Safety Regulation Group

Civil Aviation Authority

CAP 636

Progress Report 1994

CAA Responses to Air Accidents Investigation (AAIB) Safety Recommendations

www.caa.co.uk

Safety Regulation Group

Civil Aviation Authority

CAP 636

Progress Report 1994

CAA Responses to Air Accidents Investigation (AAIB) Safety Recommendations

CAA Responses to AAIB Recommendations received up to 31 December 1993, presented to the Secretary of State of Transport July 1994

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.

July 1994

ISBN 0 86039 598 7
ISSN 0964–6159

First edition July 1994
Reprinted May 2002 (incorporating new house style cover)

Enquiries regarding the content of this publication should be addressed to:
Safety Analysis Department, Safety Regulation Group, Civil Aviation Authority, Aviation House, Gatwick Airport South, West Sussex, RH6 0YR.

The latest version of this document is available in electronic format at www.caa.co.uk, where you may also register for e-mail notification of amendments.

Printed copies and amendment services are available from: Documedia Solutions Ltd., 37 Windsor Street, Cheltenham, Glos., GL52 2DG.

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 require 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 fifth Annual Progress Report submitted to the Secretary of State for Transport. It contains all Recommendations addressed to the Authority and received during 1993 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. Part 1 of this report is a statement of their position as at 15 May 1994.

Contents

CAA Responses to AAIB Recommendations 5th 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 of 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 1993 are dealt with in Part 2.

2 Recommendations – Status Summary

2.1 *Recommendations Outstanding from Previous Report*

60 Recommendations remained open from the previous Report, of which 29 have now been closed and 31 remain open requiring further Authority action.

2.2 *New Recommendations Received*

During 1993, a total of 48 Recommendations addressed to the Authority were received compared with 90 for 1992. A Summary of the Acceptance and Current Closure Status of these is as follows:

Year	*Acceptance*		*Not Accepted*	*Current Status*	
	Full	*Partial*		*Open*	*Closed*
1992	73	9	8	14	76
1993	38	6	4	20	28

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 1992	534	394 (74%)	140	17	517
1992	90	73 (81%)	17	14	76
1993	48	38 (79%)	10	20	28
TOTAL	672	505 (75%)	167	51	621

Part 1 – AAIB Recommendations Remaining Open from the 1993 Progress Report

AS355 TWIN SQUIRREL	**SWALCLIFFE**	**08Apr86**	**ACCIDENT**	**8600990**	**89/03**

References: AAR 7/87 dated 16Dec87
FACTAR F7/88 dated 29Feb88

RECOMMENDATION 4.03

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 – Closed

CAA Action

Research into failure recognition and pilot intervention is being undertaken by the RAF Institute of Aviation Medicine. A simulator trial at Farnborough, using a Chinook simulator with predominantly military crews, has been completed and further data is being gathered from civil crews performing routine base check sorties using an S61 simulator at Aberdeen. This data will provide new information on required intervention times and will form a basis for proposals for amendment to JAR 27/29.

RECOMMENDATION 4.07

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 Authority.

Results of the tests (CEPR,SACLAY Document No 332AO4.4685) undertaken in France specifically directed towards techniques of testing engine intakes at 0degC have also shown that it is feasible to represent icing conditions at and close to 0degC. However, at the time of preparing this report, analysis of this work in France has not yet materialised.

BELL 222	LIPPITTS HILL ESSEX	06May87	ACCIDENT	8700930	89/05

References: AAR 3/88 dated 08Jul88
FACTAR F11/88 dated 18Aug880

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 is to be proposed to JAR25 (Large Aeroplanes) to extend the current requirements for turbo-jet engines to include turbo-propeller engines. JAR 23, 27 and 29 (small aeroplanes, small helicopters and large helicopters) have now been published and the Authority will propose and actively pursue the introduction of requirements for engine vibration monitoring equipment in all of them through the appropriate JAA procedures.

SIKORSKY S76A	NORTH SEA	09Dec87	INCIDENT	8703362	89/07

References: AAR 5/88 dated 14Sep88
FACTAR F14/88 dated 06Dec88

RECOMMENDATION 4.04

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

Following a full evaluation of the results of the in-service trial on the Kittiwake platform, conducted by British International Helicopters Ltd in conjunction with DRA Bedford, it has been determined that optical signalling systems do not represent the best means of providing approach guidance to helicopters at off-shore installations. The major areas of difficulty that have been identified are:

(i) Conspicuity

(ii) Judgement of distance

(iii) Siting

A CAA Paper is to be produced for publication later this year which will report fully on the trials completed. No further work on visual approach aids is currently planned. A programme of work, including off-shore flight trials in 1995, aimed at generating airworthiness and operational requirements for instrument-based off-shore approaches is, however, underway. It is hoped that this work will demonstrate the suitability of differential Global Navigation Satellite System technology for the task.

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

References: AAR 8/88 dated 15Dec88
FACTAR F5/89 dated 13Mar89

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 (ie: hidden fires).

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

The Authority has contracted the DARCHEM Company to undertake complementary research which involves tests of representative components on a medium scale test rig. The test facility has been commissioned and the first phase of testing has been completed. The results will be published in CAA Paper 94002 in the second quarter of 1994.

These research programmes are continuing and in due course the Authority will, in co-operation with JAA and FAA, determine what, if any, new requirements are necessary.

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

References: AAR 3/89 dated 02Jun89
FACTAR F8/89 dated 27Jun89

RECOMMENDATION 4.01

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 – Closed

CAA Action

To increase the number of exits available following a capsize, the CAA has for some time required 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. This standard of exit availability has also now been made a requirement for other overwater operations including Search and Rescue through a re-issue of Airworthiness Notice No 27. This Notice also includes requirements for illumination of emergency exit handles.

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. This will be included as part of the review of offshore safety and survivability being conducted in response to Recommendation 93-30.

SIKORSKY S61N	NORTH SEA	10Nov88	ACCIDENT	8803819	90/01

References: AAR 1/90 dated 15May90
FACTAR F1/90 dated 15May90

RECOMMENDATION 4.07

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 – Closed

CAA Action

The current UK certification standard for new large helicopter types is JAR 29 which requires a design assessment of the rotor drive system. The Authority considers that the design

assessment will not be satisfied for current transmission technology without vibration health monitoring.

JAR 27 for small helicopters, agreed by the JAA Helicopter Airworthiness Steering Group and published in September 1993, requires a design assessment for Category A rotorcraft but not Category B. The Authority accepts this position.

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 Authority has issued AAD 004-10-93 which requires the vibratory health of main rotor gearboxes to be continually monitored with equipment and procedures acceptable to the Authority.

SIKORSKY S61N	NR SUMBURGH	13Jul88	ACCIDENT	8802141	90/03

References: AAR 3/90 dated 06Sep90
FACTAR F3/90 dated 06Sep90

RECOMMENDATION 4.11

The CAA require, for UK registered public transport S-61N 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 – Closed

CAA Action

UK North Sea operators have each established a programme to embody HUMS systems, incorporating vibration monitoring into their existing S61 fleets. The Authority has complemented the initiative by issuing Additional Airworthiness Directive 004-10-93 which requires 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

The CAA 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

The current UK certification standard for new large helicopter types is JAR 29 which requires a design assessment of the rotor drive system. The Authority considers that the design assessment will not be satisfied for current transmission technology without vibration health monitoring.

JAR 27 for small helicopters, agreed by the JAA Helicopter Airworthiness Steering Group and published in September 1993, requires a design assessment for Category A rotorcraft but not Category B. The Authority accepts this position.

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 Authority has issued AAD 004-10-93 which requires the vibratory health of main rotor gearboxes to be continually monitored with equipment and procedures acceptable to the Authority.

From the point of view of engine integrity the Authority 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 the Authority 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 Authority to take mandatory action on currently certificated helicopter engines, other than that detailed in Recommendation 4.11. Nevertheless for new engines the Authority 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 Authority will continue to monitor service experience and will require the provision of monitoring equipment where this is warranted.

As a result of the CAA review of the need to provide vibration monitoring equipment for all types of engines a change is to be proposed to JAR 25 (Large Aeroplanes) to extend the current requirements for turbo-jet engines to include turbo-propeller engines. JAR 23, 27 and 29 (small aeroplanes, small helicopters and large helicopters) have now been published and the Authority will propose and actively pursue the introduction of requirements for engine vibration monitoring equipment in all of them through the appropriate JAA procedures.

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

References: AAR 4/90 dated 18Oct90
FACTAR F4/90 dated 23Oct90

RECOMMENDATION 4.09

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 – Rejected – Closed

CAA Action

Although initially accepting this Recommendation, the Authority does not now do so for the following reasons:

The Authority 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 Authority does not propose to require an attention-getting facility 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 has reviewed engine vibration indication systems and crew procedures for aeroplanes with high by-pass ratio turbo jet engines.

The Authority has also reviewed the responses received from engine manufacturers in UK, France and the USA and has concluded that all critical levels of vibration generated by the engine will be felt by the crew through the airframe.

The engine vibration indication systems and crew actions specified in Flight and Operations Manuals are considered adequate for each particular engine type.

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 Authority 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 4.31

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 first phase of the FAA dynamic test programme has been completed. Regrettably, this work has not revealed any useful information in respect of bin latching. The FAA programme is continuing but will not be complete until 1998. In the meantime, the CAA has decided to proceed with the drafting of a JAR 25 NPA to propose more specific guidance on acceptable methods of bin latching in ACJ 25.787(b).

SIKORSKY S61N	**BRENT SPAR**	**25Jul90**	**ACCIDENT**	**9003279**	**90/12**

References: AAR 2/91 dated 10Oct91
FACTAR F2/91 dated 10Oct91

RECOMMENDATION 4.02

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 Authority continues to inspect offshore installation helidecks under contract to HSE. Up to 15 May 1994 a total of 195 inspections had been carried out. The current work

programme is expected to complete the inspection of helidecks subject to the Minerals Workings (Offshore Installations) Act (1971) (approx 70 decks remaining). Whenever possible helidecks not covered by the Act (i.e. vessels) are being inspected on an opportunity basis but this area of activity remains the subject of discussion between CAA, DoT (Marine Division) and HSE.

