Safety Regulation Group

Civil Aviation Authority

CAP 625

Progress Report 1993

CAA Responses to Air Accidents Investigation Branch (AAIB) Safety Recommendations

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CAA Responses to AAIB Recommendations received up to 31 December 1992, presented to the Secretary of State for Transport November 1993

Important Note

The CAA has made many of the documents that it publishes available electronically (in addition to traditional printed format). The contents of this document are unchanged from the previously printed version. For consistency with other CAA documents new cover pages have been added. Further information about these changes and the latest version of documents can be found at www.caa.co.uk.

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Foreword

In the UK, the Civil Aviation Authority (CAA) is responsible for civil air safety ie the establishment and monitoring of standards, including the licensing of flight crews, aircraft engineers, air traffic controllers and aerodromes and the certification of airlines and aircraft.

The Air Accidents Investigation Branch (AAIB), a branch of the Department of Transport, is responsible for the investigation of all civil aircraft accidents and serious incidents occurring in or over the UK.

The two functions, and associated responsibilities, of accident investigation and safety regulation are clearly different and the two organisations are deliberately kept independent of each other. However, the evaluation of the findings of an accident investigation and the determination of the need for, and the initiation of, appropriate action to maintain and enhance safety is an important part of safety regulation ie the responsibility of the CAA. Thus a good working relationship between the two organisations is essential, while in no way jeopardising the independence of the accident investigation.

While day to day liaison is maintained between CAA and AAIB in the aftermath of any accident, the formal procedure by which AAIB identify and convey to the CAA, or other bodies, matters which it believes requires action – either by the Authority or others – is by means of Safety Recommendations.

Recommendations can be, and are, made at any stage as the AAIB investigation progresses. CAA has in place formal procedures for the receipt and evaluation of such Recommendations and initiation of necessary action. In its evaluation the Authority has to consider all the implications of the Recommendation and any action being proposed; it must also take into account the views of other Regulatory Authorities eg the European Joint Aviation Authorities or the Authority responsible for the initial certification of the aircraft type. The Authority responds to the AAIB as quickly as possible on all Recommendations as they arise: those of an urgent nature being acted upon immediately. In the case of AAIB Formal Investigations for which an Accident Investigation Report is published, all Recommendations made are listed in the final Report. In such cases, the Authority publishes its response to the Recommendations on the day the Report is published. This is done by means of a FACTOR (Follow-up Action on Occurrence Report). Responses to Recommendations arising from other AAIB investigations are also included in this Annual Report.

Some Recommendations involve long term investigation or research; in order to determine appropriate action when this is so, the Authority response will indicate that the status of the Recommendation is ‘Open’ until all action by the CAA has been completed.

Some of the Recommendations made by the AAIB are addressed to organisations other than the CAA: such Recommendations are not included in this Annual Report.

This is the fourth Annual Progress Report submitted to the Secretary of State for Transport. It contains all Recommendations addressed to the Authority and received during 1992 together with the Authority’s responses. This Report also contains the current status of earlier Recommendations which were listed as ‘Open’ in the previous Progress Report.

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CAA Responses to AAIB Recommendations 4th Report

1 Introduction

This Report is in response to the Secretary of State for Transport's request to the Authority for Annual Reports on the status and progress on its responses to the Recommendations made to the Authority from the Air Accidents Investigation Branch. This Report covers all of those Recommendations which remained open from the previous Report and these are dealt with in Part 1. All Recommendations received during 1992 are dealt with in Part 2.

2 Recommendations – Status Summary

2.1 *Recommendations Outstanding from Previous Report*

65 Recommendations remained open from the previous report; of which 23 have now been closed and 42 remain open requiring further Authority action.

2.2 *New Recommendations Received*

During 1992, a total of 90 Recommendations addressed to the Authority were received compared with 82 for 1991. A Summary of the Acceptance and Current Closure Status of these is as follows:

Year	*Acceptance*		*Not Accepted*	*Current Status*	
	Full	*Partial*		*Open*	*Closed*
1991	45	18	19	19	63
1992	73	9	8	31	59

NB: Recommendations not addressed to the Authority are not included in the text of this report and are excluded from the above statistics.

3 Overall Summary of Recommendations Addressed to the Authority

	Total	*Accepted*	*Partially or Not Accepted*	*Current Status*	
				Open	*Closed*
PRE 1991	452	349 (77%)	103	10	442
1991	82	45 (55%)	37	19	63
1992	90	73 (81%)	17	31	59
TOTAL	624	467 (75%)	157	60	564

Part 1 – AAIB Recommendations Remaining Open from the 1992 Progress Report

AEROSPATIALE AS 355 TWIN SQUIRREL	**SWALCLIFFE**	**08Apr86**	**ACCIDENT**	**8600990**	**89/03**

References: AAR 7/87 dated 16Dec87
FACTAR 7/88 dated 29Feb88

RECOMMENDATION 4.3

A review of those BCARs which deal with power unit malfunctions be conducted with a view to improving those indicating systems that enable a pilot to identify a failed power unit correctly.

Status – Fully Accepted – Open

CAA Action

Research into failure recognition and pilot intervention is being undertaken by the RAF Institute of Aviation Medicine. Phase 1 of a simulator trial at Farnborough using the BIHL Chinook simulator, with predominantly military crews, has been completed. Phase 2, though dependent on the results of Phase 1, proposes to extend the experimental work to a representative North Sea helicopter simulator and to civil crews performing routine base check sorties.

RECOMMENDATION 4.7

A review of current CAA and FAA proposals relating to the criteria for likely icing conditions at low altitude be conducted.

Status – Fully Accepted – Open

CAA Action

The FAA work on the revision of the definition of icing conditions contained in Appendix C of FAR25 continues and progress is being monitored by the CAA.

Results of the tests (CEPR,SACLAY Document No 332AO4.4685) undertaken in France specifically directed towards techniques of test engine intakes at 0°C have also shown that it is feasible satisfactorily to represent icing conditions at and close to 0°C. Analysis of the results of the tests by the French Authority will be used to review the icing atmosphere that is used as the basis for certification within the JAA requirements.

RECOMMENDATION 4.8

Consideration be given to the establishment of test facilities which can provide experimental conditions of engine installations in icing at temperatures around 0°C.

Status – Fully Accepted – Closed

CAA Action

The Authority has re-examined existing data obtained during the certification of helicopter and fixed wing aircraft engine installations to determine the extent and limitations of the present tests and has surveyed the test facilities currently available.

Similarly the French Authority has conducted tests specifically to address engine intake icing at or near 0°C which demonstrates the feasibility of providing experimental conditions of engine installation icing at temperatures around 0°C.

As a result of this action the CAA has determined that there are established test facilities which are able to provide experimental conditions for the certification of engine installations in icing conditions at or close to 0°C.

LOCKHEED L1011 TRISTAR LEEDS/BRADFORD 27May85 ACCIDENT 8501527 89/04

References: AAR 2/87 dated 07Jul87
FACTAR 10/88 dated 28Jul88

RECOMMENDATION 4.5

Regulatory authorities should identify runways with initial downslopes that are severe enough to affect significantly aircraft landing performance, and should require aircraft operators to take account of such slopes when determining maximum landing weights.

Status – Fully Accepted – Closed

CAA Action

Relevant runways have been identified by the CAA using an arbitrary criteria of a downslope in excess of 0.5% over the first 400 metres of the landing distance available and their actual downslopes promulgated in the UK AIP.

Compliance with operational regulations concerning landing distance performance is determined prior to aircraft despatch and is based on a number of assumptions about the aircraft and airfield conditions that will pertain at the time of landing. These sources of imprecision are compensated for by the relatively large safety factor that is included in scheduled landing distances, in keeping with international practice and endorsed by the JAA.

Therefore the CAA believes that considerations of runway slope on landing performance are adequately addressed by current requirements.

It is however recognised that there would be merit in providing flight crews with advice on the derivation of landing performance and the allowances made for variations of landing conditions and techniques. To this end an Aeronautical Information Circular entitled 'Landing Performance of Large Transport Aeroplanes' AIC 84/1992 was published on 15th October 1992.

BELL 222	LIPPITS HILL, ESSEX	06May87	ACCIDENT	8700930	89/05

References: AAR 3/88 dated 08Jul88
FACTAR 11/88 dated 18Aug88

RECOMMENDATION 4.13

The CAA require, for all aircraft types, the early provision of a facility continuously to monitor the vibration of all high speed rotating equipment whose integrity is critical to flight safety.

Status – Fully Accepted – Open

CAA Action

As a result of the CAA review of the need to provide vibration monitoring equipment for all types of engines a change has been proposed to JAR25 (Large Aeroplanes) to extend the current requirements for turbo-jet engines to include turbo-propeller engines.

JAA requirements for small aeroplanes and helicopters (JAR23, JAR27 and JAR29) are being developed and CAA will propose the introduction of similar requirements. In the meantime the CAA will consider the necessity for vibration monitoring equipment on all new engines during the review of the hazard assessment and will require provision of this equipment for existing types where warranted.

SIKORSKY S76A	NORTH SEA	09Dec87	INCIDENT	8703362	89/07

References: AAR 5/88 dated 14Sep88
FACTAR 14/88 dated 06Dec88

RECOMMENDATION 4.4

The CAA, in conjunction with helicopter operating companies, should consider the production and provision of a visual approach aid for use on platform and rig helidecks.

Status – Fully Accepted – Open

CAA Action

The original version of the ODAPI (Omni-Directional Approach Path Indicator) was redesigned, following earlier flight trials, to increase the light output. Offshore flight trials of the redesigned ODAPI started on the Shell Kittiwake platform on the 25th February 1993. The trials cover operational use of the aid and its performance in the offshore environment. The results of the trial are presently being analysed. The interim report produced by DRA Bedford, covering the effects of contamination on unit operation, concluded that no significant in-service problems are to be expected provided the ODAPI lens is cleaned regularly. Determination of any further action required awaits completion of the final trials report by the contractor.

BOEING 737-236	MANCHESTER AIRPORT	22Aug85	ACCIDENT	8502815	89/11

References: AAR 8/88 dated 15Dec88
FACTAR 5/89 dated 13Mar89

RECOMMENDATION 4.2

Research should be undertaken into methods of providing the flight deck crew with an external view of the aircraft, enabling them to assess the nature and extent of external damage and fires.

Status – Fully Accepted – Closed

CAA Action

The Authority accepts this Recommendation and has considered a range of equipment. The potential for recent developments in miniature closed circuit television (CCTV) systems to provide the flight crew with an external view of the aircraft and a view of inaccessible compartments etc was investigated.

In June 1991, the Authority, in collaboration with British Airways, commenced a joint engineering trial of externally mounted miniature closed circuit television (CCTV) cameras. This trial investigated the engineering feasibility of such a system employing recording and monitoring equipment operated from the passenger cabin. Recorded information has been gained in daylight in a wide range of flight conditions, lighting and weather.

The trial is now entering a further phase. A colour display installed on the flight deck to give operating crew an opportunity to view the camera pictures is to be evaluated and a study made of the human factor aspects of presenting visual information to the flight crew and the integration of that information into the normal and emergency procedures.

The Defence Research Agency (DRA) Farnborough has been contacted by the Authority to carry out investigations related to these aspects. Some of this work is complete but the reaction of operational crews is to be elicited through a questionnaire devised and analysed by DRA.

In parallel with this activity DRA are carrying out trials of similar equipment on their BAC 111 aircraft which will include recording of flight deck activity, the latter primarily in the interests of post accident investigation.

The Authority has also collaborated with a computer/software development company in examining techniques for data ‘compression’ aimed at reducing very substantially the recording media required for video information, and at facilitating in-flight recall of recorded data.

The Authority has also conducted a safety benefit analysis and, based on this study, produced a position paper which concluded that at present there is no case for mandatory fitting of external viewing devices to UK registered aircraft.

RECOMMENDATION 4.10

A review of the approval of the cabin configuration as it existed on G-BGJL should be conducted, with particular reference to the following features of that configuration: i) The restricted view of the passenger cabin afforded the forward cabin crew when seated. ii) The forward aisle restriction created by the floor to ceiling forward galleys. iii) Access to the overwing exit where the presence of row 10 seats appeared to conflict with the British Civil Airworthiness Requirements. It is recommended that all row 10 seats be removed. The approval of other configurations on Boeing 737 and other types should also be reviewed with the intention of addressing any similar problems. (letter to CAA dated 19 September 1985).

Status – Fully Accepted – Closed

CAA Action

(i) *Direct View*

The CAA is proposing interpretative material to the Joint Airworthiness Requirements JAR25.785(h) to ensure that each required cabin attendant is seated in a location adjacent to the exit but which, at the same time, affords a direct view of the majority of the cabin for which the attendant is responsible. This will take into account an FAA Draft Advisory Circular (AC 25.285-1A) which has been reviewed by the JAA. The JAA interpretation of the Cabin Attendant Direct View material in this AC has been used as the design standard applied by the JAA for joint European Type Certification of the MD-11 and will be applied for future JAA Joint Type Certification investigations. CAA has also applied the material for validation of the Boeing 747-400, 767-300 and the Airbus A300-600.

When the FAA AC is formally published JAA will consider the need for any amendments to it in the light of the comments made, and its adoption into the JAA system. A Survey of aircraft in service has been conducted to determine what retrospective action can be implemented to enhance attendant view of the cabin. The CAA in conjunction with the JAA propose that such action be promulgated as a JAR 26 requirement.

(ii) *Access through bulkheads*

The review showed that current requirements for minimum aisle widths are based upon extensive testing under orderly evacuation conditions. In considering any adverse effects induced by panic (competitive behaviour) as might exist in rapidly deteriorating environmental conditions, the CAA initiated a research programme to investigate these effects. A report on this work has been published (CAA Paper 89019). Based on the report findings the CAA has raised a Draft JAR 25 NPA (25D-224-Emergency Exit Access) proposing a minimum aisle width of 30 inches adjacent to floor to ceiling galleys and bulkheads. This is also under consideration for retrospective application. The NPA is being progressed by the JAA Cabin Safety Study Group.

(iii) *Access to overwing exits*

To facilitate the more rapid opening of these types of overwing exit, the CAA has published Airworthiness Notice No 79 (AN 79) (Issue 1, 20 January 1986 and Issue 2, 16 March 1987) which requires an increased space adjacent to the exit to ease the handling and subsequent disposal of such exit hatches. For Type III emergency exits

these requirements were implemented on all UK registered aircraft by 1 July 1986. A similar requirement for the smaller Type IV exits was implemented by 1 December 1987. In addition, this Notice also requires improved operating instructions located in front of seat occupants adjacent to the exit, more secure access routes to the exit and elimination of any features on seats bounding the access route which might trap the limbs of escaping passengers.

AN 79 is an interim measure pending the adoption of similar requirements by the JAA for inclusion in JAR 25. To this end, CAA defined a research programme in conjunction with the Cranfield Applied Psychology Unit to study the ease of emergency exit operation at Type III exits. The report on this work (CAA Paper 89019) shows that access to overwing exits under competitive behaviour is optimised at a passageway width of 18 inches.

This research programme also included an assessment of the effects of passenger egress rates of various access configurations to overwing exits. Preliminary findings show that the removal of Row 10, as recommended by the AAIB, provides no further benefit. In fact egress rates are superior when seat configurations are in accordance with AN 79. The trials revealed the importance of preventing crowding at the exit itself and the need for optimised spacing between seat rows to achieve this.

An FAA NPRM which addressed the matter of access to Type III exits was published as a Final Rule as amendments 25–76; 121–228; and 135–43 in May 1992. Since these amendments did not take into account the JAA comments and areas of concern the JAA has concluded that it needs to develop its own rule change which will address improvements to the requirements for access to Type III exits and will take into account the results of the competitive behaviour trails reported upon in CAA Paper 89019. Retrospective action is also under consideration. This work is currently being undertaken by the JAA Cabin Safety Study Group.

RECOMMENDATION 4.11

A review should be conducted to examine the adequacy of existing British Civil Airworthiness Requirements relating to 'unobstructed access' to exits and these updated where necessary to take account of modern high density seating configurations.

Status – Fully Accepted – Closed

CAA Action

This review has now been completed and is addressed by the action taken in responses to recommendation 4.10 Parts(ii) and (iii).

RECOMMENDATION 4.20

The balance of effort in aircraft fire research should be restored by increased effort directed towards fire hardening of the hull, the limitation of fire transmission through the structure and the prevention of structural collapse in critical areas. Short term measures should be devised for application to existing types but, in the long term, fire criteria should form a part of international airworthiness requirements.

Status – Fully Accepted – Open

CAA Action

The CAA is collaborating with the FAA in a research programme that is addressing both the ability of existing aircraft fuselage skins to resist penetration in a ground fire condition and the behaviour of fires within remote aircraft compartments (i.e.: hidden fires).

The FAA are carrying out full-scale tests on real aircraft and their initial findings have been reported.

The CAA are to test representative components on a medium scale test rig, representative of the full-scale aircraft environment, and have contacted the DARCHEM Company in this respect to undertake complementary research.

These research programmes are continuing. When results are available and have been reviewed, the CAA will, in co-operation with JAA and FAA, determine what, if any, new requirements are necessary.

It should be noted that the capability of water sprays, in limiting fire transmission through the structure, will be included in such a review.

RECOMMENDATION 4.27

A research programme should be undertaken to establish the effect of water mist-spray extinguishing systems on the toxic/irritant constituents of fire atmospheres.

Status – Fully Accepted – Closed

CAA Action

An experiment evaluation of cabin water sprays for fire suppression, commissioned by CAA, has been completed by the Fire Research Station of the Building Research Establishment. With respect to this Recommendation the report (CAA Paper 93009 dated March 1993) concluded that water sprays significantly reduce the temperature and levels of toxic and irritant fire products within the cabin.

RECOMMENDATION 4.31

Research should be undertaken into the effects of cabin airflow on smoke/gas venting and flashover delay/suppression, with a view towards the possible benefits of changing current cabin air-conditioning design and/or associated procedures.

Status – Fully Accepted – Closed

CAA Action

In respect of inflight fires, the FAA have in hand a comprehensive research programme to investigate the most effective method of smoke evacuation, including the use of smoke/gas venting and its effects on flashover fire phenomena. The CAA and the European Authorities are closely monitoring this work and are fully briefed on the status of the FAA research. Interim reports have been issued but further work, which includes a proposal for a computerised cabin fire detection and controls system, is in progress. When the results of this work are available the JAA/FAA/Transport Canada Cabin Safety Working Group will review the need for any associated regulatory action.

SIKORSKY S61N	NR HANDA ISLAND	17Oct88	ACCIDENT	8803491	89/13

References: AAR 3/89 dated 02Jun89
FACTAR 8/89 dated 27Jun89

RECOMMENDATION 4.1

It is recommended that the Civil Aviation Authority examine the requirement for the provision of a more accessible rear port emergency exit release mechanism for occasions when the helicopter is flooded whilst inverted, and illuminating it and the existing handles with EXIS lights or other means.

Status – Fully Accepted – Open

CAA Action

Action has been taken to increase the number of exits available following a capsize and CAA now requires for all Class 7 Licence Operations (i.e. operations in connection with oil or gas exploration or production under the sea) that all usable cabin windows shall be made available for occupant escape. This reduces the degree of dependence upon the rear port emergency exit. The need to mandate this standard of exit availability to other overwater operations is under review.

Further study is required to determine the most suitable position for release handles for emergency exits such that maximum accessibility is maintained in the continually changing conditions that may occur within an aircraft that is progressively capsizing and flooding.

