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14 December 2000

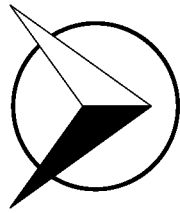
CASA NPRM 0011CS - SKYFOX CA25 AEROPLANES SCAT/SCEET HOSES.

Following this is the subject NPRM (Notice of Proposed Rule Making) for the Scat/Sceet Hose issue raised in the May 1999 AUF Magazine which arose from a Skyfox accident in Queensland. This NPRM will result in an Airworthiness Directive which will have an impact on AUF Aeroplanes.

I have removed some of the "intentionally blank" pages from the CASA document to reduce download size and recommend those with Skyfoxes read it and pass any comment to either CASA or to me in the AUF for onforwarding. I would like to see all comments as they might be worth passing to the membership.

A copy of the AUF Magazine article can be viewed on the AUF Airworthiness page under the heading General Information and Airworthiness Wisdom: Scat/Sceet Hoses

R Hewitt-Cook
Technical Manager



CIVIL AVIATION
SAFETY AUTHORITY
AUSTRALIA

Notice of Proposed Rule Making
NPRM 0011CS

**Airworthiness Directive for
Skyfox Aviation CA25 Series
Aeroplanes**

Civil Aviation Regulation 1998 (CAR) 39

Who this NPRM applies to:

[It is anticipated that this proposal will have a direct impact on the following groups in the aviation community:]

Aircraft maintenance organisations, aircraft owners, LAMEs and aircraft operators.

Issued as part of the process of public consultation by CASA's Standards Coordination and Support Branch

December 2000



INTRODUCTION

The 1996 CASA investigation of a number of Pilatus Britten-Norman BN-2 Islander engine power loss events focussed on the flexible hoses used as engine air intake ducts. CASA technical specialists contacted HRD Thermoid Industries, manufacturers of Aeroduct SCAT and SCEET hoses. Advice from the hose manufacturer was that; Aeroduct SCAT and SCEET hoses are not approved for negative pressure applications.

AD/BN-2/57 ENGINE AIR INTAKE HOSE was issued on 24 January 1996 to require inspection and replacement of defective air intake hose(s). This was also the subject of Pilatus Britten-Norman Service Bulletin No BN-2/SB.95 Issue 4, made mandatory by the United Kingdom (UK) Civil Aviation Authority (CAA).

CASA was aware of some Civil Aviation Regulation (CAR) 35/36 authorised persons approving the use of Aeroduct SCAT or SCEET hoses as replacement components for an original aircraft manufacturer's Illustrated Parts Catalogue (IPC) listed hose. CASA was also aware of at least one Australian aircraft manufacturer incorporating Aeroduct SCAT hose as an engine air intake duct in an aircraft design.

CASA responded in 1996 by the issue of advice to CAR 35/36 authorised persons and Australian light aircraft manufacturers. CASA also published an advisory article on SCAT/SCEET hoses in a 1996 edition of the CASA Flight Safety magazine. A review of Australian defect reports since 1996 suggests that, with one exception, the Australian aviation industry has responded to the CASA advice.

However, investigation of a recent Skyfox accident concluded that the primary cause of the accident was failure of an Aeroduct SCEET engine air intake hose. A review of past Major Defect Reports disclosed 3 reports of Skyfox SCAT/SCEET engine intake hose failures. The cause of the accident and reported failures is considered to be, in part, the use of commercially available Aeroduct SCAT or SCEET flexible hose as an engine intake duct.

An Airworthiness Directive (AD) is therefore proposed to require Skyfox engine intake hoses to be inspected for condition and specification of the hose. Where the hose is inappropriate for the purpose, the hose is to be replaced with a hose approved for the purpose by a CAR 35 authorised person. A copy of the proposed Airworthiness Directive is attached as Annex A.

