

|                                                                                 |                                 |  |         |        |
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|                                                                                 | CRUISE                          |  | SEQ 001 | REV 07 |

## REACHING CRUISE FLIGHT LEVEL

Upon reaching the cruise flight level, the pilot should be sure that the FMA displays “ALT CRZ” in its second column, which ensures that the aircraft is at CRZ FL (CRZ MACH, predictions valid, soft N1 (EPR) available).

If the FMA does not display ALT CRZ at the assigned FL (as may occur when the ATC-assigned FL is lower than the preplanned FL selected initially) :

- PRESS the [PROG] key.
- ENTER the current cruise flight level.

**Note :** *If the current cruise flight level is above the preplanned FL, selecting the FCU updates it automatically.*

If the pilot selected the speed target during the climb phase and planned to use ECON MACH for the cruise phase, SET MANAGED SPEED appears on the PFD and MCDU as a reminder.

- PRESS the FCU speed selector knob to activate the managed Mach/speed.

## MONITORING THE NAVIGATION ACCURACY

On aircraft equipped with GPS PRIMARY, the navigation accuracy check is not required as long as GPS PRIMARY is available. 

Otherwise, navigation accuracy shall be checked periodically in cruise.

The PROG page displays an estimated accuracy as being high or low (center of sixth line).

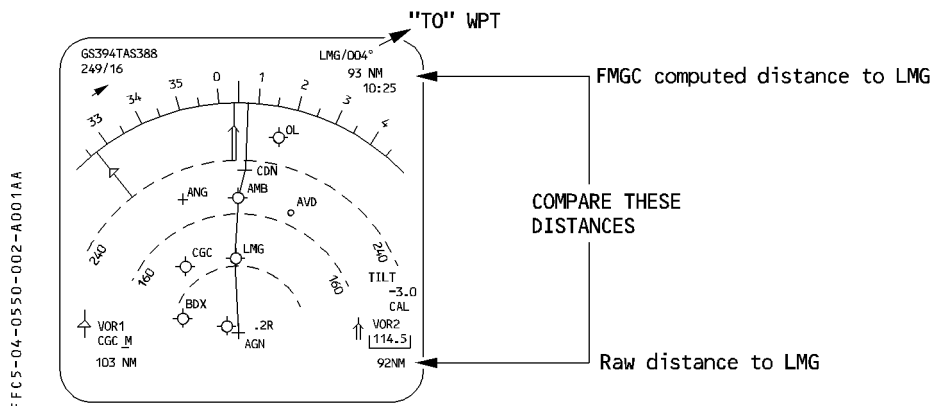
"HIGH" means that the FMGS estimates the FM position accurate enough to meet the EN ROUTE criteria.

"LOW" means that the pilot must compare raw data from tuned nav aids with corresponding data computed by FM and shown on the ND or MCDU PROG page. The appearance of the message "NAV ACCUR DOWNGRAD" on the MCDU calls for a similar crosscheck.

**Note :** The pilot should make such a comparison periodically, even if the PROG page is displaying "HIGH" and nav aids are available : this allows him to quantify the FM position error.

The method for checking the accuracy is explained in the SOP and in 4.02.20.

A quick check is explained here below when the TO waypoint is a DME type. (VOR/DME or DME or TAC/DME)



|                                                                                  |                                        |  |         |        |
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## POSITION DISCREPANCY

If the MCDU, or the ECAM, displays one of the following messages :

IRS ONLY NAVIGATION (10 min IRS nav mode, enroute) on the MCDU

FMS 1/2 POS DIFF (5 nm pos difference between FMs) on the MCDU

GPS PRIMARY LOST (FM-IRS threshold function of  $\Delta t$ ) on the ECAM

CHECK IRS X/FM POS (FM-IRS threshold function of  $\Delta t$ ) on the ECAM

FM/IRS POS DISAGREE (FM-IRS threshold function of  $\Delta t$ ) on the ECAM

FM/GPS DISAGRE (> 0.5 nm)

NAV ACCUR DOWNGRAD (EPE > 3.41 nm en route)

or, if there is a discrepancy between the raw data position and the FM position :

- PRESS the [DATA] key on the MCDU.
- SELECT the POSITION MONITOR page.
- SELECT "FREEZE".

