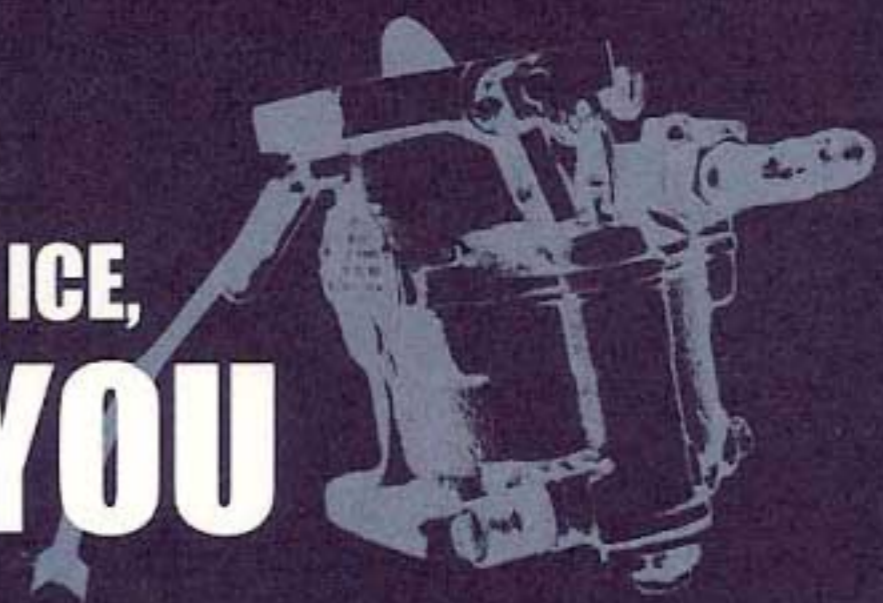
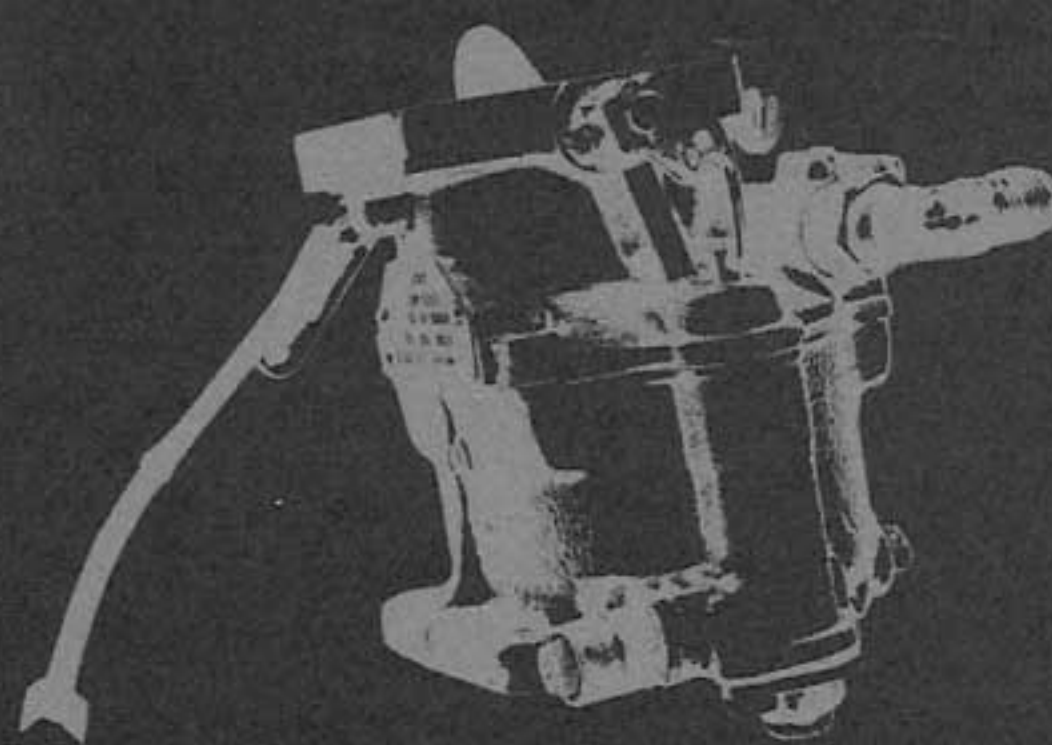


