



## CONFIDENTIAL HUMAN FACTORS INCIDENT REPORTING PROGRAMME

# FEEDBACK

APRIL 1990

NUMBER 21

### YOUR DISCRETION.

⇒ Commercial pressure on operators to maintain the longest safe duty periods results in the CAA having to regulate very carefully for the safe limit. When that limit is reached the use of discretion seems occasionally to be viewed from two different perspectives by Operator and Commander.

The Operator rightly contends that the discretionary limits are part of the Regulations and the AOC within which he is allowed to operate. Commercial reasons are seen as full justification to extend within the prescribed limits of discretion. Unfortunately the wording of CAP371 does not define the PURPOSE OF DISCRETION.

When a Commander is required to extend the Duty Period beyond the normal limit, as defined in CAP 371, then the very act of exceeding a limit can sometimes be regarded as degrading safety. There is often further confusion because the final limit may be extended only in an emergency, defined for the Commander as that which "...presents a serious risk to health or safety." This text is bound to colour the judgement of a Commander in application of the initial duty period extension.

The problem does not always exist but is, of course, at its worst where there is a conflict of view at the end of a telephone, time constrained, after a rotten night stop and before an arduous duty with the operations officer having no aircraft, no crews, and no accommodation available to assist.

Perhaps a definition of the PURPOSE of discretion would go a long way to enabling conflicts of this sort to be amicably resolved and prevent recrimination. There would be no infringement of the absolute right of the Commander, vested in him by the Licensing Authority, to operate the aircraft under his authority to meet his legal responsibilities but any conflict as a result of conflicting interpretation of the meaning would be avoided. That might just keep everybody happy.

### REMEMBER...

- Your words...
- ⇒ Our words...

### WATCH THIS SPACE!

There have been a number of interesting reports during the last four months presenting problems that are still being addressed by the experts. Some of them are of the "... it's impossible for that to happen!" variety, and it can take a while to convince people that there is anything to be investigated.

We will be coming back to you with some of those in the next FEEDBACK, but in the meantime, we would be pleased to hear of any strange adventures with the automatics of the glass-cockpit, experience of the rogue inertial system, or have been doing several consecutive 24 hour flights while on a short detachment!

### BACK AGAIN...

- ⇒ You will remember that there have been comments before on comfort and in particular seat problems. Some of the quotes...
- ...Might not be too bad if pilots' seats were designed to be more comfortable and you could sleep in them.
  - ...What a blessed relief to get out again after a couple of hours and "un-numb" the bum and back! I suspect the chap that occupies the seat does not buy the 'plane, unlike my car!
- ⇒ So CHIRP felt that although you are not all blessed with the adjustable seat the next page might be of use....now read on.

## BACKACHE FROM ADJUSTABLE FLIGHT DECK SEATS?

☞ “Those who possess structurally normal spines can sit for many hours at a time without discomfort or undue fatigue...” so said a report on research done by IAM over 15 years ago: but it went on to say “...provided that the seat design and the seat environment permit, or better still, encourage good seated posture.”

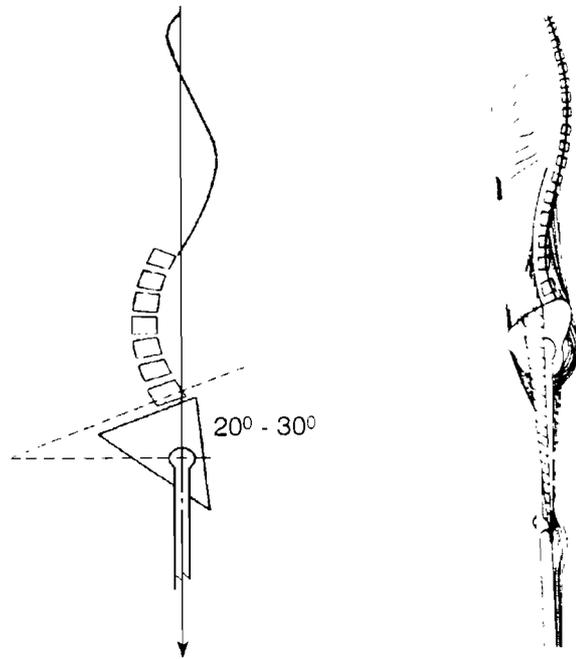
Although aviation books on fitness and fatigue have mentioned, in passing, the effect of good sitting posture on fatigue there is little real advice on how to achieve good sitting posture. On the seats which are available now a number of different adjustments are possible leading to a bewildering number of combinations of settings. Instruction during “type conversion” includes the operation of these adjustments but at that time the criteria for the settings are all related to operational factors, like rudder travel and line of sight down the nose of the aircraft. Poor posture may be the eventual result of these adjustments giving rise to discomfort and fatigue after a comparatively short time.

