ACCIDENT

Aircraft Type and Registration:	Eurocopter AS350B3 'Ecureuil', G-BZVG
No & Type of Engines:	1 Turbomeca Arriel 2B turboshaft engine
Year of Manufacture:	2000
Date & Time (UTC):	18 October 2004 at 1300 hrs
Location:	Oxford Kidlington Airport
Type of Flight:	Training
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - 1 (Serious) Passengers - N/A
Nature of Damage:	Extensive damage to fuselage and main rotors
Commander's Licence:	Airline Transport Pilot's Licence with Instructor Rating
Commander's Age:	53 years
Commander's Flying Experience:	6,862 hours (of which 420 were on type) Last 90 days - 144 hours Last 28 days - 20 hours
Information Source:	Aircraft Accident Report Form submitted by the commander plus further enquiries and examination of the helicopter and its control system components

Synopsis

An instructor and student were carrying out a simulated hydraulic failure approach and landing. The student was about to carry out a run-on landing when she experienced difficulty overcoming the control feedback forces. The instructor took control and attempted to climb the helicopter but it rolled to the left and struck the ground. No evidence of pre-impact mechanical faults was found but the issue of heavy control forces in manual flight was well understood by the helicopter manufacturer. Appropriate procedures, advice and guidance had been issued, both within the helicopter's Flight Manual and through supplementary documents, but the pilots involved had neither followed the Flight Manual procedure accurately nor seen all the relevant supplementary guidance and information. One safety recommendation was made about the distribution of handling advice and information to pilots.

General information

The chief instructor of the Type Rating Training Organisation (TRTO) and the instructor on the accident flight had both flown simulated hydraulic failure exercises in G-BZVG. Both pilots had been concerned at what they considered to be abnormally high 'hydraulics OFF' control feedback forces.

The owner purchased the helicopter in December 2003 and completed his type rating on 23 January 2004. On a day that the owner believed was 14 April 2004 the chief instructor was carrying out a simulated hydraulic failure approach in G-BZVG with the owner. Just before touch down, the owner had difficulty controlling the helicopter which he attributed to his relative inexperience. The chief instructor took control and he too was unable to exert enough force on the cyclic control to correct a roll to the left which was developing. He did not want to re-instate the hydraulics at such a low height in case he over-controlled causing the main rotor blades to strike the ground. He raised the collective lever and was able to fly away from the ground but not before the helicopter had yawed to the left through 180°.

Following the incident, the chief instructor and the owner consulted the test pilot of the helicopter manufacturer's import agent. They explained that they thought the control feedback forces were abnormally high. The owner asked the test pilot to assess the control forces without hydraulic power when he next flew the helicopter. The test pilot flew G-BZVG on 14 May 2004 and carried out a full C of A test flight in June 2004; on both occasions he found the control forces with 'hydraulics OFF' to be normal for the type.

After the owner had experienced heavy control forces during a practice manual landing on 14 April, he trained regularly until he was satisfied that he had mastered the technique. Also, between 30 July and 1 October 2004, the chief instructor conducted five Licence Skill Tests using G-BZVG. A 'hydraulics OFF' approach to landing was made during each test. Although the chief instructor did not handle the controls during the exercise, none of the candidates encountered significant difficulties.

On 9 September 2004 the test pilot flew G-BZVG and again found the control feedback forces to be normal for the AS350B3. This information was passed to both the chief instructor and the owner.

The flight instructor and student involved in the accident carried out a training flight on 29 September 2004 during which a simulated hydraulic failure was attempted. Both pilots considered the control feedback forces to be abnormally high and the exercise was abandoned. After the flight, the instructor informed the chief instructor of the problem. The owner and the chief instructor went to see the test pilot who re-iterated the high forces to be expected.

On 1 October 2004 the owner and the chief instructor carried out one hour of simulated hydraulic failure training. No significant problems occurred during the training and the owner remained confident in his ability to fly the helicopter without hydraulics should the situation arise. The owner also stated that all his practice hydraulic failure approaches and landings had been carried out with the HYD TEST switch in the depressed (test) position.