SIKORSKY S61N	SUMBURGH	11May89	ACCIDENT	8901536	90/15

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

RECOMMENDATION 4.02

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 – Closed

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 FAA's 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, the Authority has issued Additional Airworthiness Directive 004-10-93 which requires vibratory health monitoring of main rotor gearbox high speed input driveshafts and associated parts with equipment and procedures acceptable to the Authority.

SIKORSKY S61	FALKLANDS	09Oct90	ACCIDENT	9004530	90/19

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

RECOMMENDATION 4.02

The CAA consider the need for measures aimed at providing significantly greater margin between the natural frequency of the S-61N engine mounting rear support assembly tube and the normal rotational frequency of the main gearbox input drive train.

Status – Fully Accepted – Closed

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. Tests have 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 Authority has therefore issued an Additional Airworthiness Directive 005-10-93 which requires that S61 EMRSA isolator spacers 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 4.03

The CAA consider requiring, for UK public transport S-61N helicopters, the replacement of input pinion plain bearings with rolling element bearings.

Status – Fully Accepted – Closed

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.

The Authority considers 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 4.01, 4.04, 4.07 and 4.08.

It is considered that the following Additional ADs, will provide assurance of an acceptable probability of failure of input pinion plain bearings:

Checks of T-bolt nuts	007-12-90
MRGB electrical chip detector	006-10-93
Periodic replacement of vibration isolator	005-10-93
Vibration health monitoring of MRGB input drivetrains	004-10-93

RECOMMENDATION 4.04

The CAA 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 – Closed

CAA Action

For new type certification to JAR 29 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.

JAR 27 for small helicopters, agreed by the JAA Helicopter Airworthiness Steering Group and published in September 1993, requires a design assessment for Category A rotorcraft but not Category B. The Authority accepts this position.

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

For the S61, CAA have made Mandatory the embodiment of electrical chip detectors giving cockpit warnings for main, intermediate and tail gearboxes in accordance with Sikorsky Service Bulletin S61B 55-39 (CAA AD 006-10-93 refers).

RECOMMENDATION 4.07

The CAA require, for UK public transport and aerial work S-61N 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 – Closed

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 the 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, the Authority has issued an Additional Airworthiness Directive 004-10-93 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 4.08

The CAA 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 – Closed

CAA Action

The current UK certification standard for new large helicopter types is JAR 29 which requires a design assessment of the rotor drive system. The Authority considers that the design assessment will not be satisfied for current transmission technology without vibration health monitoring.

JAR 27 for small helicopters, agreed by the JAA Helicopter Airworthiness Steering Group and published in September 1993, requires a design assessment for Category A rotorcraft but not Category B. The Authority accepts this position.

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 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 has issued AAD 004-10-93 which requires the vibratory health of main rotor gearboxes to be continually monitored with equipment and procedures acceptable to the Authority.

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

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

RECOMMENDATION 4.05

The CAA 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 – Closed

CAA Action

Since the equipment which this Recommendation addresses is of US manufacture, CAA have sought FAA approval of a field repair scheme proposed by the manufacturer and has requested FAA action to require mandatory inspection and where necessary, replacement of connectors of this type. To date no such action has been notified to the Authority.

Information has already been published in a General Aviation Safety Information Leaflet drawing the attention of operators to the need to replace the safety harness if the shoulder strap does not locate securely over the elastomeric bush or there is any tendency for the steel attachment fitting from the shoulder strap to disengage from the lap strap buckle. Established maintenance procedures in the CAA Light Aircraft Maintenance Scheme (LAMS Section 7, Item 12) should detect these problems.

PIPER PA28-181	STANMORE	18Apr91	ACCIDENT	9101093	91/14

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

RECOMMENDATION 4.01

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

The amendment of the Air Navigation Order will not be possible until the Civil Aviation Act has been suitably amended to give the primary legislation power for the Authority to amend the Order. It is likely that a Civil Aviation Bill will be introduced in 1994, the Department of Transport being responsible for the Civil Aviation Act amendment, but action awaits Parliamentary time being made available. Once the Civil Aviation Act has been amended, the detailed amendment to the Air Navigation Order will follow without delay.

PIPER PA34	BOURNEMOUTH	25Aug91	ACCIDENT	9103040	91/21

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

RECOMMENDATION 4.01

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 this Recommendation has been prepared. CAA comments have also been submitted on an FAA NPRM (Docket 93-CE-58-AD) issued in January 1994 that proposes an AD to address this situation with a view to making the CAA Additional Airworthiness Directive unnecessary.

CESSNA 172	SOUTHPORT	21Mar91	ACCIDENT	9100793	91/22

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

RECOMMENDATION 4.03

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

The feasibility study conducted in response to the Recommendation regarding the inclusion in aviation forecasts of information on conditions likely to produce carburettor induction system icing is now complete. The study has revealed that inclusion of relative humidity data into aviation forecasts is not practicable and it has been concluded that there is no merit in pursuing this particular approach. However, consideration is being given to producing objective numerical forecasts of atmospheric water distribution (eg Liquid Water Content LWC) which could be presented in a similar format to the UK spot wind/temperature chart. Such forecasts are already proving of value in a trial being conducted for UK offshore helicopters but the benefit of the forecasts depends upon pilots being provided with engine operating limitations for their specific installation based on the use of an objective parameter such as LWC.

RECOMMENDATION 4.04

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.

The first stage of the research, a literature search, is in its final stages.

AS355-F2	**NR BIRMINGHAM**	**30Dec90**	**ACCIDENT**	**9005638**	**91/23**

References: AAIB Letter dated 05Nov91

RECOMMENDATION 4.01

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 levels 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 Recommendation 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.

The Authority believes 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. Consequently LTO 1191 will be revised to delete the 50 hour visual check of Thomas couplings. LTO 1274 was issued to require inspection of the gearbox mount laminates, deterioration of which was the most probable cause of rapid deterioration of the coupling.

(ii) The constructor continues to re-examine 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. CAA LTO 1274 includes a Recommendation for appropriate torque checks.

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) Test evidence leads the constructor and DGAC France to believe that vibration checks of the flexible coupling will not help to detect installational errors or coupling degradation at an early stage. The design is such that misalignment checks are not required if the engine and coupling are installed in accordance with the manufacturers instructions. The Authority agrees with this conclusion.

RECOMMENDATION 4.02

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 levels 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) Experience subsequent to this accident indicates that initial engine/gearbox misalignment is not the cause of Thomas coupling break-up. DGAC and Eurocopter state that misalignment checks are not required if the engine and coupling are installed in accordance with the manufacturer's instructions. Production tolerances are small and therefore alignment is not considered to be significantly influenced by build up of tolerances.

FAA and DGAC confirm that installation checks on other aircraft types are adequate and that no further action is required.

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

JAR 27 for small helicopters, agreed by the JAA Helicopter Airworthiness Steering Group and published in September 1993, requires a design assessment for Category A rotorcraft but not Category B. The Authority accepts this position.

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 and Usage Monitoring Systems (HUMS), incorporating vibration monitoring, into their existing fleets.

RECOMMENDATION 4.03

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 – Fully Accepted – Open

CAA Action

The Status of this response has been revised from Partially Accepted to Fully Accepted. It was initially decided not to proceed with amendment of relevant UK legislation until such time as the European JAA Requirements on this subject had been finalised. In the light of

Recommendation 92-13, arising from the investigation into a Piper Seneca accident in September 1991, a different course of action was decided. The Authority instituted a complete review of the criteria applicable to the Mandatory Occurrence Reporting Scheme. This review was conducted by inviting representatives of interested organisations to join a specialist Study Group. The specialist Study Group has now completed its deliberations. It is planned that further action will have been decided by the end of May 1994. When finalised, the Study Group's conclusions will be brought to the attention of the JAA, as will details of any UK action.

BAC 111	NR DIDCOT	10Jun90	ACCIDENT	9002400	91/27

References: AAR 1/92 dated 14Apr92
FACTAR F1/92 dated 14Apr92

RECOMMENDATION 4.07

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

A draft Airworthiness Notice has been prepared and circulated. The primary legislation amendment necessary to allow the ANO amendment, however, rests with the Department of Transport and is awaiting the next Civil Aviation Bill. Once the primary legislation has been amended the ANO amendment will take place.

RECOMMENDATION 4.08

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

Requirements for emergency and continuation training were subjected to consultation with industry in the second half of 1993. The requirements for emergency and continuation training will be published in the next edition of CAP160, Licensing of Air Traffic Controllers, and providers of air traffic services will be obliged to implement the requirements by 1st January 1995.

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

References: Bulletin 3/92

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 Action

The Authority instituted a complete review of the criteria applicable to the Mandatory Occurrence Reporting Scheme. This review was conducted by inviting representatives of interested organisations to join a specialist Study Group. The specialist Study Group has now completed its deliberations. It is planned that further action will have been decided by the end of May 1994. When finalised, the Study Group's conclusions will be brought to the attention of the JAA, as will details of any UK action.

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

References: Bulletin 4/92
FACTOR F12/93 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 Action

Subsequent to the above recommendation, a NATS Working Group was established. This Group was tasked with defining a standard for future installations of recording and replay equipment at ATCCs, and investigating the feasibility of upgrading existing installations to this standard.

The Group issued its report together with recommendations for future radar recording systems requirements and these have now been accepted and endorsed as NATS policy. It is

not considered practicable to adapt the current radar recording facilities at LATCC and ScOATCC to comply with this newly defined standard. However, the new equipment to be introduced at the New En-Route Centre, at Burseldon and the New Scottish Centre at Prestwick will meet the standard.

