AIRBUS
DEFENCE & SPACE

C-295M
VT01 VERSION

AIRCRAFT OPERATIONS MANUAL
ANNEXE 1

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USER'S MANUAL

FLIGHT MANAGEMENT SYSTEM

FMS210 (C295-P3)

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LIST OF REVISIONS

Issue	Date	Description of revisions	Approbation
00	28 Nov 07	First issue	--
01	1 Dec 08	- Transfer of the revisions 04 from NAV/05/009295 - Correction of conf type - Add of an explanation about FMS INTERRUPT COMMAND - ECM 1944 (BCP and EPE computation) - ECM 1960 - FM2XX00000800 (POS discrepancy alert) - Add of an explanation about weight parameters monitoring - FM2XX00000790 (POS INIT)	NAV/08/008818
02	06 Feb 09	- Issue taking into account the FITS coupling evolutions	NAV/09/000096
03	28 Oct 09	- Issue taking into account ECM 1821 (Flight ID) - Evolution of LNAV engagement logic (FM2XX00001118) - add of IFA for TOTEM - Improve of Rally navigation explanation (FM2XX00001789)	AMS/09/003938
04	20 Sept 10	- Issue taking into account ECM 1992 (wording modification)	AMS/10/005972
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06	01 Mar 13	- Issue taking into account ECM 2211 - Cautions in § 4.7.1, § 4.8.1 & § 8.1.3.5	/

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1 SCOPE

1.1 <u>Overview</u>

The Flight Management System is a part of the THALES TOPDECK system designed for aircrafts.

To ensure this purpose, the FMS is a pilot interactive system which provides the following main functions :

- ➤ Navigation.
- ➤ Management of tactical, logistical, SAR flight plan.
- ➤ Lateral guidance.
- ➤ Vertical guidance.
- ➤ Data base management.
- ➤ Radio navigation management.
- ➤ Fuel, weight and performance management.

The FMS includes the following units:

- ➤ 2 FMC (Flight Management Computer) located in the Integrated Flight Cabinet.
- ➤ 2 MCDU (Multipurpose Control Display Unit).
- ➤ 1 ADL (Airborne Data Loader) with its DTM (Data Transfer module).

Note : The Flight Management Computer corresponds to the NAVigation Module (NAVM) for FMS200 or to the Flight Management Processor (FMP) for FMS210.

The data base is uploaded by the way of a DTM inserted in the ADL. It is prepared on ground using a Flight Planning System, FPS, and it contains:

- ➤ Standard data, which are published data and are not modifiable. It has a capacity to store :
  - 4000 airports.
  - 4000 enroute VHF navaids.
  - 30000 enroute waypoints.
  - 10000 enroute NDB navaids.
  - 8000 runways.
  - 12000 terminal fixes.
  - 4000 SIDs.
  - 4000 STARs.
  - 4000 approaches of an average of 4 legs each.
- ➤ Pilot data with a capacity of :
  - 100 airports.
  - 100 VHF navaids.
  - 100 waypoints.
  - 100 routes each one with a maximum of 40 standard or pilot fixes.

- ➢ Tactical data with a capacity of :
  - 4 routes, each one with a maximum of 100 tactical waypoints (not available for P3 aircraft)
  - 10 warning zones.

In addition to the information already included in the tactical database, the FMS is also able to store:

- ➢ 1 radio communication plan data containing up to 20 data sets

Limitations related to FMS database :

- ➢ The maximum size of standard database is 8 Mbytes.
  If the standard database size is over 8 Mbytes, the CROSS TALK function will not work properly.
- ➢ The maximum size of pilot database is 70 Kbytes
- ➢ The maximum size of tactical database is 40 Kbytes

Operational domain

- ➢ Coordinates :
  - Performances of navigation are guaranteed in the range :
    - . Latitude : [S85, N85],
    - . Longitude : no restriction [W180, E180].
  - UTM or MGRS coordinates are limited to the range :
    - . Latitude : [S80, N84],
    - . Longitude : no restriction [W180, E180].
- ➢ Ground Speed (GS) max : 750 kts
  (CAUTION : GS can also be limited by Perf DB for prediction).
- ➢ Altitude :
  - min : - 1 500 ft,
  - max : 36 000 ft.

Nota : Performances computation by FMC is limited to 30 000 ft for P3 aircraft

1.2 <u>System interface</u>

1.2.1 *General*

The FMS interface is built on a dual architecture. Each Flight Management Module, in the normal configuration, uses for its own navigation computations and manages its own side sources.
 In the cockpit, switches depending of the aircraft configuration enable to set the mode of reversion (for the ADU, for the RadioAltimeter (RA) for the AHRS ,…) both on 1, normal, both on 2.

The normal reversion means that each FM takes into account data from sources of his own side.
  ➢ FMC 1 uses AHRS1, ADU1, RA1
  ➢ FMC2 uses AHRS2, ADU2, RA2
  NOTE : IN CASE OF ONLY ONE INSTALLED RA, NO REVERSION IS AVAILABLE.

If one of this equipment is failed, the FM will automatically uses the equipment of the other side. In the reversion both on 1 or 2, both FM receive the same source side 1 or 2, even if data provided by this equipment is invalid.

Note : Concerning others sensors, no reversion selection is possible.

The Input Output Processor, IOP, collects data from ADU, AHRS, GPS, IRS (if present), GPIRS (if present), Radionav and Radiocom equipements (if present), Radioaltimeter, and Fuel flow meter. The guidance data provided by the FM is sent to the AutoPilot through the IOP.

For special missions, an external system such as a FITS may ensure the preparation of a special IFR flight plan and its transfer to the FMS using a dedicated ARINC429 data bus.

Other subsystems can be connected to the MCDU, such as IOP.

1.2.2 *IRU configuration*

Two types of IRU can be used :
  ➢ IRS or
  ➢ AHRS

1.2.3 *GPS/IRS configuration*

Different configurations are possible. For P3 , PG , CLX , the following configuration is retained :
  ➢   2 GPIRS

In this configuration, each FMC select IRS of its own side if parameters are valid and the other side IRS otherwise. Then, each FMC uses data from the GPS of the same side than its selected IRS, and the other GPS otherwise.

The GPS used in this configuration is a SPS type (SPS : Standard Positioning service).

1.2.4 *Aircraft configuration*

The FMS is designed for different aircraft types :
- C295
- P3

According to the aircraft type, different flight configurations can be used :
- FAR or military for C295
- military for P3

1.2.5 *Architecture*

The following figure presents the main FMS interfaces and its avionics environment. The link between units, sums up the physical connections which transfer digital information, according to the ARINC 429 and the RS 422A for the ADL.

Connection with AHRS and IRS/GPS sensors depends on the avionics architecture.

Others subsystems: IOP1. IOP2
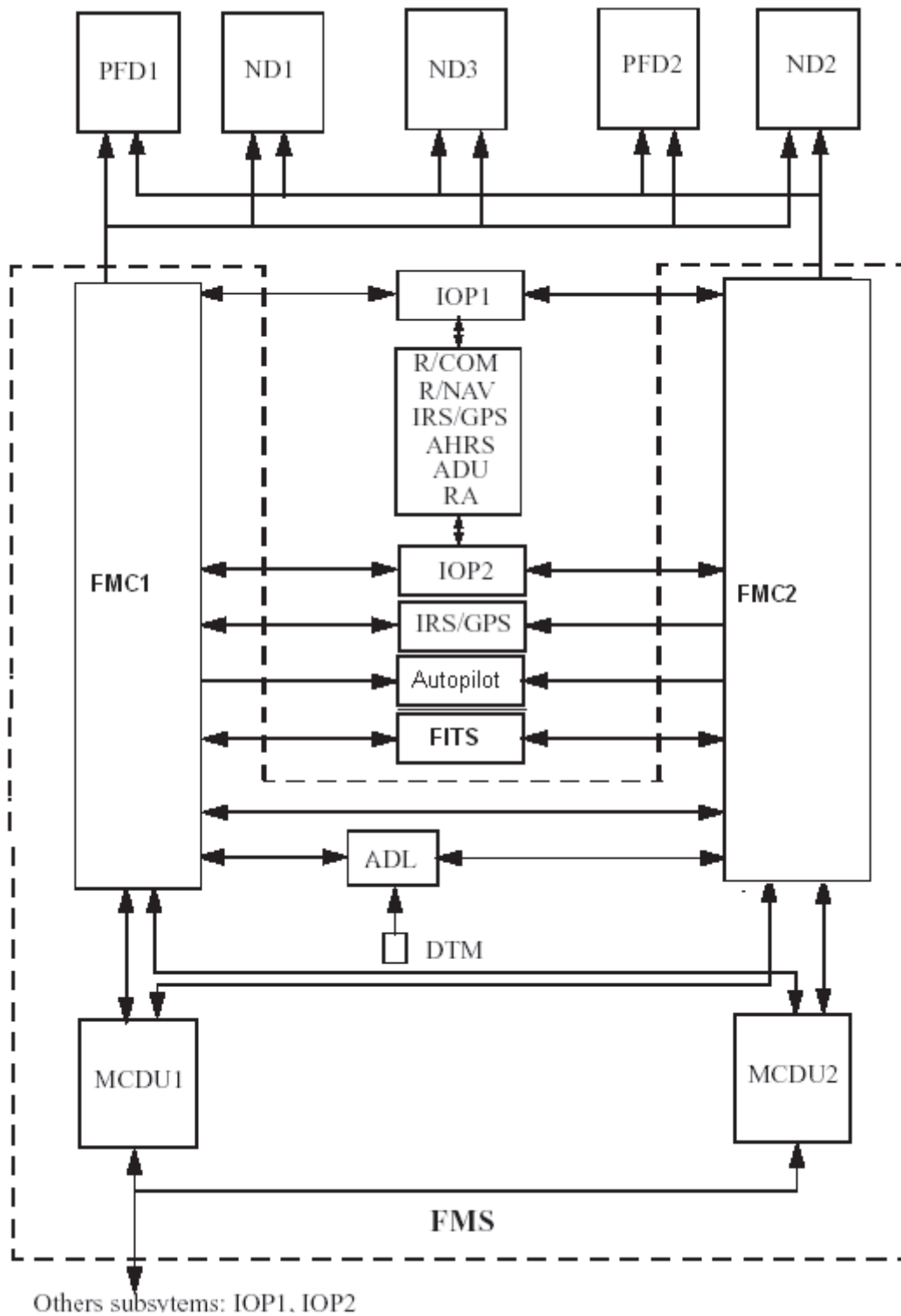
1.3 <u>Navigation modes</u>

There are 4 modes of navigation:
- ➢ IRS, Inertial Reference System (if IRS sensor present).
- ➢ GPS, Global Reference System.
- ➢ HYB, IRS hybridized with GPS (if IRS sensor present).
- ➢ BCP, Best Computed Position.

Each one provides:
- ➢ horizontal position, latitude and longitude.
- ➢ Ground speed.
- ➢ Track Angle.
- ➢ Speed and origin of the wind.

In dual mode, both FMC have the same mode. But they use their own navigation parameters.

Navigation computations are done in WGS84 datum reference, and so Standard, Pilot, Tactical data are assumed to be defined in WGS84 reference.

The BCP parameters are calculated by a specific filter weighted by the estimated errors, of the values provided by different sources.
The sources used by the BCP computation are:
- ➢ IRS of selected side (if present).
- ➢ HYB or GPS of selected side.
- ➢ Bearings, distances from the VOR, DME, TACAN receivers.

NOTE :- The AIR DATA backup mode, DR mode, is automatically triggered when the BCP mode is selected and when there is no ground speed nor position available. In this case, TAS, heading and wind information are used.
- For the BCP, the GPS can be used, only if the HYB is not active.

1.4 <u>Scope of the document</u>

This document contains the following sections :

Chap	Title	object
1	**SCOPE**	description of the system and description of the document
2	**DESCRIPTION AND GENERAL USE**	description of the pilot interface on the MCDU
3	**PREFLIGHT**	description of the procedure used on ground

Chap	Title	object
		(initialisation,…) including climbing
4	**LOGISTICAL OPERATION**	description of procedure for this type of mission,
5	**TACTICAL OPERATION**	description of procedure for this type of mission, not available for P3 aircraft except warning zones
6	**SAR OPERATION**	description of procedure for this type of mission,
7	**GENERAL PROCEDURE**	description of general procedure
8	**ALARM**	description of the alarm messages
9	**MAINTENANCE OPERATION**	description of maintenance procedures and analysing status
10	**PAGES HIERARCHY**	hierarchy of the different pages displayed on the MCDU, volume per volume.
11	**POSITION COMPUTATION**	description of the BCP computation.
12	**GLOSSARY**	Glossary

CAUTION : in the page examples :
 ➢ some parameters values displayed may be not representative of operational functioning.
 ➢ positions (and associated commentaries) are given in Geographical coordinates (Latitude and longitude), depending of the selection retained in the UNITS page, the position can either been in geographical coordinates, UTM coordinates, MGRS coordinates.

2 DESCRIPTION AND GENERAL USE

2.1 Pilot interface

The pilot interface is made of the EFIS (MFD, PFD, ...), DMAP and the MCDU.
The EFIS screens are not described in this document.

2.1.1 *MCDU description*

The MCDU includes a full colour flat panel active matrix liquid crystal display
(AMLCD). It enables to display 14 lines of 24 characters. The MCDU keyboard
contents brightness key, line select keys, numeric and alphabetic keys, access keys
and function keys as shown below :
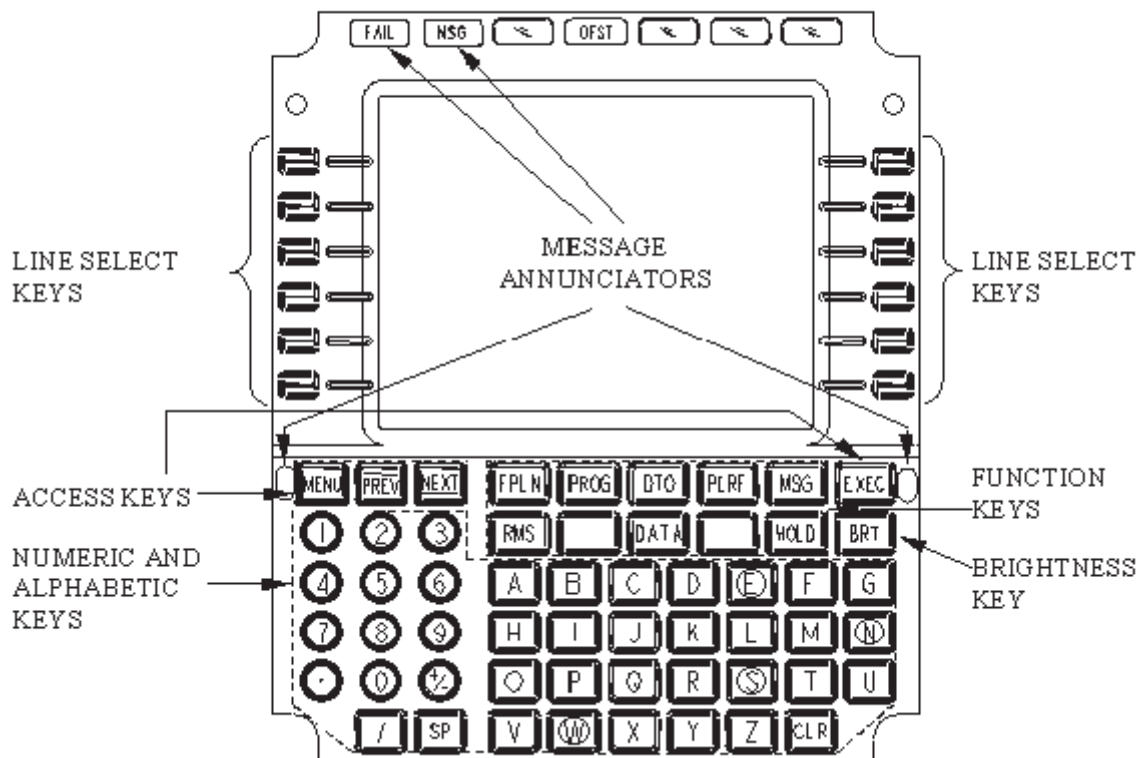
2.1.2 *Keys and annunciators description*

BRIGHTNESS KEY

This key controls the brightness of the screen and annunciators. After an elapsed time of 5 seconds, the first press of the `BRT` key will always increase brightness, each depression of this key alternately brightens or dims the display.

MESSAGE ANNUNCIATORS

The MCDU provides five annunciators which the illumination has the following meaning :
- `MENU`, another system linked to the MCDU requests to be selected.
- `FAIL`, illuminates at maximum brightness with the display blank upon a detection of a major MCDU failure.
- `MSG`, a message of the system which manages the display has occurred.
- `EXEC`, the `EXEC` key is active. To confirm the execution of a command, press it.
- `OFST`, an offset value has been inserted in the flight plan,

NUMERIC AND ALPHABETIC KEYS

- The numeric keys are used to enter numbers 0 to 9, ".".
- **"+/-",** the first press displays "-" in the scratchpad and the next press displays alternatively "+" and "-".
- **"/",** write a slash in order to separate data fields if data are associated for insertion.
- **SP,** write a space.
- The alphabetic keys enable to enter the 26 letters of the alphabet and a space. E, W, N, S have a specific drawn key, because they are used to enter latitudes and longitudes.
- **CLR :** if the scratchpad line or the insertion line are empty, it allows to clear data, else
  - a brief press (< 1 s) enables to erase the last character of the insertion line,
  - a long press (> 1 s) enables to erase all characters of the insertion line.

LINE SELECT KEYS

The Line Select key (Lsk) allows into the fields containing "<" or ">", to enter a data or access to a function identified in that field.

FUNCTION KEYS

Pressing a function key enables to display a new MCDU page, and to access to a function :
- **FPLN**, access to the **FPLN 1/X** page.
- **PROG**, access to the **PROG 1/3** page.
- **DTO**, access to the **DIRECT TO** page.
- **PERF**, access to the **PERF** page corresponding to the flight phase.
- **MSG**, access to the **MSG 1/X** page.
- **DATA**, access to the **DATA MENU** page.
- **DATA** pressed twice, access to the **DATA LIST** page.
- **HOLD**, access to the **HOLD** page, and to the updated, stored position function.

NOTE : The **RMS** key access to the radio management system, not managed by the FMS.

ACCESS KEYS

The access keys are :
- **MENU** allows to access to **MCDU MENU** page where the list of the equipment linked to MCDU are displayed. Press it to change of the equipment which monitors the display.
- **RMS** allows direct access to **RMS** equipment.
- **PREV**, when there is more than one subpage, enables to scroll up the page.
- **NEXT**, when there is more than one subpage, enables to scroll down the page.
- **EXEC**, when the **EXEC** annunciator is illuminated, allows to confirm the execution of a command.

NOTE : -   For all keys or Line Select keys, except for the **CLR** key which has a specific treatment, a press greater than 1 s has the same result as two consecutive presses.

NOTE : -   **BRT**, **MENU** keys are linked to the use of the MCDU and are independent of the type of equipment connected to it.

NOTE : -   The **MENU** key is the only way to change the equipment that monitors the MCDU display.

2.1.3 *MCDU menu*

The MCDU displays the MENU page :
- when the **MENU** key is pressed.
- at the power up of the FMC when the MCDU is already powered on.

```
                    MENU
L1 — <FMS  1                      R1
L2 — <FMS  2                      R2
L3 — <RMS  1                      R3
L4 — <RMS  2                      R4
L5 —                              R5
L6 —                              R6
BRT
```
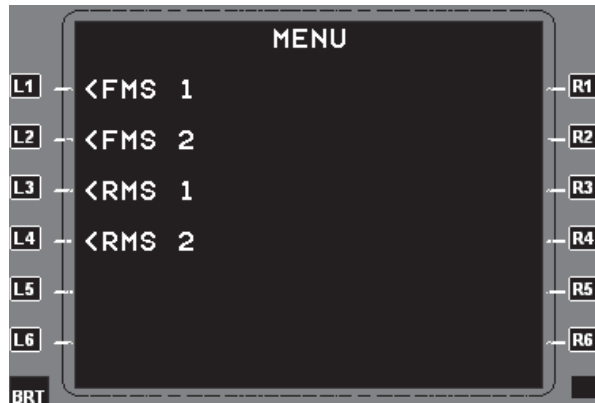
The name of the subsystem (e.g. FMS1,FMS2, RMS1, RMS2) connected to the
MCDU is displayed. Only one manages the MCDU display.
Press the Lsk beside the desired subsystem name.

2.1.4 *MCDU display description*

The MCDU screen contains 14 lines, each having 24 characters.
- The first line is used as the title line.
- The bottom line (line 14) is the scratchpad line.
- The others lines (line 2 to 13) define a page.

```
M MSG PAGE TITLE LOC EPE
HEADER L1        HEADER  R1
DATA L1            DATA  R1
HEADER L2        HEADER  R2
DATA L2            DATA  R2
HEADER L3        HEADER  R3
DATA L3            DATA  R3
HEADER L4        HEADER  R4
DATA L4            DATA  R4
HEADER L5        HEADER  R5
DATA L5            DATA  R5
------------------------
<ACTION L6    ACTION R6<
------SCRATCHPAD-------
```
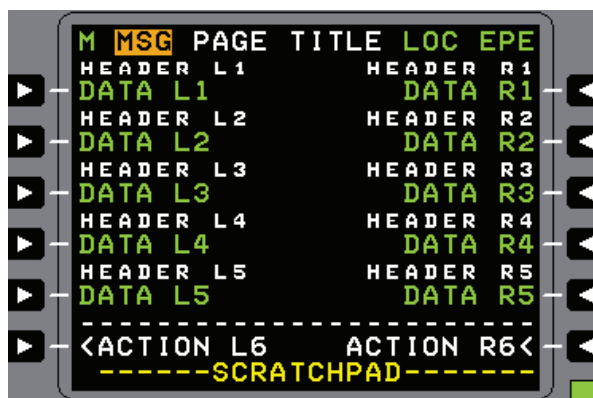
TITLE LINE

The title line is composed of 5 different fields, which are displayed on every page, except the **POWER ON** and **MENU** pages:

- the heading reference: Magnetic: **M**, True: **T** or Directional: **D**.

- the code of the highest triggered alerts. Refer to the MEANING OF ALARM MESSAGES paragraph of the ALARM section.

- the page title with eventually the number of subpages x/y.

- the navigation mode selected to determine the FMS position :

  - "**GPS**" in cyan if the active position fixing is GPS,
  - "**IRS**" in cyan if the active position fixing is IRS,
  - "**HYB**" in cyan if the active position fixing is HYB,
  - else (the active position fixing is BCP) :
    - "**GPS**", in green if the BCP data are mainly computed with GPS,
    - "**D-D**", in green if the BCP data are mainly computed with Radio NAV data and is in DME-DME mode.
    - "**V-D**", in green if the BCP data are mainly computed with Radio NAV data and is in VOR-DME mode and is compliant with PRNAV.
    - "**V-D**", in amber if the BCP data are mainly computed with Radio NAV data and is in VOR-DME mode not compliant with PRNAV.
    - "**V-V**", in amber if the BCP data are mainly computed with Radio NAV data and is in VOR-VOR mode.
    - "**DOP**", in amber if the BCP data are mainly computed with doppler data.
    - "**IRS**", in amber if the BCP data are mainly computed with IRS data.
    - "**A-D**", in amber if the BCP data are mainly computer with Air Data.
    - "**---**" in amber otherwise

CAUTION : some pages in this User's Manual have kept "BCP" instead of the BCP mode described above. The reader should read this BCP mode ("GPS", "D-D", "V-D', 'V-V", "DOP", "A-D", ...) instead of "BCP".

- the Estimated Position Error, **EPE**, of the FMS position.

NOTE : -   The Directional heading reference is displayed in amber.

PAGE

The page is made of data and action lines or prompts. Each data line is adjacent to a line select key, and a header line is above it.

SCRATCHPAD

The scratchpad line is used to display the keyboard insertions. The FMS may clear it and display on it a message in reverse video. Pressing **CLR** key enables to erase this message and to restore the contain of the scratchpad. Whatever the page modification, the data of the scratchpad are retained.

2.1.5 *Colors meaning*

The displays are color coded to assist the operator in recognizing information. The following table is a list of these colors and their meanings.

MCDU COLOR	DATA
WHITE	• Titles. • Comments. • Units. • Flight plan legs (header lines) : procedures, bearing/distance between waypoints. • Secondary flight plan • Separation line (dashes). • Minor messages and advisories. • Special characters : <, >.
CYAN	• Modifiable data. • Selectable data. • Brackets. • Missed approach waypoints. • Non active items in selections.
GREEN	• Non modifiable data. • Active data. • Data with no specified color. • Active items in selections. • Primary flight plan waypoints (except «fly to» waypoint).
AMBER	• Mandatory data (boxes). • Pilot action required. • Important messages. • Missed constraints. • Negative margins.
MAGENTA	• Next flight plan constraints. • «fly to» waypoint. • Altitude/speed/time constraints.
YELLOW	• Temporary data. • Temporary FPLN.

2.1.6 *Character attributes meaning*

Beside the color, in order to point out the different types of information, the display uses four attributes described in the following table.

SMALL FONT	• Headers and column titles. • Data names. • Units. • Default values for data. • Non active items or data in selections (xxx/YYY/ zzz).
LARGE FONT	• Title line, scratchpad. • Data (except default values). • Active item or data in selections (xxx/YYY/zzz).
REVERSE VIDEO	• Alert codes in title line. • Messages in scratchpad line. • Text requiring action (e.g. activation, validation).
UNDERLINE	• Prediction data on FPLN page if a constraint exist on this data (speed/altitude/ETA)

2.1.7 *Scratchpad messages*

When a command or insertion is rejected, or during the execution of command, the FMS clears the scratchpad and displays on it a message in reverse video. When this message can not be cleared, presses on keyboard, except **BRT**, **MENU** keys, are not taken into account until the end of the command.
These messages are listed hereafter:

MESSAGE NAME	CLEAR	MEANING
CLEAR ?	YES	Pressing the desired Lsk will delete its field's value
RANGE ERROR	YES	The data entry is out of range
FORMAT ERROR	YES	The format of data entry is wrong
NO ACTION DEFINED	YES	The Lsk is not active
NOT ALLOWED	YES	The command or the data entry is forbidden
NOT IN DATABASE	YES	The data is not found in the database
OFFSET CANCELLED	YES	On the active leg the offset is deleted
OFFSET DELAYED	YES	On the active leg the offset is postponed to the next leg
FPLN FULL	YES	The flight plan is full
SEC FULL	YES	The secondary flight plan is full
MEMORY FULL	YES	The pilot data base is full
OPTION NOT CLEARED	YES	The deletion of the optional waypoint of the active tactical route is forbidden
IDENT ALREADY USED	YES	The ident (airport, navaid, waypoint) is already used in the database
ALREADY DESELECTED	YES	The navaid has been already deselected
ERASING DATA	NO	The pilot data and tactical are being erased
IN PROGRESS	NO	The command is being executed
XFER DATA IN PROGRESS	NO	The data transfer is being executed

MESSAGE NAME	CLEAR	MEANING
XFER FAIL	YES	The data uploading or downloading has failed, data are not transferred
INCOHERENT DATA	YES	At least one pilot route contains a fix which does not belong to the standard data base.
CROSSTALK INIT	YES	The two FMC are harmonizing their data
FPLN WILL BE DELETED	YES	The confirmation of the command by pressing the EXEC key will erase the flight plan
PRESS EXEC TO CONFIRM	YES	Pressing the EXEC key will confirm and execute the command
TMPY EXIST	YES	A temporary flight plan exists and - a "secondary activation", or - a "secondary init as copy", or - a "secondary swap" command is received.
CRZ ALT MODIFIED	YES	The value of the cruise altitude computed by the FMS has been changed. See Vertical navigation
VNAV INCOHERENCE	YES	An incoherence appeared in the vertical navigation profile computation. See Vertical navigation
TOO STEEP PATH AHEAD	YES	A leg of the descent profile is to steep according to the aircraft performances. See Vertical navigation
SPEED LIMIT	YES	In descent or approach flight phase, the airspeed is too great
UTM/MGRS ZONE CHANGE	YES	If the UTM coordinate is selected, the 6°UTM zone identification of the A/C position is modified×× ×
		If the MGRS coordinate is selected, the MGRS square identification of the A/C position is modified
UTM/MGRS OUT OF RANGE	YES	The corresponding latitude is out of range
BITE FAILURE	YES	At least one FATAL sanction is raised after a PBIT or CBIT test.
RTA MISSED	YES	The RTA constraint cannot be respected
DELETE OTHER RTA	YES	A RTA already exists, press EXEC to delete the previous RTA.
SEC FULL	YES	A new secondary flight plan exceeds the flight plan limitations (maximum flight plan size or maximum number of step or maximum number of RTA.
NEW FPLN UPDATING	YES	A FITS FPLN is received in the TMPY.
GUIDANCE LAW MODIFIED	YES	The FITS Authority discrete has been switched from enabled to disabled or disabled to enabled.

2.1.8 *Data entry*

Using the numeric and alphabetic keys write in the scratchpad the data to insert. Then press the Lsk corresponding to the field of the data. If this field contains several data, the slash character has to be used with the following rules:

- entry of first data only: **DDDD**

- entry of second data only: **/DDDD**

- entry of third data only: **//DDDD**

- entry of first and second data only: **DDDD/DDDD**

- entry of second and third data only: **/DDDD/DDDD**

- entry of first and third data only: **DDDD//DDDD**

where «**DDDD**» is the data and «**/**» the separator of data fields. The maximum number of data included in a set is limited to 4.

The length of the format of data to insert is the same as the display format with the sign is necessary but without the unit, for example: to insert 14H22 enter **1422**. The point is only necessary for decimal data entry.

For latitude or longitude,

- With the GEO DMH coordinates :
  entry of the indication N/S or E/W can begin or end the value, for exemple :
  to insert S45°42.23, the entry "S4542.23" , "4542.2 3S" are possible.
- With The GEO DMS coordinates, for example :
  to insert S45°42'35", the entry "S454235" , "454235 S" are possible.
- With the UTM coordinates, for example :
  to insert 31N 449.52, enter "31N 449.52" or "31N449.52"
- With the MGRS coordinates, for example :
  to insert 31DTL 49.52, enter "31DTL 49.52" or "31DTL49.52"

NOTE : With the UTM or MGRS coordinates, it is possible to entry only numerical data, so the MRGS square or the 6×UTM is not changed. For example : if the coordinate is 31N 449.52, entry only "522.42" to insert "31N 552.42". Or if the coordinate is 31DTL 49.52 entry only "56.32" to insert "31DTL 56.32"

In certain cases, the inserted data can be shorted, as indicated in the following table of insertion examples:

PARAMETER		ENTRY	RESULT
LATITUDE	GEO DMH	S502	S05°02.00
		502N	N05°02.00
	GEO DMS	S50200	S05°02'00"
		50200N	N05°02'00"
	UTM	4S4	04S 004.00
		4S 4	04S 004.00
		7N54.3	07N 054.30
	MGRS	5TLD8	5TLD 08.00
		5TLD 8	5TLD 08.00
		8JDC6.2	8JDC 06.20
LONGITUDE or LATITUDE	GEO DMH	E502	E005°02.00
		W1234.5	W012°34.50
	GEO DMS	E50200	E005°02'00"
		W123450	W012°34'50"
	UTM	42	0042.00
		54.2	0054.20
	MGRS	23.2	23.20
		56	56.00
ALTITUDE		15000	15000
		-1000	-1000
		FL200	FL200
WIND		40/30	040°/ 30
		50	050°/ xx
		/50	xxx°/ 50
FMS TIME		122423	12H24:23

PARAMETER	ENTRY	RESULT
	12	00H00:12
TIME	0115	01H15
TIME DIFFERENCE	-0225	-02H25
DATE	25APR99	25-APR-99
FREQUENCY	112	112.00
	134.2	134.20
CHANNEL	069Y	069Y
TEMPERATURE	-20	-20
	40	+40
REFUELING	-2000	-2000
	500	500
OFFSET	L02	L02
SLOPE	2.5	2.5

2.1.9 *Clearing data*

If the scratchpad is not empty, perform a long press (> 1s) on the **CLR** key to clear the data contained in the scratchpad.
If the scratchpad is empty, pressing the **CLR** key makes appear in reverse video the message "**CLEAR ?**" in the scratchpad. Press the desired Lsk corresponding to the data field to clear. When the data has a default value, after a clear action, it reverts to its value.