History of the accident flight

The student was an experienced AS350B pilot having flown approximately 100 hours on that type in the USA on her FAA licence. The purpose of the training was to carry out a type conversion to have the AS350B3 variant endorsed on her UK PPL. She had accumulated 11.5 hours of flying on the B3 and the accident flight was the second training sortie of that day. The same instructor had carried out all her B3 training and was the instructor on the accident flight. During the earlier one-hour dual sortie, various emergencies were practiced including simulated engine governor failure. This exercise necessarily resulted in a low speed run-on landing into wind.

The instructor had fully briefed the simulated hydraulic failure exercise. She had observed the student satisfactorily demonstrate the safe handling of this exercise on a number of previous occasions. On the downwind leg of a circuit she depressed the HYD TEST switch to simulate hydraulic failure. The student correctly identified the emergency and reduced airspeed to 60 kt. When the helicopter was stable the instructor switched the hydraulic cut-off switch on the collective control lever to OFF. Next the instructor confirmed that the student was comfortable with the feel of the controls due to them being abnormally heavy on a previous flight. The student considered them normal and continued to fly the aircraft around the circuit and made an approach to the helicopter training area on a final approach track of 200º. The weather was good with a surface wind of 240º/8 kt, visibility 10 km and the lowest cloud at 3,000 ft. In the last few hundred feet of the approach, the helicopter was turned into wind for the landing.

The approach was smoothly controlled with speed reducing gradually, consistent with the correct approach profile. As the helicopter neared the ground, still with forward ground speed, the nose began to rise up and yaw to the left as the collective was raised. The instructor took control and with right tail-rotor-pedal and cyclic inputs, attempted to lower the nose, correct the yaw and correct the increasing angle of bank to the left. The lateral cyclic control forces required were very high and the student asked if she should reinstate the hydraulics by switching ON the hydraulic cut-off switch mounted on the right side collective control. Given the large force the instructor was exerting and the helicopter's close proximity to the ground, the instructor elected to remain in manual control. Because the instructor's physical efforts to correct the yaw and roll had insufficient effect, she tried to raise the collective lever in an attempt to fly away from the ground. However, the aircraft continued to roll left and it struck the grass surface of the helicopter training area. A witness in another helicopter behind G-BZVG, also operating in the training area, saw it make a steeply banked left turn and strike the ground. The helicopter came to rest upright on a heading of 020º, almost opposite in direction to its final approach track of 240°.

ATC activated the crash alarm and the airfield Rescue and Fire Fighting Service promptly attended the scene. They assisted with the removal of both pilots who had received back injuries and were subsequently taken to hospital. Although there was substantial damage to the helicopter, there was no fire.

Hydraulic system

Purpose and control forces

The helicopter is fitted with a single hydraulic system which provides the pilot with hydraulically boosted cyclic, collective and tail rotor controls. Accumulators in the main rotor servo actuator units provide a small energy reserve. The tail rotor servo unit also has an accumulator and a yaw load compensator; the latter is mounted in parallel with the servo actuator to reduce the control loads in the case of loss of hydraulic power. It does so by resisting the zero-pitch return moment of the tail rotor blades (which is only partly compensated by boss-type weights).

In the event of a loss of hydraulic pressure, the main rotor servo accumulators provide approximately 30 seconds of boost to enable the pilot either to land the helicopter if it is in the hover, or to establish the recommended safety speed range (40 to 60 kt), which minimises control forces in forward flight. The tail rotor servo unit accumulator also powers the load compensator for a period. The helicopter can be flown without hydraulic assistance but control forces are high. Within the safety speed range,

the lateral cyclic forces required are as low as 9 lb for left cyclic movement and 11 lb for forward cyclic movement. The collective lever has a neutral force position at about 40% torque and any movement up or down from that position requires increasing amounts of force.