In addition, the Authority has published its proposed requirements for Radar Recording equipment in CAP581 (Air Traffic Services Engineering Requirements) which is currently in draft format and released to the industry in the formal consultative process. Following the consultation, the Authority will publish requirements and guidance covering recording systems synchronisation.

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 Action

Requirements for emergency and continuation training were subjected to consultation with industry in the second half of 1993. The requirements for emergency and continuation training will be published in the next edition of CAP160 (Licensing of Air Traffic Controllers) and providers of air traffic services will be obliged to implement the requirements by 1st January 1995.

JAGUAR; CESSNA 152	**CARNO**	**29Aug91**	**ACCIDENT**	**9103079**	**92/07**

References: AAR 2/92 dated 29Apr92
FACTAR F2/92 dated 16Jun92

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 – Closed

CAA Action

The outstanding aspect of this partially accepted Recommendation is that the scope of CANP should be widened to include all forms of aerial work which take place below 1000 feet agl. Following the review of CANP which, on 1 April 1993, introduced some defined recreational and other flying events into the range of activities which may be notified to the Tactical Booking Cell, pipeline and power line inspection work became the

major low level activity not included in the CANP. The introduction of the Pipeline Inspection Notification System (PINS) following the accident at Kendal on 23 June 1993 has addressed this aspect of the Recommendation.

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 Action

The proposal to utilise the AIS 'dial a fax' NOTAM Navigation Warning system in order to provide a dedicated list of NOTAMs which would inform General Aviation pilots of areas of intensive military low-flying has encountered problems. AIS advise that there are technical difficulties with the proposal because the nature of the 'dial a fax' system does not permit the creation of a separate page for NOTAMs which include warning of military low-flying activity; such NOTAMs already appear in the general listing. Moreover, even if a dedicated page could easily be created, AIS would not wish to list some NOTAMs, ie: those with a military low-flying element, in two places, since the highlighting of one particular category tends to make others less visible. MoD wishes to study the proposal carefully because it believes that the information could be misleading in that a NOTAMed exercise in one area is most likely to lead to the low-flying traffic which would have been flying in that area diverting to other areas which may then be busier than the NOTAMed exercise area. Nevertheless, NATS continues to pursue this general objective although additional resources may be required in order to reconfigure the AIS 'dial a fax' data base. It is believed that the introduction of ALFENS (Automated Low Flying Enquiry and Notification System), once proved, will make the creation of such an advice service feasible.

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 Action

Military Low-flying System flow arrows appear on the chart at AIP RAC 5-0-1.1 'Chart of UK Areas of Intense Aerial Activity (AIAA), Aerial Tactics Areas (ATA) and Military Low Flying System', which was published on 1 September 1993. NATS intend to add to this chart a number of additional features, eg: Military Aerodrome Traffic Zones, which will make the significance of the flow arrows more meaningful.

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 Action

Work on the amendments to national legislation is currently in hand. Proposals have been circulated for CAA internal comment.

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

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

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 Action

The IMC Rating Review Working Group is meeting on a regular basis. The Group is proposing major changes to the form, privileges, training and testing requirements for the IMC rating. The recommended changes are such that the group is proposing a change of name to the Instrument Weather Rating (IWR). In its new form it is hoped that the rating will be acceptable to other JAA states. The working group made a detailed report, on 6th April 1994, on its progress to date to the Standing Advisory Committee on Pilot Licensing (SACP) which endorsed the initial proposals.

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 relevance 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 Action

Two items of research are related to this Recommendation.

(a) Intervention Times. A simulator trial conducted by the RAF Institute of Aviation Medicine at Farnborough, investigating pilot intervention times following total loss of power, using a Chinook simulator with predominantly military crews has been completed. Further data is being gathered from civil crews performing routine base check sorties in an S61 simulator at Aberdeen.

(b) Rotor RPM Loss and Warning. A programme of research work undertaken by Westland Helicopters Limited, on behalf of the Authority, to investigate methods of reducing rotor rpm loss following engine failure is now complete. The work included controlled piloted simulation trials to assess the relative merits of various additional warning and intervention strategies. A final report containing the results of this work will be published this year.

The results of this research will form a basis for formulation of any proposals for amendments 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 Action

The draft 'Helicopter Airmanship Guide' is with the Helicopter Panel of Examiners for their comment. It is anticipated that the leaflet will be circulated by mid-1994.

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

References: Bulletin 7/92
FACTOR F21/93 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 Action

The FAA have recently issued an Advance Notice of Proposed Rulemaking (ANPRM) (Docket No. 93-CE-61-AD) concerning the initial part of this Recommendation (i.e. the requirement for a periodic check of the swivel pin). Further CAA action will await the outcome of this FAA proposed rulemaking.

DE-HAVILLAND DHC7	**BTWN BRUSSELS/ LONDON(CITY)**	**30Jan90**	**INCIDENT**	**9100255**	**92/19**

References: AAR 3/92 dated 09Jul92
FACTAR F3/92 dated 09Jul92

RECOMMENDATION 4.03

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 – Closed

CAA Action

Investigation has shown that many aircraft designs are such that the autopilot disconnect warning system is fail safe to ensure that the warning will operate under the majority of autopilot failure conditions, including inadvertent or necessary tripping of autopilot power supply circuit breakers. The continued warning that occurred on this occasion was caused by disconnecting the autopilot power circuit breaker before operating the autopilot quick disconnect.

Consideration has been given to issuing a Letter to Operators (LTO) but in view of the low frequency of this type of occurrence and the fact that the crew could have isolated the continuous warning by tripping the audible warning system circuit breaker such action is considered unwarranted.

RECOMMENDATION 4.04

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 – Closed

CAA Action

The Authority has conducted a design survey of UK manufactured Transport Category aircraft of over 5700 Kgs MTOW for evidence of related problems. Except for one type, which was subsequently modified, no history of such problems was discovered and in the majority of cases particular design characteristics make it unlikely that similar problems would occur.

Responses from other authorities having responsibility for indigenous transport aircraft types over 5700 Kgs MTOW show that four other types with a similar autopilot installation have been affected and all have been modified.

BAe ATP	**NR OXFORD**	**11Aug91**	**INCIDENT**	**9102773**	**92/26**

References: AAR 4/92 dated 13Oct92
FACTAR F4/92 dated 13Oct92

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 – Closed

CAA Action

Part b). Analysis of the information in the report produced by IAM (Report No.716) has been made by the Authority. The following findings of the report do not in the CAA's view justify attempting to assess readability of CRT type displays under vibration conditions as part of the certification of the instrument.

(1) The effect of vibration of observer and instrument simultaneously over the range of 10–20 Hz at levels comparable to those estimated to have occurred in the incident, while having a detrimental effect on the readability of the EFIS display, was no worse than that for a colour print representation of the display. Between 10 and 31.25 Hz the CRT display was more readable than the print.

(2) The reported 'break-up' of parts of the image on the display during the incident was only consistently reproduced in the laboratory by direct vibration of the observers head at a frequency close to the refresh rate of the display screen, with the display static.

(3) The report does not find that readability of CRT instruments is more adversely affected than that for conventional instruments under vibration conditions that probably existed during this incident.

Although the Authority will continue to evaluate the readability of all instruments as installed in crew instrument panels under conditions of vibration that may occur during certification flight testing, further research work into the effects of vibration on the readability of instruments is planned and has been budgeted for in this financial year. Details have yet to be defined.

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

References: Bulletin 12/91
FACTOR F13/93 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 – Closed

CAA Action

CAA have now received FAA's response to the AAIB's findings and the CAA's request for advice. As a result of the FAA quality assessment programme of the rear bulkhead casting, improvements have been made to the X-ray techniques used by Robinson Helicopter

Company for acceptance of new castings. Nevertheless FAA have stated that the original X-ray technique was adequate for the certification of the R22 and for continued flight safety. In addition the FAA have stated that due to the extremely large demonstrated margins of static and fatigue strength inherent in the casting's design, and its excellent service history any small areas of excess porosity that might by present in any location in a given production casting would have no impact on safety of flight.

FAA have also carried out a Fracture Mechanics analysis of the casting, which has shown that small flaws, such as those thought to have been present in another casting, would cause no impairment of the static or fatigue strength of the casting under in-service operational loads.

CAA accepts the FAA findings and agree that no further action is necessary.

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

References: Bulletin 11/92
FACTOR F8/93 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 – Closed

CAA Action

The certification criteria have been reviewed and have been found to be adequate for operations within motion parameter limits currently in use for take-off and landing from moving decks.

Research is in progress aimed at the development of a helideck motion severity index, together with the definition of a means to continuously measure the value of the index on helidecks at sea. The index will take account of the stochastic nature of ship's motions and so will provide better guidance on the limits for aircraft which remain on the deck.

Once this work is complete it should be possible to define the landing gear and braking system capability requirements as a function of the limiting motion severity index for which it is desired to clear an aircraft type to operate.

MD83	LONDON GATWICK	18Aug92	INCIDENT	9203358	92/31

References: Bulletin 12/92
FACTOR F17/93 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 – Closed

CAA Action

CAA have issued an Aircraft Maintenance Standards Department Circular 3/19 Issue 1 that defines what is required to be available at issue or renewal of a C of A concerning serviceability, maintenance and conversion data for readout of flight data recorders. The Authority will urge that a similar requirement be included in the appropriate JARs concerning the issue and renewal of Type Certificates/Certificates of Airworthiness.

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 – Closed

CAA Action

The Authority has issued an Aircraft Maintenance Standards Department 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. The Circular is number 3/19, Issue 1, dated July 1993.

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

References: AAR 4/93 dated 30Jul93
FACTOR F23/93 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 – Closed

CAA Action

The review with BAe of the applicability of modification HCM00913 has been completed. BAe Service Bulletin 27-70-00913 A & B has been revised and reissued, making compliance with it Mandatory, for BAe 146 aircraft.

