Saab 340A Speed Cards Guide

Reflected Reality Simulations

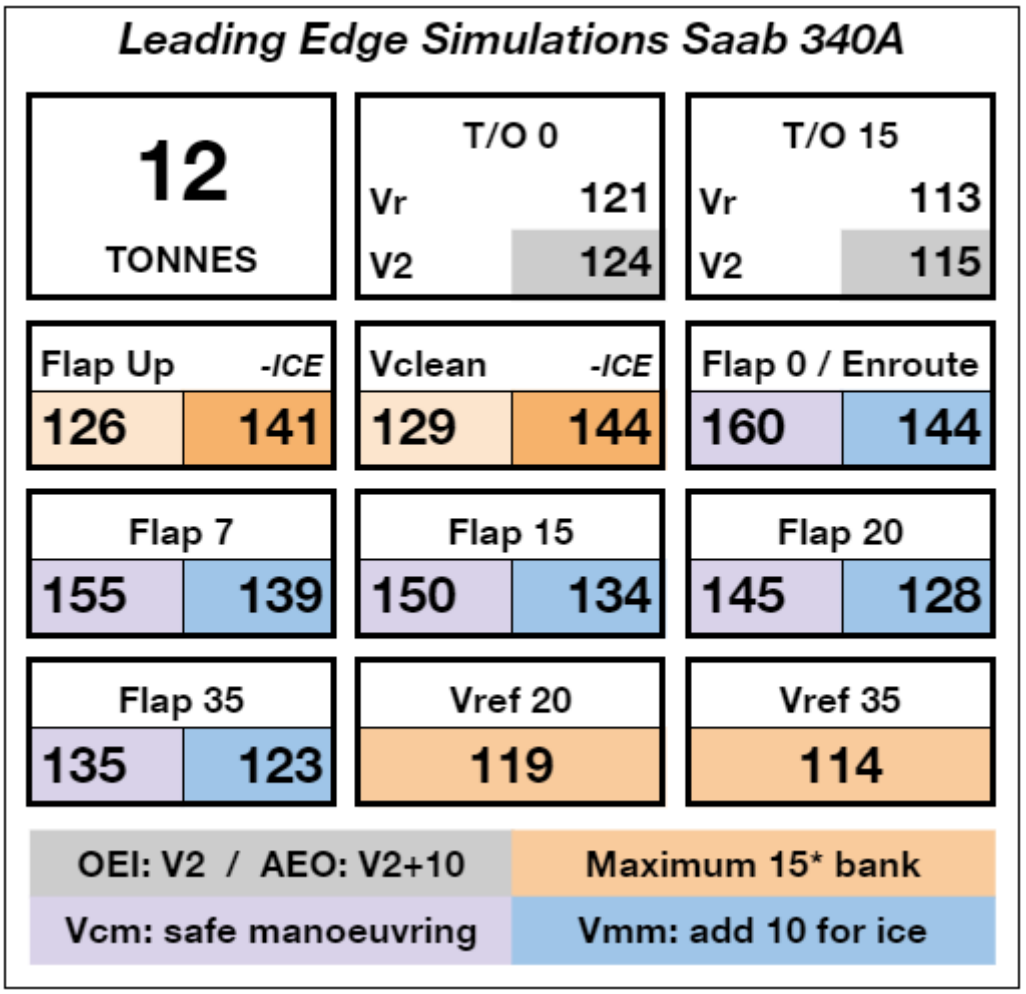
Leading Edge Simulations Saab 340A v1.6.5, X-Plane 11

Reflected Reality?

YouTube has made it possible for sim pilots the world over to share their enthusiasm and flights with fellow flyers, and that's a great thing. I started "proper" flight simming in 1991 with FS4 on the PC, and before that many other 8 bit flying games. I'm fortunate now to be employed flying the Airbus A320 series all across Europe. I've seen a lot of tutorial videos that focus on which switches to click and in what order, but very little content on flying procedures. The *Reflected Reality Simulations* channel was created to try and fill that gap. For me desktop flight simulation is about the act of flying more than the switch flicking. Today's complex simulations are fantastic and when done really well allow the sim pilot the previously impossible chance to operate a huge array of complicated virtual aeroplanes in a semi-realistic manner. "Semi-realistic" as these machines are usually operated by two pilots who, with lots of training, fly the same aircraft type day in day out. In the sim world some simplifications are appropriate and required given the realities of operating single pilot using a keyboard, mouse, joystick, and screen.

