CHIRP

Confidential Human-Factors
Incident Reporting Programme

Aviation FEEDBACK

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GENERAL AVIATION

CHIRP GENERAL AVIATION FEEDBACK
Confidential Human-Factors Incident Reporting Programme

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GA's top 5 human factor issues

No matter how experienced you are, it's worth taking time to think long and hard about your levels of currency

Director Aviation: STEVE FORWARD

The previous 12 months saw huge impacts to GA flying as lockdowns and other COVID restrictions came and went. The next 12 months will hopefully see the GA flying recovery gather pace as we return to something like the pre-COVID norms we knew before but care still needs to be taken to make sure that sensible COVID-aware precautions remain baked into our personal procedures rather than simply ignoring what might otherwise be seen as just an inconvenience.

With that in mind, I thought it might be instructive to look back on the last 12 months of reports to CHIRP to see if there are any themes that might be useful indicators for the immediate future. Statistically, overall CHIRP received 364 reports over the last 12 months, about 50% of our historic pre-COVID reporting rate. This is not surprising, GA flying did not really get going again until late-summer 2021 when the frustrations of COVID restrictions were finally removed.

In reporting terms, CHIRP is now at about 75-80% of seasonal norms and so efforts to encourage reporting are paying off – it is only by reporting concerns and issues that any change will be made, and CHIRP plays its role in this by providing the confidential conduit for those who have no access to or do not feel able to use the formal systems. But stating pure numbers of received reports is a fairly meaningless measure in itself, it is the aggregated content and value of

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these reports which make the difference between simply counting activity versus influencing events.

More specifically, in the last 12 months the top-5 key issues within GA reports made to CHIRP have been Procedures; Handling/Operation; Defences (against errors and mistakes); Individual Errors; and Situational Awareness. The sun-dial graph illustrates these 5 key issues and their subset components, many of which have resulted from reduced currency and rustiness when getting back into the cockpit after long lay-offs. We've highlighted some of these high-level issues in previous editions of FEEDBACK, but it's worth reiterating them once more as many of us come out of hibernation again to enjoy what will hopefully be a long summer of fantastic flying weather.

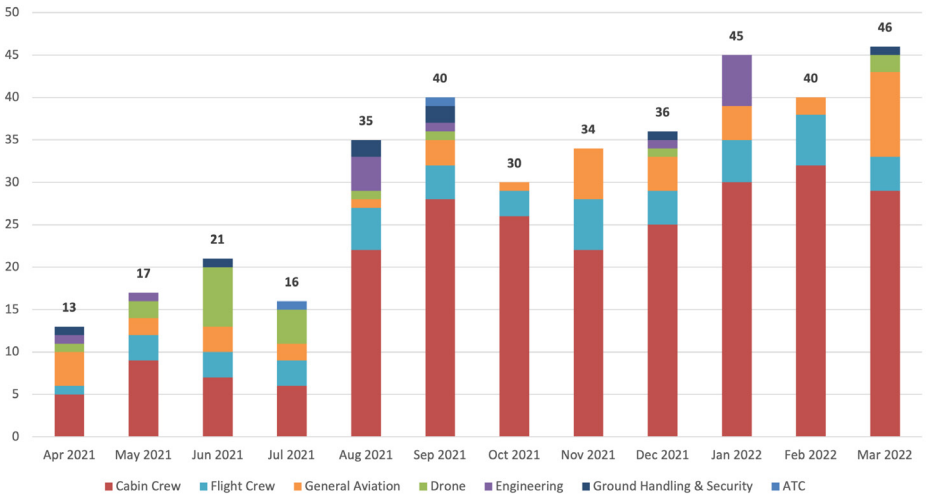
No matter how experienced you are, it's worth taking time to think long and hard about your personal levels of currency across the whole spread of aviation activities. Having identified the areas in which you might feel uncomfortable, take action to refresh your knowledge, get some instructional help if appropriate, and force yourself as much as possible to hone those least-favourite skills so that you have capacity to spare if and when you need to use them for real. As fuel prices increase, we all need to make the most of the flying time available to us because this will have its own effect on how much recency we can afford.

Take a look at the outer ring of the sun-dial graph in particular and think how those aspects might apply to your own flying. It might also be worth reprising the Human Factors 'Dirty Dozen' of: normalisation of deviation; lack of teamwork; pressure; distraction; lack of knowledge; complacency; poor communication; loss of awareness; lack of assertiveness; lack of resources; fatigue; and stress to see whether any of these might also potentially be relevant as you prepare for your next and subsequent flights as the summer flying season approaches.

CHIRP will continue to engage with the CAA and other appropriate organisations where it can to ensure that any relevant concerns or issues are aired in a confidential, independent and impartial manner. The first option should always be to use the relevant organisation's formal reporting systems if appropriate because this will hopefully gain the quickest and most complete response to any concerns. But CHIRP stands ready to assist as best we can those who do not feel able to do so or just wish to report things that 'nearly happened' and might not meet the threshold for formal reporting elsewhere; or where you just want to let others know about an incident that happened to you so that they can learn from your experiences.

