



Stéphane GRANGER

A320 Family Autoflight System Manager
Design Office



Eric JEANPIERRE

System Manager
A320 Family Program

Automatic NAV engagement at Go Around

1. Introduction

Whatever the reasons to perform a Go Around, the need has arisen for an automatic engagement of Navigation (NAV) mode.

To meet this increasing interest, an operational enhancement called “NAV in Go Around” has been developed by Airbus.

This article presents the operational context, and the solution proposed with its advantages.

2. Operational context

2.1. Go Around options

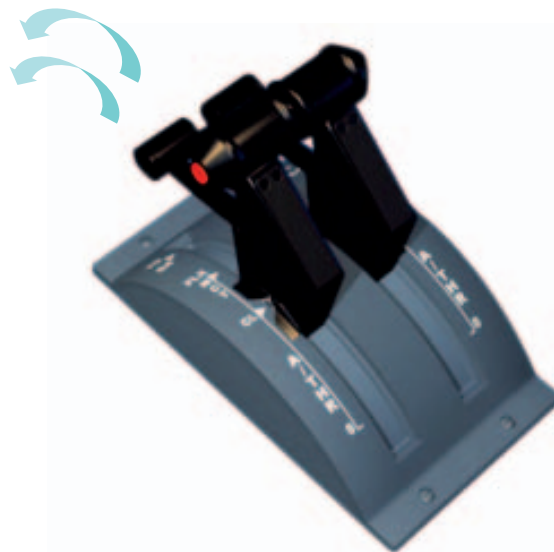
The crew must always be prepared for a Go Around, even though it is an infrequent occurrence.

After the initiation of a Go Around, there are two options:

- In the most probable one, the crew follows the published Missed Approach procedure.
- Otherwise, if cleared by ATC, the crew follows a constant heading. The heading target can be preset by the crew during the approach.

2.1. Current Go Around procedure

The Go Around is systematically initiated by pushing the thrust levers to TOGA.



This ensures the engagement of the Go Around Track (GA TRK) Auto Pilot and/or Flight Director lateral mode¹.

The FMS entered published Missed Approach procedure becomes part of the ACTIVE F-PLN and the previously flown approach is strung back into the F-PLN at the end of the Missed Approach procedure.

The GA TRK mode guides the aircraft on a constant track (which is the current track when the Go Around is initiated with wings level).

Once the Go Around is initiated, the crew will likely fly the published Missed Approach procedure: the Pilot Flying (PF) or the Pilot Non Flying (PNF) will have to engage the NAV mode by pushing the HDG/TRK selector on the Flight Control Unit (FCU).

Therefore, in the most probable Go Around scenario, the crew will perform two main actions (as far as the Autoflight system is concerned):

- Push the thrust levers to TOGA
- Push the HDG/TRK selector.

2.2. Objectives of the modification

The modification reduces the crew workload, and limits the potential deviations from the required flight path when performing a Go Around.

It covers the most probable Go Around scenario, where the crew has to follow the published Missed Approach procedure. Moreover, it makes the Go Around procedure as similar as possible to the Take Off procedure.

Finally, in the context of RNP-AR operations where the aircraft is more likely to be in a turn, it will not interrupt the turn in case of a Go Around.

¹: As well as the Speed Reference System (SRS) Auto Pilot and/or Flight Director longitudinal mode, if the aircraft is not in a clean configuration.

3. Principle of the modification

The principle is to keep the NAV mode engaged or, if a valid flight plan exists, to arm the NAV mode at the initiation of the Go Around. The pilot does not need to push the FCU selector anymore: the new logics do it automatically.

The Auto Flight System automatically follows the published Missed Approach procedure.

The AP/FD modes engaged are identical to the modes that would have been engaged by pushing on the FCU “HGD-TRK” selector immediately after the Go Around:

► In a non-precision approach with managed lateral guidance (NAV, APP NAV or FINAL APP), the NAV mode is kept engaged.

► In a non-precision approach with selected lateral guidance (HDG or TRK), the HDG or TRK mode is kept engaged and the NAV mode is automatically armed (if a valid flight plan exists).

► In a precision approach (ILS, MLS or GLS) or in a FLS / Mixed LOC-VNAV approach, the GA TRK mode is initially engaged (as currently) and the NAV mode is automatically armed (if a valid flight plan exists and if no heading preset has been selected during the approach).






In other words, the AP/FD mode engagement sequence is strictly the same as when the pilot pushes the thrust levers to TOGA and pushes the HDG/TRK FCU selector.