Speed Cards

Thanks for downloading the speed cards for the Saab 340A. The cards are derived from the charts supplied by Leading Edge Simulations and presented in a layout inspired by various real world and sim world examples. Below is an example for 12000kg:-



Installation

There are card sets provided for kilograms and pounds, with each set having the option of clean or textured, where textured adds a paper texture. The desired chart set should be extracted to the resources/charts aircraft subfolder for each variant required.

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X-Plane 11\Aircraft\X-Aviation\Saab 340A\Passenger Variant\resources\charts
X-Plane 11\Aircraft\X-Aviation\Saab 340A\Cargo Variant\resources\charts
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When installed, the chart can be selected using the “Saab Pilot Chart Selector” on the right side popout menu if enabled, or via the top menu Plugins > Gizmo64 > Windows > Saab Pilot Chart Selector

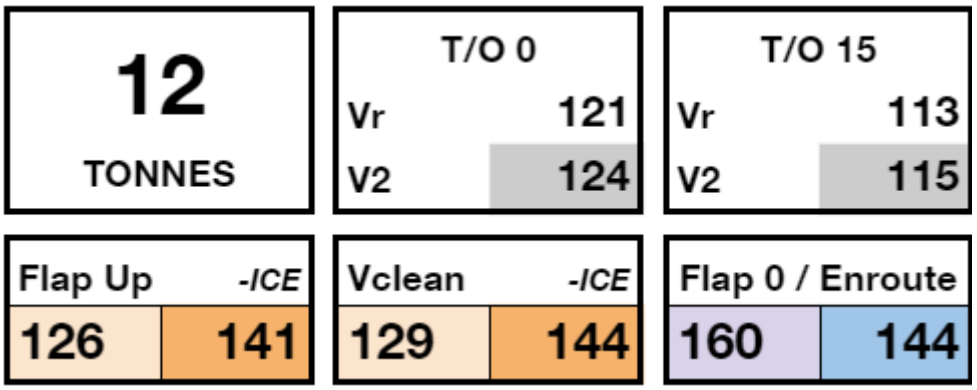
Accessibility

Background colour coding is used to indicate different sets of figures. At the end of this document I have provided a decoder to hopefully help any sim pilots unable to distinguish between the colour shades used.

Introduction

Leading Edge Simulations provide an extensive set of charts to allow sim pilots to operate the Saab 340A using figures derived from the real world. However these charts are not really “pilot-friendly” in my opinion and in real life would most often be supplemented with speed booklet or performance application that provides the same information in an easily understood and pilot friendly manner. This is what these speed cards aim to recreate in the sim.

Understanding takeoff and climb



Speeds are given for takeoff with flaps up and flaps 15. You will note that no V1 speeds are supplied. Calculating V1 can be complicated, and it can vary from runway to runway depending on environmental conditions, departure obstacles etc.