NOTE : The clear of a default value has no effect.

2.2 Operational modes

There is three possible modes of operation: dual, independent, single.

2.2.1 *Dual Mode*

This is the normal mode, both FMC are synchronized. Both achieve their own computation and exchange data through the CROSS TALK link. One FMC is declared as the master. This means that modifications of the flight plan are firstly performed by the master FMC, and afterwards transfered to the slave in order to obtain the data coherence between both calculators. In a same way, radionavigation sensors command and monitoring is effected by the master FMC and tuning mode (auto/man) is commanded to the slave. The other MCDU entries (e.g. database modifications, navigation mode, monitoring sensors), except alarms treatment, are transmitted to both FMC, each of FMC perform or reject them in an independent way.
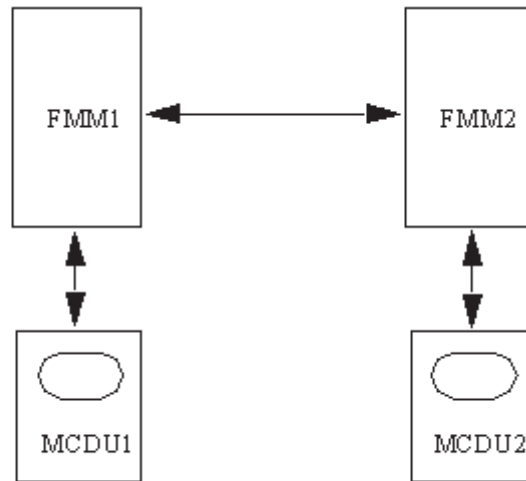
CAUTION : FMC are in dual mode, even if a standard database discrepancy is found.
Simultaneous entries of different values for the same parameter can lead to incoherence data between the two FMC.

NOTE : If one FMC is engaged to the AUTOPILOT, it is the master FMC. Otherwise, the master FMC corresponds to the side 1 or 2 of the selected source on the FGCP, HSI/SEL button.

2.2.2 *Independant Mode*

This is a degraded mode, automatically selected when a **CTK** alarm with one of this following message is triggered:
- **CROSS TALK FAILURE NO COMMUNICATION FMS1/2**.
- **CROSS TALK INIT CONFIRM ON THE OTHER FMS**.
- **CROSS TALK INIT PRESS CTK TO CONFIRM**.

Data are not exchanged between FMC. Each FMC works independently, and takes into account only entries of its MCDU.
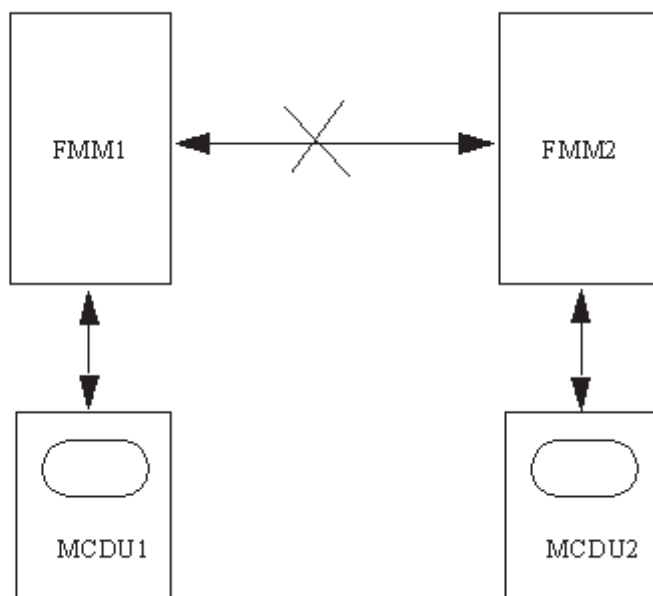
2.2.3 _Single Mode_

This degraded mode is selected in the event of one FMC failure. In this case, turn the MCDU switch to the corresponding selection. Then both MCDU as all other equipments are managed by the remaining FMC.

NOTE : In this mode, flight plan modifications on one MCDU change the displayed page on the other MCDU, in order to inform the operator that modifications have occurred.
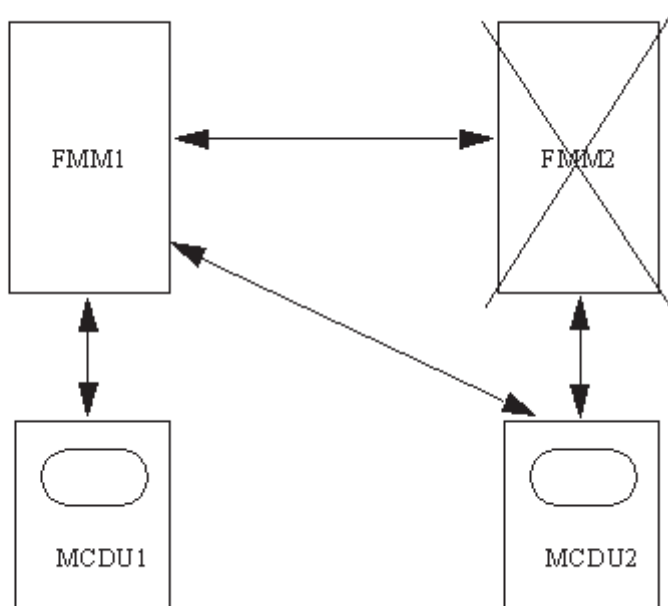
3 PREFLIGHT

3.1 Power-on

1) Power on the FMS: the FMC, the MCDU, and the ADL.

NOTE : If the power on happens within 7 s following a power off, the power
interruption is transparent, all data and the displayed page are restored.

2) If the MCDU is already powered on, the **MENU** page is displayed with the list of
the equipments connected to the MCDU.
Press **FMS** Lsk to obtain the **POWER ON** page.
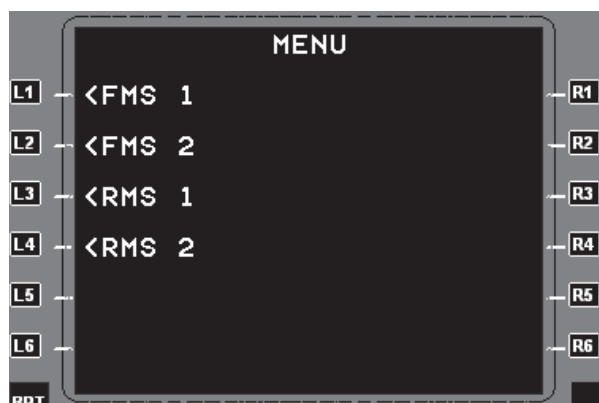
NOTE :   The display of **FMS** is not displayed immediately; it can take up to 10
seconds.

3) The **POWER ON** page contents :

- Company name
- Product name
- Identification of Perf. Data Base
- FMC software version
- Identification of Standard Data Base
- Checksum of system Configuration table
- Expiration Date of Std. Data Base
- Power On tests status :
  - FMC test status
  - FMS data test status
- The message CROSS TALK INIT in reverse video in the scratchpad, if the two FMC are started up in the same time (delay lower than 10 seconds)

NOTE : -   -- While the CROSS TALK initialization is in progress between the two FMC in order to harmonize their data, all press on a Lsk, or an alphanumeric key or function key are locked, except the BRT and MENU keys.
--The CROSS TALK initialisation can last up to 2min30s if Data bases are different on the two FMC, the normal duration is less than 30s.
-- TEST in reverse video means that the test is in progress.
-- If the power on happens in flight, the CROSS TALK initialisation is not automatically triggerred, but manually. This action is proposed by a specific message of CTK alert.

4) Press BRT key to adjust the brightness of the MCDU screen.

5) If at least one test has failed, then the **FMS BITE** prompt is displayed, press the corresponding Lsk to access to the **FMS BITE** page and find the cause of the failed test. Report to the MAINTENANCE OPERATION section.

NOTE :   If the Pilot Data Base makes reference to a **Standard** Data Base which is not the Standard Data Base loaded on the FMC, the **FMS DATA** test is failed and the message INCOHERENT DATA is displayed in the scratchpad. Then the concerned fix of a pilot route is displayed in amber when the route is edited and a discontinuity replaces this fix when the route is engaged in a flight plan.

6) . When the **FMC** and **FMS DATA** tests have been completed, the **INIT** Lsk is displayed. Press it to continue the preflight operations.

NOTE : The **STD DATA** test can last up to few minutes, according to the data size.
CAUTION : before to go the INIT PAGE, the pilot shall verify carefully :
- the A/C configuration (i.e. the Checksum of System Conf. Table),name and validity of used Data Bases (i.e. Perf. Data Base and/or Standard Data Base),
- the result of tests (i.e. all tests shall be OK = no failure).

3.2 Init page


```
M        INIT        GPS .04
DATE            (GPS) UTC
19-SEP-05        12H34:53
STD DATA     LOCAL   DIFF
18-OCT-05     14H34  +02H00
- - - - - - - - - - - - - - - -
<POS INIT        WEIGHT>
<DATA XFER     PERF INIT>
<FPLN INIT       UNITS>
BRT
```
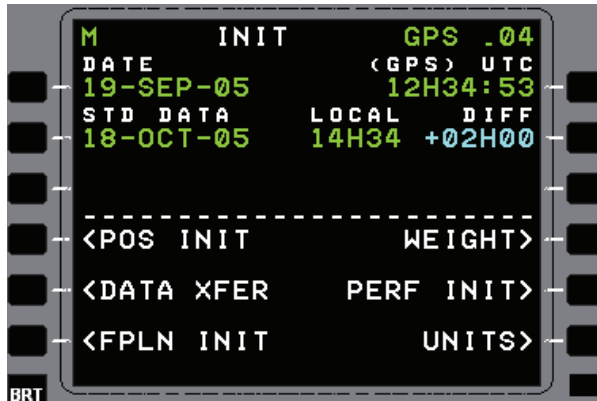
1) Press **INIT** on **POWER ON** page, or press **DATA** key, and **INIT** Lsk.

2) The date and time used by the FMS are displayed:

- **GPS** means that those data are coming from the GPS sensor.
- **FMS** means that data are provided by the internal clock of the FMC. In this case check the data and UTC value. To modify them, enter the new values on **DATE** and **UTC** Lsk (e.g. 15APR00 and 102530).

NOTE : When GPS data is valid, the internal clock of the FMC is automatically updated to the GPS date and time.

3) The expiration date of the Standard Data Base is displayed:

- in green, when the date has not expired.
- in amber, when the date has expired.


```
M        INIT        GPS .04
DATE            (FMS) UTC
15-APR-00        10H25:30
STD DATA     LOCAL   DIFF
13-DEC-99     10H25  +00H00
- - - - - - - - - - - - - - - -
<POS INIT        WEIGHT>
<DATA XFER     PERF INIT>
<FPLN INIT       UNITS>
```
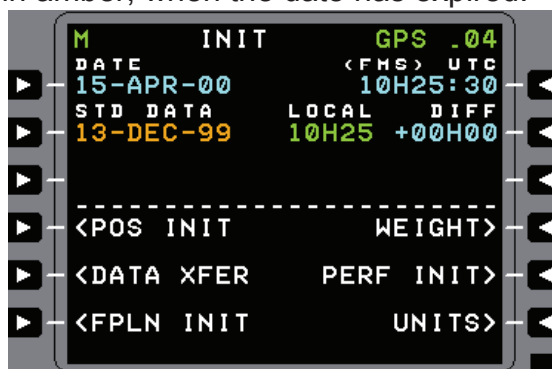
NOTE : If not standard database has been uploaded in the FMC, the data is dashed (in amber).

CAUTION : When the date has expired, the use of the standard data base has to be avoided, only the selection of an approach procedure is impossible (the list of approaches of the airport is empty).

4) Enter on **DIFF** Lsk, the time difference between the local time and the UTC time: +/- XXXX(e.g. +1100). Then the new local time is displayed.

NOTE : When the time **DIFF** is different from zero, all times are displayed on MCDU and ND using the local time.

3.3 Position initialization

3.3.1 *Automatic init*

At power up, the IRS/GPS performs automatically a gyrocompass alignment, GCA, if the position memorized at the turn off is valid.

NOTE : If the GCA has not been automatically executed, the **INI** alarm is triggered to perform an IRS alignment.
After an automatic init, it is possible to perform an IRS alignment, for example when the aircraft has moved since the last turn off, or when the last position memorized is not enough accurate.

3.3.2 *IRS alignment*

CASE of TOTEM 3000

The gyrocompass alignment, (GCA), has to be performed at a latitude within the range [80°S ; 80°N]. After 1 minute, the gyrocompas s alignment can be interrupted, but the performances are degraded according its elapsed time.

Inertial reference is unserviceable if an interruption happens within the first minute of the gyrocompass alignment.

A full GCA lasts 4 minutes for a latitude within the range [45°S ;45°N], in the range [45°N/S ;80°N/S] this time is extended. When the GC A is finished the Enhanced Interrupted Alignment, (EIA), is automatically triggered.
The EIA is interrupted during the taxi (taxi time must not exceed 10 minutes), and continues when the aircraft takes another position with a heading difference between the first alignment greater than 70°. This alignmen t enables to reach the best performance.
After 1 minute of GCA, a stored heading alignment (SHA) which lasts less than 10 s can be triggered. In this case, the initial heading is not determined internally but it is the heading memorized at the last IRS turn-off. So this type of alignment can not be used if the aircraft has moved since the last turn-off, then its execution is refused.

As long as the IRS is in the alignment mode GCA or SHA and the remaining time decreases, the ALN alarm is generated.

In Flight Alignment (IFA) is triggered by a NAV command performed on FMS when conditions are met.

CASE of LN100G

The gyrocompass alignment (GCA) has to be performed at a latitude within the range [80°S ; 80°N]. An interruption of the GCA does not prolong the alignment time more than the alignment suspension time plus 20 seconds.
After 90 seconds, the GCA can be interrupted but the performances are degraded according its elapsed time.

Inertial reference is unserviceable if an interruption occurs within 90 seconds of GCA.

A full GCA lasts less than 4 minutes between 45°S a nd 45°N ; for latitudes north of 45°N and south of 45°S this time is extended.
SHA allows full GC performances within 30 seconds providing a full GCA has been successfully completed on the last turn off and the aircraft has not been moved since the GCA was completed.
In Flight Alignment allows full GC performances within 10 minutes providing a continuous GPS coverage with an HDOP of 3.5 or better.

In Flight Alignment is triggered by a NAV command performed on FMS when conditions are met.

If the pilot press NAV command (second time) in MCDU "SENSOR STATUS" page when IRS/GPS equipments are performing the in flight alignment or IRS/GPS equipments have finished the in flight alignment, the IRS/GPS equipments will go to ATT mode. (In ATT mode, IRS/GPS equipments do not provide position information). If this event happens, the operator shall switch off-switch on the IRS/GPS equipments and perform again the in flight alignment.

CAUTION: The CROSS TALK shall be established before position initialisation, otherwise IRS alignment is only done on own side IRS. To perform IRS alignment on both IRS if CROSS TALK is not active, then the crew shall send an alignment command on each FMS to align each IRS.

.

3.3.3 *Position init*
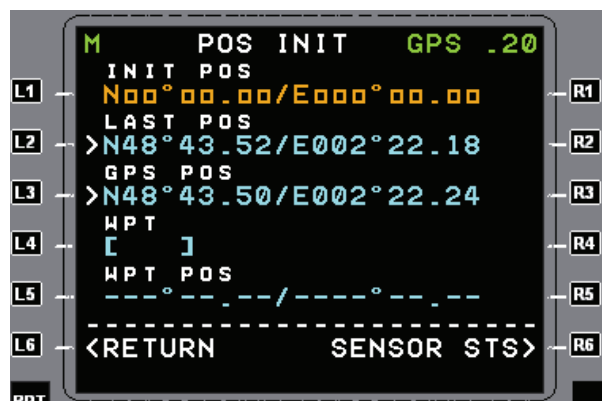
On the **INIT** page, press **POS INIT** Lsk.

1)

2) The initial position, can be:

*   the GPS position, when the GPS EPE is lower than 0.1 NM ;
    -   Press **GPS POS** Lsk.

*   the last position :
    -   Press **LAST POS** Lsk.

*   a Waypoint position :
    -   Enter the identifier
        on **WPT** Lsk. If several data correspond to this identifier, the
        duplicate page is then displayed. The Waypoint position is shown.
        Press **WPT POS** Lsk
    -   If **WPT** Lsk is pressed with empty scratchpad, the **DATA LIST** page
        is displayed with filter "ALL".

*   a position
    -   Enter the latitude, longitude on **INIT POS** Lsk.

```
M        POS INIT    GPS .20
        INIT POS
L1  —  N48°43.50/E002°22.18  — R1
        LAST POS
L2  — >N48°43.52/E002°22.18  — R2
        GPS POS
L3  — >N48°43.50/E002°22.24  — R3
        WPT
L4     [      ]              — R4
        WPT POS
L5     ---°--.--/----°--.--  — R5
       ----------------------
L6  — <RETURN     SENSOR STS> — R6
BRT
```
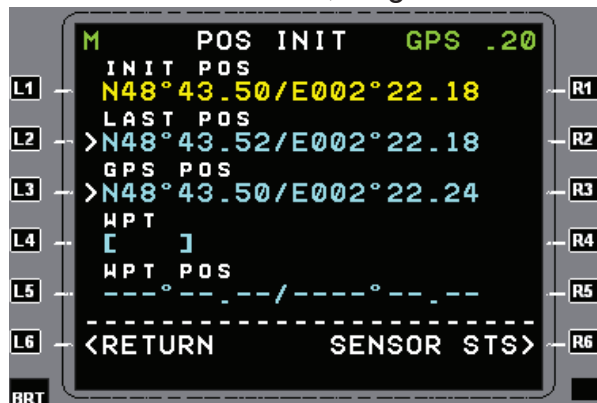
When the initialization position is valid, the prompt **SENSOR INIT** is displayed.

3) Press **SENSOR INIT** Lsk, the command and position of alignment are sent to
    the GPS sensor and the BCP localisation mode. Then, the prompt **SENSOR
    STS** replaces **SENSOR INIT.**

4) Press **SENSOR STS** Lsk, the **SENSOR STS** page is displayed and shows for
    each IRS, following ALN

*   With TOTEM3000, the remaining alignment in seconds,

*   With LN100G, the alignment time in seconds

NOTE : Each line is displayed only if the corresponding equipment is present.
       A"*" character is displayed beside the active sensor headers
       ALNxxx in amber means that moving is not allowed.
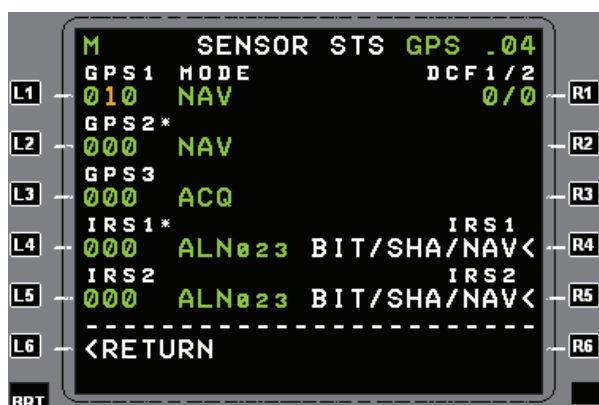
5) IRS and GPS STATUS (three figures beside each left Lsk) : see Sensor status.

6) IRS and GPS **MODE :** see Sensors monitoring .

7) GPS **KEY :** for each GPS sensor with PPS capability, display the GPS key status :

- **NOKEY,** no key present.
- **VERIF,** verified key.
- **UNVER,** unverified key.
- **PRTY,** parity error.
- **INSUF,** insufficient key.
- **INCOR,** incorrect key.

8) For each IRS, up to three commands are available : **BIT, SHA, NAV.**

Command availability	T3000	LN100G
BIT	Yes	Yes
SHA	Yes	Yes
NAV	Yes	Yes

- **If the prompt consists to one item (BIT, SHA** or **NAV**), the press of the Lsk alternatively select or deselect the item.
- If the prompt consists to more than one item, the press to the Lsk :
  o select the first item if no one was selected.
  o deselect the previous item if selected and select the following one.
  o deselect the last item if it was selected.

When the desired command is displayed in reverse video, press **EXEC** to send the command.
The three different commands are :

- **BIT,** available if the A/C is on ground and if the IRS allows it. Triggers an IRS Built In Test.
- **SHA,** available if the A/C is on ground and if the IRS allows it. Triggers a Stored Heading Alignment.
- **NAV,** available if the IRS allows it.

9) Press **RETURN** Lsk, one or two times, to display the **POS INIT** page.

3.4 Uploading standard data , tactical and pilot data

The STandarD DataBase, Pilot Database and Tactical data (depending of the configuration) can be uploaded on ground.

1) Insert a DTM in the ADL, with the desired data.

```
 M       DATA XFER   GPS .20
L1  --------FMS DATA---------  R1
    STD DATA          EXP DATE
L2  STDDTBID00        18-JUL-97  R2
    PILOT DATA        LAST MOD
L3  PLTDTBID00        01-JUL-97  R3
    TACTICAL          LAST MOD
L4  TACDTBID00        02-JUL-97  R4
    ------------------------
L5  >UPLOAD           DOWNLOAD<  R5

L6  <RETURN                     R6
BRT
```
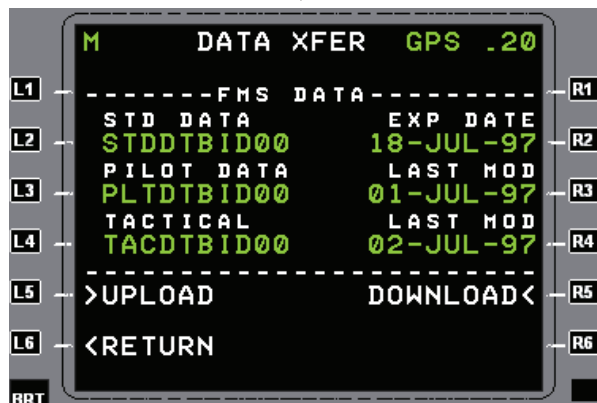
2) On **INIT** page, press **DATA XFER KEY**.
3) Press **UPLOAD** Lsk, then the name and the date of expiration/modification of the data which can be uploaded, are displayed in yellow.
4) Press Lsk beside the type of data that have not to be transferred, then this field becomes green. By default all DTM data are selected for the uploading.

5) Press **EXEC** to confirm the transfer.

6) The message **XFER DATA IN PROGRESS** is displayed and keyboard is locked on the MCDU, because the uploading is performed on the FMC.

NOTE : - A progress indicator is displayed near the **UPLOAD** command.
     - When the data are uploaded, the FPLN is deleted.

```
 M       DATA XFER   GPS .20
L1  --------DISK DATA---------  R1
    STD DATA          EXP DATE
L2 >STDDTBID01        10-AUG-97  R2
    PILOT DATA        LAST MOD
L3 >PLTDTBID00        03-JUL-97  R3
    TACTICAL          LAST MOD
L4  (NO DATA)         --------  R4
    ------------------------
L5  UPLOAD            DOWNLOAD>  R5

L6  <RETURN                     R6
    FPLN WILL BE DELETED
BRT
```
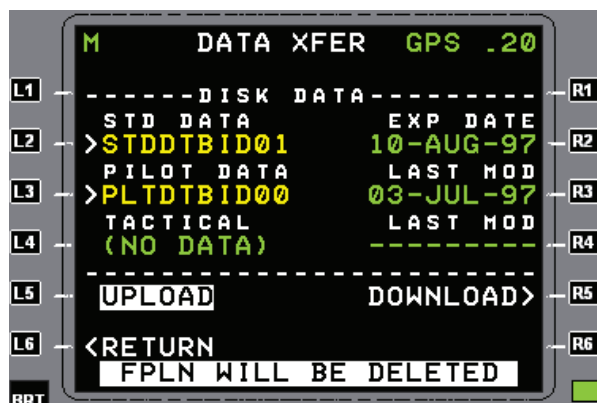
7) Press **RETURN** Lsk to return to the **INIT** page.

3.5 Checking units

At power on, the units are those selected at the power off.

To change one or several units, perform this procedure:

1) On **INIT** page, press **UNITS** Lsk
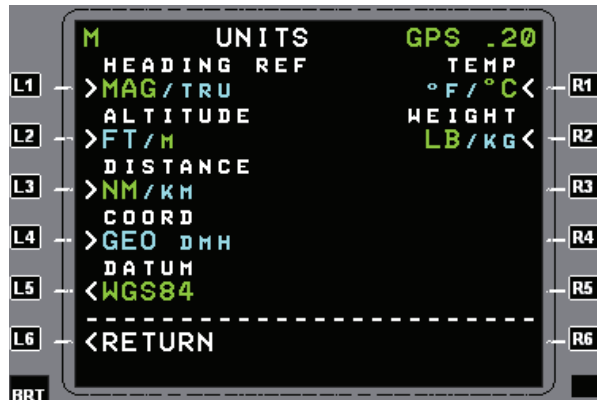
2) .Press Lsk near the parameter to select the desired unit. The selected units are displayed in green and in large font.

3) Select the **COORD** by circular permutation. GEO DMH, GEO DMS, UTM or MGRS coordinates are possible.

4) Press **RETURN** Lsk to return to the **INIT** page.

GEODETIC DATUM SELECTION

1) On **UNIT** Page, press **DATUM** Lsk to display the **DATUM** page.

2) The list of the DATUM is displayed in cyan, the selected DATUM is display in green.

NOTE : Press action **PREV** / **NEXT** to access to the previous/next data. .

3) Press the Lsk to display the geodetic datum details, the GEO DATUM page display .
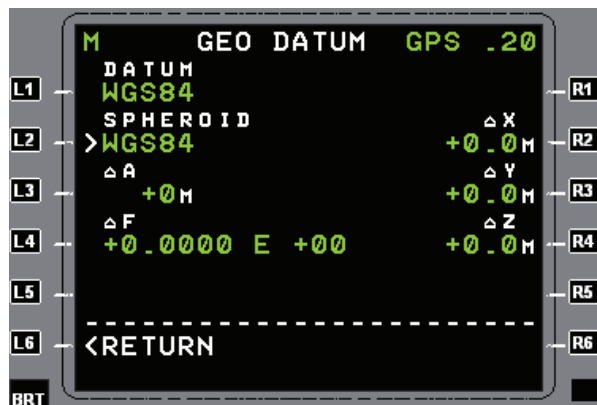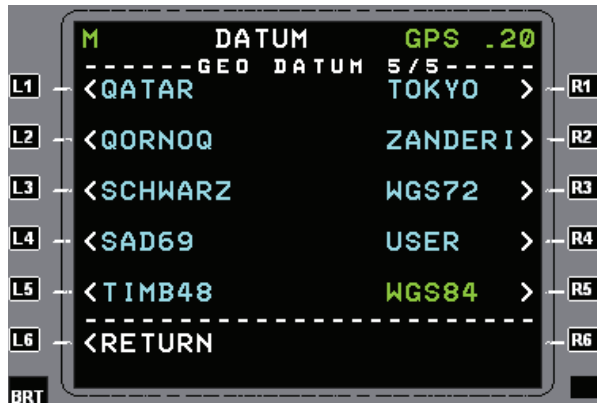
4) The **SPHEROID** identification associated to the geodetic **DATUM** is displayed. The following parameters of the **DATUM** and the **SPHEROID** are displayed :

- **DELTA A** : WGS84 semi-major axis minus Spheroid semi-major axis.
- **DELTA F :** WGS84 flattering minus Spheroid flattering.
- **DELTA X**: X-axis difference between WGS84 and Geoid.
- **DELTA Y**: Y-axis difference between WGS84 and Geoid.
- **DELTA Z**: Z-axis difference between WGS84 and Geoid.

5) To select this geodetic system, press **SELECT** Lsk

NOTE : The SELECT<   prompt is not displayed when the geodetic system is already selected.

USER DATUM MODIFICATION

6) To Modify Geodetic datum parameters (DELTA X, DELTA Y and DELTA Z) select the USER datum system in the **DATUM** Page.
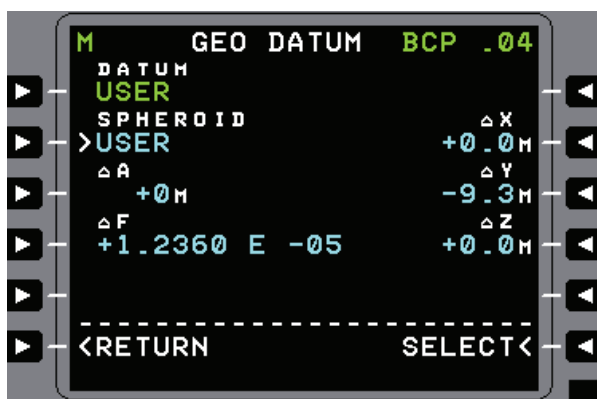
7) To modify the spheroid parameters (DELTA A, DELTA F), select the USER SPHEROID by circular permutation.

NOTE : - The USER data are recorded at the power off, however they can be modified. By default, the USER Data are WGS84 data (all data are equal to zero).

3.6 Weight insertion

1) On **INIT** page, press **WEIGHT** Lsk.

WEIGHT page with Refueling parameters   WEIGHT page without Refueling parameters
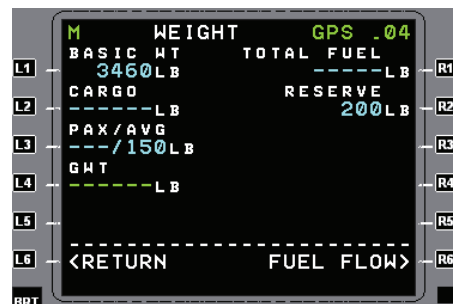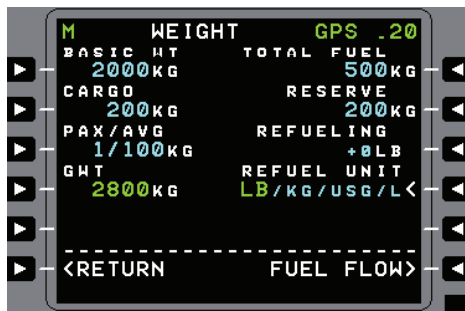
2) Enter :
   - **BASIC WT (**Basic Weight**)**, which includes the weight of the empty aircraft, of the equipments, and of the crew. .
   - **CARGO**, weight of the load on board.
   - **PAX/AVG**, number of passengers on board, and their average weight.
   - **TOTAL FUEL**, weight of fuel on board.
   - **RESERVE**, weight of fuel reserve.

