AIRCRAFT ACCIDENT REPORT 11/76

Department of Trade

ACCIDENTS INVESTIGATION BRANCH

Wessex 60 Series 1 G-ATSC
Report on the accident in the North Sea, north east of the River Humber estuary on 8 March 1976

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Department of Trade
Accidents Investigation Branch
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30 June 1976

The Rt Honourable Edmund Dell MP
Secretary of State for Trade

Sir

I have the honour to submit the report by Mr P J Bardon, an Inspector of Accidents, on the circumstances of the accident to Wessex 60, Model Series 1, G--ATSC which occurred north east of the River Humber estuary, on 8 March 1976.

I have the honour to be
Sir
Your obedient Servant

WH Tench
Chief Inspector of Accidents

Accidents Investigation Branch
Aircraft Accident Report No. 11/76
(EW/C554)

Operator:		Bristow Helicopters Ltd
Aircraft:	*Type:*	Wessex 60
	Model:	Series 1
	Nationality:	United Kingdom
	Registration:	G–ATSC
Place of Accident:		In the North Sea, 35 nm north east of the River Humber estuary 53° 43′ N 00° 56′ 04″ E.
Date of Accident:		8 March 1976 at 1317 hrs
		All times in this report are GMT.

Synopsis

The accident was notified by the Department of Trade on 8 March 1976. The Accident Investigation Branch carried out an investigation and the following groups were established: operations and engineering.

The accident happened when both engines stopped in rapid succession shortly after the helicopter had taken off from a gas rig platform in the North Sea. A successful ditching was carried out and all the occupants of the aircraft were able to escape unhurt and board the liferaft. After some 25 minutes they were picked up by a rig support vessel.

The accident was caused by the ingestion of the engine intake cover which the pilot had omitted to remove before take-off.

1. Factual Information

1.1 History of flight

The helicopter was operating in the West Sole area of the North Sea ferrying gas rig personnel between various platforms. It was due to return to its shore base at Easington near Humberside when the weather deteriorated to a visibility of ¾ nm in heavy snow. The pilot accordingly delayed his departure from platform A until the weather improved and during the time the aircraft was parked he fitted the engine intake cover. At about 1250 hrs, the weather was considered by the pilot to be suitable for flying and the passengers were called forward. The pilot ordered a further 200 lb of fuel to be put into the aircraft and whilst this was being done, he interrupted his external check to enter the cockpit to monitor the refuelling. Whilst he was in the cockpit he also amended the passenger manifest and as he did so, the platform superintendent indicated that all was ready for take-off. The pilot then started the engines and a few minutes later took off. The aircraft first flew to platform B and then to platform C, each flight lasting 2 and 3 minutes respectively, and embarked further passengers to a total of 13. At 1315 hrs the aircraft took off from platform C for Easington and climbed to a cruising height of 300 feet in conditions of moderate snow. As the aircraft was being levelled at 300 feet, the pilot heard a slight thump and thinking that this may have been due to ice on the rotor blades looked outside the cockpit to check. On resuming his instrument scan, he noticed that a light on the Centralised Warning Panel indicated that the port engine had flamed out. Assuming that this was due to snow ingestion the pilot immediately retarded the port engine speed select lever in the hope that the engine may not have fully run down. At the same time, he ordered the passengers via the intercom to put on life-jackets. He then turned the helicopter to port to return to platform C and as he did so, he heard another thump followed immediately by a loss of rotor rpm. The pilot at once initiated auto-rotation and within a few seconds the helicopter was close to the surface of the sea. He then flared the aircraft to reduce its speed to zero and after allowing it to drop about 15 feet, raised the collective lever fully. The aircraft dropped into the sea, which was calm, from about 15 feet. Initially the water rose to the level of the cockpit, but as soon as the flotation bags inflated, which they did immediately, the aircraft settled upright with about 12–18 inches of water in the passenger cabin.

Shortly afterwards all the occupants of the aircraft were able to disembark unhurt and board the liferaft. They were picked up some 25 minutes later by a rig support vessel.

The port wheel flotation bag failed about one hour after the aircraft had entered the water, allowing it to roll over and float with the tail rotor clear of the surface. The aircraft sank later that evening in 90 feet of water whilst an attempt was being made to tow it ashore. It was successfully salvaged and brought ashore 12 days later.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	–	–	–
Non-fatal	–	–	–
None	1	13	

1.3 Damage to aircraft

The aircraft was undamaged by the ditching but was subsequently destroyed by the effects of immersion and movement on the sea bed.

