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## SERVICE LETTER

IMPORTANCE	ADVISORY
AREA AFFECTED	Pilots' Operating Handbook – CG go/no-go graph
SA/B NUMBER	SL 020-10-2023
EFFECTIVE DATE	4 October 2023

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## 1. Applicability:

All BushCat/Cheetah XLS aircraft operating on any of the following POH versions:

BCPH-NT-012-001	BCPH-NT-012-001-1
BCPH-NT-012-002	BCPH-NT-012-002-1

All aircraft operating according to these POH versions should, by definition, also have the following features installed. This may either be by upgrade kits, or if they were built on a standard that incorporated them: the improved empennage and control surface systems along with the relevant fuselage modifications, vortex generators, the new pitot tube, and be built according to the factory specification, either from the factory or as provided in the relevant build and upgrade manuals.

If there is any doubt as to whether a particular aircraft does meet these requirements, please contact the factory.

## 2. Subject:

Revision and expansion of the Mass vs CG location go/no-go graph.

## 3. Purpose:

This advisory service letter serves to inform owners of a change in the allowable CG location range for aircraft built according to or upgraded to the improved aircraft design standard. This is based on the proven safe flight envelopes tested during the flight-testing programme done on the aircraft.

## 4. Background:

During the extensive flight-testing programme of the aircraft, there was a great deal of analysis done to ensure the safe continued flight and operation of the aircraft with the upgraded and modified features incorporated into the improved design.

These features included the new aerodynamic control surfaces on the wings, as well as the new empennage and associated systems. These also incorporated the fuselage modifications to allow the safe and secure attachment of the new systems, as well as the addition of the dorsal fin. In addition to these larger hardware upgrades, there was also the requirement to fit vortex generators to the top of the wings, as well as the improved pitot tube system.

During different phases of testing, the mass vs centre of gravity envelope was modified according to what had been tested and demonstrated to be safe. This was done in a very conservative manner. However, when the versions of the POH listed above were published, some of the analysis of the data accumulated had not been completed. This data is now ready for publication, and in lieu of a full new POH (which will be published in due course, and will incorporate all the relevant results), the new Mass vs. CG location go/no-go graph (Figure 7.1, on page 65 in the POH versions mentioned above) is published here. This will allow an expanded, safe flight and operation of the aircraft which are built incorporating the improved design features.

## 5. Preliminary Notes and Nomenclature:

The aircraft weighing procedure has not changed, and the aircraft will still need to be weighed in the correct manner, levelling and measuring as stated in the manuals already published.

The following term definitions are first being stated here, in order to ensure the correct understanding of the limits of the new graph:

**Centre of Gravity of the aircraft (CG)** may be defined as the point where negative and positive moments are in equilibrium. If the aircraft is suspended at that point, it would have no tendency to pitch its nose up or down and would remain balanced. The mass of the aircraft is assumed to be concentrated at its **CG**.

**CG Range** is the allowable variation in the CG location. CG location can be affected by variations in loading of aircraft: e.g. weight of occupants, fuel, and baggage. Since CG limits define the range of allowable variation of the CG without making the aircraft unstable and unsafe to fly, the CG of a loaded aircraft must remain within these limits.

**Forward and Aft CG** is the most forward and the most rearward allowable CG limits of the aircraft. These limits are defined by the design of the aircraft and should never be exceeded under any circumstances.

**Mean Aerodynamic Chord (MAC)** is the mean chord of the wing. For mass and balance purposes MAC is used to determine the CG range of the aircraft. Mean Aerodynamic Chord for BushCat aircraft is 1508mm.

**Maximum Gross weight** of the aircraft is the maximum weight of the aircraft and its "contents" authorized for flight by its design limitations and applicable regulations.

**Nil Fuel Empty Weight (NFEW)** of the aircraft includes all operating equipment which is permanently fitted in the aircraft. The NFEW excludes all fuel (including unusable), but engine oil and brake fluid must be included.

**Minimum Zero Fuel Weight (Min ZFW)** of the aircraft is the minimum weight that the aircraft must be loaded to prior to accounting for the weight of any fuel. This equates NFEW + Occupants + Baggage.

**Useful load** is calculated by subtracting the Nil Fuel Empty Weight *and unusable fuel* weight from the maximum allowable gross weight of the aircraft. This load consists of occupants, usable fuel, and baggage.

**All of this assumes that the CG calculation of the aircraft has been done according to the correct methodology, as stipulated in the aircraft build and maintenance manuals.**

## 6. New CG Limits and Graph:

The centre of gravity position limits are given below as distances aft from the wing leading edge:

	<u>Forward limit</u>	<u>Aft limit</u>
<b>600kg (1320lb)</b>	445mm (17.5in) (29.5%MAC)	588mm (23.1in) (39.0%MAC)
<b>445kg (981lb)</b>	389mm (15.3in) (25.8% MAC)	539mm (21.2in) (35.8% MAC)

## Mass Limits

The mass limits applicable to the loading and operation of the aircraft are shown below.

Maximum Take-off Weight:	600kg <sup>2</sup>	1320lb
Maximum Landing Weight:	600kg	1320lb
Minimum Zero Fuel Weight:	445kg <sup>1</sup>	981lb
Maximum Upper Baggage Weight <sup>4</sup> :	25.0kg	55lb
Maximum Lower Baggage Weight <sup>4</sup> :	20.0kg	44lb
Maximum Fuel Mass <sup>3</sup> :	69kg	152lb

Notes:

- 1) The minimum flying weight of the aircraft is specified as the minimum weight that the aircraft must be loaded to before any fuel weight is accounted for.
- 2) This is the maximum structural gross mass of the BushCat. The maximum allowable mass of the BushCat may vary depending on the country of the individual registration, and the category of aircraft under which the individual aircraft is registered, but in no instance shall be greater than 600kg.
- 3) Assuming an average fuel density of 0.734kg/L (6.126lbs/US Gallon) at the maximum tank capacity of 94L.
- 4) These limits apply to the closed luggage compartments. If the older open ones are installed, the limits stated in the POH for those must be used.

## 7. Required Action:

The aircraft can still be safely operated with the envelope published in the POH versions above. However, should the operator desire, this serves to provide a new envelope that can be substituted for the published one, provided that the aircraft does meet the described standard.

## 8. Effective date:

This notice takes effect as of the 4<sup>th</sup> of October 2023.

## **9. Contact:**

Questions and/or comments regarding this advisory service letter should be directed to Rainbow SkyReach (Pty) Ltd on:

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