Illumination of emergency exit handles by means of EXIS lights has been a requirement for all helicopters engaged in oil and gas exploration for some time. Airworthiness Notice No27 containing the requirement for adequate illumination of emergency exits and their means of opening is now also applicable to, inter alia, helicopters operated in a dedicated Offshore Search and Rescue role.

PIPER PA28	SANDTOFT	11Dec88	ACCIDENT	8804262	89/18

References: AAIB Letter dated 10Apr89
CAA Letter dated 02Feb90

RECOMMENDATION 4.1

The CAA requires the deletion of the drain valve locking feature on British registered aircraft that can be affected in the above way should the valve inadvertently be left open.

Status – Fully Accepted – Closed

CAA Action

The CAA issued, as an interim measure, Emergency Airworthiness Directive 001-02-90 requiring the installation of warning placards adjacent to the strainer drain valve on PA28 series aircraft.

Negotiations with Piper and the FAA has led to the discontinuation of the use of strainer valves, that lock open, on production Piper aircraft, but has not resulted in the issue of a Service Publication requiring the replacement of these valves.

In the absence of a manufacturers Service Bulletin the CAA is preparing an Additional Airworthiness Directive, intended to replace EAD001-02-90, that will require the replacement of the existing 'Curtis' gascolator drain valves with alternative, non-lockable Curtis units on PA28 variants with fuel systems similar to those on the accident aircraft.

The occurrence database shows no evidence that this particular problem appears on aircraft types other than the PA28. For this reason, the CAA considers that action on other types is not warranted.

SIKORSKY S61N	**NORTH SEA**	**10Nov88**	**ACCIDENT**	**8803819**	**90/01**

References: AAR 1/90 dated 15May90
FACTAR 1/90 dated 15May90

RECOMMENDATION 4.4

The Civil Aviation Authority produce a requirement for an effective means of communication between flight deck crew and passengers for public transport helicopters.

Status – Fully Accepted – Closed

CAA Action

This Recommendation was accepted for public transport helicopters with a separate cabin. JAA regulations will require all helicopters with a maximum certificated seating capacity of more than 9 to install a public address system.

The JAA requirement is scheduled for EC adoption on 1st March 1994 and will have to be implemented by Member States by no later than 1st December 1995.

In view of the fact that all large helicopters currently operating in the North Sea area are fitted with a means of communication, the Authority does not intend to introduce unilaterally this requirement ahead of the JAA time-scale.

RECOMMENDATION 4.7

The Civil Aviation Authority require, for all public transport helicopters, the provision of a facility to monitor continuously the vibration/audio 'signature' of all high speed rotating equipment whose integrity is critical to flight safety.

Status – Fully Accepted – Open

CAA Action

This Recommendation is similar in intent to Recommendation 4.8 of AAIB Report 19/90 and Recommendation 4.1 (ii) of AAIB Report 23/91.

The current UK certification standard for new large helicopter types is BCAR 29 which defines the safety objectives. A safety assessment is required to confirm that they will be met. The CAA is satisfied that the objectives will not be met with current transmission technology without vibration health monitoring.

BCAR 29 will be superseded by JAR 29 which is the subject of a harmonisation exercise with FAR 29. Both will require a safety assessment which will lead to similar provisions for health monitoring.

The CAA discussion paper 'The Airworthiness of Group A Helicopters' has led to proposals for retrospective application of the JAR 29 design assessment requirements, targeting those helicopters operating over hostile terrain and city centres. The proposals will be submitted for JAA consideration with a view to joint implementation.

UK North Sea operators have each established a programme to embody Health & Usage Monitoring Systems (HUMS), incorporating vibration monitoring, into their existing fleets.

Service experience has already identified the need for action in the case of the Sikorsky S61 and the CAA will complement the initiative by issuing an Additional Airworthiness Directive in the near future which will require the vibratory health of main rotor gearboxes to be continually monitored with equipment and procedures acceptable to the Authority.

The application of HUMS to small public transport helicopters will be reviewed following the publication of JAR 27 in October 1993.

BOEING 747-121	**LOCKERBIE**	**21Dec88**	**ACCIDENT**	**8804319**	**90/02**

References: AAR 2/90 dated 11Sep90
FACTAR 2/90 dated 11Sep90

RECOMMENDATION 4.5

That Airworthiness Authorities and aircraft manufacturers undertake a systematic study with a view to identifying measures that might mitigate the effects of explosive devices and improve the tolerance of aircraft structure and systems to explosive damage.

Status – Fully Accepted – Closed

CAA Action

Funding has been provided in equal shares by the DTI, DTP and CAA for a 4 year programme of theoretical and experimental research into the effect of explosions on typical aircraft structure and systems, which will be undertaken at the Defence Research Agency (DRA) and technically monitored by the CAA.

Other work, including testing on fuselage sections and baggage containers, by industry and foreign aviation authorities (the FAA and DGAC in particular), is being undertaken and monitored by the CAA.

The Authority is participating in the ICAO study group – Incorporation of Security into Aircraft Design (ISAD) – which has made eighteen proposals for standards and recommendations. A number of these proposals concerning design standards will be developed by the CAA as the international research progresses.

SIKORSKY S61N	NR SUMBURGH	13Jul88	ACCIDENT	8802141	90/03

References: AAR 3/90 dated 06Sep90
FACTAR 3/90 dated 06Sep90

RECOMMENDATION 4.1

Require, for UK registered public transport helicopters, the fitment of rear view mirrors to provide the flight deck crew with an external view of the aircraft, enabling them to assess the nature and extent of external damage and fires. (Made July 1990).

Status – Fully Accepted – Closed

CAA Action

The Authority has reviewed the recommended requirement to fit rear view mirrors to give flight deck crew the means to view the exterior of the helicopter in flight.

The proposed installation of rear view mirrors is not considered to be a practical solution as they are of little use at night and at all other times can only provide, at best, a partial view of the airframe. Furthermore, having reviewed its accident database, the Authority does not consider there to be sufficient justification for a requirement which would provide the means to visually assess the nature and extent of any external damage and fires.

RECOMMENDATION 4.11

Require, for UK registered public transport S61N helicopters, that measures be taken to ensure that excessive deterioration of the No 5 bearing of the engine shall not result in failure of the engine mounting rear support assembly. (Made 14 April 1989).

Status – Fully Accepted – Open

CAA Action

UK North Sea operators have each established a programme to embody HUMS systems, incorporating vibration monitoring into their existing S61 fleets.

CAA will complement the initiative by issuing an Additional Airworthiness Directive which will require the vibratory health of main rotor gearboxes to be continually monitored with equipment and procedures acceptable to the Authority. The transducers monitoring the input drive train will also detect excessive deterioration of the No 5 bearing.

RECOMMENDATION 4.14

Require, for all UK public transport helicopters, the early provision of a facility to continuously monitor the vibration of all high-speed rotating equipment whose integrity is critical to flight safety. (Made 21 November 1989).

Status – Fully Accepted – Open

CAA Action

This Recommendation is similar in nature to Recommendation 4.7 of AAIB Report 1/90, Recommendation 4.8 of Report 19/90 and Recommendation 4.1 (ii) of Report 23/91.

The current UK certification standard for new large helicopter types is BCAR 29 which defines the safety objectives. A safety assessment is required to confirm that they will be met. The CAA is satisfied that the objectives will not be met with current transmission technology without vibration health monitoring.

BCAR 29 will be superseded by JAR 29 which is the subject of a harmonisation exercise with FAR 29. Both will require a safety assessment which will lead to similar provisions for health monitoring.

The CAA discussion paper 'The Airworthiness of Group A Helicopters' has led to proposals for retrospective application of the JAR 29 design assessment requirements, targeting those helicopters operating over hostile terrain and city centres. The proposals will be submitted for JAA consideration with a view to joint implementation.

UK North Sea operators have each established a programme to embody HUMS systems, incorporating vibration monitoring, into their existing fleets.

Service experience has already identified the need for action in the case of the Sikorsky S61 and the CAA will complement the initiative by issuing an Additional Airworthiness Directive which will require the vibratory health of main rotor gearboxes, including the input drive, to be continually monitored with equipment and procedures acceptable to the Authority.

The application of HUMS to small public transport helicopters will be reviewed following the publication of JAR 27 in October 1993.

These initiatives have been targeted at rotor drive integrity. From the point of view of engine integrity the CAA has concluded a detailed review of information from the SDAU database covering approximately 300 occurrences involving high vibration in helicopters. Of these, 25 were the result of turbine engine faults. The evidence provided by these occurrences is insufficient for CAA to determine whether vibration monitoring equipment would have detected and prevented the failures.

Two helicopter engine manufacturers have stated that their review of hazardous or potentially hazardous events indicate no instances where vibration monitoring would have been of benefit.

These findings give insufficient grounds for the CAA to take mandatory action on currently certificated helicopter engines, other than that detailed in Recommendation 4.11. Nevertheless for new engines the CAA is reviewing the need to provide vibration monitoring equipment for all types of turbine engine. When the review is complete proposals will be made to the JAA for inclusion in the respective JARs as appropriate.

For existing aircraft types the CAA will continue to monitor service experience and will require the provision of monitoring equipment where this is warranted.

RECOMMENDATION 4.16

Require that clear written instructions are provided to maintenance personnel on health monitoring systems whose effectiveness may have significant effects on flight safety. (Made 21 November 1989).

Status – Fully Accepted – Closed

CAA Action

Sikorsky S61N maintenance manuals have been reviewed and are considered to be satisfactory. General Electric maintenance manuals for the CT58 engine have been revised to include clear acceptance/rejection criteria.

A review of existing maintenance instructions for other UK registered public transport helicopters, in conjunction with foreign certification authorities, has indicated a satisfactory situation.

For new type certifications, new requirements identifying the constructor's and operator's responsibilities in establishing and supporting an effective health monitoring programme have been proposed for inclusion in JAR 29 but meanwhile the principles are being applied as a condition of certification.

RECOMMENDATION 4.24

Require measures to improve S61N engine bay firewall integrity by blanking the inspection hole in each engine mounting rear support assembly tube. (Made 14 April 1989).

Status – Fully Accepted – Closed

CAA Action

The development of a modification to provide a blanking cover as suggested in the Recommendation requires the support of the aircraft constructor both in its design and implementation. In response to a request that they consider such a modification, Sikorsky first carried out a review of their Occurrence/Accident database. This review included both the civil and military variants going back to 1962 and resulted in a total of 14 incidents of engine fire. None of these involved combustible fluids entering the engine mounting rear support tube and all were extinguished by the aircraft systems. The combined civil and military fleet of this Sikorsky type has to date accumulated approximately 5 million flight hours, 10 million engine hours.

A review of the S61 engine bay firewall integrity has therefore been carried out and it is the view of the CAA and the aircraft manufacturer that a modification to blank off the inspection hole is not justified.

RECOMMENDATION 4.25

Review the fire protection provision needs of helicopter main gearbox bays, including the fitment of thermal isolation means, fire detection and extinguishing systems, and flammable fluid shut-off systems. (Made 21 November 1989).

Status – Fully Accepted – Closed

CAA Action

The Authority has now completed a comprehensive review of rotorcraft main rotor transmission area fire protection, including an evaluation of the existing requirements and a detailed analysis of relevant service experience. A record of this review is contained in the 'Report on the Review of Rotorcraft Main Rotor Transmission Area Fire Protection' dated 24 June 1992.

The review concluded that while the existing requirements applicable to rotorcraft main rotor transmission area fire protection are basically adequate, there is a need to clarify their intent in three areas:

(1) to emphasise the criticality of the main rotor transmission to the safety of the rotorcraft and its occupants;

(2) to recommend that only those system components which could not perform their intended function elsewhere should be located within the main rotor transmission area (BCAR and FAR 29.863 refer); and

(3) to extend the applicability of BCAR 29.1187(f) (adequate drainage and ventilation) and (g) (safe discharge of cooling air for electrical equipment) to include main rotor transmission areas.

The review also concluded that there is a need for the differences between the requirements relating to main rotor transmission area fire protection in BCAR29 and FAR29 to be taken fully into consideration in the development of JAR29.

With respect to the three specific elements of the AAIB recommendation, the review concluded the following:

(a) Thermal isolation means – It is not desirable to achieve thermal isolation between the main rotor transmission area and other areas of the rotorcraft as, in the event of a fire within the main rotor transmission area, thermal isolation may accelerate the destruction of the contents of that area and therefore increase the severity of the effects of a fire upon the rotorcraft and its occupants.

(b) Fire detection and extinguishing systems – The review of relevant service experience has shown that the internationally agreed safety objectives for the main rotor transmission area are satisfied without the provision of either fire detection or fire extinguishing capability. The provision of main rotor transmission area fire detection capability alone is presently considered unacceptable for rotorcraft which operate at night, in IMC or over hostile terrain, in view of:

(i) the poor demonstrated integrity of state-of-the-art fire detection systems (which results in a high percentage of false warnings) and

(ii) in the absence of a practical fire extinguishing system for this area, the need to conduct an immediate emergency landing following a fire warning.

It should be noted that the continuing problems associated with false fire detector indications are recognised and addressed by the changes proposed in JAR 29 NPA 29-1 'Fire Detection Systems, Powerplant Instruments, Vibration'.

(c) Flammable fluid shut-off systems – It is not practicable to introduce a means to shut off the flow of flammable fluids into or within main rotor transmission areas as, with few exceptions, the supply and flow of such fluids is essential for continued safe flight and landing. However, it may be practicable to reduce further the potential for flammable fluid/vapour leakage by excluding from the main rotor transmission area all flammable fluid system components which could perform their intended function elsewhere: this is addressed by 2) above.

The review concluded that no action other than those identified above would be justified. The Authority will pursue the above actions in its continuing JAR29 development work within the JAA.

BOEING 737-400	**NR KEGWORTH**	**08Jan89**	**ACCIDENT**	**8900005**	**90/04**

References: AAR 4/90 dated 18Oct90
FACTAR 4/90 dated 23Oct90

RECOMMENDATION 4.9

The CAA should require that the engine instrument system on the Boeing 737-400, and other applicable public transport aircraft, be modified to include an attention-getting facility to draw attention to each vibration indicator when it indicates maximum vibration. (Made 30 March 1990).

Status – Fully Accepted – Open

CAA Action

The CAA considers that to provide attention-getters for each vibration indicator is likely to precipitate unwarranted action and to degrade the warning system philosophy such that overall safety could be adversely affected.

In the case of the Boeing 737-400, the presence of potentially hazardous engine vibration is readily detectable by the crew by transmission through the airframe and the check lists already contain sufficient information to enable vibration indicators to be used in assisting the identification of a damaged engine and for the correct crew action to be taken. The Authority has issued Notice to AOC Holders No 11/90 in order to raise flight crew awareness of the action to be taken in the event of vibration through additional training.

It is for these reasons that the CAA does not propose to require an attention-getting device for each vibration indicator on the Boeing 737-400. However, for those types of aircraft where there are declared vibration conditions which are considered to be critical but which cannot always be felt by the crew through the aircraft, it is accepted that consideration should be given to the provision of an attention-getting facility. The Authority is reviewing engine vibration indication systems and crew procedures for aeroplanes with high by-pass ratio turbo jet engines.

It is the Authority's intention to involve the European Joint Aviation Authorities and other Airworthiness Authorities in the review with the objective that any significant conclusions are accepted internationally and unique UK requirements or modifications are avoided.

One UK manufacturer of high by-pass ratio engines has completed a comprehensive review and concluded that critical levels of vibration on their engines would be felt by the crew through the airframe.

Response is still awaited from foreign manufacturers.

RECOMMENDATION 4.15

The CAA should review current airline transport pilot training requirements with a view towards considering the need to restore the balance in flight crew technical appreciation of aircraft systems, including systems response under abnormal conditions, and to evaluate the potential of additional simulator training in flight deck decision making (Made 30 March 1990).

Status – Fully Accepted – Closed

CAA Action

The Authority reviewed, in consultation with the industry, the content and style of the Authority's written aircraft type rating examinations and the content of the approved aircraft type rating conversion courses. The conclusion reached was that, for initial qualification on a new type of aircraft, the contents of current examinations and approved courses were adequate. Greater emphasis was given to the improvement of training requirements during periodic Public Transport training under the Air Navigation Order Schedule 10. In particular the Authority developed a programme with the industry which requires Air Carriers to train their crews in Flight Deck Management and Human Factor issues.

In the context of European Harmonisation, the proposed JAR-FCL contains a comprehensive syllabus of ground and flight training for approved type rating courses, and this will meet the Recommendation in full. The adoption and implementation of JAR-FCL is now extended past 1 January 1996 but the Authority's policy is to introduce JAR requirements earlier wherever possible.

RECOMMENDATION 4.17

The potential for fuel and oil system leakage within the fan case area of high by-pass turbo fan engines, during conditions of excessive vibration, should be reviewed by the engine manufacturers and the CAA with a view towards modifying such systems to minimise such leakage, and the associated fire risk (Made 30 March 1990).

Status – Fully Accepted – Closed

CAA Action

A review of fuel and oil system leaks in the fan case area has been carried out in conjunction with all manufacturers of high by-pass turbofan engines. The results conclude that current design and test requirements are adequate.

RECOMMENDATION 4.19

The CAA should expedite current research into methods of providing flight deck crews of public transport aircraft with visual information on the status of their aircraft by means of external and internal closed circuit television monitoring and the recording/recall of such monitoring, including that associated with flight deck presentations, with a view towards producing a requirement for all UK public transport aircraft to be so equipped (Made 30 March 1990).

Status – Fully Accepted – Closed

CAA Action

See Responses to Recommendation 4.2 of (89/11) accident to B737 at Manchester on 22 Aug 85.

RECOMMENDATION 4.22

The CAA should actively seek further improvement in the standards of JAR 25.561/.562 and the level of such standards should not be constrained by the current FAA requirements (Made 30 March 1990).

Status – Fully Accepted – Closed

CAA Action

See Response to 4.27 below.

RECOMMENDATION 4.23

The CAA should require that, for aircraft passenger seats, the current loading and dynamic testing requirements of JAR 25.561 and .562 be applied to newly manufactured aircraft coming onto the UK register and, with the minimum of delay, to aircraft already on the UK register (Made 30 March 1990).

Status – Fully Accepted – Open

CAA Action

The CAA is pursuing retrospective requirements complementary to those currently contained in the FAA Notice of Proposed Rule Making NPRM 88-8 (Issued May 1988).

The CAA had anticipated that the FAA proposal to require all air carrier aircraft registered in the USA to be equipped with seats that meet the improved crashworthiness standards contained in FAR/JAR 25.561 and 562 would become a final rule in the near future. The proposed applicability dates are that any aircraft for which application for a new type certificate is made after 12 May 1988 will have to comply from the date of the final rule.

Aircraft type certificated after 1 January 1958 will have to comply before 16 June 1995. CAA intends to adopt the FAA rule when it is published and not take unilateral action thereby maintaining a harmonised position. Publication of the FAA Final Rule is still awaited.

RECOMMENDATION 4.24

In addition to the dynamic test requirements, the CAA should seek to modify the JARs associated with detailed seat design to ensure that such seats are safety-engineered to minimise occupant injury in an impact (Made 30 March 1990).

Status – Fully Accepted – Closed

CAA Action

See Response to 4.27 below.

RECOMMENDATION 4.25

The CAA should initiate and expedite a structured programme of research, in conjunction with the European airworthiness authorities, into passenger seat design, with particular emphasis on:

(1) Effective upper torso restraint.

(2) Aft-facing passenger seats

(Made 30 March 1990)

Status – Fully Accepted – Closed

CAA Action

See Response to 4.27 below.

