



Introduction to the Soft Go-Around Function

The “all engines” go-around is a very dynamic procedure with high accelerations created by the application of TOGA thrust. Yet in-service experience has shown that as long as both engines are operating, a lower thrust can still be sufficient to perform a safe go-around.

As a safety enhancement, Airbus has introduced the Soft Go-Around (SGA) function, which provides a reduced go-around thrust and associated operating procedures.

This article will review how the Soft Go-Around function works, how it is activated, on which aircraft it is installed, and how to deal with a “mixed” fleet composed of aircraft with and without the function.

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GO-AROUNDS & SOMATOGRAVIC ILLUSION

Go-arounds can be performed in various conditions (aircraft weight, speed, altitude...). However, even if these parameters are known to vary significantly from one go-around to another, up until recently only one level of thrust has been available to perform this manoeuvre: the TOGA thrust.

Go-arounds usually take place when an aircraft's weight is well below the Max Landing Weight, and of course, when flying at a low speed close to the Approach speed (VAPP). Application of the TOGA thrust under these conditions creates an unusually strong longitudinal acceleration. Such a strong acceleration is rarely experienced by flight crew since the only other time TOGA thrust is applied is at take-off when the aircraft is heavy.

Flight crew are not used to the feeling of such a strong acceleration, so this may lead to them being surprised. The strong longitudinal acceleration induced by the TOGA thrust may ultimately lead to Spatial Disorientation (SD) of the flight crew caused by a Somatogravic Illusion (SI). SI is a suspected element in several fatal accidents.

As a means to reduce the likelihood of SI occurring, Airbus developed a function that allows crews to perform a go-around with a reduced thrust, adapted to the aircraft weight, speed and altitude: the Soft Go-Around Function (SGA). ■

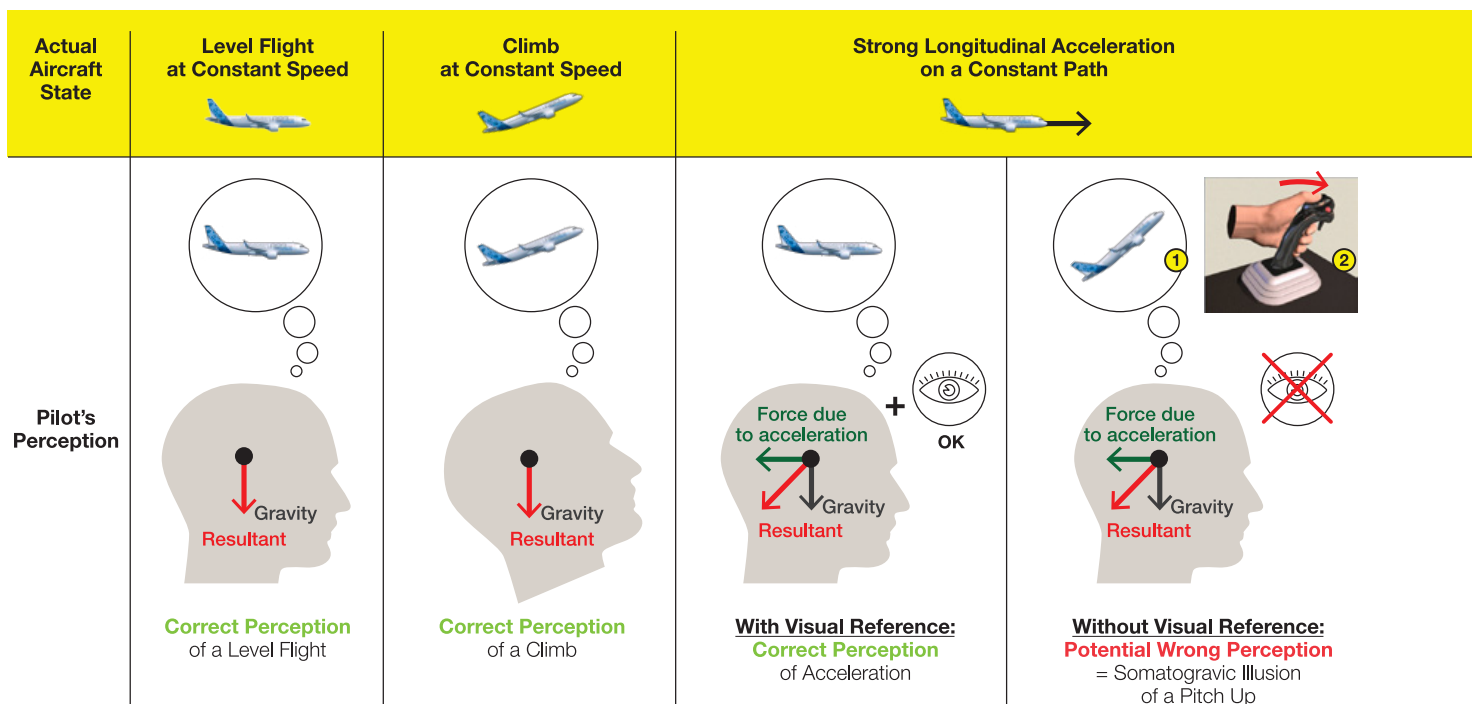
WHAT IS THE SOMATOGRAVIC ILLUSION?

