret the words "medically fit" a little differently than you think if you fly with a cold or under the influence of alcohol or drugs. In any case, you should talk to a medical examiner as soon as possible in the case of:

- admission to a hospital or clinic for over 12 hours
- surgery or other invasive procedures
- regular use of medication
- regular use of correcting lenses

You should also inform the authorities in writing of significant personal injuries involving your capacity to act as a member of a flight crew, or illness that lasts for more than 21 days (after that period has elapsed), or pregnancy. In these cases, your medical is suspended, but it can be reinstated after an examination, or if you are exempt. It can be given back directly after giving birth.

ACCIDENTS

A *reportable* accident occurs when:

- anyone is killed or seriously injured from contact with an aircraft, including jet blast or rotor downwash.
- an aircraft sustains damage or structural failure.
- an aircraft is missing or inaccessible.

between the time any person boards it *with the intention of flight*, and all persons have disembarked. This does not include injuries from natural causes, which are self-inflicted or inflicted by other people, or any to stowaways hiding in places not normally accessible to passengers and crew.

Significant or *Substantial Damage* means damage or failure affecting structure or performance, normally needing major repairs - essentially, anything that may involve an insurance claim.

Under ICAO, a *fatal injury* involves death within 30 days. A *serious injury* involves:

- more than 48 hours in hospital within 7 days
- more than *simple fractures* of *fingers*, *toes* and *nose*
- lacerations causing nerve or muscle damage or severe haemorrhage
- injury to any internal organ
- 2nd or 3rd degree burns or any over 5% of the body
- exposure to infectious substances or radiation

An **incident** is any happening, other than an accident, which hazards or, if not corrected, would hazard any aircraft, its occupants or anyone else, *not* resulting in substantial damage to the aircraft or third parties, crew or passengers. In other words, a dangerous event, but not as serious as an accident.

An accident is the end product of a chain of events so, in theory, if you can recognise the sequence it should be possible to stop one before it happens. A common saying is that "the well oiled nut behind the wheel is the most dangerous part of any car". Not necessarily true for aviation, perhaps but, in looking for causes other than the hardware when it comes to accidents, it's hard not to focus on the pilot (or other people - e.g. the human factor) as the weak link in the chain - around 75% (between 70-80%) of accidents can be attributed to this, although it's also true to say that the *situations* some aircraft (and people) are put into make them liable to misfortune, particularly with helicopters - if you continually land on slippery logs, something untoward is bound to happen sometime!

The current teaching is that the human factor is the weak link at the root of most accidents, so if you remove the bad apple the problem should go away, but it isn't the whole story. Circumstances can also be involved, and even experienced pilots can get caught out. Take, for example, one who is tasked to do two flights in an afternoon, the first one with a light load of two people and the second with four. It would seem logical to fill the machine up with enough fuel to cover both flights, since the loads allow it and the schedule is tight between them, so you can save time by not refuelling. But what if the first passengers are late, or don't even turn up? You are then faced with doing the second trip with more fuel than you would normally plan for to allow for safety margins, even though you might be within the weight limits. Of course, you could defuel, but that can be a major inconvenience when you are the only one there and the passengers are waiting in the usual car-park-as-a-passenger-lounge! Thus, it is not necessarily a person's character, but their circumstances that can be at the root of an accident, as has been proven by many psychological studies involving prison guards.

The "safety record" of an airline can also be nothing but a numbers game. Take a flight from Los Angeles to New York with two hundred passengers on board - the distance is 3000 miles, so they have flown 600,000 passenger-seat miles. With 150 on the flight back, you get 1,050,000, for being in the air for only 9 hours! If they have 20 aircraft doing that five days a week, and injure one passenger, they can say it happened only once in 105,000,000 passenger-seat-miles, which is still only 900 hours! Having said that, when flying, you are still safer by over 9:1 against driving or 300:1 over riding a bicycle on the road! Currently, the accident rate is *around 1 per million aircraft movements*.

However, it is impossible to design all errors out, so no system is safe - it still depends on people for its operation, and safety is not the only goal they have to achieve (Transport Canada's statement that a safety management system is a "businesslike approach to safety" does not mean that company profits, etc. should be taken into account, but that safety procedures should be integrated into the company's normal business practice). Granted, some people in any system may have an "attitude" problem, as discussed later, but it is definitely not the only factor! Thus, there is hardly ever a single cause responsible.

And if you are thinking that safety procedures might be expensive, review the consequences of an accident:

- Fatalities and/or injuries
- Customer relations & company reputation suffer
- You need another aircraft .....
- .....while still paying for the one you crashed
- Any schedule gets screwed up
- The insurance is increased
- You end up with unwanted attention from the media and the authorities - the strongest economic pressure to improve safety is often the need to avoid negative publicity.

Even if you don't get that far, it's safe to say that, for every accident, there are thousands of incidents - it costs $15,000 for an airliner to return to the gate, or $500,000 to shut down an engine in flight in terms of lost revenue and other indirect costs, such as hotels for passengers. It even costs $100 or so just to start a turbine engine! Such losses are uninsured and cost the airline industry over $36 billion in 2001.

THE HUMAN FACTOR

There are two broad aspects to Human Factors:

- **Engineering**, which includes:
  - **Ergonomics**, or human capabilities and limitations in the design of machines and objects, work processes and environments. In World War II, many problems were caused by mismatches between machines and operators.
  - **Anthropometry**, the study of human body measurements (from the whole population except the lowest and highest 5%).
- **Cognitive Psychology**. The study of human behaviour and the mental processes that drive it. That is, how mental processes interact with each other to help us understand and use objects.

The emphasis on the human element in relation to accidents was first recognised in '79 and '80, where over 500 incidents relating to shipping were analysed, and 55% were found to be related to

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