If the pilot attempts to hover the helicopter without hydraulic assistance, the control forces change in both direction and intensity as the pilot attempts to maintain a steady position. The pilot has to exert longitudinal and lateral forces of up to 12 lb which can change quickly in direction. This results in excessive pilot workload and controllability problems. During a run-on landing at about 10 kt, the pilot may have to exert a forward longitudinal force of up to 37 lb for less than 30 seconds with low lateral forces. The maximum forces which may be encountered are at the extremes of the speed envelope. These may be as high as 33 lb left or right lateral cyclic and 37 lb forward longitudinal cyclic. A force of up to 30 lb may be required to raise or lower the collective control to its maximum up or down travel. The tail rotor control pedals also exhibit high feedback forces, particularly the right pedal when the collective lever is raised. These forces are described as 'very high' if the yaw load compensator is inactive.

System control

The hydraulic system is controlled using the hydraulic cut-off switch located on the right seat collective lever and the hydraulic test pushbutton on the centre console.

Hydraulic cut-off switch

The cut-off switch is a two position guarded switch (ON/OFF), normally remaining in the ON position. It allows the main and tail rotor servos to be powered when the hydraulic system is operating normally. When selected to OFF, the system is depressurised and the accumulators on the main rotor servo safety units are depressurised simultaneously; this prevents asymmetric exhaustion of the accumulators. Asymmetric exhaustion could cause control difficulties; consequently, selecting this switch to OFF is a required action for either a real or a simulated hydraulic failure. However, the tail rotor servo accumulator is not depressurised by the cut-off switch; the tail rotor servo and compensator retain their accumulator assistance. If system hydraulic pressure is available, selecting the switch to ON immediately reinstates hydraulic pressure to the servos and re-pressurises the accumulators.

Hydraulic test pushbutton

The HYD TEST pushbutton, mounted on the centre console between the two pilots' seats, has two positions. The TEST position (button pushed in) initiates the test function and the button out position restores normal operation. The primary function of the HYD TEST pushbutton is to enable the pilot to check the functioning of the servo accumulators before flight but it is also used to simulate the onset of hydraulic failure during training. Selecting the TEST position results in the solenoid valve opening on the regulator unit, which immediately depressurises the hydraulic system. It will also open the tail rotor servo solenoid, depressurising the tail rotor accumulator, and with it the tail rotor load compensator, but it allows the main rotor servos to be powered by their accumulators until the energy stored in them is exhausted.

Hydraulic system failure training

Hydraulic system failure is simulated by carrying out a specific sequence of switch selections and corresponding actions which are documented in the aircraft Flight Manual within Supplement 7. Practice 'hydraulics OFF' approaches are conducted in two phases: firstly, a transition to recommended

safety speed range from steady flight conditions and secondly, a transition to landing.

The instructor depresses the HYD TEST pushbutton to the TEST position and the student reduces airspeed to between 40 and 60 kt. The main rotor controls are pressurised through their accumulators but no hydraulic assistance is provided for the tail rotor servo and load compensator. Once the student has stabilised the helicopter at the safety speed, the first phase of the exercise is complete.

When in a steady flight condition, the instructor resets the HYD TEST pushbutton to the ON position which restores system pressure and recharges the main and tail rotor accumulators. Next the student selects the collective hydraulic cut-off switch to the OFF position which, within two seconds, introduces the main rotor manual control loads. The tail rotor accumulator continues to assist the tail rotor servo and load compensator. This switch configuration ensures that if hydraulic power is required, selecting the collective hydraulic cut-off switch to ON will immediately reinstate the powered controls.

The recommended procedure for landing is to select a clear flat area and make a shallow final approach which minimises operation of the collective lever. The pilot should perform a no hover, slow run-on landing, at about 10 kt, with the helicopter's nose into wind. Specifically, the helicopter should not be hovered or taxied without hydraulic pressure assistance.

Flight Manual supplements

At the time of the accident, Flight Manual Supplement 7 Revision 0 (zero) was current (see Appendix A). Whilst it required the same training procedure for conducting the simulation of a hydraulic failure, it contained less comprehensive additional information than Revision 1, which superseded Revision 0, particularly regarding the magnitude of expected control forces.