Stay safe!
Steve Forward, Director Aviation

Reports by Type – April 2021 to March 2022



COMMENTS ON PREVIOUS FEEDBACKs

Comment No 1 –
Regarding Report No.3 in FEEDBACK Ed 91 [GA1306 – Intense distracting noise in the headset]. A mobile phone is a transmitter/receiver and any transmission has the potential to cause interference especially when signals are relatively strong. All digital communication (including texts, voice (VOIP) and internet) are bursts of data transmission that have a 'pulsed' or 'rasping' nature when inadvertently received via audio equipment. It's worth remembering that a 'crystal set' or 'cats whisker' radio in days of old did not need a battery and everything heard was through the power contained in the received radio signals themselves. Keep in mind that those signals had travelled many miles from the transmitter; not from a transmitter in the same cockpit as you.

Whilst mobile phone transmission and reception of data is expected when a text, voice or internet usage is actually occurring, it is less obvious that occasional transmissions and reception of data are also made to maintain connection between the phone and the mobile network. The system is primarily implemented to facilitate the user of a phone to be mobile in terms of walking or in a land-bound vehicle (e.g. car). Look carefully and you notice the mobile phone base-stations adjacent to roads or on the tops of buildings; you'll be amazed how many you will see!

The general idea is that your mobile phone only needs to communicate with the nearest base-station. However, this means that as you move about, the communication needs to hand-over to the next base-station along your route. Every hand-over requires a burst of communication as the change of connection is negotiated and established. As you fly along at say 2,000ft the phone still attempts to communicate with a base-station. The issue now is that your elevated position means that tens of base-stations appear and an electronic battle takes place trying to discover which is the nearest. Add to this that your mobile phone is essentially inside a tin-can (especially downwards where the nearest base-station is) which causes the mobile phone to dynamically increase its transmission power so that it can be 'heard' by the base-stations that are all competing for its business. Suddenly you can have a lot more interference than normal.

In conclusion, flying with a mobile phone that is actively connected to the network is a potential source of interference to all equipment (not just your headset), and don't be surprised if the battery in your mobile drains quicker than normal.

❝ CHIRP *Response* ❞
In addition to the information about how mobile phones react to being moved rapidly from base-station to base-station, the point about mobile phones interfering with equipment other than just the headset is well made. Many commercial airlines still have restrictions on mobile phone usage in flight for just that reason despite shielding of important flight safety avionics. Although GA aircraft may not have quite the same reliance on vital navigation systems and fly-by-wire, we all need to be aware of the potential for mobile phones to affect the increasingly sophisticated electronics in more modern aircraft systems so care needs to be taken if they are left on in the cockpit (or in any baggage).

Comment No 2 –
The CHIRP Ed 91 ILAFFT report [What if? – being caught out by reducing weather] induced a sympathetic butterfly in my stomach. I've always been taught that LARS is there to help, not criticise, and any descent into cloud, particularly in the known vicinity of an airfield, needs at least a Traffic Service. If you're not confident in IMC, tell them: others will be listening and I'm sure they will accept a deconfliction vector whilst you keep the wings level.

Comment No 3 –
Report No.2 in FEEDBACK Ed 91 [GA1305 – GA recency] includes the observation that some clubs do, and some don't, require currency to be on the same type of aircraft. Once Upon A Time I breezed into the club and rented an aircraft without a check ride, claiming currency because of the lots of flying I'd done the week before, quite legitimately according to the club rules. But all the flying I'd done the week before had been on floatplanes - and I was renting a landplane. I promptly made something of a pig's ear of the crosswind landing, being something I'd not had recent practice of because you just land into wind in a floatplane.

❝ CHIRP *Response* ❞
Probably an unusual set of circumstances but a salutary lesson that not all similar types are equal and a useful reminder that it's up to all of us to be sensible in assessing where our weaknesses might be. The important thing is that recency and currency should be relevant. Although aircraft might be the same type/class, they might have differing cockpit configurations (digital vs analogue for example) or they might be different versions with different equipment. When considering the need for familiarisation on an aircraft, 'Differences Training' and 'Familiarisation Training' are not the same and are defined in EASA Part-FCL GM1 FCL.710[1] wherein Familiarisation Training doesn't

1 GM1 FCL.710 Class and type ratings - variants. Differences and familiarisation training.
(a) Differences training requires the acquisition of additional knowledge and training on an appropriate training device or the aircraft.
(b) Familiarisation training requires the acquisition of additional knowledge.

necessarily need an instructor (it may just be a self-help ground-based study module). Finally, as we said in the last edition, recency (satisfying the rules) versus currency (actual ability to fly safely) are not the same thing and we need to think about personal comfort levels and capabilities. In past discussions about this, the concept of the 'Farley Card' has been aired by CHIRP before. This was devised by the test pilot John Farley who used it to make sure that he had considered the essential elements of his personal currency comfort levels over a period of time.

Comment No 4 –
CHIRP is a valuable initiative and one of my standard learning resources. However, low numbers of incident reports should not just trigger a reflex of asking the GA community to submit more reports, but also trigger a reflection on how CHIRP could be more useful. The key is already in the name of CHIRP: "Human-Factors". I wonder what human factors methodology CHIRP authors actually apply when they assess incidents? I struggle to see a systematically applied approach to incident analysis.