On the other MCDU : Select the GPS MONITOR page.

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| POSITION MONITOR |          |                  |    |    |  |
|------------------|----------|------------------|----|----|--|
| 1L               | FMGEC    | 4610.2N/00618.3E | 1R | 1L |  |
|                  |          | IRS/DME/DME      |    |    |  |
| 2L               | FMGEC    | 4610.2N/00618.8E | 2R | 2L |  |
|                  |          | IRS/GPS          |    |    |  |
| 3L               | GPS      | 4610.1N/00618.2E | 3R | 3L |  |
|                  |          |                  |    |    |  |
| 4L               | MIX IRS  | 4609.7N/00618.0E | 4R | 4L |  |
|                  | IRS1     | IRS2 IRS3        |    |    |  |
| 5L               | NAV 0.4  | NAV 0.2 NAV 0.4  | 5R | 5L |  |
|                  |          | SEL              |    |    |  |
| 6L               | ← FREEZE | NAVAIDS>         | 6R | 6L |  |

| GPS MONITOR |                        |     |  |  |    |
|-------------|------------------------|-----|--|--|----|
|             | GPS1 POSITION          |     |  |  | 1R |
|             | 46°10.2N/006°18.4E     |     |  |  |    |
|             | TTRK UTC               | GS  |  |  |    |
|             | 359.9 10:37:42         | 450 |  |  | 2R |
|             | MERIT GPS ALT MODE/SAT |     |  |  |    |
|             | 100M 32000 NAV/6       |     |  |  | 3R |
|             | GPS2 POSITION          |     |  |  |    |
|             | 46°10.2N/006°18.4E     |     |  |  | 4R |
|             | TTRK UTC               | GS  |  |  |    |
|             | 359.9 10:37:42         | 450 |  |  | 5R |
|             | MERIT GPS ALT MODE/SAT |     |  |  |    |
|             | 100M 32000 NAV/6       |     |  |  | 6R |

|                                                                                 |                                 |  |         |        |
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## MONITORING THE PREDICTIONS

The F-PLN page and FUEL PRED page show fuel and time predictions. These predictions are meaningful if the flight plan and entered winds are accurate enough.

### Procedure

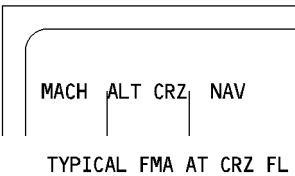
- UPDATE the F-PLN to show accurate predictions.
- Periodically CHECK the wind on the F-PLN B page, and update it when the current wind is significantly different.
- Monitor the fuel by checking :
  - *Estimated fuel on board (EFOB) at destination (F-PLN page)*
  - *EFOB at alternate and extra fuel (FUEL PRED page)*
- **If the extra fuel is negative, modify successively the following data until the extra fuel becomes null or positive :**
  - CHECK current cruise flight level versus the optimum level (OPT FL)  
*If advisable, REQUEST reassignment to the OPT FL (or OPT FL + 2000)*
  - Decrease the cost index down to zero if necessary (MIN FUEL). If the extra fuel is positive, set CI = LRC.
  - SELECT another ALTN on the ALTN page and CHECK whether or not XTRA FUEL becomes positive.
  - Continue to check different alternates until you find one for which XTRA FUEL is null or positive.
- **When an alternate is not necessary, you may select “NO ALTN” option :**
  - CHECK the required conditions (weather, runways, etc.) for NO ALTN.
  - SELECT “NO ALTN” on the ALTN selection page.
  - ADJUST FINAL TIME on the FUEL PRED page.
  - CHECK XTRA FUEL.

|                                                                                  |                                        |  |         |        |
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The pilot must ensure that the aircraft flies the cruise flight level entered on the PROG page, then the aircraft will :

- Fly at ECON CRZ MACH.
- Benefit from the soft altitude (SOFT N1 (EPR)) mode.
- Present accurate predictions.