1.4 **Other damage**

None

1.5 **Personnel information**

Commander:	Age 54 years.
Licence:	Airline Transport Pilot's (Helicopters) Licence, valid until 24 July 1978.
Aircraft ratings (Group 1):	Westland Wessex 60 and S.55; Hiller 360; Bell 206A and B.
Certificate of Test:	Valid to 13 August 1976.
Instrument ratings:	Valid to 13 March 1977.
Medical certificate:	Valid to 31 August 1976.
Flying experience	
Total time as pilot:	7,467 hours.
Total time as helicopter pilot:	5,000 hours.
Time in command of Wessex 60:	1,148 hours.
Time in last 28 days:	37 hours.
Last rest period:	12 hours rest prior to accident flight.

1.6 **Aircraft information**

The aircraft is a single rotor helicopter powered by two coupled Rolls Royce Gnome engines. There is a single engine air intake built into the nose door structure facing forward and upward. Air is drawn down through a reverse curve and thence through a bell mouth on to the front of each compressor. No intake grill was fitted.

(a) Airframe:

Date of manufacture:	August 1966.
Certificate of Airworthiness (C of A):	Transport Category, (Passenger) valid until 13 October 1976.
Certificate of Maintenance:	issued 5 March 1976, valid until 4 April 1976 until 8,698 flying hours.
Total flying:	(1) since new: 8,650 hours.
	(2) since C of A renewal: 229 hours.
	(3) since last check 1:2 hours 40 minutes.
Maximum weight authorised:	13,600 lb.

Weight at take-off:	13,426 lb.	
Centre of Gravity range:	+7.5 in. to –4.0 in.	
Accident Centre of Gravity:	+4.5 in.	

(b) Engines: Two Rolls Royce GNOME H.1200 Mk.660.

	Port	Starboard
Serial number:	290014	280022.
Last complete overhaul:	16 January 1975	13 June 1975.
Time since overhaul:	740 hours	55 hours.
Last check 1:	5 March 1976	5 March 1976.
Time since last check 1:	2 hours 40 minutes	2 hours 40 minutes.

(c) The engine intake cover which fits externally over the nose of the aircraft was of the loose fabric type. It is secured by press studs along its forward lower edge and a strap at each side is looped around the intake door handles and attached by hooks and buckles. The upper edge of the cover is not secured.

1.7 **Meteorological information**

The forecast for the West Sole area the period 0600 hrs to dusk on 8 March and received by the pilot was as follows:

Situation:	The area was affected by a cold unstable north easterly airflow.
Winds:	Surface 030°/050° 7-12 knots. 500-2,000 feet 040°/10-15 knots.
Cloud:	5-8/8 Strato cumulus and cumulus base 3,000 feet; tops, 5,000 feet. In showers; base 500-800 feet; tops, 8,000 feet.
Visibility:	6-12 km reducing to 3,000-5,000 m in snow and at times to 1,000 m or less.
Weather:	Occasional snow showers, moderate and prolonged at times.
Freezing level:	500 feet.
Icing index:	Moderate to severe in cloud.
Warnings:	Snow with low cloud and poor visibility.

The actual conditions at the time of the accident were substantially as forecast with light to moderate snow and 1-1½ nm visibility. The sea was calm with a slight swell and the surface was lightly ruffled by a slight breeze.

The accident occurred in daylight.

1.8 **Aids to navigation**

Not applicable.

1.9 **Communications**

The aircraft operated in visual flight conditions around the various platforms in the gas field maintaining RTF watch on 123.45 MHz with which the platforms were also equipped.

On leaving the field to return to Easington the aircraft would normally have established HF contact with North Denes, but the accident happened before this was done. However, when the first engine stopped the pilot was able to advise platform C on 123.45 MHz that he was returning. When the second engine failed the pilot made a MAYDAY call on the same frequency. The MAYDAY message was received by platform A and 'HUMBER RADIO' which re-broadcast it a few minutes later. The superintendent of platform A alerted the rig support vessel *Margaret Christina* which reached and rescued the survivors 25 minutes later.