Somatogravic Illusion (SI) is a spatial disorientation phenomena which is caused by a mismatch between different signals from our senses and the brain. It is generated by a strong longitudinal acceleration or deceleration. The brain interprets acceleration as a pitch up and this may lead to inappropriate pitch down command. **(fig-1)**

Pilots can be especially susceptible to SI when performing a go-around at night or in poor visual conditions. The strong longitudinal accelerations combined with a lack of visual references lead to the mistaken perception of excessive pitch up.

(fig-1)

Explanation of the Somatogravic Illusion



“ The SGA function provides a lower than TOGA initial thrust level, such that it ensures a reduced acceleration and requirement to pitch up and a lower but constant final rate of climb whatever the aircraft weight, speed, altitude and Slat/Flaps configuration. ”

PRINCIPLE OF THE SOFT GO-AROUND FUNCTION

The SGA function provides a lower than TOGA initial thrust level, such that it ensures a reduced acceleration and requirement to pitch up and a lower but constant final rate of climb whatever the aircraft weight, speed, altitude and Slat/Flaps configuration.

Airbus has designed the SGA climb capability to be sufficient to be able to deal with the world's most demanding missed approaches. The target rate of climb is either 2000 or 2300 ft/min, depending on the aircraft model.

To put 2000 ft/min into context, if a go-around is performed by an A330-300 at a weight of 150 tons, at sea level, the rate of climb obtained with the TOGA thrust is 3500 ft/min.

Performance of the SGA function is demonstrated to be at least as good as if the go-around was performed with TOGA thrust with One Engine Inoperative (OEI).

The Soft Go-Around function is only available when all engines are operating:

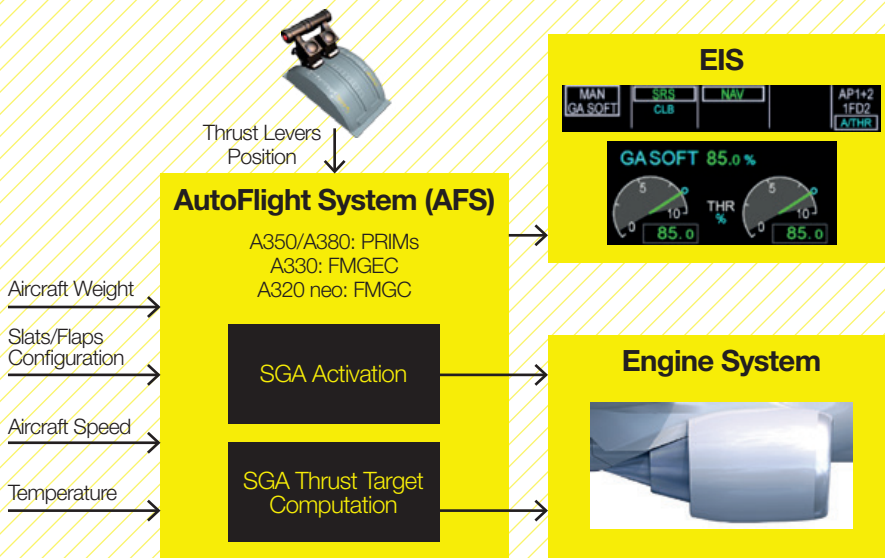
- If the go-around is performed with one engine inoperative, TOGA thrust must be used
- In the case of an engine failure during a soft go-around, the flight crew must also select TOGA thrust.

At any time during a soft go-around, the TOGA thrust can be applied if needed by setting the thrust levers to the TOGA position. ■



HOW DOES THE SGA WORK?

Based on the environmental conditions, the aircraft weight, altitude, speed and slats/flaps configuration, the Auto Flight System (AFS) via the PRIMs (A350/A380) or FMGECs (A330) or FMGCs (A320) computes a thrust target that will enable the aircraft to climb at 2000 (or 2300 ft/min) **(fig.2)**. This thrust target is then sent to the engines FADEC that will apply the optimized thrust as soon as the function is activated via the thrust levers.



