No: 10/92 **Ref: EW/G92/08/16** **Category: 2c**

Aircraft Type and Registration:	Robinson R22 Beta, G-OSHL
No & Type of Engines:	1 Lycoming O-320-B2C piston engine
Year of Manufacture:	1989
Date & Time (UTC):	14 August 1992 at 1743 hrs
Location:	Near Roade, Northamptonshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Substantial
Commander's Licence:	Private Pilot's Licence (Helicopters)
Commander's Age:	39 years
Commander's Flying Experience:	Approximately 2,000 hours (of which 1,800 on type) Last 90 days - 34 hours Last 28 days - 11 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot, an engineering report from the operators maintenance organisation, a meterological aftercast and enquiries by an AAIB Inspector

The helicopter was on a private flight from Hinton-in-the-Hedges to Sywell, flying in the cruise at 1000 feet agl, heading 060°, 85 kt IAS and with a power setting of 22 inches manifold pressure. The first indication of a problem was described as 'twitching' of the helicopter in yaw, similar to that felt when there is a spark plug problem. The pilot lowered the collective lever to a power setting of approximately 13 inches manifold pressure. The engine ran smoothly again, and so he brought the power back up to 22 inches. The engine performed perfectly for approximately 30 seconds. However, the helicopter then yawed violently to the left, some 90° from the original heading. The indicated airspeed at this time was approximately 85 kt. The low rotor speed warning horn sounded. The pilot applied right pedal, lowered the collective lever and opened the throttle. He estimated that the main rotor RPM decayed to approximately 90%. A Mayday call was transmitted to Sywell at 17:43 hrs on 122.7 MHz. The helicopter was still yawing markedly and the pilot had difficulty in maintaining heading. He then closed the throttle, since he had noticed that both the rotor and engine RPM pointers were indicating in excess of 110%. The yawing then ceased and he set the helicopter up for an 'engine-off' landing. At about 300-500 feet, he checked the engine indications and noticed that it was idling at approximately 75%. He decided to raise the collective lever to utilise some power.

However, on doing so the helicopter again yawed violently to the left and the engine stopped, confirmed by the engine RPM indicator and illumination of the low oil pressure warning light. Some rotor RPM was lost during this manoeuvre and the low rotor speed warning horn again sounded. However, the rotor RPM had recovered to approximately 100% by the time the pilot had to initiate the flare. Due to the lack of any headwind he flared the helicopter for as long as possible to reduce any 'run-on'. The helicopter was levelled and a smooth touchdown was achieved, with very little forward speed.

The helicopter travelled approximately 12 feet before the landing skids contacted a ridge of soft earth. Although the helicopter had almost stopped at this point, it pitched forward and rolled onto its right side. The pilot switched off the electrics and the passenger switched off the fuel. They were both uninjured and vacated the helicopter via the left hand door.

The helicopter was subsequently recovered to the operator's maintenance base where a detailed examination and engine runs were carried out. The following is the report made by the engineering organisation that carried out this examination.

"The engine was visually inspected in the airframe and apart from a small amount of damage to the Cooling Fan, it was found in a condition to try and run. Prior to starting the engine, it was turned by hand to check on freedom of rotation.

The engine started normally and ran at 52% ERPM. The engine note was not normal and a large amount of oil was seen to be coming from the exhaust attachment to the stubb assembly points on No's 2 and 4 cylinders and from the exhaust tail pipe. White smoke was also seen to be coming from the exhaust tail pipe. The engine was shut down on the mixture control.

As the oil could have been the result of the helicopter lying on its side for approximately one hour, the bottom spark plugs (4-off) were removed. No's 2 and 4 plugs were found to be heavily contaminated with oil as were the inside of the cylinders. The plugs and cylinders were cleaned and the plugs refitted.

The engine was run again with the same result. Large amounts of oil and smoke coming from the exhaust system. The engine was kept running to try and clear any unburnt oil in the exhaust system but the longer it ran, the more oil and smoke was emitted. The engine was again shut down using the mixture control. Some seven ground runs of the engine were carried out, all with the same results.

The cylinders were removed from the engine and inspected (4-off). There was evidence of blowby in No's 2 & 4 cylinders but not considered excessive. There were no broken rings in any of the cylinders and no reason could be found as to why the oil was being induced into the exhaust system. It should also be noted that the exhaust valves operated satisfactorily ie. no evidence of sticking. No failure of any description was found inside the crank case. The oil sump was removed for inspection

and found to be serviceable as were the mags and carburettor. They all indicated that they had been and were operating satisfactorily.

The only area other than the cylinders where oil was found in quantity was the carburettor, the venturi being heavily contaminated and oil had dropped down from this area and was lying in pools on the air filter housing floor. It was noted that the oil had a blue colour, indicating it had been mixed with fuel which had evaporated and just left the blue dye.

