

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES		4.04.40	P 1
	LONG RANGE		SEQ 001	REV 14

NAVIGATION

IRS ALIGNMENT

IRs will be aligned, as per the recommendations in the SOP (3.03.06) and Supplementary Techniques' (3.04.34) chapters.

F PLN INSERTION and CROSSCHECK

On certain routes, the pilot has to define LAT/LONG waypoints, which must be entered as follows :

- WRITE the waypoint longitude/latitude in the scratchpad.
The format is 4500N/3000W.
- PRESS a left key of the MCDU F-PLN page.
This automatically triggers the NEW WAYPOINT page.
- CHECK the coordinates and the proposed waypoint ident.
If the pilot entered 4500N/3000W, the system proposes the ident N45W30.
- PRESS the STORE prompt.
The waypoint is inserted in the F-PLN, and stored in the navigation database (stored element).
- A F-PLN crosscheck must be carefully performed by both crewmembers :
 - Check the SID (F-PLN page and ND PLAN mode versus the SID chart including constraints).
 - En route segments :
 - If the F-PLN is defined by a company route : Check the ROUTE SELECTION page, versus the ATC F-PLN.
 - If the F-PLN is defined by a succession of airways : Check the AWY intersect waypoints on the AWY page, versus the ATC F-PLN.
 - If the F-PLN is defined by a succession of waypoints : Check the TRK/DIST of each leg, versus the computerized F-PLN.
 - Check the flight plan DISTANCE on the F-PLN page, versus the ground distance of the computerized flight plan.

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES		4.04.40	P 2
	LONG RANGE		SEQ 001	REV 07

- Once the flight plan is finalized, and all GW/PERF data are inserted :
 - PRINT the PREFLIGHT REPORT

This report may then be used as the master document for the continuous monitor of the flight progress, until a major flight plan change will occur in flight.

IN FLIGHT PROCEDURES

Takeoff

- If takeoff is achieved from an intersection, INSERT the corresponding TO SHIFT on the PERF TO page, to get an accurate position update at takeoff.

Reaching the initial cruise FL

- COMPLETE WIND/TEMP entry at waypoints, if not done during preflight
 - COMPLETE STEP entry, check whether an OPT STEP is proposed for the next STEP on the STEP ALT page
 - UPDATE the F-PLN with the latest ATC or Oceanic clearance
 - PRINT the resulting predictions (if PRINTER is installed) : PRINT the INFLIGHT REPORT
- This will be then used as the basic document to follow the proper completion of the flight, until a new major change is requested by ATC.*

Before leaving radio navaid coverage

- TUNE the last navaid within range and INSERT its ident on PROG page.
 - **When IRS ONLY NAVIGATION message comes up :**
 - VALIDATE FMS position (raw data versus computed BRG/DIST on PROG page)
 - **If a significant deviation is noticed between the IRS deviations :**
 - Determine the best 2 IRSs on DATA POS MONITOR page
- eg*
IRS1 IRS 2 IRS3
6.4 2.8 2.5 IRS 3/IRS2 are best.

Outside radio navaid coverage

- USE NAV mode.
 - KEEP FD bars displayed on both PFD.
- Any FMS position mismatch is immediately detected by the FD bars of the slave FMS, which will not be properly centered.*

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES		4.04.40	P 3
	LONG RANGE		SEQ 001	REV 07

- When close to the TO waypoint : SELECT the report page
- When overhead the waypoint, CHECK the proper sequencing :
 - *REPORT to ATC using REPORT page*
 - *CHECK BRG/DIST to the new TO WPT on the ND*
 - *CHECK Fuel and Xtra on FUEL PRED page*

Modification of the F-PLN

- PNF : ENTERS the new clearance in the MCDU
- PF/PNF : CROSSCHECK the correct insertion of the new clearance
- PRINT the resulting predictions (if PRINTER is installed) : INFLIGHT REPORT
The previous print may be suppressed since the new print includes the history of the past waypoints.

When back into radio navaid coverage area

- Manually TUNE for display the first navaid potentially in range
Note : *Autotune of the navaid will only occur when within the figure of merit of the navaids.*
- CROSSCHECK FMS accuracy whenever raw data are available
Note : *If a VOR/DME update occurs, it is quite common to note that the aircraft enters a shallow turn to slowly catch up the new radio position.*

At the end of the flight

- PRINT the POST FLIGHT REPORT (if the PRINTER is installed).
Note : *When taxiing, the GS information provided by the worst IRS might be misleading*
- CHECK the IRS drift on the POST FLIGHT REPORT or on the IRS MONITOR page (if printer is not installed)

POLAR NAVIGATION

When a flight is scheduled to cross high latitude areas (beyond 60°), various precautions have to be taken regarding : ADIRSs, FMGSs, EIS

These precautions are basically dictated by :

- The change from the MAG to TRUE heading (track) reference required by the airway reference changes in high latitude, or the inability of the IRSs to provide magnetic heading.
- Some particularities linked to the pole overfly.

DESCRIPTION

ADIRS

– Alignment :

The IRS may be aligned up to latitude 73N without any particular procedures.

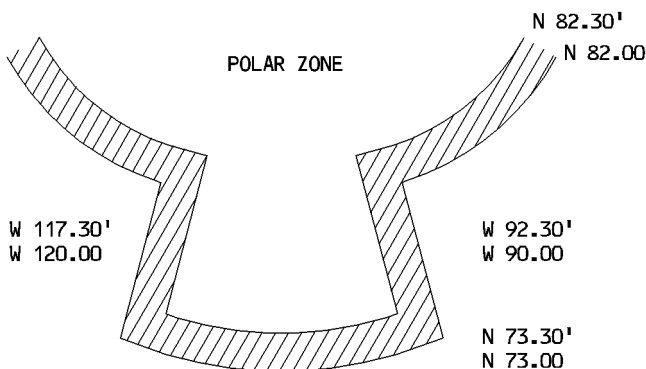
Between 73N and 82N (north or south), the required alignment time is greater and a specific procedure has to be performed.

Beyond 82° North or South, no ADIRS alignment is possible.

– MAG-TRUE reference selection :

The ADIRS are able to provide TRUE heading (track), regardless of the aircraft latitude.

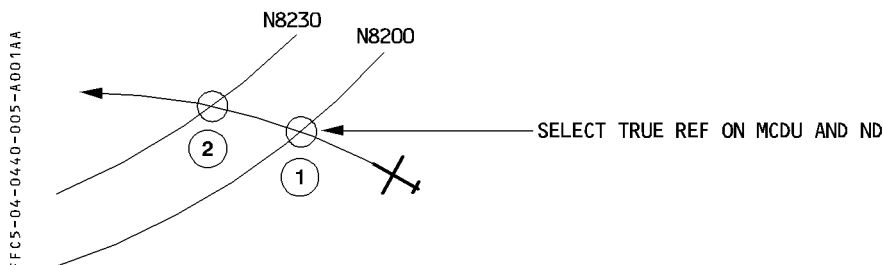
The ADIRS are able to provide MAG heading (track) between latitudes 82°30' N and 60°30' S, except in the vicinity of the magnetic pole, as shown below :



- Note :**
1. The latitude values given in this diagram are average values. In reality, the polar area involves different hysteresis, combined with the track angle penetration of the aircraft in the zone.
 2. All airfields where STARs and APPRs are MAG referenced — such as Svalbard, Thule — will be flown with magnetic reference selected.

virgin atlantic A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES LONG RANGE	4.04.40	P 5
		SEQ 001	REV 07

The MAG/TRUE selection is achieved manually by pressing the NORTH REF pushbutton, or automatically if the aircraft enters the polar zone with MAG still selected. In this case the following messages and cautions are displayed.



When in 2, and MAG reference is still selected, following events will occur :

- the IRSs automatically revert from MAG to TRUE
- an indication TRU appears on the ND and PFD heading scales. The GRID track information appears on ND.
- an amber caution is triggered on the ECAM :
NAV EXTREME LATITUDE
NORTH REF SEL. TRUE
- the autopilot might disconnect, an amber caution HDG DISCREPANCY (associated with a CHECK HDG message on the PFD and on the ND) might be triggered (the IRS do not reach the polar zone simultaneously).

Note : The messages and cautions are triggered as soon as the first IRS reaches the polar zone ; once cleared, when the other two IRSs enter the polar zone, the messages are no longer displayed.

FMGS

- Flight Guidance part
 - When the pilot changes manually the heading reference from MAG to TRUE or vice versa,
 - * if NAV mode is engaged, there is no discontinuity in the lateral guidance.
 - * if HDG (TRK) modes are engaged, the HDG (TRK) target is automatically modified using current position variation ; thus there is no discontinuity in the lateral guidance.
 - if TRUE reference is selected, only CAT 1 ILS approaches may be flown.
 - if an automatic MAG/TRUE switching occurs when entering the Polar zone, the autopilot might disengage due to the fact that, most probably, the automatic switching or Pole overfly will not be seen simultaneously by the 3 IRSs. The AP OFF warning is displayed on the ECAM.

virgin atlantic A340-600 <i>Flight Crew Operating Manual</i>	MULTI PHASE RELATED PROCEDURES		4.04.40	P 6
	LONG RANGE		SEQ 001	REV 07

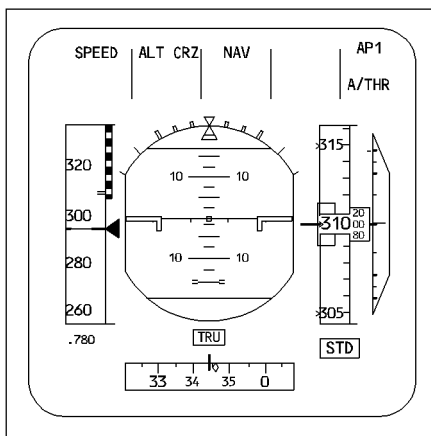
- Flight Management part
 - When the aircraft reaches 78 N (60 S), the aircraft position is computed using XYZ earth centered Cartesian coordinates.
This allows the FM to provide continuously, regardless of latitude, a MIX IRS position, the FM position being linked to the MIX IRS one.
 - During preflight phase, if TRUE reference is selected (take off with TRUE reference is rare), the pilot is reminded of this selection by :
 - * CHECK NORTH REFERENCE amber message on ND and MCDU scratchpad if the origin airport reference does not match the one selected by the pilot.
 - * TRU label above PFD/ND heading scales flashes for 10 seconds at slat extension.
 - * TRUE NORTH REF memo message flashes for 10 seconds at engine start or at slat extension.
 - Before approach, the pilot is reminded of the correct TRUE/MAG selection by :
 - * CHECK NORTH REF amber message on ND and MCDU scratchpad if the destination airport reference in data base does not match the one selected by the pilot and the aircraft reaches the arrival area (approximately 25 NM from destination airport).
 - * If true is selected, TRU label pulses on PFD/ND during 10 seconds at slat extension, as well as the TRUE NORTH REF message on ECAM (as a reminder).
 - The tracks and bearings, provided on the MCDU F.PLN, PROG... pages are computed TRUE or MAG referenced, according to the TRUE/MAG cockpit selection
 - * if selection is TRUE, the bearing and track figures are displayed followed by a T.
 - if the pilot wishes to create a PBD, PB/PB waypoint or define a radial (DIR TO INTCPT), the rule for bearing or radial entry is as follows :
 - * if the bearing is inserted without specifying its reference, the reference is the one corresponding to the cockpit selection
 - * if the bearing is inserted with its specified reference (M for magnetic, T for true), the bearing is so defined : e.g. TOU/350 T/15.