To get it right we need to understand a little physiology. When the spine is upright and properly aligned in the neutral position the load of the trunk, arms and head is spread evenly over the lower part of the spine. The discs separating each of the lower vertebrae are compressed evenly across their load bearing surface. If there is any alteration of the natural curvature of the spine there is uneven pressure across the load bearing surfaces of the discs causing them to bulge slightly from between the vertebrae. It is this bulge which causes discomfort resulting in the surrounding muscles and ligaments being put into tension to relieve the load on the disc. Positioning the pelvis forward from the back of the seat while the shoulders lean on the seat-back results in changing the curvature of the spine and the angle between spine and thigh.

There is a way to obtain good sitting posture. Once the seat has been adjusted for operational considerations ensure that the buttocks and the shoulders make contact with the seat-back. By placing one hand between your back and the seat you can now feel where the lower curvature is on the spine. That is the gap for the lumbar support to fill. The angle of the seat-back with the seat should be between 105 to 112 degrees (that is leaning slightly back!) for greatest comfort and least stress on the spine. Finally, any thigh support should be adjusted to give support along the length of the lower thigh in the relaxed position without restricting rudder operation.

The source of this information was the work of the late Dr. J. G. Fitzgerald, well known at IAM. You may find that this advice is helpful, but if you have a persistent problem with back discomfort then you should see your AME for specific personal advice.

There are back supports available which can be designed for the individual and carried by them for personal use both in aircraft and other seating.



Above are diagrams to show the spine correctly positioned when standing erect. (VIEWED FROM THE SIDE)

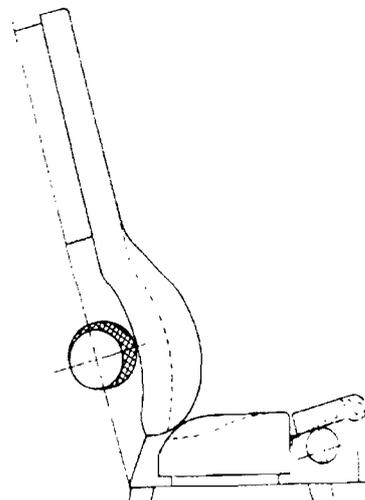


Diagram showing adjustable seat with lumbar support in position..

## “AND THE REST”

● I think that it might be an idea to publish the hours that the Europeans fly + FAA duty hours.

i.e. I think the Spanish duty hours maximum is 16HRS! - no matter what time they start the duty period.

⇒ Several reporters have asked if there is a breakdown of the rest of the world's airlines rules for operating. The quick answer is that the minefield of weighting factors and caveats make fair comparison very difficult. We have, however, been brave enough to put together some information, from a variety of sources. The best overview is provided by the papers on the One Day Conference on Flight Time Limitations available from the RAeS.

Country	Max Hours	Min Rest	Yearly
UK	14	12	900
BELGIUM	16	8	1000
FRANCE	14	11	900
W. GERMANY	14	10	1000
GREECE	14	10	1000
SWITZERLAND	14	8	1000
SPAIN	14	10.5	800
ITALY	24	15	1000
NETHERLANDS	16	11	1000
PORTUGAL	12	8	850

NOTE THAT NONE OF THE VARIOUS WEIGHTING FACTORS ARE APPLIED TO THIS GENERALISATION OF HOURS ON DUTY.