RECOMMENDATION 4.26

The certification requirements for cabin floors of new aircraft types should be modified to require that dynamic impulse and distortion be taken into account and these criteria should be applied to future production of existing designs (Made 30 March 1990).

Status – Fully Accepted – Closed

CAA Action

See Response to 4.27 below.

RECOMMENDATION 4.27

The CAA should initiate research, in conjunction with the European airworthiness authorities, into the feasibility of a significant increase in cabin floor toughness beyond the level of the current JAR/FAR seat requirements (Made 30 March 1990).

Status – Fully Accepted – Closed

CAA Action

Recommendations 4.22 and 4.24 to 4.27 inclusive are being addressed as part of a co-ordinated Improved Occupant Survivability research programme. Funding for this substantial programme is being sought from the European Commission. In the meantime CAA has decided to fund a study during FY93/94 to define the detailed Work Plan required for such a programme.

Work already undertaken in response to recommendation 4.25 indicates clearly that a revised 'brace' position has the potential significantly to reduce injuries which can otherwise occur in severe impact accidents. Research into the definition of an optimised brace position has been concluded. Based on the results of this research a Notice to AOC holders, number 8/93, has been published. The research report has not yet been published.

RECOMMENDATION 4.28

The CAA implement a programme to require that all infants and young children, who would not be safely restrained by supplementary or standard lap belts, be placed in child-seats for take-off, landing and flight in turbulence (Made 30 March 1990, amended 8 August 1990).

Status – Fully Accepted – Closed

CAA Action

See Response to 4.29 below.

RECOMMENDATION 4.29

The CAA expedite the publication of a specification for child seat designs (Made 30 March 1990).

Status – Fully Accepted – Closed

CAA Action

A programme of research into methods of child restraint in aircraft has been completed by the Cranfield Impact Centre. The results of this work have been published in a CAA Research Paper (CAA Paper 92020).

While the implications of this work are under review by the JAA with a view to producing design and operational requirements for child restraint systems, CAA have published further guidance material on compliance with current CAA regulations.

The use of an aviation type safety seat specifically approved by CAA may be used as mandatory equipment by the operator to replace a supplementary loop. One such seat has been given approval by the CAA.

Any car-type safety seat that meets certain design criteria may be used at the discretion of the operator. The use of car-type seats is governed by means of a General exemption to the Air Navigation Order (1989) which outlines the specific rules for such use. Car-type seats are used at the discretion of the operator who can insist that the child is restrained instead by any of the approved devices. The CAA used a seat description rather than a seat name or certification standard in order to widen the range of acceptable seats.

RECOMMENDATION 4.31

The CAA consider improving the airworthiness requirements for transport aircraft to require some form of improved latching to be fitted to overhead stowage bins and this should also apply to new stowage bins fitted to existing aircraft (Made 30 March 1990).

Status – Fully Accepted – Open

CAA Action

The FAA programme of dynamic tests being carried out on a section of aircraft fuselage fitted with overhead stowage bins is not expected to be completed until late in 1993. Work to develop advisory material in relation to improvement of these latches is in abeyance until the results of the dynamic testing are available.

PIPER PA25	**WATTISHAM**	**18Mar90**	**ACCIDENT**	**9001041**	**90/05**

References: AAIB Letter dated 10May90
CAA Letter dated 31Jul90

RECOMMENDATION 4.1

It is recommended that: the CAA require a precautionary structural inspection of tailplane attachments on all Piper models with tailplane attachments similar to the PA25 Pawnee, and that the LAMS requirement for the 'removal of sufficient detachable panels to inspect the internal structure of the fuselage...', at the 150 hour and annual checks, be amended to include removal of the fabric patch surrounding these tubes on such aircraft.

Status – Fully Accepted – Closed

CAA Action

The results of the fleet check undertaken since the July 1990 revision to CAA AD 004-06-90 have indicated that ground handling could exacerbate the failure of the tailplane attachments. In December 1990 a second revision to 004-06-90 was issued to call up a repeat inspection of the area.

In response to requests to FAA and Piper for them to consider a Service Bulletin inspection procedure for the tailplane attachments of the PA25 and similarly configured types, Piper Aircraft Corp have stated that they have no records of any similar cracks in tailplane attachment fittings apart from those that have occurred in the UK. In their opinion this problem is unique to the UK and possibly related to glider towing operations and ground mishandling.

Action has been taken to draw the attention of operators to the possibility that lifting of the aircraft by the tailplane prior to wheeling it can induce high stress in the attachment tubes. The Light Aircraft Maintenance Schedule requires the removal of sufficient detachable panels and covers to inspect the internal structure of the fuselage etc.

The CAA does not therefore accept that it is necessary to amend the schedule to refer specifically to a fabric patch having to be removed in a document which is, by necessity, of a general nature that applies to a complete range of General Aviation aircraft.

BELL 206	GLASGOW	24Jan90	ACCIDENT	9000239	90/07

References: AAIB Letter dated 03Apr90
CAA Letter dated 18Dec90

RECOMMENDATION 4.1

It is therefore recommended that the CAA should consider a review of the procedures concerning notification to owners and operators of approvals given to 'Revisions' to Flight Manuals and their Supplements of small foreign manufactured aircraft.

Status – Fully Accepted – Closed

CAA Action

A major revision to BCAR Chapter B2–2 is in the final process of publication. This introduces a significant simplification in the processing and approval of Flight Manuals for UK certificated foreign aircraft types of less than 2730 kg (6000lb) weight.

In addition, the CAA's Flight Manual Record System has now been converted to IT such that it is now possible to provide any customer/operator/owner with immediate information on the approval status of any Flight Manual and its associated amendments.

SIKORSKY S61N	BRENT SPAR	25Jul90	ACCIDENT	9003279	90/12

References: AAR 2/91 dated 10Oct91
FACTAR 2/91 dated 10Oct91

RECOMMENDATION 4.2

The CAA considers with HSE the best arrangements for inspection of at least all restricted helidecks, and ideally all helidecks, which are regularly used by UK registered helicopters.

Status – Fully Accepted – Open

CAA Action

The CAA continues to inspect offshore helidecks under contract to HSE. To date a total of 145 helidecks have been inspected. The current phase (1993) of the contract includes a

further 10 helidecks which will, inter-alia, complete the Restricted helideck inspection programme. However, the inspections have resulted in some previously unrestricted classifications being amended to Restricted status. Helidecks which are not covered by the Minerals Workings (Offshore Installations) Act (1971) remain the subject of discussion between CAA, DTp (Marine Division) and HSE.

AGUSTA A109	ROCESTER	27Jun90	ACCIDENT	9002743	90/13

References: AAIB Letter dated 12Oct90
CAA Letter dated 15Apr91

RECOMMENDATION 4.1

It is recommended that consideration be given to a suitable form of safety audit which would monitor private operators.

Status – Fully Accepted – Closed

CAA Action

The regulation of corporate operations had been under consideration by the Authority prior to this accident; its proposals, one of which was the need for an operations manual, were subsequently endorsed by the Operations Advisory Committee.

However, the advent of JAA regulations which override national legislation has made further independent work on this subject nugatory. The Authority however will represent these views in the appropriate JAA working group tasked with devising rules for regulation of Corporate Transport Operations.

SIKORSKY S61N	SUMBURGH	11May89	ACCIDENT	8901536	90/15

References: AAIB Letter dated 14Jun90
CAA Letter dated 29Aug90

RECOMMENDATION 4.2

It is recommended that UK public transport S61N helicopters be fitted with a means of continuously monitoring the health of the main gearbox input pinion plain bearings.

Status – Fully Accepted – Open

CAA Action

On CAA request the FAA, which is the primary certificating authority for this helicopter type, liaised with the constructor to explore any opportunities health monitoring may give in this area. The FAA response based on their perception of the current state of development of HUM systems is that they cannot make mandatory a health monitoring system in this aircraft for this particular failure. Implicit in this response is FAAs view that a long and detailed development programme would be required should a technique be identified to exploit any damage tolerance inherent in the design.

Following CAA review including consultation with industry specialists, particularly the Helicopter Health Monitoring Advisory Group (a post-HARP international body formed to promote the application of HUMS), it was concluded that direct monitoring of the bearings for indications of distress is likely to be fully effective with currently available techniques.

However most, if not all, conditions that compromise plain bearing function (shaft misalignment, out of balance, vibratory excitation etc.) can be monitored. Currently available technology for vibration monitoring offers this facility and the UK North Sea operators have each established a programme to embody HUMS on their existing S61 fleets. These systems include vibration health monitoring of engine to main gearbox drivetrains.

To complement this initiative, CAA hopes to have in place in the near future an Additional Airworthiness Directive which will require vibratory health monitoring of main rotor gearbox high speed input driveshafts and associated parts with equipment and procedures acceptable to the Authority.

LOCKHEED L1011 TRISTAR	**NR MANCHESTER**	**11Dec90**	**ACCIDENT**	**9005393 90/18**

References: AAR 3/91 dated 18Dec91
FACTAR 3/91 dated 18Dec91

RECOMMENDATION 4.1

The Civil Aviation Authority and the Federal Aviation Administration, in conjunction with Lockheed, instigate an in-service inspection of L1011 aircraft aft pressure bulkheads, capable of reliably detecting: 1. Fatigue cracking on the bulkhead structure. 2. Scoring on the bulkhead gore-diaphragm. (Made 21 December 1990).

Status – Fully Accepted – Closed

CAA Action

The FAA issued Airworthiness Directive AD 91-07-03, effective 3 April 1991 (which is also mandatory in the UK). This requires inspections of the aft pressure bulkhead with reference to Lockheed Service Bulletin SB 093-53-263. The only UK civil operator of the L1011 aircraft developed a Non-Destructive Inspection (NDI) procedure to inspect the region of potential scoring and/or fatigue cracking, and has reported no findings. The manufacturer has

evaluated such techniques to establish a reliable procedure for repeated inspection in this area and has raised a Service Bulletin to call up an eddy current technique to inspect the areas where the scoring and cracking has occurred.

RECOMMENDATION 4.2

The 'worst case' failure mode of the L1011 aft pressure bulkhead used for the original certification testing be reviewed in the light of this failure, and the findings from the recommended in service inspections, and modified to take account of the maximum anticipated failure which could occur, based on these findings. The Civil Aviation Authority and the Federal Aviation Administration expedite, in conjunction with Lockheed, an assessment of the venting capability of the (normally unpressured) aft fuselage to dissipate the maximum anticipated overpressurisation of this zone, following a 'worst case' major failure of the aft pressure bulkhead, without incurring structural damage to the empennage. (Made 21 December 1990).

Status – Fully Accepted – Closed

CAA Action

The original certificated fail-safe design of the L1011 rear pressure bulkhead was predicated on the loss of the maximum area bounded by bonded crack stoppers with (as acknowledged in the AAIB Report) provision for adequate venting in the tail area. There have been three known service incidents which have shown this assumption to be valid, despite this latest incident showing the manufacturing induced damage crack to extend just beyond one of these boundaries.

The CAA were satisfied that the safety of the fleet was maintained by this demonstrated structural capability in conjunction with an adequate inspection.

FAA have confirmed to CAA that a Lockheed analysis of the L1011 afterbody shows that there is adequate venting for the failure of a complete panel in the rear pressure bulkhead.

RECOMMENDATION 4.5

The CAA ensure that the standards of the European Joint Airworthiness Requirements for large public transport aircraft, JAR25, are raised at the earliest opportunity to the level of the proposed FAA regulations concerning the fail-safe design of pressure cabins. (Made 16 August 1991).

Status – Fully Accepted – Closed

CAA Action

In the continuing development of the European Joint Airworthiness Requirements (JAR) for large transport aeroplanes all proposed amendments to the FAA regulations are as a matter of course considered for inclusion in JAR 25. Those which may be proposed in relation to fail-safe or damage tolerant design of pressure cabins will be so considered.

SIKORSKY S61	FALKLANDS	09Oct90	ACCIDENT	9004530	90/19

References: AAIB Letter dated 21Nov91
CAA Letter dated 13Apr92

RECOMMENDATION 4.1

Require, for UK registered S61N helicopters, a number of checks regarding T-bolt nuts, including a tightening torque check at frequent regular intervals and consideration of a requirement for T-bolt nut renewal after each removal of a nut.

Status – Fully Accepted – Closed

CAA Action

CAA Emergency Airworthiness Directive (AD) 007-12-90 was issued with an effective date of 12 December 1990. This required that the tightening torque of T-bolt nuts be checked and recorded within 10 flight hours and repeated thereafter at intervals not to exceed 200 flight hours.

With regard to requiring T-bolt nut renewal after each removal of the nut CAA requested that FAA and the constructor review the policy which allows certain nuts to be re-used. To assist with this the results of application of the AD were supplied. It was concluded by FAA, CAA and the constructor that current maintenance manual instructions including re-use of certain nuts were correct.

RECOMMENDATION 4.2

Consider the need for measures aimed at providing significantly greater margin between the natural frequency of the S61N engine mounting rear support assembly tube and the normal rotational frequency of the main gearbox input drive train.

Status – Fully Accepted – Open

CAA Action

CAA requested that FAA consider, with the constructor, the need for embodying modifications made to the US military variant of the S61 aimed at providing a greater margin between the natural frequency of the engine mounting rear support assembly tube (EMRSA) and the normal rotational frequency of the main gearbox input drive train (IDS). The constructor has advised that due to design configuration differences between the military and civil variants, which alter their vibratory characteristics, the embodiment of these modifications would be inappropriate. Further, the frequency margin is acceptable for the civil variant when the equipment is maintained to the published instructions. The FAA concur with this position and propose to take no action.

CAA however have considered the history of excessive deterioration of engine mount rear support assembly isolator spacers when operated over the North Sea. Test has established that deteriorated isolator spacers can result in a reduction of the frequency margin.

The current Maintenance Manual instructions cannot support these parts as ‘on-condition’. The constructor is unwilling to amend the Maintenance Manual instruction or hard life the

parts. The CAA will therefore issue an Additional Airworthiness Directive that requires S61 EMRSA isolator spacers to be replaced with new at each main rotor gearbox overhaul and imposes a hard life. By this action the frequency margin between the natural frequency of the EMRSA and the rotational frequency of the IDS will be maintained.

RECOMMENDATION 4.3

Consider requiring, for UK public transport S61N helicopters, the replacement of input pinion plain bearings with rolling element bearings.

Status – Fully Accepted – Open

CAA Action

CAA requested that FAA, with the constructor, consider and advise on the need and feasibility of embodying a version of the modification which is currently available for some S61 military variants. In their response the constructor stated that modification action is not required. The FAA concurs with this position.

CAA consider that an equivalent level of safety will be provided by enhanced maintenance procedures including Health Monitoring. Attention is drawn to the CAA response for Recommendations 4.1, 4.2, 4.4, 4.7 and 4.8.

It is considered that the following Additional ADs, issued or intended to be issued in the near future will provide adequate assurance of an acceptable probability of failure of input pinion plain bearings:

Checks of T-bolt nuts
MRGB electrical chip detector
Periodic replacement of vibration isolator
Vibration health monitoring of MRGB input drivetrains

RECOMMENDATION 4.4

Require, for UK registered public transport and aerial work helicopters, a system to continuously monitor debris levels in gearboxes whose integrity is critical to flight safety and to provide immediate warning to the crew of abnormalities.

Status – Fully Accepted – Open

CAA Action

For new type certification the current requirements for a Safety Assessment are likely to result in the need to provide a Health and Usage Monitoring System, a fundamental part of which will involve monitoring of gearbox oil wear debris levels. The sampling intervals required and the need or otherwise to provide immediate warning to the crew of abnormalities remain to be identified by failure analyses and consideration of the failure modes and their effects.

Most large public transport helicopters are already fitted with suitable systems.

For the S61, CAA propose to make Mandatory the embodiment of electrical chip detectors giving cockpit warning for main, intermediate and tail gearboxes in accordance with Sikorsky Service Bulletin S61B 55-39.

The applicability of this Recommendation to small public transport helicopters will be reviewed following the publication of JAR27 in October 1993.

RECOMMENDATION 4.6

Require improved quality control of overhauled S61 N main gearboxes.

Status – Fully Accepted – Closed

CAA Action

Currently the main gearboxes of S61 helicopters on the UK Register are all overhauled by US organisations under the overall control of the FAA. CAA has drawn the FAA's attention to the deficiencies noted by the AAIB and the need for improved quality control. CAA requested that it be advised of other components or assemblies fitted to helicopters on the UK Register where there may be suspected non-conformance identified by the FAA investigation.

FAA have now advised that no further components or assemblies fitted to helicopters on the UK Register are suspected of non-conformance.

RECOMMENDATION 4.7

Require, for UK public transport and aerial work S61N helicopters, the early provision of a means of continuously monitoring the health of main gearbox input pinion bearings. (Made 27 November 1990. A similar recommendation was made on 14 June 1990 relating to the accident to S61N G-BFFJ at Sumburgh on 11 May 1989, AAIB Bulletin 7/90)

Status – Fully Accepted – Open

CAA Action

On CAA request, the FAA which is the primary certificating authority for this helicopter type, liaised with the constructor to explore any opportunities health monitoring may give in this area. The FAA response based on their perception of the current state of development of HUM systems is that they cannot make mandatory a health monitoring system in this aircraft for the particular failure. Implicit in this response is FAAs view that a long and detailed development programme would be required should a technique be identified to exploit any damage tolerance inherent in the design.

Following CAA review including consultation with industry specialists, particularly the Helicopter Health Monitoring Advisory Group (a post-HARP international body formed to promote the application of HUMS) it was concluded that direct monitoring of the bearings for indications of distress is unlikely to be fully effective with currently available techniques.

However, most if not all conditions that compromise plain bearing function (shaft misalignment, out of balance, vibratory excitation etc.) can be monitored. Currently available technology for vibration monitoring offers this facility and the UK North Sea operators have each established a programme to embody HUMS on their existing S61 fleets. These systems include vibration health monitoring of engine to main gearbox drivetrains.

To complement this initiative, CAA will issue an Additional Airworthiness Directive which requires the vibratory health monitoring of main rotor gearbox high speed input driveshafts and associated parts, with equipment and procedures acceptable to the Authority.

RECOMMENDATION 4.8

Require, for UK registered public transport and aerial work helicopters, the early provision of a facility to continuously monitor the vibration of high-speed rotating equipment whose integrity is, or may foreseeably be, critical to flight safety. (Made 27 November 1990. A similar recommendation was made on 18 June 1991 in relation to the accident to AS355-2 Twin Squirrel G-WMPA near Birmingham on 30 December 1990 (AAIB Bulletin 12/91); on 21 November 1989 in relation to the accident to S61N G-BEID in the North Sea on 13 July 1988 (AAIB Report 3/90); and on 25 November 1987 in relation to the accident to Bell 222 G-META at Lippitts Hill on 6 May 1987 (AAIB Report 3/88).

Status – Fully Accepted – Open

CAA Action

The current UK certification standard for new large helicopter types is BCAR 29 which defines the safety objectives. A safety assessment is required to confirm that they will be met. The CAA is satisfied that the objectives will not be met with current transmission technology without vibration health monitoring.

BCAR29 will be superseded by JAR29 which is the subject of a harmonisation exercise with FAR29. Both will require a safety assessment which will lead to similar provisions for health monitoring.

The CAA discussion paper 'The Airworthiness of Group A Helicopters' has led to proposals for retrospective application of the JAR29 design assessment requirements, targeting those helicopters operating over hostile terrain and city centres.

The proposals will be submitted for JAA consideration with a view to joint implementation.

UK North Sea operators have each established a programme to embody HUM systems, incorporating vibration monitoring, into their existing fleets.