Revision 1 was raised by Eurocopter in the 25th week of 2003. DGAC approval for the revision was granted on 14 May 2004 with EASA approval[1] gained on 2 June 2004. By that time EASA approval was valid for all European operators and so Eurocopter issued Revision 1 to all European countries on 30 June 2004. However, when the UK CAA received Revision 1 a few days later, it was deemed not acceptable because the CAA required Eurocopter to take account of modifications which the CAA had required before granting type approval to AS350B3 helicopters registered within the UK. At the beginning of October 2004, when Eurocopter discovered that UK operators had not received Revision 1, they prepared a new master for the UK and issued it without CAA approval (because it did not need it since it had already been approved by EASA). This master (revision) was released on 21 October 2004; it reached the UK agent for the aircraft type on 29 October 2004, 11 days after the accident[2].

Between the raising of Revision 1 and its circulation, Eurocopter TELEX INFORMATION, T.F.S. No 00000153 dated 9 December 2003 was circulated regarding hydraulic power. The TELEX was issued as a CAUTION and directly applicable to the AS350B3. With regard to hydraulic system failure training, the following advice was included:

Footnotes

[1] Until September 2003, Flight Manuals intended for European operators were approved and issued in accordance with four different layouts according to the country of certification (DGAC for France, LBA for Germany, ENAC for Italy and CAA for UK). Since September 2003 the EASA approved Flight Manual version was applicable in all member States of the European Community.

[2] At the end of December 2005, Eurocopter Service Letter 1731-00-05 was issued to explain to operators that they will gradually receive normal revisions with code letter A (EASA approved) when no definition specificity applies, or with a code letter E when including definition specificity.

'Over a clear and flat landing area, apply the landing procedure in accordance with the Flight Manual: Make a flat approach, nose into wind, and perform a no-hover slight running landing at low speed (10 kt are sufficient)'.

Within Revision 1 were several notes which amplified the recommended training procedure. One of these notes reiterated the advice above contained in the TELEX message. Other notes and cautions explained the importance of not attempting to hover the helicopter and of returning the HYD TEST pushbutton to the OFF position, thereby restoring system hydraulic pressure to all the actuators and accumulators before switching the hydraulic cut-off switch to OFF.

The TRTO had not received a copy of the TELEX and neither the chief instructor nor the accident flight instructor had seen a copy of the TELEX. The UK agent for the helicopter manufacturer had received the TELEX but it was unable to provide a record of when the TELEX was received or a distribution list of where and when it was re-distributed within the UK.

Previous incidents

On 16 July 2004, some three months before this accident, the helicopter manufacturer issued a cautionary TELEX message (TFS No 00000188) relevant to a number of helicopter types including the AS350B and B3 versions. The caution on page 1 stated 'THE INFORMATION AND INSTRUCTIONS CONTAINED IN THIS TELEX INFORMATION ARE INTENDED FOR FLIGHT CREWS'. The message described a previous occurrence of hydraulic problems which resulted in a hard landing and attributed some of the difficulties experienced to inadvertent operation of the HYD TEST pushbutton. The stated purposes of this message were: to remind flight crews of the function of the (yaw) load compensator; to remind flight crews of the proper use of the hydraulic test function; and to inform pilots of the consequences of unintentional actuation of the HYD TEST pushbutton.

Airworthiness Directive

Soon after this accident, on 10 November 2004, Airworthiness Directive No F-2004-174 was issued by the French DGAC on behalf of EASA. It required incorporation of Revision 1 to Supplement 7 of the Flight Manual within one month (it also applied to other variants of the AS350 helicopter). The reason stated was:

'This AD is issued after having noted that some crews do not understand how to comply with the emergency procedures in the event of a hydraulic power system failure or during emergency procedure training (hydraulic failure training procedures). The Flight Manuals have been revised to prevent misunderstanding'.

Engineering examination

A detailed examination of the wreckage was undertaken after it was recovered to the helicopter's maintenance organisation's hangar at Oxford Airport. The tail rotor blade pitch control system was found to be connected but seized. Examination found that the seizure was caused by severe impact damage between the tail rotor blade balance weights and the pitch shaft outer sleeve casing; this resulted in the casing being deformed onto the shaft. There was no evidence of a pre-impact restriction or disconnection within the main rotor control systems.

