Federal Public Service
Mobility and Transport
Air Accident Investigation Unit

Air Accident Investigation Unit - (Belgium)
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Safety Investigation Report

FINAL REPORT ON THE SERIOUS INCIDENT TO APEX AIRCRAFT DR400/120 REGISTERED OO-C** AT POTTES ON 2 AUGUST 2011

Ref. AAIU-2011-20-Pottes-OO-C**
Issue date: 7 September 2012
Status: Final

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FOREWORD

This report is a technical document that reflects the views of the investigation team on the circumstances that led to the accident.

In accordance with Annex 13 of the Convention on International Civil Aviation, it is not the purpose of aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the Final Report is the determination of the causes, and define recommendations in order to prevent future accidents and incidents.

In particular, Article 16 of the EU regulation EU 996/2010 stipulates that the safety recommendations made in this report do not constitute any suspicion of guilt or responsibility in the accident.

Unless otherwise indicated, recommendations in this report are addressed to the Regulatory Authorities of the State having responsibility for the matters with which the recommendation is concerned. It is for those Authorities to decide what action is taken.

The investigation was conducted by Henri Metillon and Sam Laureys
The report was compiled by Henri Metillon and was published under the authority of the Chief Investigator.

NOTES:

For the purpose of this report, time will be indicated in UTC, unless otherwise specified.

ICAO document 9859 “Safety Management Manual” was used to identify the hazard and the consequences related to the accident.

SYNOPSIS

Date and hour of the accident: 02 August 2011 at 13:30 UTC

Aircraft: Robin Aviation / Apex Aircraft DR400/120

Accident location: On a field in the Commune of Pecq N 050° 43.446', E 003° 22.712'

Aircraft owner: Private

Type of flight: Private

Persons on board: 1

Abstract:
At the end of a gliding flight exercise the engine did not respond to the command when the pilot pushed the throttle forward. The pilot moved the throttle several times forward causing the engine to revive briefly before returning to low speed. At 400 ft, the pilot selected a wheat field adequate for a forced landing and landed the airplane successfully.

Cause(s):
The cause of the incident is an engine failure due to the presence of a small insect (fly) inside the carburettor, blocking the fuel feed to the main nozzle. The insect found its way through openings in the carburettor heater air induction system and entered by inertia into the vertical channel of the carburettor bowl vent before ending in the float chamber.

Hazard identified during the investigation [1]:
Carburettor contamination.

Consequence [2]:
Engine failure (SCF-PP)

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1 Hazard – Condition or object with the potential of causing injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.

2 Consequence – Potential outcome(s) of the hazard

1 FACTUAL INFORMATIONS

1.1 History of flight

After 3 weeks of no flying, the pilot decided to make a local flight from the airfield of Kortrijk.

After flight preparation and fuelling, the airplane took off from EBKT at 12:08 UTC. The pilot performed 3 touch and goes and also requested to carry out an exercise of simulated forced landing; it was refused due to traffic at the airfield.
He flew further to the south.

After half an hour of flight and the airplane flying at 1400 ft, the pilot decided to perform a gliding flight exercise. He retarded the throttle to idle, switched the electrical fuel pump on and selected the carburettor heater on. The airplane flew at a stabilized 80 Kt. At 800 ft, he decided to open the throttle, after having switched the carburettor heater off.
The engine did not respond to the command, and remained at low rpm. The pilot moved the throttle several times forward causing the engine to revive briefly before returning to low speed. At 400 ft, the pilot selected a wheat field adequate for a forced landing.

The pilot landed the airplane successfully at 12:45 UTC, with minimal damage.

The pilot climbed out of the airplane, uninjured.

The Air Accident Investigation Unit (Belgium) was notified of the accident by the representative of the owner. The investigation team arrived at the accident site the next morning.

1.2 Injuries persons

Injuries	Pilot	Passenger	Others	Total
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	0	0	0	0
None	1	0	0	1
Total	1	0	0	1

1.3 Damage to aircraft

Minor

1.4 Other damage

The cultivated field was damaged by the forced landing and by land vehicles used for the recovery of the airplane.