This shows on the flight mode annunciator (FMA) :



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## ENTERING A STEP CLIMB OR A STEP DESCENT

The pilot may use the STEP ALT page to enter up to four geographic step points or one optimal step (computed by the FM) at any waypoint of the cruise.

### Procedure

- PRESS the PERF key
- SELECT “STEP ALTS” prompt.

*The PERF PAGE displays this prompt in cruise phase. The pilot may also select the STEP ALTS page using a vertical revision at a cruise waypoint.*

### Entering an OPTIMAL STEP

- WRITE a step altitude or FL into the scratchpad
- ENTER it in the [1R] field
- CHECK the FUEL and TIME SAVINGS and predictions on the 5L and 5R fields.
- INSERT it if adequate

*After insertion, the optimum step climb or step descent is no longer updated.*

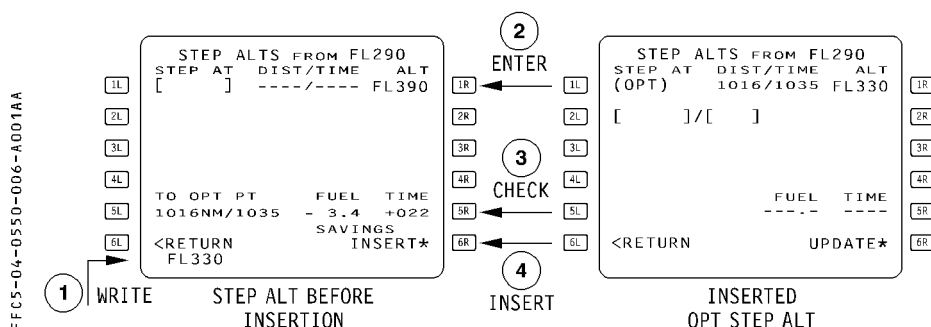
*The ND shows symbols for the start of climb or descent and the top of climb or bottom of descent.*

*The MCDU shows associated pseudo waypoints.*

*It is possible to convert an optimum step to a geographic step by overwriting the [1L] field (see geographic step).*

#### ● When reaching the step climb or descent pseudo waypoint :

- REQUEST climb or descent clearance
- ADJUST the FCU altitude to the STEP ALT, and PUSH.



### Entering a GEOGRAPHIC STEP

- WRITE a step altitude into the scratchpad.

The format is :

- Place/altitude (or FL)
- Place/distance/altitude (or FL)

The place must be along the track.

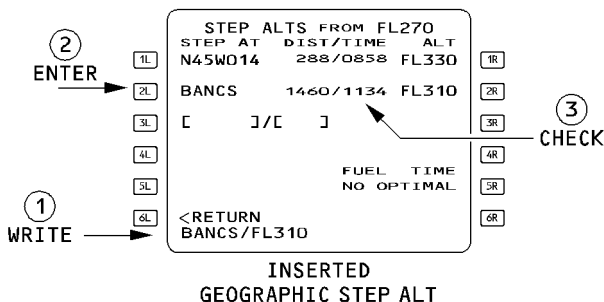
- ENTER it in [1L] to [4L] field.

It is possible to independently modify either the place or the altitude of an existing step altitude.  
It is not possible to modify with a single entry both the place and the altitude : An entry "place/xxx" will be taken by the system as an along track off set of xxx nautical miles.

- CHECK the predictions

#### ● When reaching the step climb or descent pseudo waypoint :

- REQUEST climb or descent clearance.
- ADJUST the FCU altitude to the STEP ALT, and PUSH.



The DIST/TIME field may display the following messages :

- ABOVE MAX if the step altitude exceeds the MAX ALT.
- IGNORED if the start step point is less than 50 NM from the top of descent.
- STEP NOW if the step climb is reached.

If the aircraft passes the step waypoint without commencing a climb or a descent, the system deletes the step from the vertical F-PLN automatically ("STEP DELETED" appears) and recomputes the predictions.