Service experience has already identified the need for action in the case of the Sikorsky S61 and the CAA will complement the initiative by issuing an Additional Airworthiness Directive which will require the vibratory health of main rotor gearboxes to be continually monitored with equipment and procedures acceptable to the Authority.

The application of HUMS to small public transport helicopters will be reviewed following the publication of JAR 27 in October 1993.

BEECH 200	NR EAST MIDLANDS	14Jan91	ACCIDENT	9100064	91/05

References: AAIB Letter dated 19Feb91
CAA Letter dated 20Mar91

RECOMMENDATION 4.1

It is recommended that a Code of Conduct for corporate aircraft operators, which would include a requirement for fuel and load records to be maintained, should have urgent consideration.

Status – Fully Accepted – Closed

CAA Action

The regulation of corporate operations had been under consideration by the Authority prior to this accident; its proposals, one of which was the need for an operations manual, were subsequently endorsed by the Operations Advisory Committee.

However, the advent of JAA regulations which override national legislation has made further independent work on this subject nugatory. The Authority however will represent these views in the appropriate JAA working group tasked with devising rules for regulation of Corporate Transport Operations.

PIPER PA28-140	CRANFIELD	07Jul90	ACCIDENT	9002960	91/06

References: AAIB Letter dated 19Feb91
CAA Letter dated 13Feb92

RECOMMENDATION 4.5

Require that suitable approved repair schemes be promulgated for keyhole type diagonal strap fastenings where retention to the lap strap is assisted by the presence of an elastomeric insert, while such a fastening arrangement remains approved.

Status – Fully Accepted – Open

CAA Action

The CAA is in liaison with the FAA with a view to producing suitable service information to facilitate the inspection and, where necessary the replacement of, safety belt connectors of this type.

PIPER PA28-18	STANMORE	18Apr91	ACCIDENT	9101093	91/14

References: AAIB Letter dated 23Aug91
CAA Letter dated 01Nov91

RECOMMENDATION 4.1

The CAA initiate action to amend the Air Navigation Order Article 52, such that when a person is involved in an accident or incident or is suspected of an offence under the Article, the person may be required to submit to appropriate tests and provide samples.

Status – Fully Accepted – Open

CAA Action

In September 1991 the CAA requested that the Department of Transport amend the Air Navigation Order Article 52 to require post-accident testing for alcohol with appropriate set maxima. Government approval is still awaited.

DH89A RAPIDE	NEAR AUDLEY END	30Jun91	ACCIDENT	9102082	91/15

References: AAIB Letter dated 28Aug91
CAA Letter dated 16Aug92

RECOMMENDATION 4.3

The CAA should decide upon and then publish clear guidance on the need or otherwise for professional pilots to obtain valid Certificates of Experience before exercising private pilot privileges in light aircraft of groups A and B.

Status – Fully Accepted – Closed

CAA Action

An Aeronautical Information Circular (67/1992) giving guidance has been published. An amendment to the Air Navigation Order is not required.

EAGLE 11	NR ASHAMPSTEAD	17Aug91	ACCIDENT	9102889	91/17

References: AAIB Letter dated 01Oct91

RECOMMENDATION 4.1

It is recommended that the CAA studies the suitability of modern turn coordinators for inclusion in the instrument panels of aerobatic aircraft with a view to publicising the advantages of the plain turn indicator for spin mode identification.

Status – Fully Accepted – Closed

CAA Action

The circumstances of this accident and the recommendation were highlighted in a Monthly CAA Accident Prevention Leaflet GASIL and in the house magazine of the Aerobatic Association. Additionally the Authority has drafted a booklet in the General Aviation Safety Sense series, entitled 'Aerobatics Sense'.

PIPER PA34	BOURNEMOUTH	25Aug91	ACCIDENT	9103040	91/21

References: AAIB Letter dated 29Oct91
CAA Letter dated 01May92

RECOMMENDATION 4.1

The CAA should review the requirement of AD 002-01-88, with particular reference to the quality of the required inspection, its periodicity and reprotection of the affected areas after each inspection.

Status – Fully Accepted – Open

CAA Action

An amendment to AD 002-01-88 covering the recommendation is in the process of being issued.

CESSNA 172	SOUTHPORT	21Mar91	ACCIDENT	9100793	91/22

References: AAIB Letter dated 05Nov91
CAA Letter dated 14May92

RECOMMENDATION 4.3

It is recommended that the CAA consider requiring inclusion of relative humidity or dew point in aviation forecasts and weather reports.

Status – Fully Accepted – Open

CAA Action

A feasibility study regarding the inclusion of information on conditions likely to produce carburettor induction system icing into aviation forecasts continues. Whilst there is no inherent problem in producing humidity predictions from numerical models, the main difficulty is how to present the data to pilots. Initial proposals of charted presentation methods of forecast induction icing have been considered by the General Aviation Safety Committee (GASCO) but were rejected as being rather complex and difficult to interpret. Alternative presentation methods were produced for the GASCO meeting in May 1993 and the Meteorological Office/CAA Open Day in June 1993 but again these were considered unsatisfactory. Studies therefore continue in an attempt to produce an acceptable solution. Efforts are also being made to include general carburettor icing warnings into text forecasts such as AIRMET regional and area forecasts etc.

RECOMMENDATION 4.4

It is recommended that the CAA require the fitment of a warning system to alert pilots of induction system icing on future types of aircraft certificated in the UK, and consider a similar requirement for types currently certificated.

Status – Fully Accepted – Open

CAA Action

The CAA having accepted the recommendation in principle has reviewed the available warning systems and is not convinced that such systems are adequately effective. Consequently the Authority has instigated a research programme to examine means by which induction system icing can be prevented.

The results of the programme will be discussed with JAA member Authorities in order to establish a common certification requirement.

AEROSPATIALE NEAR BIRMINGHAM 30Dec90 ACCIDENT 9005638 91/23 AS355-F2

References: AAIB Letter dated 05Nov91

RECOMMENDATION 4.1

It is recommended that the CAA conduct a review of the design and failure history of the engine-main gearbox drive train on Aerospatiale AS355 Twin Squirrel helicopters and give particular consideration to the following:

(i) More frequent inspection of the engine-MGB Thomas couplings.

(ii) Re-torquing of Thomas coupling bolt retaining nuts after a short bedding-in period of operation, and consider the need for such a procedure on other aircraft with similar types of coupling.

(iii) Checks aimed at ensuring that engine-MGB alignment and drive train vibration level are acceptable following replacement of an engine-MGB Thomas coupling that has suffered damage for which there is no clear explanation.

Status – Fully Accepted – Open

CAA Action

The constructor and the DGAC were requested to review the design and failure history of the engine-MGB drive train on AS355 Twin Squirrel helicopters.

Their response notes that three similar incidents of AS355 engine-MGB flexible coupling ruptures are known to have occurred since 1987. Two ruptures were due to misalignments caused by damaged MGB suspension laminates and one due to poor engine mount fitment which caused an excessive misalignment. For all these, as for G-WMPA, the flights were continued on one engine and normal landings made and it is considered the consequences on flight safety are equivalent to an engine stop in flight.

Addressing the Recommendations sub-parts in turn:

(i) As an interim measure, pending advice from the constructor and DGAC, CAA published a 'Letter to Operators' No 1191 dated 7 February 1992 giving the status of CAAs investigations and advising more frequent in-situ inspection of AS355 engine-MGB Thomas couplings.

In his response the constructor stated that experience demonstrates that flexible coupling ruptures are generally caused by significant engine-MGB coupling shaft misalignments with gross degradation and failure too fast to allow detection with periodic inspection. As a consequence Eurocopter and DGAC do not recommend changing the in-situ inspection frequency of the couplings nor the frequency of removal for more extensive inspections.

CAA believe recent experience supports this position. A further incident of engine-MGB Thomas coupling failure occurred on 9 December 1992 on AS355 helicopter G-OHMS with similar characteristics as for G-WMPA. The Thomas couplings were inspected to LTO 1191 only two days and 2.2 flight hours previously with no damage noted. LTO 1191 has been amended to include inspection of the gearbox mount laminates.

(ii) The constructor is re-examining the necessity for the introduction of tightening torque checks of AS355 engine-MGB Thomas coupling bolt retaining nuts after a short bedding-in period. This procedure proved necessary and effective when introduced on Puma and AS365 aircraft and recent AS350 service experience of tightening torque loss gave rise to instructions calling for tightening after a few operating hours. In the meantime LTO 1191 has been amended to include an appropriate action.

Further, in consideration of other helicopter types, the CAA have written to all certificating authorities of types validated by the CAA requesting they instigate a review with constructors to establish if similar procedures exist and are effective or are necessary. Their advice is awaited.

(iii) The constructor and DGAC do not believe vibration checks of the flexible coupling would help detect installation errors or coupling degradation at an early stage. Misalignment checks are not required if the engine and coupling are installed in accordance with the manufacturer's instructions. CAA believe the constructors response to be incomplete and dialogue continues.

RECOMMENDATION 4.2

It is recommended that the CAA consider requiring, for UK registered public transport and police helicopters:

(i) Checks aimed at ensuring that engine-MGB alignment and drive train vibration level are acceptable following disturbance of engine or MGB mountings or drive train components.

(ii) The early provision of a facility to monitor continuously the vibration of high-speed rotating equipment whose integrity is, or may foreseeably be, critical to flight safety.

Status – Fully Accepted – Open

CAA Action

(i) UK and foreign manufacturers of rotorcraft have been contacted for their views and information on the means of ensuring correct engine – MGB coupling alignment and checks of drive train vibration levels. Responses are awaited but overdue, CAA consider them to be of high priority and will pursue the matter accordingly.

(ii) This Recommendation is similar to Recommendation 4.7 of AAIB Report 1/90 and Recommendation 4.14 of AAIB Report 3/90.

The current UK Certification standard for new large helicopter types is BCAR 29 which defines the safety objectives. A safety assessment is required to confirm that they will be met. The CAA is satisfied that the objectives will not be met with current transmission technology without vibration health monitoring.

BCAR 29 will be superseded by JAR 29 which is the subject of a harmonisation exercise with FAR29. Both will require a safety assessment which will lead to similar provisions for health monitoring.

The CAA Discussion Paper 'The Airworthiness of Group A Helicopters' has led to proposals for retrospective application of the JAR 29 design assessment requirements, targeting those helicopters operating over hostile terrain and city centres.

The proposals will be submitted for JAA consideration with a view to joint implementation.

The application of HUMS to small public transport helicopters will be reviewed following the publication of JAR 27 in October 1993.

RECOMMENDATION 4.3

It is recommended that the CAA consider extension of the Mandatory Occurrence Reporting system to include aircraft under 2730 kg maximum gross weight in the Public Transport and Aerial Work categories, and take measures aimed at ensuring that the service experience of operators and maintainers is fed back to the manufacturer and expeditiously shared with other relevant UK operators and maintainers.

Status – Partially Accepted – Open

CAA Action

The Authority has decided to institute a complete review of the reporting criteria applicable to the Mandatory Occurrence Reporting Scheme. The Authority proposes to conduct such a review by inviting industry representatives to join a specialist Study Group, reporting its recommendations to the Authority by the end of December 1993. The Study Group's recommendations will be reviewed by the Authority and any appropriate action then taken. The Study Group's conclusions will also be brought to the attention of the JAA.

BAC 1-11	NEAR DIDCOT	10Jun90	ACCIDENT	9002400	91/27

References: AAR 1/92 dated 14Apr92
FACTAR 1/92 dated 14Apr92

RECOMMENDATION 4.1

The CAA should examine the applicability of self certification to aircraft engineering safety critical tasks following which the components or systems are cleared for service without functional checks. Such a review should include the interpretation of 'single mal-assembly' within the context of 'Vital Points' and the requirements which include a waiver making the definition of 'Vital Points' non-mandatory for aircraft with a Maximum Take-Off Weight Authorised of over 5,700 kg which were manufactured in accordance with a Type Certificate issued prior to 1 January 1986.

Status – Fully Accepted – Closed

CAA Action

The CAA has conducted a review of Self Certification by properly authorised maintenance engineers, the procedures for returning aircraft to service after significant maintenance, the interpretation of single mal-assembly within the context of Vital Points and the exclusion of the Vital Points requirement for aircraft over 5700 kg MTWA certification prior to January 1986.

The review concluded that:

(1) aircraft returned to service in accordance with manufacturer's maintenance manual requirements in association with currently promulgated airworthiness management procedures, which can involve self certification by appropriately authorised maintenance personnel, do not represent a significant risk. The level of risk assessed is judged to be of the same order as that underlying current aircraft design and certification standards;

(2) the need to mandate a design review for the purpose of extending the current maintenance requirements for Duplicate Inspections by the development of lists of Vital Points, within the terms of the definition, for aircraft over 5700 kg certificated prior to January 1986 is not justified on the basis of (1) above. Vital Points, as defined in BCAR, are superseded by JAR25.

RECOMMENDATION 4.7

The CAA should recognise the need for the use of corrective glasses, if prescribed, in association with the undertaking of aircraft engineering tasks.

Status – Fully Accepted – Open

CAA Action

Guidelines on acceptable visual standards will be issued as an Airworthiness Notice when the Amendment to Article 12 of the ANO (Prohibition on the exercise of privileges of Licensed Maintenance Engineers while medically unfit) comes into force. It is currently with DOT awaiting legislation.

RECOMMENDATION 4.8

The CAA should ensure that, prior to the issue of an ATC rating, a candidate shall undergo an approved course which includes training in both the theoretical and practical handling of emergency situations. This training should then be enhanced at the validation stage and later by regular continuation and refresher exercises.

Status – Fully Accepted – Open

CAA Action

Proposed new requirements for Air Traffic Controller Emergency Training are currently subject to industry consultation. Following consultation the CAA will review its proposals and, if necessary, amend them in the light of comments received before introducing mandatory provisions for Air Traffic Controllers to receive and satisfactorily complete regular training in the handling of abnormal/emergency situations.

Part 2 – AAIB Recommendations received during 1992

PIPER PA34-200T SENECA II	**COMPTON ABBAS**	**17Sep91**	**ACCIDENT**	**9103409**	**92/01**

References: Bulletin 3/92

RECOMMENDATION 92–10

The CAA introduce a 'one-time' inspection to be carried out on all Piper PA34 aircraft to ensure that the specified washer is fitted to the downlock link/nose landing gear bolt; that such bolts have the correct head markings and the surface condition of their shanks is satisfactory.

Status – Rejected – Closed

CAA Response

The Authority does not accept this Recommendation. The Authority believes that the absence of the subject washer was due to poor maintenance practices, i.e. improper assembly of the drag link truss to the landing gear leg, which in turn caused the subject bolt and bushing to be damaged in such a way that fatigue developed. Long established practice requires that the assembly of a moving structural joint such as that in question must be undertaken using appropriate washers under bolt heads and securing nuts even though such an assembly procedure may not be specifically detailed in maintenance manuals. The introduction of a once off inspection to determine correctness of long established good engineering practice as it affects one particular instance would call into question the assembly of every other mechanical joint of similar description.

The bolt identified in the PA 34-200T illustrated parts catalogue as Part Number 400-274 is also identified as an AN7-35. Aircraft hardware such as the subject bolt are classed as standard parts and are manufactured universally throughout the United States to the US Army and Navy Specifications. The only common marking on these all purpose structural bolts is a star/cross embossed on the bolt head and usually, but not necessarily, a manufacturers mark. Hence, a new or replacement bolt may come from one of many sources. Such diversity of production precludes identifying a specifically correct marking.

RECOMMENDATION 92–11

The CAA ensure that adequate instructions and guidance are given in the Piper PA34-200T Maintenance Manual and Illustrated Parts Catalogue to enable correct assembly of the downlock link/nose gear bolt.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. Notwithstanding established good engineering practice, the Authority will draw to the attention of the aircraft type certificate holder the AAIB observation concerning the information in the aircraft servicing manuals. Additionally, the Authority will, in a General Aviation Safety Information Leaflet (GASIL), draw attention to the need to comply with established good engineering practices.

RECOMMENDATION 92–12

The CAA require that a suitable life be determined for downlock link/nose landing gear bolts on Piper aircraft.

Status – Partially Accepted – Closed

CAA Response

The Authority partially accepts this Recommendation. The Authority has considered the circumstances of this nose landing gear downlock link bolt failure as reported in the AAIB Bulletin and the DRA failure analysis report. It is concluded that in this case the failure was assisted by the increased reversed bending fatigue loads on the bolt caused by displacement of the downlock link bush, probably as the result of mal-assembly. Also, initiation of cracking was promoted by the presence of significant defects at the surface of the bolt, associated with decarburisation which had occurred during manufacture. In the absence of these defects it is considered that a downlock link bolt, correctly assembled, would achieve a life equal to the intended life of the aircraft as a whole.

Piper Aircraft Corporation have confirmed that the defective condition of this bolt as installed should be discovered during routine service inspections. In accordance with the Piper Seneca II Service Manual such inspections of these bolts are required at every 100 hours.

The Authority contends that rigorous inspections can achieve at least an equivalent level of safety to that available by introduction of a specified retirement life below the life of the aircraft. The Authority will publish an article in GASIL as a reminder of the inspection requirements for such undercarriage pivot bolts.

RECOMMENDATION 92–13

The CAA consider extension of the Mandatory Occurrence Reporting system to include aircraft under 2,300 kg maximum gross weight in the Public Transport and Aerial Work categories, and take measures aimed at ensuring that the service experience of operators and maintainers is fed back to the manufacturer and expeditiously shared with other relevant UK operators and maintainers. (This Recommendation was also previously made following the investigation into Aerospatiale Twin Squirrel, G-WMPA on 30 December 1990, AAIB Bulletin 12/91).

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation in respect of public transport operations and is initiating action to amend the appropriate article of the ANO to delete the 2300 kg maximum gross weight limit from mandatory occurrence reporting. As an interim measure, pending amendment of the ANO, a revised edition of CAP 360 (Air Operators Certificates) to be published shortly, will require operators of aircraft below this weight to report in accordance with MOR criteria and procedures.

The position with respect to aerial work operations is the subject of further review before a decision is taken. It is considered that the existing procedures for feedback to manufacturers of service experience from operators and maintenance organisations,

together with dissemination of this information to others, are satisfactory provided that occurrence reports are raised.

CAA Action

The Authority has decided to institute a complete review of the reporting criteria applicable to the Mandatory Occurrence Reporting Scheme. The Authority proposes to conduct such a review by inviting representatives to join a specialist Study Group, reporting its recommendations to the Authority by the end of December 1993. The Study Group's recommendations will be reviewed by the Authority and any appropriate action then taken. The Study Group's conclusions will also be brought to the attention of the JAA.

CESSNA 421	FAIROAKS	01Jan92	ACCIDENT	9200001	92/02

References: Bulletin 4/92
FACTOR 19/93 dated 14Sep93

RECOMMENDATION 92–21

The CAA and FAA, for Cessna 300 and 400 Series aircraft with this type of main landing gear, assess the type and frequency of inspection and lubrication necessary for all main landing gear pivots that can influence the achievement of downlock and require these to be clearly specified and take measures to alert operators to the history and the importance of interpreting the servicing requirements within the context of their operation.

Status – Partially Accepted – Closed

CAA Response

The CAA partially accepts this Recommendation. Aircraft maintenance manuals establish a level of maintenance which may be increased or decreased by the aircraft operator responsible for the airworthiness of the aircraft, depending on the operating conditions and environment. The Cessna 300 and 400 Series Maintenance Manuals already specify an appropriate level of maintenance for the landing gear. Nevertheless as a safeguard the Authority has published a reminder in GASIL to operators and owners of the need to comply fully with undercarriage inspection and lubrication requirements and of the need to amend these according to operational need. Similarly the FAA intend to issue an airworthiness alert to remind operators.