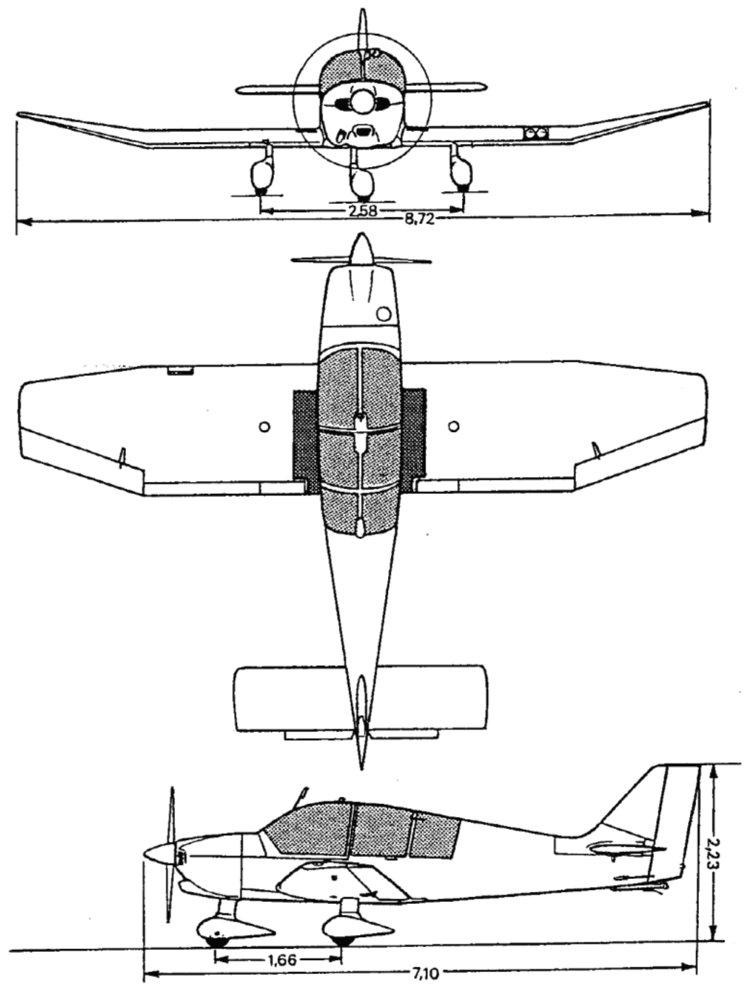
1.5 Personnel information

Pilot:	
Sex:	Male
Age:	62 years old
Nationality:	Belgian
License:	Private Pilot Aeroplane license delivered on 15 July 1996, valid up to 02 October 2013. Ratings: SEP (Land), valid up to 30 September 2011.
Medical certificate:	Class II, issued on October 2010. Valid up to 15 October 2011.
Pilot's experience:	The pilot had more than 750 flight hour's experience, mostly gained flying on DR400 series airplanes.

1.6 Aircraft information

The Robin DR400 is a wooden sport monoplane, conceived by Pierre Robin and Jean Délémontez. The Robin DR400 first flew in 1972. It has a tricycle undercarriage, and can carry four people. The DR400 aircraft have the 'cranked wing' configuration, in which the dihedral angle of the outer wing is much greater than the inboard section.

The airplane type was manufactured and delivered to customers over the years under different names as for example "ROBIN", "Avions Pierre Robin", APEX, CEAPR and "Robin Aircraft".



<u>General characteristics</u>

Capacity:	4
Length:	6.96 m
Wingspan:	8.72 m
Height:	2.23 m
Wing area:	14.20 m2
Empty weight:	Around 600 kg
Maximum take-off weight:	900 kg
Power plant:	Lycoming O-235-L2 flat-four piston engine, 120 hp
Fuel Capacity:	110 l from which 10 l are unusable

Maintenance of the airplane

The airplane was regularly maintained by a Part M Subpart F Approved Maintenance Organisation.

The maintenance of the airplane was performed following a BCAA approved "Aircraft Maintenance Program" (ref: AMP/OO-C** Revision 01 dated 28 January 2011).
This "Aircraft Maintenance Program" refers, for the scheduled maintenance, to the "CEAPR" manufacturer "Maintenance Schedule" document number 1001586GB Ed 4 Revision 4 dated 16 May 2008 or later revision.

The following last maintenances were performed, beginning December 2010:

28/12/2010	100 h inspection	A/C TT: 8003 h
14/02/2011	50 h inspection	A/C TT: 8050 h
04/04/2011	200h inspection	A/C TT: 8111 h
28/04/2011	50h inspection	A/C TT: 8155 h
01/06/2011	Airworthiness Review	A/C TT: 8169 h
14/06/2011	500 h inspection	A/C TT: 8197 h
28/07/2011	50 h inspection	A/C TT: 8252 h

Among other tasks, the following recurrent Airworthiness Directives concerning the engine air intake were performed during the last 500h inspection dated 14/06/2011:

DGAC AD 1999-053 R1:	Paint of the carburettor heat box (Rec. 100h)
DGAC AD 1999-470:	Air intake duct (Rec. 100h)
DGAC AD 2001-036:	Air intake valve (Rec. 100h and 12 months)

Findings on the airplane

The on-site examination by the investigation team was supported by the technicians of another maintenance organisation. The following checks were made:

- Position of the engine controls; (they were in the off position)
- Presence of fuel by draining the fuel pump and the carburettor, (60 l remaining in the fuel tank)
- Working of the electrical fuel pump
- Fuel pressure
- Flushing of the carburettor float chamber through the drain plug using the electrical fuel pump. No contamination was found in the drained fuel.
- General inspection of the engine
- Inspection of the air filter for function and proper installation

- Working of the magneto's, and measuring of the timing (25°). NB: the timing as mentioned on the engine Data Plate is 20°
- Mechanical integrity of the engine internal rotating parts
- Condition of the spark plugs
- Engine exhaust for obstructions
- Engine controls

As these inspections did not reveal obvious evidence of malfunction that could have led to the engine failure, the investigation team decided to attempt to start the engine.
All parts were reinstalled and after setting the fuel pump on, magnetos on, etc... and having pushed the throttle forward 3 times, the starter was engaged.
The engine started immediately, and went to 1400 rpm, but very rapidly the rpm decreased, and the engine could only be kept running, very roughly, by continuously pushing the throttle back and forth, activating the accelerator pump.

The airplane was disassembled and transported to the supporting maintenance organisation.

The investigation team inspected the engine further, and proceeded with the disassembly of the carburettor.
Before opening the carburettor bowl, the fuel inlet strainer was inspected and found in good condition. No contamination was found.

Then the carburettor was disassembled and contamination deposits of small metallic non magnetic particles and black undetermined particles were found on the bottom of the float chamber). However, it was determined that those small metallic particles did not affect the carburettor's working.