REFUELING AND REFUEL UNIT are not available for P3 aircraft.
   - REFUELING : fuel update
   - REFUEL UNIT : select the fuel update unit by alternation between pounds – USGallons – kilograms and litres

CAUTION : The data entered by the crew must be carefully checked, because they are used for the performance calculations

BASIC WEIGHT, CARGO, PAX, AVG and TOTAL FUEL have each a minimal and a maximal possible value.

The weight parameters shall be set in the correct range otherwise the entry is refused and a ``RANGE ERROR'' message is displayed.

TOTAL FUEL shall also be greater than a defined portion of RESERVE value and reciprocally RESERVE value depends on TOTAL FUEL value.

Furthermore, the sum of the weight entered shall respect some conditions:

- If Gross Weight GWT (= BASIC WEIGHT + CARGO + PAX* AVG + TOTAL FUEL) is out of range, the last parameter entered is refused

- If Zero fuel weight ZFW (= BASIC WEIGHT + CARGO + PAX* AVG) is out of range, the last parameter entered is refused.

Ranges with PERF MODE = PERFDATA

	C295	P3
CARGO	Log : [0-9900]kg FAR/NORM : [0- 7700]kg	[0, 6510] kg
PASSENGER NUMBER	[0,80]	[0,18]
PASSENGER WEIGHT	[70- 140] kg	[70- 140] kg
GWT	Log : [10800 – 23200] kg FAR/NORM : [10800 – 21000] kg	[28976 – 35486] kg
ZFW	Log : [10800 – 20700] kg FAR/NORM : [10800 – 18500] kg	[28976 – 35486] kg
FUEL	[0 – 6520] kg	[0 – 27960] kg

Ranges with PERF mode = manual

	Min	Max
CARGO	0 kg	1 000 000 kg
PASSENGER NUMBER	0	1000
PASSENGER WEIGHT	0 kg	1000 kg
GWT	0 kg	1 000 000 kg
ZFW	0 kg	1 000 000 kg
FUEL	0 kg	100 000 kg

 (*) The values displayed in the columns "min" "max" values are used by FMC is case of a manual PERFDATA (no performance database loaded), otherwise, they are overloaded by values defined in the Database

NOTE : - **BASIC WT**, **AVG**, **RESERVE** take the value memorized at the power off, however they can be modified.

- **TOTAL FUEL** can be provided by a specific computer and is then displayed in small font. When the crew enters **TOTAL FUEL**, it is displayed in large font.

3) The fuel delivery unit (**REFUEL UNIT**) can be selected, and the fuel quantity (**REFUELING**) inserted. Refer to refuelling/jettisoning paragraph.

4) **GWT**, Gross weight computation is computed and displayed.

5) Press **RETURN** Lsk to return to the **INIT** page.

3.7 <u>Deselecting Navaids</u>

Refer to the "Deselecting a navaid" paragraph.

3.8 <u>Radiocom Plan</u>

Refer to the "**TUNE 1/2** page" paragraph and the "**COM PLAN** page" paragraph.

3.9 Flight plan init

1) On **INIT** page, press **FPLN INIT** Lsk

```
M       FPLN  INIT   BCP .04
L1 ─ <ROUTE        SAR SECTOR> ─ R1
L2 ─ <SEC INIT     SAR LADDER> ─ R2
L3 ─ <TACT 1       SAR SQUARE> ─ R3
L4 ─                           ─ R4
        ----------------------
L5 ─                SAR RESUME< ─ R5
L6 ─ <RETURN       CANCEL FPLN< ─ R6
```
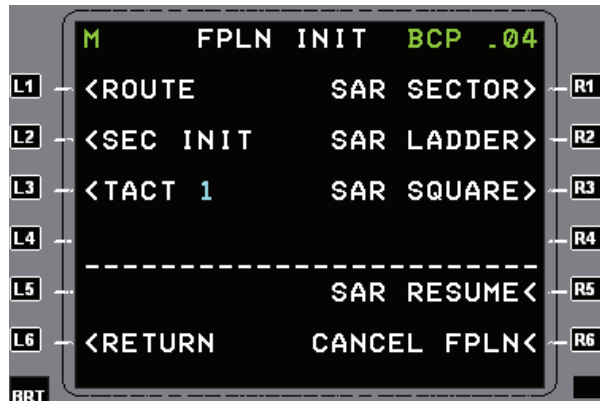
NOTA : TACT 1 is not displayed for P3 aircraft

2) According to the type of flight plan to enter, refer to the :

   • Logistical flight plan initialisation paragraph
   • Tactical flight plan initialisation paragraph
   • SAR flight plan initialisation paragraph
   • Secondary flight plan initialisation paragraph

3) Press **RETURN** Lsk to return to the **INIT** page.

3.9.1 *Selecting navigation mode*

1) Press **PROG** key.

```
M        PROG 3/3    GPS .04
            A/C POSITION

           N45°12.34      EPE
    <BCP   E002°21.44    0.15NM
    <GPS   356°/0.10NM   0.08NM
    <IRS   091°/1.01NM   1.35NM
    <HYB   120°/0.23NM   0.04NM
     FM2   355°/0.22NM   0.05NM
```
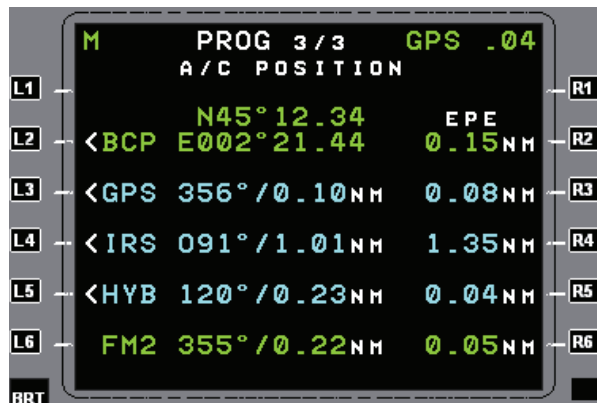
2) Press **PREV** key.

3) The following parameters are displayed:

   • the FMS position (coordinates) provided by the selected navigation mode (displayed in green).
   • the discrepancy (bearing and distance) from the FMS position to the other mode position.
   • the Estimated Position Error, **EPE**, of all navigation modes.

NOTE : At power up the **BCP** is the selected mode by default.

4) On the **PROG 3/3** page, press on the Lsk near the desired navigation mode

```
M        GPS NAV      GPS .20
    LAT/LONG
    N45°25.25/E002°23.30
    EPE                 ALT
    0.04NM            4810FT
    TK      GS          HIL
    125°   189KT      0.06NM
    WIND               HDOP
    251°/  31KT         3.4
    SOURCE / MODE
    GPS1    NAV
    ------------------------
    <RETURN
```
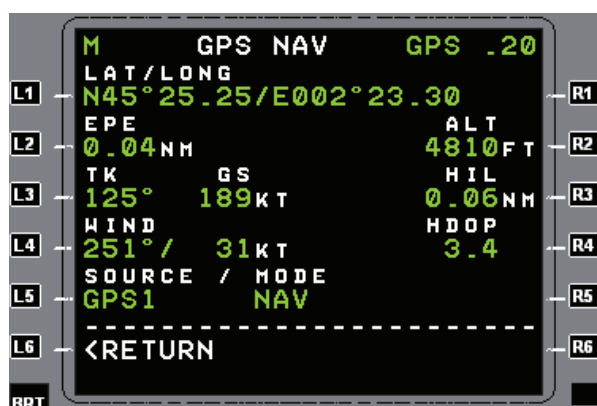
example of **GPS NAV page**

5) The parameters of this navigation mode are displayed.

6) To select this navigation mode, press **SELECT** Lsk.

NOTE : The **SELECT** prompt is not displayed when the navigation mode is already selected.

3.10 Performance init

NOTE : All the initial performance parameters included in the different performance init pages (Take off, cruise, approach, landing, weight, fuel flow) shall be filled in order to enable the proper performance data calculation by FMS.

1) On **INIT** page or on each **PERF** page, press **PERF INIT** Lsk.
   The displayed page depends of the PERF MODE (according selection done on **STS XFER** page),

MANUAL
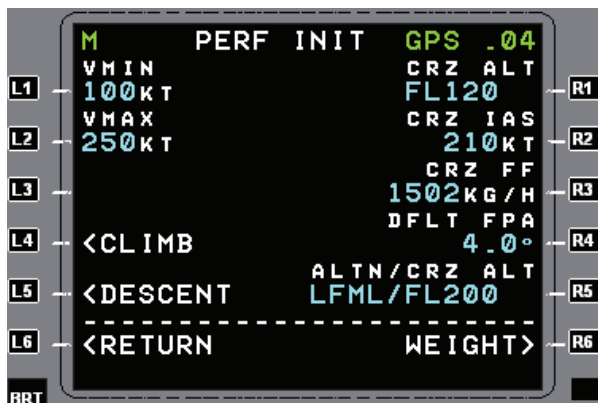
PERFDATA for P3 aircraft   **PERFDATA for others aircrafts**
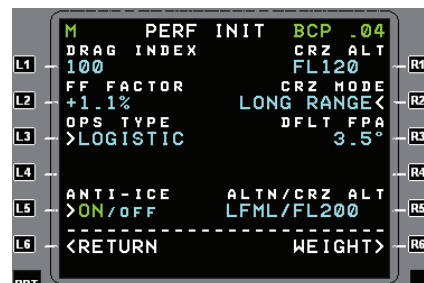
2) Enter or select the following values :

Parameters not depending of PERF MODE

- **CRZ ALT,** Cruize Altitude,
- **DFLT FPA,** Default Flight Path Angle used for the descent profile computation.
- Case **ALTN/CRZ ALT,** Alternate destination airport identification and Cruize Altitude for the alternate destination.
  The alternate can be selected among airports of the standard or pilot databases.
  When **ALTN/CRZ ALT** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with standard and pilot airports filter.

NOTE : - Before insertion, **DFLT FPA** parameter is filled in small fonts with the memorized values at power off.
When no memorized value is available, **DFLT FPA** is filled in small fonts with 3°
- The alternate airport is by default the origin airport when defined.

Parameters specific to the MANUAL PERF MODE

- **CRS IAS,** Cruize indicated Air speed,
- **CRZ FF,** Cruize Fuel Flow.
- **VMIN,**
- **VMAX,**

NOTE : - When MISSED APPROACH is engaged, **CRZ ALT** becomes invalid (Amber boxes).
- For theses parameters, the ranges allowed and the default values are the followings :

parameter	range	default value
Cruize IAS	Vmin ; Vmax	Memorized values or invalid (dashes)
Cruise fuel Flow	FF_min ; FF_max	
Vmin	K_AIR_Spd_Min; VMAX	Memorized value or K_AIR_Spd_Min
Vmax	VMIN; 300 m/s	Memorized value or 400 kts (216 m/s)

With K_AIR_Spd_Min defined in constant table as 30 kts (16 m/s).
Before insertion, these parameters are filled with the memorized values at power off. When no memorized value is available, these parameters are invalid or a pre-defined default value is used.

Parameters specific to the PERFDATA PERF MODE

- **FF FACTOR,** Fuel Flow Factor.
- **DRAG INDEX**
For Aircrafts different of P3, the **DRAG INDEX** is inserted by crew action as a number (range depending of the performance DataBase). By default, it is filled with the memorized values at power off. When no memorized value is available, the default drag index is invalid.

For P3 aircraft: **DRAG INDEX** is selected by alternation between allowed drag index values:
- A(0-50)
- B(51-260)
- C(261-480)
- D(700-1050)

▪   E(1051-1500)

By default, it is filled with the memorized values at power off. When no memorized value is available, the default drag index is set to A.

- **CRZ MODE**: Press the corresponding Lsk to change the selection by alternation between:
    o   **MAX RANGE** and **LOITER** for P3 aircraft,
    o   **LONG RANGE** and **MAX SPEED** for others aircrafts.

    Before selection, **CRZ MODE** is filled with the last memorized selection at power off. When no memorized selection is available, **CRZ MODE** is set to **MAX RANGE** or **LONG RANGE**.

    The **CRZ MODE** is applied when the aircraft is at the **CRZ ALT.**
- **OPS TYPE:** Available for aircrafts different of P3, it is selected by circular permutation between FAR, NORMAL and LOGISTIC:
- **ENGINES** Available for P3 aircraft **:** number of engines : selection of number of engines by alternation between 2/3/4.
- **ANTI-ICE :** for P3 aircrafts , selection by alternation between ON and OFF.

For P3 aircraft,for each coherent group of ENGINES/DRAG INDEX/CRZ MODE, allowed selections are the following :

DRAG INDEX		A			B			C			D			E		
ENGINES		4	3	2	4	3	2	4	3	2	4	3	2	4	3	2
CRZ MODE	MAX RANGE	A	A	A	A	A	A	A	A	A	A	A	N/A	A	N/A	N/A
	LOITER	A	A	A	A	A	A	A	A	A	A	A	N/A	N/A	N/A	N/A

A   Allowed

N/A   Not Allowed

3.11 Take-off or climb performance

The displayed page depends on the PERF MODE and the type of aircraft.

MANUAL PERF MODE

The displayed page is the "**CLIMB**" page.

1) Press **PERF** key, or on **PERF INIT** page press CLIMB Lsk
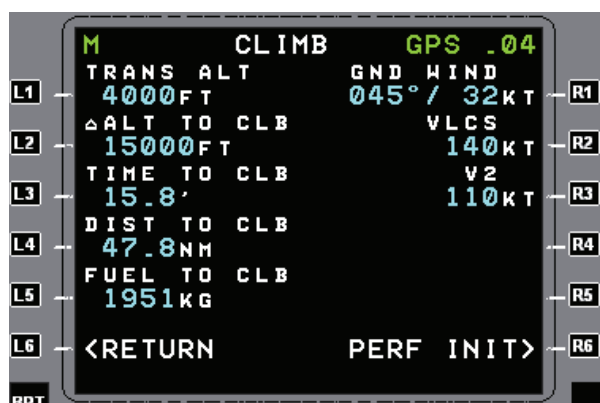
2) Enter the ground wind origin and speed (**GND WIND).**

3) Enter the transition altitude (**TRANS ALT)** of the departure.

NOTE : If the transition altitude at the departure airport is valid, the **TRANS ALT** is displayed in small font. To enter one value or to overwrite it, Enter a new transition altitude. A **CLEAR** action enables to return to the default value. When the **TRANS ALT** has been inserted, it is displayed in large font.

4) Enter the ΔALT TO CLIMB (Δ**ALT TO CLIMB**).

5) Enter the TIME TO CLIMB (**TIME TO CLIMB**).

6) Enter the DISTANCE TO CLIMB (**DISTANCE TO CLIMB**).

7) Enter the fuel to Climb (**FUEL TO CLIMB)**.

8) Enter the Climb speed (**VLCS**).

9) Enter the Take-Off safety speed (**V2**).

NOTE : The prompt <RETURN beside the **L6** Lsk is present if the climb page has been selected from the PERF INIT page. It allows to return to this page.

parameter	range	default value
ΔAlt to climb	>0	invalid (dashes)
Time to climb	>0	invalid (dashes)
Distance to climb	>0	invalid (dashes)
Fuel to climb	≥0	invalid (dashes)
Climb speed (VLCS)	[VMIN;VMAX]	Memorized value (*) or invalid (dashes)
Take-off safety speed (V2)	[VMIN;VMAX]	invalid (dashes)

 (*) Before insertion, VCLS is filled with the memorized values at power off. When no memorized value is available, VCLS is invalid.

PERFDATA PERF MODE

The displayed page is the "**TAKE OFF**" page.

1) Press **PERF** key

P3 aircraft
NORMAL T/O type

P3 aircraft
M.DISTANCE T/O type

Others aircrafts

2) Select the TAKE-OFF type (**T/O TYPE**) by circular permutation between
    For P3 : NORMAL and M. DISTANCE
    For C295 : NORMAL MIL F10, SHT FIELD F10 and SHT FIELD F15
3) Enter the static temperature (**GND SAT)** at ground level.
4) Enter the runway characteristics: length and axis (**RWY LNG/AXIS)**
5) Enter the wind parameters (**GND WIND)** at ground level.
P3 aircraft:
6) Enter the runway slope (**SLOPE)**,

7) Enter the Runway Condition Reading (**RCR),**

Others aircrafts:

8) Enter the runway slope and the runway margin used for the computation of the short fields takeoff parameters (**SLOPE/MARGIN),**

9) Select the runway surface type (**SURFACE**) by circular permutation,

10) Enter the Runway Condition Reading and the Rolling Friction Index (**RCR/RFI).**

4 LOGISTICAL OPERATION

4.1 Standard data

4.1.1 Standard data consultation

1) Press **DATA** key.
2) Press **DATABASE** Lsk.

```
  M      DATABASE      GPS .04
         STANDARD        PILOT
L1 <AIRPORT          AIRPORT>  R1

L2 <NAVAID            NAVAID>  R2

L3 <WAYPOINT        WAYPOINT>  R3

L4 <NDB                ROUTE>  R4
                     TACTICAL
L5 <WARN ZONE        ROUTE 1>  R5
   - - - - - - - - - - - - - -
L6 <RETURN                     R6

BRT
```
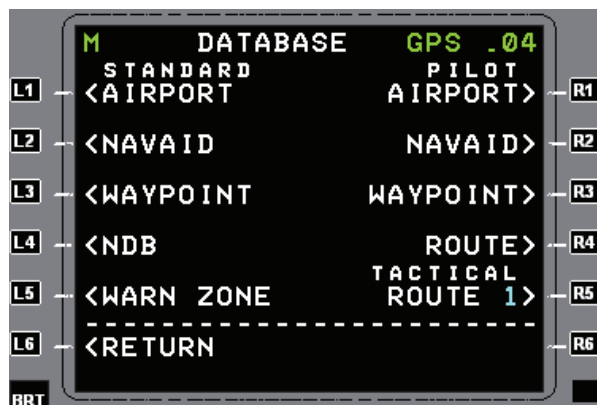
3) Press on **AIRPORT / NAVAID / WAYPOINT / NDB** Lsk.

4) On the **STANDARD AIRPORT / NAVAID / WAYPOINT / NDB page**, enter the identifier of the data on the **IDENT** Lsk.

NOTE : - For navaids, waypoints and NDB, if the identifier corresponds to several standard data, the **DUPLICATE** page is displayed to choose the desired data.

4.1.2 Standard airport page

```
  M        STD APT       BCP .04
  IDENT
  LFLL    LF
  LAT/LONG
  N45°43.62/E005°04.92
  ELEVATION            MAG VAR
     250M              W002.0°
  MAX RWY
   3993M
  NAME
  SATOLAS
  - - - - - - - - - - - - - - -
  <RETURN

BRT
```
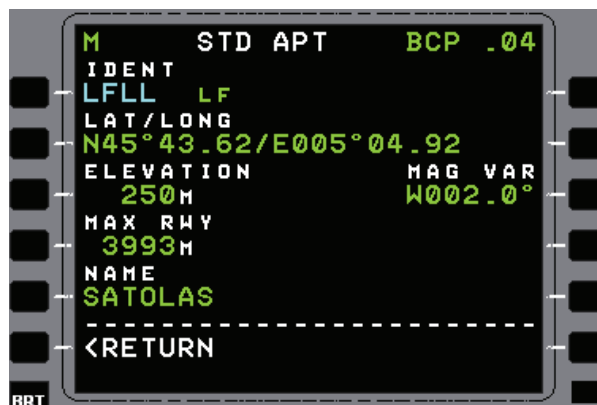
When the **IDENT** field is filled, the features of the airport are displayed :
- country code.
- **LAT/LONG**. position
- **ELEVATION**.
- **MAG VAR**, Magnetic Variation.
- **MAX RWY**, Maximum Runway length.
- **NAME** (limited to 15 characters).

When **IDENT** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with standard airports filter.

4.1.3 *Standard navaid page*
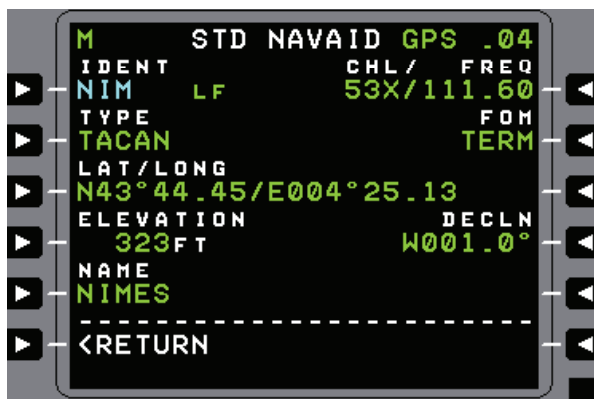
When the **IDENT** field is filled, the features of the navaid are displayed :
- country code.
- **CHL/FREQ**, channel/frequency.
- **TYPE**: VOR, VORDME, VORTAC, DME, ILS, ILSDME, ILSTAC, LOC, LOCDME, TACAN.
- **FOM**, figure of merit: TERM (Terminal), LOW (Low Altitude), HIGH (High Altitude), EXT (Extended range).
- **ELEVATION** : Standard navaid elevation.
- **LAT/LONG**. :station position
- **DECLN**, Station declinaison (antenna update).
- **NAME** (limited to 15 characters).

```
M        STD NAVAID GPS .04
IDENT                    FREQ
TBN      LF            109.30
TYPE
ILS
LAT/LONG
N43°37.18/E001°22.20
ELEVATION
  532FT
RUNWAY
LFB033R
---------------------------------
<RETURN
```
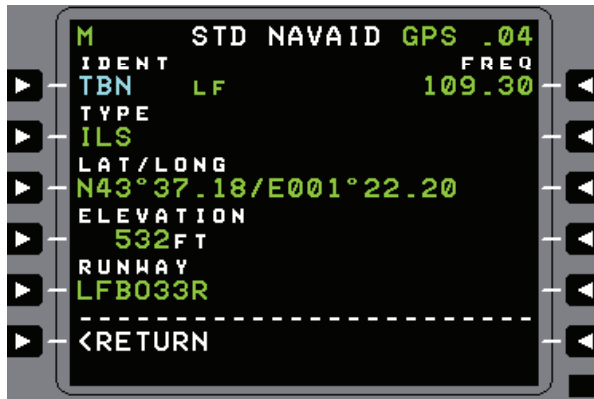
CAUTION :   For ILS or LOC navaids, **CHL**, **FOM**, **DECLN** are not displayed. And **NAME** is replaced by the airport **RUNWAY** associated to this navaid.

For VORDME/VORTAC not collocated, "**(VOR)**" is displayed next **LAT/LONG,** and "**(DME/TAC)**" next **ELEVATION**.

For **ILSDME**, **ILSTAC** and **LOCDME**, only the DME or TACAN features are displayed.

When **IDENT** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with standard navaids filter.

4.1.4 _Standard waypoint page_

```
1234567890123456789 01234
M        STD WPT     BCP .04
IDENT           TYPE    APT
BARAT  LF       TWPT    LFML
LAT/LONG
N43°03.19/E005°04.16



---------------------------------
<RETURN
1234567890123456789 01234
```
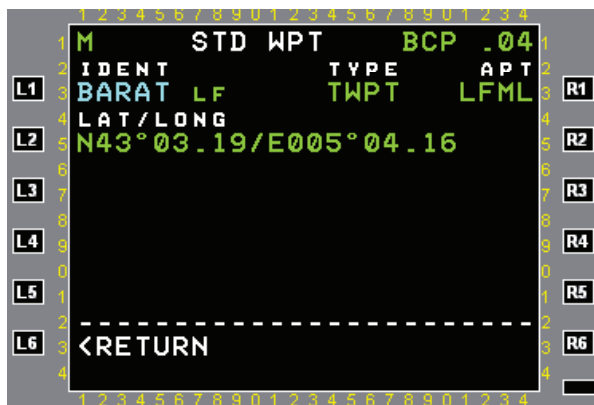
When the **IDENT** field is filled, the features are displayed :
- country code.
- **TYPE :**
  - **WPT**, enroute waypoint.
  - **TWPT**, terminal waypoint.
- **APT**, the associated airport is displayed, in case of **TWPT**.
- **LAT/LONG**.: waypoint position

When **IDENT** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with standard waypoints filter.

4.1.5 *Standard NDB navaid page*
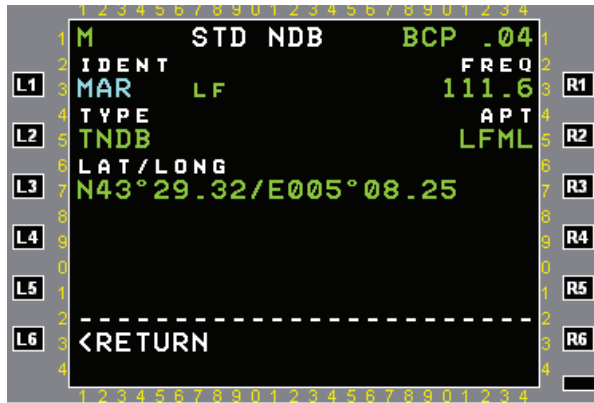
When the **IDENT** field is filled, the features are displayed :
- country code.
- **FREQ. :** frequency of the NDB
- **TYPE :**
  - **NDB**, enroute NDB.
  - **TNDB**, terminal NDB.
- **APT**, the associated airport is displayed, in case of **TNDB**.
- **LAT/LONG**. : position of the NDB

When **IDENT** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with standard NDB filter.

4.2 Pilot data

The pilot data are divided in 4 types of data: **AIRPORT**, **NAVAID**, **WAYPOINT,**
ROUTE. Each type contains up to 100 elements.
The pilot data can be consulted, modified, created or erased.

4.2.1 *Creation, modification, deletion, rename of pilot point*

1) Press **DATA** key.
2) Press **DATABASE** Lsk.
3) Press on **AIRPORT/ NAVAID/WAYPOINT** Lsk. Then the **PILOT DATA** page
   corresponding to the chosen type is displayed with the list of the data identifier
   and the number of free place.

```
 M      PILOT DATA GPS .20
-----AIRPORTS  1/ 6-----
<LSDP            PCAS>
<MATE            PDAT>
<MSTR            PFGR>
<NATL            RAMT>
<PARI            SUDO>
--------------- 45 FREE-
<RETURN          NEW>
```
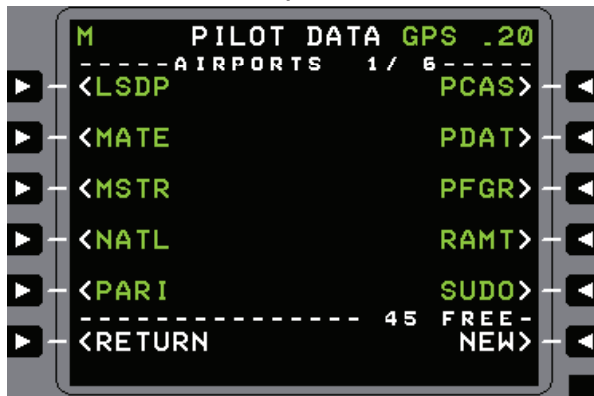
4) To consult modify or rename a data, on **PILOT DATA** page, press on the Lsk
   near the desired identifier. The corresponding **PLT APT/NAVAID/WPT** page is
   displayed, and its content can be modified.

NOTE : - If the data is used in the flight plan, the modification or deletion is
   impossible. The symbol USED appears in reverse video in the associated
   page (respectively PLT APR /PLT NAVAID / PLT WPT WPT –see examples
   below)
   - If the data is used in a route, its deletion is impossible. The symbol USED
   appears in the associated page (respectively PLT APR /PLT NAVAID / PLT
   WPT)

5) On **PLT APT/NAVAID/WPT** page, press action on **PREV/NEXT** Lsk enables
   to access to the previous/next data.
6) To create a new data either, on **PILOT DATA** page press **NEW** Lsk, or on
   PLT APT/ NAVAID/WPT page insert a new identifier. Then fill the content of
   the corresponding pilot page.
7) To delete a data, on the **PILOT DATA** or **PLT APT/NAVAID/WPT** page,
   perform a CLEAR action on the identifier, and press **EXEC** to confirm

8) To rename a data, on the **PLT APT/WPT/NAVAID** page, enter the new name preceded by "-" in the IDENT field

NOTE : - It is forbidden to create two data with the same type, and the same identifier, in this case, the message "IDENT ALREADY USED" appears on the scratchpad.
After modifications, in order to recover the same pilot data after a power off, the alarm DTA is triggered to perform a save of data.

4.2.2 *Pilot airport page*

This page contents :
- **IDENT**, airport identifier.
- **USED**, in reverse video if the airport is used in the flight plan, in normal video if used in a pilot route, not displayed otherwise.
- **LAT/LONG**.
- **ELEVATION**.
- **MAG VAR**, magnetic variation.
- **MAX RWY**, Maximum Runway. length.
- **NAME** (limited to 15 characters).

4.2.3 *Pilot navaid page*
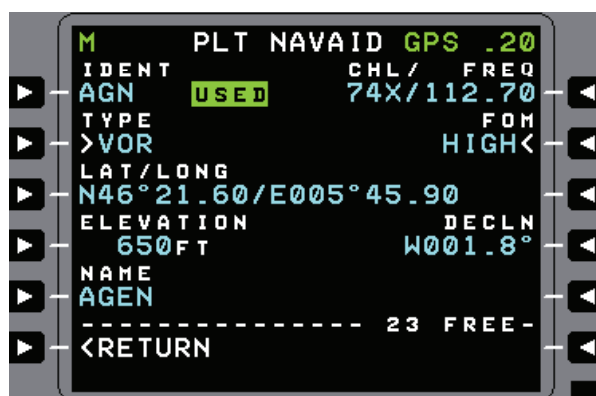
This page contents :
- **IDENT**, navaid identifier.
- **USED**, in reverse video if the navaid is used in the flight plan, in normal video if used in a pilot route, not displayed otherwise.
- **CHL/FREQ**, channel/frequency.
- **TYPE**, VOR, TAC, DME, VORTAC, VORDME.
- **FOM**, figure of merit: TERM (Terminal), LOW (Low Altitude), HIGH (High Altitude), EXT (Extended range).
- **LAT/LONG**, station coordinates,
- **ELEVATION**, station altitude
- **DECLN**, Station declinaison (antenna update).
- **NAME** (limited to 15 characters).

When creating or modifying the pilot navaid, the content of **TYPE** and **FOM** can be changed by pressing successively Lsk near their field, until to obtain the desired parameter.

NOTE : - Either the channel or the frequency has to be entered. The channel insertion is a three digits followed by X or Y (e.g. 074Y).

4.2.4 *Pilot waypoint page*
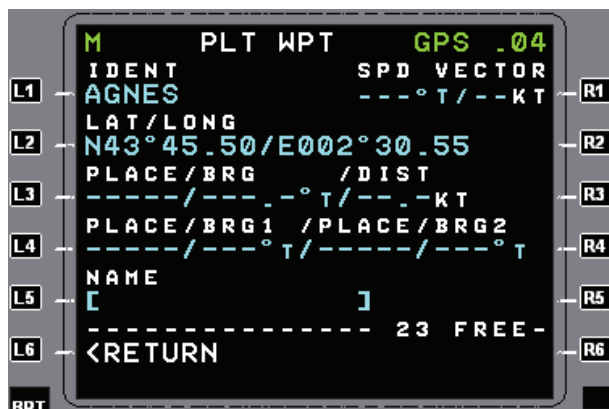
This page contents :
- **IDENT**, navaid identifier.
- **USED**, in reverse video if the waypoint is used in the flight plan, in normal video if used in a pilot route, not displayed otherwise.
- **SPD VECTOR :** track and speed of the waypoint (if non null values are inserted, the waypoint becomes a moving waypoint).
- **LAT/LONG**.
- **NAME** (limited to 15 characters).