A step is not deleted if the FCU altitude is moved only partially towards the step altitude. The flight phase remains at cruise whenever a step is initiated.

**Note :** For an altitude restriction defined at a waypoint located less than 50 NM before the top of descent and at an altitude lower than the cruise flight level, it is recommended to enter an altitude constraint rather than a step.

|                                                                                                                                  |         |        |
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### **IMMEDIATE CHANGE OF LEVEL IN CRUISE**

when the pilot changes his flight level without inserting a step :

- If the FCU-selected altitude is above the previous CRZ FL, the CRZ FL on the PROG page changes to the new flight level.
- If the FCU-selected altitude is lower than the previous CRZ FL and if the distance to DEST is more than 200 NM, the CRZ FL on the PROG page changes.

In that case Mach target is managed as follows :

- At the start of the descent, the Mach target is the managed Mach number at the initial cruise flight level.
- When the aircraft reaches the new flight level, the Mach target switches either to the Mach number for the lower CRZ FL, or to the speed for the lower CRZ FL if the aircraft reaches the crossover altitude. This logic prevents the aircraft from exceeding Vmo during descent.
- If the FCU-selected altitude is lower than the previous CRZ FL and the aircraft is within 200 NM of its destination, the system activates the descent phase.

The pilot may reactivate the cruise phase by entering a new cruise flight level in the PROG PAGE