Comments are invited on the proposals in this NPRM, the closing date for which is **19 February 2001**. After taking all submissions and responses into consideration, a Summary of Responses (SOR) will be published together with the CASA evaluation of each comment (or categorised comments). The SOR will be published at the time CASA publishes the proposed AD.



I would like to thank you for expressing interest in this proposal, and wish to emphasise that no rule changes will be taken until all responses and submissions have been considered.

A handwritten signature in black ink, appearing to read 'Richard G Yates', written in a cursive style.

Richard G Yates
Assistant Director
Aviation Safety Standards

11 December 2000



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TERMINOLOGY

AD	Airworthiness Directive
AUF	Australian Ultralight Federation
CAA	Civil Aviation Authority
CAR	Civil Aviation Regulation
FAR	Federal Aviation Regulation
IPC	Illustrated Parts Catalogue
UK	United Kingdom



THE PROPOSAL

1. Problem/Issue

1.1 Since December 1996, there have been 4 reported Skyfox engine power loss events attributed to defective engine air intake hoses. The most recent occurred in March 2000. That aircraft was fitted with "SCEET" hoses. The issue of concern is that; neither "SCAT" or "SCEET" hoses are approved by the hose manufacturer, HRD Thermoid Industries, for use in negative pressure applications.

1.2 Incorporating a SCAT/SCEET type of hose into a piston engine air intake duct system, contrary to the hose manufacturer's specifications, exposes that hose to conditions for which it has not been designed. Those conditions include:

1.2.1 **Negative pressure:** Induction airflow combined with the slight restriction of airflow across an air filter results in a negative pressure between the carburettor and the air intake filter: Any loss of bonding between the hose material and the supporting helix wire can result in the wire being displaced, exposing the material to a level where the hose can collapse blocking intake air flow.

1.2.2 **Environment:** The aircraft manufacturer, when designing an aircraft, has to consider the ability of parts used in the aircraft to withstand environment related factors. Engine intake hoses must be resistant to air contaminated with salt or industrial pollution. Salt or chemical contamination can result in corrosion developing on the wire helix which can then result in loss of bonding to the fabric. When this happens, the wire helix spacing can be lost and the hose collapses. Not all "SCAT/SCEET" type hoses have helix wires that are protected against corrosion.

1.2.3 **Fuel tolerance:** Piston engine intake hoses can be sprayed/flooded with fuel in service when an event such as a failed engine start attempt results in flooding of the air intake or the engine backfires for whatever reason. The material used in an engine air intake hose must be tolerant of fuel. That tolerance must be in consideration of the expected hose time in service.

1.2.4 **Hose inner liner:** A SCEET hose differs from a SCAT hose in that a SCEET hose has a liner inside the helix wire. SCEET hoses are not suitable for an engine air intake, despite the apparent benefits of the inner liner. Whilst the inner liner results in less air friction losses, the inner liner represents a potential intake airflow blockage situation if the liner separates from the outer material or helix wire.

2. Objective

2.1 The objective of the proposed AD is to enhance the reliability of operation of the engine installed in the Skyfox aircraft.



3. Options considered

3.1 As an alternative to requiring the replacement of hoses which do not satisfy the criteria detailed in Section 1 of this proposal, options considered were:

- a) Redesign of the engine air intake to incorporate a flexible induction system satisfying the requirements of Federal Aviation Regulation (FAR) 23.1103; or
- b) A repetitive engine air intake hose removal and inspection procedure to be carried out at intervals as necessary to ensure the integrity of the engine intake; or
- c) A life limit to be placed on engine air intake hoses to ensure the integrity of the engine intake.

3.2 Option (a): The manufacturer, Skyfox Aviation, was advised in 1996 of the problem and requested to develop a corrective design solution. Unfortunately, a response was not received prior to the de-registration of Skyfox Aviation.

3.3 Options (b) and (c) were dismissed as not satisfying the primary cause of concern (i.e. the use of a flexible hose not approved for the purpose by the hose manufacturer and the difficulty of determining an effective maintenance period to ensure the integrity of the engine intake).