RECOMMENDATION 92–22

The CAA and FAA review fuel system crashworthiness requirements for type certification, in particular considering the presence of fuel vapour as a potential fire source.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The Authority's review of the crashworthiness requirements for fuel systems has shown that they provide for an appropriate level of safety for this class of aeroplane. The requirements of BCAR 23 and those proposed for JAR 23 provide significant airworthiness improvements on US Civil Airworthiness Requirements (CAR) 3 to which this aeroplane type was certified.

A310;	**'BEREK'**	**14Jan92**	**ACCIDENT**	**9200085 92/03**
BAe JETSTREAM 31				

References: Bulletin 4/92
FACTOR 12/93 dated 04May93

RECOMMENDATION 92–15

It is recommended that the CAA define the requirements of an effective radar/RTF replay system for incident/accident investigation and implement them as soon as practicable.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. Annex 11 to the convention on International Civil Aviation Organisation recommends that where radar data provides the primary source of ATS positional information, a Radar Recording system should record this information. The Authority is currently consulting industry on its proposed requirements for Radar Recording equipment. These include requirements for the synchronisation of RTF and radar data.

RECOMMENDATION 92–16

It is recommended that the CAA make provision for ATCOs to receive regular periodic training in the handling of abnormal/emergency situations and that it be a requirement for them to satisfactorily complete such training.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. The Authority's proposed requirements for Air Traffic Controller Emergency Training are currently subject to industry consultation process. Following consultation, the Authority will review and, if necessary, amend the proposed requirements in the light of comments received before introducing mandatory provisions for Air Traffic Controllers to receive and satisfactorily complete regular training in the handling of abnormal/emergency situations.

CONCORDE 102	NORTH ATLANTIC	21Mar92	ACCIDENT	9200841	92/04

References: AAIB Letter dated 13Apr92
CAA Letter dated 03Jun92

RECOMMENDATION 92–23

They revise the content of Airworthiness Directive 022-04-89 and associated British Aerospace Alert Service Bulletin 55-A-007 to decrease the inspection intervals to prevent the possibility of further failures of Concorde rudder bonded structures. Particular attention should be drawn to rudders with existing repairs which should be re-inspected within a very short time.

Status – Partially Accepted – Closed

CAA Response

The Authority accepts the intent of this Recommendation. Alert Service Bulletin SST 55-A-007 has been superseded by the Mandatory Campaign Wire SST 55-CW-010 Issue 1, dated 14 May 1992. This Mandatory Campaign Wire, which is supported by CAA Airworthiness Directive 026-05-92, revises the mandatory inspection requirements for Concorde Rudders as follows:

(a) Total reliance is now placed on Mechanical Impedance Testing (AFD/MIT); the manual tap test has been eliminated.

(b) Mechanical Impedance Testing is to be carried out over both surfaces of both top and bottom rudders using a maximum scan pitch of 0.5 inches. A two inch area around existing repairs is to be given particular attention.

(c) The Mechanical Impedance Testing Procedure has been modified to introduce a dual frequency inspection requirement. The new inspection intervals are:

Either:

(i) Single frequency Mechanical Impedance Test at intervals not exceeding 80 flying hours or 2 months, whichever is the sooner, and dual frequency Mechanical Impedance Test at intervals not exceeding 320 flying hours or 8 months, whichever is the sooner;

Or:

(ii) Dual frequency Mechanical Impedance Test at intervals not exceeding 120 flying hours or 4 months, whichever is the sooner.

(d) In addition, the Structural Repair Manual has been amended:- to extend the area in which no detectable delamination is permissible; and to reduce the maximum permitted dimension of a delaminated area from 1.5 inches to 1.0 inches and to delete the minimum distance to the edge of the panel.

RECOMMENDATION 92–24

They investigate, in conjunction with the operators and manufacturers, improved NDT inspection methods for Concorde honeycomb bonded structures. In particular, devices which seek to replace the manual 'tapping' method by electronic instruments appear promising and should be given serious consideration.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. As indicated in the response to 92–23, reliance on the manual tapping method of inspection has been totally replaced by reliance on Mechanical Impedance Testing.

RECOMMENDATION 92–25

They re-examine with the manufacturers and the operators the approval and quality control procedures for large repairs and with the manufacturer the relevant chapters of the Structural Repair Manual.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The Authority will undertake a review of the manufacturers and operators approval and quality control procedures for large repairs together with a re-appraisal of the relevant chapters of the Structural Repair Manual.

CAA Action

The CAA has undertaken monitoring audits of the operators design office and bonding facility with a particular focus on repairs. The relationship between the manufacturer and the operator has been clarified and amendments made to the Structural Repair Manual (See response to 92–23).

BAe ATP	**EDINBURGH**	**05Feb92**	**ACCIDENT**	**9200304**	**92/05**

References: AAR 5/92 dated 20Oct92
FACTAR 5/92 dated 20Oct92

RECOMMENDATION 92–76

It is recommended that the CAA review the requirements of the Air Navigation Order, Schedule 4, Scale Y2 to increase the number of megaphones required.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation and will review the number of portable battery-powered megaphones required, taking into account the draft requirements of JAR–OPS.

CAA Action

The CAA requested that the JAR–OPS Equipment Sub-Committee review the number of megaphones required to be carried, taking account of the communication difficulties encountered in this accident. The committee concluded that there was no justification for increasing the number of megaphones required. The Authority does not consider that unilateral action to increase the number of megaphones required would be justified if, with the probable implementation of JAR–OPS, this would cease to be a requirement within the next three years. The Authority has required that additional instructions for cabin crews be promulgated to ensure that the breakdown of communication apparent in this accident does not happen again.

BRITTEN-NORMAN ISLANDER BN2A	**PRESTWICK**	**30Jan92**	**ACCIDENT**	**9200253**	**92/06**

References: AAIB Letter dated 18Mar92
CAA Letter dated 31Jul92

RECOMMENDATION 92–20

The CAA should carry out an audit of those airfields where the paved surface extends beyond the runway width, in order to standardise the surface markings at taxiway/runway junctions designed to lead aircraft onto the centreline. Furthermore, it is recommended that where taxiway guidance is by painted marks alone and possible confusion exists, consideration should be given to restricting the use of these taxiway/runway junctions to daylight hours only.

Status – Fully Accepted – Closed

CAA Response

This Recommendation is accepted, and the Authority's long term aim is to achieve standardisation of taxiway/runway entry guidance. In the short term, it considers that existing runway entry markings at those airports with hard shoulders, and which are all equipped with a minimum of yellow painted centre line guidance, are sufficient for daylight and good visibility operations.

The Authority could not currently justify to aerodrome operators the considerable expense of instituting an immediate standardisation programme, given the infrequency of incidents of this type. However, the Authority accepts that by night and in low visibility operations there is considerable merit in restricting runway access to those taxiway/runway entry points which are equipped with standard illuminated route markings, as required by CAP 168 (Licensing of Aerodromes). Accordingly it is reviewing each of the airports with hard shoulders (listed below) in order to produce an agreed list of approved night time and low

visibility runway entry points for use by local ATC. In the case of Prestwick, night time use has been restricted to five of the present access routes, which do not include the two mentioned in the Bulletin.

Airports with wide hard shoulders: Cardiff; Edinburgh; Glasgow; Liverpool; Gatwick; Heathrow; Stansted; Manchester.

In addition to the action on aerodromes, the Authority will also seek to publicise the danger of attempting to manoeuvre aircraft on the ground when external vision is obscured by contamination of cockpit windows.

CAA Action

A minimum standard of a yellow painted taxiway centreline for runway entry guidance during day time in good visibility has been accepted for the short term. A review of aerodromes with hard shoulders to runways has shown these markings to be satisfactory. Appropriate restrictions on the night use of taxiways without adequate lighting have been introduced where necessary. The long term aim is to provide standardised taxiway/runway edge marking where taxiways cross hard runway shoulders. New requirements are currently being considered by the industry for inclusion in CAP 168 and a compliance date will be agreed during this consultation.

JAGUAR; CESSNA 152 CARNO 29Aug 91 ACCIDENT 9103079 92/07

References: AAR 2/92 dated 29Apr92
FACTAR 2/92 dated 16Jun92

RECOMMENDATION 92–05

The Civil Aviation Authority and Ministry of Defence should ensure wider publicity of CANP procedures and restate its safety benefit to civil aircraft operators.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. Action in support of wider CANP publicity is continuing. In addition to the articles contained in General Aviation Safety Information Leaflets (GASIL) 10/91, 11/91 and 1/92, as mentioned in para 2.3.2 of the Report, Aeronautical Information Circular (AIC) 2/1992 raised the vertical limit for notification of flight under CANP from 500 to 1000 ft for a trial period of six months starting from 6 January 1992 as noted in para 1.17.3 of the Report.

RECOMMENDATION 92–06

The trial extension of the CANP system to encompass civil aerial work carried out at or below 1000 feet agl should be maintained and its scope widened to include all forms of aerial work at these levels.

Status – Partially Accepted – Open

CAA Response

The Authority accepts this Recommendation in part, and it is intended to make the raising of CANP airspace to 1000ft permanent. The trial introduced by AIC 2/1992 has been further extended to 17 September 1992 to prove the RAF Tactical Booking Cell processing capability during the summer months. Permanent adoption of the 1000ft ceiling will be reviewed in the light of the extended trial.

The subject of mandatory status for CANP has been raised within the National Air Traffic Management Advisory Committee. There are reservations, however, regarding the inclusion of pipe/powerline inspection flights by helicopters. This type of aerial work was originally included in CANP but the Ministry of Defence queried the value of such notification due mainly to the difficulty encountered by civil operators in providing, some hours in advance, sufficiently accurate times/positions. Following a trial by the principal operator at the time, and with the full agreement of the British Helicopter Advisory Board, such inspection flights were removed from CANP in 1984.

Similarly, it would be impracticable to include flying training for brief periods (e.g. practice forced landings) for which a large number of notifications would be necessary. It should be noted however, that with effect from 1 July 1992, helicopters engaged in pipe/powerline inspections at low level will be required to have a High Intensity Strobe Light installed.

CAA Action

After the trial period, the vertical extension of the CANP procedures to 1000ft agl was made permanent on 17 September 1992. A revised CANP Aeronautical Information Circular (AIC 44/93), was published on 1 April 1993; this AIC widened the range of aerial activities which can be notified to the Tactical Booking Cell to include some recreational flying and notification of concentrations of aircraft. Negotiations with the companies that carry out pipe and power-line inspections by helicopter continue with a view to the inclusion of this activity in CANP. So far the companies have been unable to undertake to define their activity to such a degree that would make its inclusion in CANP viable.

RECOMMENDATION 92–07

Together with the Ministry of Defence, NATS should examine methods of making available, on a daily basis, information concerning areas where high intensity military low flying will take place, so that civil operators may plan to avoid or overfly these areas.

Status – Fully Accepted – Open

CAA Response

The Authority and the Ministry of Defence accept this Recommendation. An Aeronautical Information Circular on the subject of Military low flying is being prepared.

CAA Action

This recommendation was echoed by a similar one in the MOD review of low flying which was promulgated internally on 28 February 1992. The MOD recommendation proposed an investigation into the use of ALFENS (Automated Low Flying Flight Planning Enquiry and

Notification System) for the provision of daily information concerning intensity of military low flying. ALFENS is not expected to enter service until late 1994 and the equipment must be proved in operational use before a briefing service based upon it can be contemplated. In the meantime, however, it is intended to utilise the AIS 'dial-a-fax NOTAM Nav Warning' system, when this becomes operational later this year, to create a dedicated list of NOTAMS which will inform of intensive military low flying and which may be accessed by General Aviation pilots. Action is therefore on-going in respect of this recommendation and a further report will be made when the new fax NOTAM system is in service.

RECOMMENDATION 92–08

Military flow directional arrows should be published on civil aeronautical charts and that those RAF stations that operate fast jets should be 'highlighted'.

Status – Partially Accepted – Open

CAA Response

The Authority accepts this Recommendation in part. The inclusion of flow arrows on civil charts has been agreed by the Ministry of Defence, and the Authority is considering the mapping implications. However, 'highlighting' RAF stations that operate fast jets is not considered practicable as most stations can be so used, and these aircraft do little low flying near their bases.

CAA Action

At a recent National Air Traffic Management Advisory Committee (NATMAC) meeting, the Ministry of Defence made available details of the Military low flying activity which will provide information to allow flow direction arrows to be published on civil aeronautical charts. NATMAC are currently discussing how best to present these flow directional arrows to the civil aviation community. The 'highlighting' of RAF stations that operate fast jets is not considered helpful by MoD as most stations can be so used and such aircraft do little low flying near their bases.

RECOMMENDATION 92–09

The CAA should re-examine the UK definition of aerial work and ensure that the legislation allows that the activities of operators engaged in aerial photography flights of a commercial nature may be properly and safely regulated.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. The current UK definition of aerial work is derived from the definition of public transport, i.e. if valuable consideration is associated with a flight which is not public transport, then it is an aerial work flight. The Report (para 1.17.8.1) points out that the ICAO definition of aerial work is more specific, and relates to particular examples of specialised services which are defined as aerial work, e.g. agriculture, construction, photography, survey, etc. Adoption of the ICAO definition was seen as having advantages, and preliminary work has been carried out. The UK position will have to align with that of the Joint Aviation Authorities (JAA) in their operational requirements which are due to become effective on 1st December 1995. In view of this long timescale, the Authority

intends to consult with industry on proposals to amend national legislation consistent with the expected JAA position. Initial consultation with industry is planned to commence before the end of October 1992.

CAA Action

The Operations Advisory Committee (OAC) chose in 1992 to await the development of European regulations in preference to enacting short-term UK legislation which would require an Aerial Work Certificate for flights such as aerial photography.

At its January 1993 meeting, the OAC was informed that the Department of Transport, having been appraised of the OAC's view, nevertheless supported the Authority's premise that effort could be expended usefully on three related amendments to national legislation in respect of commercial aerial photography which would improve safety in the airspace below 1000ft agl. Although formal DoT agreement is still awaited, work on the amendments to national legislation will be commenced shortly.

BOEING 747-136	**HEATHROW**	**19Mar91**	**INCIDENT**	**9100788**	**92/08**

References: Bulletin 3/93
FACTOR F16/93 dated 20Jul93

RECOMMENDATION 92–17

The CAA, in consultation with the FAA and the aircraft manufacturer, should require that the aluminium alloy fuel and hydraulic pipes in the four wing leading-edge/pylon zones of the Boeing 747 be replaced by pipes constructed from materials which meet the fire resistance requirements applicable to designated Fire Zones. The material specification and dimensions of the pipes should be such as will enhance the ability of these pipes to withstand external mechanical impact and abrasion.

Status – Rejected – Closed

CAA Response

See Response to 92–18 below.

RECOMMENDATION 92–18

The CAA, in consultation with the FAA and the aircraft manufacturer, should require that the fire detection system on the Boeing 747 type be extended to include the wing leading-edge/pylon zone.

Status – Rejected – Closed

CAA Response

The Authority does not accept these Recommendations. The Recommendations challenge the well established philosophy of flammable fluid leakage zones both for this and many other regions of the aircraft. Although bleed air duct failures occur from time to time, the resulting temperatures are below the level normally accepted as likely to cause ignition of flammable fluids. There are already provisions on the Boeing 747 for detecting and isolating a significant bleed air leak arising from a duct failure. Increasing the wall of pipes in this region is not thought to be the right way to deal with such a pipe clamp failure. The energy of impact arising from such a clamp failure is difficult to predict and it is our view that in this situation prevention is better than cure. The introduction of a more reliable pipe clamp as recommended by Boeing and already implemented by British Airways would therefore appear to be the most sensible approach.

The Authority will investigate this further with the FAA and consider whether mandatory replacement is appropriate. A review of our records, however, show no previous incident where a duct clamp failure has caused serious secondary damage to adjacent systems and equipment.

With regard to the Northwest Airlines incident, which is considered to be a quite separate issue, the Authority believes that the mandatory inspection and subsequent modification implemented by FAA AD to separate the generator feeder cable from the engine fuel feed pipe will guard against a repetition of this type of event. Our records indicate that there have been no other instances of fire in the leading-edge/pylon area of this, or any other, aircraft type. Therefore, there is little justification for extending the fire detection system to this area.

The fuel and hydraulic lines are aluminium alloy and as such already comply with the FAA/JAA criteria for 'fire resistance' as applicable to a Fire Zone. Penetration as a result of arcing would not be substantially improved by changing the pipe materials.

RECOMMENDATION 92–19

The CAA, in consultation with the appropriate airworthiness authorities and manufacturers, review other large public transport aircraft types with pylon mounted engines to determine if similar action is required.

Status – Rejected – Closed

CAA Response

The Authority does not accept this Recommendation. A review of the Authority's SDAU records indicates that these types of event do not represent a significant airworthiness problem for the Boeing 747 or any other type of large public transport aeroplane. The Authority therefore believes that a more extensive investigation of other aircraft types would not be justified and proposes no further action in this respect.

PIPER PA28R-200 CHEROKEE ARROW II	SKIDDAW	13Feb92	ACCIDENT	9200386	92/09

References: AAIB Letter dated 08May92
CAA Letter dated 25Jun92

RECOMMENDATION 92–29

The CAA conduct an urgent review of altimeter setting procedures, with a view to raising the transition altitude outside controlled airspace to provide adequate clearance above the highest terrain within the UK.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation and will take immediate steps to advise the NATS Altimetry Standing Working Group to consider the matter.

CAA Action

A review of altimeter setting procedures for aircraft operating outside Controlled Airspace has been completed by the National Air Traffic Services Altimetry Standing Working Group (ASWG). The ASWG confirmed that current policy in the UK complied with ICAO DOC 8168 PANS – Aircraft Operations, and that ICAO and National documentation determined that, despite popular belief, the Transition Altitude is effective only in the vicinity of an aerodrome and is not established at 3000ft throughout the whole of the UK Flight Information Regions (FIRs) outside controlled airspace. Nonetheless, the ASWG recognised that the AAIB Recommendation could assist in alleviating problems relating to terrain clearance when operating on the Standard Pressure Settings. On this basis the ASWG consulted widely throughout the aviation industry but found that the great majority of the views obtained were not in favour of raising the Transition Altitude. The group therefore considered that to raise the Transition Altitude outside Controlled Airspace would introduce unacceptable disadvantages to a system that had, with few exceptions, stood the test of time.

With the foregoing in mind the ASWG concluded that the Transition Altitude within the UK FIRs outside Controlled Airspace should remain at 3000ft amsl; however, the following actions were undertaken, or are in the process of being implemented:

(a) Following the first ASWG meeting, the Safety Promotion Section, of the Safety Regulation Group was requested to consider the publication of a Safety Sense Leaflet on the subject of terrain clearance. As this had recently been done, a special mention of this subject was made in GASIL. Further, the Safety Promotion Section undertook to highlight the need for comprehensive terrain clearance planning during their Safety Evening lectures.

(b) In view of the AAIB concern for aircraft flying in the vicinity of high ground when unsure of position, each Air Traffic Service Unit providing an Air Traffic Service outside CAS will, besides having available the minimum altitude for the provision of a Radar Advisory Service, also have at hand the equivalent Flight Level conversion where appropriate.