When creating or modifying the pilot waypoint :
  its coordinates can be defined by:
- a latitude, longitude, enter value on **LAT/LONG** Lsk (case of geographic coordinates)

- a position relative to a database fix, enter identifier fix, bearing, distance from this fix on **PLACE / BRG / DIST** Lsk.
- a position relative to 2 database fixes, enter identifier, bearing from the first fix, and identifier, bearing from the second fix on **PLACE / BRG1 / PLACE / BRG2** Lsk.

The speed vector
- can be inserted : → the fix waypoint becomes a moving waypoint,
- can be cleared by performing a CLEAR action on the SPD VECTOR , → the moving waypoint becomes a fix waypoint
- can be modified.

NOTE : - Fixes used to build the pilot waypoint are Standard or Pilot data.
          When position is computed, the **PLACE/BRG/DIST** or the **PLACE/ BRG1/PLACE/BRG2** are not memorized.
          - Bearing inputs must be performed in TRUE reference (**T** display).
          "A moving waypoint can only be created by : .DATABASE/PILOT WPT or .DIRECT TO/NEW DATA/PILOT WPT.
          Otherwise, the message **NOT ALLOWED** is displayed while creating the moving waypoint"

4.2.5 *Route list review, deletion , rename of a route*

1) Press **DATA** key.

2) Press **DATABASE** Lsk.

3) Press **ROUTE** Lsk. Then the **PILOT DATA ROUTE** page is displayed with the list of the route identifier and their optional departure and arrival airports.


```
M       PILOT DATA BCP .04
-------ROUTE   1/ 1-------

   LFBO/LFLL      LFPO/LFMN
  <LFBOLFLL01           R1A>
   LFBO/LFLL
  <LFBOLFLL02            1A>
   LFBO/LFPO
  <LFBOLFPO             21>

  <ROIS
---------------  93 FREE-
  <RETURN              NEW>
```
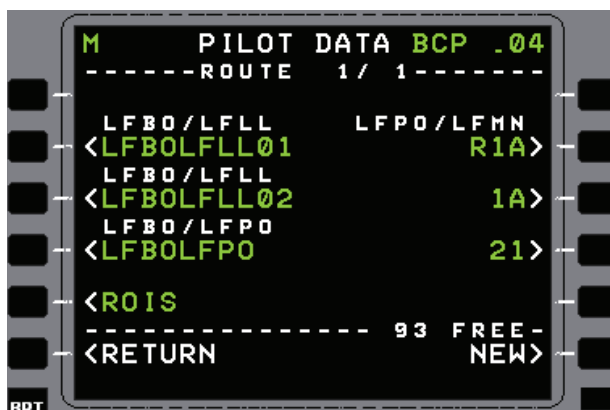
NOTE : - If a route contains fixes which are no more in the Standard Data base, the route identifier is displayed in amber.

4) Press **PREV** / **NEXT** key to access to the previous/next route

5) To erase a route , press **CLR** key , press the Lsk beside the desired route
   identifier, and press **EXEC** key to confirm this deletion.

6) To rename a route, enter the new name preceded by "-" in the IDENT field

NOTE : - After erasing, in order to recover the same pilot data after a power off,
          the alarm DTA is triggered to perform a save of data.

4.2.6 *Review and modification of a pilot route*

1) On **PILOT DATA ROUTE** page, press Lsk beside the desired route identifier.
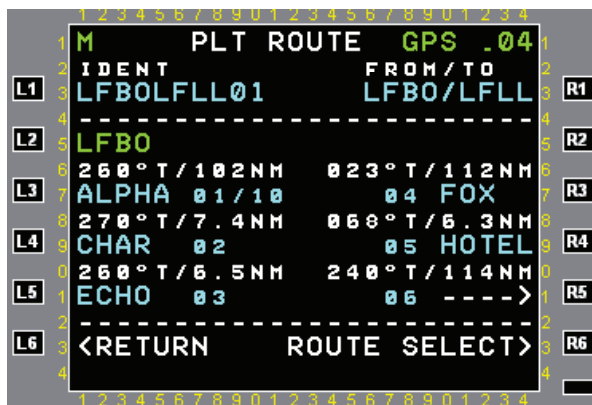
2) The **PLT ROUTE** page is displayed, this page contents :

   • **IDENT**, route identifier.
   • **FROM/TO**, the optional arrival and departure airports.
   • List of elements of the route (with **FROM** and **TO** airports) with
   bearing/distance between elements.

NOTE : - Each route contains up to 40 waypoints.
       - There is no hole, discontinuity on a route.
       - If a route contains fixes which are not in the Standard Data Base,
         the route identifier and the concerned fixes are displayed in amber.

3) If "**<- - - - -**" or "**- - - - - >**" is displayed, a press on this Lsk enables to scroll
   down or up the fix list of the route.
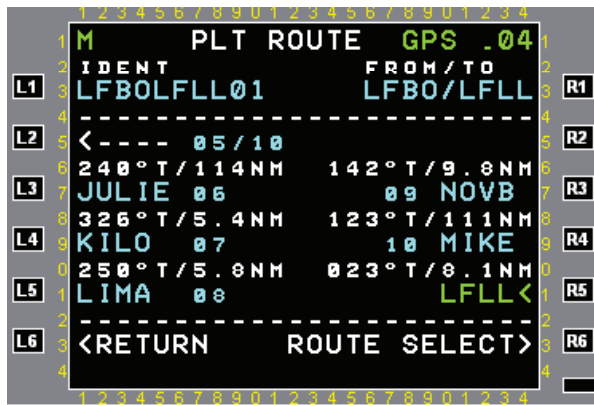
NOTE : - Press action on **PREV** / **NEXT** Lsk enables to access to the previous/next route.

4) To delete a fix of the route, perform a CLEAR action on the desired fix, except departure or arrival airport displayed in route list. The following fixes go back up.

5) To add a fix, enter its identifier on a fix Lsk or beside cyan or green prompt, except beside the departure airport (if exists) displayed in route list. Then the fix is positionned near the pressed Lsk and the following fixes are shifted down to the list. When a fix Lsk, or beside cyan or green prompt, except beside the departure airport (if exists) displayed in route list, is pressed with empty scratchpad, the **DATA LIST** page is displayed with filter "ALL".

NOTE : - When inserting fix, if several data with the same identifier are found, the **DUPLICATE** page is displayed to choose the desired data, if the fix is not in the standard or the pilot database the **NEW DATA** page is displayed.
- After modifications, in order to recover the same pilot route after a power off, the alarm DTA is triggered to perform a save of data.

6) To display or to select this route, press the ROUTE SELECT Lsk.

4.2.7 *Pilot route creation*

1) Press successively **DATA** key, **DATABASE** Lsk and **ROUTE** Lsk to display the **PILOT ROUTE** page.

2) Press **NEW** Lsk.
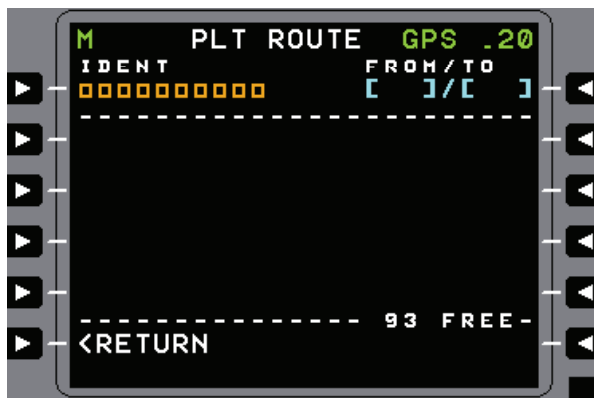
3) Enter the route identifier on **IDENT** Lsk.

NOTE : - The insertion of the departure and arrival airport of the Standard or Pilot database is optional.

4) Insert fixes as described in the previous paragraph.

5) Perform a data save: press twice on **RETURN** prompt to return to the **DATA** page and press on **SAVE** prompt.

NOTE : - When FROM/TO Lsk is pressed with empty scratchpad, the DATA LIST page is displayed with standard and pilot airports filter in order to search the FROM airport.

NOTE : - When FROM/TO Lsk is pressed with only a slash character ('/') in scratchpad, the DATA LIST page is displayed with standard and pilot airports filter in order to search the TO airport.

Example of pilot route construction:
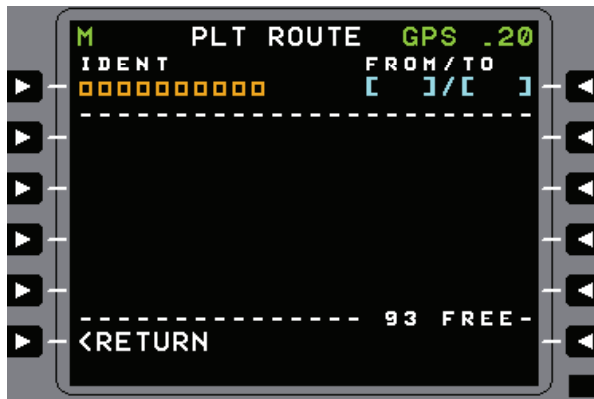
Insertion of "ROUTE1" in the IDENT field on Lsk L1
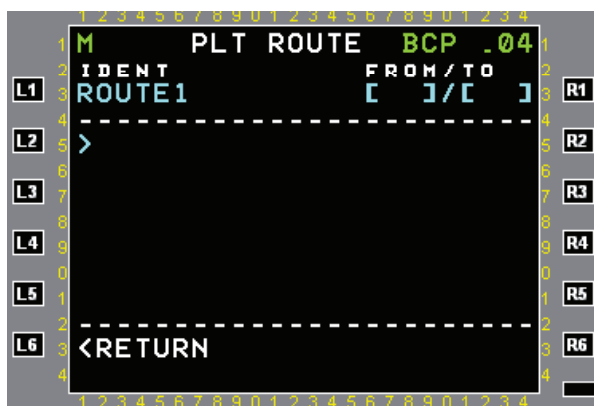
Insertion of "BECHU" on Lsk L2
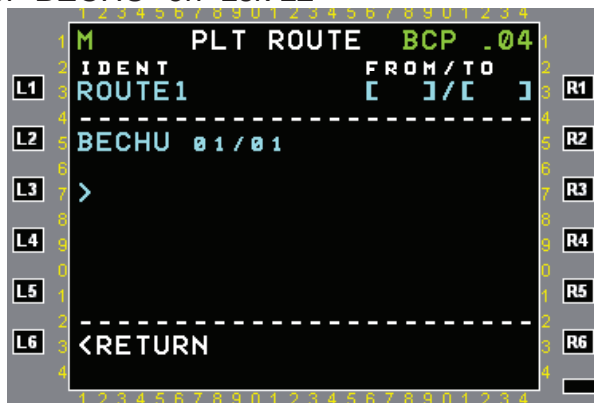
Insertion of "FILOU" on Lsk **L2** (the route is stored in database)
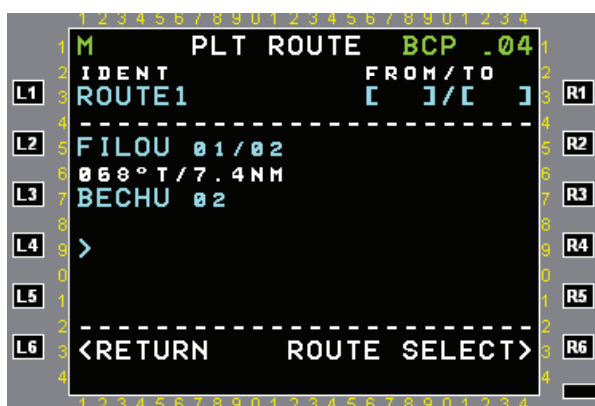
Insertion of "LFBO/LFLL" on Lsk R1
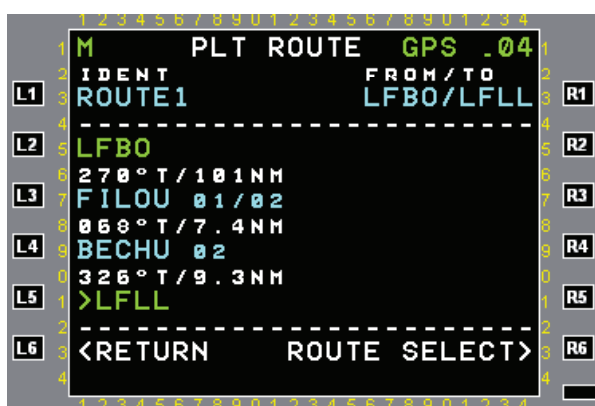
NOTE : After the route creation, in order to recover the same pilot route after a power off, the alarm DTA is triggered to perform a save of data.

CAUTION : all created or modified Pilot Routes shall be checked carefully by the pilot directly on MCDU before use.

4.3 Duplicate page

```
M      MTL    1/ 2 GPS .04
< N45/E005  LF  TWPT
                  VORDME
< N45/E005  LF  NAV  114.65
< N46/E010      APT
                  ILSTAC
< N23/E050  LS  NAV  109.40
                  LOC
< N23/E050  LS  ILS  109.40
-----------------------
< RETURN
```
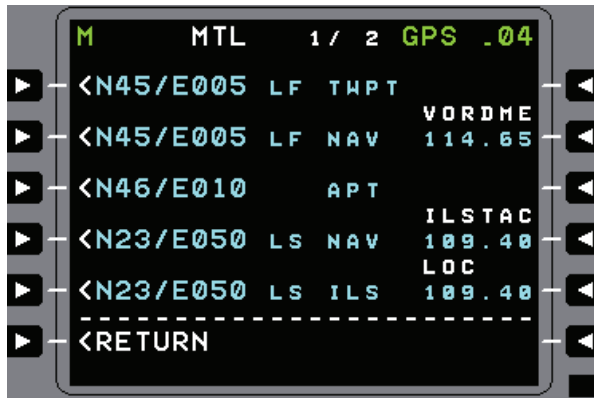
This page is displayed when several data with the same identifier are found.

1) This page contents up to 20 fixes sorted out by growing distance with the following information :

- Abbreviation of their horizontal position, the first three characters of the latitude and the first four characters of the longitude.
- Country code.
- Fix type :
    - **WPT**, Waypoint.
    - **TWPT**, Terminal waypoint.
    - **APT**, Airport.
    - **NAV**, VHF Navaid.
    - **NDB**, Enroute NDB Navaid.
    - **TNDB**, Terminal NDB Navaid.
    - **ILS**, Loc and Glide.
- The frequency of VHF navaids and ILS.

2) If necessary, press **NEXT** key to access to other fixes.

3) Press Lsk beside the desired data.

NOTE : If the coordinate mode is UTM or MGRS, the abbreviation of the horizontal position is always in GEO coordinates.

4.4 New data page
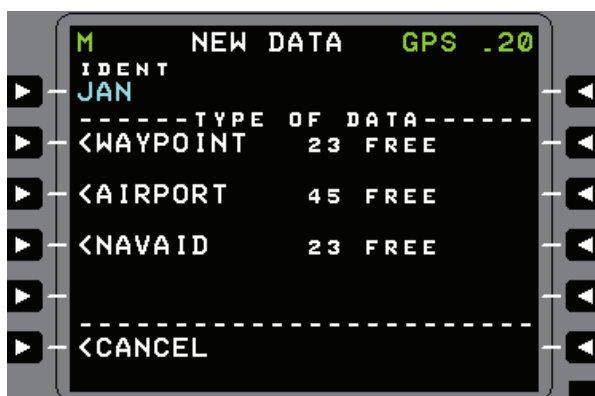
When inserting a fix identifier which does not belong to the standard or pilot database, the **NEW DATA** page is displayed, with the type of pilot data and their free place.

Press Lsk beside the desired type of data to create.

NOTE : This page is displayed only if the inserted identifier is compliant with several fix types. The FMS assumes that a waypoint identifier is maximum 5 characters long, a navaid or an airport is maximum 4 characters long. Therefore, if a five characters ident is entered and if this point does not correspond to any data in the databases, the FMS automatically access the PLT WPT page in order to allow the crew to create this point.

4.5 Logistical flight plan

4.5.1 *Route management principles*

Flight Plan

A flight plan is a succession of waypoints connected by legs. The flight planning function allows the pilot to create, revise and activate a flight plan.
The crew may create a flight plan by entry of idents, referring to points defined in the Data Base, with selection among duplicates if necessary.

It has the possibility to use pre-stored departure procedures, waypoints, navaids, and arrival procedures, but also to create pilot data (waypoints, navaids, airports and routes)

Three different flight plans exist:
- The active flight plan : this flight plan is the currently flown flight plan,
  The active flight plan contains up to 100 waypoints, including : departure and arrival airports, departure and arrival procedures, approaches, routes . On departure or arrival procedure insertion or on revision of a flight plan, a copy of the active flight plan is built, called temporary flight plan.
- The temporary flight plan : this flight plan is used to check flight plan modifications before activation.
  Any revision of a flight plan creates a temporary and multi-revisions are allowed on this temporary before its activation.
- The secondary Flight Plan : the flight plan is used to
  - save the current flight for an eventual re-engagement,
  - prepare an alternate flight plan
  - prepare a return flight plan or a following to the current flight plan (and so to double the capability of the flight plan)

The following colors are retained on the displayed pages :
- green for active flight plan,
- yellow for temporary flight plan,
- white for secondary flight plan

Flight Plan using FITS mission system equipment
If "FITS authority" discrete is set to enable, the master FMC can receive a flight plan, limited to 50 legs, from mission system. The active flight plan can also be cancelled by the mission system equipment. In both cases, the management depends on the "FITS AUTO/MAN" discrete status:

- If the "FITS AUTO/MAN" discrete is set to manual and no temporary flight plan exists, the **TMPY** page is automatically displayed with the revised flight plan. Moreover, the message NEW FPLN UPDATING is displayed in the scratchpad and the FPL alert is raised.
- If the "FITS AUTO/MAN" discrete is set to automatic, the revised flight plan is transferred in the active flight plan.
  The **FPLN** page is not automatically displayed.

Active Flight Plan

The aircraft is guided by the active flight plan - or offset path if offset applies - , even when a temporary exists or a secondary flight plan is initialized.
Once a temporary flight plan is created and until its activation or deletion, any flight plan revision is performed on the temporary flight plan and the active flight plan is not modified by crew revisions.

NOTE : For temporary Flight , the FPLN page becomes TMPY page and associated data are displayed in yellow

The maximum flight plan size is computed using as a basis 100 legs per flight plan (the active and the temporary flight plans).

If any flight plan revision cannot be completed due to limit in the number of legs, the attempted revision is aborted with a **"FPLN FULL"** message .

Temporary Flight Plan

When a revision is performed on the active flight plan and if no temporary flight plan exists, then a temporary flight plan is created as a copy of the active flight plan by taking into account this first revision. A temporary is created upon following actions :
- departure or arrival procedures insertion or modification,
- new destination selection,
- waypoint insertion : next waypoint function or direct insertion,
- direct to,
- holding pattern insertion or modification,
- leg or discontinuity (except after XM legs) deletion,
- discontinuity insertion,
- offset insertion or modification,
- overfly status modification,
- vertical revision : step altitude, altitude constraint, speed constraint insertion, deletion or modification or step mode modification,
- Required Time of Arrival (RTA) insertion.
- Reception of a FITS FPLN with "FITS AUTO/MAN" discrete set to manual
- Mission area insertion

If no temporary exists, the following revisions are performed directly in the active flight plan (and no temporary flight plan is created):

- Discontinuity after XM legs deletion
- Mission activation
- Reception of a FITS FPLN with "FITS AUTO/MAN" discrete set to automatic

When the active flight plan is sequenced, the temporary flight plan is automatically sequenced if the first leg of the temporary flight plan (which corresponds to an active leg) matches the active leg being sequenced.
The temporary flight plan is no longer sequenced when the first leg of the temporary no longer matches the active leg.

When a temporary exists, the crew is able to active it. In such a case, the active flight plan is replaced with the temporary flight plan and then the temporary flight plan is deleted. The temporary flight plan doesn't exist any more until a new temporary flight plan creation.
If the FROM of the temporary flight plan is a T/P and aircraft parameters (position, track, GS, TAS) are not all valid, then the command is rejected with a "NOT ALLOWED" message.
If previous navigation mode was TAC or SAR, it becomes IFR only at the activation of the temporary flight plan to allow IFR temporary flight planning during TAC or SAR navigation.
When a temporary exists, it can be canceled in the following cases :
- the crew cancels the temporary flight plan manually
- the crew cancels the active flight plan manually
- a flight plan initialisation is performed directly in the active flight plan
- IFR navigation mode is left for SAR navigation modes
- an upload or zeroize database is performed
- In such cases, the temporary flight plan is deleted and is not activated. The temporary flight plan doesn't exist any more until a new temporary flight plan creation.

Secondary Flight Plan

The default secondary FPLN is a flight plan composed with : PPOS / discontinuity / end of flight plan.

The secondary flight plan can have the two different modes :
- linked with the active flight plan : if the secondary flight plan is initialized as a copy of the active flight plan. In this case, the secondary flight plan is common with the active flight until the alternate point where the two flight plan diverge.
- Not linked : after a long power-off, if it is initialized from route, when the secondary flight plan has been canceled.

The following actions can be done on the secondary flight plan :
- copy of the active flight plan,
- swap with the active flight plan,
- activation,

- cancellation,
- initialization : FROM/TO, pilot route;
- lateral and vertical revisions,

All theses actions are done directly on the secondary flight plan..
Holding Pattern at PPOS, DIRECT-TO (including Rally nav), OFFSET (all revisions
at PPOS) are copy from the active flight plan in the secondary but they can't be
manually modified or inserted.

The secondary flight plan is saved by the data Save action in the **DATA MENU** page
(refer to saving data subparagraph).

The secondary flight plan page can be reach from the logistical flight plan by pressing
the FPLN< Lsk.

When the secondary is linked, for the common parts (before the alternate waypoint),
the revisions of the active flight plan are reported on the secondary flight plan.
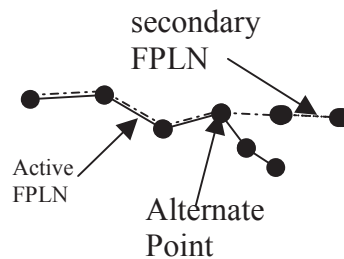
4.5.2 *Logistical flight plan initialisation*
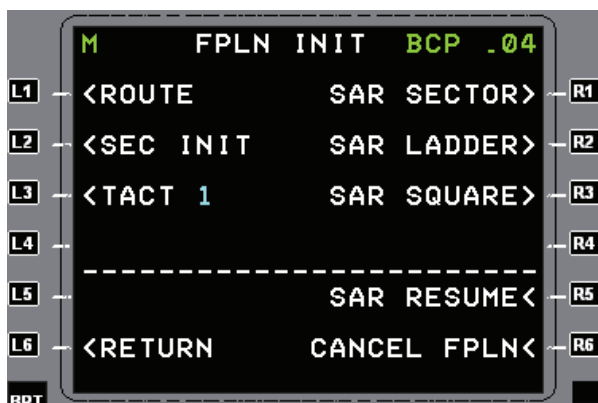
1) Two possible access to the flight plan initialization page:

- On **INIT** page, press **FPLN INIT** Lsk.
- On **LTRL REV** page, on active Page, press **NEW FPLN** Lsk.

2) Press **SEC INIT** Lsk to access to the secondary flight initialisation (see specific
   paragraph).

3) Press **ROUTE** Lsk.
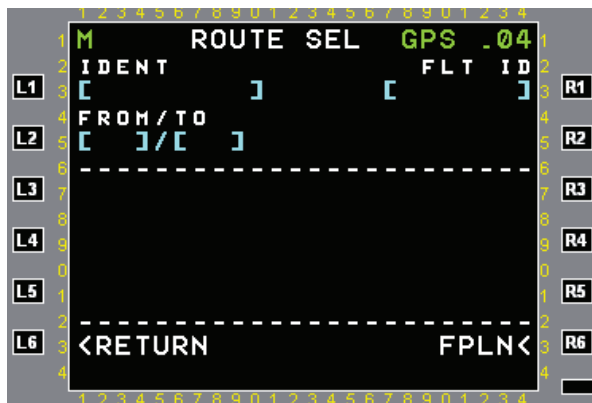
4) Three cases to select the route :

- Write the route identifier into the scratchpad and press Lsk beside the **IDENT** field.
- Enter, on the **FROM**/**TO** Lsk, the departure/arrival airport ICAO identifier of the route. If several routes with this FROM/TO are found in the database, on the first line, the field **XX/YY** appears with **YY**, the total number of route found. press **NEXT** / **PREV** key to display the next/previous route.

5) To reverse the selected route, press REVERSE Lsk. The route waypoints are displayed in reverse order, and departure / arrival airport are swapped.

If the selected route is reversed compared to the one stored in the pilot database, the " **REVERSED** " flag is displayed in reverse video.

NOTE : - If the airport identification corresponds to several airports, the duplicate page is then displayed to select the desired data.

-If no route is found with the corresponding **FROM/TO**, no fix appears, the flight is activated including only the departure and arrival airport.

6) Enter on **FLT ID** Lsk, the flight number, up to 8 alphanumeric characters.

NOTE : - When FLID is associated to the active flight plan i.e. initialised with the flight plan on ROUTE SEL page no more modification is possible neither on FMS nor on RMS (IFF dedicated page). But when FPLN is cancelled or when a new FPLN is initialized with no associated FLID, modification of FLID is possible on RMS IFF dedicated page.

     - When FLID is not associated to the active FPLN (not displayed on FPLN pages), RMS MCDU interface allows the crew to manage the FLID

7) Press **EXEC** key to activate the displayed route. Then the **FPLN** page appears.

NOTE : If the route contains waypoints no longer belonging to the current Standard Data Base, they are replaced by a discontinuity.

8) To initialise the temporary flight plan with this displayed route and to access to the first '**FLPN**' page , press TMPY prompt and press **EXEC** key.

4.5.3 *Logistical flight plan page*

The logistical flight plan page displays all legs of the active flight plan, with information on constraints, course, heading and distance between each waypoint and predictions about ETA and EFOB. It also allows access to lateral and vertical revisions.

The purpose of this description is not to give details about each type of leg and its representation : the following only deals with general aspects of the page and more common encountered situations.

OVERVIEW

The top of the page contains :
• the flight number, if defined.
• depending on the selection :
 - **ETA** (Estimated Time of Arrival at the corresponding fix) followed by the time reference,
   see **INIT** page for local or zulu time setting.
 - **SPD/ALT** (Speed / altitude)
• or
 - **ETE** (Estimated Time En route = remaining flight time until the corresponding fix),
 - **EFOB** (Estimated Fuel On Board)

The **FPLN** page is then a succession of a header line containing PROCEDURE, PATH, DIST and FPA fields and a data line composed by TERM, ETA, ETE, SPD, ALT and EFOB fields.

NOTE : - Press NEXT / PREV key to scroll up/down the waypoints of the flight plan.

'**IFR FLPN** with ETA / SPD / ALT' page :

'**IFR FLPN** with ETE / EFOB' page :

INDICATORS

- **OFST** : indicates that an offset applies on the active leg.
- Δ : this symbol appears when the status of the overfly is YES on this waypoint or when the waypoint is a rally waypoint (1) (an overfly is set on a ralliement waypoint)
- * : this symbol appears when the designated waypoint is a moving or a ralliement waypoint(1).
- ← or → : those arrows specify the turn onto the next leg.
- 12H03: ETA (resp. ETE) is underlined when a RTA is defined for this waypoint. If ETA (resp. ETE) is displayed in amber, RTA is missed.

Note (1): Refer to the NAV RALLY section for further information.

PROCEDURE FIELD

The procedure field may contain different indications :
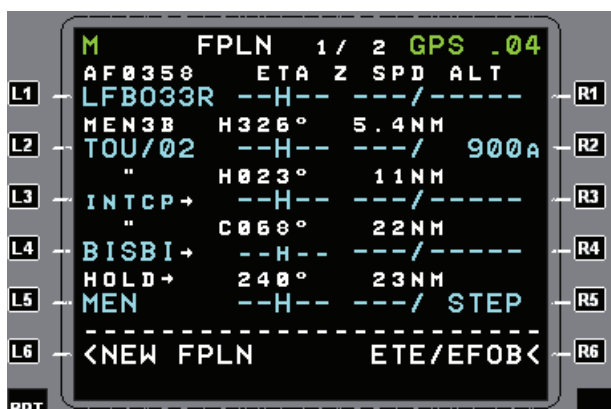
"**HOLD ←**" or "**HOLD →**" indicates a holding pattern with a left or right turn direction.
- "**TURN ←**" or "**TURN →**" indicates a procedure turn with a left or right turn direction.
- if the leg is part of a departure or an arrival procedure, the procedure field displays the procedure name except if there is yet one of the two preceding indicators (**HOLD** or **TURN**). A ditto character is displayed in place of the name procedure if the previous leg belongs to the same name procedure.

PATH FIELD

- XXX° : course from the starting waypoint to the ter minating waypoint of the leg, measured at the starting waypoint
- CXXX° : indicates that the A/C follows a constant c ourse (track angle) towards the leg termination.
- HXXX° : indicates that the A/C follows a constant h eading towards the leg termination.

NOTE : - If the north reference is set to Magnetic and no relevant magnetic variation reference for the leg is found then data is displayed in True reference followed by "T".

- For the active leg (between FROM and TO waypoints) and if the format is "XXX°", the path field contains the bearing to go.

DIST FIELD

For the active leg, DIST field displays the active distance to the TO waypoint, i.e. the distance between A/C and the TO waypoint along the trajectory.
For other legs, DIST field contains distance from leg transition to leg transition (distance between bissectors for straight legs).

NOTE : In ground phase, no transition is calculated : DIST field displays the leg length without taking transitions into account .

TERM FIELD

- XXXXXXX : indicates the waypoint name where the leg terminates (it is the most common case).
- INTCP : indicates that the leg term is defined as an interception to the next leg.
- HHHHH : represents an altitude leg termination.
- MANUAL : used for a manual leg termination (except for a holding pattern inserted by the crew).

ETA/SPD/ALT and ETE/EFOB FIELDS

These information cannot be displayed at the same time : to commute, press on the Lsk beside **ETA/SPD/ALT** or **ETE/EFOB** prompt at the bottom of the page.

At the FROM waypoint, all displayed values are the ones at the sequencement time of the leg.

For other remaining waypoints :

- **EFOB** value is the fuel prediction over the leg termination (EFOB displayed in amber if EFOB at waypoint is lower than the fuel reserve)
- **SPD/ALT** values represent the speed and altitude constraints on the leg. They can be modified by accessing to the **VERT REV** page.

NOTE : - "**WINDOW**" indicates a window altitude constraint.

NOTE : - The ALT constraint value is displayed :
in amber if it is a missed constraint,
in green otherwise.