All the components of the helicopter's hydraulic system were taken to the helicopter manufacturer's test facility in France where full functional tests on each component were carried out. All but two of these components functioned within the manufacturer's specifications.

Two of the three main rotor hydraulic servo actuators failed to function correctly. These two actuators were dismantled and it was found that they had failed the functional test because of damage caused during the impact sequence.

Examination of the maintenance records showed that approximately two flying hours before the accident the tail rotor pitch control hydraulic servo actuator had been replaced. It was replaced with the helicopter's original servo actuator that had previously been returned to the manufacturer for modification. This hydraulic servo was one of the items that, when tested, was found to function within the manufacturer's specifications.

Analysis

During the accident flight the instructor had correctly initiated the exercise by depressing the HYD TEST pushbutton and the student had reduced the airspeed to the recommended safety speed. The exercise then deviated from that required in the Flight Manual in that the hydraulic cut-off switch was selected to OFF before the HYD TEST pushbutton was selected out to restore hydraulic power. The pushbutton was not moved and it remained in the depressed TEST position for the remainder of the flight. This omission had two unwanted effects. Firstly it depressurised the tail rotor load compensator and thereby increased the right pedal force subsequently required to control yaw at low airspeed. Secondly, although the instructor did not accept the student's offer to select the cut-off switch to ON, even if the collective mounted switch had been selected ON, no hydraulic power would have been available due to the system being in the TEST mode.

The circuit and initial approach had been flown correctly with the aircraft reducing speed in the descent consistent with the required profile. The first indication of difficulty was the uncorrected yaw to the left. Although the angular displacement was not large, the reduction in speed caused the helicopter's nose to pitch up. The effect of the crosswind from the right due to the yaw of the helicopter probably caused the main rotor disc to flapback to the left to some degree. The effect of yaw to the left would also have caused the helicopter to roll to the left. Having taken control, the instructor was surprised by the magnitude of force she needed to exert on the cyclic control in order to try and correct the situation. She considered these forces were greater than normal when practising a 'hydraulics OFF' landing.

The physical demands of the combined feedback forces and the rate of change in attitude led the instructor to believe that raising the collective was the best option in order to climb away from the ground.

Conclusion

The accident occurred during a training exercise when the helicopter was at a low height with hydraulic power selected off. The approach was flown with the helicopter's nose into wind but the instructor had not followed the correct sequence of hydraulic switch selections. Having taken control, the instructor was unable to exert sufficient force on the controls to counteract the movement of the helicopter and so control was lost.

When he flew G-BZVG on several occasions, the import agent's test pilot found the control forces normal for the type, perhaps because he was using the correct hydraulic failure simulation technique. However, the TRTO's chief instructor and the accident instructor were not complying with the training procedure stated in the Flight Manual at Supplement 7 Revision 0. Specifically, they were not resetting the HYD TEST switch before commencing an approach to land. This may explain why they felt the control forces were too high.

Had the HYD TEST switch been reset before the second phase of the manual approach, the tail rotor accumulator would have been recharged and yaw control forces would have been reduced. Additionally, the pilots would have had the option of restoring hydraulic power very quickly using the student's collective mounted cut-off switch. However, because of her fear of over-controlling so close to the ground, in this instance the instructor elected not to re-instate the hydraulics. Consequently, the incorrect position of the HYD TEST switch at the moment control was lost made little difference to the outcome of this event.

Correct positioning of the test switch ensures that the tail rotor load compensator remains pressurised for the 'manual' approach and landing, thereby minimising yaw pedal foot loads, which in turn may reduce the magnitude of any lateral cyclic forces required to retain roll control. Moreover, its correct positioning on final approach could be relevant to future training flights so that hydraulics can be re-selected in time to avoid loss of control if the forces experienced are excessive. In the opinion of the CAA's Flight Department, the hydraulic failure training exercise, if correctly conducted, is within the capabilities of the crew.