EIS PFD/ND

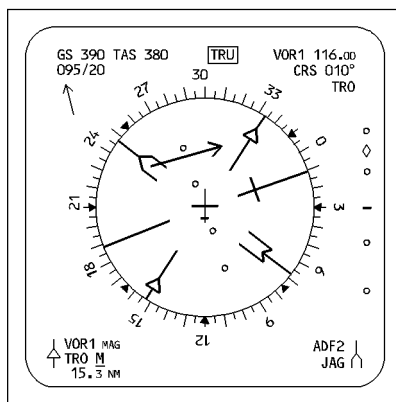
– TRUE/MAG reference indication

The TRUE/MAG reference selection is indicated by a specific label displayed above the heading scales of both EFIS DUs :

- If MAG is selected (which is the most common situation) no label is provided ; the bearing to the TO waypoint on the ND is displayed with the digits only.
- If true is selected (manually or automatically), a TRU label is provided above PFD/ND heading scales.

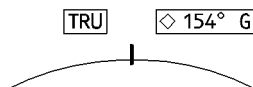


PFD : TRUE REFERENCE SELECTED

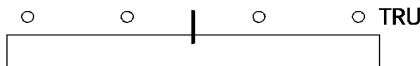


ND ROSE in ROSE-VOR mode:
TRUE REFERENCE SELECTED

- The GRID TRACK appears on the PFD in all modes except in PLAN mode if no approach title is displayed.

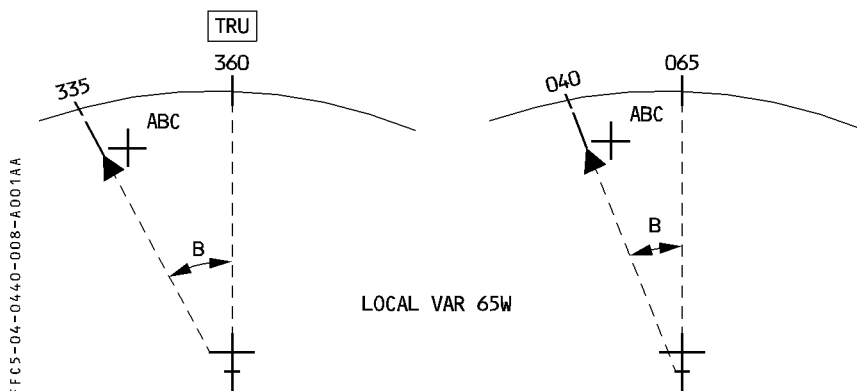


Note : If the ILS scale is displayed on PFD, the TRUE message is shifted on the right side.



ADF and VOR bearing display

- The ADF needle represents the relative bearing between the aircraft and the NDB.
The ADF relative bearing information (B) is thus independant of the TRUE/MAG selection, and the needle is always pointing to the same direction whatever is the selection.
Furthermore (provided FM position is accurate) when the EFIS ND is in ARC or ROSE NAV modes, the ADF needle will point towards the NDB symbol as provided by the FMS.



Note : the same reading is available on the DDRMI.

- The VOR bearing is measured by the VOR, at the VOR location :
 - * it is a TRUE bearing if the VOR transmitter is TRUE referenced
 - * it is a MAG bearing if the VOR transmitter is MAG referenced.
 When the ND display mode is ARC or ROSENAV, the FM computed data (aircraft position, F-PLN legs, NAVAIID position symbol...) are provided along with VOR needles, if selected.
 → it is important in these display modes, that there is a consistency between the FM data and the raw data.
 Hence, if the cockpit TRUE/MAG reference selection does not match the VOR transmitter reference, there may be a discrepancy between the VOR raw data and the FM data, unless a correction is applied to the VOR data.

Principle

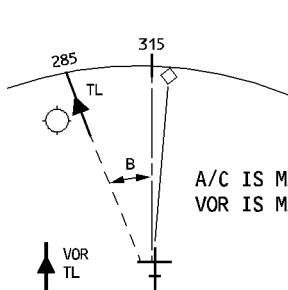
When the ND is in ARC/ROSE NAV mode, if there is a mismatch between the TRUE/MAG cockpit reference selection and the VOR transmitter reference, the VOR needle is equal to the VOR raw bearing corrected by the local variation at the aircraft present position.

In that case, the needle is displayed in magenta colour, the label CORR (corrected) is displayed in magenta in the lower corner of the ND.

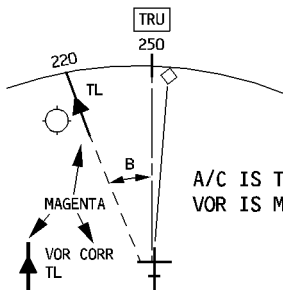
In all other ND display modes (ROSE VOR, ROSE ILS), the VOR raw data (with no correction) is displayed. MAG or TRU (amber) is displayed next to the VOR identifier when its reference does not match the cockpit selection.

Example :

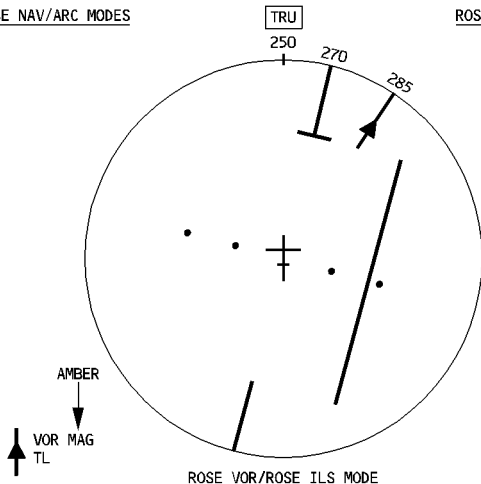
Local variation 65W – TL is a magnetic referenced VOR.



ROSE NAV/ARC MODES



ROSE NAV/ARC MODES



ROSE VOR/ROSE ILS MODE

THE VOR DEVIATION BAR
IS RELATED TO THE (MAG)
VOR RAW DATA.
A/C IS TRUE REFERENCED
VOR IS MAG REFERENCED

FFC5-04-0440-009-A001AA

VOR transmitter Reference	ND display MODE	Cockpit Reference Selection		DDRMI
		TRUE	MAG	
TRUE	ARC/ROSE NAV	VOR Raw data	VOR is corrected	VOR RAW DATA
	ROSE VOR/ILS	VOR RAW DATA		
MAG	ARC/ROSE NAV	VOR is corrected	VOR Raw Data	
	ROSE VOR/ILS	VOR RAW DATA		

Note : ND in ROSE VOR/ROSE ILS modes and DDRMI VOR bearing indications are always identical.

DDRMI

The heading provided by the DDRMI is directly linked to the TRUE/MAG reference cockpit selection.

The ADF and VOR bearing indications are raw data, as provided by the transmitters.

PROCEDURES

IRS alignment :

- When a high latitude flight or polar flight is planned, it is most probably a long range type of a flight.
 - DELAY the completion of IRS alignment as long as possible.
 - Prior to pressing the ALIGN IRS prompt, SLEW the origin airport reference coordinates to the gate coordinates, if published.
- When the origin airport is located between latitude 73°N and 82° (North or South), IRS alignment should last at least 15 minutes. Consequently :
 - SET IRS selectors to NAV
 - START the STOP WATCH
 - ADJUST the origin airport coordinates to the gate coordinates, if published, on the INIT A page
 - PRESS the ALIGN IRS prompt, after the 15-minute countdown or later.

Note : Beyond 82° North or South, no ADIRS alignment is possible.

virgin atlantic A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES LONG RANGE	4.04.40 SEQ 001	P 11 REV 10
---	--	--------------------	----------------

Flight

● Takeoff :

- If CHECK NORTH REF amber message comes up on the ND and MCDU, verify that the NORTH REF pushbutton is selected as the origin airport reference.

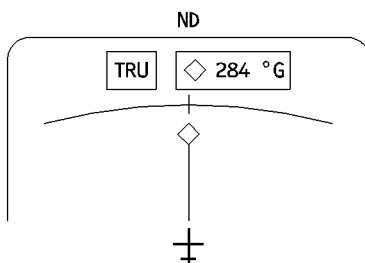
● Cruise :

When reaching an area where the heading reference is to be changed (oceanic area, airway or polar track defined in TRUE reference ...) ;

- SELECT TRUE by pressing the NORTH REF pushbutton.

When reaching 65 N with TRUE reference selected, the GRID TRACK is provided on the ND upper right box. The ND compass still displays true track and heading.

GRID TRK along with XTK are the cues to be used to monitor the proper lateral guidance.



If the message "SELECT TRUE" appears on the ND/MCDU, this indicates that the aircraft has reached the Polar zone with MAG reference still selected in the cockpit. PRESS NORTH REF pushbutton to select TRUE.

Note : *If this is not achieved, an automatic switching will subsequently occur along with an ECAM caution NAV EXTREME LATITUDE. The AP will most probably disengage with associated warnings.*

In such a case :

PRESS NORTH REF pushbutton to select TRUE.

RE-ENGAGE THE AP.

– Use of NAVAIDS

• ADFS

The NDBs in the Polar zone are quite powerful and the bearing can be received at long distances.

- USE these NDB to check the reasonableness of the FM navigation by comparing the ADF bearing displayed on the ND with the FM-computed bearing displayed on the PROG page.

- VOR/DME

En route, the VOR/DME are basically used either for FM NAV ACCY crosscheck or to report to ATC on a given radial.

The FM NAV ACCY crosscheck is achieved as usual by comparing the bearing/distance displayed on the ND with the bearing/distance displayed on the PROG page ;

in case the VOR used is defined in another reference (e.g MAG) than the one selected in the cockpit (e.g. TRUE), the bearing provided on ND is magenta and is corrected ; the VOR corrected bearing should be within 5° of the FM computed bearing (taking into consideration the meridian convergence and difference of magnetic variation).

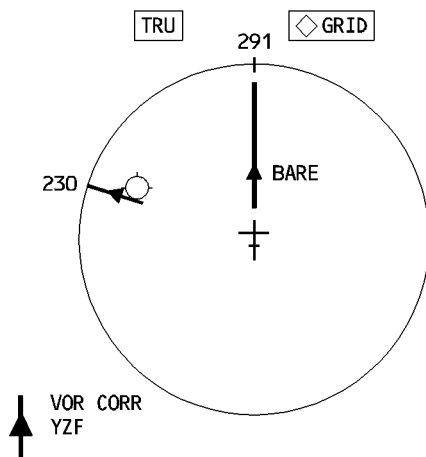
→ if there is a doubt, select the NORTH REF to the VOR reference and check the bearings.

if the aircraft has to report on a given radial of a VOR which is defined in a different reference (e.g MAG) from the cockpit reference (e.g. TRUE),

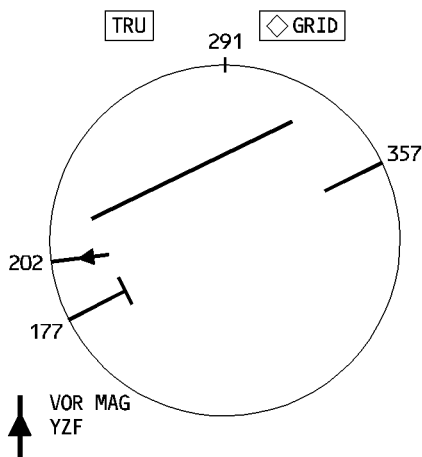
check the RADIAL crossing on PNF ND set to ROSE VOR mode or use DDRMI.

e.g. : aircraft flies NCA 24. (NCA 24 is TRUE referenced route). ATC requests the aircraft to report on RADIAL 357 from YZF (MAG referenced).

PF ND IN ROSE NAV/ARC MODE



PF ND IN ROSE VOR MODE



FFCS-04-0440-012-A001AA

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES		4.04.40	P 13
	LONG RANGE		SEQ 001	REV 07

- Flying the pole
 - in most cases the autopilot will be in NAV mode.
When getting close to the pole, a message CHECK HDG comes up with the associated ECAM procedure.
 - * Disregard the ECAM procedure.
The message is due to the fact that the IRSs do not reach the pole simultaneously ; thus the headings do not turn simultaneously from 360 to 180°.
 - in case HDG mode is used (e.g FM1 + 2 failed and Back Up Nav is used)
 - * the autopilot outside the best IRS is to be engaged.
The offside HDG bug (▽) should be disregarded when close to the pole since, the IRS headings may differ.
- Approach
 - If CHECK NORTH REF amber message comes up on ND and MCDU, verify that the NORTH REF pushbutton is selected to the destination airport reference.
 - If TRUE is selected for approach, only CATI ILS may be flown.