(c) In order to clarify the extent of the Transition Altitude within the UK, the group concluded that a UK Area Transition Altitude should be established. Permissible by ICAO, the UK Area Transition Altitude would be, unless otherwise specified, 3000ft amsl outside CAS throughout the UK FIRS, thus regularising common practice. This matter is currently the subject of consultation through NATMAC.

A further initiative arising from the discussion has been to consider reducing the number of Altimeter Setting Regions. This work continues, as a separate subject.

RECOMMENDATION 92–30

The CAA publish a recommended standard for navigation logs, as currently published for commercial operators in CAP 360/450.

Status – Partially Accepted – Closed

CAA Response

The Authority accepts this Recommendation in principle and will publish guidance on the content of navigation logs in a General Aviation Safety Information Leaflet.

CAA Action

Further guidance material, specifically noting the importance of Minimum Safe Altitudes, was included in General Aviation Safety Information Leaflet (GASIL) 12/91.

RECOMMENDATION 92–31

The CAA publish, in concise form, all information outlining the problems associated with flight in IMC, including those encountered over inhospitable terrain, during winter operations etc.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. At present, operating in the winter is the subject of Safety Sense Leaflet No 3A 'Winter Flying', which also includes survival aspects of flying over inhospitable terrain. Clothing aspects are included in Safety Sense Leaflet No 2A 'Care of Passengers'. 'Flight over and in the vicinity of high ground' is the subject of Aeronautical Information Circular 94/1989 (Pink 125). The Authority is giving consideration to the possibility of a new Safety Sense Leaflet entitled 'IMC Sense'.

CAA Action

AIC 120/1992 (Pink 59) 'Flight over and in the vicinity of high ground' updated AIC 94/1989 (Pink 125). Instead of publishing a Safety Sense Leaflet, which would have required a consultation period and therefore a long lead-time before publication, the CAA acted more swiftly by highlighting the problems in GASIL 11/92 and 12/92, the latter being a lengthy text. Additionally, greater emphasis is now and will continue to be placed on this subject during Safety Evenings at which CAA staff discuss General Aviation hazards and problems. Similarly, articles on this subject will continue to appear in the GASIL.

RECOMMENDATION 92–32

The CAA consider ways of enhancing the training content of the IMC Rating, to bring it closer to the ICAO minimum standard for IFR operations. This should include the incorporation of a full navigation flight test, with increased emphasis on the use of radio aids for en route navigation, and including a descent to minimum safe altitude and diversion due to (simulated) adverse weather conditions.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation which will be covered in a review of the future of the IMC Rating conducted in the context of the introduction from 1993 of European harmonised flight crew licensing requirements.

CAA Action

The Authority raised the issue as a main agenda item at the Standing Advisory Committee for Professional and Private Pilot Licensing held at Aviation House on 30 September 1992. As a consequence of this meeting a working group was established whose terms of reference were:

(1) To determine the original objectives of the IMC rating and to assess if these objectives have been achieved with the rating in its present form.

(2) To consider if there is a place for the IMC rating for UK pilots in parallel with the JAR/FCL Instrument Rating.

(3) To make recommendations as to the training, testing and continued competency requirements of the IMC rating, taking account of the ICAO VMC minima.

The IMC Rating Review Working Group is meeting on a monthly basis. The Group is proposing major changes to the form, privileges, training and testing requirements for the IMC rating, taking into account both the AAIB Recommendations and the requirement for a rating that will provide genuine benefit to operators in UK airspace and be seen as a clear intermediate step towards a full instrument rating. In its new form it is hoped that the new rating will be acceptable to other JAA states. The working group aims to produce a preliminary report at the end of 1993.

RECOMMENDATION 92–33

The CAA review the provision and availability of essential information to Air Traffic Controllers, including weather and topographical/navigational data, in order to facilitate a timely response to potential emergency situations. The facilities available by use of the Distress & Diversion Cell in these situations should be emphasised to both pilots and controllers.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. A review will be conducted regarding the provision and availability of essential information to Air Traffic Controllers in order to facilitate a timely response to potential emergency situations. Should the review reveal any shortcomings in current practice, amendments will be incorporated in CAP 573 (Approval of Air Traffic Control Units) to ensure that controllers will be in a position to offer as much assistance as possible to any aircraft in an emergency situation. The Authority will also draw the attention of both pilots and controllers to the contents of Aeronautical Information Circular 76/1991 (Pink 26) which gives details of the facilities that are available from the two UK Distress and Diversion Cells.

CAA Action

The review regarding the provision and availability of essential information to Air Traffic Controllers, in order to facilitate a timely response to emergency situations, is complete. In the light of the review, CAP 573 (Approval of Air Traffic Control Units) has been amended such that facilities to accommodate manuals and documents, and display information such as NOTAMs, weather and royal flights are to be provided. Information of a more permanent nature, such as instrument approach procedures, topographical maps, telephone and emergency check-lists, is to be conveniently located about the position.

RECOMMENDATION 92–34

The CAA re-emphasise to pilots of general aviation aircraft that the allocation of a transponder code does not, in itself, mean that a radar service is being provided, unless specifically notified as being so.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. A note in red on the Summary page of the revised Safety Sense Leaflet No 8A 'Air Traffic Services in the Open FIR', and in the text, states 'Pilots are responsible for terrain and obstacle clearance'. This revised leaflet becomes available in July 1992. A similar paragraph in red will be included in the revised Safety Sense Leaflet No 1A 'Good Airmanship Guide'. This will be distributed with the July General Aviation Safety Information Leaflet, to all aircraft owners, instructors, etc.

CAA Action

The new Safety Sense Leaflet 1A 'Good Airmanship Guide' was distributed with the July 1992 GASIL; copies are also widely distributed at Safety Evenings, at each of which a presentation is made on the services available to and the responsibilities of the pilot when in receipt of a Lower Airspace Radar Service.

CAMERON A210 BALLOON	SELBORNE	08Mar92	ACCIDENT	9200998	92/11

References: AAIB Letter dated 20May92
CAA Letter dated 16Jun92

RECOMMENDATION 92–38

The CAA should consider the introduction of a requirement for a standard passenger briefing to be given prior to and during every public transport flight, the content of which should be included in the Operations Manual for each company undertaking such operation.

Status – Fully Accepted – Closed

CAA Response

An instruction that Operations Manuals must include information on the briefing of passengers is contained in the CAP 360 Part 3, a draft of which is now being circulated for comment to the British Balloon and Airship Club, the balloon manufacturing industry, and the interested parties within the Authority.

CAA Action

A passenger briefing note is now a requirement of the revised AOC Operations Manual for balloons (Appendix H). BBAC have produced such a standard passenger briefing.

RECOMMENDATION 92–39

The CAA should consider the introduction of a Recommendation to public transport operators that protective headgear be available to passengers, for takeoff and landing operations.

Status – Fully Accepted – Closed

CAA Response

The new CAP 360 Part 3 will require the Operations Manual to include the possible provision of protective headgear, suitable clothing and other items of safety equipment as part of the pilot's pre-flight responsibilities. The pilot will decide which, if any, items are required, depending on the conditions prevailing for the flight, where for example if a landing in difficult terrain is a possibility.

CAA Action

Balloon Notice 2/93, published in February 1993, recommends that head protection be provided for passengers if other than normal conditions could be encountered during the course of a flight.

RECOMMENDATION 92–40

The CAA should consider the introduction of a Recommendation to operators to encourage adherence to the 8 knot windspeed limit for this type of balloon while engaged in public transport operations, rather than the overall 15 knot limit specified by the manufacturer.

Status – Fully Accepted – Closed

CAA Response

In the standard 'Operations Manual' produced by the British Balloon and Airship Club and accepted by the Authority, 8 knots is stated as being the upper limit in normal circumstances but insufficient guidance is given for operating in windspeeds in excess of 8 knots. The new CAP 360 Part 3 will require that the Operations Manual contains clear guidance on the procedures to be followed 'before taking off in a surface wind exceeding 8 knots'. Interim advice on the subject will be given in a notice to balloon AOC holders, shortly to be issued.

CAA Action

Operations Manual instructions on maximum wind speeds have been revised to emphasise that the normal maximum surface wind speed for PT flights is 8 kts. The Balloon Flight Manual maximum of 15 kts is only to be authorised on the specific instructions of the Chief Pilot.

ROBINSON R22 MARINER	**OLDHAM**	**23Feb92**	**ACCIDENT**	**9200496**	**92/12**

References: AAIB Letter dated 10Jun92
CAA Letter dated 22Oct92

RECOMMENDATION 92–26

Existing certification criteria in relation to pilot intervention times following loss of power should be re-appraised when formulating JAR 27. Revised requirements should be based upon the results of current research into pilot intervention times. The relevancy of the guidance material contained in the existing Appendix to BCAR Section G2–8 should also be considered for inclusion in future requirements.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. Two items of research related to the Recommendation are currently in progress:

(a) Intervention times. A study is being conducted by the RAF Institute of Aviation Medicine, on behalf of the Authority, into likely pilot reaction times to a variety of cues resulting from failure. This work will cover a number of different failures, including engine failure.

(b) Rotor RPM Loss and Warning. Proposals have been agreed with Westland Helicopters Limited and research work will start in the near future on the specific topic of rotor rpm loss and associated warning. This work should identify the most appropriate method for warning the pilot of low rotor rpm conditions.

It is anticipated that both items of research will be completed during the next financial year. As JAR27 has now been published (6th Sept 93) the results of this research will form a basis for formulation of any proposals for amendment to JAR 27 which then appear to be necessary. The relevance of the guidance material in the appendix to BCAR G2–8 will be considered at the same time.

RECOMMENDATION 92–27

Publicity material should be forwarded to all owners and operators of light helicopters emphasising the following safety points:

(a) The crucial importance of fully lowering the collective pitch lever without delay as soon as power loss occurs.

(b) The need for continual practice of engine failure emergency procedures.

(c) A recommended 'recency' check by a qualified helicopter flying instructor for a pilot who has not flown a light helicopter within the previous 28 days.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. A Safety Sense Leaflet covering the points mentioned is in preparation, and will be distributed widely.

CAA Action

A Safety Sense Leaflet covering the points mentioned will be published in December 1993.

AS332L SUPER PUMA	**ABERDEEN**	**22Feb92**	**INCIDENT**	**9200523**	**92/14**

References: Bulletin 7/92
FACTOR 20/93 dated 14Sep93

RECOMMENDATION 92–35

The CAA consider requiring the mandatory embodiment of Service Bulletin Nos. SB76-02 and 63-45 on AS332L helicopters to reduce the incidence of inadvertent brake application, and associated fires, during ground running.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. An Additional Airworthiness Directive has been raised that requires implementation of the manufacturers Service Bulletins 76-02 and 63-45.

RECOMMENDATION 92–36

The CAA consider the introduction of a requirement to provide for the installation of fire detection and suppression systems within the transmission bays of large Public Transport helicopters. (NOTE: This is similar to Recommendations made in AAIB Reports 7/84 and 3/90)

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation and has now completed a comprehensive review of rotorcraft main rotor transmission area fire protection, including an evaluation of the existing requirements and a detailed analysis of relevant service experience. A record of this review is contained in the Authority's report on the 'Review of Rotorcraft Main Rotor Transmission Area Fire Protection' dated 24 June 1992. The review concluded that the internationally agreed safety objectives for the main rotor transmission area are satisfied without the provision of either fire detection or fire extinguishing capability.

ROTORWAY EXECUTIVE	COALPORT	28Mar92	ACCIDENT	9200920	92/15

References: Bulletin 7/92

RECOMMENDATION 92–43

The CAA consider the requirement for an appropriate calendar time inspection of the main rotor blades on Rotorway Executive and Executive 90 helicopters, by a suitable qualified person, and require that all such blades should be painted.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation.

The conditions under which these types of helicopter are accepted by the Authority for the issue of a Permit to Fly in the UK have been amended to require compliance, and certification by a suitably approved person, of all service bulletins issued by Rotorway.

The maintenance manual for these types currently calls for a 'coin tap' inspection of the skin to spar joint on the main rotor blades every 100 hours of operation. Rotorway will issue a service bulletin to require that this inspection is carried out at an appropriate calendar interval.

The UK build standard of these types has been amended to require that the external surface of the main rotor blades be painted, and that the internal surfaces be treated to incorporate a corrosion protection process.

PIPER PA28-140 CHEROKEE	CONSETT	07Apr92	ACCIDENT	9201058	92/16

References: Bulletin 7/92
FACTOR 5/93 dated 19Mar93

RECOMMENDATION 92–45

The CAA (National Air Traffic Services (NATS)), through their field engineering departments at ScATCC and LATCC, in liaison with the Assistant Chief of the Air Staff, Operations (ACAS Ops), MOD (RAF) should investigate means to provide the timely transfer of radar information to the RCCs in the event of Search and Rescue operations.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. Procedures and equipment are now in place at both the London and Scottish Air Traffic Control Centres, whereby radar data plot information can be supplied to the Rescue Co-ordination Centres to assist in aircraft location in the event of an accident.

PIPER PA34-200T SENECA II	OXFORD	13May92	ACCIDENT	9201647	92/17

References: Bulletin 7/92
FACTOR 21/93 dated 14Sep93

RECOMMENDATION 92–47

It has been recommended that the Civil Aviation Authority require a periodic check of the swivel pin and assess the need for mandatory replacement of the fitting type with one of more robust design.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. The FAA have recently initiated NPRM action for an Airworthiness Directive for mandatory implementation of a revised SB No 787B. CAA are reviewing this SB to determine if it covers the initial part of AAIB recommendation 92–47 (i.e. the requirement for a periodic check of the swivel pin).

ZLIN Z326 TRENER MASTER	**URCHFONT**	**03May92**	**ACCIDENT**	**9201507**	**92/18**

References: Bulletin 7/92
FACTOR 18/93 dated 23Aug93

RECOMMENDATION 92–48

It has been recommended that the CAA require additional inspection of the crankshaft of engines similar to the Walter Minor 6-III, particularly related to calendar time in service, or modification action to prevent recurrence of this problem.

Status – Rejected – Closed

CAA Response

The Authority does not accept this Recommendation. Single engined aircraft are naturally vulnerable to loss of engine power or engine shutdown. Accordingly, the risk of a forced landing as a result of engine failure must be anticipated during any phase of flight on such an aircraft.

Engine failures which involve fire, detachment of a propeller, or significant break-up, together with the causes of such failures, are usually addressed individually by the Authority. Partial seizure associated with a lack of lubrication resulting in a loss of power or complete engine stoppage does not merit special action unless the failure rate for this cause is considered to be excessive. The Authority does not have sufficient evidence that the failure rate of Walter Minor engines currently justifies this action. However, the UK experience of the type is relatively limited, therefore the advice of the Czech Republic Authority has been sought and Service Bulletin action to address low utilisation will be expected, if this is warranted by the total service experience.

DHC-7	**BTWN BRUSSELS AND LONDON (CITY)**	**30Jan90**	**INCIDENT**	**9100255**	**92/19**

References: AAR 3/92 dated 09Jul92
FACTAR 3/92 dated 09Jul92

RECOMMENDATION 4.1

The CAA make the De Havilland Canada Service Bulletin 7-55-10 mandatory.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. This Service Bulletin (which addresses the installation of a water deflector over the autopilot elevator servo assembly) was made

mandatory by the CAA on 4 February 1992, through Airworthiness Directive 001-01-92, and required compliance within one month.

RECOMMENDATION 4.2

The CAA and the manufacturer take steps to ensure that provision for drainage of the elevator servo-drum bracket is incorporated in DHC-7 aircraft.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation and will request the aircraft and/or servo manufacturer, as appropriate, to provide a means of introducing a drainage (or equivalent) facility for the DHC-7 elevator servo drive drum bracket.

CAA Action

In response to recommendation 4.1, DH Canada Service Bulletin 7-55-10 has been made mandatory as recommended. This modification introduces a water deflector which is installed on the front spar of the vertical stabiliser directly above the elevator servo to prevent ingress of water. The purposes of this deflector is to deflect the condensation that drips on to the assembly as described by AAIB in their report.

Having prevented the ingress of water, the provision for drainage of the servo-drive drum bracket is unnecessary. CAA believe that recommendation 4.2 is effectively dealt with by the action taken in response to recommendation 4.1.

RECOMMENDATION 4.3

The CAA liaise with the manufacturers of the DHC-7 to introduce a modification to ensure that audio autopilot disconnect warnings, when fitted, are unable to operate continuously, regardless of the cause of initial operation.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation, which is interpreted as meaning that crew distraction and interference with communication should not be caused by an uncancellable autopilot audio disconnect warning. Where fitted, such a warning must cover all modes of autopilot disconnection, including tripping of circuit breakers while the autopilot is engaged. Initiation of the audio warning under the circumstances of this incident was therefore appropriate. It should, however, be cancellable by crew action following their recognition of the disconnection. Such cancellation should be by a simple crew action that does not involve inhibition of other elements of the aircraft's warning system. The design of the autopilot audio warning on the DHC-7 is being reviewed with the manufacturer with the objective of achieving this intent.

CAA Action

An aeroplane fitted with an autopilot giving it Category II operating capability is provided with an audible warning that is activated when, following failure of the autopilot or loss of

the automatic landing mode, it is necessary for the pilot to assume manual control immediately. The warning must operate with no delay until silenced by operating the automatic pilot quick release control on the control wheel.

The audible warning system provided on G-BOAW complies with these requirements (JAR–AWO 153). The continued warning was caused by disconnecting the autopilot power circuit breaker before releasing the autopilot with the quick release control.

Further analysis of the warning system logic is to be carried out before a decision can be made on the necessity for it to be modified. Consideration will be given to issuing an LTO advising operators of conditions where continuous autopilot disconnect warning may occur and procedures for preventing it.

RECOMMENDATION 4.4

The CAA and other authorities examine other autopilot equipped aircraft on their registers to identify those which may suffer from analogous problems with tailcone mounted servo-drives and with audio warnings, and take steps to ensure that the risk of such problems occurring is eliminated.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation and recognises the potential for similar problems associated with servo assembly freezing and the inability to cancel audio warnings to occur on other aircraft types.

The Authority will determine the extent to which such problems could occur on UK manufactured aircraft types and identify what, if any, preventative action would be appropriate. The Authority will also recommend to other authorities that similar action is taken for foreign manufactured aircraft.

BOEING 747 SP31 HEATHROW	**09Apr92**	**ACCIDENT**	**9201105**	**92/20**

References: AAIB Letter dated 21Jul92
CAA Letter dated 18Sep92

RECOMMENDATION 92–52

The CAA should begin a consultative process with aerodrome operators, with a view to the introduction of a prominent ‘emergency stop’ indicating system for each self manoeuvring stand, to be activated in the event of an unforeseen occurrence where the aircraft is required to stop urgently.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation and recognises the advantage of being able to instruct aircraft to stop during the docking manoeuvre. The Authority will undertake a consultation with industry in order to establish the most effective method of implementing 'emergency stop' indicating systems on self-manoeuvring stands.

CAA Action

The Authority established a Working Group with industry representatives to address Recommendation 92–52. The Working Group agreed that this accident arose from a combination of factors relating primarily to the marking of the stop position indicator and aircrew human factors, with the added complication of a mispositioned mobile airbridge. The underlying cause was more concerned with inadequate safety management and human factors. It concluded that an emergency stop system (ESS) would not have prevented the accident.