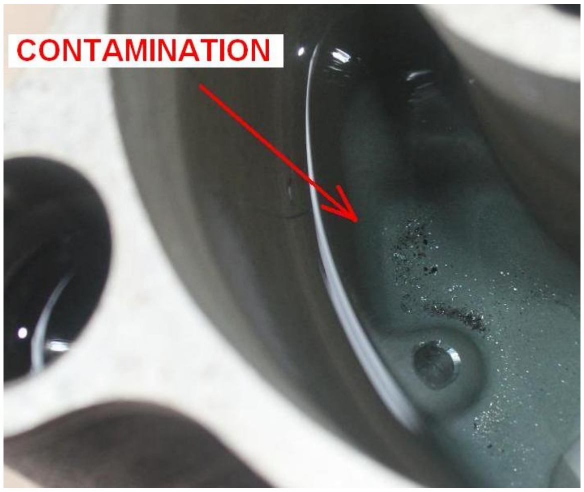


Figure 1: contamination particles

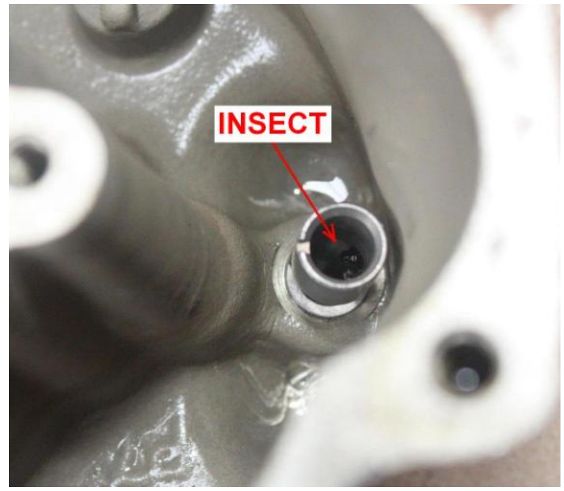


Figure 2: insect contamination

Further inspection found a small dead insect inside the fuel feed tube (housing the metering valve), at its bottom, leading to the main fuel nozzle. The insect was blocking the fuel flow to the main fuel nozzle.

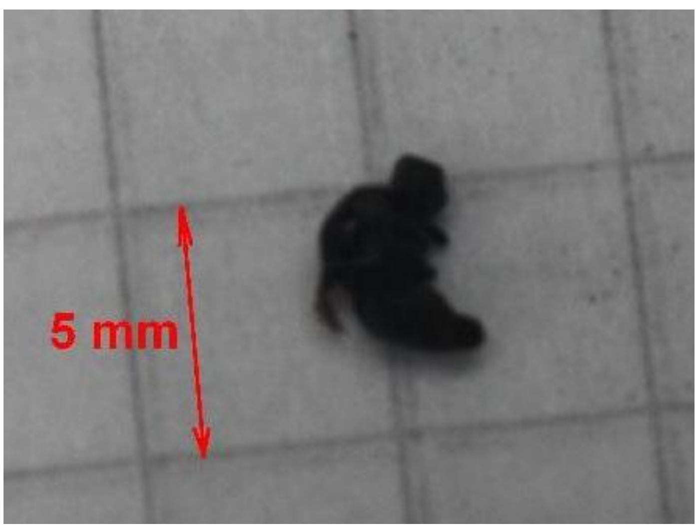


Figure 3: picture of the insect

Description of the Carburettor Air Induction System.

Air is fed to the carburettor, through 2 ducts:

- The cold air intake, featuring an air filter and a duct leading to the carburettor heater box.
- The hot air intake:
  When the carburettor heater control valve is set to ON, air is drawn from inside the engine cowl in a heat exchanger. The heat exchanger consists of a chamber located between the exhaust shroud and the exhaust muffler. The air entering the heat exchanger is filtered by a screen filter (wire mesh) before being heated by contact with the hot exhaust muffler.

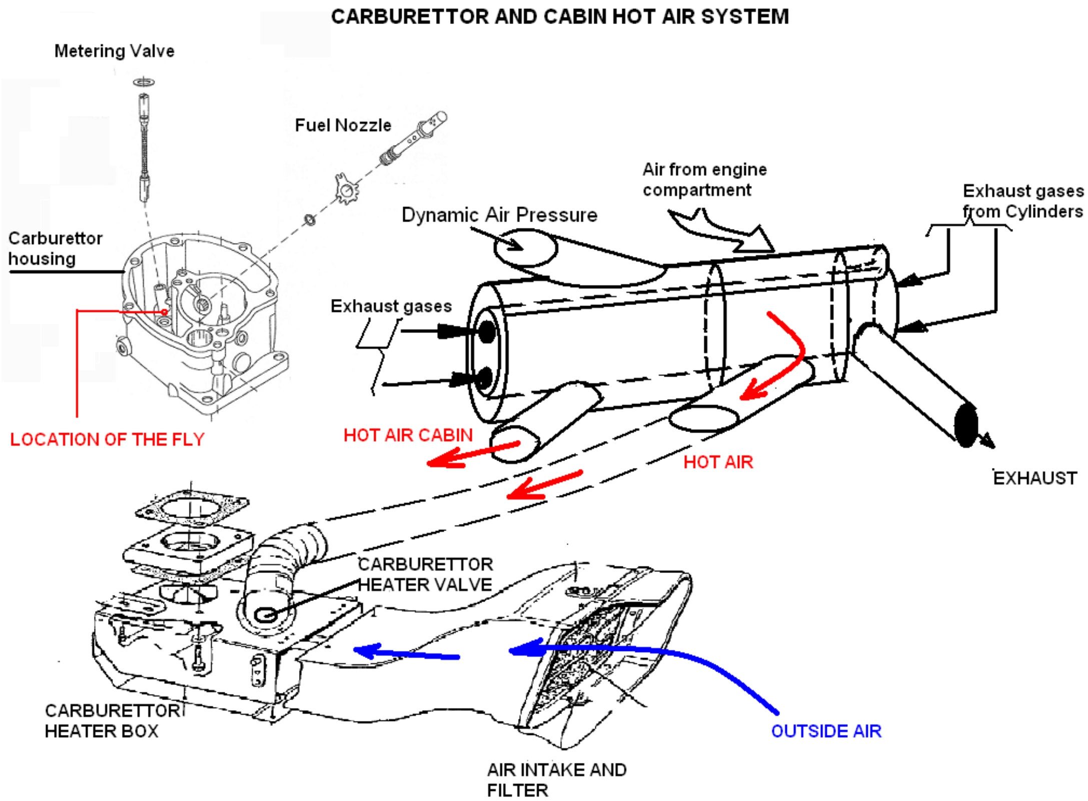


Figure 4: carburettor and cabin heater system

1.7 Meteorological conditions

The meteorological conditions at the time of the event were 26°C ambient temperature, with a dew point of 13°C.