BAe ATP	SUMBURGH	23Dec91	ACCIDENT	9104733	92/33

References: AAR 6/92 dated 30Dec92
FACTOR F6/92 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 – Closed

CAA Action

See CAA action to recommendation 92-102.

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 – Closed

CAA Action

The Loads and Dynamics Working Group of the Aviation Rulemaking Committee (ARAC) have now agreed upon improvements to JAR 25.415(a) covering control surface loads due to ground gusts and taxying downwind. It is proposed to increase the ground gust velocity in this requirement from the current maximum of 88 feet per second (about 52 knots) to 65 knots. A Notice of Proposed Amendment to JAR 25 (NPA 25C-260) covering this, and other changes, has been written and submitted to the Joint Aviation Authorities (JAA) Regulations Director. This NPA will be published simultaneously with a corresponding Notice of Proposed Rulemaking (NPRM) that will introduce identical changes to FAR 25 loads requirements.

In addition, CAA funded research has been completed into the effects of tail-to-wind gusts on control surface and control system loads. This work has shown that when the gust locking means is not immediately adjacent to the control surface to be locked, then the stiffness of the locking circuit from surface to lock must be considered and its effect on the dynamic behaviour of the locked surface and hence the circuit lock loads established. This important conclusion has been brought to the attention of the appropriate JAA certification specialists through the auspices of the JAA Structures Study Group. This has ensured that, in future, improved attention will be paid to this phenomenon during certification.

These structural measures are felt sufficient to safeguard aircraft against operation in ground gusts. It is felt that when properly applied by taking control system flexibility into account, the improved structural requirement of JAR 25.415(a) will produce adequate control surface and control system designs to enable normal airmanship to determine the safety of ground operations in high winds without the need for JARs to introduce additional Flight Manual limitations.

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 – Closed

CAA Action

Action on 92-105 will be implemented as a result of actions on 92-102.

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 Action

(a) The review of windshear research is continuing.

(b) Further action on this is dependent upon the results of the review in part (a).

(c) CAP 573, Approval of Air Traffic Control Units was amended in April 1993. This amendment withdrew the list of aerodromes required to comply with ICAO Annex 3 for wind indication and replaced it with a general requirement as follows:

'At aerodromes supporting scheduled journeys (as defined in ANO ART 106) by aircraft whose maximum total weight authorised exceeds 5700 kg and such other aerodromes as the Authority may direct, control positions are to be equipped with a surface wind indicator capable of giving surface wind information in accordance with ICAO Annex 3, Meteorological Services for International Air Navigation'.

The revised wording will allow the Authority to require any aerodrome authority to implement the Annex 3 wind indicators. When information is received which indicates that an aerodrome is prone to hazardous wind conditions, the Authority requires that aerodrome to install the Annex 3 equipment.

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

References: Bulletin 10/92
FACTOR F2/93 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 – Closed

CAA Action

The Authority has raised Additional Airworthiness Directive 002-03-93 which requires all units fitted to UK registered aircraft to have the Lamar Switch Unit sensing line protected by a 250 mA fuse. This limits the maximum current available to the unit and effectively removes the dangerous failure mode. The Authority therefore considers that the fitment of the Lamar unit will not now be a safety hazard and that prohibition of the use of this unit is unnecessary.

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 – Closed

CAA Action

The Authority has raised Additional Airworthiness Directive 002-03-93 which requires all units fitted to UK registered aircraft to have the Lamar Switch Unit sensing line protected by a 250 mA fuse. This limits the maximum current available to the unit and effectively removes the dangerous failure mode and sustains compliance with BCAR Section K. The FAA have been made aware of the CAA action.

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 – Closed

CAA Action

See Action to Recommendation 92-54 and 92-55.

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

References: Bulletin 12/92
FACTOR F24/93 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 Action

The Recommendation for positive locking of the B nuts has been rejected by Allison and the FAA. The Authority is reviewing the situation.

BAe ATP	LIVERPOOL	19Apr92	ACCIDENT	9201226	92/39

References: Bulletin 2/93
FACTOR F3/93 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 Action

The Authority has requested this issue to be studied by a joint FAA/Transport Canada/JAA Cabin Safety Team. The findings are expected in Autumn 1994.

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 Action

See CAA Action to Recommendation 92-90

Part 2 – AAIB Recommendations received during 1993

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

References: AAR 1/93 dated 10Mar93
FACTOR F7/93 dated 06Apr93

RECOMMENDATION 93-11

An updated version of AIC 77/90 should be published that emphasises the potential hazards of wake vortices and downwash generated by a helicopter whilst in hovering flight.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. A revised version of AIC 77/90 on Wake Turbulence was published on 10 December 1992. Numbered AIC 122/92 (Pink 61), the circular makes particular mention of the forceful blast of air which rolls outwards in all directions from helicopters whilst hover taxiing.

RECOMMENDATION 93-12

The CAA should reconsider the entry in MATS Part I that defines hazardous wake vortices and defines the 'flight path', with a view to amending that paragraph so that the advice is relevant to all types of aircraft, including helicopters that may be hovering close to an active runway.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. MATS Pt 1 has been amended to include reference to helicopters.

RECOMMENDATION 93-13

The CAA should require the organisers of Special Events, as part of their planning, to draw attention to any unusual features such as a high volume of helicopter traffic that may in general constitute a hazard to flight safety.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. Although the accident was not at the site of the Special Event, the subject was nevertheless discussed at the next meeting of the Special Events Working Group, so that event organisers are aware of the problems posed by wake turbulence from taxiing helicopters.

RECOMMENDATION 93-14

The CAA, in consultation with interested parties, should develop and implement a research programme into helicopter wake vortex and downwash effects.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts the need to review relevant research in order to determine what further work may be needed. A project is already underway to investigate the effects of helicopter downwash and vortices.

CAA Action

The necessary research into helicopter wake turbulence has been carried out under Chief Scientist Division (NATS) funding and as a result further discussion will be held on vortex wake separation policy in the UK. (See Recommendation 93-15)

RECOMMENDATION 93-15

The CAA should require that for wake turbulence spacing purposes, all large helicopters that are not known to be on the ground, including those hovering, should be treated as in flight and within the 'flight path' as presently defined.

Status – Partially Accepted – Open

CAA Response

The Authority accepts the intent of this Recommendation and is considering its implications. It will introduce additional requirements into MATS Pt 1, as appropriate, in the light of the results of the review proposed in response to Recommendation 93-14.

CAA Action

Amendment 19 to MATS Part 1 implemented on 25th October 1993 gives advice and instructions to controllers on how to control helicopters to minimise the effect of vortex wake. The amendment was developed in conjunction with the Air Traffic Operations Section of the NATS Directorate of Operations who hold policy responsibility within the Authority for vortex wake separations.

Further discussions regarding the problem will be held following consideration of the recently completed research relating to helicopter wake turbulence.

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

References: AAR 4/93 dated 30Jul93
FACTOR F23/93 dated 27Aug93

RECOMMENDATION 93-03

The CAA should examine methods whereby flight crews of BAe 146 aircraft may more fully appreciate the performance penalties and handling differences that exist when spoiler system malfunctions occur during the landing phase and with limiting runway situations.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. Flight simulators cannot fully replicate the performance and handling consequences of non-deployment of the spoiler on a limiting runway and therefore the CAA will remind operators that these aspects should be covered during conversion courses and refresher training and when applicable in pre-landing briefings. The CAA will ensure that individual operators of BAe 146 aircraft have adequate cockpit procedures in order to ensure that non-deployment of the spoiler is detected and acted on immediately.

CAA Action

The Authority has ensured that individual operators of BAe 146 aircraft have adequate cockpit procedures incorporated into their operations manuals, in order to ensure that non deployment of the spoiler is detected and acted on immediately.

RECOMMENDATION 93-04

The manufacturer of the BAe 146 aircraft should reconsider the time delays which are currently a feature of the lift spoiler non-deployment warning system, with a view to providing associated flight crews with the earliest cue for lift spoiler deployment, following achievement of the required weight-on-wheels configuration on landing. (Recommendation made in March 1993.)

Status – Rejected – Closed

CAA Response

The Authority concurs with this Recommendation, has already reviewed the subject with BAe and agrees with its conclusion that the existing times are appropriate, giving due regard to the variabilities involved in the landing manoeuvre and selection of spoilers.

RECOMMENDATION 93-08

British Aerospace should include, in the BAe 146 aircraft Manufacturer's Operating Manual normal handling section, a warning to crews emphasising the effects that spoilers and their non-deployment can have on landing performance.

Status – Fully Accepted – Closed

CAA Response

The Authority concurs with this Recommendation. It is understood that BAe is undertaking a review of the text to ensure consistency across the range of applicable Manuals for all BAe 146 aeroplanes.

RECOMMENDATION 93-09

Air UK should expand its Operations Manual entry relating to normal approach and landing techniques to include the additional technique that can be used in very gusty conditions which is detailed in the Manufacturer's Training Manual for the BAe 146 aircraft.

Status – Fully Accepted – Closed

CAA Response

The Authority concurs with this Recommendation. Air UK Limited amended their Operations Manual in November 1992 to include the additional technique that can be used in very gusty conditions as detailed in the Manufacturer's Training Manual for the BAe 146 aircraft.

TIGER MOTH	**TIBENHAM**	**21Nov92**	**ACCIDENT**	**9204765**	**93/01**

References: Bulletin 3/93
FACTOR F10/93 dated 13Apr93

RECOMMENDATION 93-10

It is recommended that the CAA introduces an inspection of the magneto gear oil supply filter screen and oil jet at the next appropriate inspection and subsequently at intervals to be determined by experience.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. H & S Aviation, the holders of the design records for the engine, have issued Technical News Sheet GM10 No 50 calling for appropriate inspection within 14 days of issue and annually thereafter.