## CHIRP AND CONFIDENTIALITY

From time to time we are asked about the confidentiality of the identity of our reporters. We do take great pains to ensure it. Reports usually arrive complete with the name, address and telephone number. If there is any query or further information needed to clarify some detail then this is used to contact the reporter. The part of the form containing the name, address and telephone number is then removed from the report and enclosed with a letter of thanks to the reporter explaining any action taken. The report is put into the computer without this but containing all the relevant information on the event and is used only in a completely disidentified form. This has become very difficult since the inclusion of ATC reports which by their very nature make anonymity difficult. If doubts on this subject are preventing you from reporting, consider that from the start date of 1982 there has been no breach of confidentiality.

⇒ INCAPACITATION : IAM has requested your help with a current IFALPA study. They would like to hear, through CHIRP to ensure confidentiality, of any in flight incapacitation experienced by flight crew.

## INCAPACITATION OF THE "ELECTRONIC CREW MEMBER"

● On the day of Son of the Great Storm, I was tasked to fly a glass-cockpit twin from the Mediterranean to the UK.

Pre-departure landing forecast was for strong south-westerlies, gusting to 70kts. The rest of the UK all offered reasonable diversions.

Max. available fuel was uplifted, giving us about 1hr 20min holding capability, based on the nearest diversion.

The flight progressed normally. The first useful actual was obtained over Austria, about one and half hours before ETA. This showed the expected strong south-westerly, but gave no indication of any other significant problems which might affect our landing. THIS WAS THE IMPLICATION IN ALL SUBSEQUENT VOLMET AND ATIS REPORTS WHICH WE RECEIVED.

We entered the hold at about FL200, with an expected delay of around 40 mins.

As we slowly descended through the stack, winds aloft were 70-80kts, with little or no turbulence. The ATIS

continued to report strong surface winds but gave no warning of any exceptional turbulence.

Eventually we were vectored off the bottom of the stack, still in clear and fairly smooth air, above 8/8 Sc, tops about FL80. Wind still about 70-80kts at height.

As we descended into the cloud, the situation deteriorated rapidly. The wind and turbulence quickly increased. On one frequency change, we overheard the tailend of an ATC message to another aircraft: "... due to several overshoots". We surmised that these were probably caused by cross-winds, a notion reinforced when ATC told us that we were to switch runways for our landing.

At 3000ft inbound on the localiser we were experiencing westerly winds of 188kts (surface wind reported as westerly 38, gusting to 57kts) and we were encountering severe turbulence. When the F/O reported the wind to ATC, the reply was "Roger, understand westerly 88kts".

F/O: "Negative, ONE eighty-eight knots!".

ATC: "Good grief".

At about this time the a/c's automatics started running for cover: both FMSs were repeatedly failing and recovering, and at various times both auto-pilots and the Captain's flight-director were out of action. (The F/O was doing a great job of trying to round up the wayward systems whilst simultaneously monitoring my handling).

The ride down the ILS was very wild, with the wind indicating around 150-180kts. The Tower continued to report surface winds gusting to 50kts, with no mention of wind-shear/turbulence.

At 700ft, with violent turbulence and an apparent 130kts negative shear between that altitude and the ground, we commenced a go-around.

During the Go-Around virtually all the automatics failed again and the turbulence became extreme.

Levelling at 3000ft, cleaned up, but still in severe turbulence we were now confronted with further problems. Our "bolt-holes" began to look suspect: prime diversion was so close that it must inevitably be experiencing the same (UNREPORTED) approach conditions. We determined that only one diversion field was still just about OK, but now on the limit of our fuel reserves. We elected to go, and ATC started vectoring us through the traffic, still at low level in heavy turbulence, with most of the automatics (including the FMSs) inop.

At last we were cleared up out of the cloud and back into clear and relatively calm air. The automatics now started creeping back out of the woodwork, but we were still extremely busy: the two crew operation really stretched to the limit.

As we flew on, the weather continued to deteriorate, with cross-winds gusting to over 50kts. Once again, as we descended into the Sc, the wind and turbulence became intense, but neither ATIS nor the ATC were reporting anything more than a 10kt shear.