1.8 Additional information

A routine check on another airplane (Robin HR200), a few days after, revealed the same condition; an insect was found after draining the carburettor float chamber twice.

2 ANALYSIS

2.1 Carburettor contamination examination

As the fuel inlet strainer was found uncontaminated and in good condition, the way the insect (fly-like) entered the carburettor float chamber was investigated and it was determined that the insectarrived in the carburettor through the bowl vent.

Figure 5: vent view carburettor intake side

Figure 6: vent view float chamber side

Before arriving at the carburettor vent the insect would first have to enter the carburettor air intake system (airplane side).

The entire carburettor air intake system was inspected, as well the cold air flow as the carburettor heat system, in order to understand the route the insect followed before ending in the carburettor float chamber.

The cold air flow conducts were found in good condition and the air filter was found correctly installed, without obvious openings.

Then, all the components of the carburettor heater system were thoroughly inspected and the following anomalies were found:
The metal strip attachments of the wire mesh of the exhaust shroud showed a deformation in two different places (Figure 7).
One rivet of the shroud attachment was missing (Figure 8).
One rivet of the shroud was completely loose showing a significant oval hole.
The two U profiles of the carburettor heater section of the shroud showed significant wear (Figure 7 and 9).
The external structure of exhaust muffler showed two deformations (welding recesses) located precisely at the separation of the cabin heat section and the carburettor air heater section of the exhaust shroud.

Due to the dynamic air pressure of the cabin heat side of the heater, the air stream has transferred particles from this pressurised side to the carburettor heat side. That was shown by black deposits (Figure 9) coming from the friction between the shroud and the muffler, which were only visible on the internal surface of the carburettor heater side (and not on the cabin heat side).

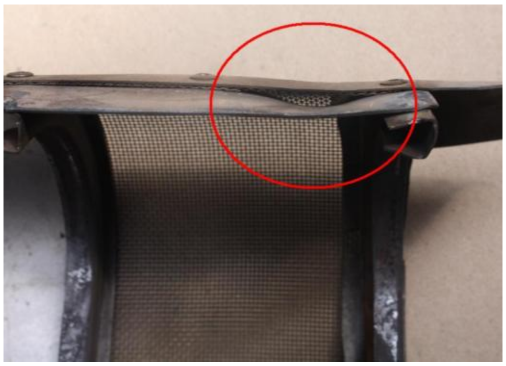


Figure 7: example of mesh wire support damage

Figure 8: missing rivet on carburettor heater shroud

Figure 9: View of black deposits located inside the shroud, only on carburettor heat side

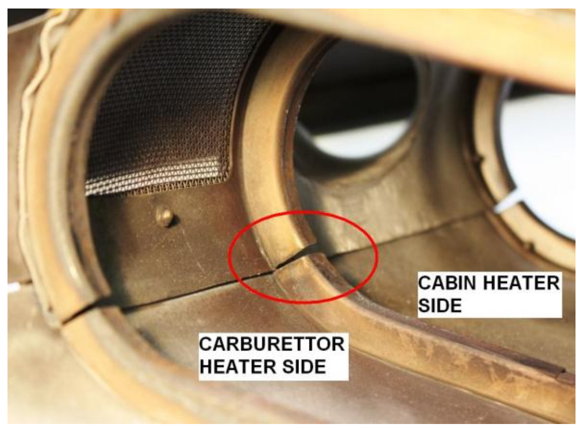


Figure 10: View of passages between carburettor heat and cabin heat chambers

Figure 11: View of misaligned central ribs located between carburettor heat and cabin heat chambers

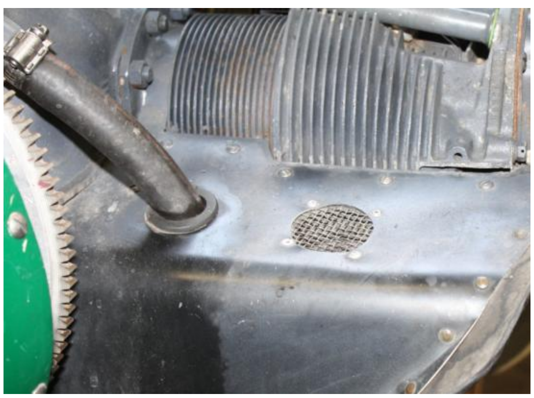


Figure 12: View of the cabin heat air intake screen featuring square openings significantly larger than the wire mesh of the carburettor heat shroud.

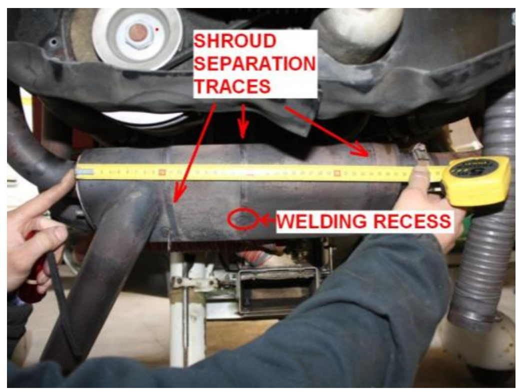


Figure 13: Traces of the shroud ribs onto the muffler + welding recess

Finally, it is likely that the carburettor heater system allowed penetration of the insect and of the small undetermined particles (Dust …). It also produced itself small metallic particles and by-products due to friction between the different parts. More precisely:
The insect contamination was caused by the clearance between the cabin heat and the carburettor heat chambers of the exhaust shroud.
The metallic particle contamination of the carburettor was caused by the poor condition of the exhaust shroud.
The non metallic particle contamination was caused by both the airflow between the cabin heat and the carburettor heater chambers and the inability of the wire mesh to retain small particles of dust.