BOEING 747-200	**NEWARK NEW JERSEY, USA**	**25Sep92**	**INCIDENT**	**9203990**	**93/02**

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

RECOMMENDATION 93-01

The CAA, in consultation with the FAA and the aircraft manufacturer, should require the mandatory replacement of air duct clamps part number 7540602 with redesigned clamps to part number 7541751 on all Boeing 747 aircraft, in zones where fuel pipes are present, in order to reduce the incidence of clamp failure and possible critical secondary damage effects upon fuel, hydraulic and electrical systems.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. In response to a CAA approach the FAA has investigated the failure of the subject air duct clamps used on the Boeing 747 with the aircraft manufacturer, who has undertaken to produce a Service Bulletin describing procedures for replacing them with clamps of the type currently used in production. The CAA are seeking the cooperation of the FAA to make mandatory, by an Airworthiness Directive, the unconditional replacement of all air duct clamps of the old design in that part of the wing leading edge within each engine pylon.

CAA Action

A proposed Airworthiness Directive was published in the Federal Register on 9 December 1993. This would require replacement of identified duct clamps in the engine pylon region of the wing leading edge where fuel pipes or other systems are vulnerable. The closing date for comment was 3 February 1994. If confirmed, the AD will adequately address the Recommendation.

RECOMMENDATION 93-02

The CAA, in consultation with the FAA and the aircraft manufacturer, should actively consider requiring the mandatory replacement of air duct clamps PN 7540602 with redesigned clamps to PN 7541751 in all other locations of the Boeing 747 aircraft where such clamps are used.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation and has given consideration to it with the FAA and Boeing. Throughout the pneumatic duct system there is design provision for containing the effects of duct failure and leakage of hot air. The form of failure that is not adequately addressed is the separation of a duct clamp with sufficient force to cause damage by impact. This has been investigated by Boeing and the FAA and their conclusion is that the only region where components or systems might be damaged in a manner that could affect the safety of the aircraft is the wing leading edge within each engine pylon. Mandatory air duct clamp replacement is being sought in these areas.

CAA Action

The actions taken, or in hand, in response to Recommendation 93-01 also satisfy this Recommendation.

BOEING 747-300	**LONDON HEATHROW**	**04Dec92**	**INCIDENT**	**9204991**	**93/03**

References: Bulletin 4/93
FACTOR F11/93 dated 26Apr93

RECOMMENDATION 93-18

Emergency Stop System: The CAA should expedite their implementation of Recommendation 92-52, which stated: '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'. The CAA should include in their consultations the issues raised in Recommendations 93-16 and 93-17 (Not addressed to the CAA).

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. It began the consultative process suggested in Recommendation 92-52 in January 1993 through a representative industry Working Group (BATA, BALPA, AOA and CAA). The Working Group had already concluded, as the result of its first meeting, that its terms of reference should be widened beyond consideration only of 'emergency stop' facilities and accordingly the Authority accepts the Recommendation to consider also the further issues raised by Recommendations 93-16 and 93-17, which are directed at Heathrow Airport Limited.

CAA Action

The Authority has concluded the consultative process in Recommendation 92-52 through the agency of a representative Working Group. In the course of its deliberations the Working Group considered the issues raised in Recommendations 93-16 and 93-17 and which were directed at Heathrow Airport Limited. In the light of the Working Group's considerations, the Authority decided not to proceed with the mandatory introduction of 'emergency stop' indicating systems for self-manoeuvring stands. (See Factor F11/93). The Authority has reconvened the Working Group to look at the wider and more general questions of apron safety procedures and apron safety management systems. Safety Management issues typified by AAIB Recommendations 93-16 and 93-17 will be considered in that context. The Authority will monitor Heathrow Airport Limited's responses to Recommendations 93-16 and 93-17 through its normal regulatory interfaces with the airport licensee.

PIPER PA28-161	MANSTON	18Oct92	ACCIDENT	9204312	93/04

References: Bulletin 4/93 dated 23Mar93
FACTOR F8/94 dated 18May94

RECOMMENDATION 93-19

The CAA should draw the attention of owners and maintainers of general aviation aircraft to the potential problems associated with battery terminal connections, possibly through the medium of the General Aviation Safety and Information Leaflet (GASIL), or a similar publication.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. Issue 1/94 of the GASIL included material drawing the attention of owners and maintainers of General Aviation aircraft to the hazards of poor battery terminal connections.

RECOMMENDATION 93-20

The CAA should consider a review of the design of general aviation battery boxes in general, with particular reference to the fire potential arising from the close proximity of combustible cover materials to terminal posts and other potential sources of resistive heating.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The Authority has reviewed past incidents concerning General Aviation battery boxes and found that this PA28-161 incident is the only known one of its kind on record. FAA AD81-23-05 concerning inspection for proximity of seat springs to battery boxes mounted beneath the seats on PA28 aircraft has been highlighted in the GASIL entry as described in the response to Recommendation 93-19.

RECOMMENDATION 93-21

The CAA should take note of the manufacturer's concern in relation to aluminium battery cables in Piper aircraft and re-consider whether such aluminium should be replaced with copper cables, as called for in Piper Service Bulletin 836, of 26 August 1986.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The Authority has reconsidered whether aluminium cables should be replaced with copper cables and does not intend to require such a modification. This aspect is highlighted in issue 1/94 of the GASIL Article that advises maintenance organisations to undertake the current CAA recommended practice of carrying out regular inspections of aluminium cables and their terminations.

PIPER PA 38	LEICESTER	13Nov92	ACCIDENT	9204688	93/05

References: Bulletin 5/93
FACTOR F9/94 dated 18May94

RECOMMENDATION 93-07

The CAA should introduce a service maintenance requirement for a periodic dye penetrant inspection of the lubrication groove at the lower end of the nose leg oleo cylinder on Piper PA38 Tomahawk aircraft, in order to reduce the incidence of associated nose leg failure due to fatigue cracking initiation from the sharp radii at the base of this groove.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. In response to a request from the Authority to the FAA, Piper Aircraft Corporation has revised the PA38 Tomahawk maintenance manual (MM) to include a dye penetrant or Zyglo inspection of the nose gear strut housing after 1000 hours of operation and at each recurring 500 hour interval. If cracks are noted the complete housing would need to be replaced. The relevant MM amendment was published on 1st September 1993. The Authority has accepted the FAA advice that the MM revision is sufficient action.

AS355 TWIN SQUIRREL	LLANBEDR	08Dec92	ACCIDENT	9205078	93/06

References: AAR 1/94 dated 18Jan94
FACTOR F1/94 dated 18Jan94

RECOMMENDATION 93-33

Require, for UK registered AS355 helicopters and other types with similar design features, a positive means of retaining the UJ pivot pins that does not rely on springs.

Status – Partially Accepted – Closed

CAA Response

The Recommendation is partially accepted, fully for the AS355 and partially for other types. The AAIB report suggests that the Terry pin detachment was not the primary cause of the drive train failure. The primary cause was given as gross misalignment probably caused by deterioration of the main gearbox suspension pads. This is the subject of Recommendation 93-34.

Redesign to provide means of retaining the engine to main gearbox universal joint pivot pins that does not rely on springs would not address the primary cause of failure.

Nevertheless discussions are taking place with the constructor and the prime certificating authority (DGAC France) with a view to suitable modification action in accordance with the Recommendation.

With regard to other types the Authority, with the co-operation of other prime certificating airworthiness authorities, is reviewing the experience of types with similar design features to determine whether similar action is appropriate.

CAA Action

Eurocopter advise that they have 8.2 million flight hours experience for this type of pin retention and the G-WMPA and G-OHMS incidents are the only ones where detachment has occurred. They conclude that the pins were most probably incorrectly fitted. Further, no pin deterioration has been noted by the constructor at his repair and overhaul facility.

Eurocopter Service letter No. 1169-63-93 draws attention to a requirement for daily inspection of the pins.

Redesign to provide means of retaining the engine to main gearbox universal pivot pins that does not rely on springs would not address the primary cause of failure which was mount laminate deterioration (See Recommendation 93-34). Nevertheless discussions have taken place with the constructor and prime certificating authority, DGAC France, with a view to identifying appropriate modification action. It was concluded that design changes are not necessary.

The Authority concludes that no further measures are required.

The Authority is unaware of any other helicopter type which uses this design feature for securing universal joint pins.

RECOMMENDATION 93-34

Require, for UK registered AS355 helicopters and other types with similar design features, more frequent inspection of the MGB bi-lateral suspension system laminated pads of a type that permits adequate assessment of their condition, and require recommended inspection intervals and procedures to be clearly specified.

Status – Partially Accepted – Open

CAA Response

The Recommendation is partially accepted, fully for the AS355 and partially for other types.

For AS355 helicopters the constructor has revised the Master Servicing Recommendations (MSR) (published at the end of 1993) to require more frequent inspection of the bi-lateral suspension system laminated pads (the inspection interval of 400 hours has now been reduced to 100 hours). The associated maintenance manual (MET) inspection procedures have been revised to more clearly specify the criteria for adequate assessment of laminated pad condition.

In advance of these revisions and pending publication of the AAIB report the above actions have already been addressed by CAA Letter To Operators (LTO)1274 issued 16 March 1993 (supplemented by LTO 1191) which states:

'The CAA consider it prudent to further recommend that;

1 Main gearbox suspension laminated pads be subject to an in-situ inspection within 10 flight hours from receipt of the LTO and repeated at intervals not to exceed 100 flight hours thereafter.

Caution: The in-situ inspection is defined in paragraph 4 of MET work card 63.00.00.602. However, the Authority would draw particular attention to the requirement for examination of the full circumference of the pads which, considering the installation especially for the inboard pads, necessitates careful and close examination with torch and dental mirror or similar equipment'.