The results of the inspection of the engine are inconclusive."

An aftercast from the Meteorological Office at Bracknell gave the following weather:
Synoptic Situation: The situation at 1800 UTC showed a ridge of high pressure extending northeastwards across England and Wales with a light northerly airflow over the Roade area.

Visibility: 30 km or more
Weather: Nil
Mean Sea Level Pressure: 1017.5 mb
Cloud: SCT CUSC base 4000 feet

	Winds:	Dry temp:	Dew point:
Surface	360°/07 kt	+16°C	+6°C
1000 feet		+11.5°C	+3°C
2000 feet	320°/10 kt	+9°C	+3°C

Remarks: Nil

These readings were plotted on a Carburettor Icing Probability Graph and are shown at figure 1.

CARB ICING

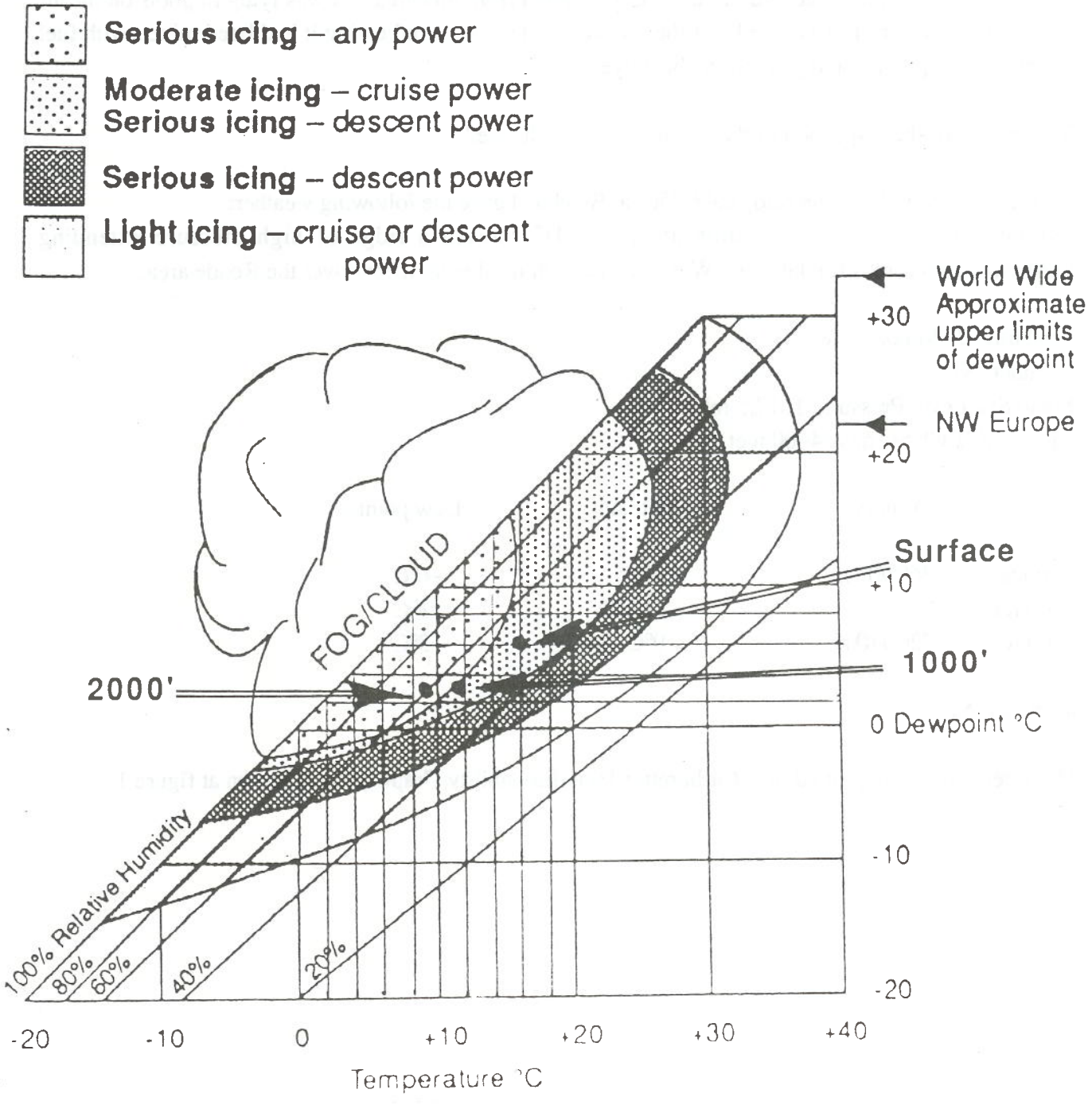

FIGURE 1. CARBURETTOR ICING PROBABILITY GRAPH