En-route to the diversion, a combination of failed automatics, unfamiliar ATC clearances, and monitoring of the weather (to say nothing of liaison with the cabin crew, the very frightened pax, and the Company) had precluded us from getting the weather for any "ultimate"/"tanks dry" possibilities. With just over 3 tonnes remaining (about 30 mins flying), we HAD to make it in, and with the weather deteriorating literally by the minute, it had to be the first time.

Fate wasn't hunting us that day and we made it. The last wind read-out from the FMS/IRS systems, "locked in" at 35ft, was north-westerly at 113kts.

The next aircraft on the approach overshot successfully from the flare. The next, a narrow-body twin, scraped a pod along the runway in spectacular fashion.

That's a long story, but someone could have been killed that day, and it could have been me. Flight safety is about learning from those who "got away with it", so may I offer the following observations?

1. First, and most important of all WHY WERE WE ALLOWED TO FLY INTO SUCH DANGEROUS CONDITIONS COMPLETELY UNWARNED? Strong south-westerlies always bring turbulence. ("I" know that, because I've been operating into the UK for 20 years. But is every international pilot so familiar with local effects? Why can't the ATIS give us some clue - "Expect light/moderate/severe turbulence on the approach"?).

Obviously, on this day, previous flights had experienced severe problems (hence the overshoots). Why did ATC give no hint of the troubles lying in wait on the approach? Any such warning would have had us far more alert and questioning during the hold. ATC seemed surprised at our report of 180+kts winds at 3000ft. Were we really the first a/c to report these? If so, why hadn't anyone else?

2. Following our go-around, we needed quick and accurate weather reports to decide on the diversion. Obviously, the actuals we had earlier received were now highly suspect in view of what we had experienced. Given lack of automatics and workload, we had no time to listen to a selection of VOLMET broadcasts: we needed IMMEDIATE information. However, ATC did not have this to hand, so it was several minutes before we could establish a clear preference for any diversion airfield. I BELIEVE ATC SHOULD HAVE REAL-TIME WEATHER REPORTS OF POSSIBLE ALTERNATES IMMEDIATELY AVAILABLE TO SUPPLY TO CREWS UNDER PRESSURE (eg DURING ABNORMALITIES/EMERGENCIES OR FOLLOWING GO-AROUNDS).

3. At neither airfield was any impression given by the ATIS or ATC of the real conditions on the approach. Would the "low overshoot" and the "pod-scraper" really have pressed on if they had had forewarning of the conditions?

4. Why did the automatics quit when we really needed them? Has their performance been assessed in severe turbulence, not just under steady G-loading?

☞ The manning levels of the aircraft and ATC are predicated on all the systems working correctly. When the automatics disappear the workload of both doing and monitoring is a quantum jump from normal. There may be a case for declaring an emergency under these conditions. The workload can then be better shared between aircrew and ATC so that it does not become so great that nobody notices that there is a danger of running out of time, fuel - or just ideas to cope with the situation.

## RETURN MATCH?

- There are still too many aircrew who do not realize it really can be a crowded sky and that their actions can have a drastic effect on the planned separations of controllers. In a recent airmiss, it was discovered that one a/c involved, which had been climbing to FL310 and had reached FL290, a fact which was noted by a controller and used as a basis for certain actions by that controller, then descended to FL285 to gain airspeed to attempt the further climb. All without a word to ATC. If the aircrew had only reported their problems to ATC no incident would have occurred. In another incident, sometime ago, two aircraft of the same type, at the same level and, approximately, 15 miles apart in trail, came within 7 miles of one another, before the controller realized something was wrong and intervened to avert a serious incident. The leading a/c had reduced speed by 40knots, or more, in preparation for a descent (which had not at that stage been given) without a word to the controller.

It would be a very useful piece of advice to impart to all aircrew, that if you do anything other than "continue as cleared, or expected" i.e. change heading, change speed, reduce rate of descent, run out of climb and level off, then tell the controller. he'll generally be able to cope without any significant penalty to you. If you don't tell him, the penalty may be much more serious.

## BY THE WAY:

- "ANXIOUS" : Now we have "cured" the fatigue problem by attaining a 55 hour week. what shall we concentrate on next??