With regard to other types the Authority, with the co-operation of the prime certificating airworthiness authorities, is reviewing those with similar design features to determine whether action is appropriate.

RECOMMENDATION 93-35

Include considerations of the complexity of the aircraft and the type of operation in the criteria for:

(a) Approving use of the CAA Light Aircraft Maintenance Schedules (LAMS).

(b) Application of the CAA Mandatory Occurrence Reporting (MOR) system.

Status – Partially Accepted – Open

CAA Response

This Recommendation is partially accepted. The Authority does not accept part a) of the Recommendation in view of the impracticability of including detailed requirements in this generic schedule for all types of aircraft below 2730kg, their engines, systems, equipment and varied types of operation. Each LAMS is personalised for the individual aircraft by inclusion of the manufacturers specific maintenance recommendations.

The philosophy of the Light Aircraft Maintenance Schedule is currently under review with the relevant industry consultative bodies.

The Authority accepts part b) of the Recommendation. The Authority instituted a complete review of the criteria applicable to the Mandatory Occurrence Reporting Scheme. This review was conducted by inviting representatives of interested organisations to join a specialist Study Group. The specialist Study Group has now completed its deliberations. It is planned that further action will have been decided by the end of May 1994. When finalised, the Study Group's conclusions will be brought to the attention of the JAA, as will details of any UK action.

PITTS	CRANFIELD	09Jan93	INCIDENT	9300068	93/07

References: Bulletin 5/93
FACTOR F10/94 dated 18May94

RECOMMENDATION 93-36

The CAA/PFA should require all owners of homebuilt Pitts Special aircraft and all owners of factory-built aircraft affected by Pitts Service Bulletin No. 14 to inspect the tailplane support tubes of their aircraft in order to determine its modification state. Where the earlier standard of tube is found, it should be replaced with the later standard immediately.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. CAA AD 002-06-93 Revision 1 applies. It requires that the support tubes be inspected prior to further flight from the effective date of the Directive – 8 June 1993.

Note: If the support tube is identified as type 1-210-126 it must be replaced with support tube Part Number 1-210-166 or approved equivalent prior to further aerobatic flight or not later than 25 flight hours from carrying out the initial inspection if the aircraft is to be flown for non-aerobatic flight. If the latter case applies a placard must be installed in the cockpit, in full view of the pilot, prohibiting aerobatic flight until full compliance with CAA EAD 002-06-93 is accomplished.

AS355	NR LIVERPOOL	06Jan93	ACCIDENT	9300022	93/08

References: Bulletin 5/93
FACTOR F26/93 dated 03Dec93

RECOMMENDATION 93-37

Require for UK registered AS350 and AS355 helicopters, the fitment of a system to provide unmistakable cockpit indication to the pilot of improperly latched engine or MGB bay doors.

Status – Partially Accepted – Open

CAA Response

The Authority rejects this Recommendation as written in that it dictates a specific design solution which may not in airworthiness terms be the optimum answer to the problem. However the intent of the Recommendation is accepted in that improved indication of improperly latched engine or MGB bay doors is necessary. To this end the manufacturer in co-operation with the type certification authority (DGAC France) is currently examining

ways and means of achieving such an improvement and plan to have the design of a suitable indication system certificated towards the end of 1993. When such a system is available DGAC France will be consulted on the need for airworthiness directive action.

CAA Action

The manufacturer has developed proposals for an improved engine and main gearbox bay doors locking mechanism. It is understood that the correct engagement and locking of the bay doors is indicated by a visual indicator which can be inspected as part of the crew pre flight drills.

It is anticipated that these proposals will be approved as modifications by the middle of 1994. Consultations with the DGAC will be held to determine if mandatory fitment of the modifications is necessary as soon as the design is finalised and approved.

RECOMMENDATION 93-38

Consider requiring, for other UK registered helicopters, the fitment of such a system on doors that could constitute a flight safety hazard if not correctly latched.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. A review of the service experience on the security of doors and hatches, etc., will determine what requirement changes if any, are needed.

CAA Action

The Authority is currently carrying out the review of the security of doors and hatches on in-service helicopters.

AS332L SUPER PUMA	**CORMORANT ALPHA,NORTH SEA**	**14Mar92**	**ACCIDENT**	**9200749**	**93/09**

References: AAR 2/93 dated 27May93
FACTOR F14/93 dated 27May93

RECOMMENDATION 93-22

The current study within the CAA on the subject of cockpit workload should be given a high priority with a view to reducing the workload, in particular administrative matters, of flight crews whilst airborne or engaged in the shuttling task. Meanwhile, standard operating procedures should ensure that flight administration and flight planning must be completed, so far as is practical, before each movement takes place.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. Problems with cockpit workload in this type of operation have already been identified by the Authority and a feasibility study into the use of an aircraft mounted electronic flight planning aid is in hand. The Authority will also review standard operating procedures.

CAA Action

The subject of cockpit workload, and in particular administrative matters, is to be addressed under a CAA research programme during the Authority's current financial year, ending March 1995. Standard operating procedures have been reviewed to ensure that administrative matters are completed on the ground or during non-critical flight phases.

RECOMMENDATION 93-23

The CAA should publish an amendment to CAP 437 Chapter 5.3 – Vessel Movement, that stipulates an agreed and unambiguous method of reporting pitch and roll.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The Authority is holding discussions with interested parties in order to produce an agreed and unambiguous reporting format.

CAA Action

Following consultation with HSE, Department of Transport (Marine Directorate), UKOOA and the Helicopter Operators, the Authority issued an amendment to CAP 437 in July 1993. This was followed by an HSE Safety Notice and a Merchant Shipping Notice. The amendment was incorporated into the re-issued edition of CAP 437 in December 1993.

The text now reads:

Pitch and Roll reports to helicopters should include values, in degrees, about both axes of the true vertical datum (i.e. relative to the true horizon) and be expressed in relation to the vessel's head. Roll should be expressed in terms of 'left' and 'right'; pitch should be expressed in terms of 'up' and 'down'; heave should be reported in a single figure, being the total heave motion of the helideck rounded up to the nearest metre. Heave is to be taken as the vertical difference between the highest and lowest points of the helideck movement. The parameters reported should be the maximum peak levels recorded during the ten minute period prior to commencement of helicopter deck operations.

The helicopter pilot is concerned, in order to make vital safety decisions, with the amount of 'slope' of the landing surface and it is therefore important that the Roll values are only related to the true vertical and do not relate to any 'false' datum (i.e. a 'list') created, for example, by anchor patterns or displacement.

A standard radio message reporting format has also been included which is designed to include the above information on helideck movement in an unambiguous format for transmission to helicopters.

RECOMMENDATION 93-24

The CAA should discuss with helicopter operators the safety benefit of raising the AVAD fixed height warning to a more appropriate height for existing minimum descent heights.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. However changes to the simple AVAD system will be handled cautiously so that there is no significant increase in the number of nuisance warnings.

CAA Action

The Authority has discussed with helicopter operators any potential safety benefit of raising the AVAD fixed height warning, but it has been rejected since the unanimous view is that it will lead to an unacceptable increase in nuisance warnings.

RECOMMENDATION 93-25

In further pursuance of the HARP Recommendation No 1, the CAA should commission a study into 'human error' helicopter accidents. The study should include recommendations for programmes of research and co-ordination of the industry's effort. The possibility of international collaboration should also be examined.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. In 1986 the Authority established a helicopter human factors working group and its report was published in July 1987 (CAA Paper 87007). However the Authority accepts that it would now be appropriate to commission a further study into human error in helicopter accidents. In determining the most appropriate form of the study, advice will be sought not only from specialists in aviation human factors but from a number of organisations who have relevant expertise and have applied this expertise in a variety of industries for the purpose of improving safety.

RECOMMENDATION 93-26

The CAA should consider amending certification requirements for public transport helicopters operating over the sea to include a suitable system for manual and automatic inflation of emergency hull flotation equipment and that this requirement should also apply to helicopter types currently in service.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. A comparison will be made of the safety benefits and disadvantages which are likely to arise if automatically inflatable flotation equipment was to be installed on a helicopter. If a net safety benefit is established then changes to the relevant airworthiness requirements will be proposed.

CAA Action

This issue has been included in the Review of Helicopter Offshore Safety and Survivability which is being conducted in response to Recommendation 93-30.

RECOMMENDATION 93-27

The CAA should re-examine their response to the AAIB Recommendation made in Aircraft Accident Report 9/88 with a view to the urgent modification of AS 332L cabin doors so that they can be jettisoned when the helicopter is not upright.

Status – Fully Accepted – Closed

CAA Response

The Authority has re-examined the responses made to Recommendation 4.4 of AAIB report 9/88. The Authority has concluded that the initial response and subsequent actions being taken in response to that Recommendation were, and remain appropriate. (CAA Responses to Air Accidents Investigation Branch Safety Recommendations – Progress Report 1992 (CAP 607) pages 6 and 7). In arriving at this conclusion the Authority has reviewed the circumstances of the more recent accident and can find nothing to suggest that a non upright jettison capability for the main cabin doors would have contributed to occupant survival.

RECOMMENDATION 93-28

The CAA should issue guidance to SAR operators on the need for suitable head protection to be worn by winchmen engaged in SAR operations.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. The Authority already requires anyone who is being raised or lowered from a Public Transport helicopter to wear protective headgear. Similar guidance will be issued to Search and Rescue operators who are not involved in public transport operations.

CAA Action

The Authority has issued guidance to all SAR operators on the need for a suitable head protection to be worn by winchmen engaged on SAR operations.

RECOMMENDATION 93-30

The CAA, in consultation with the offshore oil industry and other appropriate bodies such as the HSE, should re-assess offshore helicopter passenger safety and survivability in normal operating conditions using the concept of an integrated escape and survival system in order to promulgate such regulations as are necessary to achieve it; such an assessment should be made against both a controlled ditching and an uncontrolled crash into the sea where the helicopter inverts and sinks almost immediately.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. The Authority will set up a review body to consider the concept of helicopter passenger safety and survivability in normal conditions, as an integrated system. The review body will include representatives of Government Agencies, Medical Institutions, Research Organisations, and the North Sea Operators.