Important note:
The possible penetration of foreign objects inside the carburettor float chamber is due to the combination of the following factors:

- The entering (or production) of contaminants inside the carburettor heater system.
- The particular design of the vertical vent of the carburettor float chamber.

The lack of a constant airflow through the carburettor heat exchanger when the heater valve is set to OFF does not allow possible contaminants to be evacuated outside the heat exchanger system and therefore increases drastically the probability of carburettor float chamber contamination.

2.2 Maintenance

The following last maintenances were performed:
14 June 2011at A/C TT: 8197 h 500 h inspection
28 July 2011 at A/C TT: 8252 h 50 h inspection

The forced landing occurred 74 FH after the last 500 h inspection and 17 FH after the last 50 h inspection (For information, a copy of the concerned pages of the Maintenance Schedule is enclosed at the end of this report).

It is likely that most of the defects found during the investigation were already present, although less obviously visible, when the last 500 h inspection was performed, but were considered as acceptable.

The Maintenance Schedule and the maintenance manual does not give specific instruction as to how the carburettor heater shroud condition had to be assessed and does not warn the maintenance engineers about the importance of the muffler/shroud condition. In particular, there is no guidance allowing the detection of abnormal alignment and clearance at the junctions of the central rib of the shroud.

Therefore, it is likely that the anomalies, as described above, were not detected and/or were not considered as serious during the last maintenances.

Additionally, there is no detailed guidance available to properly drain/rinse the carburettor float chamber to ensure possible contaminants evacuation (i.e. number of successive flushing, electrical fuel pump ON or not …) when contamination is suspected.

Finally, the French and the English versions of the same Maintenance Schedule don't require exactly the same inspection tasks.

Example:

ATA Number	French Version	English version
78-02	Examen détaillé des enveloppes de réchauffage cabine (*)	Close examination of the heat exchangers
78-04	Dépose du pot de détente pour inspection interne	Removal of heat exchanger for internal inspection (**)

(*) No reference to the carburettor heater chamber.
(**) The "Pot de détente" means exhaust silencer (or muffler), and is not a "heat exchanger".

NOTE: The maintenance schedule (chapter ATA 75-03, 75-04 and 78-02) was somewhat improved during the investigation process as per amendment N°12 dated 13 January 2012.

2.3 Certification considerations.

In the course of the investigation, we looked at the carburettor heater system in detail. We found that, unlike the vast majority of carburettor heater systems found on the general aviation fleet, the system installed on this type of airplane does not provide a constant “forced” airflow through the carburettor heat exchanger when the valve is set to OFF.

The design requirements of the carburettor heater are to be found in CS 23.1101.

CS 23.1101 Induction air preheater design

Each exhaust-heated, induction air preheater must be designed and constructed to –

(a) Ensure ventilation of the preheater when the induction air preheater is not being used during engine operation.

(b) Allow inspection of the exhaust manifold parts that it surrounds; and

(c) Allow inspection of critical parts of the preheater itself.

Figure 14: extract of CS 23 regulation

CS 23.1101 does not define the actual reason behind the ventilation.

EASA was contacted, and a meeting was held in Cologne with representatives of the certification authority (EASA). The Certification Authority confirmed the DR400/120 already complies with CS 23.1101 (a).

The official interpretation of CS 23.1101(a) by EASA is that it mainly concerns the prevention of overheating of the system when the carburettor heater is set to OFF. The reference documentation used by EASA was the justification made for the last revision of the text of CS 23.1101 (Amdt 43 vs. Amdt 7). (Actually, the revision of the text originates from FAR 23.1101 and NPR 90-23).
This text introduced a clarification for the cooling requirements for the induction air pre-heater, and further stated that the intent of the requirement is to ensure that the preheat device is <u>ventilated and cooled</u> at all other times the engine is operating.

In the current design of the CEAPR pre-heater device, ventilation and cooling are only achieved by natural convection, allowing the evacuation of hot air through the wire mesh of the shroud.

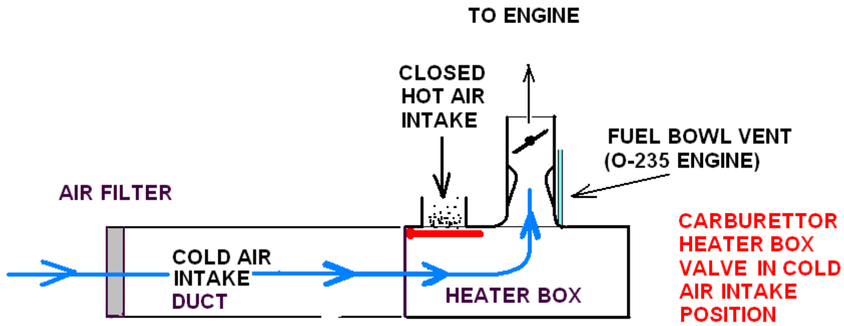


Figure 15: CEAPR carburettor heater box

As seen on the above drawing, the CEAPR carburettor box valve is an open/close valve, which remains in the closed position as long as thecarburettor heater is not selected by the pilot.
This system is likely to capture contaminants during the entire flight and may later release them when the pilot uses the carburettor heater system.

For further clarification, we have outlined hereunder the configuration found the vast majority of general aviation fleet.