The Flight Manual supplement in use at the time of the accident did not fully alert a pilot to the magnitude of the forces required to contain such a situation. However, the Flight Manual Section 7.8 'Hydraulic System' section did contain appropriate information. Moreover, appropriate information and advice in the form of two cautionary TELEX messages had preceded circulation of the revised Flight Manual supplement. After this accident, the importance of this revision was emphasised by the Airworthiness Directive but neither of the preceding TELEX messages had been seen by the instructors or the student.

At the time of the accident the flight manual for G-BZVG contained both Revision 0 (zero) to Supplement 7, which was current at the time the helicopter was sold to its owner, and the Section 7.8 'Hydraulic System' description. It did not contain (nor did it need to contain) copies of the cautionary TELEX messages issued by the manufacturer.

Safety action

One issue embedded in the events leading up to this accident was the use of TELEX messages and an Airworthiness Directive to convey information and instructions to pilots. These communication methods are well developed but more suited to distributing information to agents and maintenance organisations than to type-rated pilots.

The duty of producing handling advice and information to pilots rightly rests with an aircraft manufacturer and the duty of assimilating this advice and information rightly rests with type-rated pilots. However, problems arise when pilots are unaware that safety-related information intended for them has been issued in advance of a formal amendment to the Flight Manual. Their responsibility is to know and abide by the Flight Manual for the aircraft type, so the proper place for updated handling advice is in the Flight Manual.

In this case, appropriate and expanded handling advice had been prepared by the manufacturer, in the form of a revision to a Flight Manual Supplement, more than a year before this accident. However, because of regulatory issues, the revision was not issued to UK operators until more than a year later. In the meantime, the manufacturer had issued a cautionary TELEX message, basically advising pilots of the same instructions, advice and information within Revision 1 to Supplement 7 of the Flight Manual. Moreover, after an incident that was

in many ways comparable to this accident, but which occurred three months earlier, the manufacturer issued a second cautionary TELEX message about correct use of the hydraulic system switches. However, the distribution method used for all these documents was not optimised for delivering handling advice to pilots. Neither of the accident pilots nor their supervisor within the TRTO had seen these documents before the accident.

Safety Recommendation

Only an authority that issues pilot licences and type ratings can have an accurate record of pilots rated on an aircraft type. Worldwide, there are a large number of such authorities. Consequently, neither a helicopter manufacturer nor its overseas agents have sufficient information with which to distribute information rapidly to pilots who have a relevant type rating or are training to acquire a relevant type rating. Furthermore, formal amendments to Flight Manuals have to be authorised by the appropriate regulatory body (in this case EASA) which, of necessity, introduces administrative delays into the issue and circulation of important safety information. However, cautionary messages and interim advice can be issued by an aircraft manufacturer without formal approval from the regulatory body. This accident might have been averted if the documents issued by the manufacturer had been read and assimilated by the TRTO's flying staff.

Most pilots now have access to the Internet and so the power of this modern communication medium is used by some aircraft manufacturers to make safety-related information available to pilots and technicians. In November 2004 Eurocopter launched a system known by the acronym T.I.P.I. (Technical Information Publication on Internet). The T.I.P.I system is described at http://www.eurocopter.com/ Applicants should select Services, Technical Publications, T.I.P.I. which will link them to the T.I.P.I. public space.

A personal subscription is available to owners and operators of Eurocopter products, maintenance centres, and representatives of official air navigation authorities. The system is free to the user and recipients can select the helicopter type or types which interest them. Thereafter, recipients can receive e-mail notification of the issue of new or revised technical documents. An example page sent by e-mail annotated with instructions and caveats is attached at Appendix B.

If all aircraft manufacturers made safety-related information available to those seeking it, pilots in particular would then be able to check a website to determine if new or revised handling advice had been issued in advance of a formal amendment to a Flight Manual. Moreover, pilots who hold a relevant type rating can register their e-mail address with the aircraft manufacturer so that they can be alerted to the issue of information appropriate to their needs. These methods could be more widely used to good effect. Consequently, it was recommended that:

Safety Recommendation 2006-005

The European Aviation Safety Agency should encourage all aircraft manufacturers to make available, for an appropriate period, via an Internet website, interim technical instructions, handling advice and similar safety-related information, until the information has been incorporated into the appropriate manuals by formal amendment.