4.6 Logistical progress 1/3 page

ACCESS : `PROG` key.

```
M       PROG 1/3    GPS .04
AF0358     ETA Z SPD ALT
LFB033R  --H-- ---/----
MEN3B   H326°   5.4NM  OFST
TOU/02   --H-- ---/  900A
   "     H023°    11NM
INTCP    --H-- ---/----
- - - - - - - - - - - - - - - - -
<VNAV   ↓11000           NRP
     10H40/ 60NM      10H55

DEST     ETA   DIST   EFOB
LFLL    11H04   168    678
```

1) This page displays the beginning of the active flight plan (FROM, TO and NEXT waypoints), the next vertical pseudo-waypoint information and the DEST predictions :

   - FPLN field : those lines are similar to the **FPLN** page ones with **SPD/ALT** option.
   - pseudo-waypoint : this field contains information relative to the next vertical pseudo-waypoint :
     - **TOD** for Top Of Descent or ↓**AAAAA** or ↑**AAAAA** for an altitude interception.
     - estimated time of arrival and distance from A/C position to next vertical pseudo- waypoint.
   - **NRP** : estimated time of arrival at the Non Return Point.
   - **DEST** : identifier of the destination : airport or ENDFPLN if no airport selected as destination.
   - **ETA** : estimated time of arrival at destination.
   - **DIST** : distance between A/C and destination.
   - **EFOB** : estimated fuel on board at destination.

NOTE : The **PROG 2/3** and **3/3** pages are described in GENERAL PROCEDURE section.

2) Press **VNAV** Lsk to access to the **VNAV** page.
   For more details, see the Vertical Navigation paragraph

4.7 Departure procedure

A Departure procedure is composed of 3 elements : a Runway (RWY), a Standard Instrument Departure (SID) and an En Route Transition (TRANS). The figure below illustrates, when procedures overlap, the stringing rules to build the active flight plan which includes the legs defining this procedure and also the associated constraints (Altitude, Speed).
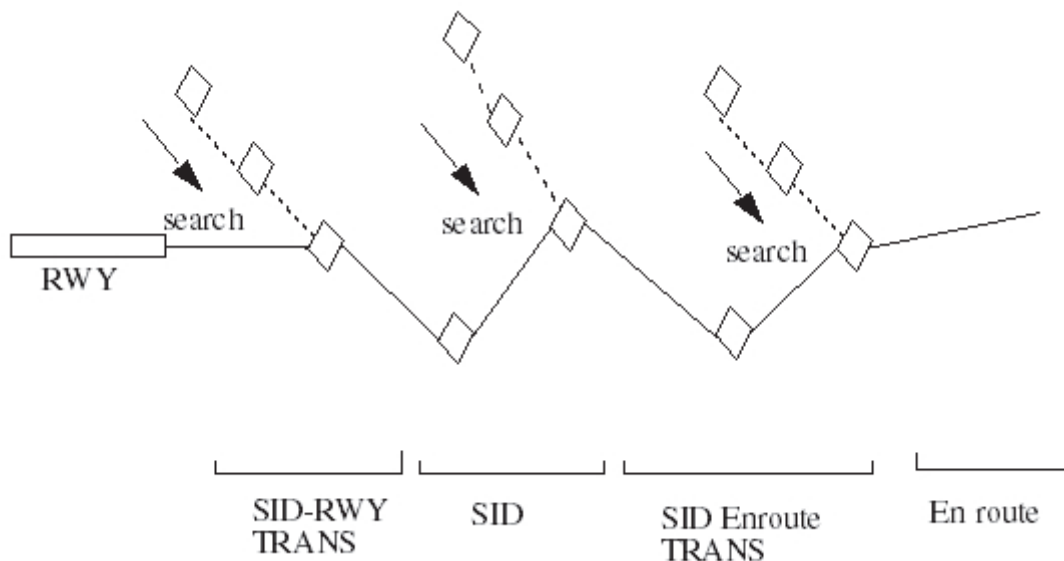
NOTE : It is not allowed to enter a SID without a RWY or a TRANS without a SID.

4.7.1 *Entering a departure procedure*

1) Press **FPLN** key.

2) Press on the Lsk beside the departure airport, then the departure page is displayed, with the list of runway and their length.

NOTE : To have access to all elements of the list , press `NEXT` / `PREV` key to scroll up/down the list.
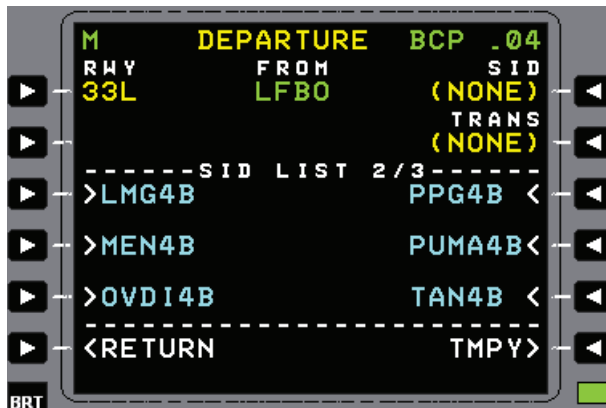
3) Press on the Lsk beside the desired runway. The **RWY** field is completed with the selected runway identifier and the list of compatible SID appears.

NOTE : - Runway insertion is allowed only on ground phase.

- When only a runway is selected, a waypoint along the runway course, 1500 ft above the airport elevation is automaticaly inserted after the runway. Its position depends on the vertical speed, except on the ground where it is 2 NM from the runway.

If a leg sequence or a flight plan modification happens, when the **DEPARTURE** page is displayed, then the first **FPLN** page is automatically displayed.

4) Press on the Lsk beside the desired SID. The **SID** field is completed with the selected SID identifier and the list of compatible TRANSITION appears.
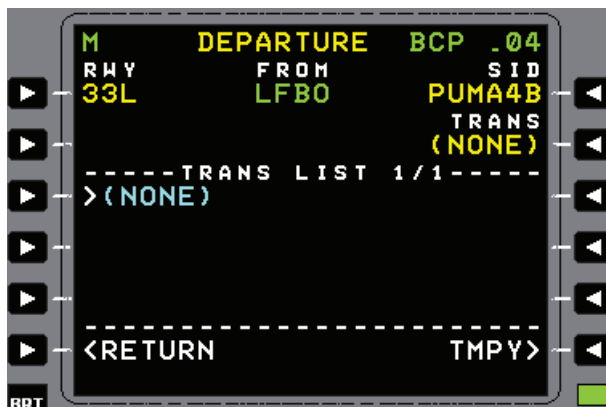
5) Press on the Lsk beside the desired SID TRANSITION. The **TRANS** field is completed with the selected TRANS identifier and no more list is displayed.

```
   ┌─────────────────────────────────────┐
   │  M      DEPARTURE    BCP .04         │
   │  RWY      FROM            SID        │
 ► │  33L      LFBO         PUMA4B     ◄  │
   │                        TRANS        │
 ► │                        (NONE)    ◄  │
 ► │                                  ◄  │
 ► │                                  ◄  │
 ► │                                  ◄  │
   │  - - - - - - - - - - - - - - - -    │
 ► │  <RETURN              TMPY>      ◄  │
   └─────────────────────────────────────┘
```
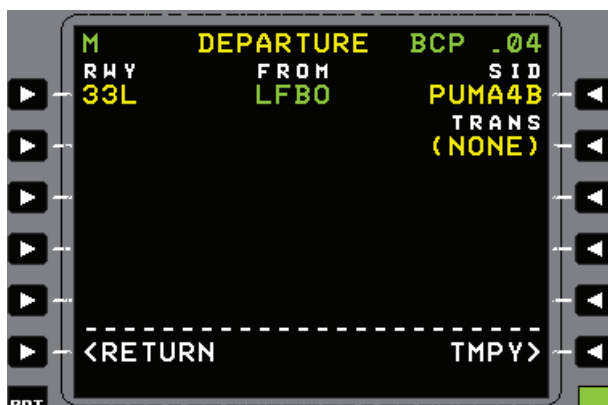
6) Before inserting the departure procedure in the active flight plan, it is possible to check it by pressing the key beside **TMPY** prompt.

7) Press **EXEC** key to activate the departure procedure.

NOTE : Once the **EXEC** key is activated, it is allowed to enter the procedure even if all fields are not completed.

CAUTION : At the insertion of a departure procedure, when the last waypoint of the departure procedure is included twice or more in the en-route flight plan then no automatic stringing is performed.
The crew will have to clear manually unwanted waypoints including duplicate waypoint prior to delete the discontinuity in FMS flight plan.

Departure   En Route
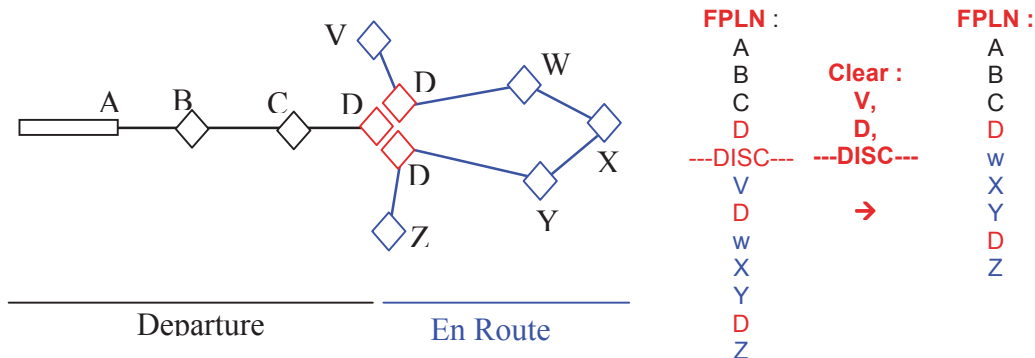
In other cases, when stringing rules apply some waypoints of the flight plan may be deleted as a consequence of the stringing procedure.

4.7.2 *Revision of a departure procedure*

Once a Departure procedure is inserted in the active flight plan, it is possible to modify one or several of its characteristics. The new Departure procedure is inserted in place of the previous one.

1) Press **FPLN** key.

```
M        TMPY   1/ 2 BCP .04
AF0358    ETA Z SPD/ ALT
LFBO33R   --H-- ---/-----
MEN3B    H326°  5.4NM
TOU/02   --H-- ---/  900A
  "      H023°   11NM
INTCPT   --H-- ---/-----
  "      C068°   22NM
BISBI△   --H-- ---/-----
  "      240°    23NM
MEN      --H-- ---/-----
--------------------------
>CLR TMPY        ETE/EFOB<
```
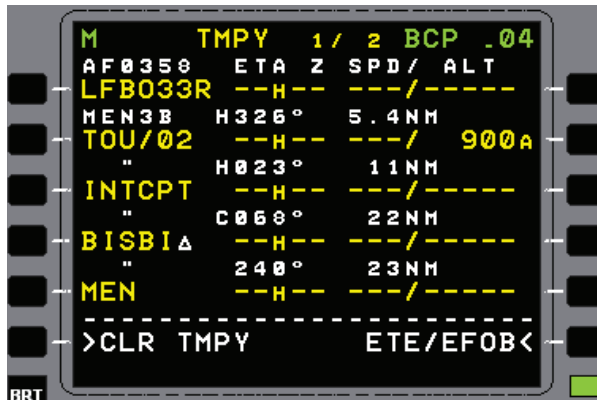
2) Press on the Lsk beside the departure airport or runway. Then, the **DEPARTURE** page is displayed with preceding entered fields completed.

3) Press on the Lsk beside **RWY**. The list of runways corresponding to the airport is then displayed. Pressing on the Lsk beside **SID** field displays the list of SIDs. Pressing on the Lsk beside **TRANS** field displays the list of transitions.

4) Press on the Lsk beside the new desired elements as for an insertion.

5) Before inserting the new departure procedure in the active flight plan, it is possible to check it by pressing the key beside **TMPY** prompt.

6) Press **EXEC** key to activate the departure procedure.

4.8 Arrival procedure

An arrival procedure is composed of 4 elements : an Approach (APP), an Approach Transition (VIA), a Standard Terminal Arrival Route (STAR) and a En Route STAR Transition (TRANS). The figure below illustrates, when procedures overlap, the stringing rules to build the active flight plan which includes the legs defining this procedure and also the associated constraints (Altitude, Speed, Slope).
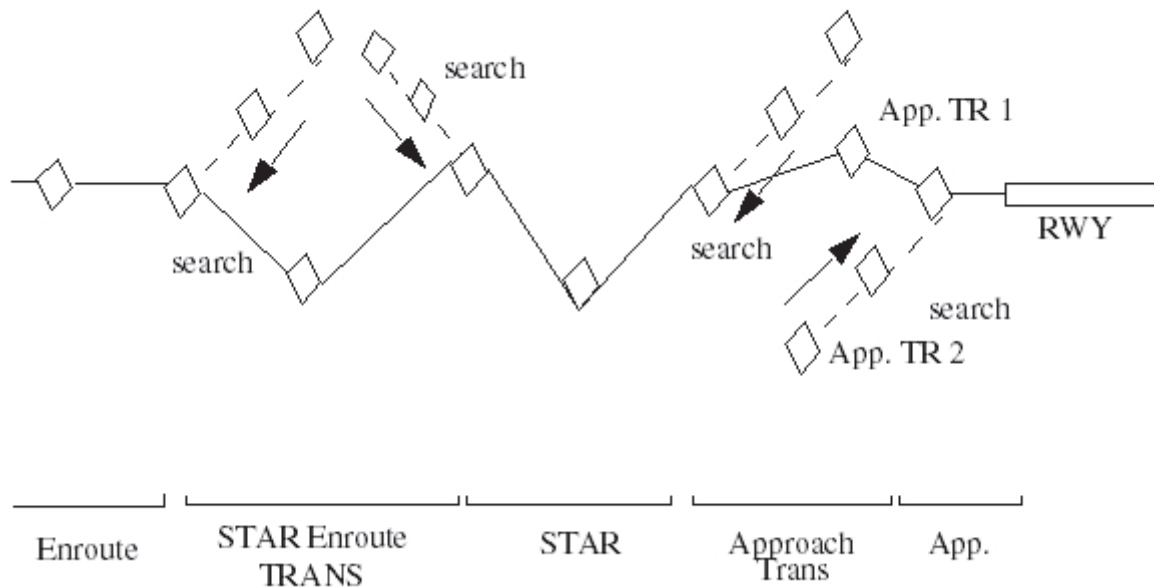
4.8.1 _Entering an arrival procedure_

1) Press **FPLN** key.

2) Press on the Lsk beside the arrival airport, then the arrival page is displayed, with for each approach, its identifier.
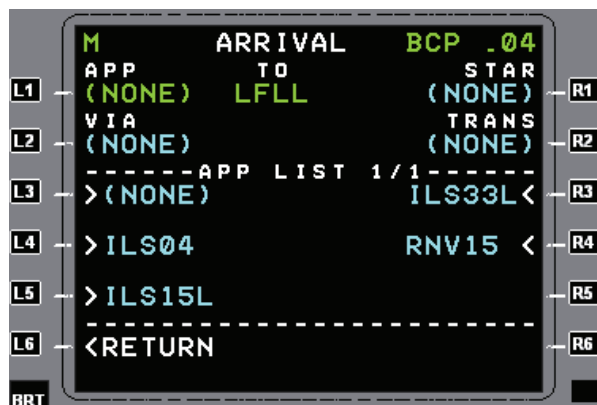
NOTE : - To have access to all elements of the list press **NEXT** / **PREV** key to scroll up/down the list.
- If a leg sequence or a flight plan modification happens, when the **ARRIVAL** page is displayed, then the first **FPLN** page is automatically displayed.

3) Press on the Lsk beside the desired approach. The **APP** field is completed with the selected approach identifier and the list of compatible STAR appears.

```
M          ARRIVAL    BCP .04
APP        TO             STAR
ILS04      LFLL         (NONE)
VIA        MIO           TRANS
(NONE)     112.45       (NONE)
-------STAR LIST 1/1------
>(NONE)              TW04   <
>TOENB              TOTA4L<
>TW03L
- - - - - - - - - - - - - - - -
<RETURN               TMPY>
```
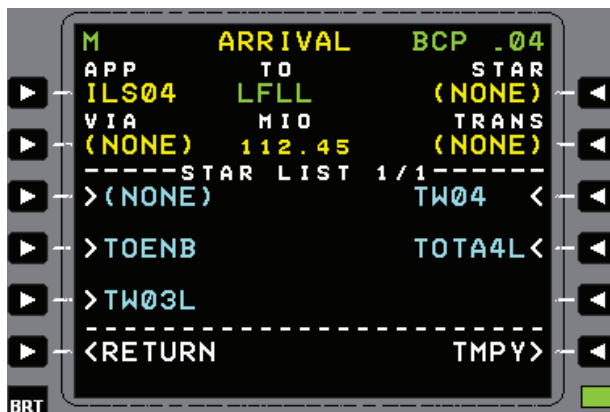
4) Press on the Lsk beside the desired STAR. The **STAR** field is completed with the selected STAR identifier and the list of compatible VIA appears.

```
M          ARRIVAL    BCP .04
APP        TO             STAR
ILS04      LFLL         TOENB
VIA        MIO           TRANS
(NONE)     112.45       (NONE)
-------VIA LIST 1/1------
>(NONE)              TOE-R<
>TOE                 VNER <
>TOE-L
- - - - - - - - - - - - - - - -
<RETURN               TMPY>
```
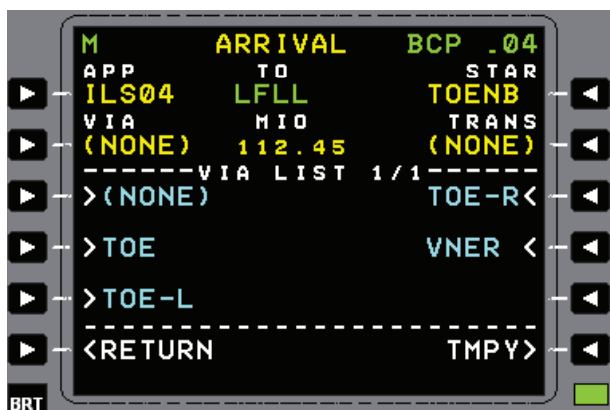
5) Press on the Lsk beside the desired VIA. The **VIA** field is completed with the selected VIA identifier and the list of compatible TRANS appears.

```
M          ARRIVAL    BCP .04
APP        TO             STAR
ILS04      LFLL         TOENB
VIA        MIO           TRANS
TOE        112.45       (NONE)
-------TRANS LIST 1/1-----
>(NONE)
>GAI13
>GAI18
- - - - - - - - - - - - - - - -
<RETURN               TMPY>
```

6) Press on the Lsk beside the desired TRANS. The **TRANS** field is completed with the selected TRANS identifier and no more list is displayed.

```
M          ARRIVAL      BCP .04
APP          TO          STAR
ILS04      LFLL        TOENB
VIA          MIO        TRANS
TOE       112.45        GAI13


- - - - - - - - - - - - - - - - - -
<RETURN                    TMPY>
```

7) Before inserting the arrival procedure in the active flight plan, it is possible to check it by pressing the key beside **TMPY** prompt.

8) Press **EXEC** key to activate the arrival procedure.

NOTE : Once the **EXEC** key is activated, it is allowed to enter the procedure, even if all fields are not completed.

CAUTION : At the insertion of an arrival procedure, when the first waypoint of the arrival procedure is included twice or more in the en-route flight plan then no automatic stringing is performed.
The crew will have to clear manually unwanted waypoints including duplicate waypoint prior to delete the discontinuity in FMS flight plan.
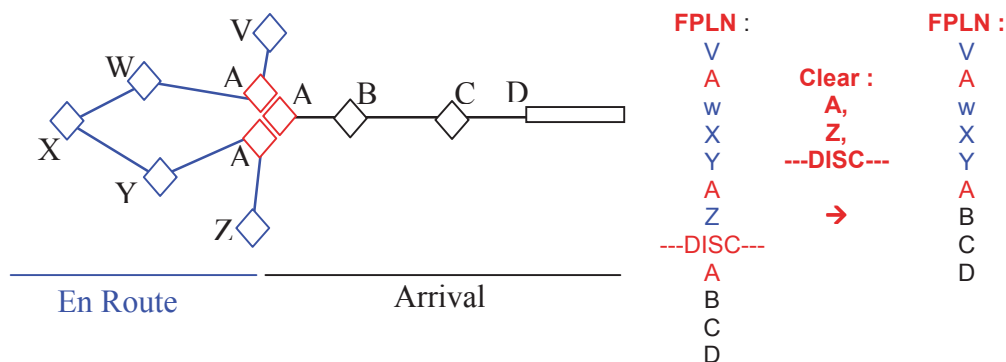
In other cases when stringing rules apply some waypoints of the flight plan may be deleted as a consequence of the stringing procedure.

CAUTION : When an arrival procedure is inserted and the matching fix for stringing is not the last waypoint of En Route part of flight plan, after STAR/APP insertion the crew must systematically perform a DIR TO the current TO waypoint to prevent mis-computed flight plan on first legs of the procedure.

4.8.2 *Revision of an arrival procedure*

Once an arrival procedure is inserted in the active flight plan, it is possible to modify one or several of its characteristics. The new arrival procedure is inserted in place of the old one.

1) Press **FPLN** key.

2) Press on the Lsk beside the arrival airport or runway: the arrival page is displayed with preceding entered fields completed.

3) Press on the Lsk beside **APP**. The list of approaches corresponding to the airport is then displayed. Pressing on the Lsk beside **STAR** field displays the list of STARs. Pressing on the Lsk beside **VIA** field displays the list of approach transitions.Pressing on the Lsk beside **TRANS** field displays the list of transitions.

4) Press on the Lsk beside the new desired elements as for an insertion.

5) Before inserting the new arrival procedure in the active flight plan, it is possible to check it by pressing the key beside **TMPY** prompt.

6) Press **EXEC** key to activate the arrival procedure.

4.8.3 *Missed approach*

The MISSED APPROACH is used when the aircraft cannot land. It allows to join the right position to try to land again or to be redirected to another runway or airport.

The MISSED APPROACH is displayed after the arrival procedure, in cyan. It is activated when the Go Around mode of the autopilot is selected, or when a DIRECT TO is performed on one of the Missed Approach fixes. In that case, the colour of the MISSED APPROACH becomes green to indicate that it is part of the flight plan. It is then strung with the selected approach (APP) via the selected approach transition (VIA).

4.9 Holding pattern

The FMS can fly Holding Pattern defined in departure or arrival procedures (SID, STAR or Missed Approach) or defined by the crew.

4.9.1 *Holding entry*

Depending on the holding inbound course and the previous leg heading or track, there are three types of entry in a holding pattern.

Right turn hold   Left turn hold
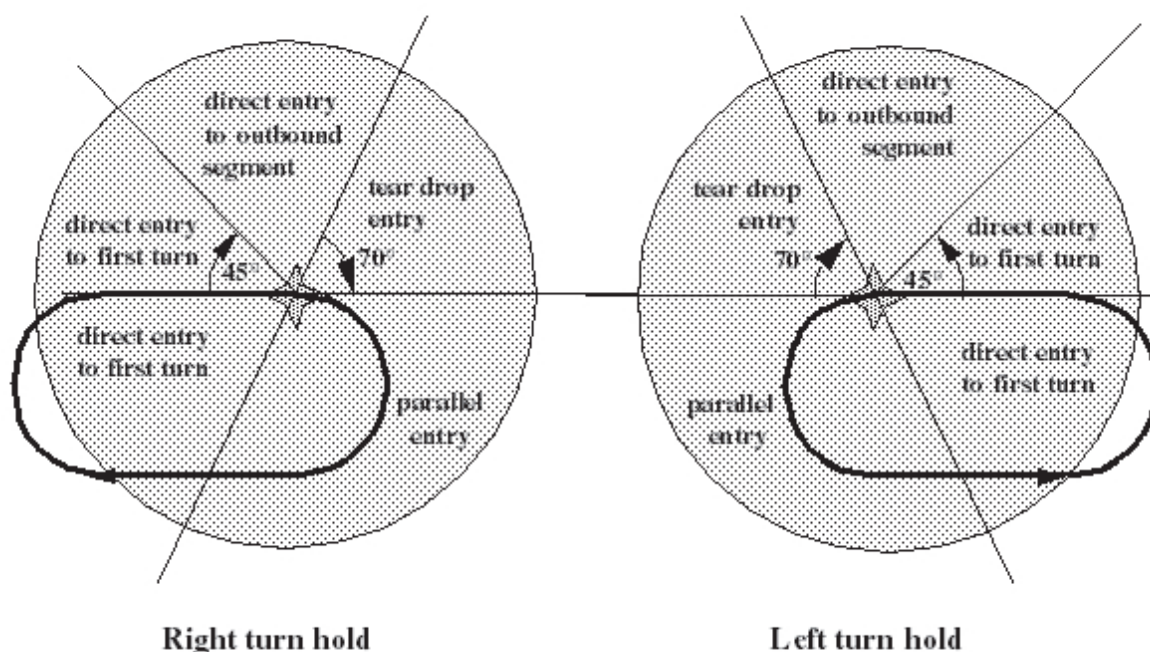
Those types are represented here below :

THALES
AVIONICS
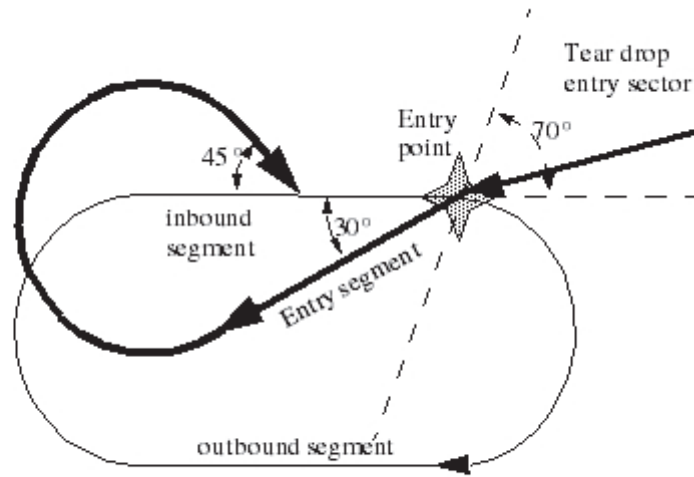
Teardrop entry

Parallel entry

Direct entry to first turn

Direct entry to outbound segment
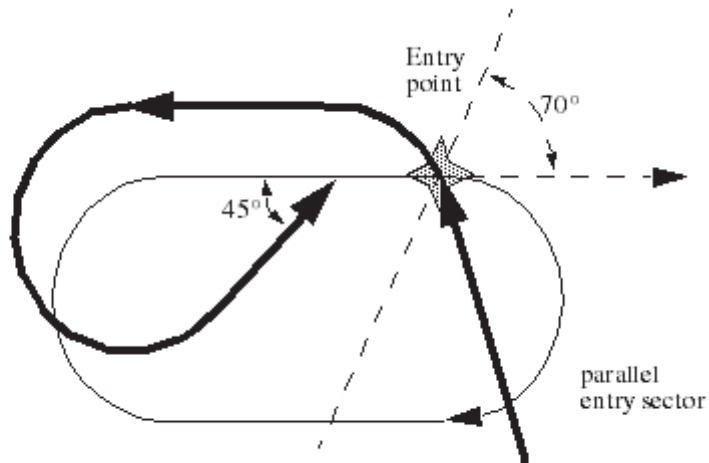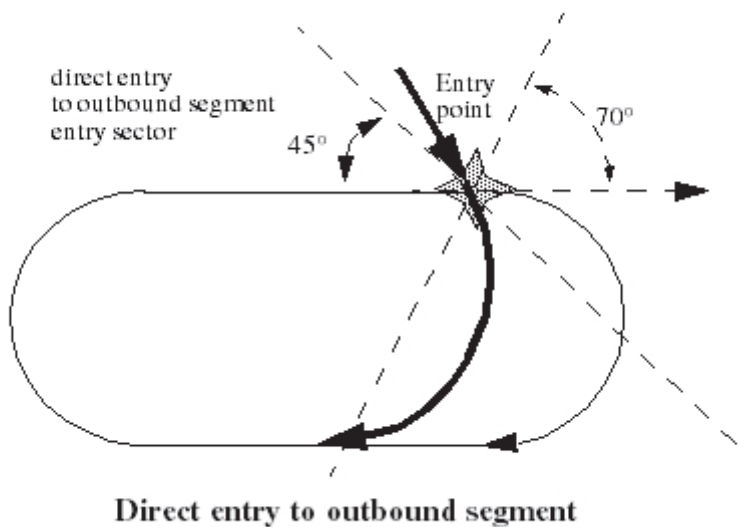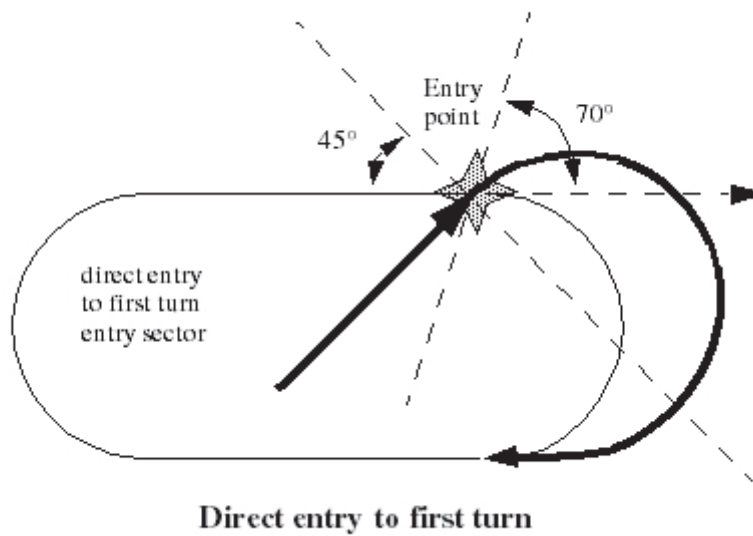
4.9.2 *Holding pattern insertion*

The insertion of a holding pattern is allowed only at waypoints of the active flight plan or at the present position (PPOS).

NOTE : - It is not allowed to insert a holding pattern at PPOS if A/C parameters (position, track, ground speed and true air speed) are not all valid.

- If the FROM waypoint is the departure airport, the insertion of a holding pattern at PPOS is not allowed. The solution is to perform, firstly, a DIRECT TO the TO waypoint and then a holding at PPOS.

1) Press **FPLN** key
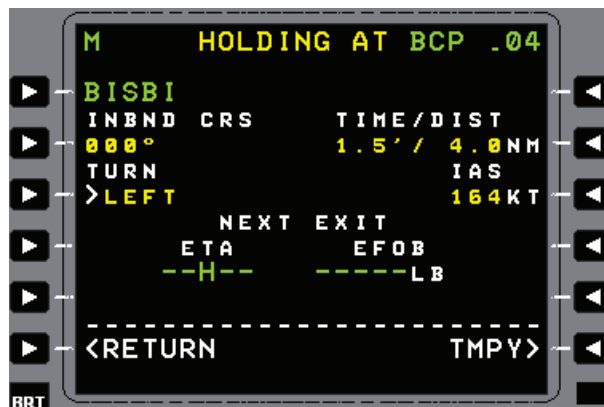
2) Press on the left Lsk beside the FROM waypoint for a holding at the present position or the desired waypoint on which the holding pattern shall be inserted : the **LTRL REV** page is displayed.

3) Press on the **HOLDING** Lsk. The **HOLDING AT** page is displayed with the default values of parameters:

- **INBND CRS** : present A/C track if insertion at PPOS or if there is a discontinuity before the revised point, or course of the leg arrival at the revise point.
- **TURN** : right.
- **TIME** : 1 minute.
- **DIST** : computed accordingly with the Holding **IAS** and **TIME**.
- **IAS** : curent A/C IAS. Maximum IAS at which the holding will be flown.