In order to ensure that the potential benefits resulting from the introduction of ESS on self-parking stands were comprehensively assessed the Working Group reviewed all aircraft parking apron jetty accidents recorded on the SDAU database over a 10 year period. Of the 28 occurrences thus examined, 4 involved aircraft overrunning the designated parking stop position and 3 involved impact with the mobile airbridge and minor damage to the aircraft. The Group came to the view that, had ESS been available in each of the events thus reviewed, its contribution in terms of accident prevention would have been negligible. In fact there was only one accident where the Group could agree that provision of ESS would have had any influence at all. As a result of these deliberations the Working Group was unable to support the introduction of emergency stop indicating systems for all self-manoeuvring stands.

The Authority has considered this conclusion both within the context of implementation and the relatively low incidence of the type of accidents in which provision of ESS would have significant safety benefits. The Authority has decided that it will not propose mandatory introduction of emergency stop systems. However, in the course of its review the Working Group concluded that there are significant problems associated with wider questions concerned with the training, judgement and discipline of apron staff and that this in turn indicates underlying problems associated with inadequate apron safety procedures and safety management systems. This work persuaded the Authority to re-convene the Working Group with new terms of reference to address apron safety management issues more comprehensively.

Accordingly, the Authority invited the members of the ESSWG to join the Apron Safety Management Working Group (ASMWG) and issued draft terms of reference. The ASMWG's first meeting is scheduled November 1993.

PIPER PA28-161 WARRIOR	OXFORD	12Jul92	ACCIDENT	9202724	92/21

References: AAR 1/93 dated 10Mar93
FACTOR 7/93 dated 06Apr93

RECOMMENDATION 92–53

The Civil Aviation Authority should publish more specific information that will draw the attention of all pilots, ATCOs and aerodrome operators to the potential hazards associated with the atmospheric disturbance generated by heavy helicopters whilst hover-taxiing.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation and has published a number of documents to draw the attention of pilots, ATCOs and aerodrome operators to the potential hazards associated with the atmospheric disturbance generated by heavy helicopters whilst hover-taxiing. These documents include a revised AIC, a GASIL and a Safety Sense Leaflet on Wake Turbulence which all include references to the turbulence generated by helicopters in the hover close to the ground and the precautions that need to be taken. In addition, the Manual of Air Traffic Services has been amended to ensure that controllers are fully aware of the potential hazards, whilst a Notice to Aerodrome Licensees (NOTAL) will be issued shortly to draw the problem to the attention of the operators of Licensed Aerodromes. In order to complement these measures the subject of Wake Vortex is now covered in the Authority's General Aviation Safety Evening Lectures. It is considered that these measures together with the publicity following the release of the AAIB report on the accident will ensure compliance with the Recommendation.

GRUMMAN AA5A CHEETAH; PIPER PA28-140 CHEROKEE	ELSTREE	24Jun92	ACCIDENT	9202442	92/22

References: AAIB Letter dated 07Aug92
CAA Letter dated 07Sep92

RECOMMENDATION 92–78

It has been recommended to the CAA that when and where provision of a RFFS is required by regulation, there should be an equivalent requirement for a competent person to be on watch with immediate access to the crash alarm operating mechanism and a good view of the aerodrome.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation, whilst considering that the existing conditions of the aerodrome licence provide an adequate regulatory requirement for the provision of a competent person. Accordingly the Authority has written to all licensees alerting them to the need to ensure that the provision of RFFS is accompanied by the matching of effective and available call out facilities. In addition the Authority will as a matter of priority review the RFFS at all aerodromes in order to ensure that proper arrangements in accordance with the intent of the Recommendation are in place.

CAA Action

The existing conditions of the aerodrome licence provide a regulatory requirement for the provision of a competent person, but as a result of this recommendation the CAA wrote to all licensees and reminded them of their legal obligations.

The CAA is satisfied that all aerodromes now operate having regard to the recommended criterion but recognises that, at a small number of low category aerodromes, a full view of the whole operating area is not possible due to physical restrictions which limit the full field of vision of the observer. The CAA is also satisfied that where the limits of vision are known they do not present a significant risk to the safe operation of the aerodrome. The Authority will however seek to ensure full compliance whenever developments take place at a relevant aerodrome.

ROTORWAY EXECUTIVE	**LANCASTER**	**16May92**	**ACCIDENT**	**9202305**	**92/23**

References: AAIB Letter dated 13Aug92
CAA Letter dated 04Sep92

RECOMMENDATION 92–56

It is recommended that the CAA in conjunction with the FAA require, for the Rotorway Aircraft Exec and Rotorway International Exec 90 helicopters, replacement, before further flight, of the bolts attaching the chain drive sprocket to the main rotor shaft flange with items that are satisfactorily quality controlled.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. A copy of the AAIB Bulletin has been sent to the FAA for their action. Pending further investigations by Rotorway, the Authority has sent a letter to all operators and registered owners of Rotorway Exec and Exec 90 helicopters requiring new sprocket attachment bolts to be fitted before further flight and every 50 flying hours thereafter.

CAA Action

Rotorway have now issued Bulletins for the Exec and Exec 90 to require replacement of the sprocket attachment bolts, and thereafter replacement every 500 hours. It is a condition of the Permit to Fly for the Rotorway helicopters in the UK that these bulletins be complied with.

RECOMMENDATION 92–77

It is recommended that the CAA in conjunction with the FAA consider requiring, for the Rotorway Aircraft Exec and Rotorway International Exec 90 helicopters, a means of preventing the release of parts of their entrainment between the chain and sprocket in the event of failure of one or more of the bolts attaching the chain sprocket to the main rotor shaft flange.

Status – Partially Accepted – Closed

CAA Response

The Authority partially accepts this Recommendation. These helicopters have not been shown to comply with an airworthiness code, but have been accepted for Permits to Fly on the basis that they have a satisfactory service record in their country of origin. Examination of the available accident data from the USA and Canada indicates that there does not appear to have been any previous accidents attributable to this design feature. In this context, it is difficult for the Authority to mandate a design change to reinstate an acceptable level of airworthiness, when the level of airworthiness for this particular part of the design is unknown. However, the Authority has written to Rotorway to advise them of the Recommendation, and of the Authority's support for it on the basis of good engineering practice. Rotorway have since advised the Authority that a Service Bulletin will be issued shortly to incorporate a suitable retention device. The terms of the Authority's acceptance of these helicopters for Permits to Fly require compliance with such manufacturers bulletins.

GEMINI FLASH IIA MICROLIGHT	**ALDFORD**	**27Jun92**	**ACCIDENT**	**9202440**	**92/24**

References: AAIB Letter dated 13Aug92
CAA Letter dated 04Sep92

RECOMMENDATION 92–79

The CAA introduce a requirement for a General Flight Test, conducted by an authorised examiner, before the holder of a UK PPL (Aeroplanes) may fly as Pilot in Command of a microlight aircraft with a control system that differs significantly from that of a conventional 3-axis control aircraft.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation, and is considering how best to introduce such a requirement.

CAA Action

The requirement was introduced in August 93 as an amendment to CAP 53.

BAe ATP	NEAR OXFORD	11Aug91	INCIDENT	9102773	92/26

References: AAR 4/92 dated 13Oct92
FACTAR 4/92 dated 13Oct92

RECOMMENDATION 92–58

The CAA require the provision of sufficient wing leading edge illumination to enable reasonable assessment of ice accumulation at night.

Status – Fully Accepted – Closed

CAA Response

The CAA agrees with this Recommendation. However, for aeroplanes approved for operation at night in known or forecast icing conditions, JAR.25.1403 currently requires: 'a means ..... for illuminating or otherwise determining the formation of ice on the parts of the wing that are critical from the standpoint of ice accumulation'. This requirement was addressed during the certification of the ATP and the illumination system fitted to the Aeroplane was found by CAA to be acceptable. It is, therefore, considered that the requirements are satisfactory and that compliance has been established on the ATP. (See Recommendation 59).

RECOMMENDATION 92–59

The CAA require that ATP Maintenance Manual procedures clearly specify the optimum setting for the ice illumination lights and take measures aimed at ensuring that ice illumination lights are correctly adjusted.

Status – Fully Accepted – Closed

CAA Response

The CAA accepts this Recommendation and the Maintenance Manual procedure has been amended (Revision dated 14th June 92) to provide suitable information for the optimum setting of the ice illumination lights. Adherence to the appropriate procedure will ensure that ice illumination lights are always correctly adjusted.

RECOMMENDATION 92–60

The CAA take measures to ensure that Maintenance Manuals are updated in line with the aircraft model to which they apply.

Status – Fully Accepted – Closed

CAA Response

The CAA accepts this Recommendation and already tries to ensure that Maintenance Manual amendments and procedures are available at the time that modifications are approved. It is the responsibility of the manufacturer and the operator to ensure that the Maintenance Manual amendments are available and that operators manuals are correctly amended and updated to reflect the aeroplane standards in their fleet.

RECOMMENDATION 92–61

For UK registered aircraft certificated with approval for flight into known icing conditions, the CAA require a reliable means of actively alerting the flight crew to all conditions where operation of the airframe de-icing system is necessary to maintain safe flight.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts that there is a need to investigate the effectiveness of ice detection methods. A research project was outlined early in 1992 by the JAA Research Committee and funds are being sought from the European Commission under their forthcoming EURET II programme. It is expected that this project will commence in FY 1993/94 and will review the capability, reliability, controllability and overall effectiveness of current turboprop aircraft systems, including ice detection facilities and determine if new certification and/or operational standards are required.

(Note: The further action identified in this Response, and also in Response 4.12, is not related solely to this incident or to these Recommendations and has already been included in the JAA future work programme).

RECOMMENDATION 92–62

The CAA review the pre-stall warning system on the ATP and its protection and take appropriate action.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The stall warning system has been reviewed by both the Authority and British Aerospace, as a result of which CAA AD 006-10-91 was issued requiring compliance with British Aerospace Service Bulletin ATP-27-41-70031B by 30 June 1992. This SB addresses a modification to the stall warning system to introduce a replacement stall warning transducer with improved heating capability and a deflector plate, to ensure satisfactory stall warning system operation down to –30°C and to prevent moisture ingress. The Authority considers that this completes its action in response to this Recommendation.

RECOMMENDATION 92–63

The CAA use this and other incidents during the summer of 1991 to re-educate the pilot profession of the unexpected onset of glaze ice which can quickly lead to an insidious stall which may be difficult to recognise because it can occur at abnormally high airspeed and before the stall warning system is activated.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. This advice has already been incorporated in the update of Aeronautical Information Circular entitled 'Frost, Ice and Snow on Aircraft', which was issued on 20th August 1992.

RECOMMENDATION 92–65

The CAA ask BAe to review the adequacy of the BAe Operations Manual in relation to the speed requirements for flight in all icing conditions.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation and has reviewed the guidance given in the Operations Manual which it considers adequate.

RECOMMENDATION 92–66

The CAA review company Operations Manuals to ensure that the minimum speeds referred to in the Adverse Weather section concerning 'Operations with residual ice' should be applied at all times in icing, when propeller icing is present or performance is being degraded by the possible formation of ice.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation and the review has been completed. The minimum speeds referred to in the Adverse Weather Section of the ATP Manufacturer's Operations Manual are now reflected in relevant company Operations Manuals. In addition, company Operations Manuals specify that these speeds are to be applied at all times in icing, when propeller icing is present or performance is being degraded by the possible formation of ice.

RECOMMENDATION 92–67

The use of the autopilot in the pitch mode during the climb, when the performance of the aircraft is possibly degraded by the presence of ice, should be avoided.

Status – Rejected – Closed

CAA Response

The Authority has reviewed this proposal with the aircraft manufacturer and does not accept this Recommendation. In addition to observing specific autopilot limitations, crews must continually monitor its operation and the performance and flight path of the aircraft. If the performance of the aircraft is not as expected for any reason then the crew must take appropriate action. This monitoring process applies to use of an autopilot in any aircraft at any time and is not peculiar to flight in icing conditions. Use of the pitch mode, with the necessary monitoring by the crew, was not inappropriate during the flight phase where this incident occurred.

RECOMMENDATION 92–68

The CAA require mandatory incorporation of means to minimise ATP propeller icing.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. British Aerospace Service Bulletin ABA810-61-11 introduced improved propeller blade heater mats which must be installed as complete aircraft sets in conjunction with an optimised de-icing timer unit introduced by British Aerospace Service Bulletin 790112-4-30-2. These bulletins, approved by CAA and published on 14 November 1990, have been voluntarily incorporated into all ATP aircraft with the exception of three foreign operated aircraft. These operators are in possession of the modification kits. The Authority is satisfied that this provides an adequate means to minimise ATP propeller icing.

RECOMMENDATION 92–69

The CAA, in conjunction with the FAA and NASA conduct a reappraisal of the icing envelopes specified in the JARs, particularly in the area of large droplet sizes and temperatures just below freezing.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The Authority is already collaborating with FAA on a review of the JAR 25/FAR Part 25 Appendix C icing envelope. The FAA is completing world-wide atmospheric data collection, which includes conditions outside the existing Appendix C. The Authority has contributed significant data to this programme, particularly with respect to freezing rain. The FAA will shortly begin consideration of revisions to the airworthiness requirements based on this data. However, the complexities of this subject are such that revised requirements, including means of compliance, are not expected to be available for several years. In addition to this work, a European research project has been outlined by the JAA Research Committee with the objective of expanding and, if necessary, improving the scope, validity and presentation of Appendix C. Funds are being sought from the European Commission under their EURET II programme, and it is expected that this project will commence in FY 1993/94 and be completed within approximately 3 years.

RECOMMENDATION 92–70

The Authority undertake a comprehensive review of the certification requirements for CRT or other intermittently illuminated type displays, with particular attention to:

(a) the vibration levels specified for certification testing, requiring them to be based on the actual aircraft vibration spectrum, measured under adverse conditions, in which such equipment and crew will operate.

(b) the inclusion in certification testing of the assessment of readability and abnormal effects when the display and/or the observer is vibrated.

(c) the adequacy of requirements for the readability under difficult viewing conditions of information presented in digital rather than analogue form.

(d) the necessity of specifying the colour of particular display symbology in order to optimise readability.

Status – Partially Accepted – Open

CAA Response

The Authority partially accepts this Recommendation. The Authority does not consider that a review of the certification requirements is necessary with respect to Parts a), c) and d) of this Recommendation.

The Authority has recently participated in a JAA review of the certification requirements for electronic display systems as a result of which JAA NPA 25D, F-214 'Electronic Display Systems', based upon FAA Advisory Circular AC25-11, has been prepared. This NPA, which will be published by the JAA as an AMJ (advisory material) to JAR 25, includes guidance material for both the presentation of information in digital form and for the selection of symbol colours. EUROCAE/RTCA document ED-14B/DO-160B 'Environmental Conditions and Test Procedures for Airborne Equipment' defines the vibration testing requirements for such equipment which is representative of measured actual aircraft vibration levels under normal operating conditions. These qualification testing requirements have been adopted as an international standard by both the FAA and the JAA and no changes are currently anticipated.

With respect to Part b) of this Recommendation the Authority proposes further to review the problems associated with the simultaneous vibration of both the display and the crew member responsible for monitoring the display.

CAA Action

Part b) In view of the aeromedical nature of the effect that vibration has on the readability of CRT and similar instruments when the observer is simultaneously vibrated, the findings of the Institute of Aviation Medicine in their report No. 716 are being studied, together with observations made by Southampton University in a letter to the CAA Medical Division of 18 January 1993.

RECOMMENDATION 92–71

The CAA and the recorder manufacturers review the performance of the PV1584 recorder, and its mountings, under high vibration and shock conditions to ensure that it meets the applicable requirements of CAA Specification No 10 (Flight Data Recorder for Aeroplane Accident Investigation).

Status – Fully Accepted – Closed

CAA Response

The Authority has requested the equipment manufacturer to confirm that the type of FDR installed in G-BMYK, was as the Authority's equipment approval records indicate, satisfactorily tested under the environmental conditions specified in CAA Specification No 10 as part of the performance qualification testing required in order to gain CAA Approval. If this proves the case, consideration will be given to amending Specification No 10.

CAA Action

The equipment manufacturer has confirmed that the PV1584 recorder and its shock mounts meet the vibration requirements of CAA Specification 10. Enquiries are progressing with the airframe manufacturer concerning the limitations of the shock mounts at high vibration levels in conjunction with high bank angles.

ROBINSON R22-BETA	**WELFORD-ON-AVON**	**08Sep91**	**ACCIDENT**	**9103221**	**92/27**

References: Bulletin 12/91
FACTOR 13/93 dated 04May93

RECOMMENDATION 92–82

The CAA, in conjunction with the FAA and the Robinson R22 helicopter manufacturer, establish criteria for the continued acceptance, or replacement, of rear bulkhead castings which do not meet the associated design requirements, and actively consider requiring a one-time inspection of all R22 helicopters in order to establish the condition of the associated rear bulkhead castings, part number A148.

Status – Fully Accepted – Open

CAA Response

The CAA accepts this Recommendation. There may be rear bulkhead castings in service which do not comply fully with the manufacturer's design specification with regard to permitted levels of porosity. There is, however, no evidence that such castings represent a hazardous condition, since testing has indicated that production standard castings have a considerable reserve of strength above the certification requirements.

The rear bulkhead casting of the aircraft involved in this accident fractured when the tail cone hit the ground after the helicopter had broken up in the air, and the failure was not considered by AAIB to have been a causal factor in the accident. Furthermore, there are no records of failure of this casting occurring in flight, or causing or contributing to any accident.

Full details of AAIB's findings have been passed to the FAA, who have primary responsibility for the airworthiness of the R22 helicopter, and their advice has been requested as to the action which needs to be taken to ensure that castings in service are of adequate strength to sustain the certification design loads. The FAA has responded positively, and has established a quality assessment programme for the rear bulkhead casting. The CAA will decide what action to take on receipt of FAA's advice based on the results of this programme.

RECOMMENDATION 92–83

The CAA urge the FAA and the Robinson R22 helicopter manufacturer to review the manufacturing and quality assurance processes used in the production of the associated rear bulkhead casting, part number A148, to ensure that such castings comply with design requirements.

Status – Fully Accepted – Closed

CAA Response

The CAA accepts this Recommendation. As noted in our response to Recommendation 92–82, AAIB's findings have been referred to the FAA, who have established a quality assessment programme for the rear bulkhead castings.

ROBINSON R22-BETA	**NR LATIMER, BUCKS**	**29May92**	**ACCIDENT**	**9201941**	**92/28**

References: Bulletin 11/92
FACTOR 22/93 dated 14Sep93

RECOMMENDATION 92–92

The CAA, together with the engine and airframe manufacturers, should determine the cause or causes of the increased incidence of sticking valves that have occurred in engines installed in UK registered Robinson R22 Beta helicopters. Appropriate measures should be instigated to reduce the number of occurrences consistent with the rate experienced on other Lycoming O-320 engine installations.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The cause of the increase in incidents of sticking exhaust valves has been investigated by the Authority and the engine manufacturer.

Investigation has established that due to misinterpretation of the wording of the Light Aircraft Maintenance Schedule (LAMS) the majority of operators/owners change the engine oil at 50 or 100 hour intervals whereas the engine manufacturer recommends a 25 hour oil change interval. One large operator of Robinson 22 helicopters who does change the engine oil every 25 hours has never experienced a sticking exhaust valve in 15000 hours of operation.

On 12th February 1993, the Authority issued AAD 003-02-93 requiring operators and owners to change the engine oil at 25 hour intervals and inspect the oil filters every 50 hours. Similarly, the same AAD requires compliance with Lycoming Service Bulletin No. 388B at 300 hour intervals in accordance with Lycoming recommendations. (See response to Recommendation 92–93).