“ SGA is only available when all engines are operating. The TOGA thrust can be applied at any time by setting the thrust levers to the TOGA position. ”

(fig.2)
SGA functional description

SOFT GO-AROUND ACTIVATION AND DEACTIVATION

When the go-around is initiated, the flight crew sets the thrust levers to TOGA position, as usual, to trigger all the logics (approach modes disengagement, FMS FPL sequencing...), and then activates the SGA by moving back without delay the thrust lever to the FLX/MCT detent. Like any mode, the flight crew checks the engagement of the SGA via the FMA **(fig.3)**:

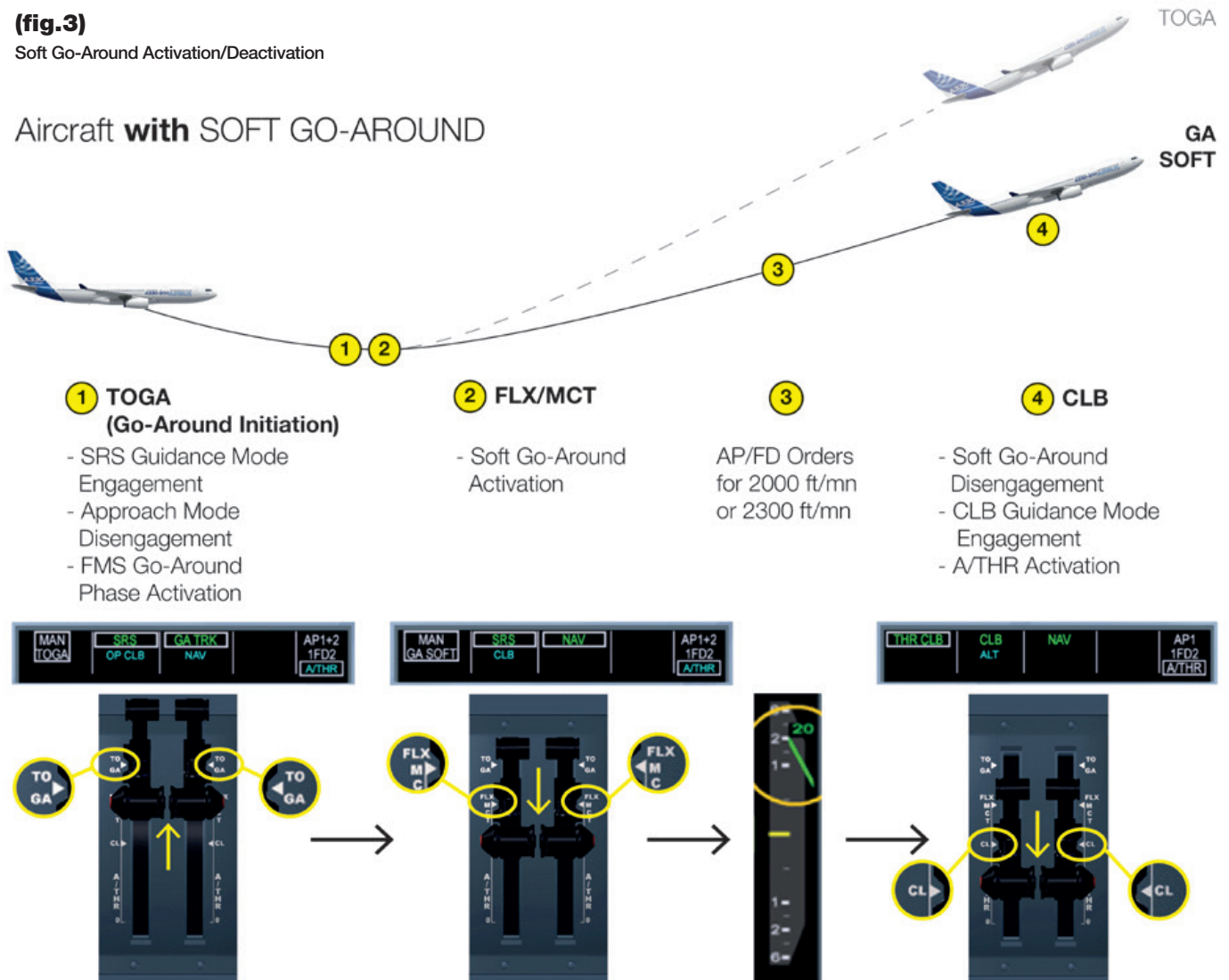
1. The flight crew first sets the thrust lever to the TOGA detent to:
 - Disengage the approach modes
 - Engage the go-around guidance mode (SRS GA TRK or SRS NAV)
 - Engage the go-around phase of the FMS to insert the missed-approach procedure in the FMS flight plan.
2. Without delay, the flight crew sets the thrust levers back to the FLX/MCT detent to engage the SGA mode (MAN GA SOFT displayed on the FMA)
3. If the flight crew follows FD orders or if AP is ON, a 2000 ft/mn (or 2300 ft/mn) is maintained
4. At the Go-around thrust reduction altitude, the flight crew sets the thrust levers to the CLB detent:
 - MAN GA SOFT disengages
 - The CLB guidance mode engages
 - The Autothrust activates. ■