NOTE : - ETA and EFOB at the next exit of the holding pattern are not computed at the insertion.

  - The **TIME/DIST** parameter defines the inbound leg length.

  - IAS holding speed define the maximum speed flyable for the holding pattern. When inserting a holding pattern take care to adjust holding IAS to maximum IAS expected speed.

4) To modify a holding pattern parameter :

- for TURN parameter : press on the Lsk beside **TURN** parameter to commute.
- for the other parameters : enter the value in the scratchpad and press the Lsk beside the corresponding parameter to insert it. The formats used to enter those parameters are the following ones :

INBND CRS	TIME	DIST	IAS
NNN	N.N	NN.N	NNN

NOTE : The following rules applied for modification of a parameter :
- no leading zeroes are required for INBND CRS, DIST and IAS
- new DIST value shall be preceded by "/".
- modification of TIME and DIST at the same time is not allowed.

5) Press **EXEC** key to insert the holding pattern in the active flight plan, then the FMS takes into account the A/C position to build the holding patern.

NOTE : When a holding pattern is inserted at PPOS, the position of the entry point is the current position at the **EXEC** key press.

4.9.3 *Editing a holding pattern*

The crew can edit a holding pattern in order to modify one or several parameters. Parameters modified at the creation or during modifications appear in large font.

1) Press **FPLN** key

2) Press on the left Lsk beside the holding waypoint entry (if holding pattern is not yet active) or holding waypoint exit. Then the **LTRL REV** page is displayed.

3) Press on the **HOLDING** Lsk. The **HOLDING AT** page is displayed with holding parameters :

- **INBND CRS** : the one which was displayed at the creation or at the last modification.
- **TURN** : ditto.
- **TIME** : 1 minute if pilot does not change **TIME/DIST** parameters, pilot entered value or computed value according to Holding IAS and DIST if the **DIST** parameter has been modified.
- **DIST** : entered value or computed value according to Holding IAS and TIME.
- **IAS** : entered value or current A/C IAS.

```
M        HOLDING AT BCP .04

BISBI
INBND  CRS      TIME/DIST
000°            1.5'/ 4.0NM
TURN                 IAS
>LEFT               102KT
         NEXT EXIT
      ETA         EFOB
      09H18       3056LB
-----------------------------
<RETURN                TMPY>
```

NOTE : - **ETA** and **EFOB** are displayed only on the **HOLDING AT** page of holding waypoint exit.
- If the holding pattern is active, the **IAS** cannot be modified.

4) To modify a holding pattern parameter, use the same rules as for the insertion of a holding pattern.

NOTE : When a holding pattern is active, only modification of **TIME** or **DIST** parameter is allowed.

4.9.4 *Holding pattern exit*

The normal way to perform an exit from an active holding pattern with manual termination is to clear the discontinuity following the holding pattern exit waypoint : the exit is then performed at the next overfly of the holding waypoint.

NOTE : It is also possible to exit from an active holding pattern performing a DIRECT TO function to the holding pattern exit waypoint or to the next waypoint of the flight plan.

4.9.5 *Clearing a holding pattern*

1) Press **FPLN** key to display the desired holding leg.

2) Perform a CLEAR action on the left Lsk, beside the desired holding leg.

4.10 Logistical flight plan revision

4.10.1 Waypoint identification

The identification of a waypoint entered by the pilot can be :
- the identifier which is stored in Standard Data Base or in Pilot Data Base.
- the identifier which is created by the FMS for a temporary waypoint when :
  - pilot inserts a Latitude/Longitude waypoint : N4512.8/E01012.26 entered in the scratchpad becomes N45E10 in the flight plan (longitude hundreds of degrees are omitted).
  - pilot inserts a Place/Bearing/Distance waypoint defined by its bearing and distance to a place : PERLE/120/12 in the scratchpad becomes PERxx, where xx is an index computed by the FMS.
  - pilot inserts a Place-Bearing/Place-Bearing waypoint defined by the intersection of 2 radials relative to 2 places : SAURG/40/TOU/146 in the scratchpad becomes SAUxx.

4.10.2 Waypoint insertion

This function allows the direct entry of a new waypoint in the flight plan. It may be inserted by an ident or by position, Place/Bearing/Distance or Place-Bearing/Place-Bearing entry.

1) Write the waypoint identifier into the scratchpad,

2) Press the left Lsk beside the revised waypoint or the discontinuity: the new waypoint takes place in face of the pressed Lsk and the previous waypoint is moved down path in the flight plan. A discontinuity is inserted between the new waypoint and the previous one. If the revised waypoint is PPOS, PPOS is retained and the new waypoint is inserted after the discontinuity.

NOTE : - If the new waypoint is part of the downpath flight plan (except if it is part of the missed approach), all legs between the new waypoint and the identical downpath waypoint are deleted.

- A new waypoint cannot be inserted on the discontinuity following a leg with a manual termination.

- Insertion at the FROM or TO waypoints of the active leg is not allowed when the FMS is coupled to the autopilot.

If an airport is inserted, it is processed as a waypoint. Use **DIRECT TO** or **NEW DEST** to access to the airport procedures.

- Moving waypoints can be inserted only as **DIRECT TO.**

3) If the new waypoint or the reference place does not belong to the Standard or Pilot data base, the **NEW DATA** page is displayed.

4.10.3 *Clearing a waypoint*

1) Press **FPLN** key.

2) Press **CLR** key with the scratchpad empty.

3) Press on the Lsk beside the selected waypoint : the corresponding leg is deleted from the flight plan, a discontinuity is inserted.

NOTE : - Clearing the FROM waypoint is never allowed.
- Clearing the TO waypoint is not allowed when the FMS is coupled to the autopilot.
- Clearing the origin or the destination airport is not allowed.
- If clearing successive waypoints, only one discontinuity is generated.
- After clearing a holding pattern or a procedure turn, no discontinuity is inserted.

4.10.4 *Discontinuity INSERTION*

This function allows the direct insertion of a discontinuity in the flight plan.

1) Enter the slash character ('/') in the scratchpad.

2) Press the left Lsk beside the revised waypoint.

NOTE : - A discontinuity can only be inserted after legs with fix termination, except RF legs (radius to a fix).
- A discontinuity cannot be inserted between the present position and the active waypoint.
- A discontinuity cannot be inserted after a mission leg.

4.10.5 *Clearing a discontinuity*

1) Press **FPLN** key.

2) Press **CLR** key with the scratchpad empty.

3) Press on the Lsk beside the selected discontinuity.

NOTE : - The discontinuity following PPOS cannot be deleted, except when a DIRECT TO the first waypoint of the flight plan is executed.
- The discontinuity following a leg with manual termination cannot be deleted while this leg is not active.

4.10.6 *DIRECT-TO*

This function allows to fly a DIRECT TO a fix, a moving waypoint, an airport or a temporary waypoint.
It also allows to specify a desired track and distance to intercept the selected fix in the case of a DIRECT TO/INTERCEPT.

1) Press **DTO** key. The **DIRECT TO** page is displayed, which contents the next points of the flight plan with their direct distance and bearing from the FMS position.

```
M      DIRECT TO   GPS .04
IDENT
  □□□□□□□     AIRPORTS>
-----FPLN WPT  1/ 6-----
TANCA   320°/  22NM
BECHU   260°/  53NM
JULEE   350°/  82NM
DELTA   003°/ 114NM
IODAN   014°/ 132NM
```

NOTE : Press **NEXT** / **PREV** key to scroll up/down the list. This flight plan fix list includes standard, pilot and temporary waypoints of the flight plan.

2) Press **DTO** key again or press the key beside **AIRPORTS** prompt : the **DIRECT TO** page with nearest airports list is displayed (pressing again **DTO** key or the key beside **FPLN WPTS** returns to the precedent page). For each airport, the maximum runway length is displayed.

```
M      DIRECT TO   BCP .04
IDENT
L1  □□□□□□□     FPLN WPTS>  R1
 -AIRPORTS 1/2---MAX RWY-
L2 MEKD 190°/  12NM  3424M  R2
L3 MJKD 358°/  23NM  3185M  R3
L4 MARG 123°/  40NM  3810M  R4
L5 MERU 321°/  58NM  4642M  R5
L6 MATO 241°/  70NM  3423M  R6
BRT
```
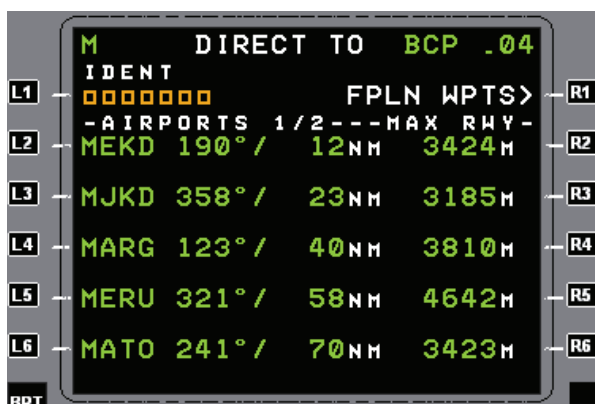
3) To select the **DIRECT TO** fix :

- Press the key beside the desired fix or airport.
- or enter the name of the fix or airport on the **IDENT** Lsk.
- or enter a lat/long waypoint or a database waypoint identifier on the **IDENT** Lsk. or press **IDENT** Lsk with empty scratchpad, the **DATA LIST** page is displayed with filter "ALL", and select a fix.

The **DIRECT TO** page with the **IDENT** field filled is then displayed.

4) A DIRECT TO/INTERCEPT function is performed by entering :

- an inbound course value in **INBND CRS** field,
- a distance in **INTCP DIST** field.

NOTE : If no distance is entered, a FMS computed distance, which depends on TAS, and altitude will be used.

5) Enter the altitude constraint **ALT CNSTR,**

```
M        FPLN   1/ 2 BCP .04
AF0358    ETA Z  SPD/ ALT
T-P      08H45  100/  499
MEN3B    H326°   5.4NM
TS       08H45  ---/-----
  "      H023°   11NM
INTCP    --H--  ---/-----
  "      C068°   22NM
BISBI    --H--  ---/-----
  "      240°    23NM
MEN←     --H--  ---/ STEP
------------------------
<NEW FPLN         ETE/EFOB<
```

6) Press **EXEC** key to activate the function :

- if an airport has been chosen, this airport is considered as the new destination. It becomes the TO waypoint and the last point of the flight plan.
- if the entered waypoint is identical to a waypoint in the flight plan, all legs and discontinuities prior to the first occurrence of the waypoint are deleted.
- if the waypoint has been selected via a Lsk, all legs and discontinuities prior to the selection are deleted even if it is not the first occurrence of the waypoint.
- if an off flight plan waypoint has been entered, it becomes the TO waypoint and a discontinuity is inserted after this waypoint.
- if a DIRECT TO/INTERCEPT is performed, the FMS inserts an intercept leg before the Direct To fix. This leg becomes the active leg.

```
M        FPLN   1/ 2 BCP .04
AF0358    ETA Z  SPD/ ALT
IN-BND   08H45  100/  499
         H326°   5.4NM
TS-01    --H--  ---/-----
MEN3B    H023°   11NM
TS       --H--  ---/-----
  "      C068°   22NM
INTCP    --H--  ---/-----
  "      240°    23NM
BISBI    --H--  ---/-----
------------------------
<NEW FPLN         ETE/EFOB<
```

NOTE : DIRECT TO function is not allowed if A/C position is invalid.
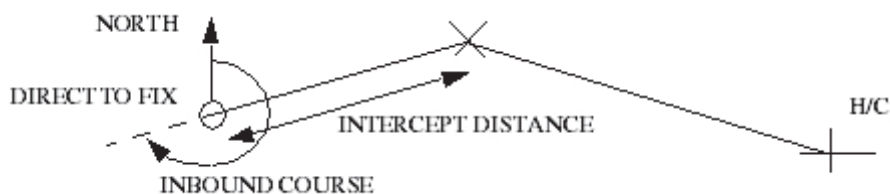
DIRECT TO moving waypoint:

A specific **SPD VECTOR** field is displayed in case of a moving waypoint and indicates the track and speed of the moving waypoint.

RALLY NAVIGATION

The rally navigation mode consists in a "DIRECT-TO a moving waypoint" which goal is to follow a "rally navigation" to reach a computed ralliement waypoint.
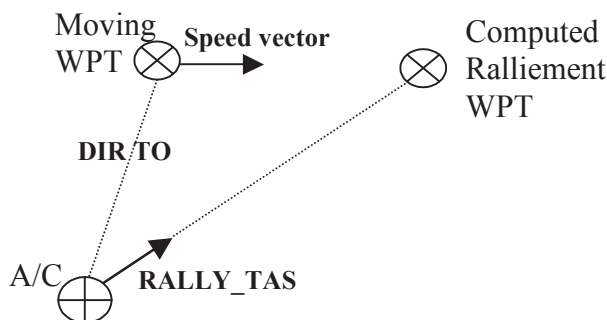
This ralliement waypoint is a temporary waypoint refreshed according to the wind and the aircraft position. Calculation is done in 2D geometry with a constant rally navigation TAS (=RALLY TAS) during ralliement.

In the **FPLN** page, the ralliement waypoint is named with the ident of the moving waypoint to reach, followed by an asterix except if the ralliement is impossible with the RALLY TAS or in high latitudes (>89°). In such case the waypoint is the moving waypoint.

A discontinuity is inserted in the flight plan after the moving waypoint.

Only one moving waypoint per flight plan is allowed.

4.11 Offset

This function allows the aircraft to fly parallel to the original flight plan entering the value of the parallel offset.

4.11.1 *Offset insertion or modification*

The insertion of an offset is possible on the **LTRL REV** page of the FROM waypoint.

1) Press **FPLN** key.

2) Press on the Lsk beside the FROM waypoint : the **LTRL REV** page is displayed.

3) WRITE the desired value of offset in the scratchpad : the format of the entry must be a character which indicates left (negative offset) or right (positive offset) followed by a number (ex : L15, L6, R1, R12).

4) Press on the Lsk beside the offset field : the value is displayed.

NOTE : - The offset value is limited to 20NM.

- Offset insertion is possible if:
   - Current leg is of TF or CF type
   - Current leg is not the last leg of the flight plan
   - Current and next leg terminations are not the destination runway
   - Otherwise it is refused with a "**NOT ALLOWED**" message displayed in the scratchpad.

- Offset stays applicable along flight plan until:
   - leg type is neither TF nor CF or
   - course change becomes greater than 90°or
   - leg is part of the approach or
   - leg terminates on the destination runway or

- leg is followed by a discontinuity.

- At offset insertion, if aircraft cannot rejoin the offset path before transition to next leg but can rejoin it on next leg, then the "OFFSET DELAYED" message is displayed in the scratchpad and offset will be applied on next leg.

- At offset insertion, if aircraft cannot rejoin the offset path neither before transition to next leg nor on next leg, then the insertion is refused with the "NOT ALLOWED" message displayed in the scratchpad.

- When the inserted offset is no more applicable, the offset is automatically cancelled with the "OFFSET CANCELLED" message displayed in the scratchpad.

CAUTION : Do not insert an offset during transition to next leg to avoid abnormal guidance during the transition.

4.11.2 *Offset deletion*

1) Access to the **LTRL REV** page of the FROM waypoint, as for an offset insertion.

2) Press **CLR** key with an empty scratchpad or write **L0** or **R0** in the scratchpad.

3) Press **OFFSET** Lsk.

NOTE : - If a revision modifies the active leg (e.g. insertion of a holding pattern, DIRECT TO), offset is cancelled.
- If the crew deletes the active offset, aircraft automatically returns to the original flight plan and the offset indicator disappears from the **FPLN** page.

4.11.3 *Offset display*

If an offset is entered, the offset indicator OFST, in reverse video, appears on the the FPLN page and on the NDs, and the OFST annunciator is illuminated on the MCDU.

4.12 Lateral revision page

Access : Press on the left Lsk beside a revised waypoint of the active flight plan on the **FPLN** page.

4.12.1 *LTRL REV page at PPOS*

The page is composed of the following fields :
- Position : present position of the A/C in the selected position fixing mode.
- **OFFSET** : used to enter an offset (see Offset paragraph for details).
- **HOLDING** prompt : access to **HOLDING AT** page of PPOS.
- **CHECK POS TO** : used to calculate bearing/distance from the A/C position to a waypoint. WRITE the waypoint identifier in the scratchpad and press on **CHECK POS TO** Lsk. When **CHECK POS TO** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with filter "ALL".

NOTE : CHECK POS is not possible towards moving waypoints.

This page enables to select a new flight plan, pressing the **NEW FPLN** Lsk.

NOTE : If a leg sequence or a flight plan modification happens, when the **LAT REV** page is displayed, then the first **FPLN** page is automatically displayed.

4.12.2 *LTRL REV page at a waypoint*

```
M         LTRL REV    GPS .04
       N45°12.34/E023°45.67
L1 ─ MINDI                        ─ R1
      OVERFLY      NEXT WPT
L2 ─ >YES/NO         [      ]     ─ R2
                   NEW DEST
L3 ─ <HOLDING        [      ]     ─ R3

L4 ─                              ─ R4

L5 ─             MISSION>         ─ R5
      ----------------------
L6 ─ <RETURN     NEW FPLN>        ─ R6
```
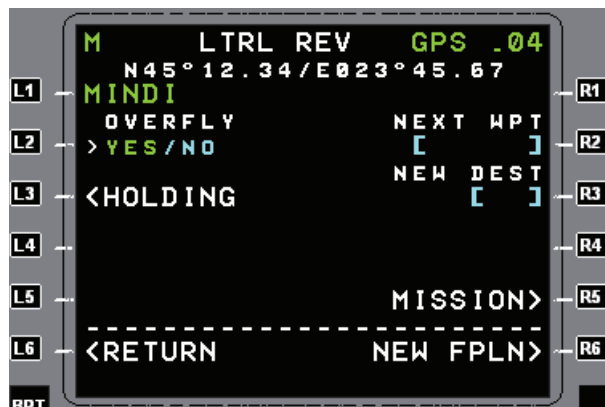
The page is composed of several fields which are described here below :
- Position : coordinates of the revised waypoint in the selected position fixing mode.
- Revised waypoint identifier field : name of the revised waypoint. When this Lsk is pressed, the corresponding database page is displayed.
- **HOLDING** prompt : access to **HOLDING AT** page of the revised waypoint.
- **OVERFLY** status : used to insert an overfly on the revised waypoint. press on the Lsk beside the prompt to commute the status. If the overfly status is YES, the overfly symbol Δ is displayed after the waypoint identification.
- **DEPARTURE** or **ARRIVAL** prompt : access to the **DEPARTURE** or **ARRIVAL** page.
- **NEXT WPT** field : used to choose the next waypoint. Enter the waypoint identifier on the Lsk beside this field. The **TMPY** page is then displayed to check the flight plan and to confirm its activation. When **NEXT WPT** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with filter "ALL".
- **NEW DEST** field : used to link a new destination from the revised waypoint. Enter the airport identifier on the Lsk beside this field. The **TMPY** page is then displayed to check the flight plan and to confirm its activation. When **NEW DEST** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with standard and pilot airports filter
- . **MISSION** prompt : access to the **MISSION** page.
  This prompt is avalaible only if a mission can be inserted at this fix (perfdata mode, no mission already inserted,… - Cf paragraph mission)

This page enables to select a new flight plan, pressing the **NEW FPLN** Lsk.

NOTE : - HOLDING, OVERFLY and NEW DEST are displayed only if able to be activated at the revised waypoint.
- If a leg sequence or a flight plan modification happens, when the **LTRL REV** page is displayed, then the first **FPLN** page is automatically displayed.

4.13 Vertical navigation

4.13.1 *General description*

4.13.1.1 *Vertical navigation profile*

The vertical navigation profile is defined in three sections (climb, cruise and descent) as follows :
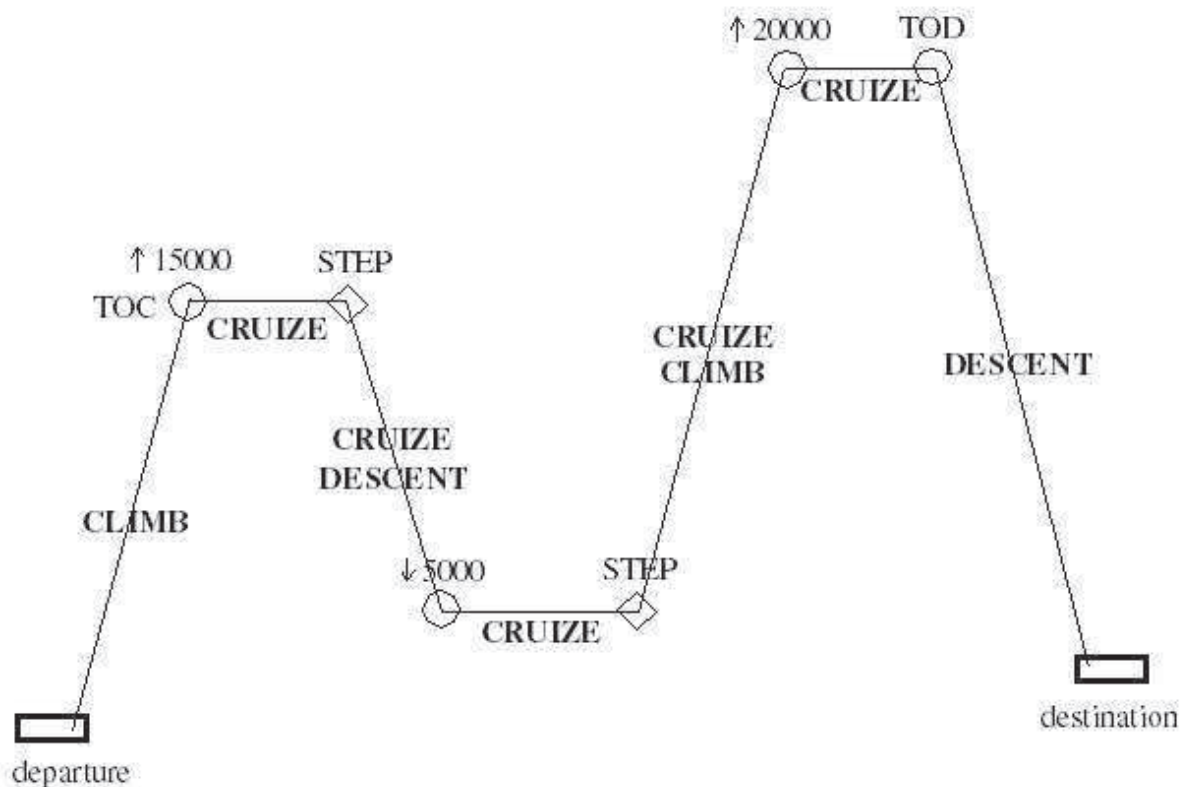
4.13.1.2 *Altitude*

- **TRANS ALT**: Transition altitude
  The destination transition altitude, **TRANS ALT,** is provided by the standard database according to the destination airport. The crew can override it on the **APPROACH** page (See Approach performance paragraph).

- **QNH**
  The crew can insert the destination **QNH** on the **APPROACH** page. This QNH is used by the FMS for internal conversions of altitudes during the descent section when A/C is above the destination transition altitude (See Approach performance paragraph).

- **MDA:** Minimum Descent Altitude
  Each time a destination is entered, the Minimum Descent Altitude is initialized with the destination altitude + 1000 ft. The crew can override this computed value on this APPROACH page.

  This is the minimum altitude under which, during the descent section, the A/C is guided on a horizontal path.

- **CRZ ALT**: Cruize altitude
  The cruize altitude is used by the FMS to compute the TOC (Top Of Climb) point and the possible level interception points of the cruize section.
  The crew can enter the initial cruize altitude in the **CRZ ALT** field of the **PERF INIT** page (Example below : PERFMODE = MANUAL - see performance init paragraph page).
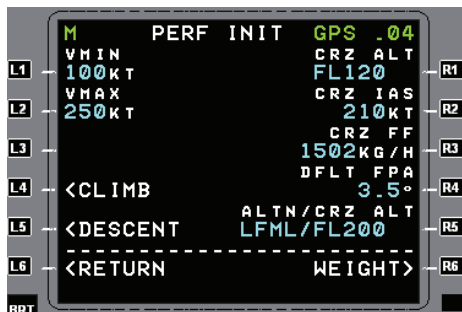
  During the climb section, the cruize altitude is the maximum value between the selected altitude coming from the FGCP and the initial cruize altitude entered by the crew.

  During other sections, the cruize altitude is the selected altitude coming from the FGCP.

  The cruize altitude is the **TGT ALT** field displayed on the **VNAV** page.

NOTE : Each time the target altitude changes, the message **CRZ ALT MODIFIED** is displayed in the scratchpad.

4.13.1.3 *Vertical navigation incoherence*

During the vertical navigation profile computation, incoherences may appear in the following cases :
- a step waypoint is located on climb or descent section
- a step waypoint is located on a fish-bird leg
- a level interception point or the TOC is located after the next step waypoint
- a level interception point or the TOC is located after the TOD (Top Of Descent)
- on ground, the TOD is located behind the A/C

NOTE : In such cases, the message VNAV INCOHERENCE is displayed in the scratchpad. Altitude constraints or steps on the current flight plan must be checked in **VNAV** page.

4.13.2 *Vertical navigation display*

4.13.2.1 *Vertical revision page*

Access : Press on the right Lsk beside a revised waypoint of the active flight plan on the **FPLN** page.

This page displays the vertical navigation information and the constraints at the revise waypoint. It contents :

MANUAL PERF MODE   **PERFDATA PERF MODE**
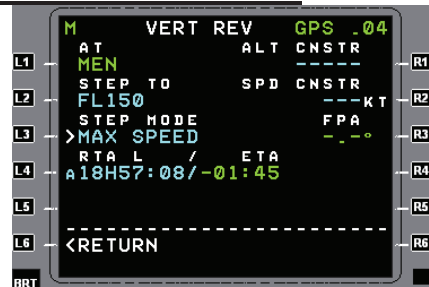
- **AT** : revise waypoint identification. If the overfly status is YES, the overfly symbol Δ is displayed after the waypoint identification. When this Lsk is pressed, the corresponding database page is displayed.
- **STEP TO** : step altitude at the revise point. This value can be cleared or entered by the crew.
- With a PerfDatabase loaded and in PERFDATA PERF MODE: **STEP MODE** : if the **STEP TO** field is filled in, then allows the selection of the step mode value by alternation between predefined values (depending on the PerfDatabase).
- **ALT CNSTR** : altitude constraint at the revise point. The following formats are used :
  - HHHHH**A** for "AT or ABOVE" altitude constraint.
  - HHHHH**B** for "AT or BELOW" altitude constraint.
  - HHHHH for "AT" altitude constraint.
  - 2 altitudes separate by "**-**" represents a window altitude constraint.

  This parameter can be cleared or entered by the crew.

  For ALT CNSTR greater than 36000 feet, some conversion errors may be introduce by the FM. Only conversion from "FLxxxx" formats are guaranteed.
- **RTA / ETA** :
  RTA = required time of arrival at the revise point. The following formats are used :
  - **A**XXHXX:XX for "AT or AFTER" required time of arrival.
  - **B**XXHXX:XX for "AT or BEFORE" required time of arrival.

- XXHXX:XX for "AT" required time of arrival.

This parameter can be cleared or entered by the crew.

NOTE : The RTA parameter is expressed in local Time

If RTA is valid, ETA displays the error between specified RTA and computed ETA for the waypoint.
- **SPD CNSTR** : speed constraint at the revise point. This parameter can be cleared or entered by the crew.
- **FPA** : flight path angle. If an "AT" altitude constraint is defined at the revise point, this parameter can be cleared or entered by the crew and is displayed in cyan. Otherwise, it is displayed in green.
The range of crew entered value is [1°; 6°].

NOTE : - The window altitude constraint may be cleared but cannot be entered by the crew.
- If a temporary flight plan exists, no modifications of constraints are allowed.
- Only one RTA can be specified for a flight plan.
- If a leg sequence or a flight plan modification happens, when this page is displayed, then the first **FPLN** page is automatically displayed.

4.13.2.2 *Vertical navigation page*

Press the R1 Lsk (vertical revision at the FROM waypoint) on the **FPLN** page or the **VNAV** Lsk on the **PROG 1/3** page.
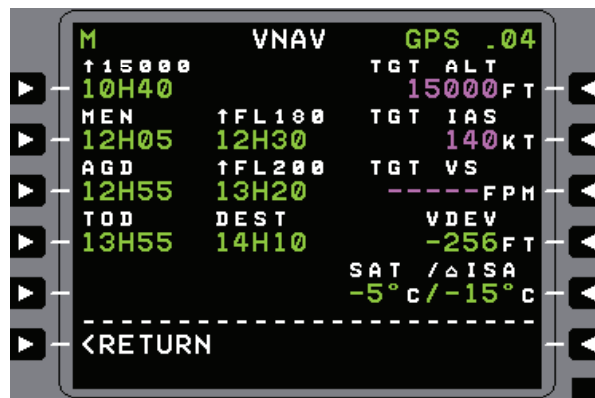
This page displays the vertical navigation information and contents :
- If an active level interception point exists, ↓**AAAAA** or ↑**AAAAA** and the ETA on the active level interception point.
- If a step 1 exists, the step 1 fix ident, ETA on fix, altitude and ETA on altitude.
- If a step 2 exists, the step 2 fix ident, ETA on fix, altitude and ETA on altitude.
- **TOD,** the ETA at top of descent.
- **DEST,** the ETA at destination.
- **TGT ALT,** the current target altitude.
- **TGT IAS,** the target IAS.
- **TGT VS,** the target vertical speed.

- **VDEV,** the vertical deviation.
- **SAT,** the static air temperature.
- ∆**ISA,** the standard temperature discrepancy.

4.13.3 *Vertical navigation sections*

4.13.3.1 *Climb section*

This section is defined by the portion of the active flight plan located between the departure and the TOC.

During the climb section, the target IAS, **TGT IAS,** is computed and displayed on the **VNAV** page.
- The target vertical speed, **TGT VS,** is invalid.
- The vertical deviation, **VDEV,** is computed in comparison with the cruize altitude, **TGT ALT**.

NOTE : - During one minute before the TOC, the vertical track alert is triggered on the Navigation Displays.
- If there is no departure, the climb section does not exist.

4.13.3.2 *Cruize section*

- General
  This section is the portion of the active flight plan located between the TOC and the TOD.
  The displayed page depends on the PERF MODE

  The crew can define up to two steps by entering a step altitude in the **STEP TO** field on the **VERT REV** page of any fix of the flight plan.
  So, the cruize section can be divided into three subsections : cruize, cruize climb and cruize descent according to the steps entered by the crew.
  Cruize climb or descent start at a step waypoint.
    - The target IAS, **TGT IAS,** and the target vertical speed, **TGT VS,** are computed and displayed on the **VNAV** page.
    - The vertical deviation, **VDEV,** is computed in comparison with the cruize altitude, **TGT ALT.**

- Cruize
  The target vertical speed, **TGT VS,** is invalid.
  The target IAS, **TGT IAS,** is egal to the cruise IAS entered by the crew in PerfDb mode (if a PerfDb has been loaded) :
    - in the **CRZ MODE** field on **PERF INIT** page for the cruize mode after the TOC.
    - in the **STEP MODE** field on **VERT REV** page for the cruize mode after a step waypoint.

If a valid RTA is defined, **TGT IAS** displays the computed IASrta.

- Cruize climb
  The target vertical speed, **TGT VS,** is invalid.
  The target IAS, **TGT IAS,** is the climb speed, VCLS.