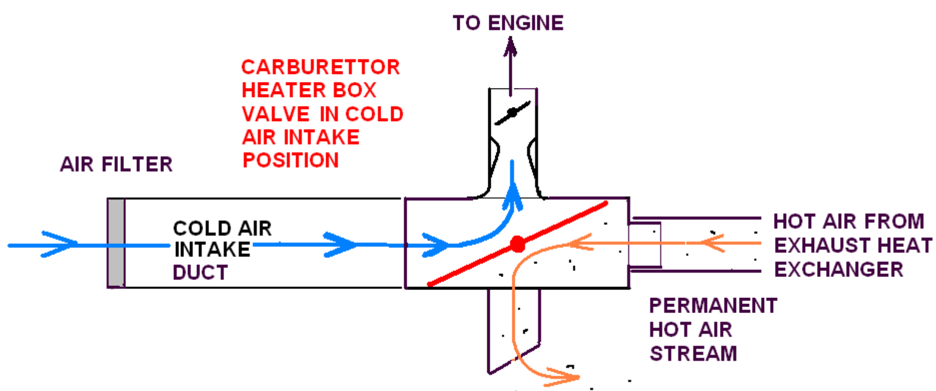


Figure 16: Typical vented carburettor heater box

By contrast, a typical vented carburettor heat box eliminates permanently the possible contaminants that could have entered the system. Ventilation is achieved by both suction of the ram air (as seen above) or by the pressurization of the carburettor heater system by total air pressure (Dynamic + static).

2.4 Carburettor contaminations and Airworthiness Directives

Events of carburettor contamination in the past led to the issue of the following DGAC Airworthiness Directive: AD 1999-114(A) R3 which was based on Robin Aviation BS N°160R1.

The Robin Aviation BS N°160 R1 (and therefore AD 1999-114(A) R3) required the installation of a wire mesh on the air intake of the shroud surrounding the exhaust muffler.

The above-mentioned AD (one-time modification) was complied with for the concerned airplane.

The Robin Aviation BS N°160 R1 featured also an additional chapter 4 “Maintenance”, (but not compulsory as per the corresponding AD) calling for the following:

> After SB application:
> Cleaning and check of the wire mesh of the intake heat exchanger: 50 hours or 1 year
> Removal of the flexible duct from the exchanger to the carburettor box and check of the air intake: 500 hours or 1 year.

Figure 17: extract of SB 160 R1

NOTES:

- The above maintenance tasks were not specifically found included in the airplane maintenance schedule of the Robin Aviation DR400 series airplane. Therefore, the condition of the wire mesh was not regularly assessed during maintenance.
- The maintenance schedule (chapter ATA 75-03, 75-04 and 78-02) was somewhat improved during the investigation process as per amendment N°12 dated 13 January 2012.
- We assume the situation to be similar for all other types aircraft referred to in DGAC AD 1999-114(A) R3, including Alpha Aviation HR200 aircraft.

2.5 Shroud analysis by the airplane manufacturer (CEAPR)

The airplane manufacturer CEAPR inspected the OO-C** exhaust shroud as well as identical new parts stored at the factory. They concluded the OO-C** exhaust shroud exhibited manufacturing defects (and/or was not properly adjusted) allowing contaminants to enter. However, the same defects were not found on parts stored in the factory.
The airplane manufacturer CEAPR also examined the original blue prints, reviewed the available manufacturing instructions and the control procedures during manufacturing.
After analysis, CEAPR concluded that the defects found on the OO-C** were due to a manufacturing error and did not result from a design problem.
CEAPR applied internal actions in order to avoid such manufacturing error in the future.

2.6 Analysis of the new shroud as installed in OO-C** after the forced landing

After the forced landing, the airplane was dissembled and moved to a repair station for repair. The carburettor was overhauled and a new CEAPR genuine shroud was installed before releasing the airplane to service.
During the course of the investigation we again inspected the airplane on 6 March 2012. On this date, the airplane had flown around 200 FH since the forced landing.

Figure 18: Newly installed shroud

We found that the newly installed shroud showed approximately the same configuration as the old one, as a consequence a clearance at the junction of the ribs was present.
This was manifested by black deposits precisely located at the junction of the two central rib halves.
Therefore, it is likely that other similar airplanes are affected by the same potential hazard.

3 CONCLUSION

3.1 Findings

- The airplane was in airworthy condition.
- The airplane was regularly maintained in a BCAA approved Part M Subpart F maintenance organization.
- The pilot was qualified for the flight and had much experience flying the airplane type.
- The pilot was adequately prepared to eventually perform a forced landing, as he first performed 3 touch and goes at EBKT airport before beginning the concerned local flight. He performed a smooth forced landing in a cultivated field, leaving the airplane almost undamaged.
- The pilot realized the engine had stopped operating when he applied power at the end of a simulated engine failure exercise.
- First investigation on site revealed the engine failure was probably connected to a carburettor problem.

3.2 Cause

The cause of the engine malfunction was the presence of a small insect (fly) inside the carburettor, blocking the fuel feed to the main nozzle.

The insect found its way due to poor manufacturing of the carburettor induction system.

4 SAFETY RECOMMENDATION

4.1 Recommendation Number 2011-P-23 to EASA.

To request the airframe TC holder to publish a detailed guideline in order to:

- Properly inspect and, if necessary, repair the exhaust shrouds and mufflers allowing penetration of contaminants in the carburettor heat induction system.
- Adequately drain, rinse or flush the carburettor float chamber.

4.2 Recommendation Number 2011-P-24 to EASA.

To request the airframe TC Holder to improve the design and/or the manufacture of carburettor heat induction system in order to avoid penetration and/or retention of contaminants inside the carburettor heater system.

Note:
During the investigation process, AAIU(Be) recommended the BCAA to mandate the incorporation of the maintenance requirements of Robin Aviation BS160 R1 "§ 4. Maintenance" or later revision, either literally or by reference, in the approved Maintenance Programme of all the BS160 R1 affected airplanes registered in Belgium.
This recommendation reference 2011-P-14 was automatically complied with when the airplane manufacturer published the last version of the maintenance schedule (amendment n°12 dated 13 January 2012).

5 ENCLOSURES

5.1 DGAC AD 1999-114(A) R3

GSAC

AIRWORTHINESS DIRECTIVE

released by DIRECTION GENERALE DE L'AVIATION CIVILE

Inspection and/or modifications described below are mandatory. No person may operate a product to which this Airworthiness Directive applies except in accordance with the requirements of this Airworthiness Directive.