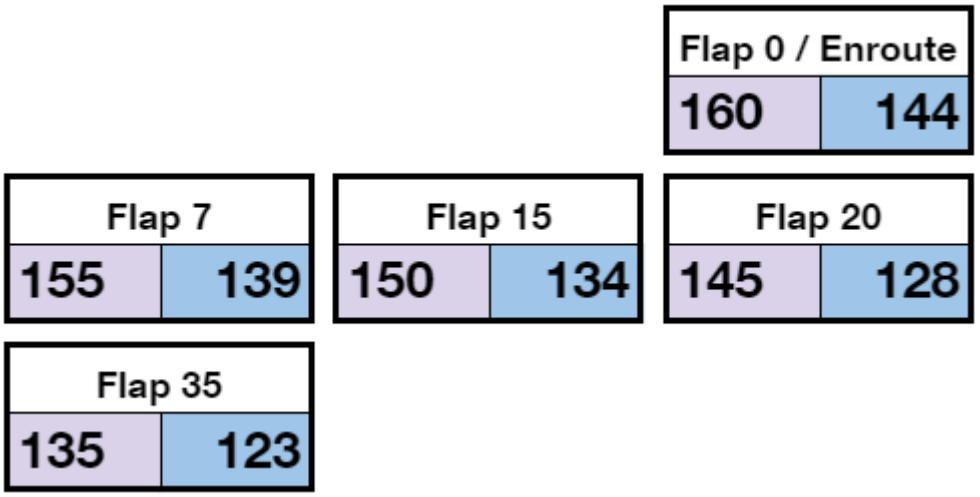
Remember, in real aircraft operations these speeds are validated for each runway the aircraft will operate - it's not "realistic" for a pilot to interrogate the charts for every single takeoff. Instead, a performance booklet or application will be provided by the airline allowing the pilots to simply look up the values they need with minimal calculation or interpolation.

To keep things simple and manageable in a recreational simulation, consider V1 and Vr to be the same. This will normally have the effect of making the accelerate-stop distance the most limiting, such that the aircraft should be able to accelerate to V1 speed, then close the power levers and stop on the remaining runway.

Like many turboprop aircraft, the Saab 340A is very sensitive to ice accretion, and hence separate speeds are used in icing conditions. This is 15 knots faster than the non-ice speed for the same configuration. For the "Flap Up" and "Vclean" speeds both normal and ice speeds are provided for convenience.

After lifting off the initial climb away from the runway should be between V2 and V2+10. Maintain this speed (and flap configuration if applicable) until acceleration altitude is reached. This could be as low as 400ft above the airfield, but 1000ft will make things a lot more relaxed. If turning is required in this phase it should be limited to 15 degrees angle of bank. Above acceleration altitude lower the nose slightly and allow the aircraft to accelerate. When passing the "Flap Up" speed select flaps up, and then set climb power. The Vclean speed is only really relevant after an engine failure, so continue accelerating to the "Flap 0 / Enroute'' speed. There are two options provided for this speed and these will be examined in the next section.

Vcm / Vmm?



Minimum configuration speeds are provided for each flap configuration, and these are the minimum speeds that the aircraft should be flown in order to allow manouvering at up to 30 degrees angle of bank. Below these speeds the bank angle should be limited to 15 degrees. The Saab 340A is slightly unusual as it has two sets of minimum speeds, but fortunately this makes things easy for sim pilots.

The figures on the left side of the boxes are "Conservative Manouvering" speeds, **Vcm**. Crucially **these speeds do not change based on weight** - you can memorise these speeds and use them at all weights, both in and out of icing conditions. You can be sure that regardless of anything else, if you have flaps up and stay above 160 kts you are able to manouver the aircraft at will.

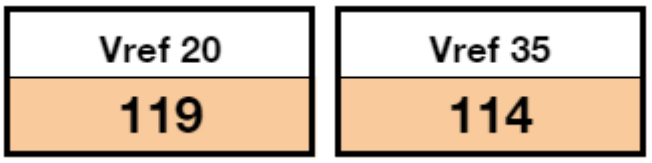
The figures on the right side of the boxes are the actual "Minimum Manouvering" speeds, **Vmm**. They change with weight, and most importantly **cannot be directly used in icing conditions**. To use Vmm speeds in icing conditions you must add 10 kts to the speed shown. *You'll notice that at max takeoff weight this makes Vmm+ICE roughly the same as Vcm.*

During climbout Vmm will give you an improved climb rate over Vcm, so it may be best to use the Vmm "Flap 0 / Enroute" speed as your target speed after retracting the flaps and setting climb power, at least until above the minimum safe altitude (MSA).

Vcm speeds are much more useful for the approach. Fly flaps up, speed 160, and when you need to slow down, select Flaps 15 and fly speed 150. You are still able to manouver up to 30 degrees angle of bank. *(Flaps 7 is most useful for engine out procedures. Going from flaps up directly to flaps 15 is acceptable with both engines operating.)*

You can also then select flaps 20 and slow to 145, but as 145 is above the Flap 35 speed limit there's a potential dilemma ahead! How do you slow down to land?