NAVIGATION PROCEDURES WITH FAILURES

LOSS OF ONE IRS

- Consequences
 - * 2 IRS/2 FMGCs available
 - * MIX IRS position of each FMGC = its outside IRS position
- Limitations
None

Note : *If FMS 1/FMS 2 POS DIFF message comes up, check the IRSs position. If they differ by more than 20 NM prior entry into MNPS area, consider a diversion.*

PROCEDURES

- APPLY ECAM procedure (ATT/HDG switching if required)
- DETERMINE the best IRS
- USE the AP associated to the best IRS.

LOSS OF TWO IRSs

- Consequences :
 - * 1 IRS/2 FMGC are still available. On navigation system available only
 - * No AP/FD/ATHR
 - * EFIS display on SINGLE SOURCE
- Limitation
 - * If the aircraft is not yet in MNPS area, do not enter.
 - * If the aircraft is within MNPS area, continue but advise ATC of navigation degradation.

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES LONG RANGE	4.04.40 SEQ 001	P 14 REV 07
---	---	--------------------	----------------

PROCEDURES

- APPLY ECAM procedure
- FLY the aircraft manually (ALTN LAW – PROT LOST)
 - In order to recover EIS display on both sides, select EIS DMS switching to DMC 1(2) EFIS SINGLE SOURCE message is displayed on PFD*
- SELECT TRK/FPV : adjust FCU TRK target so as to keep XTK = 0.0
 - Specifics for Long Range
- APPLY the normal procedures except those linked to unavailability of NAV mode
- When closing up the TO WPT : READ the OUTBND TRK the NEXT WPT
- When sequencing the waypoint, SELECT the OUTBND TRK on the FCU, and fly the FPV to the TRK symbol on the horizon.
 - Note the TIME – GS – FOB when overhead.*
- ENVISAGE plotting technic on the chart at mid point of the leg.

LOSS OF ONE MCDU

- Consequences
 - 3 IRSs, 2 FMGCs, 2 MCDUs are still available
- Note :** MCDU 3 is not able to achieve the Back Up navigation.
- Limitation
 - None

PROCEDURE

- SELECT the failed MCDU off. The MCDU 3 automatically replaces it.

LOSS OF ONE FMGC

- Consequences
 - * 3 IRSs/1 FMGC/2 MCDUs are still available
 - * Back up navigation is available on the failed side.
- Limitation
 - None

PROCEDURES

- CHECK BACK UP NAV function is available on the failed side

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES		4.04.40	P 15
	LONG RANGE		SEQ 001	REV 07

- SELECT MCDU MENU page
- PRESS NAV B/UP prompt and check that the F-PLN is displayed on the MCDU and ND
- SELECT MCDU MENU page back and deselect the NAV B/UP prompt.
- SELECT FM SOURCE switch to BOTH ON 1 or 2 position (ECAM procedure)
- SELECT the AP associated to the live FMGC
- APPLY normal procedures

Note : *If the FM fails on the master FG side with NAV mode engaged, the AP disengages ; the FD reverts to HDG (TRK) and SPD target reverts from managed to selected.
Engage the other AP, NAV mode and SPD managed. Both PFD display the same FD (1FD1 or 2FD2 is displayed).*

LOSS OF TWO FMGCs

- Consequences
 - * 3(2) IRSs/2 BACKUP NAV still available
 - * No AP/FD managed modes
 - * No managed target speed or Mach
- Limitation
 - * None : there are still two independant navigation systems.

Note : *IRS positions must be monitored closely. If they differ by more than 20 NM prior entry into MNPS area, diversion might be envisaged.*

PROCEDURES

- CHECK/SELECT FM SOURCE selector to NORMAL
- SELECT NAV B/UP on both MCDU MENU pages
- SELECT NAV on both RMPs

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES		4.04.40	P 16
	LONG RANGE		SEQ 001	REV 07

- SELECT TRK/FPA and try to engage one autopilot in TRK/ALT mode. (If the 2 FGs are available, engage the autopilot onside of the best IR).
- SELECT proper speed/Mach target and engage A/THR
- REFER to BACK UP NAV operation (Refer to 4.06.10)
- Specifics for Long Range : USE TRK mode to keep XTK = 0.0 on the BEST IRS side

● **When closing the TO WPT :**

- READ the OUTBND TRK to the NEXT WPT
- COMPARE backup navigation FPLN distance to the NEXT WPT with the computerized F-PLN
- When sequencing the WPT, SELECT the OUTBND TRK on the FCU and note : Time – GS – FOB when overhead
- ENVISAGE plotting technic on the chart at mid point of the leg.

FMS 1/2 INDEPENDENT OPERATIONS

- Consequences
 - * no crosstalk between both FMGCs : they work independently
 - * Any entry on one MCDU must be achieved on the other one
 - * No monitoring between both FMGCs
- Limitation
 - * None

PROCEDURES

- APPLY the normal procedures, but all entries have to be duplicated
- Both pilots have to MONITOR separately each FMGC (especially in terms of navigation accuracy).

Note : *If the active F-PLN legs are different in both FMGCs, the flight director bars will only be centered on the engaged autopilot side.*

If the autopilot is then changed, the aircraft will turn towards the active leg of the other FMGC.

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES		4.04.40	P 17
	LONG RANGE		SEQ 001	REV 07

MCDU BACK UP NAVIGATION

GENERAL

The MCDU NAV B/UP allows to link a MCDU to its associated IRS in order to allow the pilot to monitor the navigation and to be provided with some basic flight planning functions in case of FM 1 + 2 failure.

CAUTION

The MCDU NAV B/UP is to be used only in case of FM 1 + 2 failure. It can be selected temporarily in case of FM1 or 2 only failure, in order to ensure that the function is available on the failed side.

When in MCDU NAV B/UP on both sides, one FG at least must be available to engage AP and A/THR.

The MCDU NAV B/UP function provides :

- aircraft position using onside IRS or IRS 3
- F-PLN as memorized in the MCDU
- F-PLN display on ND
- F-PLN automatic sequencing
- AP/FD selected modes, if at least one FG is available
- Limited lateral revisions
- Mag (True) bearing depending on the pilot selection, from aircraft position to the TO WPT and associated distance
- True track between waypoints
- Time estimates computed with current GS from onside IRS
- Total time and distance to destination

The following features are not provided :

- No DATA BASE available :
 - No autotuning, NAVAIDS must be selected on RMP
 - No radio position, no GPS position
 - No EFIS CTL PANEL options
 - No LDG ELEV (must be manually selected on overhead panel)
- No performance data :
 - No CLB/DES/APP NAV/FINAL modes
 - No SPEED MANAGED
 - No automatic SPD/MACH change over
- Most of predictions are lost :
 - No EFOB
 - No XTRA
 - No ETA at DEST
- No multiple lateral F-PLN
- No AF/FD managed modes
- No crosstalk between MCDUs : F-PLN revisions have to be achieved on both MCDUs.

BACK UP NAV SELECTION

FM F-PLN download in MCDU

While BACK UP NAV is not active, the FM downloads permanently a condensed form of the F-PLN in the MCDU.

Downloaded information include :

- waypoint position
- waypoint identifier
- leg type
- discontinuity
- overfly
- turn direction

Heading legs, course to fix legs, ..., computed INTCPT positions, pseudo waypoints, ..., cannot be downloaded.

They are replaced by discontinuities.

Maximum of 150 waypoints are downloaded.

Example of downloaded F-PLN

FFCS-04-0440-018-A001A

1L 2L 3L 4L 5L 6L	FROM AI101 →				1R 2R 3R 4R 5R 6R
	BIGAR	UTC	SPD/ALT		
	BIG	117	/ 4888		
	C335°		9NM		
	BIG09Δ	116	250/*2700		
	TRK275°		1		
F-PLN BEFORE FM FAILURE					
1L 2L 3L 4L 5L 6L	(DECEL)	117	' ' / 2500	1R 2R 3R 4R 5R 6R	
	C275°		6		
	AMB	118	160/*2500		
	C275°		4 3.0°		
	OM27R	120	*136/*1310		
	DEST TIME		DIST EFOB		
EGLL27R 0121 518 36.9 ↓↑					

1L 2L 3L 4L 5L 6L	B/UP FPLN				1R 2R 3R 4R 5R 6R
	FROM	TTG	DIST		
	BIG	5119.8N/00002.2E			
	--F-PLN DISCONTINUITY--				
	BIG09Δ	5127.0N/00004.6W			
	--F-PLN DISCONTINUITY--				
1L 2L 3L 4L 5L 6L	AMB	5128.6N/00014.1W		1R 2R 3R 4R 5R 6R	
	DEST	TTG	DIST		
	EGLL27R	---	518NM		
	↓↑				
	DOWNLOAD B/UP F-PLN				
	-CF LEGS ARE PRECEDED BY A DISCONTINUITY				
-PSEUDO WPT ARE NOT DOWNLOADED					

In that procedure, all the legs are coded as CF (Course to Fix) legs. This explains all the discontinuities resulting in the B/UP F-PLN.

These discontinuities may be cleared.

When the second FM fails

- REENGAGE and SELECT the required AP and A/THR modes (if disconnected).
- SELECT the FM SOURCE SELECTOR to NORM
MCDU MENU page is automatically displayed.
NAV B/UP prompt appears.
- SELECT the NAV B/UP prompt on both MCDU.
- SELECT NAV on both RMP
Tune the required nav aids

MCDU MENU	
1L	<FM1
2L	<ACARS
3L	<ACMS
4L	<CMS
5L	
6L	
	RETURN>

B/UP FPLN	
1L	FROM TTG DIST
2L	TOU 4340.8N/00118.7E
3L	350° 0004 22NM
4L	AGN 4353.3N/00052.4E
5L	348° 0045 116NM
6L	LMG 4549.0N/00101.6E
	321° T 0045 97NM
	AMBA 4725.1N/00102.5E
	322° T 0053 40NM
	N48E001 4803.5N/00123.3E
	DEST 0126 443NM
	LFPO 4843.4N/00222.9E
	↑↓

B/UP F-PLN PAGE

B/UP PROG	
1L	OVHD ALT
2L	CYN. 24300
3L	BRG /DIST/ TTG TO
4L	---
5L	IRS1 BASED POS GS
6L	4340.6N/00017.7E 310KT
	DTRK TRK
	346° 342°
	<IRS1 IRS 3>

B/UP PROG PAGE

B/UP IRS1	
1L	POSITION
2L	43° 40.4N/000° 17.6E
3L	TTRK GS
4L	342.3 310
5L	THDG MHDG
6L	342.3 329.8
	WIND
	225° /216
	<RETURN NEXT IRS>

B/UP IRS PAGE

- Only MCDU MENU
 F-PLN key
 PROG key
 DIR key
- B/UP F-PLN page
 B/UP PROG page
 B/UP IRS 1, 2, 3 pages are available when BACK UP NAV is selected.

FFCS-04-0440-019-A001AA

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES		4.04.40	P 20
	LONG RANGE		SEQ 001	REV 07

BACK UP NAV OPERATION

AP and A/THR

One FG at least must be available to allow the engagement of AP/FD and A/THR.

All FM managed modes are lost as well as managed speed. As a consequence :

- LAT F-PLN is flown in HDG/TRK modes
- VERT F-PLN is flown in OPEN/V/S/FPA modes
- SPD TARGET is manually SELECTED on the FCU
- SPD/MACH crossover is manually SELECTED on the FCU

It is recommended to use the TRK/FPA modes :

- SELECT the required TRK on FCU at waypoint sequencing (as no AP/FD coupling exists in NAV B/UP). F-PLN sequencing is automatic.
- MONITOR the track of the next leg prior reaching the TO waypoint (track between TO and next waypoints is true track).
- ADJUST the track to follow the F-PLN with X-TRK = 0
- USE OP DES or FPA to descend as suitable.