Translation of 'Consigne de Navigabilité' ref. : 1999-114(A) R3
In case of any difficulty, reference should be made to the French original issue.

AVIONS ROBIN

HR200, R2000, DR300, DR400 airplanes

Manifold air intake (ATA 73)

APPLICABILITY

HR200/100, HR 200/100S, HR200/120, HR200/120B, R2100, R2100A, R2112, DR315, DR300/125, DR300/108, DR300/120, DR400/100, DR400/2+2, DR400/125, DR400/120, DR400/120A and DR400/120D airplanes, all serial numbers for which a previous edition of the present Airworthiness Directive has not been already applied.

REASON

The vent hole of carburators installed on 0-235 LYCOMING engines is exposed to the intrusion of foreign particles (especially insects) which could eventually result a loss of engine power.

ACTION AND COMPLIANCE

A - Proceed as soon as possible and at the latest before December 31, 1999 to the replacement of the air intake heat exchanger and/or exhaust muffler as required by AVIONS ROBIN S.B. No. 160 Rev. 1.

B - As long as the provisions of paragraph A have not been comply with, drain the carburettor and inspect the air inlet system every 50 hour inspection, as described in the DGAC Bulletin de Recommandation N° 09/98(A) dated November 18, 1998.

REFERENCE : AVIONS ROBIN Service Bulletin No. 160 rev. 1

AVIONS ROBIN Service Bulletin No. 160 Rev. 1 is available to :
ROBIN AVIATION
1 route de Troyes
21121 DAROIS
France

n/JB

.../...

October 06, 1999	AVIONS ROBIN HR200, R2000, DR300, DR400 airplanes	1999-114(A) R3

5.2 Avions ROBIN Service Bulletin N°160 rev.1

AVIONS ROBIN

1, route de Troyes 21121 DAROIS - FRANCE Tél. 33 (0)3 80 44 20 50 Fax 33 (0)3 80 35 60 80

BULLETIN SERVICE N°160 rév. 1 / SERVICE BULLETIN N°160 rev. 1

IMPERATIF

OBJET

ENTREE AIR ADMISSION
VERS RECHAUFFAGE CARBURATEUR
MOTEURS LYCOMING O-235

AVIONS CONCERNES

HR200/100, HR200/100S, HR200/120, HR200/120B, R2100, R2100A, R2112

DR315, DR300/125, DR300/108, DR300/120

DR400/100, DR400/2+2, DR400/125, DR400/120, DR400/120A, DR400/120D

DELAI D'APPLICATION

A partir du 1er août 1999
et au plus tard le 31 décembre 1999.

APPROBATION DGAC
02.06.99

ORIGINE

L'orifice de mise à l'air libre de la cuve du carburateur installé sur le moteur Lycoming O-235 est exposé à l'intrusion de corps étrangers, insectes en particulier. La section d'entrée du gicleur principal peut en être affectée et une diminution de puissance constatée.

PROCEDURE

Les entrées d'air sur les enveloppes de réchauffage reçoivent un grillage à mailles fines, ce qui impose le remplacement de ces éléments.

1 - DR400 NS ≥ 2212

Remplacement de l'enveloppe de réchauffage réf. 56.18.07.120 (rep.6 pl.345 du Catalogue de Pièces Détachées) par l'enveloppe réf. 56.18.44.000.

MANDATORY

SUBJECT

MANIFOLD AIR INTAKE
TO HEAT EXCHANGER
ON O-235 LYCOMING ENGINE

AIRCRAFT AFFECTED

HR200/100, HR200/100S, HR200/120, HR200/120B, R2100, R2100A, R2112

DR315, DR300/125, DR300/108, DR300/120

DR400/100, DR400/2+2, DR400/125, DR400/120, DR400/120A, DR400/120D

TIME OF COMPLIANCE

From the 1st of August, 1999
but not later than the 31st of December, 1999

DGAC APPROVAL
02.06.99

REASON

The vent hole of carburators installed on O-235 Lycoming engines is exposed to the intrusion of foreign particles, especially insects. This could result in an obstruction of the nozzle and a loss of engine power.

PROCESS

The manifold air intake heat exchanger surrounding the exhaust mufflers receive a wire mesh that leads to the replacement of these elements.

1 - DR400 SN ≥ 2212

Replace the air intake heat exchanger PN 56.18.07.120 (Parts Catalog rep.6 pl.345) by the exchanger PN 56.18.44.000.

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AVIONS ROBIN

BULLETIN SERVICE N°160 rév. 1 / SERVICE BULLETIN N°160 rev. 1

2 - DR400 NS ≤ 2211 et DR300

2.1 - Remplacement du collecteur échappement G standard réf. 56.26.12.000 (rep.11 pl.340 et rep.2 pl. 341) par collecteur échappement G équipé réf. 97.18.13.000
Voir nota ci-dessous

2.2 - Avions équipés du silencieux APR:
Remplacement du collecteur échappement G spécial réf. 56.26.31.030 par un collecteur réf. 56.26.31.050
Voir nota ci-dessous

3 - HR200 et R2000

3.1 - Remplacement du collecteur échappement G standard réf. 56.40.22.000 (rep.1 pl.270) par un collecteur échappement G équipé réf. 56.23.05.100.
Voir nota ci-dessous

3.2 - Avions équipés du silencieux APR:
Remplacement du collecteur échappement G spécial réf. 56.23.32.010 (rep.1 pl.271) par un collecteur échappement G réf. 56.23.05.300
Voir nota ci-dessous

Nota:
Les échappements nus totalisant moins de 500 h de fonctionnement pourront être transformés chez le constructeur.
Les modalités concernant cette opération seront à mettre en place avec notre service après vente:

2 - DR400 SN ≤ 2211 and DR300

2.1 – Replace the standard left exhaust muffler PN 56.26.12.000 (rep.11 pl.340 and rep.2 pl. 341) by the complete left exhaust muffler PN 97.18.13.000
See nota hereunder