Take Report No.4 (GA1307) in Ed91 as an example [Event involving Luton Radar]. The authors ask the key question "Why was there confusion?" but only address the phraseology used by ATC as one factor. A simple use of the SHELL model [2] would have added a wider perspective and could have helped to explore why there was reduced situational awareness in the cockpit that led to human error. The point of human factors training is to recognise that human error is an inevitable part of life and to provide crews with tools and strategies that they can employ to mitigate against errors.

If Threat and Error Management (TEM) is not just a buzzword word to the authors as they say in the introduction of this edition of CHIRP, why not use it as part of their recommendations? In this incident, the authors could have analysed how safety tools could be meaningfully applied in the context of operating VFR in controlled airspace (flight risk assessment apps for pre-flight preparation, relevant content of briefings, TEM applied for flying in controlled airspace including ATC procedures and confusion, CRM when flying with a second pilot, in-flight procedures, sterile cockpit rules, currency training, useful CPD options). Perhaps a new strategy could be to identify the key learning topic of an incident and present this in a more comprehensive CHIRP article?

❝ CHIRP *Response* ❞
We welcome all comments, be they bouquets or brickbats, and we're grateful for these constructive observations. What we are probably guilty of is not having space to expand on the whole process that we use when we receive a report. We do indeed use the SHELL model within the CHIRP Secretariat for our analysis, along with the ICAO ADREP[3] taxonomy to look at what Human Factors might apply to each report received. This is based on the fuller report that FEEDBACK readers don't get to see because we remove quite a lot that might either be identifiable or pejorative. This means that the published text isn't quite all of the story, just the bits that we think are vital and also which the reporter agrees that we can publish. What we publish is therefore by necessity a compromise and we also want to 'tell a story' rather than present a set of rather cold 'factors' that might not be supported within the text we include. Our intent being to write it up in a readable and engaging manner so that people will be given cause to think about the issues themselves.

But there's probably room for more to be done in that respect and, in that vein, we're currently in the process of revamping our website and newsletters. One of the things we've taken away from our CHIRP maritime counterparts is that they have a short section at the end of each of their reports which does indeed list the 'key issues' i.e. the main taxonomy outputs, as a way of showing some of the workings behind the scenes.

One of the things we've been considering is whether we might use a version of the 'HF Dirty Dozen' [4] to provide a traffic-light style depiction of what might be the key areas in each report so that it gives a visual idea of what we think the main issues were. That might then usefully cause people to consider what was going on at a higher level, but we need to be careful that the simplicity and directness of some of the associated short statements aren't interpreted as being pejorative in themselves.

Finally, we didn't mention TEM specifically in our comments, and we could have, but we discussed the need for a Plan B which is part of the outcome of a TEM consideration. In the past we've shied away from talking too much about TEM because it's sometimes not that well understood and sounds a bit daunting to some - it's something that would probably benefit from a more structured article (perhaps even a CAA Safety Sense pamphlet?).

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2 The SHELL model stands for **S**oftware, **H**ardware, **E**nvironment, **L**iveware (other people) and **L**iveware (self) and is an HF tool that is used to analyse how people interact with their surroundings in the circumstances by assessing their Liveware (self) interface with the other 4 components.

3 The ICAO Accident/Incident Data Reporting (ADREP) taxonomy is a glossary of specific human factors issues, concerns and latent failings that relate to aviation activities and which provides a set of definitions and descriptions used during the gathering and reporting of accident/incident data to ICAO.

4 The military applies colour coding categories to their instrument rating (IR) scheme that signifies the experience level of the pilot concerned: a pilot holding an Amber IR will add 300ft to any Procedure Minima; a pilot holding a White IR will add 200ft; whilst the additional allowance for a Green IR is zero.

I LEARNT ABOUT FLYING FROM THIS (ILAFFT)

Regarding being caught out by weather, [CHIRP Ed91 ILAFFT "What if?"]. At the end of 1964 I had finished my tour as a Jet Provost QFI (Qualified Flying Instructor) and had been posted to the Hunter force. As I had been a first tour QFI this was to be my first operational tour.

There I was, an above-average QFI, Green[5] instrument rating, 1,000 hrs, eyes in full steely mode and being given a Hunter twice a day to fly. I was on my Hunter conversion course at Chivenor and, during the Air-to-Air gunnery phase, we had been plagued by bad weather and got quite a way behind schedule. Then we got a period of clear weather and the Boss decided to get as many air-to-air gunnery sorties as possible. We students had all done the necessary dual and had been clear for solo firing on the flag [the flag is a towed banner that is used as a target for air-to-air gun firing]. The plan was that the Hunter would carry internal fuel only, 60 rounds of 30mm ammunition and we would launch from Chivenor, climb straight to the range to the South of Lundy Island, fire our 60 rounds at the target and return as fast as possible to Chivenor for a quick turnaround and back into the air.

I launched at about 1400 and as I climbed up I went into cloud at about 10,000ft, came out on top at 15,000ft, and there was the air-to-air target in front of me. The key point here is that "***I knew the cloud base was at 10,000ft***". As soon as I had finished the air-to-air firing exercise I got a steer from Chivenor and headed back in a very high speed descent, 10,000 fpm+.