FPA allows easy altitudes predictions :

$$DNM = \Delta(FL)/FPA^\circ$$

Navigation monitoring

The navigation accuracy check must be achieved periodically using the same principle as with FM navigation :

- COMPARE computed data with raw data
- SELECT ON RMP the applicable navaid
- PRESS the [PROG] key
B/UP PROG page is displayed
- WRITE in the scratchpad then ENTER the navaid LAT/LONG
- SELECT associated navaid needle on the EFIS control panel.
- COMPARE computed BRG/DIST with RAW DATA on ND
 - If the crosscheck is POSITIVE the ND may be used in ROSE NAV/MAP modes with raw data
 - If the crosscheck is NEGATIVE the ND must be used in ROSE VOR/ROSE ILS modes.

Note : *B/UP IRS pages may also be used to check the position.*

Flight Planning

The following revisions may be achieved :

- WPT insertion/deletion
- OVERFLY insertion/deletion
- DIR TO a waypoint
- CLR waypoints/discontinuities

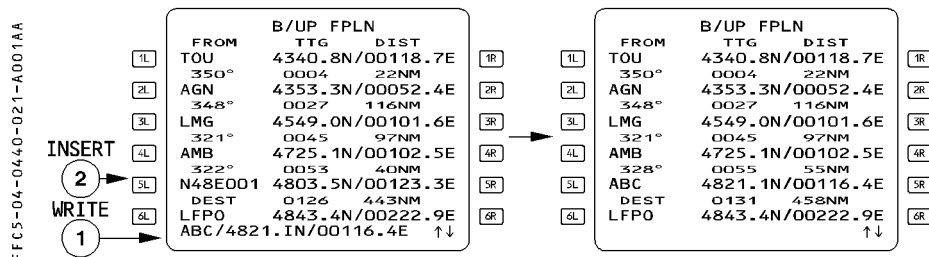
Waypoint identifiers are either published waypoint identifiers if present in the MCDU active F-PLN, or coded LAT/LONG identifiers resulting from pilot entries.

All flight planning functions are directly applied on active F-PLN without LAT REV page.

Waypoint insertion

Waypoint insertion into the F-PLN is performed via the B/UP F-PLN page by selecting the line key adjacent to the desired point of insertion, whenever a pre-existing waypoint identifier or valid IDENT/LAT/LONG or LAT/LONG entry is displayed in the scratchpad.

Any waypoint entry which causes the number of legs in the route to exceed the maximum allowed results in the "F-PLN FULL" message.



- Note :**
- If the inserted waypoint is entered only with LAT/LONG, its identifier would be : N48E001
 - If the pilot writes a waypoint IDENT/LAT/LONG with an ident already used in the F-PLN, a message "NOT ALLOWED" is displayed.

Waypoint deletion

Waypoint and discontinuity may be deleted from the B/UP F-PLN page by using the CLR key.

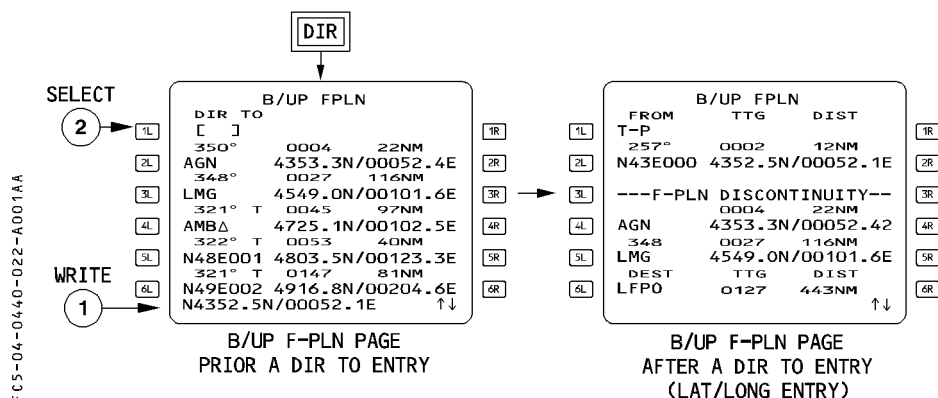
Overfly insertion/deletion

Same as for the FM F-PLN.

DIRECT TO a waypoint

The DIR TO function operates as for the normal F-PLN, except that RADIAL INTERCEPT and ABEAM functions are not available.

- PRESS the DIR key.
- SELECT the downpath waypoint
or
- WRITE LAT/LONG (or IDENT/LAT/LONG) in scratchpad then INSERT in [1L].
- SELECT the proper track on FCU to have the aircraft turn towards the new TO waypoint.



In this example, the entered DIR TO waypoint is a LAT/LONG.

As this new waypoint is not identical to any waypoint in the F-PLN, a direct leg to that waypoint is created and followed by a discontinuity.

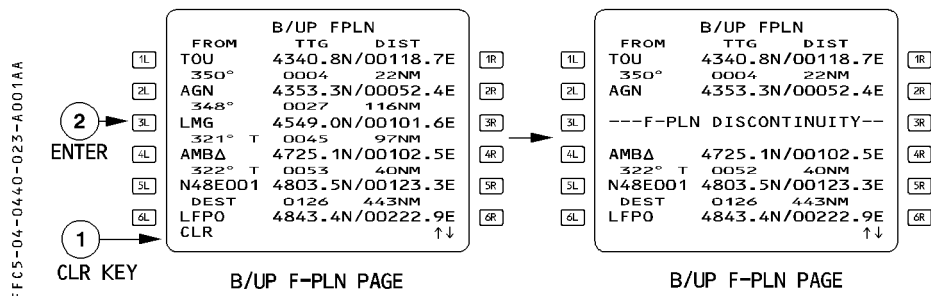
When the DIR TO function is completed, the B/UP F-PLN page is displayed with the DIR TO waypoint as the TO waypoint and T-P as the from waypoint.

In case of DIR TO is achieved to a waypoint belonging to the B/UP F/PLN, no F-PLN discontinuity is created.

Note : – *In case of DIR TO a waypoint associated with an OVERFLY condition, the OVERFLY is retained.*

CLR waypoint/discontinuity

CLR as for normal operation.



Approaches

- ND display selection rule

As per normal operation, it depends upon the result of NAV ACCY CROSS CHECK.

Furthermore it depends also whether the F-PLN is complete, including the approach.

F-PLN	NAV ACCY CHECK	ND	
		PF	PNF
Complete with appropriate approach	Positive	ARC or ROSE NAV Ref Navaid Raw data	
	Negative	ROSE VOR/ILS	ARC or ROSE NAV or ROSE VOR/ILS Ref Navaid Raw Data
Incomplete	Positive or Negative	ROSE VOR/ILS	

 A340-600 <i>Flight Crew Operating Manual</i>	MULTI PHASE RELATED PROCEDURES		4.04.40	P 24
	LONG RANGE		SEQ 001	REV 07

End of descent

- ADJUST manually the landing elevation on the overhead panel.
- SET the MDA on the standby altimeter.

Non ILS approaches

- SELECT on RMP the approach reference nav aids.
The autopilot and flight director available modes are TRK-FPA and HDG/VS
The autothrust available speed target is selected speed.

ILS approaches

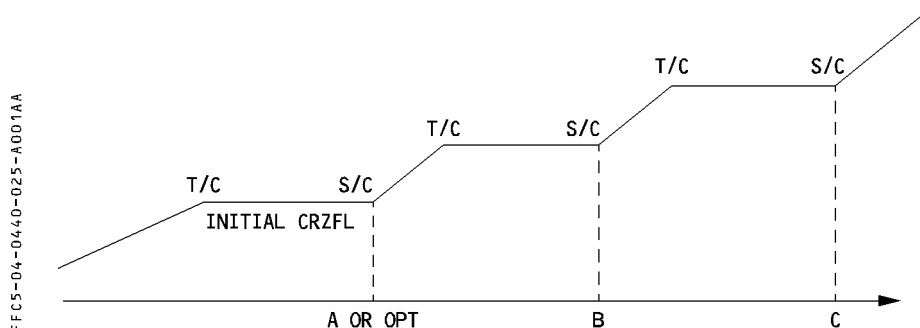
Only CAT 1 approaches may be flown since the DH indication is not available.

- CHECK the ILS frequency and course on the RMP.
- PUSH the LS pushbutton on the EIS control panel.
The autopilot and flight director available modes are APP (LOC – G/S – LAND)
The autothrottle available speed target is selected speed
- CHECK VAPP in the QRH.

OPTIMIZATION

STEP CLIMB/STEP DESCENT

The STEP ALTS function allows to define the successive CRZ FLs and to determine the optimum position to initiate a climb from the initial (or current) CRZ FL to the next one.



PRINCIPLE

Geographic steps

Up to four geographic steps may be defined on the STEP ALTS page. These steps are initiated at geographical position, along the F-PLN.

Rules

- The minimum step size is 1000 feet
- A Step Climb (S/C) cannot follow a Step Descent (S/D)
- A STEP is automatically cleared if
 - the S/C (S/D) is sequenced without any level change commanded by the pilot.
 - the pilot achieves a LAT REV which deletes the associated waypoint from the F-PLN
 - by EO condition
- A STEP is manually cleared
 - on the STEP ALTS page, by CLEARING the corresponding field
 - on the F-PLN page, by CLEARING the (S/C) (S/D) pseudowaypoint
- A STEP entry is IGNORED if the remaining CRZ distance is less than about 50 NM
- Once the steps are inserted in the F-PLN, they are displayed :
 - on the MCDU as (S/C), (S/D), (T/C), (T/D) pseudowaypoints
 - on the ND by associated ↗, ↘, ↙ white symbols

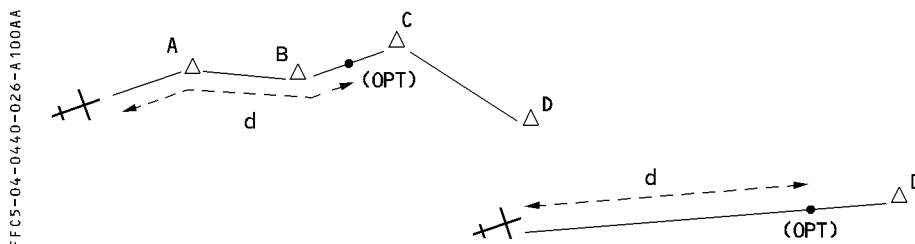
Optimum step

Once geographic steps are inserted or altitude is entered, the FM proposes an OPTIMUM STEP start of climb position for the first step climb altitude ahead : fuel/time savings are displayed if above 100 kg/1 min. If no savings are found, no optimum step is proposed.

The OPT STEP is not automatically inserted, the pilot has to insert it if appropriate. Once inserted, the OPT STEP point (OPT), is then a fixed geographical point.

If subsequently some F-PLN parameters are changed (winds, new waypoints, ...) an update of the optimum position relative to the previous one may be proposed. If savings exist, this new optimum may be inserted to replace the previous optimum step point.

Once an OPT STEP is inserted in the F-PLN, and the pilot achieves a lateral F-PLN revision, the FM keeps the (OPT) along the new F-PLN at the same distance from the aircraft position as previously determined.



Rules

- the OPT STEP is only computed by the FM if data required for the prediction computation are inserted : F-PLN, CRZ FL, CI, GW, CG at least
- the search of the OPT STEP begins 20 NM beyond T/C before Cruise, or ahead of aircraft position
- the search of the OPT STEP ends 20 NM before the next STEP POINT or 300 NM before the TOD
- only one OPT STEP is computed at a time

Guidance

When reaching the step point, the steps must be initiated by the pilot by selecting the new CRZ FL and pushing the FCU ALT selector knob. If sequenced without any pilot action, the step is automatically deleted.

