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AEROPLANE BOUNCED LANDINGS - AVOIDANCE AND RECOVERY TECHNIQUES

1 Introduction

1.1 Following an accident to an ATR-72 aircraft at Guernsey Airport, the UK Air Accidents Investigation Branch (AAIB) issued a Safety Recommendation that the UK Civil Aviation Authority should require UK aircraft manufacturers, operators and training providers to issue appropriate guidance to pilots in the techniques for recovering from bounced landings. The AAIB report noted that 'The aircraft bounced on touchdown due to insufficient landing flare being applied. In an attempt to cushion the second touchdown the co-pilot, who was the handling pilot, over-pitched the aircraft resulting in the tail bumper making contact with the runway surface.'

1.2 This Circular has been produced in response to that recommendation and provides generic guidance to pilots concerning aircraft handling following a bounced landing. Although the contents relate predominantly to landings in multi-pilot aeroplanes with all engines operating it is more generally applicable.

1.3 For the purposes of this Circular:

(a) A 'balloon' is a gain in height after the flare has been commenced, without ground contact;

(b) a 'float' is an excessively prolonged flare in which landing does not occur at the intended touchdown point;

(c) a 'bounce' is a pronounced height gain following touchdown.

2 Guidance and Training

2.1 Unfortunately it is not possible to conduct practical training of this nature safely in an aeroplane. Furthermore, even in many full flight simulators, the limitations of ground modelling do not enable a realistic bounce to be simulated. It is therefore likely that training will have to be conducted by briefing, discussion and confirmation of understanding. Many operators routinely incorporate such discussions prior to approach and landing training in the aeroplane, and the CAA encourages this practice.

2.2 Specific considerations and recovery techniques vary between different aircraft types, and therefore a Circular cannot offer precise guidance. Training providers, pilots and aircraft manufacturers are recommended to consider the following:

(a) A stabilised, trimmed, aligned approach adhering to the correct glidepath and flown at the correct approach speed will significantly reduce the possibility of a balloon, extended float or bounced landing. Avoidance is preferable to recovery;

(b) the manufacturer's recommended landing technique should always be taught and used;

(c) pilots must know maximum and minimum safe touchdown pitch attitudes (for tail and nosewheel protection respectively) for their aeroplane type/variant;

(d) a significant bounce, although an unlikely occurrence in most large aeroplanes, usually results from insufficient landing flare or excessive touchdown speed;

(e) pilots and training providers should seek manufacturers' advice with regard to recommended balloon and bounce recovery techniques. Manufacturers should address these issues and other specific considerations in appropriate guidance material.

2.3 Correct judgement as to whether to land or go-around following a balloon, extended float or bounced landing is vital and must be addressed in training. In general, a go-around will almost certainly be necessary in all cases.

2.4 Each of the three following circumstances carries an attendant serious risk:

(a) An excessively deep landing, possibly with insufficient runway length remaining;

(b) touchdown in an incorrect pitch attitude (nose high, with attendant risk of tailstrike, or nose low, with the risk of damage to the nose landing gear); and

(c) touchdown at a high rate of descent, with the risk of structural damage.

2.5 The **need for the monitoring pilot to be assertive**, calling 'Go around' when appropriate, should be emphasised during training.

3 Conclusion

3.1 It is important to adhere to manufacturers' advice. It is likely, however, that when a go-around is initiated following balloon, extended float or bounced landing the aeroplane will be very close to the ground at an airspeed that may be below V_{REF}. In this situation, in most types, the initial actions should be to apply go-around thrust and maintain the present pitch attitude, without changing the flap configuration. Only when the aeroplane has been accelerated to a safe speed should a go-around pitch attitude be selected and subsequent go-around actions, flap selection, landing gear retraction etc, be carried out. If the aeroplane is rotated to a go-around attitude and/or go-around flap selected at too low an airspeed, the situation is likely to be exacerbated by further speed reduction and the possibility of a tailstrike.

3.2 A distinction should be made between a light skip resulting in minimal height gain, which might occur after an otherwise normal touchdown in some aeroplane types, and the pronounced bounce of the type discussed above. Provided a landing in the runway touchdown zone can still be achieved safely following a light skip, a go-around may not be necessary, in which case the aeroplane should be held in the landing attitude and power applied if required.

4 Recommendation

4.1 The CAA recommends that Type Rating Training Organisations and aircraft operators ensure that all pilots are provided with initial and recurrent training in bounce avoidance and recovery techniques specific to the aeroplane type and variant.

This Circular is issued for information, guidance and necessary action.

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