1 GENERAL

This procedure allows training for hydraulic pressure failure on an AS 350 B3 which is equipped with a single hydraulic system.

In case of loss of hydraulic pressure (the HYDR red warning light illuminates and the gong sounds), the hydraulic pressure accumulators allow sufficient time to reach the recommended speed of 60 kt. Then the pilot must cut off the residual hydraulic pressure with the switch on the collective lever and apply the emergency procedure.

- Failure simulation (Figure 1)

In steady cruise flight, actuating the "HYD TEST" (1) pushbutton on the central console (2) produces the same effects as a real failure :

. The hydraulic pump pressure is by-passed.
. The main rotor accumulators give hydraulic assistance for a limited time.

The only difference from the real failure is that the tail rotor accumulator is discharged by this action and the pedal control loads are increased.

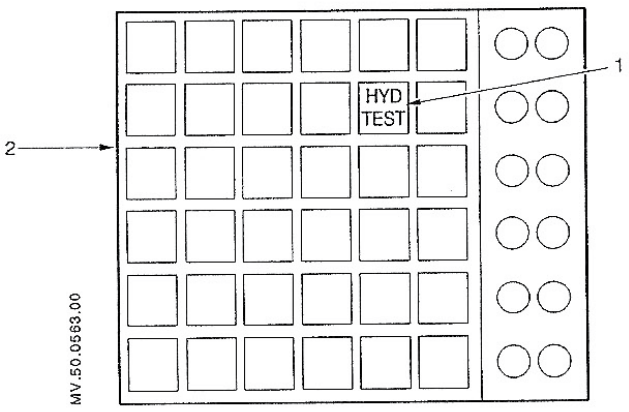

Figure 1

Appendix A

Extract from G-BZVG's Flight Manual

AAIB WARNING NOTE: - THIS SUPPLEMENT IS OUT OF DATE

FLIGHT MANUAL

2 TRAINING PROCEDURE (Figures 1 and 2)

In stabilized cruise flight conditions, depress the "HYD TEST" (1) (Figure 1) pushbutton.
The red HYDR light illuminates, the "gong" sounds immediately.
Reduce collective pitch to adjust airspeed around 60 kt.
Reset the "HYD TEST" (1) pushbutton (up position) to restore hydraulic pressure in tail rotor accumulator.
Cut-off the hydraulic pressure switch (Figure 2) on the collective lever, the control loads are felt within 1 or 2 seconds. The "gong" sounds again.
Apply the appropriate emergency procedure (red HYDR warning light) SECTION 3.3 page 2 of the present Flight Manual.

IMPORTANT : As specified in the emergency procedure :

- Make a no-hover slightly slipping landing with head wind.
- Do not hover or make forward flight without hydraulic pressure assistance.

After landing, and before any other take-off or hovering flight, reset the hydraulic pressure switch (3) forward to restore hydraulic pressure, check that the red HYDR light goes off within 3 seconds.

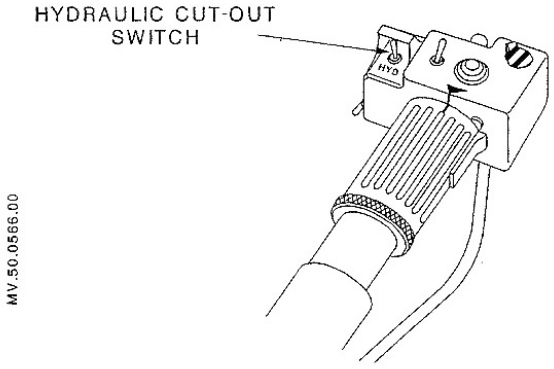

Figure 2

DGAC Approved: 350 B3 **SUP.7**

A | B | D | E | G 00-45 Page 2

Appendix A (Cont)