MORNINGTON-SANFORD AVIATION

**NO** ICE,  
THANK **YOU**



# NO ICE, THANK YOU



## Contents

### PROFILE

### INTRODUCTION

### ICING AREAS WITHIN THE CARBURETTOR

### PILOT DEFENCE EQUIPMENT

### INFORMATION FOR THE HELICOPTER PILOT

#### How, When and Why

### PREVENTION

#### Ground checks

#### Pre-takeoff

#### Hovering

#### Climb out

#### Cruise flight

#### Descent

### WHAT HAPPENS IN FLIGHT?

#### What should the pilot do?

#### Gusting/Turbulent Condition

### THE CARBURETTOR HEAT ASSIST SYSTEM

### THE EFFECT OF CARB HEAT ON POWER

#### Approximate M.A.P. Variation with Carb Heat

#### Robinson R22 Beta with:

LYC 0-320-B2C Engine

#### Robinson R22 Beta II with:

LYC 0-360-J2A Engine

#### Robinson R44 Astro/Raven with:

LYC 0-540-F1B5 Engine

## PROFILE

Richard Mornington-Sanford has thirty five years of experience in the aviation industry, 25 of these are with the Robinson product.



A CAA licensed helicopter engineer, flight instructor and Air Accident Investigator, his unique combination of expertise means that he is in demand from countries worldwide.

Richard is passionate about flight safety and devotes a considerable amount of time to that cause.

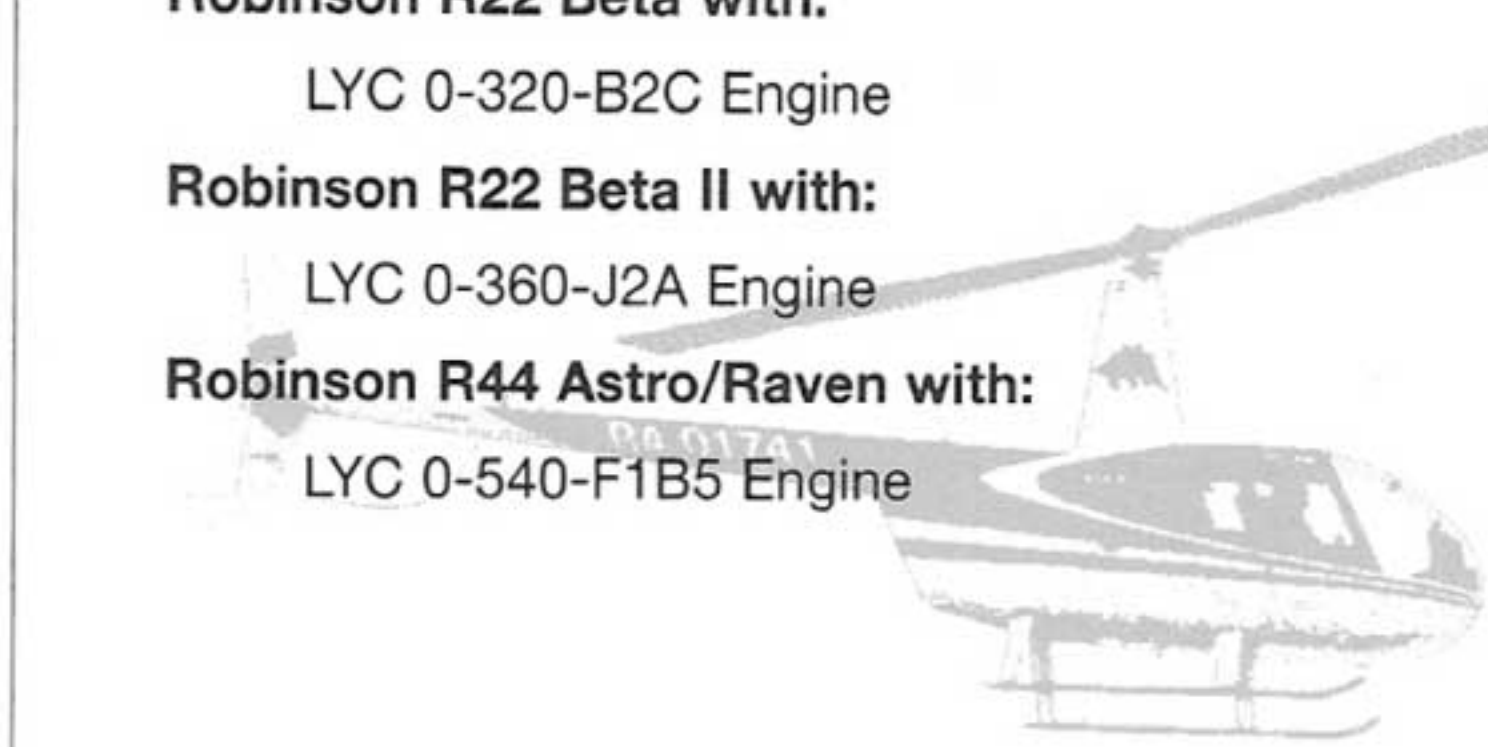
"Flight safety is predominately about the pilot's awareness and their capacity to react correctly and deal with in-flight problems. The more aware the pilot is of the aircraft they fly, the less likely they are to over react to a benign indication and potentially turning it into a life threatening situation. We tend to spend a great deal of time and effort practicing for engine failures when statistically they are not one of the main causes of fatal accidents, however practising for the engine failure is one of the main causes of training accidents, do not stop practicing autorotation's but do find out what kills helicopter pilots."