☞ Dear "ANXIOUS", curing is what you do to ham! We are trying to improve safety in what will always be a risk business.

## WITH A LITTLE HELP FROM MY FRIENDS

- Aircraft engaged on multi-leg trip. Central USA - East Coast USA - UK Customs Airport - UK destination. Number of crew and rest periods unknown, but the regular trip misses the customs stop and even then the crew usually land pretty tired. Extra leg on this occasion caused by customs problems at destination.

On day in question most of UK covered in fog, with many airfields closed. The a/c landed OK for customs and Captain rang my ATC at destination for weather.

Decided wind out of limits for ILS to instrument r/w so elected SRA to reciprocal r/w, but for this would need visibility to improve to 1600M. Over the next hour we received several calls from Captain, Co-pilot and Ops staff enquiring if VIS had picked up. Eventually we improve to 1600M so the a/c launched for us. No problems vectoring round the circuit and the aircraft was successfully positioned six miles out on the SRA centreline at 1500ft QFE. Descent began at five miles and all proceeded well for a while, with only one small heading correction needed to maintain the centreline. At three miles I made a transmission break to confirm gear down but received no reply. A further request resulted in silence from the aircraft. The talkdown was continued as by this stage the aircraft had started to drift right of centreline. An adjustment of five degrees left had no effect, neither did two further similar corrections. By this time the aircraft was well right of centreline and I requested the pilot acknowledge his offset position and confirm his heading. Again there was no reply, but at one and a half miles, just as I had decided the situation was getting too dangerous and about to instruct a go-around, the aircraft suddenly turned left towards the centreline. Such was the severity of the turn that I assumed the pilot must either have applied all my left turn corrections in one go, or seen the lights and corrected visually. I continued the talkdown, applying a total of 10 degrees right as the aircraft approached and finally settled on the centreline at three-quarters of a mile. At half a mile, just at the end of my final transmission I heard the word "lights" being shouted over the R/T. Ultimately a safe landing was effected, but on transfer to tower frequency the pilot sounded very confused. Probably the most telling point in this incident is that the Ops staff at our Handling Agents reported the crew were "totally knackered" and "almost incapable of coherent speech".

I leave you to draw your own conclusions. I guess that there might have been a freak windshear; there could have been radio problems, or technical problems on the flight deck distracting the crew. My money goes on an overdose of fatigue and boredom. Interestingly, the crew were planning on returning to their Base after offloading the cargo, but luckily the weather clamped and they were forced to stay on the ground till next day.

☞ The same point was made by a helicopter Training Captain who took over what he knew to be a very good crew half way through a long series of flights; "IT WAS AS IF THEY WERE OPERATING IN TREACLE..." The insidious degeneration of performance with fatigue affects all the crew and their ability to notice the effects.

# WHAT IS NORMAL

● There was no incident as such but a lot of factors outwith my control which could have easily contributed to an incident or made one difficult to deal with. On my sixth consecutive day of duty and having worked some forty five and a half hours, with some hours yet to go, I agreed to work a two man sector on my own. The adjacent sector was similarly manned. The understanding was that it would be for a limited period, in order to provide fatigue breaks, and that flow control would keep traffic to manageable levels. This did not happen - partly because of the way flow control is implemented, and partly because a proportion of aircrew (thankfully small) think that flow control is put on for spite and will do all they can to get around it, traffic overflying my sector which weren't really mine to deal with did not help. The thermometer above my head indicated 78 degrees F, cool by some days recently - the air conditioning is hopelessly inefficient. After 1 hour and 40 minutes I was irritable, sweating and having to concentrate hard to do tasks which should have been instinctive. The promised flow control had not been implemented at all and I was severely stretched. I could

not have coped with an emergency as effectively as I would normally. I asked for assistance - none was available. I carried on for another fifteen minutes until I was relieved, having worked 1 hour and 55 minutes. 2 hours is supposed to be the maximum time one should work under any circumstances but is used as the norm.

It took all of my days off to recover from those six days of duty, and in particular the one I refer to, sufficiently to be able to face returning to work for the next cycle - I'm not refreshed or content - merely holding on and hoping that things will improve, whilst knowing that they won't..