1.10 **Aerodrome and ground facilities**

Not relevant.

1.11 **Flight recorder**

Not fitted and not required.

1.12 **Wreckage**

The aircraft, which was equipped with a DuKane Underwater Acoustic Beacon, was located in 90 feet of water by a salvage vessel using the complementary locator system. After recovery the wreckage was transported to Paull airfield. Examination showed that the aircraft which was intact and undamaged on ditching had sustained considerable damage due to bumping and rolling on the sea bed under the influence of the tidal currents. The main rotor blades were broken off, the rear fuselage severed, the cockpit roof and windscreens smashed, and the nose intake door stove in. The structure generally was severely corroded.

Some fabric material could be seen through a small hole in the nose intake door. When the door was removed the fabric air intake cover was found jammed across the face of both engine compressors. The left engine compressor was completely blocked by the cover. The right compressor was only partially blocked but the starboard securing strap and buckle of the cover had been ingested into the engine causing damage to the inlet guide vanes and the first compressor stage.

1.13 **Medical and pathological information**

Not applicable.

1.14 **Fire**

There was no fire.

1.15 **Survival aspects**

The accident was survivable and none of the occupants of the aircraft was injured.

When the first engine stopped the pilot warned the passengers on the intercom to put on their life-jackets. When the second engine stopped the pilot put the helicopter into

auto-rotation and made a MAYDAY call on his working frequency. He then carried out a successful ditching. The helicopter initially sank until the water was up to cockpit level but then rose as the floats deployed until there was about 12 to 18 inches of water in the cabin. The floats which had been armed since take–off, deployed automatically after entry into the water. The cabin door was not opened until after ditching.

Only one passenger was wearing an immersion suit. Several of the other passengers with life-jackets on did not inflate them until reminded by the pilot and two passengers had no life-jackets on when the aircraft ditched. The life-jackets were stowed underneath the seats and those not retrieved before the ditching were by then under water and difficult to locate. After stopping the rotor the pilot gave instructions for the liferaft to be launched, and this was done by some of the passengers. However, before it was fully inflated some of the passengers jumped on to it, and in doing so sat on the roof canopy and thereby interfered with its correct deployment. Subsequently the pilot, after first entering the cabin to retrieve life-jackets for the two passengers who were without them, got the passengers properly embarked inside the raft. He then placed the search and rescue beacon (SARBE) in its correct housing and switched it on. Afterwards he retrieved the leak stoppers and the emergency flares. One tear in the side of the raft was successfully plugged using a leak stopper, and two other apparent leaks were covered by hand. It was later realised that these other two leaks were relief valves blowing off in the central pillar because survivors sitting on it prevented it from inflating correctly. Attempts to top up the inflated sections proved impossible because the correct pump adaptor appeared not to be available.

When it was found that the rotor blades were flapping close to the survivors' heads, the dinghy was cut adrift from the helicopter and paddled some 50 metres or so away. By this time it was snowing quite heavily and the visibility had deteriorated. A red flare and a single rocket were fired off in an effort to attract attention. In the meantime the rig support ship *Margaret Christina* had been advised of the ditching by the rig radio operator. It was then about 4 miles from the helicopter, but reached the scene in 25 minutes. The helicopter was on the ship's radar at about a mile and then both it and the dinghy were sighted visually at about ½ mile range. When the survivors saw the faint outline of the ship in the snow and haze they fired off a second flare and rocket. The support ship was not equipped to receive SARBE transmissions, and none were received by any of the three RAF Search and Rescue helicopters, which arrived overhead shortly after the survivors had been rescued. It was established later that the helicopter's SARBE transmitter was unserviceable due to water causing an aerial short circuit. This defect has since been remedied on all the operator's SARBE units by applying a coat of varnish to the head of a screw on the aerial unit.

Whilst it did not affect the rescue in this case it was found that the rig platforms were not equipped to contact the RAF Search and Rescue helicopters on Channel 16.

1.16 **Tests and research**

Nil.

1.17 **Additional information**

Nil.

1.18 **New investigative techniques**

Nil.

2. Analysis

The stoppage of both engines within a few seconds of each other was positively established as being due to the ingestion of the engine air intake cover which had inadvertently been left in position by the pilot.