Extract from G-BZVG's Flight Manual

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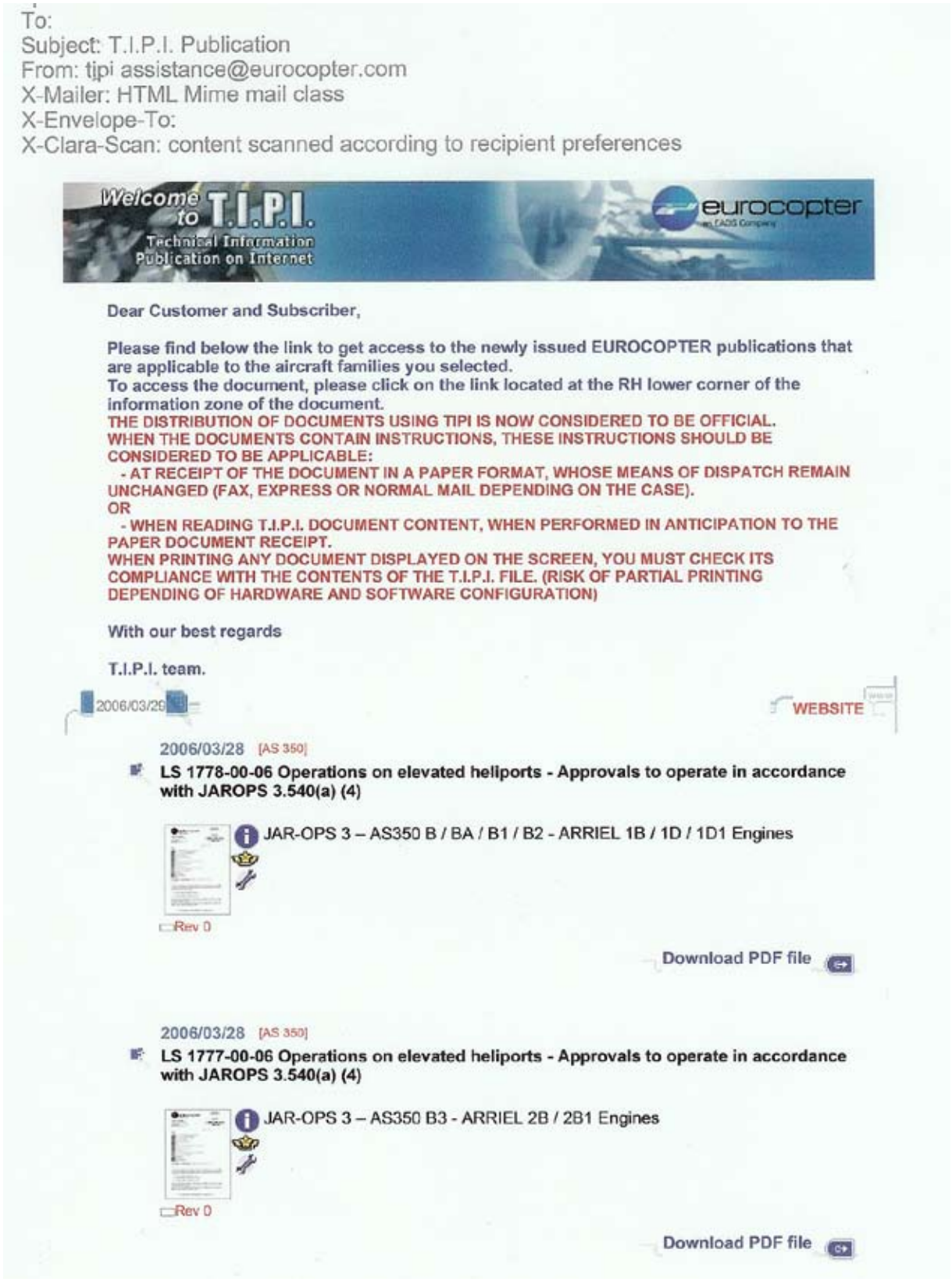

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2006/03/29 WEBSITE

2006/03/28 [AS 350]
LS 1778-00-06 Operations on elevated heliports - Approvals to operate in accordance with JAROPS 3.540(a) (4)

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Appendix B

Example E-mail alert generated by the T.I.P.I System