Because ***I knew the cloud base was 10,000ft*** I didn't do my instrument cross checks as rigorously as I should have; ***I knew the cloud base was 10,000ft*** so there was no problem. Suddenly I had a very close and intimate view of the sea, I pulled about 8G and missed the sea by a minuscule amount and went back into cloud at around 1,000 ft. When the shaking stopped I called for a GCA approach and landed back at Chivenor.

After a one-sided interview with the Boss, a rather shaken wannabe "Ace of the Base" who should have known better hopefully learnt the lesson that ASSUME makes "An Ass out of You and Me". This is particularly true about making assumptions about the weather. Don't Assume - Check.

5 The military applies colour coding categories to their instrument rating (IR) scheme that signifies the experience level of the pilot concerned: a pilot holding an Amber IR will add 300ft to any Procedure Minima; a pilot holding a White IR will add 200ft; whilst the additional allowance for a Green IR is zero.

Reports

Report No.1 – GA1309 – Camera & Equipment Mounts

Report Text: I am concerned by what seems to be a lack of awareness of the requirements when fitting cameras and tablet computer holders to an aircraft, particularly within GA. It appears that, just because pilots/owners are able to buy these mounts, both suction cups and self-adhesive, then they are permitted to fit them to their aircraft. Only on two occasions have pilots approached me to ask if there is a specific requirement to follow to have such mounts installed, and were totally unaware that there are CAA documents that regulate such installations.

CAP 1369 and [CS-STAN] Standard Changes CS-SC104 and CS-SC105 give clear instructions yet pilots seem to be unaware of their existence or are just ignored. A brief search on YouTube will show an abundance of pilots sharing videos of their flights online, many of which have tablets mounted to the yoke or suction cups holders on the windows and canopies, with no secondary lanyards and in positions likely to cause a problem should they become detached. I'm raising this in the hope that pilot / owners will be made aware that there are rules to be followed when installing these mounts.

Background Information: CAP1369 'Policy and guidance on mounting cameras on aircraft' was withdrawn on 10 May 2022 following CHIRP's engagement with the CAA. This had referred to internal mounting of cameras (Page 5) but only addressed small camera installations mounted internally or externally on aircraft structures that were self-contained, such as GoPro and similar. Such installations would be expected to have low or negligible effect with regard to mass, centre of gravity, structural strength and drag, and would thus be expected to have no appreciable effect on aircraft systems, handling or performance. The CAA commented that CAP1369 had been withdrawn due to its content now being covered in other areas of the CAA website in general terms and also within CS-STAN. They said they will review the CAP in the future, although they were unable to provide any timescale. In its place, the CAA website now informs the user that "for certified aircraft the method for approval is included in [CAA] CS-STAN - Standard Change CS-SC105a (Installation of mounting systems to hold equipment). For type accepted aircraft overseen by the British Microlight Aircraft Association or Light Aircraft Association those organisation's requirements apply".

Note that the CAA UK document in the CS-STAN link above is the old EASA document Issue 3. EASA have since updated theirs to Issue 4, which contains the same information in this respect but re-paragraphed as CS-SC105b, not as CS-SC105a. EASA CS-STAN Issue 4 section CS-SC105b 'INSTALLATION OF MOUNTING SYSTEMS TO HOLD EQUIPMENT' includes, inter alia, considerations for where equipment should not be mounted; location of brackets; lanyards for suction mounts; push/pull testing; and mount security.

LAA Comment: LAA Technical Leaflet TL 3.24: Camera Installations refers. In addition to this, care should be taken to consider aerodynamic effects if cameras are mounted to exterior surfaces. For example, the website article VAF - GoPro Mount RV-9A reported an increase in the stall speed of 12kts for a fuel-cap-mounted GoPro.

BMAA Comment: Aerial photography is a popular activity amongst pilots. However, cameras and associated mountings can become loose and cause damage, or if badly positioned affect the aircraft's aerodynamics or structural strength. Therefore, it is vital that when fitting a camera to a microlight, good design practice is followed and the installation is approved by the BMAA as a modification. Except in very unusual circumstances, the modification will be classed as minor and will be processed by the BMAA in only a few days. BMAA Technical Information Leaflet No.017 dated March 2018 refers.

CHIRP *Comment*

There are some great cameras and equipment available these days that are small and self-contained and which can provide an important addition to safety and instructional efficiency because they give valuable insights and factual evidence as to what was going on both in the cockpit and externally. However, although the carriage of some electronic equipment in the cockpit can be very beneficial, care must be taken to ensure that appropriate risk assessments are made so that any mountings and equipment are secure and safe. Also, as we said previously in GA FEEDBACK Ed84, the use of recording devices that could be a distraction should be avoided, and pilots should also avoid providing a running commentary to any recoding equipment because this can sap mental capacity and distract from the conduct of the flight.

These days we're so used to simply attaching such equipment to car windscreens etc that we can sometimes forget about the unique requirements that come with their use in aircraft. The key things to think about are that they must not interfere with any cockpit controls; not obstruct the pilot's view of the instruments (or the pilot's external view); must not cause a distraction to the pilot; and a Push/Pull test should be carried out to make sure the item is secure when installed (see the CAA/EASA CS-STAN references for advice on suitable test loading). Also, if suction mounts are used inside the cockpit or cabin, a secondary retaining lanyard or strap should be attached to the unit to prevent any damage or a control jam if the suction mount were to become detached.