Richard also conducts the Robinson R22/R44 Maintenance Course and the European Robinson R22/R44 Pilots Flight Safety Course.

Phone/fax +44 1604 407113

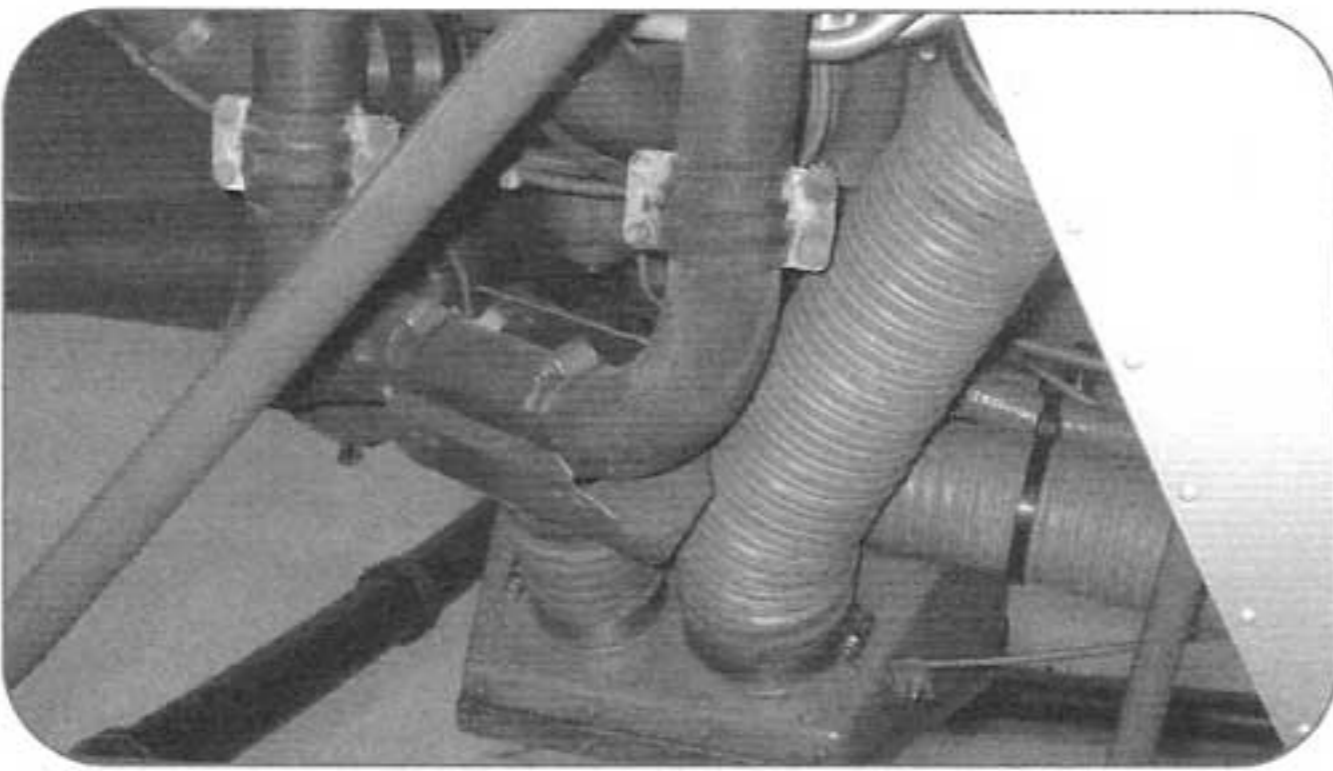
Web site. [www.morningtonsanfordaviation.co.uk](http://www.morningtonsanfordaviation.co.uk)

E-mail. [flightsafety@sanford.f9.co.uk](mailto:flightsafety@sanford.f9.co.uk)



## PILOT DEFENCE EQUIPMENT

To prevent the carburettor from icing, all piston engine installations are equipped with a system for preheating the incoming air supply to the carburettor (carb heat). This will allow sufficient heat to be added to replace the heat loss caused by the venturi/vapourisation effects; thus preventing the temperature within the carburettor from dropping to or below the freezing point of water. These carburettor heat systems are essentially a scoop, tube or jacket through which the exhaust pipe from one or more cylinders is passed. This air is heated by the exhaust system and ducted into the carburettor via the air filter housing; the pilot has full control of this heated air and can select full cold, partial, or full hot via a control in the cockpit. Most helicopter systems are designed so that the air supplied for carburettor heating is filtered.



One of the main differences between the use of carburettor heat in a helicopter against that of an aeroplane is that we can use "partial heat" whereas the aeroplane pilot should only use full hot or full cold. This operational difference is due to the helicopter being equipped with a carburettor air temperature (CAT) gauge in the cockpit, which allows the pilot to monitor the temperature within the carburettor. The reason for this anomaly is that an unknown amount of partial heat can actually cause induction ice in the carburettor, particularly where there is moisture in the incoming air in the form of ice crystals, these would ordinarily pass through the induction system without a problem (ambient temperature of  $-10^{\circ}\text{C}$  or below). Partial heat melts these crystals and they then re-form as ice on the butterfly valve.

## INFORMATION FOR THE HELICOPTER PILOT

Typical information on the use of carburettor heat states that during take-off the carb heat control should be selected to the full cold position as the possibility of icing at wide throttle openings is very remote; so remote, that it can be disregarded. This might be true of a fixed-wing aircraft where take-off power is usually full throttle, but what about helicopters with de-rated engines? (see Fig 2).

The engines in the Robinson R22 and R44 have been de-rated so your take-off power will mean you only have partial throttle openings. You can get carburettor icing during take-off. (see Fig's 2, 3 and 4 Refer to RHC Safety Notice No 25).