The “NAV in Go Around” modification does not modify the aircraft behaviour on the longitudinal axis.

4. Typical operational scenarios

Go Arouns during Precision Approaches are typically performed when visibility conditions are not met at the Decision Altitude/Height (DA/DH). The Standard Operating Procedures specify that a Go Around is performed by setting both thrust levers to TOGA.

The following table illustrates the reduction in workload introduced by the “NAV in Go Around” modification.

Without “NAV in Go Around” modification	With “NAV in GO Around” modification
<p>TOGA thrust is applied and the SRS / GA TRK modes are engaged.</p>  <p>The crew has to arm the NAV mode manually by pushing on the FCU HDG/TRK knob.</p>  <p>Then, the FMA displays the NAV mode.</p> 	<p>When TOGA thrust is applied, the SRS / GA TRK modes are engaged. In addition, the NAV mode is automatically armed without any crew action on the FCU.</p> 
<p>The NAV mode engages immediately (or as soon as the aircraft passes above 100ft if the Go Around has been initiated below 100 ft).</p>  <p>The aircraft is guided along the Missed Approach procedure.</p>	

The “NAV in Go Around” modification does not change operational procedures in the following scenarios:

► **Go Around in Heading mode with a heading preset**

When cleared by ATC to follow a constant heading in case of Missed Approach, the crew may preset the heading on the FCU. If a Go Around is initiated, the NAV mode is not automatically armed (priority is given to the preset). The crew will then just have to pull the FCU HDG/TRK knob to engage the Heading mode.

► **Go Around in Heading mode without heading preset**

In case of a late clearance from ATC to follow a constant heading after the Go Around (no heading preset), the crew will have to turn the FCU HDG/TRK knob to select the heading target then pull to engage the Heading mode. In this case, the NAV mode is automatically armed then engaged at Go Around until the pull action on the FCU.

5. CONCLUSION

With the “NAV in Go Around” modification, the NAV mode is automatically armed at the initiation of the Go Around². The mode will then engage as soon as the capture conditions are met.

This modification reduces the crew workload, and limits the potential deviations from the required flight path, when performing a Go Around.

The new logics are consistent with the most probable Missed Approach scenario and are essential for specific operations such as low RNP.

2 : If no heading preset.

Impact on aircraft and associated MOD and SB

For the A320 Family, A330/A340 and A380, the activation of the function requires the following:

- The hardware pin programming of each FMG(E)C or software pin programming of each PRIM computers, and if required, the upgrade of the flight guidance or PRIM software.
- The update of volumes: 1.22.30, 3.03.2, 4.05.80. of the Flight Crew Operating Manual (FCOM).

Aircraft type	MOD Number	SB reference	FMG(E)C or PRIM minimum standards
A320 Family	38399	22-1296	P1I11 (MOD 37311) or S4I11 (MOD 37252) for A320 IAE/PW Family P1C12 (MOD 37934) or S4C12 (MOD 37935) for A320 CFM Family
A330/A340	200383	Pending FMGEC certification	P4HJ1 (MOD 57545) or T4HJ1 (MOD 57547) for A330 PW/RR P4G1 (for 57544) or T4G1 (MOD 57548) for A330 GE P4F1 (MOD 57546) or T4F1 (MOD 57549) for A340-200/300 P4K2 or T4K2 (MOD To Be Defined) for A340-600
A380	Under development		

A320 Family

The “NAV in Go Around” modification will become the production standard starting from:

- A318: MSN 4169
- A319: MSN 4522
- A320: MSN 4674
- A321: MSN 4560

It will also be included in the low RNP modification packages (MOD 38073 Low RNP step2+, MOD 150371 / 150372 / 150373 Low RNP step 3 and MOD 151180 RNP 0.3 AR).

A330/A340

The “NAV in Go Around” modification will become the production standard, MSN to be confirmed.

It will also be included in the low RNP modification packages (MOD 200192 Low RNP step 2 for FMS R1A Thales on the A330 and new MODS RNP step 2 for FMS R1A Honeywell on the A330 and A340-500/600).

A380

The “NAV in Go Around” modification will become the production standard, MSN to be confirmed.

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Airbus

Product Safety department (GS)
1, rond point Maurice Bellonte
31707 Blagnac Cedex - France
Fax: +33(0)5 61 93 44 29
safetycommunication@airbus.com



A380
Water pool test

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