In that respect, it's also important to consider where and to what part of the aircraft the lanyard is attached; drilling holes randomly in the flight deck would effectively be an unapproved modification. Secondly, lanyard length should be based on restricting freedom of movement of the equipment were it to become "unstuck", and not on the ease of attachment/detachment of the equipment in use.

Equally important, lanyards (and any connecting cables and leads) can present their own problems if they're at risk of fouling things or getting in the way, and so their positioning and length also require careful consideration. Finally, multi-installations that end up festooning the cockpit with equipment should also be carefully reviewed; ultimately, we need to consider why we are putting things in the cockpit in the first place and limit them to those that are absolutely valuable to the flight's purpose.

The CAA reacted swiftly to CHIRP's suggestion that the old CAP1369 was outdated by withdrawing it from use. However, many pilots were probably not even aware that CAP1369 existed. CHIRP agrees that the issue of cockpit installation of electronic equipment needs greater awareness, and we have suggested that the CAA could include an article in relevant safety channels such as Clued-Up, SkyWise or 'Safety Sense', even if just to publicise the withdrawal of CAP1369 and point people towards the appropriate website links.

'I was called by a controller to ask what height I was registering, I told him 1100ft, he told me I was showing 1400ft'

Report No.2 – GA1310 – Misheard QNH

Report Text: I am a pilot of around 20 years' experience, with the last 10 years flying out of [Airfield 1]. So, I feel as though I ought to know the Manchester low-level route pretty well. However, a recent incident has led me to reflect on that belief.

I was out for a bimble with a friend, also a pilot, just to keep us both current and take advantage of a break in a run of poor weather. We had decided on a three-stage hop, out of [Airfield 1], via the low-level route, to [Airfield 2]. Land there for a quick stop for a bacon butty then over to [Airfield 3], change pilots and back to [Airfield 1] via the low-level.

All very standard stuff, and a chance for a chat and catch up for us both. The flights out to [Airfield 2] and on to [Airfield 3] were uneventful and I took the controls for the flight back to [Airfield 1]. Clearing [Airfield 3], I got a Basic Service from [ATCU] Information and, as I approached the low-level, I was cleared to listen to Manchester Approach. I squawked 7366, had a quick check of the Manchester ATIS and descended to 1100 ft for the transit, giving me a 200ft clearance below the 1300 foot ceiling of the low-level route.

Around three-quarters of the way along the route I was called by a Manchester controller to ask what height I was registering, I told him 1100ft, at which point he told me I was showing 1400ft on their systems. Not questioning, I informed him I was descending and dropped a further 200 feet. I heard no more and landed back at [Airfield 1] with no further incident.

On landing I realised that I had misheard the QNH setting on the Manchester ATIS before entering the low-level route thus leading to my altimeter giving me a wrong reading. Clearly a lesson learned ALWAYS DOUBLE-CHECK the Manchester QNH before entering the low-level route from whichever direction and I'm grateful to the Manchester controller for his gentle corrective action.

However, another thought does also occur. I always seek some form of service when entering new airspace and, whenever I do, the control data for that airspace is subject to a read-back. Thus, whenever I mishear an element – be it squawk or pressure setting – I am corrected and asked to repeat the correct data.

Manchester low-level route is Class D airspace and the QNH is a critical element in remaining clear of the ceiling, but if I mishear the ATIS then there is no failsafe of a read back. I suppose I could have asked [ATCU] for the Manchester QNH before leaving them, but one purpose of a listening squawk is to reduce demand on controllers and I would simply be shifting the burden from Manchester to [ATCU].

I have no solution to the issue, other than continued personal vigilance, but it remains a concern that in an environment where we look for double-checked read-back as a safety norm there is no such facility when entering the Manchester low-level route.

Lessons learnt: When preparing a flight the majority of variables can be pre-planned for at the pre-flight stage, but en-route QNH is not one of them. As a personal mantra I will, henceforth, always double-check any data that I derive from an automatic source such as an ATIS to satisfy myself that I have heard it correctly.

❝ CHIRP *Comment* ❞

The reporter raises a really good point about readbacks and the potential for mis-hearing critical information from ATIS sources. Although ATIS provides a source of such information, many ATIS transmissions are very long and so it's sometimes not practical to listen to them twice to confirm information such as QNH – the aircraft may travel many miles during the transmission of ATIS messages and pilots should not be tempted to sit on ATIS frequencies for any longer than is necessary.

With regard to QNH specifically, it's important that pilots have an idea about what the expected QNH should be in the areas in which they are flying, and this should be a part of pre-flight planning. As a guide, depending on how far you've travelled, anything that is materially different to your departure airfield's QNH should be checked, and this might highlight any gross errors that might be encountered if you mishear a figure on ATIS - listening out for other pilots' transmissions may also give a chance to increase situational awareness in this respect.

Also, remember that many of the available electronic planning and navigation apps/aids have features where live updates of meteorological data are available for every airfield on the route, and this also includes QNH so, in addition to having a tool to tell you where you are and warn of NOTAMs etc, they also provide a source of information for a whole host of other useful purposes – take some time now to have a play with your preferred version and explore what it can offer! Finally, this report is a really good advertisement for Listening Squawks because the Manchester controller was able to establish contact with the pilot having noted that the altitude readout on the displayed squawk was incorrect.