- Cruize descent
  The target vertical speed, **TGT VS,** on the **VNAV** page, is computed according to the flight path angle, **FPA.**
  The target IAS, **TGT IAS,** is equal to IAS DSC before the Top of Descent, after the top of Descent it's equal to min (IAS DSC, last speed constraint found in the flight plan since the A/C is in the descent section or constraint from the database).
  If a valid RTA is defined **TGT IAS** displays the computed IASrta.

NOTE : During one minute before each step waypoint and before TOD, the vertical track alert is displayed on the Navigation Displays.

4.13.3.3 *Descent section*

- General
  This section is the portion of the active flight plan located after the TOD.

  Descent profile is computed according to altitude constraints and flight path angle provided by the database or entered by the crew.
  Speed constraints are only advisory.
  The crew can override, delete or create constraints on each waypoint of the flight plan on the **VERT REV** page.

NOTE : Constraints are not taken into account for the computation of the descent profile when they are located on fixes belonging to the departure procedure or located on fixes at more than 60 NM of the destination airport or above FL199.

  The target vertical speed, **TGT VS,** is computed according to the descent profile.
  The target IAS, **TGT IAS,** is
  - the minimum between 90% of VMO and the last speed constraint found in the flight plan since the A/C is in the descent section,
  - the minimum between IASrta and the last speed constraint found in the flight plan since the A/C is in the descent section if a valid RTA is defined ahead in the descent phase,
  - the approach speed in the approach phase.

  The vertical deviation, **VDEV,** is computed in comparison with the descent profile.

NOTE : - During the descent profile computation, due to altitude constraints, the FMS may detect legs with a too high descent slope according to the aircraft

performances. In such cases, the message TOO STEEP PATH AHEAD is displayed in the scratchpad.

- During descent, the A/C airspeed should not be too important towards the Cruize airspped (defined in the PERF INIT page)

- During descent profile flying, if the A/C airspeed becomes higher than 95% of VNE then the message SPEED LIMIT is displayed in the scratchpad.

- If LNAV and VNAV are engaged and A/C is above MDA then the vertical path change alert is displayed on the navigation displays during 10 s before any slope change greater than 0.3° or before reachi ng MDA.

- Normal descent profile

   This profile is defined when one or several altitude constraints have been entered by the crew or extracted from the arrival procedure.
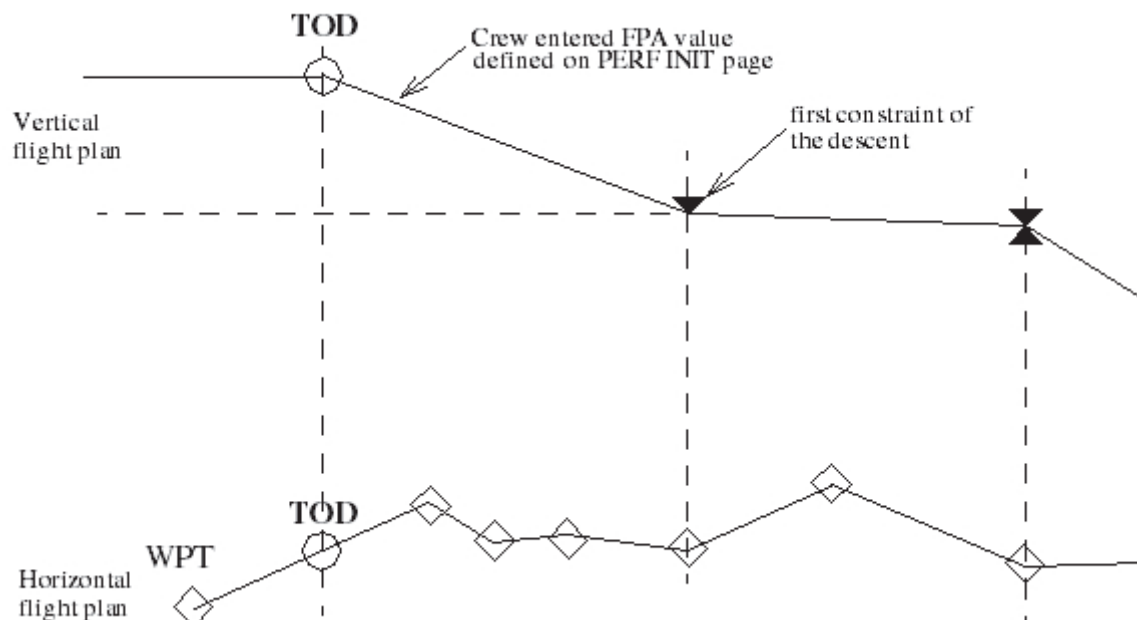
• Default descent profile

This profile is defined when no altitude constraint has been extracted from the arrival procedure or entered by the crew.
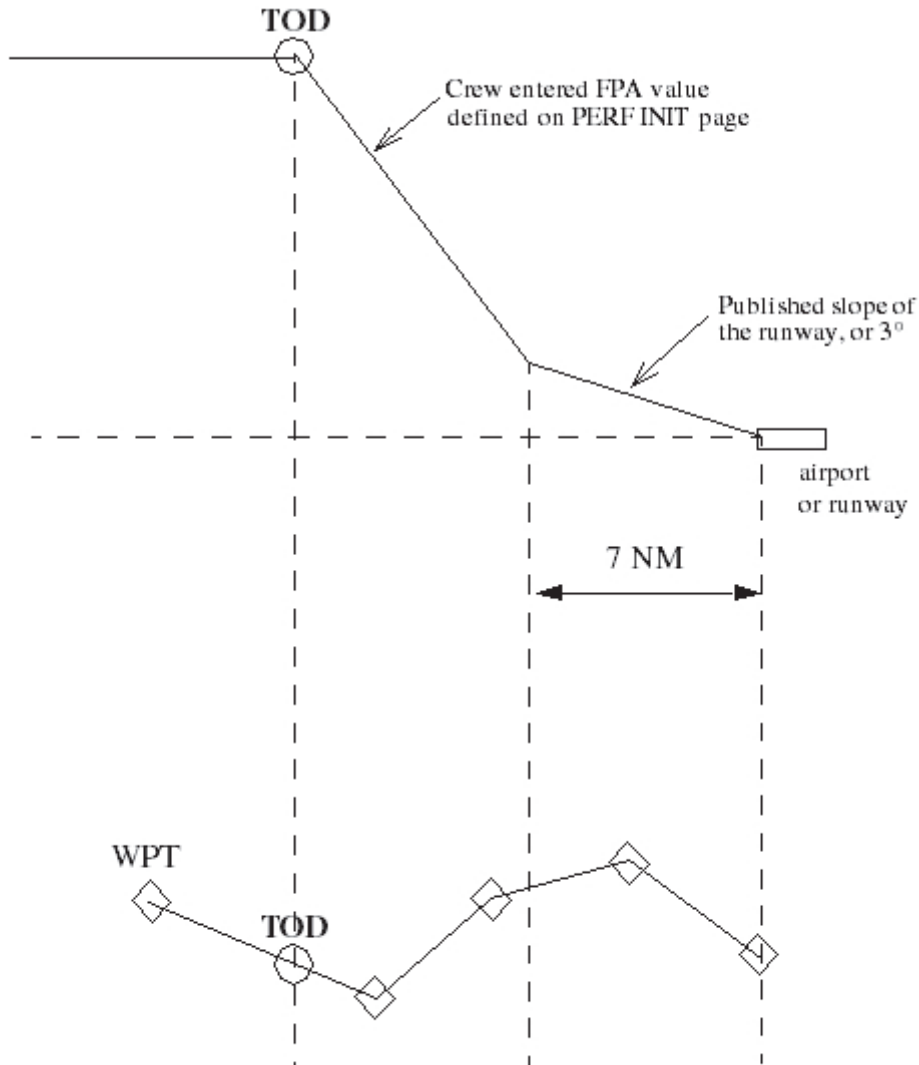
4.14 <u>Required Time of Arrival</u>

This function allows to insert a time constraint on a flight plan waypoint.

4.14.1 *<u>RTA functional description</u>*

When a RTA is defined on a flight plan waypoint, an IASrta is computed in order to respect the RTA. The constant IASrta is used for cruise and descent step phases and nominal predictions are used for climb and step climb phases.

The target IAS displayed on VNAV page will be in accordance with this computation.

When an AT OR AFTER or AT OR BEFORE constraint is defined, predictions are computed as usual and if the constraint is missed, an IASrta is computed.

The minimum value of IASrta will be computed with wind limitations: the drift shall be less than 45°, the front wind shall be less than ha lf of predicted TAS and back wind shall be less than twice the predicted TAS.
So , the minimum value of the IAS can be greater then Vmin.

A RTA can be defined for a waypoint in climb phase but no IASrta will be computed if the constraint is missed with FMS usual predictions.

4.14.2 *RTA insertion or modification*

The insertion/modification of a RTA is possible on the **VERT REV** page of a flight plan waypoint.

case of Manual PERF MODE

1) Press **FPLN** key.

2) Press on the right Lsk beside the desired waypoint : the **VERT REV** page is displayed.

3) WRITE the desired value of RTA in the scratchpad : the format of the entry must be

   - **A**XXHXX:XX for "AT or AFTER" required time of arrival.
   - **B**XXHXX:XX for "AT or BEFORE" required time of arrival.
   - XXHXX:XX for "AT" required time of arrival.

4) Press on the Lsk beside the RTA field : the value is displayed.

NOTE : - The RTA value is limited to local time + 24H00.

- Only one RTA can be defined for a flight plan. If a RTA already exists in the flight plan, the message DELETE OTHER RTA ? is displayed

- No RTA can be defined on a moving waypoint.

- If RTA is defined, ETA = ETA – RTA is displayed.

4.14.3 *RTA display*

If a RTA is entered on a waypoint, the ETA (resp. ETE) of the corresponding leg is underlined on **FPLN** and **PROG 1/3** pages.
If RTA is respected, the ETA (resp. ETE) is displayed in green (or yellow for temporary flight plan) otherwise it is displayed in amber.

NOTE : - If the RTA on a waypoint is or becomes missed, a RTA MISSED message is displayed in scratchpad.

4.15 Secondary Flight Plan

The secondary flight principles are described in the "route management principles" paragraph;

4.15.1 *Secondary flight plan initialization*

The secondary flight plan initialization page can be reach from :
- The **FPLN INIT** page (prompt <SEC INIT),
- The **SEC FPLN** page (prompt < NEW FPLN).

```
M         SEC INIT  GPS .04
L1  <ROUTE          ACTIVATE<  R1
L2  >COPY FPLN      SWAP FPLN>  R2
L3                              R3
L4                              R4
L5                  SEC PERF>  R5
L6  <RETURN      CANCEL SEC<  R6
BRT
```
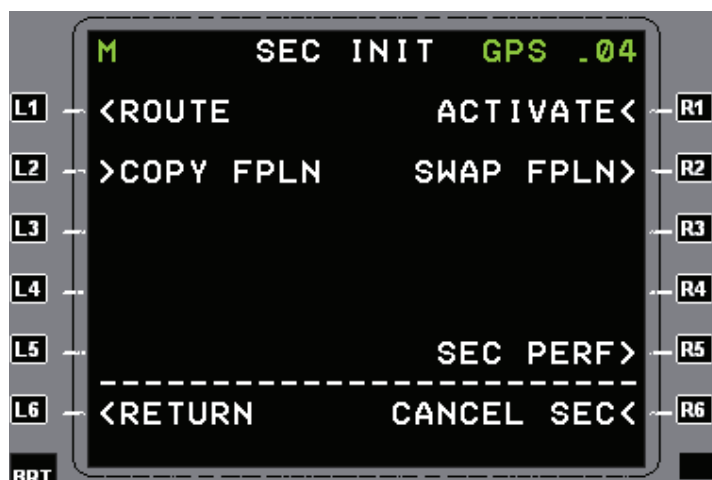
1) Press **ROUTE** Lsk to display the ROUTE SEL page associated to the secondary flight plan

2) Press **COPY FPLN** Lsk to copy the active flight plan into the secondary flight plan. This action needs a confirmation.
3) Press **SWAP FPLN** Lsk to SWAP the active and the secondary flight Plan.
4) Press **ACTIVATE** Lsk to activate the secondary flight plan.
5) Press **CANCEL SEC** to Cancel the secondary flight Plan.
6) Press **SEC PERF** to display the SEC PERF page.

Theses actions are described in specific paragraph (see below).

4.15.2 *Route Selection*

The **ROUTE SEL** page is identical as the **ROUTE SEL** page for active flight plan (see corresponding paragraph) .
The label beside the R6 Lsk indicates the flight plan concerned by the route selection. when the page is reached from the **SEC INIT** page, its' the secondary flight plan and the label is "SEC" by pressing the R6 Lsk, the selection rotates (FPLN/TMPY/SEC)
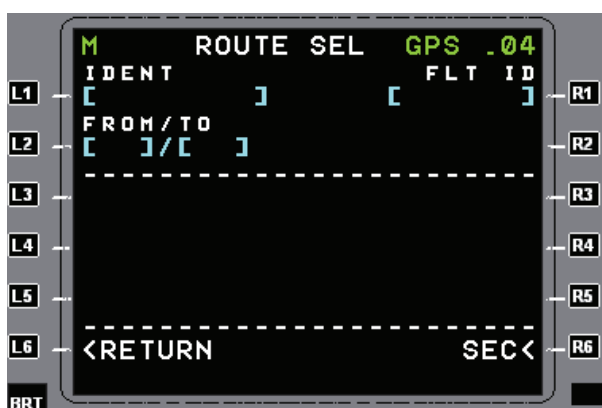
ROUTE SEL page without selected route
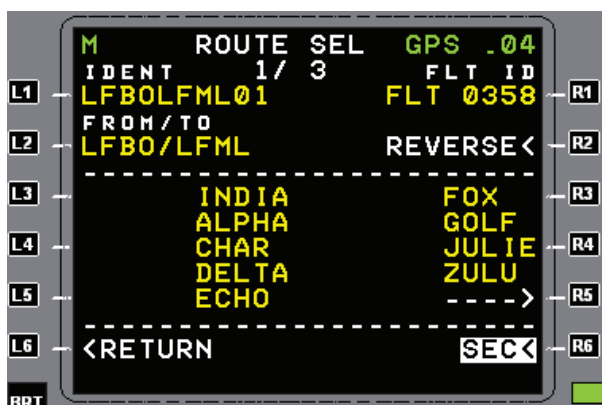
ROUTE SEL page with selected route

To selected the ROUTE : press the **EXEC** key

4.15.3 *Copy active Flight plan in the secondary flight plan*

By pressing the "**>COPY FPLN**" Lsk and then the **EXEC** key on the **SEC INIT** page the active flight plan is copied in the secondary flight plan.

```
M        SEC INIT   GPS .04
L1  <ROUTE         ACTIVATE<   R1
L2  >COPY FPLN     SWAP FPLN<   R2
L3                              R3
L4                              R4
L5               SEC PERF>      R5
    ----------------------------
L6  <RETURN       CANCEL SEC<   R6
     PRESS EXEC TO CONFIRM
BRT
```
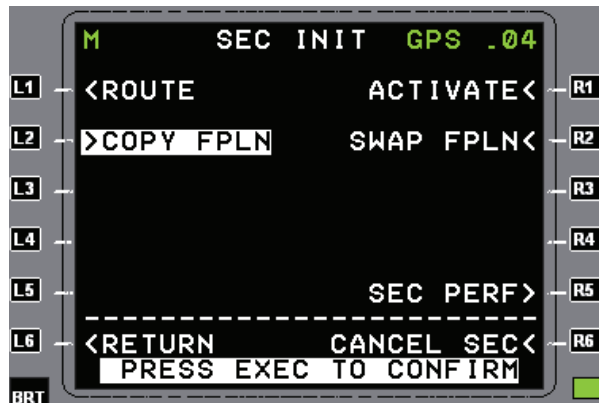
This action is taken into account after pressing the **EXEC** key. It deletes the previous secondary flight plan.

4.15.4 *Activation of the secondary Flight plan*

By pressing the "**ACTIVATE <** " Lsk and then the **EXEC** key on the **SEC INIT** page the secondary flight plan is activate and replaces the active flight plan.
So, the two flight plans are linked.

```
M        SEC 1/ 2 GPS .04
    AF0358    ETA Z SPD ALT
L1  LFB033R --H-- ---/-----   R1
    MEN3B   H326°   5.4NM
L2  TOU/02  --H--  ---/ 900a   R2
    "       H023°   11NM
L3  INTCP   --H-- ---/ 1000    R3
    "       C068°   22NM
L4  BISBI△  15H36 ---/-----    R4
    "       240°    23NM
L5  MEN     --H-- ---/ STEP    R5
    ----------------------------
L6  <NEW FPLN      ETE/EFOB<   R6
     PRESS EXEC TO CONFIRM
BRT
```
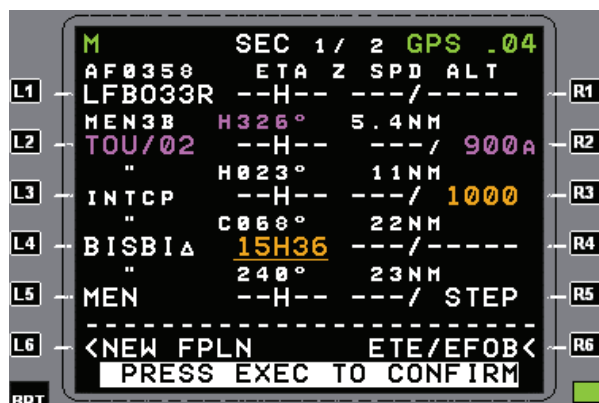
The secondary flight plan is activating by pressing the **EXEC** key. The **FPLN** page (active flight plan) is so displayed.

4.15.5 *Swap of the active and of secondary flight plan*

By pressing the "**SWAP FPLN <**" Lsk and then the **EXEC** key on the **SEC INIT** page the two flight plans are swapped.

The **EXEC** command displays the **FPLN** page (active flight plan).
If the two flight plans were linked, they stay linked.

4.15.6 *Cancellation of the secondary flight plan*

By pressing the "CANCEL SEC<" Lsk, and then the **EXEC** key, the secondary flight
plan is deleted.

```
 M         SEC INIT   GPS .04
L1 ─ <ROUTE          ACTIVATE<  ─ R1

L2 ─ >COPY FPLN      SWAP FPLN< ─ R2

L3 ─                            ─ R3

L4 ─                            ─ R4

L5 ─                 SEC PERF>  ─ R5
     ───────────────────────────
L6 ─ <RETURN         CANCEL SEC< ─ R6
      PRESS EXEC TO CONFIRM
```
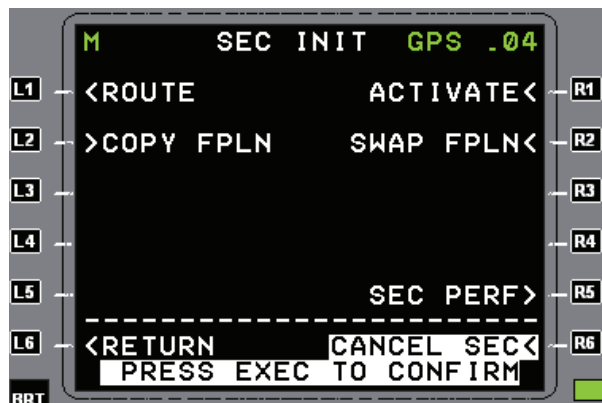
4.15.7 *Performance initialisation*

Some specific parameters are attached to the performances of the secondary flight
plan (some parameters are common to the active flight plan and to the secondary
flight plan).

| **PERFDATA MODE** | **MANUAL PERF MODE** |

```
 M     SEC PERF  GPS .20            M     SEC PERF  GPS .20
   CRZ ALT  -CRZ- MEANWIND            CRZ ALT  -CRZ- MEANWIND
L1 FL150      251°/ 15KT  R1       L1 FL150      251°/ 15KT  R1
   CRZ MODE
L2 >LONG RANGE            R2       L2                        R2
   QNH      -APP-  GND WIND           QNH      -APP-  GND WIND
L3   1015HPA  120°/  5KT  R3       L3   1015HPA  120°/  5KT  R3
   TRANS ALT                          TRANS ALT
L4   5000FT               R4       L4   5000FT               R4
   PAX      -T/O-   CARGO             PAX      -T/O-   CARGO
L5   16        12000KG    R5       L5   16        12000KG    R5
           TOTAL FUEL                         TOTAL FUEL
L6 <RETURN      8500KG    R6       L6 <RETURN      8500KG    R6
```

The "**TAKE OFF**" parameters are displayed only if :
  ➢ the mode of the secondary flight plan is "not linked" to active, and
  ➢ the departure airport of the secondary flight plan is the same as the
    destination airport of the active flight plan.",
otherwise, the corresponding parameters are not displayed :

| **PERFDATA MODE** | **MANUAL PERF MODE** |
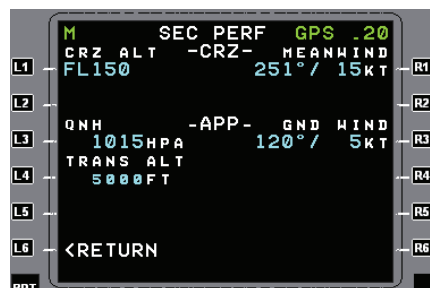
The meanings of the parameters are the same as the equivalent parameters used for the active Flight Plan (see corresponding paragraphs).

4.16 MISSION

4.16.1 *Mission area definition*

A mission area is defined as a portion of a flight plan for which the lateral path is not defined.

The mission area can be inserted between two waypoints of a flight plan (IFR active flight plan, Temporary flight plan or Secondary flight plan) only in PERFDATA PERF MODE.
Only one mission area can be defined in a flight plan.

The mission area is defined by the mission duration and also by specific performance parameters used for prediction computation in this area. The crew can modify those parameters at any time.
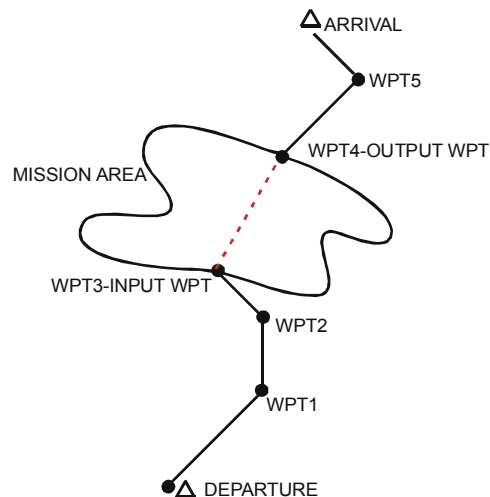
The crew has the possibility to start the mission at any time. Once started, the mission can be manually stopped.

4.16.2 *Mission insertion and initialisation*

The mission is defined as a lateral revision at a fix.

1) Display the desired FPLN and perform lateral revision (left Lsk press) on the fix after which the mission area shall be inserted (mission entry point).
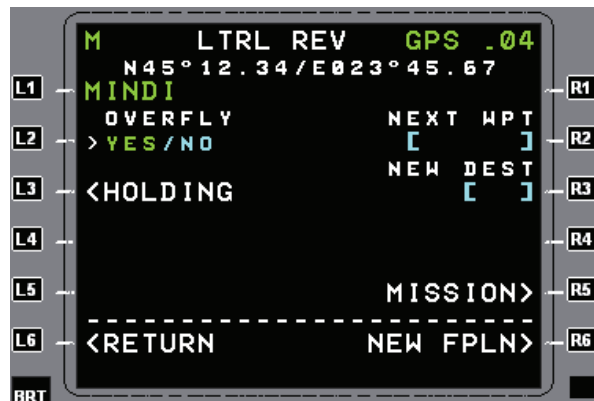
2) Press **MISSION** Lsk key to access to the **MISSION** page :

P3 aircraft   **Others aircrafts**

3) Enter the mission parameters:
➢ **CRZ ALT** mission cruize altitude
➢ **DRAG INDEX** mission drag index (selection for P3 aircraft or value insertion otherwise)
➢ **ENGINES** mission engine number
➢ **DURATION** mission duration,
➢ **CRZ MODE** mission cruize mode.

Note:The crew may insert values of theses parameters for the mission. By default, theses parameters are defined as the current parameters (Cf PERF INIT page) and the DURATION is taken as time necessary to rally the input and output point)

4.16.3 *Flight plan revision with mission area*

Once the mission area is inserted in the flight plan, it is displayed as follows:

Before MISSION INSERTION   After MISSION INSERTION

Direct access to the MISSION page is allowed through lateral revision on the FPLN page.

CLR action is allowed on the mission area.

If a fix is inserted on the mission area, the fix is inserted before the mission and becomes the new mission entry point.

4.16.4 *Mission start and stop*

The mission area is automatically started when the entry point of the mission is sequenced by the FMS.
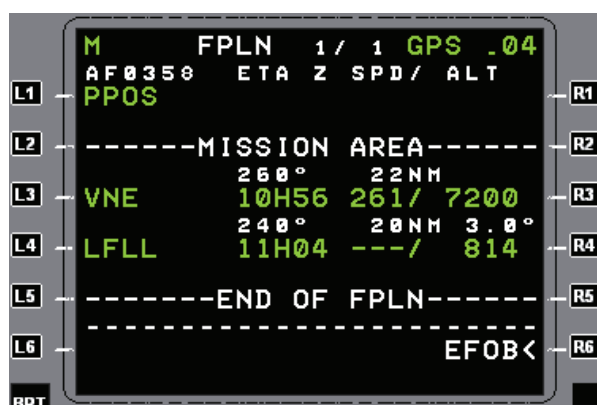
To avoid the mission to start automatically, the crew can insert a discontinuity before the mission area. Then, the entry point will not be sequenced automatically.

The crew can start manually the mission (before the entry point sequencement) by pressing the **START** Lsk in the **MISSION** page (confirmed with **EXEC**).

P3 aircraft	Others aircrafts

```
M        MISSION    GPS .04
          AT MINDI
L1                              R1
   DRAG INDEX       CRZ ALT
L2 >A(0-50)          FL210      R2
   ENGINES         CRZ MODE
L3 >4/3          MAX RANGE<     R3
   DURATION
L4 12H02:13                     R4

L5 >START                       R5
   ------------------------
L6 <RETURN                      R6
      PRESS EXEC TO CONFIRM
```

```
M        MISSION    GPS .04
          AT MINDI
L1                              R1
   DRAG INDEX       CRZ ALT
L2 200               FL210      R2
                   CRZ MODE
L3               MAX RANGE<     R3
   DURATION
L4 02H02:13                     R4

L5 >START                       R5
   ------------------------
L6 <RETURN                      R6
      PRESS EXEC TO CONFIRM
```

When the mission is active, the **DURATION** becomes **REMAINING** time and is decreased. The page becomes:

P3 aircraft	Others aircrafts

```
M        MISSION    GPS .20
L1                              R1
   DRAG INDEX       CRZ ALT
L2 >A(0-50)          FL210      R2
   ENGINES         CRZ MODE
L3 >4/3          MAX RANGE<     R3
   REMAINING
L4 11H58:23                     R4

L5 >STOP                        R5
   ------------------------
L6 <RETURN                      R6
```

```
M        MISSION    GPS .04
L1                              R1
   DRAG INDEX       CRZ ALT
L2 200               FL210      R2
                   CRZ MODE
L3               LONG RANGE<    R3
   REMAINING
L4 11H58:23                     R4

L5 >STOP                        R5
   ------------------------
L6 <RETURN                      R6
```

The remaining time is only used for prediction computations i.e. the mission is not stopped automatically when the remaining time reaches 00H00:00 (and is then frozen). The mission remains active till the crew stops it.
The crew can modify this value, which may have a significant impact on prediction computation (NRP, FAL alert… see §4.16.6)

The crew can stop the mission by:
- pressing the STOP Lsk on the **MISSION** page (a direct to is then automatically performed on the following point),
- by any lateral revision clearing the mission from the flight plan (DIRECT TO a FPLN fix after mission, CLR action on the mission, …).

4.16.5 *Active mission*

When the mission is started, all the legs located before the mission are considered in the mission area.
When a FPLN is received from the FITS computer :
- When the mission is active : it is inserted in the mission area (and the legs located after the mission are unchanged).
- When the mission is not active, the current FPLN is totally replaced by the FITS FPLN.

In the same way, when a FPLN cancellation is received from the FITS computer:
- When the mission is active: the flight plan located before the mission area is cancelled (and the legs located after the mission are unchanged).

- When the mission is not active, the whole current FPLN is cancelled.

4.16.6 *Prediction computation with mission area*

Predictions on the full flight plan are performed taking into account mission parameters for the mission area.

Predictions computations for the mission are performed using the maximum between the mission duration and the estimated time to go direct to the waypoint following the mission.

The predictions for the legs located after the mission are still computed with current performance parameters.

When the mission is active, the predictions for the legs located in the mission area are computed with the performance parameters defined for the mission area.

The remaining time is then considered to be the duration between current time and time at waypoint following mission area.

Non Return Point (NRP) computation

At each fix of the flight plan, the [EFOB at fix – fuel necessary to rally the alternate] is computed.

If the result is greater than Fuel reserve at fix n and lower at fix n+1 then the NRP is defined and located between those two points. Fix n may be the aircraft position.

This computation is performed whatever a mission exists or not.

Then an algorithm searches a more precise position of the NRP between the two points, starting at the first point.

If these two points are the input and the output of a mission area, the NRP is computed using the predicted speed in the mission and is located:

- on the segment between the 2 points if remaining fuel quantity is sufficient to fly partially the direct distance between those points (case NRP1 in figure below)

- on the output point position if remaining fuel quantity is sufficient to fly direct distance between input point and output point but not enough to fly mission duration time (case NRP2 in figure below).
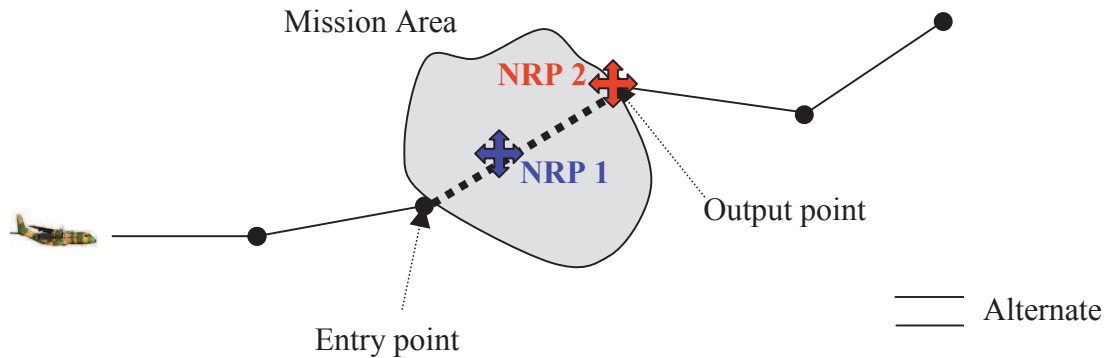
Once the aircraft is in the mission, the same principles are retained:

The NRP is computed using the predicted speed in the mission and is located :

- between last waypoint of mission area and output point if remaining fuel quantity is sufficient to fly partially the direct distance between those points (case NRP1 in figure below)

- on the output point position if remaining fuel quantity is sufficient to rally the output point but not enough to fly mission remaining time (case NRP2 in figure below)
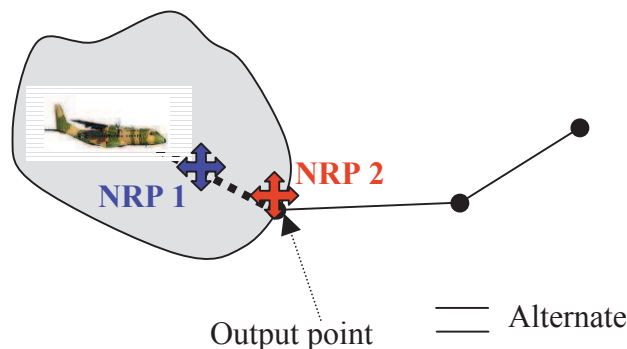
FAL Alert with mission area

The same principles described above are retained for FAL alert computation:

When a mission area is defined in the flight plan, the computation of FAL alert uses the maximum between the mission duration (or mission remaining time if mission is active) and the estimated time to go direct to the waypoint following the mission (output point).