4. Impact Analysis of Options

Persons affected

4.1 The persons affected by the proposal are as follows:

- Skyfox aircraft owners;
- Skyfox aircraft operators such as flying training schools;
- Maintenance organisations maintaining Skyfox aircraft;
- Industry engineers approved as CAR 35/36 authorised persons; and
- Third parties who could be affected by lack of engine reliability.

Effect on existing regulation

4.2 Nil.

Expected impact (benefits or costs) and persons affected

4.3. There are approximately 70 Skyfox aircraft currently on the Australian Register. In addition to aircraft on the Australian Register, there are approximately 80 Skyfox aircraft registered with the Australian Ultralight Federation (AUF). The proposed AD would only be applied to aircraft on the Australian Register. The AUF has been informed of the potential unsafe condition and has already issued a direction to AUF members on this subject.



4.4 The cost of initial inspection is estimated to be less than \$100. The cost of approval and purchase of replacement hoses is less than \$500 per engine. The total cost for implementation of the Directive would therefore be about \$35,000.

4.5 Since 1996, there have been 4 reported Skyfox engine intake hose failure related events. One of the events resulted in a major accident. The Bureau of Transport Economics Report 98 Cost of Civil Aviation Accidents and Incidents, Table 6.2, shows that accidents in Business/private, Charter, Training, and other Aerial Work, average a cost to the community of \$425,500 each. Therefore, based on 4 events in the 4 years since 1996 and one of those events resulting in an accident, the implementation of this Directive to preclude further Skyfox engine intake hose failure related events has the potential to save the community \$425,500 every four years.

Effect on the environment by implementing this proposal

4.6 Nil.

Compliance

4.7 Concern for the airworthiness of Skyfox aircraft currently in service, requires compliance with the proposed Directive within 50 hours or 1 month time in service, whichever occurs first, from the effective date of the Directive.

5. Consultation

5.1 This NPRM is the result of discussions with:

- a) CASA engineers involved in the certification of Skyfox aircraft;
- b) A CAR 35 authorised person involved in the certification of Skyfox aircraft;
- c) A maintenance organisation experienced in the maintenance of Skyfox aircraft;
- d) Technical Manager, AUF;
- e) HRD Thermoid Industries; and
- f) Aviaquip Victoria (distributor of Flexfab flexible hoses).



HOW TO SUBMIT COMMENTS ON THIS NPRM

In order to simplify collation and summarising of comments, responses should be made on the Response Sheet provided (see page 11) or a copy of the sheet, with additional comments attached as necessary.

Written comments quoting *NPRM 0011CS* should be forwarded by **19 February 2001** to CASA's Standards Coordination and Support Branch, by one of the following means:

Post (no stamp required)

Reply Paid 744,
Regulatory Documentation Coordinator,
Coordination and Support Branch,
Aviation Safety Standards,
GPO Box 2005,
CANBERRA ACT 2601

E-mail: NPRM_ADCA25@casa.gov.au

Fax (free call) 1800 653 897

Additional information is available from:

Les Lyons

Certification Standards Branch

Post: Reply Paid 744, GPO Box 2005, Canberra City ACT 2601

Email: lyons_l@casa.gov.au

Telephone: 02 6217 1825 or 131 757 (for the cost of a local call)

Fax (free call) 1800 653 897



Disposition of comments received

Subsequent to the closing date for comments, a Summary of Responses will be prepared, and made publicly available in conjunction with the making of the AD.

CASA will not acknowledge or respond to comments or submissions individually. However, the names of all contributors will be acknowledged in the Summary of Responses unless CASA is specifically requested not to do so.



NPRM RESPONSE SHEET

Airworthiness Directive for Skyfox Aviation Aircraft

Please respond by *19 February 2001* by posting this page or e-mailing the details to the addresses provided on page 10 of this NPRM, or by faxing it to 1800 653 897.

Please indicate your acceptance or otherwise of the proposal by ticking [] the appropriate box below.