OPERATIONS

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(fig.3)
Soft Go-Around Activation/Deactivation

Aircraft **with** SOFT GO-AROUND



UPDATED FCOM GO-AROUND PROCEDURE

On aircraft equipped with the SGA function, SGA is now fully part of the Standard Operating Procedures (SOPs). The FCOM and QRH have been updated accordingly.






Example of FCOM GO-AROUND procedure with SGA

GO-AROUND		
GO-AROUND INITIATION		
Simultaneously apply the following three actions:		
THRUST LEVERS.....	TOGA THEN FLX/MCT	PF
Set the thrust levers to the TOGA detent to ensure engagement of SRS GA mode. Then, set the thrust levers to FLX/MCT to engage the GA SOFT mode.		
At any time, if TOGA thrust is required, set the thrust levers to TOGA detent.		
ROTATION.....	PERFORM	PF
GO-AROUND.....	ANNOUNCE	PF
FLAPS.....	RETRACT ONE STEP	PNF
FMA.....	CHECK/ANNOUNCE	PF
If the FMA does not display MAN GA SOFT or MAN TOGA, immediately set the thrust levers to the TOGA detent.		
POSITIF CLIMB.....	ANNOUNCE	PNF



SOFT GO-AROUND FUNCTION AVAILABILITY

The SGA function is, or will be, available for the following aircraft:

A320 neo	A330 ceo + neo		A350	A380
				
<input checked="" type="checkbox"/> Optional	<input checked="" type="checkbox"/> Optional	<input checked="" type="checkbox"/> Basic	<input checked="" type="checkbox"/> Basic	<input checked="" type="checkbox"/> Optional

PROCEDURES FOR AIRCRAFT WITHOUT SOFT GO-AROUND

On aircraft not fitted with the Soft Go-around function, if the TOGA thrust is not required for a go-around, the flight crew can apply the procedure introduced in the FCOM/FCTM in 2013 (fig.4).

1. To initiate the go-around, the flight crew must set the thrust levers are set momentarily to the TOGA detent in order to ensure proper activation of the Speed Reference

System (SRS) guidance mode and of the FMS Go-Around phase.

2. Then, the flight crew should set the thrust lever to Climb (CL) detent to take advantage of the autothrust (A/THR).

Refer to the article: “Flying a Go-Around – Managing Energy“, published in the issue 17 of the Safety First magazine. ■

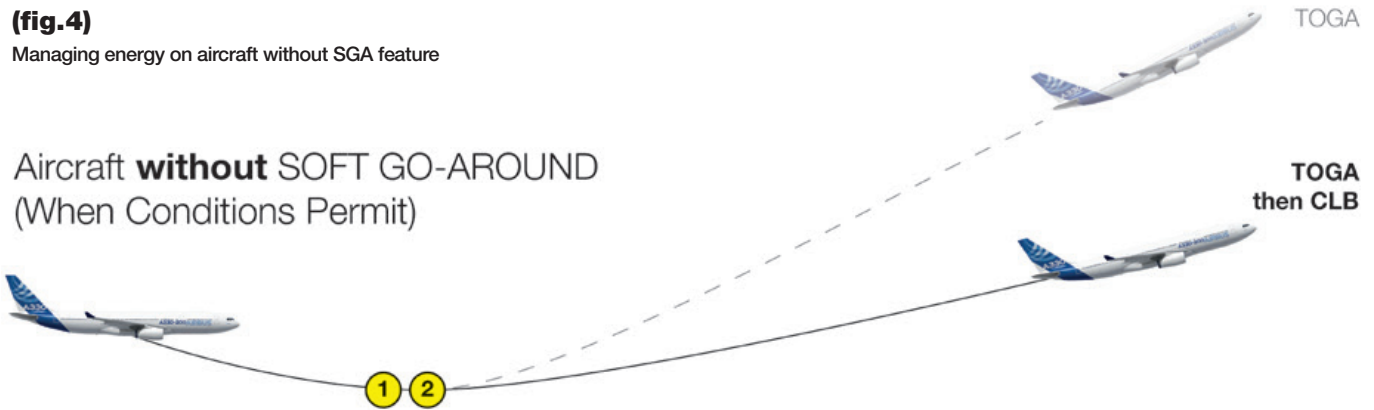
OPERATIONS

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(fig.4)