RECOMMENDATION 92–93

The CAA, together with the engine manufacturer, should examine the validity of Lycoming Service Bulletin No. 388A in determining whether there is excessive carbon build-up on the exhaust valve stem.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The Authority and the engine manufacturer believe that correct compliance with the latest issue of the bulletin (SB388B) will determine if there is excessive carbon build up on the exhaust valve stem or guide. By requiring operators/maintenance organisations to record the valve guide/stem clearance established when complying with SB388B and to report to the Authority all occurrences of exhaust valve sticking, the Authority will be able to determine the effectiveness of the Service Bulletin.

SIKORSKY S76	**SUPPORT VESSEL, NORTH SEA**	**18Apr92**	**ACCIDENT**	**9201223 92/29**

References: Bulletin 11/92
FACTOR 8/93 dated 30Mar93

RECOMMENDATION 92–94

The CAA should re-assess the certification criteria for landing gear/braking system capability in the context of the particular conditions experienced during operations onto moving decks.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation, and will carry out a re-assessment of the certification criteria as recommended.

RECOMMENDATION 92–95

The CAA should ensure that all UK operators of the S76 standardise the various current practices with regard to the method of approach and the 'safe' areas designated for this type of helicopter, with a view to minimising the requirement for any personnel to transit from one side to the other by routing close in around the nose of the helicopter.

Status – Fully Accepted – Closed

CAA Response

The helideck working group, a sub-group of the Helicopter Management Liaison Committee (HMLC), set up to review current practices during helideck operations, met on 11 November 1992 when tasks and work plans were identified, and it is intended to conclude the initial review by the end of April 1993.

CAA Action

The Initial review undertaken by the helideck working group, a sub-group of the Helicopter Management Liaison Committee, is now substantially complete. A copy of the review, which addresses current practices for helideck operations, has been sent to Sheriff Kelbie, the Sheriff of Grampian. In addition, the Authority has ensured that all UK Operators of the S76 have standardised their practices with regard to the method of approach and the 'safe' areas designated for this type of helicopter. This has been done with a view to minimising the requirement for any personnel to transit from one side to the other by routing close-in around the nose of the helicopter.

RECOMMENDATION 92–96

The CAA should require all UK operators of the S76 in the offshore role to review the current operating limitations on pitch and roll for operations to and from moving decks, and issue advice to crews on the possible reduction of the limits on decks of restricted size in adverse weather and sea conditions.

Status – Fully Accepted – Open

CAA Response

See Response to Rec 92–95.

RECOMMENDATION 92–97

All operators of the S76 should ensure that crews are aware of the hazards associated with the AFCS remaining engaged while alighted on moving decks in adverse weather conditions.

Status – Fully Accepted – Open

CAA Response

See Response to Rec 92–95.

B747-200	LONDON GATWICK AIRPORT	15Jun92	INCIDENT	9202332	92/30

References: Bulletin 12/92
FACTOR 1/93 dated 07Jan93

RECOMMENDATION 92–89

In order to avoid mis-rigging of trailing-edge flaps on Boeing 747 aircraft during replacement of flaps when the associated flap carriage shim settings are unknown, the Boeing Airplane Company, in consultation with the FAA and CAA, should incorporate the information contained in Boeing Engineering drawing 65B00116, relevant to the rigging of these shims at the mid flap, into the Maintenance Manual at paragraph 5 of ATA 27-51-01.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. In view of the response by the Boeing Company to amend section 27-51-01 of the aircraft maintenance manual in respect of the rigging of the flaps, no further action is considered necessary.

CAA Action

The Authority has confirmed that the Boeing amendment has been incorporated into the maintenance manuals of both United Kingdom operators of Boeing 747s.

MD83	LONDON GATWICK AIRPORT	18Aug92	INCIDENT	9203358	92/31

References: Bulletin 12/92
FACTOR 17/93 dated 03Aug93

RECOMMENDATION 92–109

The CAA, together with the FAA and JAA, should ensure that information on the FDR system is available at initial issue and renewal of the Certificate of Airworthiness. This information should include details of the parameters recorded, their position within the data frame and the appropriate conversion algorithms together with the associated wiring information.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation and recognises that with the significant increase in the number of parameters to be recorded by FDRs there is a need to review the information to be made available for both system maintenance and incident/accident data

retrieval. International air safety investigation agencies have requested Aeronautical Radio Inc. (ARINC) to publish guidelines for a standard data retrieval document that can be used to determine how a FDR has been programmed. Similarly, JAA in the operations requirements, JAR–OPS, propose that aircraft operators will be required to maintain such a document to provide the information necessary to retrieve and convert the stored data into parameters expressed in engineering units. The Authority is considering a number of actions that may need to be addressed in support of the proposed JAA legislation.

RECOMMENDATION 92–110

The CAA should ensure that, before an aircraft in this category is accepted onto the UK Register, the manufacturer has carried out the appropriate tests to confirm the correct functioning of the FDR system.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation and has issued a revised Airworthiness Information Leaflet (AIL) 0163 'UK Certification of Series Aircraft at the Manufacturer's Premises in the USA' which includes a specific reference to the Flight Data Recorder (FDR) requirement and the availability of conversion data. AILs are freely available in the public domain. Additionally the Authority will issue a circular to all CAA Airworthiness Surveyors pertaining to the operational requirements associated with FDR systems, where required, in accordance with Schedule 4 of the Air Navigation Order.

RECOMMENDATION 92–111

The CAA, together with the FAA and JAA, should review the advisory material associated with the proposed JAR–OPS 1-057 and define those primary parameters, the loss of any one of which would render the data recorder ineffective for investigation purposes. Without these primary parameters the recorder would be classed as unserviceable.

Status – Rejected – Closed

CAA Response

The Authority does not accept this Recommendation. The Authority was represented on the JAA Flight Recorder Study Group (FRSG), which developed the proposed JAR–OPS 1-057 rules. On the advice of accident investigation specialists the FRSG decided not to specify primary parameters, the absence of which would render a recorder unserviceable.

BAe 146-300	ABERDEEN AIRPORT	31Mar92	INCIDENT	9200952	92/32

References: AAR 4/93 dated 30Jul93
FACTOR 23/93 dated 27Aug93

RECOMMENDATION 92–46

In view of the marked effect of lift spoiler non-deployment upon the runway braking performance of the BAe 146 aircraft, the CAA should require the mandatory embodiment of BAe modification HCM00913 on all BAe 146 aircraft not so equipped in order to provide flight crew with warnings of lift spoiler non-deployment on landing. (Recommendation made in November 1992.)

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. A review is being undertaken with BAe to establish the applicability of modification HCM00913 to existing aircraft in service, together with appropriate embodiment timescales.

RECOMMENDATION 92–49

In view of the importance of lift spoiler deployment to the runway braking performance of the BAe 146 aircraft, the CAA should require the manufacturer of the BAe 146 aircraft to introduce a pre-flight test procedure into the Operations Manual to enable flight crew to check the serviceability of the lift spoiler warning lights and associated driving circuits, before each flight. (Recommendation made in November 1992.)

Status – Rejected – Closed

CAA Response

The Authority does not accept this Recommendation. The lift spoiler system design and its failure effects have been reviewed. This has shown that the probability of failure meets the criteria set out in the relevant airworthiness standards (JAR 25) and is thus sufficiently low as to require no further checks by the crew to ensure the integrity of the system. Accordingly, the Authority does not believe that the recommended action is warranted.

BAe ATP	SUMBURGH	23Dec91	ACCIDENT	9104733	92/33

References: AAR 6/92 dated 30Dec92
FACTOR 6/92 dated 30Dec92

RECOMMENDATION 92–101

The CAA should consider a requirement to factor the parking/picketing/taxiing wind limits to take account of exposure to localised gusts of greater strength than that recorded at the anemometer.

Status – Fully Accepted – Open

CAA Response

See CAA Response to Recommendation 92–102 (below).

RECOMMENDATION 92–102

The CAA should review the validity of JAR 25.415(2) relating to the ability of control systems to withstand forces generated by ground gusts and consider the need for JARs to require the maximum wind speeds for parking and taxiing to be given in Flight Manuals.

Status – Fully Accepted – Open

CAA Response

The Authority accepts these two Recommendations. An investigation and associated research is being undertaken into the response of typical flying control circuits exposed to ground gusts with a view to formulating changes to the JAR 25 Requirements covering the subject. Any proposed changes will consider the need for additional factors as recommended in 92–101.

In conjunction with Recommendation 92–101, Recommendation 92–102 will most likely be addressed by a Flight Manual entry stating a maximum wind speed for taxiing with appropriate references to procedures to be adopted (such as external control surface locks and special inspections) if ground gusts in excess of that figure are predicted or experienced.

RECOMMENDATION 92–103

Notwithstanding the outcome of Recommendation 92–102, the CAA should require appropriate parking and taxiing wind limitations to be included in the ATP Flight Manual.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation and an appropriate entry has been made in the ATP Flight Manual.

RECOMMENDATION 92–105

The CAA should instruct all UK operators to include in their Operations Manuals upper wind limits for operating a revenue service.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation, as it applies to ground operations. Since any limitations established under Recommendation 92–102 will have a significant influence on any figures that would subsequently appear in the Operations Manual, as the investigation in relation to Recommendation 92–102 proceeds, Rec 92–105 will be implemented.

CAA Action

Since any limitations established under Recommendation 92–102 will have a significant influence on any figures that would subsequently appear in the Operations Manual, as the investigation in relation to Recommendation 92–102 proceeds, Recommendation 92–105 will be implemented. Research resulting in a significant modification to the ATP aircraft has allowed an interim figure of 60 kts, upon which it is hoped to improve.

RECOMMENDATION 92–106

Sumburgh Airport should be equipped with additional windsocks located close to the threshold of each runway.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The airport authority (HIAL) has already provided an additional windsleeve serving the runway 27 threshold. The airport is now equipped with 4 separate windsleeves serving the threshold/touchdown points of runways 09, 06, 15, 27 and 33. The Authority considers that these installations, which also serve the mid-point of runway 15/33, now provide visual indications of surface wind conditions for the whole of the manoeuvring area.

RECOMMENDATION 92–107

The CAA should, with the assistance of the Meteorological Office:

(a) Sponsor practical trials to assess the combinations of strong wind, topography and convective instability which may combine to create a significant windshear hazard.

(b) Increase the number of airfields provided with a windshear alerting service to encompass those airfields most at risk to windshear.

(c) Review the list of airfields at Appendix B of CAP 573 with a view to including UK airports which support domestic scheduled air services and which are prone to hazardous wind conditions.

Status – Fully Accepted – Open

CAA Response

The Authority accepts the intent of this Recommendation.

(a) Although the AAIB states that 'windshear was not a causal factor in this accident' CAA will review the windshear research already carried out in the UK and USA and will explore with the Meteorological Office the need to sponsor practical trials.

(b) If research is sponsored in response to paragraph (a) the results could be used to determine the safety benefits of requiring more windshear alerting services at UK aerodromes.

(c) The CAA proposes to extend the requirement in CAP 573, that all air traffic control positions should be equipped with a surface wind indicator to provide information in accordance with ICAO ANNEX 3, to cover all aerodromes supporting scheduled journeys by aircraft whose maximum total weight authorised exceeds a specified minimum and to any other aerodromes which may be prone to hazardous wind conditions.

RECOMMENDATION 92–108

The CAA should advise all operators of the desirability of conducting landing configuration checks (where required) at a suitable safe height, and not below the chosen approach speed, that would allow control of the aircraft to be recovered, if necessary, prior to the final approach and landing.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The Authority will produce general guidance to pilots on the desirability of completing handling checks in the most appropriate landing configuration chosen by the crew of a damaged aircraft. In doing so, the Authority will be careful not to encourage handling checks at low speeds which could create a more dangerous situation than already pertains, nor to suggest that handling checks may be required in every situation. The Authority is conscious of the need for operators to take care in their crew training and preparation for these very variable and infrequent circumstances, which would not fit in to the regular pattern of emergency training.

CAA Action

The Authority has publishd AIC 94/1993, giving general guidance to pilots on the desirability of completing handling checks in the most appropriate landing configuration chosen by the crew of a damaged aircraft. In doing so, the Authority has been careful not to encourage handling checks at low speed which would create a more dangerous situation than already pertains, nor to suggest that handling checks may be required in every situation. The Authority is conscious of the need for operators to take care in their crew training and preparation for these very variable and infrequent circumstances, which would not fit in to the regular pattern of emergency training.

PIPER PA34 SENECA	**DUNSFORD**	**25May92**	**ACCIDENT**	**9201857**	**92/34**

References: Bulletin 10/92
FACTOR 2/93 dated 25Jan93

RECOMMENDATION 92–54

The CAA should take action, in conjunction with the FAA, to inhibit the use of the Lamar Alternator Inoperative Switch unit, Part No A-00258-1, in future aircraft electrical systems in order to prevent further instances of overheating and fire initiating from such units, with the attendant flight safety hazard of smoke and toxic gas effects upon cockpit occupants.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. The Authority has been in liaison with both Piper and the FAA for some time with respect to the continuing problems associated with the Lamar Part No A-00258-1 sensing unit. To date, neither Piper nor the FAA have indicated that they consider that there is a need to take any action to control these problems. Accordingly, the Authority has initiated action to issue a CAA Additional Airworthiness Directive (AAD) which will require the mandatory modification of all UK certificated aircraft (including the PA34) which utilise the Lamar A-00258-1 sensing unit. The modification will introduce an external 250mA fuse into the sensing circuit. This will minimise the possibility of further incidents in which an internal short circuit occurs and subsequently causes the sensing unit to generate smoke and toxic gases. This action will allow the continued safe operation of these units on aircraft currently in service.

The Authority will continue to liaise with both Piper and the FAA with a view to achieving consistency in the means by which these problems are controlled.

The current electrical system design requirements in JAR 23 and FAR 23 adequately address the effects of electrical failure (and fire), and would preclude the use of the Lamar A-00258-1 sensing units in new aircraft types.

RECOMMENDATION 92–55

The CAA should review the acceptability of the Lamar Alternator Inoperative Switch, Part No A-00258-1, and its installations against the requirements of BCAR section K in view of the known instances of overheating and fire initiation from such units, with the attendant flight safety hazard of smoke and toxic gas effects upon cockpit occupants; and inform the FAA of any need to revise associated requirements.

Status – Fully Accepted – Open

CAA Response

See Response to Recommendation 92–54.

RECOMMENDATION 92–81

The CAA should take action to ensure adequate electrical protection of all Lamar Alternator Inoperative Switch units, Part No A-00258-1, that are currently installed in aircraft electrical systems in order to prevent further instances of overheating and fire initiating from such units, with the attendant flight safety hazard of smoke and toxic gas effects upon cockpit occupants; and request the FAA to undertake corresponding action.

Status – Fully Accepted – Open

CAA Response

See Response to Recommendation 92–54.

BELL 206	**WHITSTABLE**	**12Sep92**	**ACCIDENT**	**9203814**	**92/35**

References: Bulletin 12/92
FACTOR 24/93 dated 14Sep93

RECOMMENDATION 92–85

The CAA, in conjunction with the FAA, take action with the engine manufacturer to introduce some form of positive locking of the B nuts on the compressor delivery pressure (Pc) sensing line on all Allison 250 Series engines, to prevent the loosening of such nuts and consequent sudden loss of engine power.

Status – Fully Accepted – Open

CAA Response

The Authority agrees with this Recommendation and is liaising with the FAA and Allison with a view to agreeing the necessity for design improvements.

A320	**LONDON HEATHROW**	**04Nov92**	**INCIDENT**	**9204564**	**92/37**

References: Bulletin 1/93
FACTOR 4/93 dated 02Mar93

RECOMMENDATION 92–112

The CAA should ensure that Service Bulletin 3-1491-32-4 (SB 571), issued by B F Goodrich Aerospace, is being fully implemented by UK operators of the A320 using this model of

wheel. The safety information relating to this occurrence should also be transmitted to other regulatory authorities responsible for A320 operators.

Status – Partially Accepted – Closed

CAA Response

The Authority accepts the first part of this AAIB Recommendation and has confirmed that Excalibur (the only UK operator with this particular standard of wheel) has already embodied the requirements of the BF Goodrich Bulletin 571 on all their wheels.

In accordance with ICAO Annex 8 the continued airworthiness of this particular aircraft is the responsibility of the State of Manufacture, namely the French Authority (DGAC) together with Airbus Industrie. It would be therefore inappropriate for the CAA to transmit safety information on this subject to other Authorities. However an investigation into this (Lufthansa) incident has been carried out by DGAC and Airbus via the A320 Airworthiness Review Meeting procedures and the recommendations of the DGAC and the manufacturer has been sent to all operators in the form of an Operators Information Telex. The Information Telex, which was issued on 23 November 1992, recommends that at each tyre change the wheel is inspected to the requirements of B F Goodrich SIL 1540 and that the wheel be re-worked to BFG SB571 at the next convenient opportunity.

AS365 DAUPHIN VIKING BRAVO 22Sep92 ACCIDENT 9203893 92/38
HELIDECK, NORTH SEA

References: Bulletin 1/93
FACTOR F9/93 dated 30Mar93

RECOMMENDATION 92–114

It is therefore recommended that the CAA, after consultation with all Class 7 licensed helicopter operators and other interested parties, promulgate guidelines and, where necessary, regulations for enhanced safety during rotors running helideck operations.

Status – Fully Accepted – Closed

CAA Response

The Authority fully accepts this Recommendation. Following a previous fatality the Authority set up a helideck working group, a sub-group of the Helicopter Management Liaison Committee (HMLC), in collaboration with the offshore helicopter industry to review current practices. This Recommendation is already incorporated into the group's objectives, one of which is to conclude the initial review by the end of April 1993.

CAA Action

This Recommendation was incorporated into the objectives of the helideck working group, which itself was set up following a previous fatality. A copy of the working groups review has

now been sent to Sheriff Kelbie, the Sheriff of Grampian. In addition, the Authority has promulgated, through the Operations Manuals, guidelines for enhanced safety during rotors running helideck operations.

BAe ATP	LIVERPOOL	19Apr92	ACCIDENT	9201226	92/39

References: Bulletin 2/93
FACTOR 3/93 dated 02Mar93

RECOMMENDATION 92–90

The CAA, in consultation with the JAA and FAA, should review the advice available to manufacturers on evacuation slide certification with a view towards issuing revised material, additional to current industry practice, for the high sill height cases. This new material should take account of likely combinations of structural damage and oleo extension after the collapse of one or more legs of the landing gear to ensure that such slides provide a safe means of evacuation, with acceptable maximum slide angles.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation and will review the existing requirements and practices associated with evacuation slide certification in consultation with the JAA and FAA. This review will take into consideration the assumptions which were made about the likely landing gear collapse conditions for the BAe ATP and other aircraft types in demonstrating compliance with JAR 25.809 (f)(1)(iii) and FAR 25.810 (a)(1)(iii). The review will also determine whether additional criteria need to be taken into consideration in order to ensure that evacuation slides are capable of performing their intended function under likely landing gear collapse conditions including structural damage and oleo extension. This may result in future revisions to JAA requirements, including advisory material, depending upon the findings of the review and retrospective action where appropriate.

RECOMMENDATION 92–91

The CAA, in consultation with the JAA and FAA, should re-examine existing aircraft/slide configurations to determine whether, in the event of the likely conditions arising from the collapse of one or more legs of the landing gear, the safe evacuation requirements of JAR/FAR 25.809 can be met.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. The Authority has established from SDAU database records that in no other landing gear collapse case has the resulting aircraft attitude rendered the evacuation slides incapable of providing a safe means of evacuation. No immediate action is therefore proposed pending the completion of the review planned in response to Recommendation 92–90.

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