Any additional constructive comments, suggested amendments or alternative action will be welcome and may be provided on this response sheet or by separate correspondence.

*The proposed AD is **acceptable as presented, without any changes.***

*The proposed AD is **acceptable but would be improved if the following changes were made:***

*The proposed AD is **not acceptable but would be acceptable if the following changes were made:*** (Please provide explanatory comment).

*The proposed AD is **not acceptable under any circumstances.*** (Please provide explanatory comment).

Your name: _____

Organisation: _____

Address: _____

Consent to publish your name as a respondent to this NPRM: YES NO

Signed:

Date:



ANNEX A

Proposed Airworthiness Directive Skyfox Aviation (HEDARO) CA 25 Series Aeroplanes



Proposed Airworthiness Directive

AIRWORTHINESS DIRECTIVE

For the reasons set out in the background section, the CASA delegate whose signature appears below issues the following Airworthiness Directive (AD) under subregulation 39.1 (1) of CAR 1998. The AD requires that the action set out in the requirement section (being action that the delegate considers necessary to correct the unsafe condition) be taken in relation to the aircraft or aeronautical product mentioned in the applicability section: (a) in the circumstances mentioned in the requirement section; and (b) in accordance with the instructions set out in the requirement section; and (c) at the time mentioned in the compliance section.

SKYFOX AVIATION (HEDARO) CA 25 SERIES AEROPLANES

AD/CA25/ ENGINE AIR INTAKE HOSES **/2000

Applicability: CA21, CA22, CA22A, CA22A/25, CA25, CA25N aircraft other than aircraft operated in accordance with Civil Aviation Orders, Part 95, Sections 95.10, 95.25 and 95.55.

Requirement 1: (a) Remove both engine air intake hoses and inspect hoses internally and externally for fabric, helix wire and attachment cuff condition, and
(b) inspect both engine air intake hoses for evidence of the hose manufacturer's identification and hose specification.

Requirement 2: Replace engine intake hoses with hoses approved for the purpose by a CAR 35/36 authorised person when it is established that the installed hose:
(a) Is not airworthy; or
(b) The hose manufacturer or hose specification cannot be identified; or
(c) The hose is not approved by the hose manufacturer for negative pressure applications.

Note: Aeroduct "SCAT" and "SCEET" hoses are not approved by the hose manufacturer HRD Thermoid Industries for use in negative pressure applications.

Compliance: Requirement 1: Within 50 hours time in service or 1 month from the effective date of this Directive, whichever occurs first, and thereafter at intervals not to exceed 50 hours time in service until Requirement 2 of this Directive is carried out.

Requirement 2: (a) Prior to further flight.
(b) Prior to 30 June 2001.
(c) Prior to 30 June 2001.

This Airworthiness Directive becomes effective on XX XX 2001

Background: This Directive has been issued to require the engine air intake hoses be inspected for evidence of condition and conforming to the hose manufacturer's specifications. The requirement follows the initial findings of the investigation of a March 2000 accident involving a Skyfox aircraft. The investigation of that accident and 3 previous Skyfox engine power loss incidents disclosed that the prime cause of the accident, and the incidents, to be defective engine air intake hoses.

HOW TO SUBMIT COMMENTS ON THIS NPRM

Written comments quoting *NPRM 0011CS* should be forwarded by 12 February 2001, to CASA's Standards Coordination and Support Branch, by one of the following means:

Post (no stamp required) Reply Paid 744,
Regulatory Documentation Coordinator,
Coordination and Support Branch,
Aviation Safety Standards,
GPO Box 2005,
CANBERRA ACT 2601

E-mail NPRM_ADCA25@casa.gov.au

Fax (free call) 1800 653 897

Inquiries can also be sent to the address above, or by telephoning the Project Manager, Les Lyons, on 02 6217 1825 (international +61 2 6217 1825) during Australian east coast business hours or 131 757 for the cost of a local call.