2.2 – Aircraft equipped with APR silencer:
Replace the special left exhaust muffler PN 56.26.31.030 by the exhaust muffler PN 56.26.31.050
See nota hereunder

3 - HR200 and R2000

3.1 – Replace the standard left exhaust muffler PN 56.40.22.000 (rep.1 pl.270) by the complete left exhaust muffler PN 56.23.05.100.
See nota hereunder

3.2 – Aircraft equipped with APR silencer:
Replace the special left exhaust muffler PN 56.23.32.010 (rep.1 pl.271) by the left exhaust muffler PN 56.23.05.300
See nota hereunder

Nota:
The exhaust muffler of less than 500 flight hours might be modified in the Manufacturer facilities.
The mode of inforcement of these modifications is to be dealed with our aftersale service:

ASCO
1, route de Troyes
21121 DAROIS - FRANCE
Tél.: 33 (0)3 80 35 61 98 Fax: 33 (0)3 80 35 60 58

4 - MAINTENANCE

Après application du BS:
- Nettoyage et vérification de la grille d'entrée d'air au réchauffage carburateur: 50 h ou 1 an
- Dépose de la gaine d'air chaud vers carburateur et vérification du circuit: 500 h ou 1 an

La présente révision annule et remplace le BS n°160 du 09/11/98.

4 - MAINTENANCE

After SB application:
- *Cleaning and check of the wire mesh of the air intake heat exchanger: 50 hours or 1 year*
- *Removal of the flexible duct from the exchanger to the carburator box and check of the air intake conduct: 500 hours or 1 year*

The present revision cancels and supersedes the SB nr 160 dated 09/11/98.

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5.3 Extracts of the inspection schedule concerning air intake and exhaust system

Chapter II DR400 MAINTENANCE SCHEDULE

Sec	Item	Models concerned							OPERATIONS	ROUTINE (hours)				DETAILED (hours		CALENDAR TIME (years)			Nota
		120	140 B	160	180	180 R	200 R	500		50	100	200	500	1000	2000	1	3	6	
73	08	X	X	X	X	X	X	X	Close examination of the complete fuel line from the tank to the engine driven pump (tubing, hoses, selector, fittings, pump, filter…).				●						13
73	09	X	X	X	X	X	X	X	Check and calibration of the fuel transmitter gauge. Make sure that the corresponding label is correct.				●					●	13
73	10	X	X	X	X	X	X	X	Check the efficiency of vent lines.	●						●			
73	11	X	X	X	X	X	X		<u>Fittings or aluminium tubes using sqeezed rubber element:</u> check the inner tube diameter for narrowing.						●			●	14
73	12			X	X			X	<u>A. P. R. fuel selector cock:</u> Removal of the fuel selector cock in order to verify the length of the opening travel. Close examination of the fuel cock control.					●					9
73	13			X	X			X	Test the efficiency of fuel low level warning lights. Operating conditions of "end of travel" switches connecting these lights.				●				●		
73	14						X	X	Close examination of the electric fuel pump: fittings, tightening, electrical connectors, fixing parts, drain.			●					●		
73	15						X	X	Detailed inspection of the fuel tubing and fittings of the injection circuit (flexible hoses, distributor, rigid pipes…) drain tubing.		●					●			
74	**00**								**IGNITION**										**14, 3**
75	**00**								**AIR INTAKE**										
75	01	X	X	X	X	X			Visual inspection of carburator heat box, good condition of flap shutter, of its axles and bearings.		●					●			14
75	02	X	X	X	X	X	X	X	Check air filter. Clean.	●						●			2, 13
75	03	X	X	X	X	X			Check air conduct leading to the carburator.			●				●			2 16
75	04				X	X			Detailed inspection of coupling sleeve (bad condition, tear…). Replace when damaged.		●					●			17
75	05	X	X	X	X	X		X	Check air conduct.		●					●			2 13, 15

Sec	Item	Models concerned							OPERATIONS	ROUTINE (hours)				DETAILED (hours		CALENDAR TIME (years)			Nota
		120	140 B	160	180	180 R	200 R	500		50	100	200	500	1000	2000	1	3	6	
77	03	X	X	X	X	X	X		Check of "WESTACH, Apex modified" oil temperature indicator. Measurement by adjustable resistance method (per Maintenance manual, section "Instruments").		●					●			25
77	04	X	X	X	X	X	X		Check of "WESTACH, Apex modified" oil temperature indicator. Measurement by adjustable resistance method (per Maintenance manual, section "Instruments").			●				●			25
78	00								**EXHAUST SYSTEM**										
78	01	X	X	X	X	X	X	X	Detailed examination of the exhaust components: flanges, formed tubes, muffler (look for leaks, cracks, sign of corrosion…).		●								13
78	02	X	X	X	X	X	X	X	Close examination of heat exchangers	●						●			14
78	03	X	X	X	X	X	X	X	Removal of heat exchangers and check of muffler for cracks.		●					●			4, 14
78	04	X	X	X	X	X			Removal of heat exchanger for internal inspection.				●						14
78	05	O	O	O	O	O	O	O	Detailed inspection of flexible ducts, bends and chock absorber mountings.	●						●			18, 14
78	06	O	O	O	O	O	O	O	Removal of hydro formed ball joints. Cleaning and application of grease on contact areas.		●					●			18, 14
78	07	O	O	O	O	O	O	O	Inspection before cleaning of the connecting part between mufflers and silencer (cracks, leaks, good condition of the fixing clamps), of the flexible duct and of the silencer all over its length (cracks, loose rivets…)		●					●			19, 14
79	00								**OIL SYSTEM**										
79	01	X	X	X	X	X	X	X	Oil line between engine and oil pressure switch: careful cleaning of the oil hose and connectors, including the restricted fitting.									●	26

Federal Public Service
Mobility and Transport
Air Accident Investigation Unit

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