It was remarkable that the engines apparently operated normally with the cover in position whilst the helicopter was being flown between platforms A and B and thence to C and presumably they would have continued to do so for the remainder of the flight to Easington had the starboard securing strap not become undone. Presumably the engines were able to operate with the cover in position because sufficient air could be drawn across its unsecured upper edge.

The pilot had in fact fitted the cover once before earlier in the day and on that occasion had remembered to remove it before take-off. There are a number of possible reasons why he failed to do so on the second occasion.

Firstly, his external check was interrupted by the need to board the aircraft to monitor the refuelling. It has been well established that the interruption of a check can be a common source of error.

Secondly, the cover is normally fitted and removed by ground crew personnel during overnight stops. It is not normally fitted during transit stops unless snow is falling, as it was on this occasion. Therefore the fitting and removal of the cover by the pilot was an infrequent occurrence and the necessity to check it before each flight would not have been uppermost in his mind.

Thirdly, having entered the cockpit initially to monitor the refuelling, the pilot's attention was further distracted by the requirement to amend the passenger manifest. Shortly after that, his attention was directed towards the arrival of the passengers themselves and he then received the platform superintendent's signal that all was ready for flight. By this time the pilot clearly had entirely forgotten that he had not completed the external check before boarding. The cover itself cannot be seen from the cockpit and there was nothing to indicate to the pilot that it was still in position. It is surprising however that none of the rig personnel noticed that it was still on. Even if it had subsequently occurred to the pilot that he had not positively checked that the cover had been removed, he would probably not have been unduly concerned since he could have reasonably assumed that the engines would not start with it in position. The operator is now considering the provision of a suitably conspicuous hard cover for the engine air intake which would certainly prevent the engines from being started. This will doubtless prevent a similar accident happening again, though obviously in no way does it obviate the necessity for an external check.

The ditching appears to have been skilfully carried out by the pilot though the circumstances of the evacuation contain some worrying features. Had the sea not been calm and had the aircraft not floated upright for a reasonable length of time, there could have been some risk to life by the confusion over the life-jackets and the apparent lack of understanding on the part of the passengers as to the mechanics of the liferaft inflation. As it was, there was no serious risk to life, largely due to the actions of the pilot who took immediate and effective control of the evacuation.

G–ATSC was the only aircraft operated by the Company in the North Sea in which the passengers' life-jackets were stowed under the seats. The aircraft was due to be modified in line with the remainder of the Company's aircraft which have the life-jacket stowed in pouches on the seat backs and which the passengers have to remove and secure around their waists before they can sit down comfortably. This will certainly prevent a recurrence of the problem of finding and fitting the life-jackets which the passengers

experienced on this occasion. As regards the boarding of the liferaft by the passengers before it was fully inflated and thus preventing its proper deployment, it would seem that the only solution is to brief rig personnel fully as to the characteristics of the life-raft and its operation. How this briefing is best done is a matter for consideration by the operator and the companies concerned.

3. Conclusions

(a) Findings

(i) The pilot was properly licensed and experienced on the type.

(ii) The aircraft had been maintained in accordance with an approved maintenance schedule and its documentation was in order.

(iii) The pilot had fitted the engine intake cover to prevent snow ingestion whilst the aircraft was parked on the platform.

(iv) It was the pilot's responsibility to ensure that the cover was removed before flight but he forgot to do so when he was distracted by other considerations.

(v) Both engines stopped when the intake cover broke loose during flight and was ingested into the engine air intakes.

(vi) The ditching was carried out skilfully by the pilot from a low altitude without damage and with no injury to the occupants of the aircraft.

(vii) Difficulty was experienced by some of the passengers in finding and donning their life-jackets and the liferaft was boarded prematurely before it had fully inflated.

(b) Cause

The accident was caused by ingestion of the engine air intake cover which had inadvertently been left in position by the pilot, resulting in the stoppage of both engines whilst the aircraft was over the sea.

4. Safety Recommendations

4.1 It is recommended that the operator arranges with the companies concerned for the training of all rig personnel who are carried in helicopters, in the deployment and operation of the aircrafts' liferafts with particular emphasis on acquainting these personnel with the appearance of a fully inflated liferaft and the correct method of boarding it.

P J Bardon
Inspector of Accidents

Accidents Investigation Branch
Department of Trade

June 1976

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