Landing



Following on from the previous paragraph, you're at Flap 20, flying Vcm of 145. You're ready to slow down further to land, but the flap limit speed for flaps 35 is 140. You could reduce to Vmm, which in the case of this 12 tonne example is 128, but it's much easier to simply slow to the Vref speeds. For this example weight Vref 20 is 119 kts, so if you plan to land flaps 20 that's all you need. If you need to land flaps 35, make sure flaps 35 is selected **before** going below the Vref 20.

Never fly below Vref for the current configuration.

The most important thing to understand is when you are below Vmm you must limit bank angle to 15 degrees - that's why there is a difference between Vmm 20 and Vref 20. Vmm allows 30 degrees angle of bank.

For normal, straight in approaches it should be very easy to remember:

Speed 160 -> Flaps 15, Speed 150 -> Gear Down, Flaps 20, Speed Vref20

Go Around

The speeds for the go-around are not provided on the cards, but are very easy to understand. For a go around from a flaps 20 approach, retract flaps to flaps 7, and climb initially at Vref20 + 10 kts. Similarly for a flaps 35 approach, retract to flaps 20, and climb initially at Vref35 + 10kts. So always 10 knots above the Vref speed. For icing conditions, add another 10 knots.

Landing	Go Around	Non-Ice Speed	Ice Speed
Flaps 35	Flaps 20	Vref35 + 10kts	Vref35 + 20kts
Flaps 20	Flaps 7	Vref20 + 10kts	Vref20 + 20kts

You'll hopefully notice that the go around speeds are less than the Vmm speeds for the resulting configuration. For our 12 tonne example Vref35+10 is only 124 kts, but the Vmm for Flaps 20 is 128 kts. I hope it is obvious by now that this can be explained, yet again, by the bank angle limit. In the go-around phase, you are limited to 15 degrees angle of bank until accelerating in the same manner as you would after takeoff.

Constant Torque on Takeoff

CONSTANT TORQUE ON TAKEOFF VALUES								
ALT	Sea Level		2000ft		4000ft		6000ft	
	OFF	ON	OFF	ON	OFF	ON	OFF	ON
-40C	108	108	108	108	108	108	108	108
-30C								
-20C								
-10C								105
0C						105		95
10C				103		94	106	86
20C		108		108	106	100	97	92
30C		107	105	99	96	91	88	83
40C		97	95	90	88	82	80	76
50C		88	86	81	XXX	XXX	XXX	XXX