'When the selector handle was set to the main rear tank it was in fact drawing fuel from the left-wing tank'

Report No.3 – ENG711 – Fuel selector incorrectly installed

Report Text: Following work to the undercarriage, the fuel selector handle was refitted incorrectly. It was fitted 90º out of position and with one bolt missing. When the selector handle was set to the main rear tank it was in fact drawing fuel from the left-wing tank, when the selector was set to the right-wing tank, the fuel selector valve was closed. If both bolts had been fitted it would not have been possible to fit the selector handle incorrectly.

Following completion of repairs to the undercarriage and a taxi test by the Approved Maintenance Organisation (AMO), the aircraft was released for flight. The same afternoon I planned to undertake a short local check flight. The engine first started ok but only ran for a short time. Thereafter It would start when primed but would not run for more than a few seconds. I called one of the AMO engineers to look at the problem; he discovered that the fuel-selector handle had been fitted incorrectly and one of the fixing bolts was missing.

At first, he thought the handle had been installed in reverse and, indeed, with the selector set to the off position the engine ran. However, following further checking he realised it had been installed at 90º to the correct position. I was lucky that the left wing-tank had all but run dry during the taxiing runs in the morning, otherwise it would have done so shortly after I took off. With the fuel selector set to the main rear-tank (which was full) but in fact pulling fuel from the left wing-tank, when that tank ran dry the engine would have stopped and I would have tried to select the right tank as an alternative, but this would have resulted in turning the fuel off and a forced landing.

CAA Comment: The pilot filed an MOR which has been closed by the CAA but the AMO did not file an MOR. The CAA Safety Intelligence team were able to identify that the incident resulted from several Human Factor elements,

including unclear information contained within the Aircraft Maintenance Manual (AMM) and the failure of the engineer to seek advice from a more experienced member of the maintenance team. Additionally, there were issues relating to non-recording of work, supervision failures and rushed testing post maintenance. Remedial Actions have since been implemented as required.

❝ CHIRP *Comment* ❞

The Human Factors issues in this report all lined up to create an extremely dangerous situation. The fuel selector had offset mounting holes that should have prevented it being installed incorrectly. Unfortunately, its location was such that pre-flight checks would be unlikely to spot the empty bolt hole, and it was only the fact that the left wing-tank ran dry because of the previous taxiing runs that saved the day.

The overriding question is, even if the engineer thought that the component was orientated correctly and a bolt was left over, why did that not raise a big red warning flag? We all know of situations away from work where the odd fastener is left over after carefully erecting Swedish flat-pack furniture, but this was a component critical to the safe and correct operation of the aircraft. Refitting or replacing components in the incorrect orientation is not new of course, and there is a danger that good aircraft design to make installation fool-proof is making us lower our guard against such errors.

In larger organisations, would this issue be less likely because they are able to provide sophisticated risk mitigation, large training budgets and a permanent Quality/Safety presence? Large organisations benefit from a Human Factors advantage: that of mentoring, coaching and advising - what one might call "Good" Peer Pressure.

If you are a certifying engineer with thirty licensed colleagues, then you have thirty people to ask for assistance if needed. Equally thirty people can say "you are wrong" before you make the mistake. GA certifying engineers may be working alone and although this might be routine, risk should still be assessed and mitigation possibilities considered. Using the latest revision of the AMM (and recording the ATA Chapter and Section reference) is one mitigation against error but this defence is reduced if the AMM is less sophisticated than that of newer aircraft types.

If changing a component is left to the experience and judgement of the engineer, the opportunity for error increases. If a task cannot be completed within the current duty time, even if you are absolutely certain that you will be picking up the task next shift, it is not as daft as it sounds to write yourself a handover. Five minutes of notes before packing up when you are focused on the task will be a handy aide memoir next morning. Quality Assurance has to be demonstrated as required by the regulations but Quality Control is the responsibility of the certifying engineer.

An Aircraft Maintenance Licence often leads to supervisory status but there is no exam module for man-management. Now that HF training has largely moved to Computer Based Training, is our knowledge really being refreshed? Has Safety Culture become stale? Safety Culture should be more than something only the Authority and Training focuses on - it is for all of us to support and aim to improve. Human Factors is for all of us to consider all and every day, not just on recurrent training day or on quiet days when there is time, but also on the busy days when operational, management, time and adverse peer pressures plus distractions and multi-tasking all present competing challenges.

Human Factors is for all of us to consider all and every day

Report No.4 – FC5106 – Basic UPRT

This report was initially submitted to the CHIRP Air Transport Advisory Board but has relevance to many in the GA training community and so is included for information. The reporter's concerns were that light-aircraft Upset Prevention & Recovery Training (UPRT) techniques might be inappropriately applied to large-aircraft when pilots were under the stress of conducting an actual recovery: there are some important differences between the 2 classes of aircraft that need to be understood and applied correctly.

Report Text: I am writing as I wish to voice my views on the new UPRT courses which are now mandatory for new pilots and I'm interested to hear your thoughts.