If the pilot initiates the step :

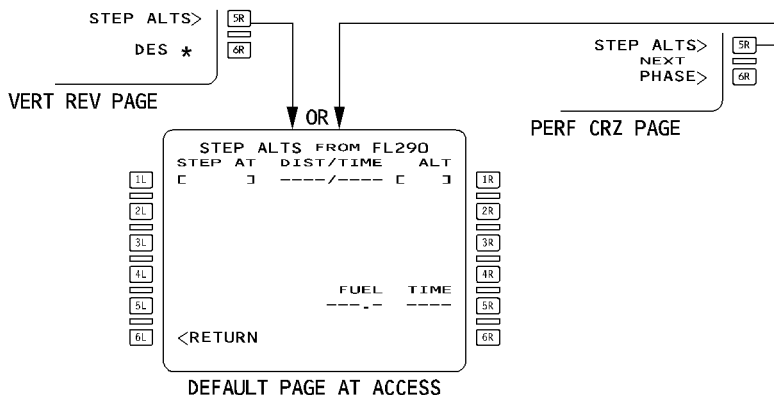
- the CRZ FL is automatically reassigned to its new value
- the guidance is

THR CLB/CLB for a step climb

THR DES/DES with V/S = – 1000 ft/mn for a step descent.

STEP entry

The STEP ALTS page is accessed :
– either from the VERT REV page
– or from the PERF CRZ page.



For GEOGRAPHIC STEP

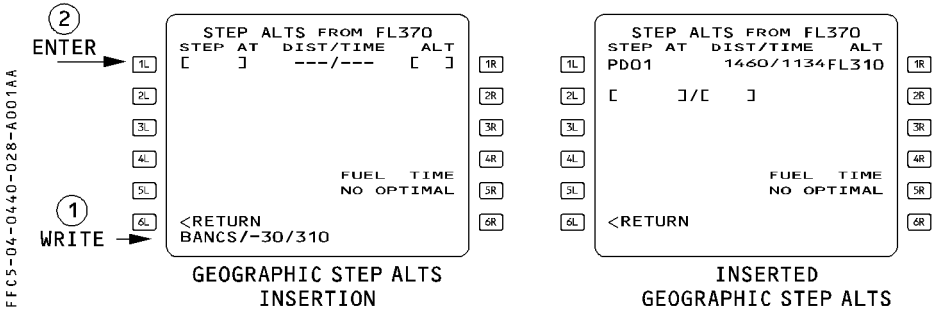
- PRESS the F-PLN or PERF key.
- SELECT vertical revision at a cruise waypoint.
- SELECT the STEP ALT prompt
- WRITE in the scratchpad the POSITION/NEW CRZ FL, and ENTER in field 1L to 4L

Note : – The position may be a waypoint ident, PBD, PD

- The pilot may enter LMG/–20/350. The FM will compute the geographic step 20 NM before LMG to FL 350.
- To modify an inserted STEP :
 - to modify the CRZ FL only, enter it in the right key
 - to modify the position only, enter it in the left key
 - to modify both, enter then in the left key.

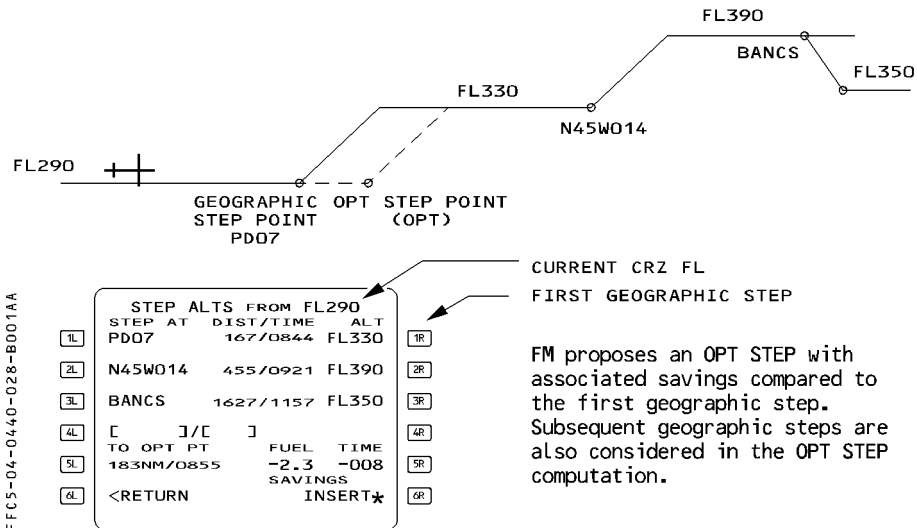
- CHECK the PREDICTIONS

FFCS-04-0440-027-A001AA



For OPTIMAL STEP

Once all geographical steps are inserted, and the predictions are available, the STEP ALTS page displays FUEL/TIME savings for the first step climb. if no significant savings are predicted, the NO OPTIMAL message is displayed.



If the pilot wishes to INSERT the proposed OPT STEP :
– SELECT the INSERT prompt

FFCS-04-0440-029-4001AA

STEP ALTS FROM FL290				
STEP	AT	DIST/TIME	ALT	
1L	(OPT)	183/0855	FL330	1R
2L	N45W014	455/0921	FL390	2R
3L	BANCS	1627/1157	FL350	3R
4L	[]/C []			4R
5L		FUEL TIME		5R
6L		SAVINGS		6R
< RETURN		UPDATE*		

The computed (OPT) step replaces the initially inserted step position, and is then considered at a fixed geographic position. Savings are no more displayed, and UPDATE prompt replaces the INSERT prompt. This prompt allows the crew to update the (OPT) step position, considering possible F-PLN or inserted wind changes.

If pressed, a new OPT point is proposed with associated SAVINGS and INSERT prompt, or NO OPTIMAL.

UPDATE prompt has been pressed, the new OPT STEP point gives additional savings :

FFCS-04-0440-029-B001AA

STEP ALTS FROM FL290				
STEP	AT	DIST/TIME	ALT	
1L	(OPT)	113/0855	FL330	1R
2L	N45W014	385/0921	FL390	2R
3L	BANCS	1557/1157	FL350	3R
4L	[]/C []			4R
5L	TO OPT PT	FUEL TIME		5R
6L	110NM/0849	-0.8 -003		6R
< RETURN		SAVINGS		
		INSERT*		

There are only 2 CRZ FLs in the F-PLN

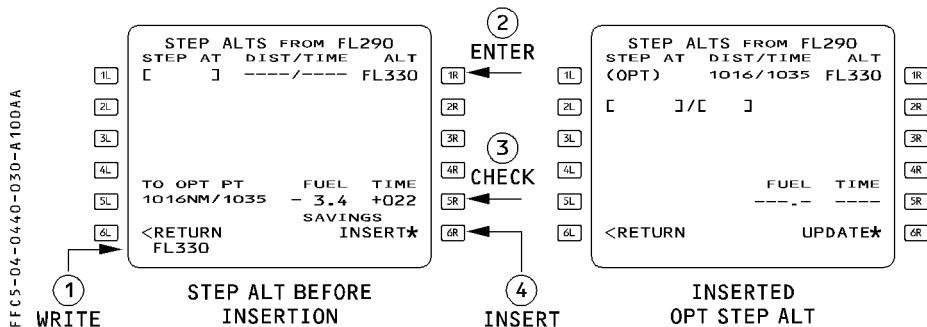
The pilot may obtain the OPT position of the STEP point as follows :

- INSERT the initial cruise FL on INIT A page
- ENSURE that the ZFW and BLOCK fuel are inserted in INIT B page
- WRITE the new cruise FL in the STEP ALTS page, and INSERT in field 1R.

Distance and time to optimum point and fuel/time saving are displayed

virgin atlantic A340-600 <i>Flight Crew Operating Manual</i>	MULTI PHASE RELATED PROCEDURES		4.04.40	P 30
	LONG RANGE		SEQ 100	REV 13

- CHECK the fuel and time savings and prediction on fields 5L and 5R.
Savings are computed by comparison between the entered step altitude and the origin altitude of the step.
- INSERT if suitable.



Note : No OPT STEP is available in the SEC F-PLN.

Messages

Messages may be displayed in the DIST/TIME field :

- “ABOVE MAX” if the inserted step altitude exceeds the MAX MAX ALT.
The “STEP ABOVE MAX FL” scratchpad message is associated to the “ABOVE MAX” message.
- “IGNORED”

This message is displayed in the following cases :

- Step climb is located prior to the top of climb or after the top of descent
- Step end is at less than 50 NM from top of descent. An optimum step point < 200 NM from top of descent cannot be inserted.
- “STEP NOW” if the step climb is at less than 20 NM.

The following message may be displayed in the scratchpad :

- “NOT ALLOWED” if :
 - four steps already exist in the F-PLN and an additional entry is attempted
 - any attempt to enter a step at the FROM waypoint or at a pseudo waypoint is done
 - two consecutive steps are entered at the same waypoint (e.g. step climb after step descent)

TIME CONSTRAINT

A time constraint may be assigned at any waypoint of the F-PLN, downpath of the origin and the FROM waypoint. It can be an "AT", "AT OR BEFORE", or "AT OR AFTER" constraint.

The FM computes a new managed speed profile from the aircraft position to the constrained waypoint, in order to match the 30-second difference (ΔT) between the time predicted at the constrained waypoint and the Required Time of Arrival (RTA). This modified managed speed profile can be checked using the speed prediction, displayed for each waypoint of the F-PLN page.

When the constrained waypoint is sequenced, the ECON SPD/MACH is resumed unless the constrained waypoint is located in a descent segment.

Note : The FM does not compute a new managed speed profile when a RTA is entered in the descent profile while the aircraft is in cruise within 40 NM from the top of descent.

The time constraint is inserted on the RTA page. A time constraint may be inserted at any waypoint of the primary or secondary flight plan.

If an engine-out condition is detected, the time constraint is automatically deleted and RTA DELETED message is displayed on scratchpad.

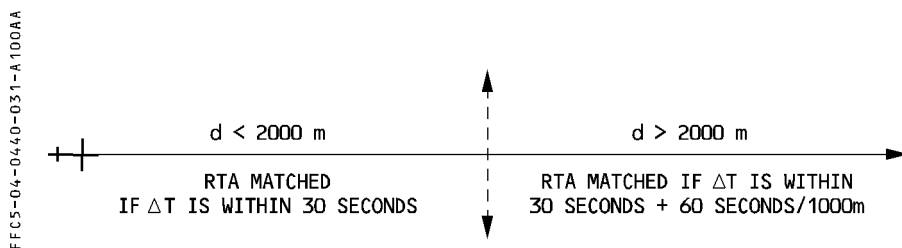
If the aircraft enters a holding pattern, the downpath time constraint is deleted.

Once inserted in the F-PLN, the RTA is displayed in magenta on the F-PLN page, as long as no predictions are available.

Once the predictions are available, the time constraint is replaced by the new predicted time at the associated waypoint, and highlighted by a star : (*)

- The (*) is magenta, if the time constraint is matched with the 30-second criteria.
- The (*) is amber, if the time constraint is missed.

Time constraint matching criteria :



Note : ΔT is the time difference between the time predicted at the constrained waypoint and the RTA.

TIME CSTR entry

- PRESS the F-PLN key
- SELECT vertical revision at revised waypoint
- SELECT the RTA key
- ENTER a waypoint at which a time constraint is to be defined.
- WRITE the time constraint (+/- HHMMSS) into the scratchpad and ENTER

The display automatically reverts to the F-PLN A page.

1L	AT	RTA			1R
	PEMAR	DIST	620	RTA	
	MANAGED			-11:45:00	
2L	320/.83			ETA	2R
	ACT MODE			11:48:12	
3L	MANAGED			RTA ERROR	3R
				+03:12	
4L					4R
5L					5R
6L	<RETURN			ETT	6R
				10:15:00	

Note : – The TIME CSTR can be cleared directly on the F-PLN A page using the CLR key.