CTOT ON | OFF: ECS AND A/I OFF | ON: ECS ON OR A/I ON BELOW +10

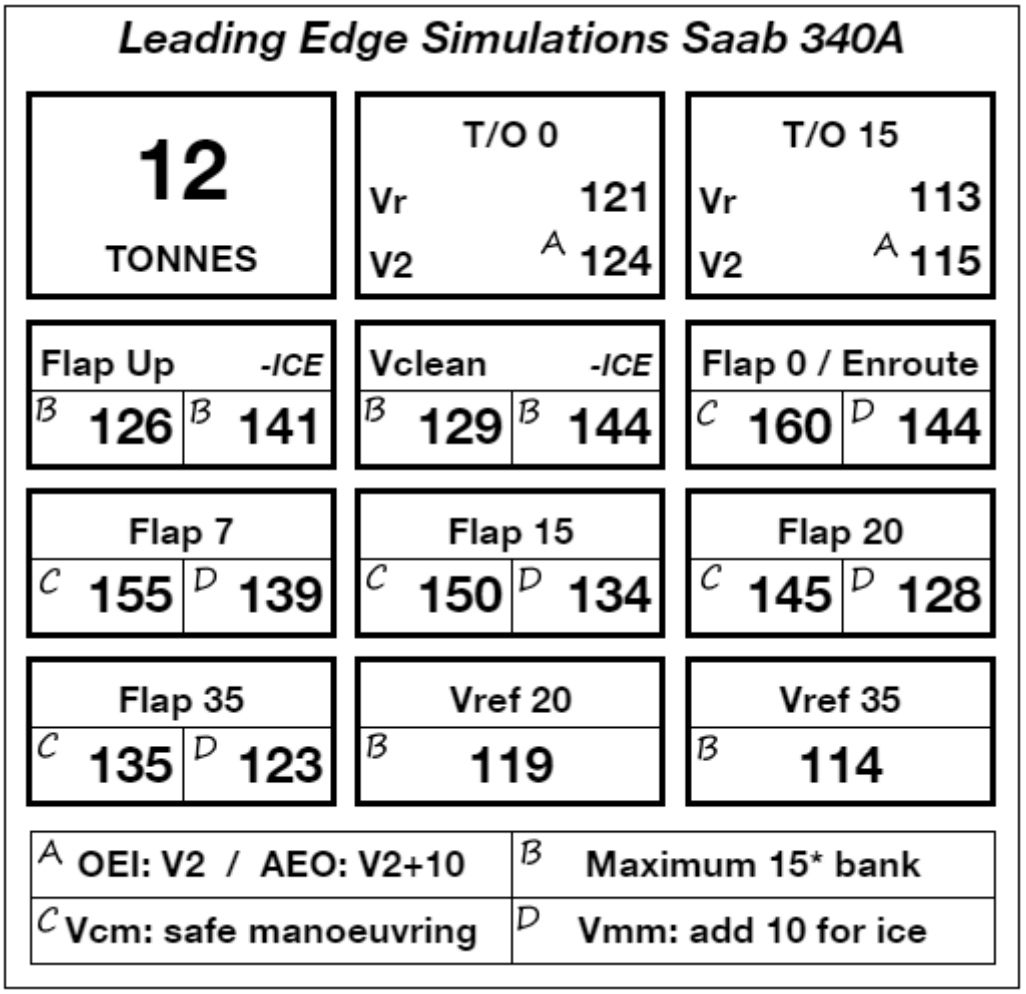
In addition to the speeds, the charts also show Constant Torque on Takeoff Values. CTOT is a system used by the Saab 340A to automatically increase or decrease the fuel flow within a small envelope to maintain a constant torque. Without CTOT, as the aircraft accelerates on takeoff the torque would reduce. In order to get maximum takeoff performance as the aircraft accelerates the fuel flow can be increased to restore the torque back to the static value, without ever exceeding the mechanical torque limit. Another concern is too much fuel flow leading to exceeding the engine temperature limits, so CTOT values are also limited by altitude, temperature and bleed demand.

The Saab cannot takeoff with both ECS (Air conditioning and pressurisation) AND anti-ice on simultaneously. The “ON” column shows the CTOT value with engine anti-ice for temperatures below 10C, and air conditioning for temperatures above 10C. I find this to be the most useful arrangement for normal operations. The information used to construct this chart is also found in the performance documentation provided by Leading Edge Simulations.

Please note that this table does not change with aircraft weight. I have provided the table on each speed card as a convenience, but the values do not change between cards.

Colour Decode

The speed cards use colour coding to help group and identify the various numbers presented. I'm aware that such background colour coding may not be ideal for those with an inability to distinguish between certain colours. I've provided a textual decode of the cards below in the hope it will help, but should this be insufficient or otherwise problematic please contact me and I'll do my best to modify the cards as required.



And finally…

Many thanks to Amy and “Pilsner” for proofreading and improvements.

Any feedback, comments, suggestions or corrections you have for any Reflected Reality Simulations content is gratefully received via the YouTube channel …

youtube.com/c/ReflectedRealitySimulations

Reflected Reality Simulations is a hobby, and intended to help sim pilots enjoy flight simulation whilst learning about real world procedures. It is not sponsored by addon developers and unless noted pays retail price for any sim models shown on the channel or discussed on any other media.

Information given, while as far as possible derived from real world operational procedures is intended for home flight simulation purposes only.

Thank you for your interest.
Graeme