CAA Action

The Authority has set up a steering group to manage a Review of Helicopter Offshore Safety and Survivability (RHOSS) to respond to this recommendation. The Steering Group has an independent chairman (Air Vice Marshall B Huxley CB, CBE) and includes representatives nominated by British Helicopter Advisory Board, the Civil Aviation Authority, the Health and Safety Executive, the Institute of Aviation Medicine, the Society of British Aerospace Companies and the United Kingdom Offshore Operators Association. The findings are expected at the end of 1994.

RECOMMENDATION 93-32

The CAA should consider inviting Ministry of Defence helicopter specialists to join an appropriate group, such as the Helicopter Management Liaison Committee, with a view to further the exchange of operating experience.

Status – Rejected – Closed

CAA Response

The Authority considers that adequate facilities for exchanges of operating experience already exist. The Helicopter Airworthiness Review Panel (HARP) Report recommended in 1984 'that the CAA should discuss with the Ministry of Defence the setting up of some sort of formal collaboration on helicopter matters; this should include consideration of the development of safety requirements and the exchange of appropriate in-service information'. Collaboration on research and development already exists. An exchange of information, both operational and airworthiness, has existed for several years through the Occurrence Reporting System. The Authority and the Helicopter Management Liaison Committee consider therefore that the present channels for the exchange of information with the Ministry of Defence are sufficient and satisfactory. Accordingly the Authority does not accept this Recommendation.

L1011 TRISTAR	FRANKFURT	09Mar92	ACCIDENT	9200726	93/10

References: AAR 3/93 dated 09Jun93
FACTOR F15/93 dated 09Jun93

RECOMMENDATION 93-39

It is recommended that the CAA require, when an aircraft in an emergency situation is required or requested to divert to an airfield other than that at which the commander has elected to land, he should be apprised of the reason for that requirement or request.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. An amendment to the Manual of Air Traffic Control Part I published in June 1993 ensures that, whilst stressing that an aircraft commander has the ultimate responsibility for the safety of his aircraft, when a message is passed by ATC requesting or requiring that an aircraft in an emergency situation is diverted to an airfield other than that at which the commander has elected to land, the message shall include the reason for that request or instruction.

RECOMMENDATION 93-40

It is recommended that the CAA take action to advise the appropriate agencies that when selecting the route for an aircraft in an emergency the avoidance of densely populated areas should be a primary consideration; when appropriate, and subject to the agreement of the aircraft commander a diversion to an alternate runway or airfield should be considered.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. An amendment to the Manual of Air Traffic Control Part I published in June 1993 incorporates advice to controllers to ensure that routes selected for aircraft in an emergency situation will take into account the desirability of such aircraft remaining clear of densely populated areas. However, the amendment will stress that the ultimate responsibility for the safety of the aircraft rests with the aircraft commander whose agreement must be obtained before any re-routing or diversion to an alternate runway or airfield occurs.

BOEING B757-200	**NR.LONDON HEATHROW**	**23Jan93**	**INCIDENT**	**9300187**	**93/11**

References: Bulletin 8/93
FACTOR F6/94 dated 27May94

RECOMMENDATION 93-41

The CAA in conjunction with the FAA and associated manufacturers, should review the need to display an EICAS REV amber message to the crew of Boeing 757 aircraft, in flight, when this is activated by only one of the two lock actuator sensors fitted to each engine, and actively consider upgrading the status of the message to a CAUTION, or WARNING, should two sensors on any one engine indicate both lock actuators unlocked in flight.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation and has written to the FAA (2 Sept 93) with a proposal that the indication logic be revised such that the current EICAS REV amber message only appears when the aircraft is on the ground. To date no formal reply has been received but CAA is aware that there have been discussions between FAA and the manufacturer and that the indication logic is likely to be changed as proposed. This would be in accordance with the CAA view that thrust reverser unlock indication in flight serves no useful purpose and is not a safety issue.

RECOMMENDATION 93-42

The CAA should review, in conjunction with the FAA and associated manufacturers, the design of the lock/unlock indication system on Boeing 757 aircraft in relation to the present Maintenance Manual proximity sensor rigging instructions in view of their evident inability to prevent associated false warnings.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. In view of the action taken in response to Recommendation 93-41 and the likelihood of the EICAS REV message becoming functional only on the ground, in flight false warnings will no longer occur. Providing that the indication logic is changed as proposed no further action in respect of this Recommendation will be necessary.

PIPER PA34	**BLACKBUSHE**	**05Mar93**	**INCIDENT**	**9300604**	**93/12**

References: Bulletin 8/93
FACTOR F27/93 dated 03Dec93

RECOMMENDATION 93-45

The CAA should require the implementation of SB872 on a repetitive basis in order to ensure that the interlocking of the lock and latching arrangements remain effective.

Status – Rejected – Closed

CAA Response

The Authority does not accept this Recommendation for the following reasons:

1 The Operator's Operations Manual requires the following pre-flight check to be carried out:

'Front fuselage' – item 4 Luggage Hatch – Check (locked key slot horizontal).

2 The pre-flight checks in the Aircraft Flight Manual and the (LAMS) Check A, all identify a requirement for the Baggage Hatch to be secure and locked.

3 The LAMS 50, 150 and Annual Checks all require an inspection of the satisfactory operation of latching and locking for the subject hatch. The requirement is also clearly iterated in the Piper PA34-200T Manufacturers Maintenance Programme.

4 In addition to the foregoing, the FAA issued AD88-04-05 which called up Service Bulletins to ensure positive locking of the subject hatch by modification.

5 Inspection of the locking system by both the AAIB and a Surveyor from the Heathrow Regional Office found that the lock was worn to a point of being totally unserviceable.

6 The pilot's pre-flight inspection of the baggage hatch was rendered void by virtue of the hatch being subsequently re-opened by the ground handler.

It is concluded that adequate maintenance activities, applicable to the subject hatch locking arrangements, had been promulgated. Had reasonable note of the condition of the lock been taken prior to the flight by the pilot and at previously certified 50/150 hour inspections, there is reasonable certainty the incident would not have occurred.

Although the Authority does not accept the AAIB Safety Recommendations for the above reasons, it is accepted that the incident reflects a need to emphasise to Operators and Maintenance Organisations that Operators, Manufacturers and CAA requirements must be observed.

The question of door/hatch locking is not confined to Piper aircraft and extends across a broader range of general aviation aircraft. In view of this, an Aircraft Maintenance Standards Department Circular will be raised requesting Regional Managers to implement, as a matter of priority, a campaign to draw the attention of maintenance contractors and individual licensed aircraft engineers in their regions, who are involved with the maintenance of General Aviation aircraft, the importance of complying with aircraft manufacturers requirements in respect of doors and hatches. Additionally an appropriate entry has been made in the CAA General Aviation Safety Information Leaflet (GASIL).

RECOMMENDATION 93-46

The CAA should require periodic checks of the latching mechanism to ensure that the external markings align accurately when the door mechanism is correctly latched.

Status – Rejected – Closed

CAA Response

The Authority does not accept this Recommendation for the same reasons given to Recommendation 93-45 above.

PIPER PA34	SHOREHAM	30Apr93	ACCIDENT	9301275	93/13

References: Bulletin 8/93 dated 04Aug93
FACTOR F11/94 dated 01Jun94

RECOMMENDATION 93-43

The CAA should expedite a review of the requirements of AD 002-01-88 with particular reference to the methods of the required inspection, its periodicity in terms of calendar time and flying time, and associated requirements for re-protection of the affected area of Piper PA-34 Seneca and PA-44 Seminole aircraft landing gear leg housings, with a view towards limiting the rate of associated gear leg failures. (Issued 21 July 1993).

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. An amendment to AD 002-01-88 covering this Recommendation has been prepared. However, CAA comments have also been submitted on an FAA NPRM (Docket 93-CE-58-AD) issued in January 1994 that proposes an AD to address this situation with a view to making CAA Additional Directive action unnecessary.

CESSNA 172	FIRTH OF FORTH	02Apr93	ACCIDENT	9300974	93/14

References: Bulletin 8/93
FACTOR F28/93 dated 30Dec93

RECOMMENDATION 93-44

In accordance with the manufacturer's recommendation (SB 480), and therefore the LAMS schedule, the CAA should emphasise to all relevant personnel that Cessna 172 aircraft, fitted with 0-320 H series engines which have pressure screen type filters, are to be subject to engine oil changes/filter inspection (together with oil additive renewal) at periods no greater than 25 hours, or four months, whichever occurs sooner, and that all direct drive engines are subject to a maximum period of four months between oil changes/filter inspection, irrespective of filter type.

Status – Fully Accepted – Open

CAA Response

The Authority has emphasised to all relevant personnel the differing requirements of Lycoming Service Bulletin 480. Because engine oil changes are permitted to be undertaken by both pilots and engineers, this has been done by way of an entry in the General Aviation Safety Information Leaflet (GASIL). Additionally, CAP 411 and 412 Light Aircraft Maintenance Schedules have been reviewed with regard to oil change requirements and changes were incorporated in April 1994.

JETSTREAM 32	PRESTWICK	21Jun92	ACCIDENT	9204093	93/15

References: Bulletin 11/93
FACTOR F3/94 dated 26Jan94

RECOMMENDATION 93-55

It is recommended that British Aerospace (Jetstream Aircraft Ltd.) review their Manufacturer's Operating Manual, Aircraft Flight Manual and associated flight training publications, to ensure that they reflect the importance of maintaining an acceptable level of Flight Idle torque during asymmetric power flight training exercises. The associated material should also be reviewed, in order to ensure that all pilots are aware of the possible adverse effects of incorrect Flight Idle power settings on aircraft handling and performance characteristics, especially those associated with McCauley propeller equipped Jetstream 32 aircraft. These effects, and their prevention, should be clearly noted as guidance to Training Captains in the appropriate section of the Manufacturer's Operating Manuals. The review should also consider, in consultation with the Civil Aviation Authority, the possible benefits of applying increased safety margins to the aircraft speeds associated with these exercises.