- If a time constraint is inserted in the F-PLN, the OPT STEP function is no longer available. Hence, if an OPT is to be inserted in the F-PLN, this shall be done prior to entering the TIME CSTR.
- The time constraint is automatically deleted in the following cases :
 - Engine-Out, or
 - When entering a holding pattern, or
 - In case of Go-Around, or
 - A time constraint is entered at another waypoint while another time constraint already exists.

A scratchpad message "RTA DELETED" is displayed.

FFCS-04-0440-032-A100AA

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES		4.04.40	P 33
	LONG RANGE		SEQ 001	REV 11

ESTIMATED TAKEOFF TIME

The Estimated Takeoff Time (ETT) may be entered by the pilot during the preflight phase at the origin airport. This time is used as the initialization time for predictions.

The entry is accepted in the preflight phase, if the ETT is greater than the clock time.

PROCEDURE

- PRESS the F-PLN key
- SELECT a vertical revision at origin
- SELECT the RTA page 
- WRITE the ETT into the scratchpad, and ENTER in the UTC CSTR (ETT ) field.

The display automatically reverts to the F-PLN A page.

Note : – If the current time exceeds the ETT entry, the message CLK IS TAKE OFF TIME is displayed ; the ETT is replaced by the clock time.

- When the takeoff is initiated, the takeoff time is automatically updated at the clock time.
- ETT entry is automatically deleted, if the origin airport is modified, or if the clock is inoperative.
- If a TIME CSTR is entered at a waypoint in the F-PLN, the takeoff time required to match the constraint is automatically computed by the FM. This result is displayed in magenta as ETT at the origin.

USE OF TIME/ETT CSTR

- | | | |
|------------------|---|---|
| During preflight | : | <ul style="list-style-type: none"> – If an ETT has been entered, time predictions are based on the entered value (or clock time, if greater). – If both an ETT and a time constraint have been entered, time predictions are based on the entered ETT value (or clock time, if greater). The managed speed profile is computed to match the time constraint, as closely as possible, using a pseudo cost index value. (Not displayed). – If only a time constraint has been entered : <ul style="list-style-type: none"> • Optimum speeds are computed to determine the ETT, so as to satisfy the TIME CSTR. • If necessary, flight time (based on optimum speeds) plus clock time (current) is greater than the TIME CSTR ; optimum speeds are modified to match the TIME CSTR as closely as possible. |
| After Takeoff : | : | <p>The predictions are based on the current time.</p> <p>Speeds are adjusted to satisfy the TIME CSTR.</p> |

virgin atlantic A340-600 <i>Flight Crew Operating Manual</i>	MULTI PHASE RELATED PROCEDURES		4.04.40	P 34
	LONG RANGE		SEQ 001	REV 07

USE OF COST INDEX

The COST INDEX is determined by the airline operations for a given sector. However the crew may have to change it in the following cases :

● **A TIME CONSTRAINT exists downpath the F-PLN (predictions at DEST too late)**

- SELECT CI 999
- CHECK XTRA FUEL and OPT FL
- CHECK TIME predictions

This allows the crew to still beneficiate of the OTIMUM STEP function.

● **FUEL PREDICTIONS are pessimistic**

Assuming the aircraft flies close to the OPT FL

- SELECT CI = LRC.

Refer to 4.05.50 supplementary information concerning the cruise phase to determine the CI (LRC).

- CHECK XTRA FUEL on FUEL PRED page

if XTRA FUEL is positive, keep CI = LRC

if XTRA FUEL is negative

- SELECT CI = 0

Check XTRA FUEL, and adopt adequate strategy

PREDICTIONS

FUEL PLANNING

The FUEL PLANNING function is used to determine the minimum fuel required for a given sector.

For a given F-PLN (lateral and vertical), and for a given ZFW, the FM computes (according to the airline fuel policy file) the fuel required for the trip, the alternate, and the reserves ; the XTRA is always 0.

A Block Fuel is proposed to the pilot ; it has to be confirmed by the crew before all predictions are provided on the various pages (F-PLN).

 virgin atlantic A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES LONG RANGE	4.04.40 SEQ 001	P 35 REV 07
--	--	-------------------------------	---------------------------

PROCEDURE

Once the overall F-PLN is defined (lateral including ALTN, vertical including STEP/WIND and CSTR) :

- ACCESS to the INIT B page
- ENTER ZFCG and ZFW
- PRESS the FUEL PLANNING prompt

The INIT B page displays the minimum block fuel required (XTRA = 0) for the given sector, and a BLOCK CONFIRM prompt replaces the FUEL PLANNING prompt.

● **If required :**

- PRESS the BLOCK CONFIRM prompt
- All predictions are available on all pages.*

- PRINT the preflight report

The resulting document provides the crew with all predictions associated with this minimum fuel scenario ; it will be used as the minimum fuel master document.

● **If the minimum block fuel is not suitable :**

- APPLY fuel corrections to the minimum Block Fuel according to the intended type of operation, and DETERMINE the applicable Block Fuel.

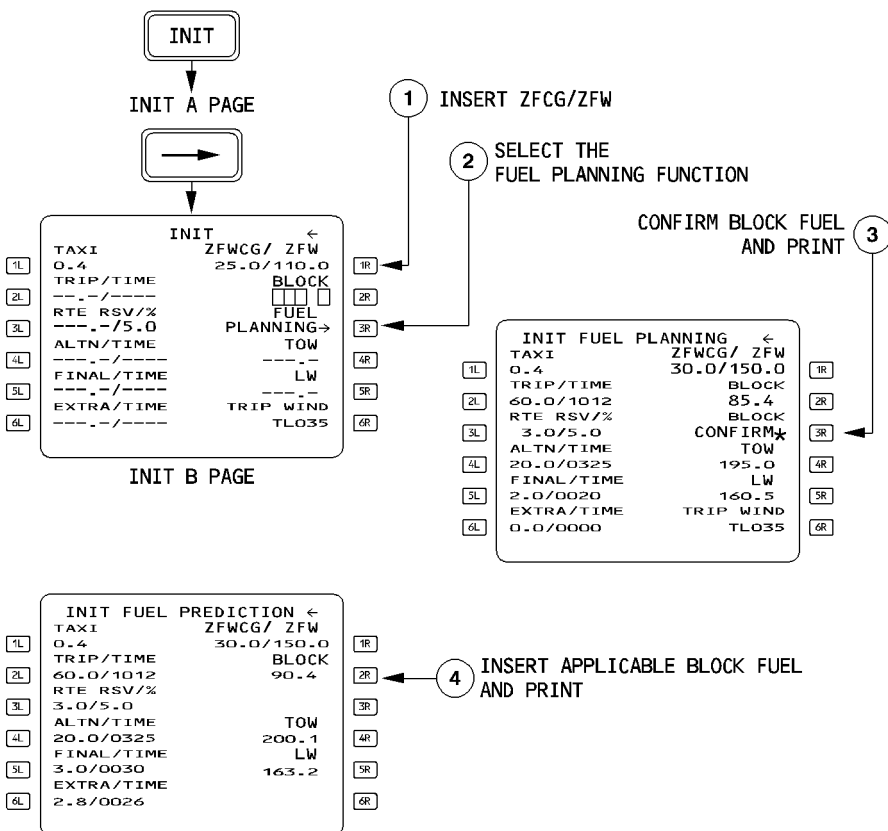
- ENTER the applicable BLOCK FUEL

All predictions computed on all MCDU pages with this new block fuel.

- PRINT the preflight report

The resulting document provides the crew with all predictions associated with the fuel actually carried ; it will be used as the initial master document to monitor the progress of the flight.

Note : *In case of ETOPS, the minimum block fuel required is equal to the minimum fuel computed with the FUEL PLANNING function, increased with the ETOPS Reserves (from the critical fuel scenario).*



FFCS-04-0440-036-A001AA

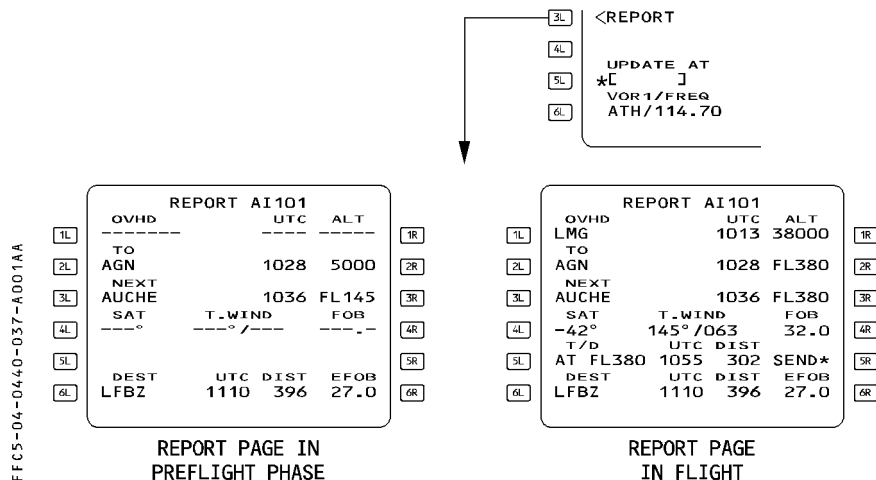
REPORT PAGE

The REPORT page allows the crew to achieve the position reporting.

It is tailored for Long Range or oceanic flights, where a more complete report is required due to the lack of radar facility, and due to the potential requirement by ATC for specific weather data report.

REPORT PAGE ACCESS

The report page is accessed from the PROG PAGE



Note : In case a DIRTO with ABEAM WPTs is achieved, or in case a FIX INFO with ABEAM or RADIAL intersection is inserted in the F-PLN, the TO WPT provided on the REPORT page will be the ABEAM WPT or the RADIAL intersect waypoint, if any, as on the F-PLN page.

PRINT FUNCTION

The PRINT function allows various reports to be printed either automatically (when linked to ACARS or ATSU ) or manually.

The manual PRINT function allows printing of FM-generated flight reports and additional data.

F-PLN	INITialization data
T.O.	Data
WIND	Data
PREFLIGHT	REPORT
IN FLIGHT	REPORT
POSTFLIGHT	REPORT

A thorough description of the PRINT FUNCTION pages is provided in 4.03.20

The print function is available whether ACARS or ATSU () are available or not.

The various flight reports collect most of the prediction information required by the crew to monitor the progress of the flight. The resulting documents may thus be used as realistic master documents, based on the latest data provided by the crew to the computer in terms of ATC clearances and weather information.

PRINT FUNCTION ACCESS

The PRINT FUNCTION page is accessed :

- From the DATA INDEX A PAGE, or
- From the ACARS FUNCTION page (if ACARS is installed).

FFC5-04-04.40-038-A100AA

PRINT FUNCTION 1/2 →	
AUTO	MANUAL
1L ★YES	F-PLN INIT PRINT★
2L	TO DATA PRINT★
3L ★NO	WIND DATA PRINT★
4L	
5L	
6L <RETURN	ACARS FUNCTION>

PRINT FUNCTION PAGE 1

PRINT FUNCTION 2/2 →	
AUTO	MANUAL
1L ★YES	PREFLIGHT PRINT★
2L ★NO	INFLIGHT PRINT★
3L ★YES	POSTFLIGHT PRINT★
4L	
5L	
6L <RETURN	ACARS FUNCTION>

PRINT FUNCTION PAGE 2

Note : For an automatic printing, "time" is the time of the reception of the message. For a manual printing, "time" is the time of the print request.

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES LONG RANGE	4.04.40 SEQ 001	P 39 REV 07
--	---	--------------------	----------------

ON GROUND PRIOR ENGINE START

Once the overall F-PLN data (lateral, vertical including WIND/STEPS/CSTR), ZFWCG/ZFW are inserted :

- SELECT the FUEL PLANNING prompt
- SELECT the CONFIRM BLOCK FUEL prompt
- PRINT the PREFLIGHT REPORT

The resulting document will provide the crew with the minimum fuel required for the sector, as well as with all associated predictions at each waypoint : among others, the minimum fuel at each waypoint required to complete safely the sector. This will be used in flight as the minimum fuel master document.