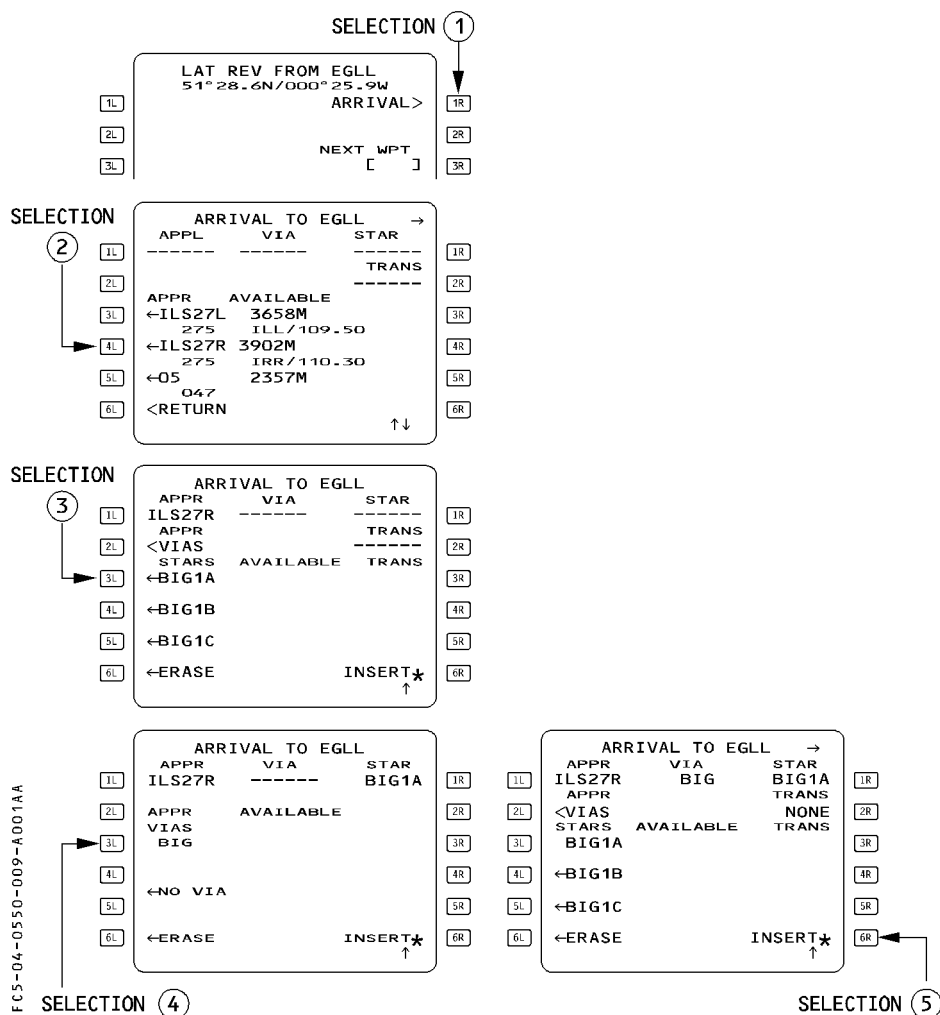
## PREPARATION FOR DESCENT AND APPROACH

The preparation for descent and approach consists of :

- Entering PERF and WIND data
- Defining the lateral and vertical F-PLN
- Checking the tuning (auto or manual) of the appropriate nav aids

After receiving the arrival information, the pilot should use the following procedure.

### REVISION OF LATERAL F-PLN



- PERFORM a lateral revision at destination
- SELECT an ARRIVAL
- SELECT an APPROACH, a STAR, a TRANSITION, a VIA.

When the pilot selects successive items, the page are automatically sequenced. But pressing the [→] key brings up the APPR and STAR page successively.

- CHECK the temporary revision including the missed approach.
- INSERT the temporary revision, [6R] key.

## REVISION OF VERTICAL FLIGHT PLAN

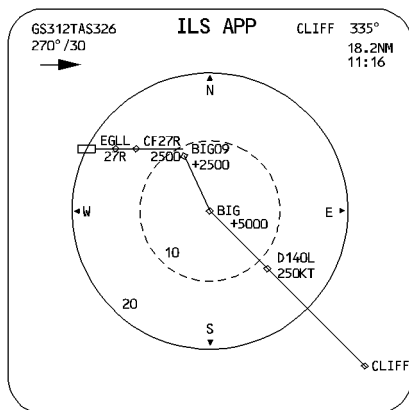
- CHECK the speed and altitude constraints as displayed on the ND. (Use the CSTR pusbutton).
- ENTER any additional speed or altitude constraints using the vertical revision page.

*In order not to be too fast when commencing approach, you may insert a speed constraint at the FAF (Final Approach Fix).*

*When all computations are completed :*

- REVIEW the flight plan using the approach chart.

*When the destination runway changes and if the previously selected STAR is compatible with the new runway, the system selects it automatically in the temporary F-PLN. If the pilot has entered any revision or constraint on this STAR, it will not be transferred. The pilot must reenter it in order to retain it for this approach.*



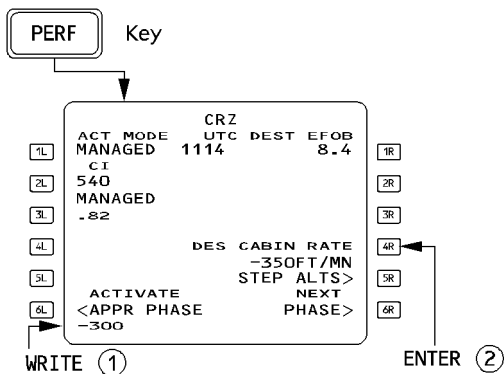
|      |         | AI101 →          |      |
|------|---------|------------------|------|
| [1L] | BIG1A   | UTC SPD/ALT      | [1R] |
|      | D140L   | 1124 *250/ FL085 |      |
| [2L] | BIG1A   | 1126 " / * 5000  | [2R] |
|      | BIG     | 1126 " / * 5000  |      |
| [3L] | C335°   | TRK335°          | [3R] |
|      | BIG09   | 1128 " / * 2780  |      |
| [4L] | (DECEL) | 1128 250/ 2500   | [4R] |
|      | C275°   | 1138 198/ * 2500 |      |
| [5L] | CF27R   | 1138 198/ * 2500 | [5R] |
|      | DEST    | UTC DIST EFOB    |      |
| [6L] | EGLL27R | 1133 78 6.8      | [6R] |
|      |         | ↑ ↓              |      |

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## MODIFYING THE CABIN RATE

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### Procedure

- PRESS the PERF key on MCDU
- WRITE the new cabin rate into the scratchpad
- ENTER it in the [ 4R ] field.