I am a TRI on [Airliner type] and I regularly fly and instruct on light-aircraft. As you are aware, student pilots who complete their initial training now require to do a 3-hour UPRT course before they can apply to airlines. As part of a type rating we do a 4-hour simulator session on UPRT manoeuvres. I have found many students are struggling with this part of the course because it is very different technique to what is taught during the UPRT basic course at flight school.

For example, in a light-aircraft in a high-nose upset, you will recognise the situation, APPLY power, lower the nose and roll wings level. However in a jet transport aircraft you may have to initially REDUCE the thrust, lower the nose and roll wings level. The same applies for stall techniques, in a swept-wing with pod-mounted engines the most important thing to do is lower the nose and, to do this, a reduction in thrust may be required.

I see lots of students on their type-rating course struggling with this due to being taught the UPRT recoveries for light-aircraft during the UPRT basic flight school course. Personally I feel that the possibility exists of airline pilots who may find themselves in an upset situation in a jet transport may revert to these

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previously taught techniques during UPRT, which may in turn make things worse. Pilots often revert to how they were first taught when under stress and dealing with situations. I would therefore ask, is the UPRT course really achieving the aim it was set out to do?

I strongly feel that simulating stalls and upsets that mimic incidents like AF447 is far more beneficial in a Level-D simulator than learning light-aircraft techniques which essentially would make the situation worse if these were applied to a swept-wing jet transport airplane. I feel part of the issue is the instructors teaching these UPRT courses at flight school often have no experience with jet transport UPRT recoveries and are unaware of the differences.

Background Information: Commission Regulation (EU) 2018/1974 entered into force on 20 December 2018. This Regulation amended Commission Regulation (EU) No 1178/2011 by introducing new requirements for upset prevention and recovery training (UPRT) for pilots in its Annex I (Part-FCL). Effectively, on-aircraft Advanced UPRT (FCL.745.A) became mandatory from 20th December 2019; all pilots studying for new ATPLs and pilots undergoing their first type rating course in multi-pilot operations, are now required to undergo the Advanced UPRT course. The training requirement under FCL.745.A is 3hrs of actual UPRT. All commercial airlines are required to include recurrent Flight Simulator UPRT over the normal 3 year Simulator Programme; there is no requirement for in-aircraft recurrency.

ICAO Doc10011 Manual on Aeroplane Upset Prevention and Recovery Training also refers, and Boeing's article Aerodynamic Principles of Large-Airplane Upsets provides useful background to UPRT concepts and recovery procedures.

CAA Comment: The CAA have recently audited UPRT at training schools to ensure that they met with the regulator's requirements for those focused on delivering commercial pilot training as opposed to aerobatic training. Such training for commercial pilots is very different from the UPRT syllabus necessary for a pilot about to undergo aerobatic training to achieve an aerobatic rating on a single-engine piston aircraft.

CHIRP Air Transport Advisory Board Comment: UPRT conducted at flight training schools may or may not assist the large-aircraft Commercial Airline pilot in the actual recovery of their aircraft but the same could be said for many aspects of basic training – many principles learned in a Cessna 152 for example may or may not be relevant to a large-aircraft operator, but we all have to start somewhere. By starting simple and moving to more advanced exercise(s) we increase our competence, and our resilience. Differences required with large-aircraft (e.g. inertia, engine handling, and numerous other items) are covered as part of the advanced MCC or Type Rating Courses. UPRT training (as approved by the CAA for large-aircraft operators) includes specific standardised ground-school requirements that emphasise the differences between the light-aircraft used for such training and the large-aircraft case, and only those providers who have been approved by the CAA for this activity can deliver the associated UPRT training, which is quite different from UPRT training delivered by other organisations for aerobatic purposes for example.

There are a couple of aspects of UPRT that may also be relevant to the UPRT training requirements. Whilst Level-D simulators provide excellent training facilities, they do lack in a couple of areas: the inability to provide G-loading and the lack of disorientation effects spring to mind (especially with regard to UPRT). The opportunity to experience "G" is a vital element in the UPRT training so that pilots will not be surprised when they encounter levels of G when commencing a recovery. Even the 2.5G that an Airbus limits to might startle a pilot during a recovery, and the opportunity to experience it in a light-aircraft will probably be invaluable. Furthermore, a Boeing could pull a lot more G than this and the ability to experience "G" in the UPRT training prior to CPL issue is most worthwhile. The regulatory requirements for UPRT are now extensive (and covered under ORO.FC.220 & 230 and their associated Guidance Material, and EASA Part FCL Appendix 9), but operators are at liberty to increase the training beyond the regulatory levels.

We would all agree that prevention is better than recovery, and a lot of the regulatory requirements focus on this. But we must not overlook the number of aircraft that have ended up in an "Unusual Position" from which the flight crew were unable to recover. CHIRP suggests that the core issue in these was probably not whether they closed the thrust levers or not, but the very basics of recognition and recovery (e.g. rolling to wings level before pulling for the nose-low recovery case). Level-D flight simulators have improved recently with the implementation of CS-FSTD 2 (which ensures the simulators should adequately reflect the handling of the actual aircraft more realistically), and airlines and training organisations now have the ability to increase the amount of training of stalls and other upsets that mimic incidents.