If necessary :

- UPDATE the BLOCK on INIT B with current fuel and ENTER
- PRINT the PREFLIGHT REPORT

The resulting document will be the initial master document which the pilot will use to monitor the progress of the flight.

It will have to be updated whenever a major ATC F-PLN change will occur.

Note : *The F-PLN must be complete to be properly printed. F-PLN discontinuities must be suppressed before printing the report.*

EXAMPLE

FM PREFLIGHT REPORT		DATE : 07MAR 94 TIME : 07 : 24							
A/C TYPE		: A330-300		DATABASE		: AB49402001			
ENG TYPE		: CF6-80E1A2		CYCLE		: 03 FEB-03 MAR			
FLT NUMBER		: V7		FROM/TO		: EINN/LFBO			
CO RTE		:		ALTN		: LFBP			
ALTN CO RTE		:							
PERF FACTOR		: +0.0		COST INDEX		: 100			
IDLE FACTOR		: +0.0							
CRUISE FL/STEP START WPT									
CRZ FL 1		: FL410							
FLIGHT PLAN DATA									
		DIST		TIME		CRZ FL			
DEST-LFBO		: 714		01:32		FL410			
ALTN-LFBP		: 80		01:52		FL220			
DEP RWY		: 24		ARV PRC		:			
DEP PRC		:		APR PRC		:			
				ARV RWY		:			
WPT	TIME	SPD/ALT	FOB	T. WIND	TAS	SAT	CRS	DIST	
PREDICTED VALUES									
EINN24	00:00	133/0095	21.4	TL/040	-	+11	183	0	
1520	00:00	159/01574	21.2	TL/040	163	+12	240	2	
SHA	00:02	190/07098	20.8	TL/040	211	+01	059	3	
CRK	00:10	295/29936	19.1	TL/040	459	-44	173	55	
TIVLI	00:16	.82/39794	18.4	TL/040	467	-57	140	50	
LND	00:27	.84/40998	17.4	TL/040	482	-57	140	99	
NAKID	00:33	.84/40998	17.0	TL/040	482	-57	130	46	
LIZAD	00:34	.84/40998	16.9	TL/040	482	-57	129	14	
BALOT	00:38	.84/40998	16.6	TL/040	482	-57	130	37	
BERAT	00:41	.84/40998	16.4	TL/040	482	-57	129	23	
DIN	00:46	.84/40998	16.0	TL/040	482	-57	128	47	
NTS	00:56	.84/40998	15.2	TL/040	482	-57	173	88	
MINEL	01:02	.84/40998	14.8	TL/040	482	-57	153	46	
VENAR	01:05	.84/40998	14.6	TL/040	482	-57	152	25	
CGC	01:08	.84/40998	14.3	TL/040	482	-57	153	34	
VELIN	01:14	320/28310	14.2	TL/040	482	-41	158	45	
AGN	01:25	250/06506	14.0	TL/040	274	+02	157	72	
LFBO	01:32	128/00550	13.7	TL/040	129	+14	001	27	
FUEL PREDICTIONS									
TAXI :	0.6		ZFWCG :	20.0 %					
TRIP (DEST) :	7.7		ZFW :	113.0					
RSV :	0.4		TOW :	134.4					
ALTN :	1.9		LW :	126.7					
FINAL :	1.9		CG :	—.-					
EXTRA :	9.6								
BLOCK :	22.0								
MISC PERF DATA									
TROPOPAUSE :	36090								
CLB TRANS :	5000								
CRZ TEMP :	-60								

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES		4.04.40	P 41
	LONG RANGE		SEQ 001	REV 07

IN FLIGHT

Once the aircraft has reached the CRZ FL once, all the latest ATC clearances have been inserted in the FM, once all the WINDS/STEPS have been properly updated :

- ACCESS to the PRINT FUNCTION page
- PRINT the INFLIGHT REPORT

The inflight report provides the list of all the overflown F-PLN waypoints (HISTORY VALUES) with their associated data (Time, Alt, Fuel, ...), and the predictions to all the downpath waypoints (PREDICTED VALUES).

This new document replaces the PREFLIGHT report, since it carries all the latest expected F-PLN changes. It is the new applicable master document used to monitor the progress of the flight.

The inflight report will be printed after each important F-PLN modification.

EXAMPLE

FM INFLIGHT REPORT		DATE : 04MAR 94 TIME : 09 : 24						
A/C TYPE		: A330-300		DATABASE		: AB49402001		
ENG TYPE		: CF6-80E1A2		CYCLE		: 03 FEB-03 MAR		
FLT NUMBER		: FWWKJ		FROM/TO		: LFBO/EINN		
CO RTE		:		ALTN		: EIDW		
ALTN CO RTE		:						
PERF FACTOR		: +0.0		COST INDEX		: 70		
IDLE FACTOR		: +0.0						
CRUISE FL/STEP START WPT								
CRZ FL 1		: FL390						
FLIGHT PLAN DATA								
		DIST		TIME		CRZ FL		
DEST-EINN		: 730		10:24		FL390		
ALTN-EIDW		: 106		10:50		FL220		
DEP RWY		: 15R				ARV PRC		:
DEP PRC		: LMG3A				APR PRC		:
						ARV RWY		:
WPT	TIME	SPD/ALT	FOB	T. WIND	TAS	SAT	CRS	DIST
HISTORY VALUES								
LFB015	08:29	126/00536	33.2	HD/070	-	+12	142	0
R								
1000	08:30	141/00982	35.4	056/003	141	+10	143	2
PREDICTED VALUES								
OSKAM	08:34	320/13336	36.9	HD/070	387	-11	350	14
LMG	08:52	.84/38998	34.3	HD/070	482	-57	359	119
VERAC	08:59	.84/38998	33.7	HD/070	482	-57	310	48
MAIXE	09:01	.84/38998	33.5	HD/070	482	-57	310	18
NTS	09:11	.84/38998	32.7	HD/070	482	-57	310	70
DIN	09:24	.84/38998	31.6	HD/070	482	-57	352	88
BERAT	09:31	.84/38998	31.1	HD/070	482	-57	309	47
BALOT	09:34	.84/38998	30.8	HD/070	482	-57	309	23
LIZAD	09:40	.84/38998	30.3	HD/070	482	-57	310	37
NAKID	09:42	.84/38998	30.2	HD/070	482	-57	309	14
LND	09:48	.84/38998	29.6	HD/070	482	-57	309	46
TIVLI	10:03	.84/38998	28.4	HD/070	482	-57	322	99
CRK	10:10	320/17044	28.3	HD/070	407	-19	319	50
SHA	10:23	128/00900	27.9	HD/070	130	+13	353	55
EINN	10:24	128/00100	27.9	HD/070	128	+15	001	2
FUEL INFORMATION AT 09:24								
WEIGH	CG	FOB	RSV/	FINAL	EXTRA			
T			RSW%					
206.5	37.3%	31.6	3.8/5.0%	27.8	2.8			

Note : In case of a major failure such as an Engine out, a new print will be done when time permits.

virgin atlantic A340-600 <i>Flight Crew Operating Manual</i>	MULTI PHASE RELATED PROCEDURES		4.04.40	P 43
	LONG RANGE		SEQ 001	REV 07

REACHING THE GATE AFTER LANDING

The POSTFLIGHT REPORT gives a complete list of all the overflown waypoints during the flight (HISTORY VALUES).

Furthermore it provides :

- FUEL/TIME summary
- IRS Drift and G/S

Once at the gate, after engine shutdown :

- ACCESS the PRINT FUNCTION page
- PRINT the POST FLIGHT REPORT

EXAMPLE

FM POSTFLIGHT REPORT						DATE : 07MAR 94 TIME 12:05		
A/C TYPE		: A330-300		DATABASE		: AB49402001		
ENG TYPE		: CF6-80E1A2		CYCLE		: 03 FEB-03 MAR		
FLT NUMBER		: V7		FROM/TO		: EINN/LFBO		
CO RTE		:		ALTN		: LFBP		
ALTN CO RTE		:						
PERF FACTOR		: +0.0		COST INDEX		: 70		
IDLE FACTOR		: +0.0						
FLIGHT PLAN DATA								
	DIST	TIME	CRZ FL					
DEST-LFBO	: —	11:52	FL—					
ALTN/—	: —	—:—	FL—					
DEP RWY	: 06		ARV PRC		: AGN2T			
DEP PRC	:		APR PRC		: VOR33L			
			ARV RWY		: 33L			
WPT	TIME	SPD/ALT	FOB	T. WIND	TAS	SAT	CRS	DIST
HISTORY VALUES								
EINN06	10:17	134/00044	21.3	TL/040	-	+11	053	0
1550	10:18	163/01536	27.5	235/019	165	+08	050	2
SHA	10:18	161/01691	27.5	236/019	163	+08	049	0
ABCRK	10:27	305/28293	18.4	295/049	459	-41	149	53
TIVLI	10:33	.80/3277	18.3	298/057	448	-64	143	46
LND	10:44	.84/32767	16.9	320/034	477	-61	129	98
ABNAKI D	10:50	.84/32767	16.5	325/033	479	-61	140	13
ABLIZAD	10:51	.84/32767	16.4	326/034	474	-61	141	12
ABBALO T	10:56	.84/32767	16.1	315/032	477	-60	141	35
ABBERA T	10:58	.84/32767	15.9	313/029	480	-59	141	21
ABOIN	11:03	.84/32767	15.7	326/030	479	-60	142	44
ABNTS	11:13	.85/32767	15.1	330/034	481	-60	142	80
ABMINE L	11:18	.84/32767	14.6	341/030	479	-59	143	46
ABVENA R	11:21	.84/32767	14.4	335/028	479	-60	143	24
CGC	11:25	.84/32767	14.2	339/031	476	-61	150	33
VELIN	11:31	.84/32767	13.9	352/028	476	-60	154	45
AGN	11:40	312/21996	13.3	050/024	429	-26	149	72
SOTAK	11:40	321/19265	13.3	052/025	425	-20	141	5
D191K	11:44	253/09267	13.3	347/015	288	+00	137	24
D165R	11:46	253/04360	13.4	309/014	265	+04	103	9
D156R	11:47	252/03428	13.4	296/014	261	+05	059	2
CD33L	11:49	175/02967	13.3	293/009	180	+05	322	5
FD33L	11:50	132/01609	13.2	308/007	132	+08	323	4
MA33L	11:52	132/00674	13.2	326/006	131	+11	321	3
FUEL AND TIME SUMMARY								
START UP				SHUT DOWN				
FUEL : —.-				FUEL		: 13.2		
WEIGHT : —.-				WEIGHT		: 126.0		
TIME : —.-				TIME		: 12:01		
TO TIME : —.-				LDG TIME		: 11:52		
IRS DATA AT : LFB033L								
	IRS 1		IRS2		IRS 3			
AVERAGE DRIFT	- 0.8 NM/H		0.4 NM/H		0.5 NM/H			
RESIDUAL GND SPD	- 1.0 KTS		0.0 KTS		1.0 KTS			

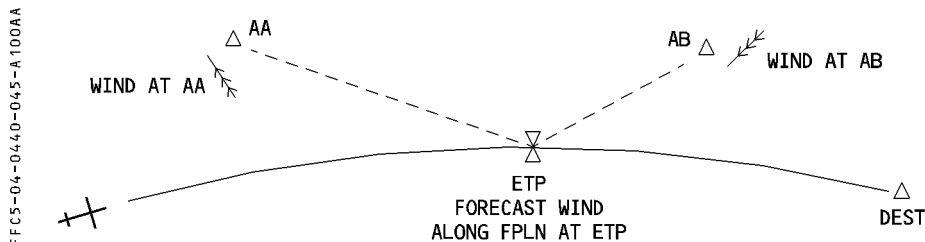
DIVERSION

EQUITIME POINT

The equitime point page displays the ETP computed along the F-PLN route between two referenced positions (airports, waypoints or nav aids) defined by the pilot (Refer to 4.03.20 for the page description). At the first access of the page, the FM proposes origin and destination airfields as defaulted positions. The pilot may overwrite these two positions and insert the wind in their vicinity at the applicable CRZ FL. The FM then computes the resulting ETP, using the managed or selected speed and blending the forecasted winds along the F-PLN route with the inserted winds.