ENTERING THE APPROACH DATA

- From PERF DES page, SELECT “NEXT PHASE” [ 6R ] key to display the APPR page.
- ENTER QNH, TEMP, WIND at destination (magnetic or true North reference depending on the airport's reference). MDA/MDH or DH  
*(The PFD displays the MDA/MDH or DH only when the distance to destination is less than 250 NM).*
- CHECK and, if necessary, MODIFY
  - LDG CONF (landing configuration)
  - Vapp (the FM-computed value may be modified)
  - TRANS ALT (transition altitude)

|    |             |          |         |    |
|----|-------------|----------|---------|----|
|    | DEST        | APPR     |         |    |
|    | QNH         | FLP RETR | FINAL   |    |
| 1L | [ ] [ ] [ ] | F=187    | ILS 27R | 1R |
|    | TEMP        | SLT RETR | MDA     |    |
| 2L | [ ] °       | S=230    | [ ]     | 2R |
|    | MAG WIND    | CLEAN    | DH      |    |
| 3L | [ ] °/[ ]   | 0=267    | [ ]     | 3R |
|    | TRANS ALT   | LDG CONF |         |    |
| 4L | [ ]         | CONF*    |         | 4R |
|    | VAPP        | VLS      | FULL    |    |
| 5L | 135         | 145      | NEXT    | 5R |
|    | PREV        |          |         |    |
| 6L | <PHASE      | PHASE>   |         | 6R |

The scratchpad displays “ENTER DEST DATA” if the approach page is not completed when the aircraft is 180 NM from destination.

- SELECT “NEXT PHASE” in order to display the GO AROUND page.
- CHECK and, if necessary, MODIFY the THR RED ALT and the ACC ALT.

|    |             |             |    |
|----|-------------|-------------|----|
|    | GO AROUND   |             |    |
|    | FLP RETR    |             |    |
| 1L | F=187       | 1R          |    |
|    | SLT RETR    |             |    |
| 2L | S=230       | 2R          |    |
|    | CLEAN       |             |    |
| 3L | 0=267       | 3R          |    |
|    |             |             |    |
| 4L |             | 4R          |    |
|    | THR RED/ACC | ENG OUT ACC |    |
| 5L | 1580/1580   | 1580        | 5R |
|    | PREV        |             |    |
| 6L | <PHASE      |             | 6R |

**SELECTING THE RADIO NAVAIDS**

- CHECK or SELECT the NAVAIDS appropriate for the approach.  
*For an ILS procedure, the ILS will be autotuned.*  
*NDBs must be entered manually.*

**Note :** When the destination has a VOR/DME, ENTER it manually in the VOR field. Enter its identifier in the BRG/DIST field of the PROG page. This allows you to perform a permanent NAV accuracy check.

1L

2L

3L

4L

5L

6L

RADIO NAV

VOR1/FREQ

BIG/115.1

CRS

075

ILS /FREQ

IRR /110.30

CRS

275

ADF1/FREQ

OE/389.5

← ADF1 BFO

FREQ/VOR2

115.1/BIG

CRS

[ ]

FREQ/ADF2

[ ] [ ]

1R

2R

3R

4R

5R

6R

|                                                                                                                                          |                                        |  |         |        |
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### COST INDEX FOR LONG-RANGE CRUISE

The pilot can use the table on this page to find an approximate value for the cost index for long-range cruise.

This unique cost index allows a specific  $\pm 1\%$  around the specific range at long range cruise speed. This cost index is valid for CRZ FL = OPT ALT  $\pm 10\,000$  feet.

| AIRCRAFT     | ENGINE  | CI LRC |            |
|--------------|---------|--------|------------|
|              |         | kg/min | 100 lbs/hr |
| A340-200/300 | CMF 5C4 | 50     | 67         |
|              | CMF 5C3 | 50     | 67         |
|              | CMF 5C2 | 50     | 67         |