**Butterfly Angle vs Manifold Pressure**

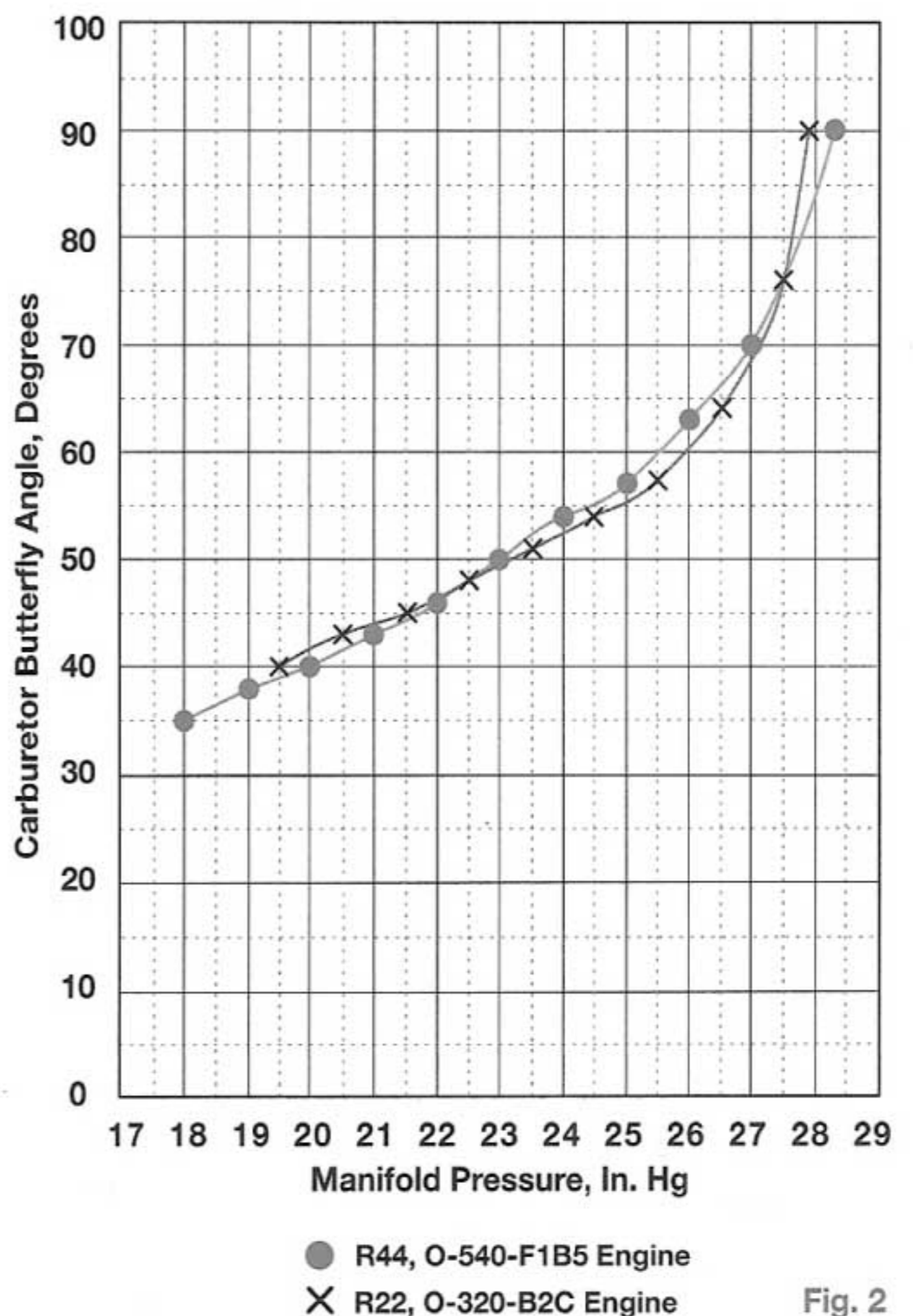


Fig. 2