The FM provides :

- TIME and DIST from aircraft position (or origin on ground) to ETP
- The BRG/DIST from ETP to the defined positions
- TIME overhead each position, assuming the aircraft flies from present position to the defined position via the ETP
- (ETP) pseudowaypoint is displayed on the ND along the F-PLN
- ETP location with regard to the subsequent waypoint



ETP ENTRY

- PRESS the DATA key
- SELECT the EQUITIME POINT prompt.

The EQUITIME POINT page is displayed. The origin and destination airports are used by default.

- ENTER the REF POINT 1 in 1L field
- ENTER the associated wind in 2L field.

The wind to be inserted is the wind in the vicinity of the reference point at the CRZ FL.

- ENTER the REF POINT 2 in 3L field.
- ENTER the associated wind in 4L field.

The system displays the ETP location with regards to the next waypoint of the active flight plan following the ETP in 5R field, and the A/C TO (ETP) predictions in 6R field.

EQUI-TIME POINT						
A/C TO		BRG	DIST		UTC	
1L	LFBO	176°	249	1139	1R	
TRU WIND		ETP TO LFBO				
2L	110°/025	171°	265	1147	2R	
3L	EGLL	007°	293	1147	3R	
TRU WIND		ETP TO EGLL				
4L	185°/045	006°	281	1147	4R	
ETP LOCATION						
5L	N52W025/ -25.2					5R
A/C TO		DIST		UTC		
6L	(ETP)	281	1112	6R		

EQUI-TIME POINT						
A/C TO		BRG	DIST		UTC	
1L	AA	029°	788	0945	1R	
TRU WIND		ETP TO AA				
2L	075°/020	003°	563	1015	2R	
3L	AB	075°	1001	1012	3R	
TRU WIND		ETP TO AB				
4L	270°/030	077°	627	1015	4R	
ETP LOCATION						
5L	N52W025/ -25.2					5R
A/C TO		DIST		UTC		
6L	(ETP)	371	0953	6R		

EQUI-TIME PAGE AT ACCESS
(DEFAULTED)

Note : – The ETP pseudowaypoint is not displayed on the MCDU F-PLN page. In order to locate it easily, or when closing up the applicable ETP, the TIME MARKER may be used ; this allows the crew to visualize it in advance on the F-PLN page or to prepare the next applicable ETP on the Equitime Point page.

- The ETP is computed using speed according to current mode (managed or selected).

FFCS-04-0440-046-A100AA

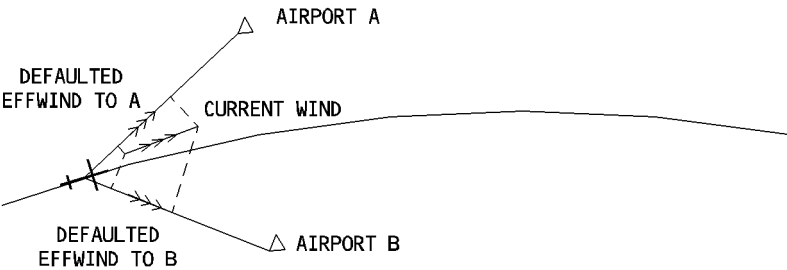
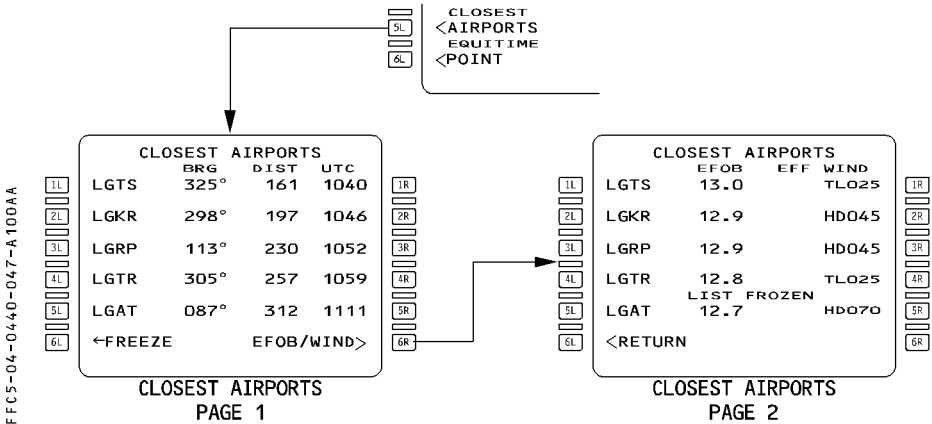
CLOSEST AIRPORTS

The CLOSEST AIRPORT page displays the 4 closest airports from the aircraft position found in the navigation database (Refer to 4.03.20 for the page description) and the fifth airport as selected by the crew.

For each airport, the FM computes :

- the BRG/DIST/ESTIMATED UTC from aircraft position to the corresponding airport
- the EFOB at the airport, assuming an EFFECTIVE WIND (defaulted or entered by the pilot)

DATA INDEX A PAGE



Note : When CLOSEST AIRPORTS page 2 is selected, the list of airports is automatically frozen as indicated on the page.

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES		4.04.40	P 48
	LONG RANGE		SEQ 001	REV 07

The FUEL/TIME predictions to the closest airports use simplified assumptions :

- Manage speed profile in cruise, with the effective wind from the CLOSEST AIRPORT page 2. In case of EO, Engine Out condition is considered.
- Continuous descent from CRZ FL down to the airport elevation.

Note : *In case SELECTED SPD is used, the CLOSEST AIRPORT page still provides good use to choose the applicable closest airport for diversion purposes. However, when SELECTED SPD is significantly different from MANAGED SPD, the predictions in terms of time and fuel must be disregarded since they are misleading.*

The predictions may then be checked on the SEC F-PLN.

HOW TO EXECUTE A DIVERSION

Various features are provided to the crew in order to execute a diversion :

- the EQUITIME POINT
- the CLOSEST AIRPORT page
- the SECONDARY F-PLN
- the ENABLE ALTN function
- the NEW DEST revision

EN ROUTE DIVERSION WITH SEVERAL AIRPORTS AVAILABLE

- SELECT the CLOSEST AIRPORT page.

CLOSEST AIRPORTS					
		EFOB		EFF WIND	
1L	LGTS	13.0		TL025	1R
2L	LGKR	12.9		HD045	2R
3L	LGRP	12.9		HD045	3R
4L	LGTR	12.8		TL025	4R
5L	LGAT	12.7		HD070	5R
6L	<RETURN	LIST FROZEN			6R
CLOSED AIRPORT					
PAGE 2					

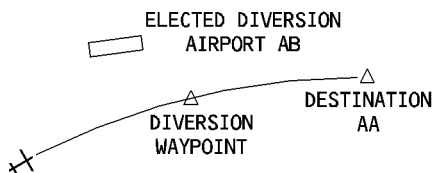
- SELECT the EFOB/WIND prompt.
- INSERT the effective wind at selected airport.
- CHECK the predictions and CHOOSE the adequate diversion airport.
- PREPARE the diversion flight plan on the secondary flight plan.

Note : Fuel/time predictions on CLOSEST AIRPORT page assume managed speed profile.

EN ROUTE DIVERSION OVER OCEANIC OR DESERTIC AREA

The diversion airports are usually determined prior to departure or using the CLOSEST AIRPORT DATA

- SELECT the EQUITIME POINT page.



EQUI-TIME POINT					
A/C TO BRG	DIST	UTC			
AA	029°	700	0945		
TRU WIND ETP	TO AA				
230/025	003°	563	1015		
AB	075°	1001	1012		
TRU WIND ETP	TO AB				
280/100	077°	627	1015		
A/C TO	DIST	UTC			
(ETP)	371	0803			

EQUITIME POINT PAGE

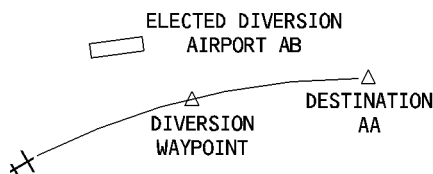
- ENTER the airport ident in 1L and 3L fields.
- ENTER the associated winds in 2L and 4L fields.
- CHECK the ETP position and time.
- ENTER a predicted time at ETP as time marker.
- PREPARE a diversion flight plan on the secondary flight plan.

DIVERSION PREPARATION ON THE SECONDARY FLIGHT PLAN

This procedure shall be applied for all diversion cases, once the diversion airport has been selected, as well as the "most probable diversion point of the F-PLN"

- PRESS the SEC F-PLN key.

FFCS-04-0440-050-A001AA



EQUI-TIME POINT			
A/C TO BRG	DIST	UTC	
AA	029°	700	0945
TRU WIND ETP TO AA			
230/025	003°	563	1015
AB	075°	1001	1012
TRU WIND ETP TO AB			
280/100	077°	627	1015
A/C TO	DIST	UTC	
(ETP)	371	0803	

EQUITIME POINT PAGE

- PRESS the COPY ACTIVE prompt.
- SELECT a lateral revision at diversion waypoint.
- ENTER the ident of the diversion airport in the NEW DEST field.

Then finalize the flight plan between the diversion point and the diversion airport. Whenever the diversion airport is no more applicable or ETP is sequenced, repeat the same procedure for the next diversion airport.

MISCELLANEOUS

In certain cases, the diversion airport may be simply chosen using the airports displayed on ND having selected AIRPORT on the EIS control panel.

During oceanic or desertic area flights, the PROG page may be advantageously used as follows :

- ENTER the ident of the diversion airport in the 4R field of MCDU 1.
- ENTER the next diversion airport in the 4R field of MCDU 2.

The pilot is then continuously provided with the instantaneous BRG/DIST to the selected diversion airports.

- UPDATE the PROG pages when sequencing the ETP.

EXECUTION OF THE DIVERSION

When the crew decides to divert

- PRESS the SEC F-PLN key.
- SELECT the ACTIVATE SEC prompt.
- SELECT DIRTO required point.

DIVERSION TO THE ALTERNATE AIRPORT

The primary F-PLN includes an alternate flight plan from destination to the preferred alternate airport. All fuel prediction and management (XTRA fuel) take into consideration the alternate flight plan.

If the crew decides to divert at the end of the cruise, or beyond the last ETP, or in descent or go around phases, this will be done most probably to the alternate airport.

When the crew decides to divert :

- SELECT a lateral revision at suitable waypoint

SEC INDEX		
1L	← COPY ACTIVE	INT>
2L	< SEC F-PLN	PERF>
3L	← DELETE SEC	
4L	★ ACTIVATE SEC	
5L		
6L		
		1R
		2R
		3R
		4R
		5R
		6R

A SEC F-PLN EXISTS

FFC5-04-0440-051-A001A

 A340-600 Flight Crew Operating Manual	MULTI PHASE RELATED PROCEDURES LONG RANGE	4.04.40 SEQ 001	P 52 REV 07
--	---	------------------------	--------------------

- SELECT ENABLE ALTN
- CHECK the temporary flight plan and INSERT.
- SELECT DIRTO required waypoint.

Note : – *In most cases the LAT REV shall be selected at the TO WPT. This will facilitate the subsequent selection of the DIR TO waypoint.*

- *The ALTN flight plan shall be finalized whenever the landing runway is known by the crew (before approach briefing).*

This will ensure, in most cases, to have the most probable flight plan displayed on the MCDU once ENABLE ALTN is selected.