There does, however, remain a regulatory requirement for Upset Recovery, as well as prevention. The basic training provided in the light-aircraft training may assist in this regard, even though it may not be as specific as one would like, and it's also important for airlines to make sure that their trainers (who may not all be experienced light-aircraft pilots) are nevertheless aware of the importance of emphasising the techniques and differences in large-aircraft UPRT handling.

CHIRP GA Advisory Board Comment: The Advanced UPRT course was introduced as a pan-European effort to combat hull losses due to aircraft loss of control; not least the AF447 incident. The course is designed to teach the students how to cope with psychological

and physiological aspects of dynamic upsets in aeroplanes in order to help develop the necessary competence and resilience to apply appropriate recovery techniques during upsets: a Level-D flight simulator cannot simulate these physiological effects of an upset.

The training is designed to teach students a strategy to recognise and prevent the onset of a stall event and potential upset position. The course is split up into two main elements; 5 hours ground-school and 3.5-4 hours inflight instruction. During the ground-school the students are refreshed on basic aerodynamic theory; in particular, the relationship of lift to angle of attack, medical aspects of upsets and the causes of upsets, including case studies. The flight aspects include investigation of slow flight and stalling, with and without high-lift devices.

A robust technique is taught to recognise stall events, along with lessons on incipient spin and spiral dive recognition and recovery. There are demonstrations of recovery from a deep stall, and how load factors (G) affect the stall. Following this, upset recovery is then trained. During the course the students are told of the limitations of using a light-aircraft; in particular with regard to inertia - in the absence of any large swept-wing aerobatic-capable aircraft, a compromise has to be achieved. At the conclusion of the course the students undergo an assessment of competence and, as part of the course debrief, the students are instructed that company procedures must always be followed when they graduate with their commercial licence.

The basis of the upset training is generic by its nature. However, the recovery techniques taught are those for commercial airliners and they align closely with Airbus and Boeing procedures. The pilot will verbalise the issue, disconnect the automatics/auto throttle (if desired) and lower the nose (unload). If this does not work then, for a nose high upset, consider thrust and roll to bring the nose to the horizon. Note that in all upset recoveries, after the consideration of automatics, the training is to attempt to unload the wing first before ANY other action, this includes thrust and or rolling options.

There will always be differences in service providers, but the leading schools' staff all have significant jet/test pilot experience. The schools encourage feedback from the airlines so that issues can be resolved and training enhanced; so far, the feedback has been highly positive.

DIRECTORY

- EASA Part-FCL GM1 FCL.710
- CS-STAN
- BMAA Technical Information Leaflet No.017 dated March 2018
- Aerodynamic Principles of Large-Airplane Upsets
- Farley Card
- EASA CS-STAN Issue 4
- GA Feeback Ed84
- ORO.FC.220 & 230 and their associated Guidance Materials
- (ADREP) taxonomy
- TL 3.24: Camera Installations
- Regulation (EU) 2018/1974
- EASE Part FCL Appednix 9
- CAP 1369
- VAF - GoPro Mount RV-9A
- Manual on Aeroplane Upset Prevention and Recovery Training

CHIRP
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CHIRP

Confidential Human Factors Incident Reporting Programme

What is CHIRP?

CHIRP is a UK charity that provides the UK's independent confidential reporting programme for aviation safety-related incidents and concerns. The programme provides a way for people to report things when they don't know where else to do so or when they wish to make a report without being identified to others. When making a report to CHIRP, personal details are not shared with any other organisation or person. Confidentiality is our watch-word and we only pass on disidentified information to other organisations with the agreement of the reporter when we conduct investigations. Your disidentified report will be reviewed by an Advisory Board of eminent aviation peers who provide independent and impartial advice and counsel to the CHIRP staff. Important information gained through reports, after being disidentified, is also disseminated as widely as possible through our FEEDBACK newsletters and website with the aim of improving safety standards and educating others.

Who can report?

Anyone closely involved in the operation, maintenance or support of aviation. This includes holders of Student/Private/Commercial pilot licences; cabin crew; glider, microlight and paraglider pilots; drone operators; parachutists and balloonists as well as maintenance/manufacturing engineers, ground handling/security staff and controllers/FISOs etc.

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Submit a report when you wish others to benefit from an important "Lesson Learned"; when other reporting procedures are not appropriate or are not available; when you are concerned to protect your identity (please note that anonymous reports are not accepted); or when you have exhausted company/club/regulatory reporting procedures without the issue having been addressed to your satisfaction.

How can I report?

The primary way of submitting a report is through our website at www.chirp.co.uk. On selecting the online reporting feature, you will be sent a link to our reporting portal where you will be invited to enter appropriate details in a series of data fields. You can enter as much or as little information as you wish but the more you give, the better we are able to assist. Although online reporting is the most efficient and effective way of submitting a report, you can also make a report by email to: reports@chirp.co.uk, by phone to: 01252 378947, or by mail to: CHIRP, One Kingdom Street, Paddington Central, London, W2 6BD.

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Report safety-related incidents or concerns involving yourself, other people, your organisation or organisations you deal with. Incidents and concerns can include:

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- regulatory aspects
- unsafe practices

What do I not report?

CHIRP cannot become involved in:

- incidents or events with no safety content
- issues involving conflicts of personalities
- industrial relations problems
- legal or commercial disputes