Status – Fully Accepted – Open

CAA Response

The Authority fully accepts this Recommendation addressed mainly to British Aerospace (Jetstream Aircraft Ltd). However, the Authority will act in consultation with British Aerospace to consider the possible benefits of applying increased safety margins to the aircraft speeds associated with asymmetric power flight training exercises.

CAA Action

Work is in hand with the Authority working in consultation with British Aerospace to consider the possible benefits of applying increased safety margins to the aircraft speeds associated with asymmetric power flight training exercises.

RECOMMENDATION 93-56

In view of the relatively high proportion of accidents and incidents associated with the training and testing of pilots under conditions of simulated asymmetric power, as compared with those occurring as a result of any real engine failure on take-off and initial climb, it is recommended that the Civil Aviation Authority continue to positively encourage the development and use of flight simulators, rather than aircraft, for initial and recurrent training in asymmetric power exercises, on all Public Transport Aeroplanes classified as Aeroplanes of Performance Group A in their Certificates of Airworthiness.

Status – Partially Accepted – Closed

CAA Response

The Authority partially accepts this Recommendation and will continue to positively encourage the development and use of flight simulation in all areas where the actual aircraft can be replaced by a realistic simulator. This will be regardless of the aircraft's Performance Classification.

However, the Authority does not accept that, within the UK, there is a relatively high proportion of accidents and incidents associated with the training and testing of pilots under conditions of simulated asymmetric power. Although crews train for the worst possible circumstances, an analysis of the Authority's SDAU database indicates there has been a low number of accidents compared to the large number of training flights undertaken. This demonstrates the value of such training.

THRUSTER MICROLIGHT	**SANDOWN**	**27Jun93**	**ACCIDENT**	**9302061**	**93/17**

References: Bulletin 11/93
FACTOR F12/94 dated 01Jun94

RECOMMENDATION 93-58

The CAA and the BMAA should review the strength of landing gear components on the Thruster and similarly configured microlight aircraft with a view to ensuring that damaging loads cannot be transmitted into critical parts of the aircraft structure as a result of associated ground contact forces, as required by BCAR Section 'S' which states 'Tail wheel and skids shall be weaker than the aeroplane structure to which they are attached.'

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation for Thruster Microlight types with reduced length rear fuselage braces (modification TUKM 001) embodied. Since the original issue of BCAR Section S, the requirement has specified that it should not be possible for damaging loads to be transmitted into the critical structure, and as there is no evidence that other tailwheeled types are at risk, a review of the Thruster design only will be undertaken by CAA/Tempest Aviation with the aim of completion within 3 months.

PIPER PA31	**BRISTOL LULSGATE**	**08Jul93**	**ACCIDENT**	**9302282**	**93/18**

References: Bulletin 12/93 dated 08Dec93
FACTOR F13/94 dated 01Jun94

RECOMMENDATION 93-61

The CAA should consider amendment of the Piper PA31 Maintenance Schedule to require renewal of the landing gear operating cable at fixed intervals, to preclude the fatigue failure of such cables.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. The Authority has considered amendment of the Piper PA31 Maintenance Schedule. However, as only aircraft certificated in the Transport Category are required to be maintained to an approved Maintenance Schedule, the Authority decided to publish Letter to Owners/Operators No 1317, which will encompass all Piper PA31 owners and operators. The Letter recommends replacement of the landing gear selector cable assembly at a life of 5000 hours or at the next Annual (Check 3) Inspection, whichever is the sooner. The Manufacturer and FAA have been informed of this action and their comments are awaited.

AIRBUS A320	**LONDON HEATHROW**	**03Oct93**	**ACCIDENT**	**9303481**	**93/19**

References: Bulletin 12/93 dated 08Dec93
FACTOR F7/94 dated 24May94

RECOMMENDATION 93-64

In order to prevent separation of the outer skins of overwing exit escape slide door panels on Airbus A320 aircraft the CAA, DGAC and the aircraft manufacturer should introduce a regular inspection requirement to detect delamination of outer skins from associated door panels, part numbers D36153-101 and D36153-102.

Status – Fully Accepted – Closed

CAA Response

The Authority accepts this Recommendation. Airbus Industrie is preparing a Service Bulletin that will require inspection of the door for delamination and the embodiment of the retrofit repair.

AIRBUS A320	LONDON HEATHROW	13Dec92	INCIDENT	9205125	93/20

References: Bulletin 12/93 dated 08Dec93
FACTOR F4/94 dated 26Jan94

RECOMMENDATION 93-62

It is recommended that the CAA liaise with the DGAC in order to confer mandatory status on the Service Bulletin, CFM SB 80-003, which provides for rework of the air turbine starter on CFM56-5 engines. (Issued 23 November 1993).

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation and will liaise with DGAC (France) with a view to classifying Service Bulletin CFM SB 80-003 as Mandatory.

CAA Action

The Authority is currently discussing this subject with DGAC to determine whether DGAC will raise an AD or whether it will be necessary to raise a CAA Additional Airworthiness Directive.

The majority of CFM 56-5 engines fitted to aircraft on the UK register have been reworked to CFM SB80-003.

Those not yet reworked are scheduled to be modified in the next few months.

RECOMMENDATION 93-63

It is recommended that the CAA liaise with the DGAC and review, for the CFM56-5 engine design, the protection from fire and overheat afforded to the Engine Control Unit (ECU) and the associated wiring harnesses. (Issued 23 November 1993).

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation and will review, with DGAC (France), the fire and overheat protection provided to the Engine Control Unit and associated harness.

CAA Action

The Authority has initiated an internal review of the information submitted by CFMI for engine validation. The results of the review will be discussed with DGAC and any necessary actions taken in conjunction with DGAC.

FOKKER F27	**EDINBURGH AIRPORT**	**11Mar93**	**ACCIDENT**	**9300671**	**93/21**

References: Bulletin 1/94 dated 07Jan94
FACTOR F14/94 dated 24May94

RECOMMENDATION 93-76

It is recommended that the Civil Aviation Authority established 'Working Group' should progress with urgency their consideration of apron safety with a view to recommending a set of requirements/criteria for the management and operation of airport apron areas to be published by the CAA, thereby providing a standard against which apron operations will be audited and monitored. The CAA should also aim, in consultation with the HSE, to establish clear divisions of responsibility for the safe conduct of apron activity.

Status – Fully Accepted – Open

CAA Response

The Authority accepts this Recommendation. The Working Group has held five meetings so far, has an agreed agenda and timetable for future work and has completed its self-imposed task of briefing and information gathering. A Notice to Aerodrome Licence Holders (NOTAL No.1/94) was circulated in May 1994 to industry outlining the Working Group's initial conclusions on apron problem areas and possible solutions. It will continue to meet frequently over forthcoming months. The HSE has attended a meeting of the Working Group and a separate meeting has been held with the HSE's National Interest Group (NIG) on Aviation. A continuing dialogue is planned. The Authority addressed an HSE seminar on aviation issues, and specifically apron issues, on 18 May of this year. The development of comprehensive requirements and criteria for use as outline or detailed guidance for eventual incorporation into airport safety management systems acceptable to the HSE will need careful and thorough development. The Authority will progress this work as quickly as it can, given that it is being handled by a representative group drawn from all relevant sectors of the industry.

Index

Aircraft Type	*Location*	*Date*	*Incident/ Accident*	*Serial No.*	*Occurrence No.*	*Page*
PART 2 – AAIB RECOMMENDATIONS RECEIVED DURING 1993						
Piper PA28-161 Warrior	Oxford	12Jul92	Accident	9202724	92/21	34
BAe 146-300	Aberdeen Airport	31Mar92	Incident	9200952	92/32	36
Tiger Moth	Tibenham	21Nov92	Accident	9204765	93/01	37
Boeing 747-200	Newark New Jersey, USA	25Sep92	Incident	9203990	93/02	38
Boeing 747-300	London Heathrow	04Dec92	Incident	9204991	93/03	39
Piper PA28-161	Manston	18Oct92	Accident	9204312	93/04	40
Piper PA 38	Leicester	13Nov92	Accident	9204688	93/05	41
AS355 Twin Squirrel	Llanbedr	08Dec92	Accident	9205078	93/06	41
Pitts	Cranfield	09Jan93	Incident	9300068	93/07	44
AS355	Nr Liverpool	06Jan93	Accident	9300022	93/08	44
AS332L Super Puma	Cormorant Alpha, North Sea	14Mar92	Accident	9200749	93/09	45
L1011 Tristar	Frankfurt	09Mar92	Accident	9200726	93/10	49
Boeing B757-200	Nr London Heathrow	23Jan93	Incident	9300187	93/11	50
Piper PA34	Blackbushe	05Mar93	Incident	9300604	93/12	51
Piper PA34	Shoreham	30Apr93	Accident	9301275	93/13	53
Cessna 172	Firth of Forth	02Apr93	Accident	9300974	93/14	53
Jetstream 32	Prestwick	21Jun92	Accident	9204093	93/15	54
Thruster Microlight	Sandown	27Jun93	Accident	9302061	93/17	55
Piper PA31	Bristol Lulsgate	08Jul93	Accident	9302282	93/18	55
Airbus A320	London Heathrow	03Oct93	Accident	9303481	93/19	56
Airbus A320	London Heathrow	13Dec92	Incident	9205125	93/20	57
Fokker F27	Edinburgh Airport	11Mar93	Accident	9300671	93/21	58