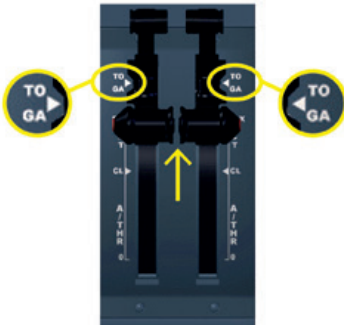
Managing energy on aircraft without SGA feature

Aircraft **without** SOFT GO-AROUND
(When Conditions Permit)



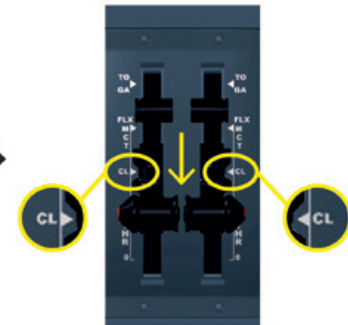
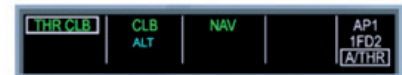
1 TOGA (Go-around initiation)

- SRS guidance mode engagement
- FMS Go-Around Phase Activation



2 CLB (only if TOGA not required)

- A/THR activation
- CLB guidance mode engagement



WHAT ABOUT MIXED FLEETS?

Due to the recent introduction of the SGA function and its fleet-wide availability status, it is likely operators will have to deal with mixed fleet operations where some aircraft will be equipped with SGA and others will not. The key is to make sure that the flight crew is aware of the SGA / Non-SGA capability of the aircraft they are flying.


During the descent preparation, the flight crew can check the SGA capability of the aircraft using the Aircraft Configuration Summary of the QRH.

During the Approach Briefing, the PF

should brief the PM on the go-around thrust strategy based on the availability of the SGA (function installed and not inoperative).

In any case, the Go Around initiation is always done by setting the thrust levers to the TOGA detent to engage the SRS guidance mode and the GO-AROUND phase of the FMS. Then, depending on the aircraft SGA capability and on the possibility to use a reduced go-around thrust, the thrust lever may be set either to the FLX/MCT for SGA activation or to the CLB detent, if conditions permit. ■

- 1 Check of SGA capability in the ACS table of the QRH



AIRCRAFT CONFIGURATION SUMMARY		
ROW/ROPS	SURV	No
Soft Go-Around Function	ENG	Yes

- 2 Explain go-around strategy during the approach briefing

In the case of a go-around, I will use soft go-around thrust. If an unexpected situation occurs, I may use TOGA thrust if required.



“ The Go Around initiation is always done by setting the thrust levers to the TOGA detent to engage the SRS guidance mode and the GO-AROUND phase of the FMS. ”

PREVIOUS ‘SAFETY FIRST’ ARTICLES DEVOTED TO THE GO-AROUND PROCEDURE:

- “Go-around Handling” issue 10, August 2010, highlighted that on Airbus Fly By Wire aircraft the go-around flight guidance modes of the Auto Flight System are triggered by setting the thrust levers to TOGA.
- “The go-around Procedure” issue 12, July 2011, insisted on the need to fly and maintain the proper pitch and on the necessity to retard the thrust levers from TOGA to CL detent without delay in the event of an early capture of altitude.
- “Flying a Go-Around Managing Energy” issue 17, January 2014, presented the refined go-around procedure to set the thrust levers to CL detent just after the TOGA detent selection when conditions permit, and introduced the discontinued approach technique.

The Soft Go-Around function represents a significant safety and operational improvement. It softens the go-around manoeuvre with optimized thrust to improve go around handling by the flight crew.

No matter whether the aircraft is or isn't fitted with the SGA function, the go-around initiation is always performed by setting the thrust levers to the TOGA detent. On aircraft equipped with the SGA, an updated FCOM go around procedure enables the flight crew to benefit from the function by setting the thrust lever to the MCT detent after the go-around initiation to activate the function, with the possibility at any time to set the thrust lever to TOGA, should the situation request it.

On aircraft not equipped with the SGA, the flight crew can apply FCOM procedure described in the “Flying a Go-Around – Managing Energy” article, published in the issue 17 of the Safety First magazine. This procedure provides the flight crew with the possibility to set the thrust lever to the CLB detent after the go-around initiation, when conditions permit.

Safety first

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