☞ The problem of fatigue in air traffic controllers has just, as everybody knows, received a fairly thorough going-over from the Committee for Regulation of Air Traffic Control Officer's Hours. The report of this committee is available from the CAA if you ask for it, and contains a good deal of the information gained from two studies here at the IAM which controllers may well find of interest. Separate reports of these studies will be available from the IAM shortly.

## OLD BUT NOT BOLD

● Many of ATCOs suffer from the 2200-0800 night shifts from age 55 onwards.

I was responsible for the conversion training of more than 100 ATCOs and ATCAs to the demands and skills of computerised operation. It was most difficult to retrain staff, over say the age of 35, to dispense with flight progress strips and pens, and adapt themselves to VDUs and keyboard inputs. I wonder if the airlines found this too when they introduced colour VDUs in air transport cockpits. We advanced in one step from the cockpit of the DC3 to the cockpit of an Airbus A320!

☞ Quote from a well respected psychological tome, " ... It is fair to suggest that insufficient time devoted to mastering new facts and ideas is a reason why thinking often becomes hidebound in later middle age among those hard pressed by day-to-day activities and responsibilities, and that time set aside to acquaint themselves with new developments would be well repaid."

Quoted from The Oxford Companion to THE MIND, edited by Richard L. Gregory.

## WHAT COMES IN AT CHIRP

### FLIGHT DECK 48

Fatigue, Commercial Pressure, CAP371.....	19
Helio - deprivation.....	6
Own errors.....	5
Foreign airspace/ATC.....	4
Simulator events.....	4
Tech problems/equipment/ergonomics.....	4
ATC related.....	3
FEEDBACK/comments/moans.....	2
Miscellaneous(Cabin Crew).....	1

### AIR TRAFFIC CONTROL.....9

Management/fatigue/stress.....	4
Moans about pilots.....	2
Equipment.....	1
Miscellaneous.....	2

***GUARANTEE*** NO RECORD OF YOUR NAME AND ADDRESS WILL BE KEPT

NAME \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 PHONE No \_\_\_\_\_  
 \_\_\_\_\_

DATE OF RECEIPT AT THE RAF INSTITUTE OF AVIATION MEDICINE
ATC REPORT

We ask that you give your identity only to enable us to contact you if we are not clear about any part of your account.  
 In any event this part of the form will be returned to you, as soon as possible, to confirm that we have received your report.

YOURSELF	THE INCIDENT	
HOW LONG AN ATCO	DATE	ATC SERVICE(S) BEING PROVIDED
HOW LONG AT PRESENT UNIT	TIME	IN WHAT TYPE(S) OF AIRSPACE
ON DUTY AS	LOCATION & NEAREST REPORTING POINT	USING WHAT TYPE(S) OF RADAR
HOW LONG VALIDATED ON THIS POSITION	TYPE(S) OF AIRCRAFT INVOLVED	WEATHER
	AIRCRAFT IFR OR VFR	

Please use this space to write your account, using extra paper if you need to

SEND TO: CONFIDENTIAL REPORTS, FREEPOST, RAF IAM, FARNBOROUGH, HANTS. GU14 6BR  
 YOU CAN ALSO OBTAIN MORE DETAILS BY TELEPHONING ALDERSHOT (0252) 24461 Ext 4375

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***GUARANTEE*** NO RECORD OF YOUR NAME AND ADDRESS WILL BE KEPT

NAME .....  
 ADDRESS .....  
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 PHONE No .....  
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DATE OF RECEIPT AT THE  
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**FLIGHT DECK  
 REPORT**

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YOURSELF	THE FLIGHT	THE INCIDENT
CREW POSITION	DATE	TIME (PLEASE STATE LOCAL/GMT)
TOTAL FLYING HOURS	FROM:-	DAY/NIGHT
HOURS ON TYPE	TO:-	LOCATION
	IFR/VFR	PHASE OF FLIGHT
	TYPE OF OPERATION	WEATHER (IMC/VMC)

THE AIRCRAFT
TYPE
No OF CREW

Please use this space to write your account, using extra paper if you need to

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