If the mission system transfers a flight plan with a flight duration over mission remaining time, the FMS takes into account the full flight time (corresponding to the mission pattern) and the corresponding fuel consumption.Fuel Alert (FAL) at final destination is then available for safety to alert the pilot when he must initiate the ferry flight back.

4.16.7 *RNP for mission area*

The crew can manually define and modify the RNP (Required Navigation Performance) to be applied to navigation along the mission area. (see §7.2.2 for RNP insertion).
When the mission flight plan is modified or stopped (manually or automatically), RNP value does not change until the flight area changes.

5 TACTICAL OPERATION

Note: tactical operation except warning zones is not available on P3 aircraft.

5.1 <u>Tactical data</u>

The tactical database is composed of four routes, numbered 1 to 4, with a maximum of 100 fixes for each. It contents also up to 10 warning zones.

There are three types of tactical waypoint :
- standard fix.
- landing fix.
- dropping fix.

The waypoint identifier is a number from 100 to 499. The first digit (1 to 4) indicates the number of the tactical route which this fix belongs to, and the two last digits (00 to 99) the sequence number of the waypoint in the route. So all waypoints are used by increasing number in a route.

Each route can comprise an optional second itinerary which is defined by a decision waypoint and the sequence number of the first waypoint of the second itinerary. This number has to be greater than the sequence number of the last point of the principal itinerary.

NOTE : - The decision point must be on a standard waypoint.
   - The presence of the decision point is not necessary, if there is no second itinerary.

For example the route 2 has the waypoint 217 as decision point. Its optional itinerary starts with the waypoint 225.

FIRST ITINERARY
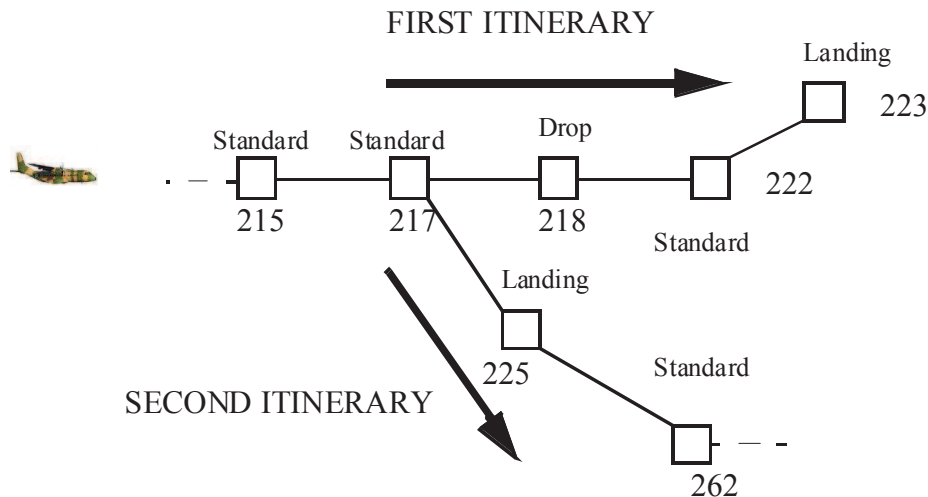
5.1.1 *Creation, modification, deletion of tactical data*
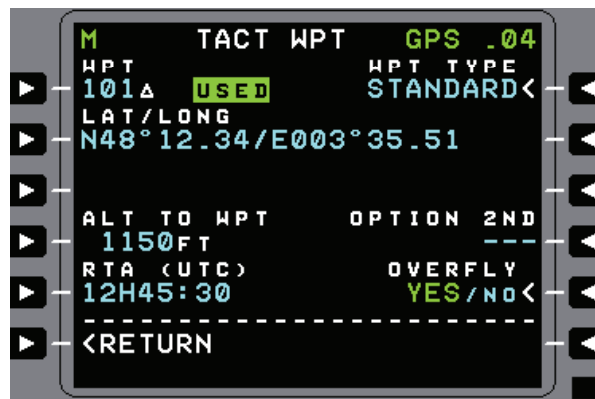
1) Press **DATA** key.

2) Press **DATABASE** Lsk.

3) If the desired number route is not displayed on the **DATABASE** page, enter its number on **TACTICAL ROUTE** Lsk.

4) Press **TACTICAL ROUTE** Lsk, then the first waypoint of the tactical route is displayed.

5) Press **NEXT** / **PREV** key to access to the next/previous waypoint.

6) To access directly to a desired waypoint, enter its number on **WPT** Lsk.

NOTE : - It is not allowed to:
- modify the type of waypoint (standard, land, drop).
- delete the waypoint which is declared as a decision point. Firstly, clear the **OPTION 2ND** field of the decision point.
- delete the first waypoint of the optional itinerary. Clear, first the **OPTION 2ND** field of the decision point.
- When the corresponding tactical route is the active flight plan, it is not allowed to:
- delete/create its waypoints.

- delete/create the **OPTION 2ND** field of its decision point.

7) To modify waypoint characteristics, enter new values. Optional parameters as **RTA**, **OPTION 2ND** can be deleted.

8) To create a new waypoint, enter a new waypoint number on **WPT** Lsk. Press **WPT TYPE** Lsk successively, until to obtain the desired type.

9) To delete a waypoint, perform a CLEAR action on **WPT** Lsk.

NOTE : After modifications, in order to recover the same tactical data after a power off, the DTA alarm is triggered to perform a save of data
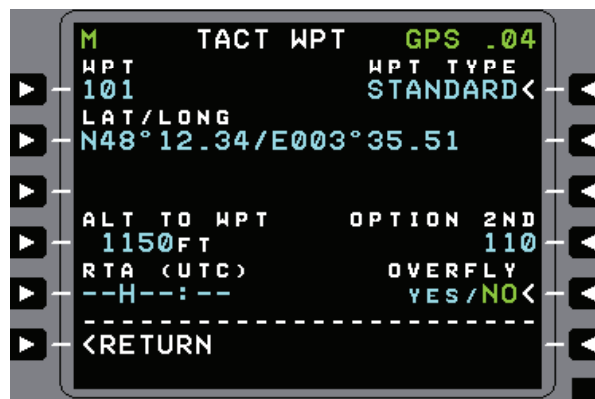
5.1.2 _Standard waypoint page_

This page contents :
- **WPT**, the waypoint number.
- Δ, if the waypoint has to be overflown.
- **USED**, if the waypoint is used in the flight plan. **WPT TYPE**.
- **LAT/LONG** : position
- **ALT TO WPT**, minimum altitude to join the waypoint.
- **OPTION 2ND**, if the waypoint is a decision point, number of the first waypoint of the second itinerary.
- **RTA**, Required Time of Arrival in UTC, optional.
- **OVERFLY**.

5.1.3 *Landing waypoint page*

This page contents :

- **WPT**, the waypoint number.
- **USED**, if the waypoint is used in the flight plan.
- **LAT/LONG**. position
- **ELEVATION**.
- **ALT TO WPT**, minimum altitude to join the waypoint.
- **AXIS**, Runway geographic axis.
- **RTA**, Required Time of Arrival in UTC.
- **SLOPE**, angle of the glide slope.

NOTE : When a slope value is entered, the format is N.N or N.

5.1.4 *Dropping waypoint page*
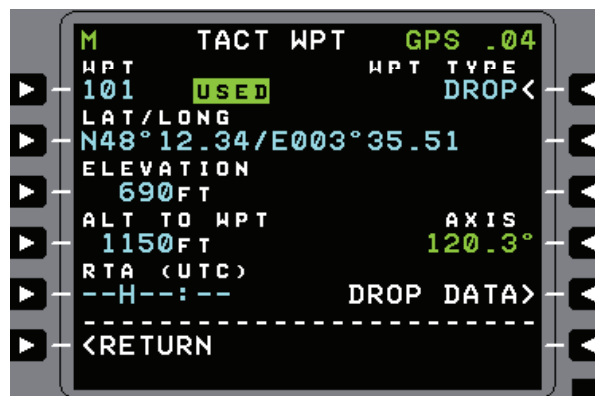
This page contents :
- **WPT**, the waypoint number.
- **USED**, if the waypoint is used in the flight plan.
- **LAT/LONG**, position
- **ELEVATION**.
- **ALT TO WPT**, minimum altitude to join the waypoint.
- **AXIS**, the dropping bearing, which is calculated from the previous tactical point to the dropping point.
- **RTA**, Required Time of Arrival in UTC, optional.

Press **DROP DATA** Lsk to access to the dropping parameters.

5.1.5 *Drop data page*
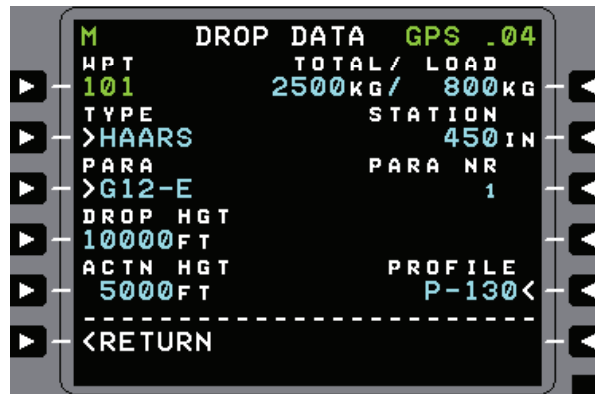
This page contents :
- **WPT**, the waypoint number.
- The **TYPE** of dropping. Press the corresponding Lsk to select it through the different dropping type names, defined in the tactical configuration table.
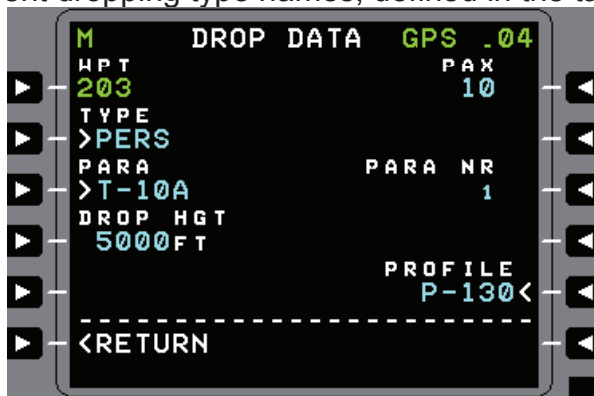
- **PARA,** the parachute type. Press the corresponding Lsk to select it through the different parachute names (defined in the tactical configuration table) which are compliant with the selected dropping type.

DROP HGT, the dropping height. enter a value.
- **STATION,** the load station in the aircraft, in inches. Enter a value.
- **PARA NR,** the number of parachutes. In case of a load dropping, its value is computed according to the parachute type and the load weight. Enter a value to overwrite the computed one.
- **ACTN HGT,** the actuation height. enter a value.

TOTAL / LOAD, the total mass to drop / the weight of the first load to be dropped. Enter values.

- **PAX,** the number of paratroopers to be dropped. Enter a value.
- **PROFILE,** the dropping profile name. Press the corresponding Lsk to select a value through the dropping profile names defined in the tactical configuration table. See Dropping paragraph

NOTE : - If a parameter is not required, according to the following table, then the corresponding field is not displayed.

- If that page is displayed as result of a lateral revision on the tactical **FPLN** page (through the tactical waypoint page) and a new flight plan is selected then the first **FPLN** page is automatically displayed.

- If that page is displayed from the **DROP** page and ((a leg sequence occurs such as neither the TO waypoint is a dropping waypoint nor (the TO waypoint is a standard waypoint and the TO+1 waypoint is a dropping waypoint)) or a new flight plan is selected) then the **PROG 1/3** page is automatically displayed.

The table below provide the list of Not Required (-) or Mandatory (*) parameters.

	DROPPING				
	Very Low Altitude	**Without Free Fall**		**With Free Fall**	
	LOAD	**LOAD**	**PERSONNEL**	**LOAD**	**PERSONNEL**
PARA	-	*	*	*	*
PARA NR	-	*	-	*	-
PAX	-	-	*	-	*
LOAD	*	*	-	*	-
TOTAL	*	*	-	*	-
STATION	-	*	-	*	-
DROP HGT	-	*	*	*	*
ACTN HGT	-	-	-	*	*

The parameters shall belong to the following ranges, else the insertion is refused :

- **PARA NR :** the insertion range is defined in the tactical configuration table, according to the selected parachute type.
- **PAX :** see weight insertion paragraph
- **LOAD :** WLOAD_MIN - the minimum between cargo max and WLOAD_MAX.
- **TOTAL :** WLOAD_MIN - cargo max.
- **STATION :** 300 in - 737 in.
- **DROP HGT :** 0 - 99,999 ft.
- **ACTN HGT :** 0 - 99,999 ft.

NOTE : - When **LOAD** or **TOTAL** is modified, if **LOAD** > **TOTAL** then the insertion is refused.

- If **ACTN HGT** is greater than **DROP HGT,** the insertion is refused.

- WLOAD_MIN and WLOAD_MAX are defined in the tactical configuration table.
- For cargo max value, see Weight insertion paragraph.

5.1.6 *Warning zone list*

This page displays the warning zone list, composed of up to 10 warning zones stored in the database.

1) Press **DATA** key, **DATABASE** Lsk and then **WARNING ZONE** Lsk.
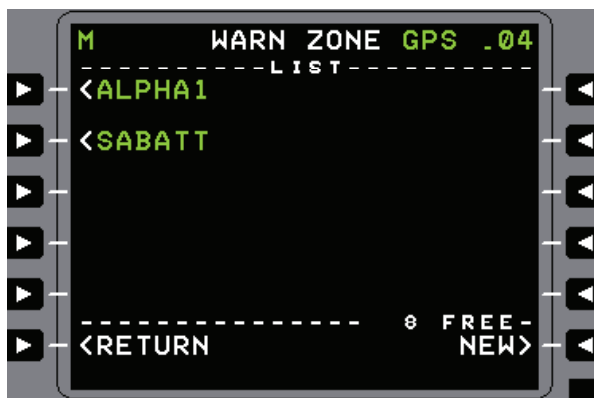
2) The warning zone idents are displayed in alphabetic order. Press the Lsk corresponding to a warning zone ident to access to the **WARN ZONE** page, in order to display and modify parameters of stored data.

3) The number of **FREE** places for warning zone data in database is displayed.

4) If the **FREE** places is not null, then **NEW >** is displayed. Press this Lsk to display the **WARN ZONE** page with invalid parameters, in order to create a new warning zone.

5.1.7 *Warning zone page*

This page displays information about a warning zone stored in the database. The crew can modify parameters of stored data or create a new warning zone.

1) On the **WARN ZONE LIST** page, press a Lsk corresponding to a warning zone or press the **NEW** Lsk.
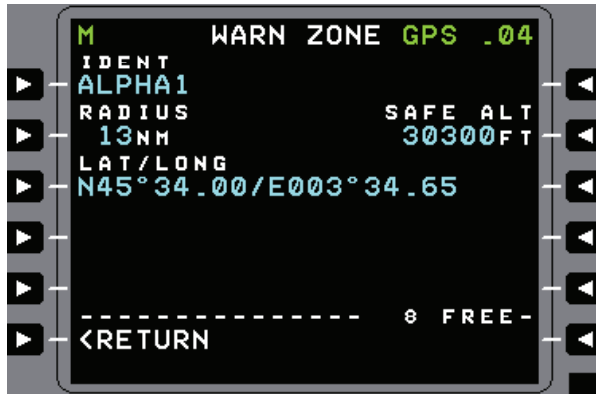
2) The following parameters are displayed and can be entered :

- **IDENT,** the warning zone identification (mandatory).
- **RADIUS** (mandatory).
- **SAFE ALT,** the safe altitude (optional).
- **LAT/LONG,,** the center latitude/longitude (mandatory).

NOTE : - If a mandatory data is invalid, large amber boxes are displayed.
    - If an optional data is invalid, large cyan dashes are displayed.
    - If all mandatory data is valid, the warning zone data is stored in the database each time a parameter (except **IDENT**) is modified or when the last invalid mandatory parameter is filled in.
    -

3) The number of **FREE** places for warning zone data in database is displayed.

4) **IDENT** entry :

- If the **IDENT** parameter was invalid before the insertion :
   - If the inserted **IDENT** is already used by another warning zone data, the entry is rejected with the IDENT ALREADY USED message.
   - Otherwise,
      - if the **FREE** places is not null, the **IDENT** parameter is filled with the entry
      - else the entry is rejected with a MEMORY FULL message.

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- If the **IDENT** parameter was valid before the insertion :
  - o If a warning zone stored in the database corresponds to the **IDENT** entry, the parameters are filled with this warning zone data.
  - o Otherwise
    - ▪ if the **FREE** places is not null, the **IDENT** parameter is filled with the entry and the other parameters are set to invalid.
    - ▪ else the entry is rejected with a MEMORY FULL message.

5) Press **PREV** (resp. NEXT) key to access to the previous (resp. next) warning zone of the database (circular access).

NOTE : If the **IDENT** parameter is not valid, the PREV (resp. NEXT) key press access to the last (resp. first) warning zone of the database.

5.2 Tactical flight plan

5.2.1 *Tactical flight plan initialization*

1) Two possible access:

- On **INIT** page, press **FPLN INIT** Lsk.
- On **TACT WPT** page, access from the **FPLN** page, press **NEW FPLN** Lsk.
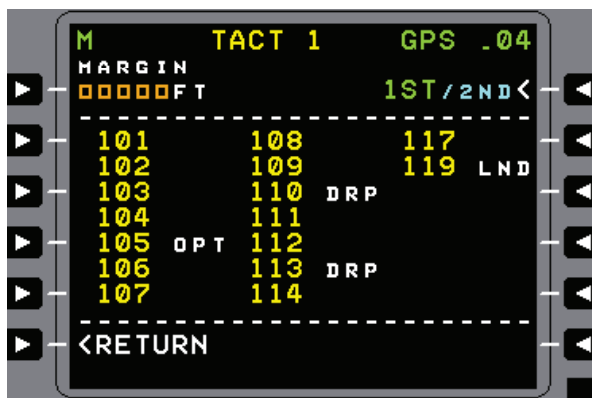
2) If the desired number route is not displayed on the **DATABASE** page, enter its number on **TACTICAL ROUTE** Lsk.
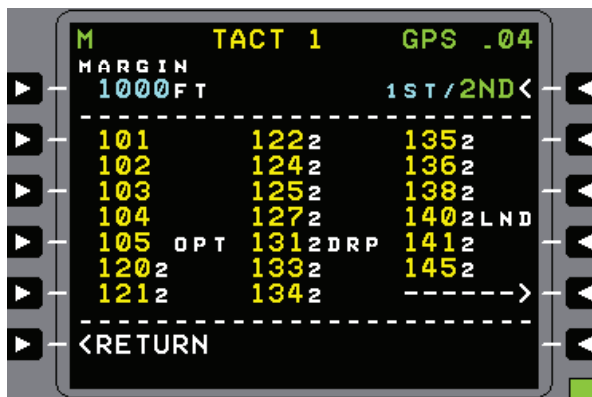
3) Press **TACT** Lsk. Then the first itinerary of the tactical route is displayed with its waypoints followed by :

- **OPT** for a decision point.
- **DRP** for a dropping point.
- **LND** for a landing point.

4) Press **1ST/2ND** Lsk to change of itinerary. The other itinerary is then displayed. The points belonging to the second path are followed by **2**.

5) If "**<.....**"/"**.....>**" are displayed, a press on this Lsk enables to scroll down/up the fix list of the route.

6) Enter on **MARGIN** Lsk, the altitude margin which is always positive (the margin use is described in the Vertical navigation paragraph.

7) Press **EXEC** to confirm the flight plan, the **FPLN** page appears.

NOTE : - When a TACTICAL flight plan is activated, the heading reference is set to TRUE.
   -    If there is already a tactical route activated, by default its margin is displayed, otherwise it is invalid and has to be entered.

5.2.2 _Tactical flight plan page_
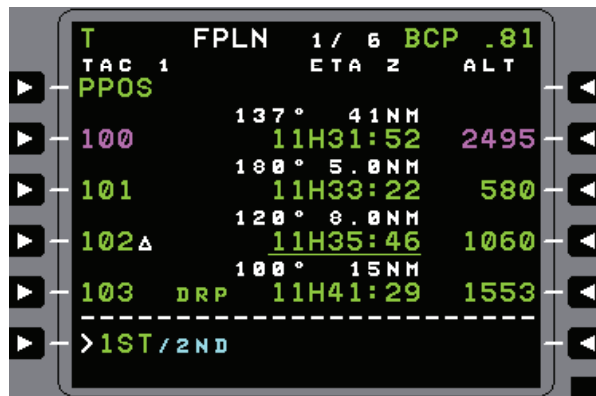
ACCESS : **FPLN** key.

This page displays :
- **TAC**, the tactical route number.
- **ETA L/Z**, Time reference for the Estimated Time of Arrival, local or zulu.
- On the third line, the FROM point is displayed.
- The number and altitude constraint of the TO waypoint are displayed in magenta.
- Δ, the waypoint has to be over flown.
- **2ND**, beginning of second itinerary.
- **OPT** for a decision point.
- **DRP** for a dropping point.
- **LND** for a landing point.
- For each fix of the route, its bearing, distance from the preceding point, its Estimated Time of arrival, **ETA**, and its altitude constraint are displayed. For the landing point, the glide slope is displayed too.

   An underlined **ETA** means that a RTA, Requested Time of Arrival, exists.

5.3 Tactical progress 1/3 page
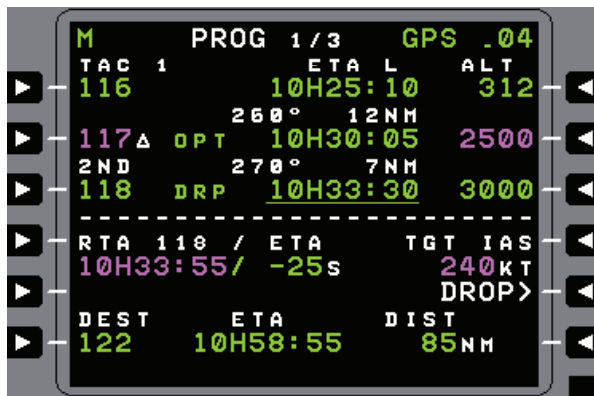
ACCESS : `PROG` key.

This page contents :
- The FROM, TO (in magenta), NEXT TO waypoints are displayed as on **FPLN** page.
- If a RTA is defined on a waypoint placed further in the flight plan, this waypoint number with its **RTA**, the time discrepancy with the **ETA** (a negative value means that the aircraft is early), and the **TGT IAS**, Indicated Air Speed Constraint to reach in time this point are displayed. For landing and dropping point, the **TGT IAS** corresponds to the speed profile, and during take off it takes the V2 value.
- **DROP** Lsk appears if the TO is a dropping waypoint or if the TO is a standard waypoint and the TO+1 a dropping waypoint. A press on this Lsk enables to access to the drop parameters. See drop page paragraph.
- The destination waypoint number, **DEST**, with its Estimated Time of Arrival, **ETA**, and the remaining flight plan distance, **DIST**, are displayed.

NOTE : The **PROG 2/3** and **3/3** pages are described in GENERAL PROCEDURES section.

5.4 Tactical flight plan revision

5.4.1 *Tactical itinerary modification*

```
T      FPLN   5/ 5 BCP .81
TAC 1          ETA Z     ALT
117          13H36:40   1755
        100°   12NM
118   OPT  13H40:21   1739
        049°   33NM
120   DRP  13H51:20   2711
        005°   11NM    3.0°
124   LND  13H54:59   3000
------END OF FPLN-------
>1ST/2ND
```
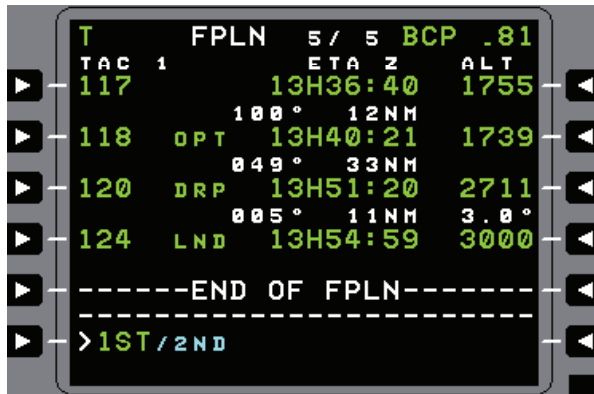
1) Press **FPLN** key.

2) Until the decision point has not been reached, press **1ST**/**2ND** Lsk.

NOTE : - It is impossible to add or delete a waypoint of an active tactical route. The
         only way is to deactivate, then modify and finally reactivate the route.
       -    To have the possibility of adding waypoints in a tactical route, it is
            recommended to define the initial route with holes (for example : 101 103
            105 ...).

5.4.2 *Waypoint modification*

```
M     TACT WPT    GPS .04
WPT               WPT TYPE
101    USED      LANDING<
LAT/LONG
N48°12.34/E003°35.51
ELEVATION
   690FT
ALT TO WPT        AXIS
  1150FT         121.3°T
RTA (UTC)         SLOPE
12H45:30           3.0°
----------------------
<RETURN
```

1) Press **FPLN** key.

2) Press on a waypoint Lsk, then its data page is displayed. Modify its features.

NOTE : - The deletion/creation of a decision point or a waypoint is forbidden.

- The modification of **WPT TYPE** is forbidden.
- Modification are taken into account for the navigation.
- After a modification, in order to recover the same pilot data after a power off, the alarm DTA is triggered to perform a save of data.
- Press **NEW FPLN** Lsk to change flight plan.

5.4.3 *Direct to*

NOTE : - The direct to a downstream tactical waypoint is only allowed if this point belongs to the activated itinerary (first or second).
- The direct to waypoint is seen as a standard waypoint, even if it is stored in the tactical database as a LANDING or DROPPING waypoint.
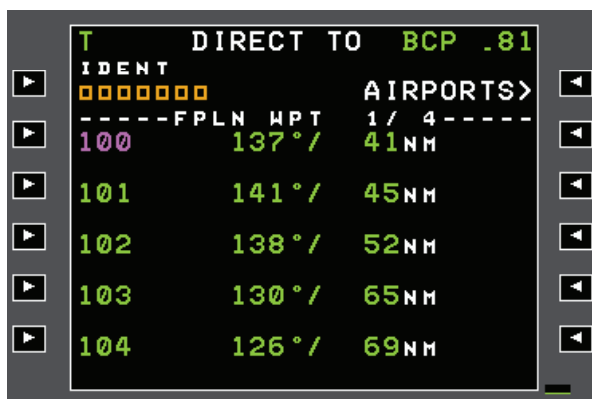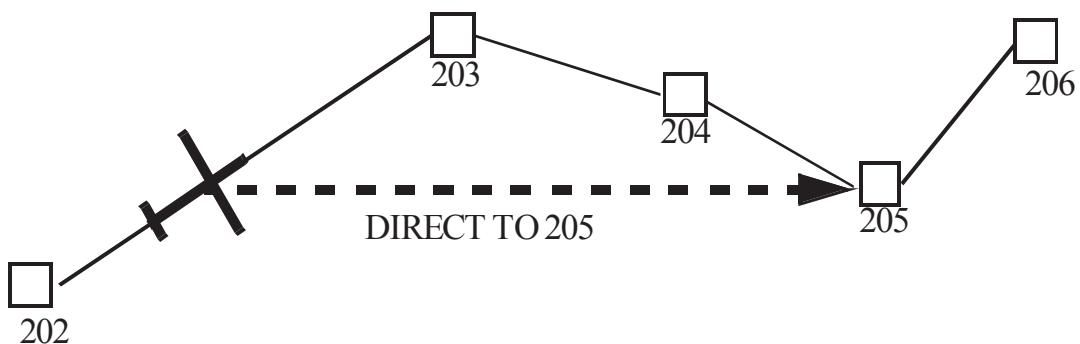
1) Press **DTO** key.

2) On **DIRECT TO** page, the next points of the flight plan with their direct distance and bearing from the FMS position are displayed.

3) Press Lsk corresponding to the chosen waypoint, then the **DIRECT TO** page is displayed, with the **IDENT** field filled.

4) Enter the **ALT TO WPT**.

5) Press **EXEC** to confirm the DIRECT TO, the **FPLN** page appears.

NOTE : The MARGIN is not changed by the DIRECT TO operation.

5.5 Vertical tactical navigation

CAUTION : For the vertical navigation, the FMS uses the barometric corrected altitude which has to be adjusted to the local QNH.

NOTE : The vertical deviation is invalidated when greater than 1000 Ft.

5.5.1 Standard waypoint

The altitude constraint is the addition of the altitude to waypoint and the margin.
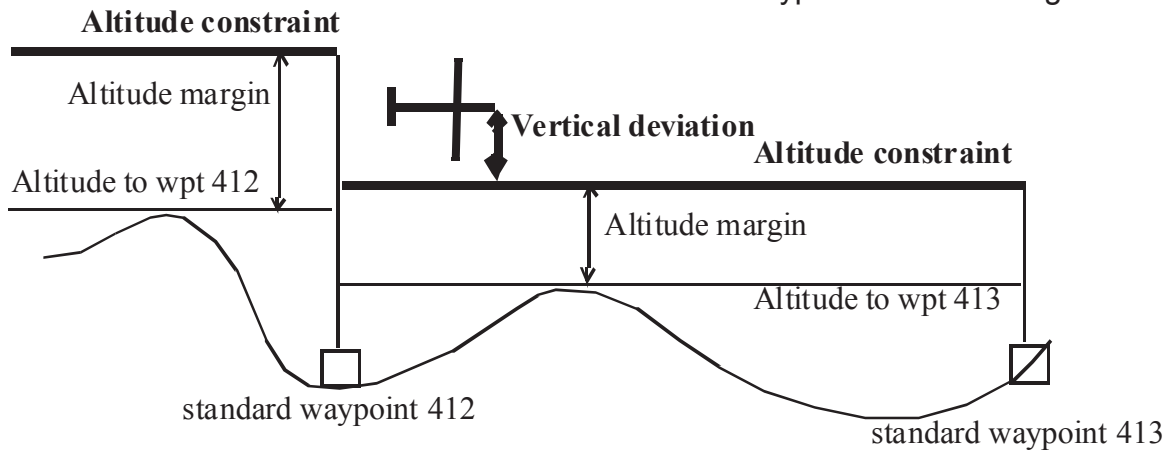
NOTE : The Altitude to waypoint xxx is the minimum altitude to fly to waypoint xxx.

5.5.2 *Landing waypoint*

Before the top of descent, the altitude constraint computation is the same as the standard waypoint. After, it corresponds to the path of the glide slope.
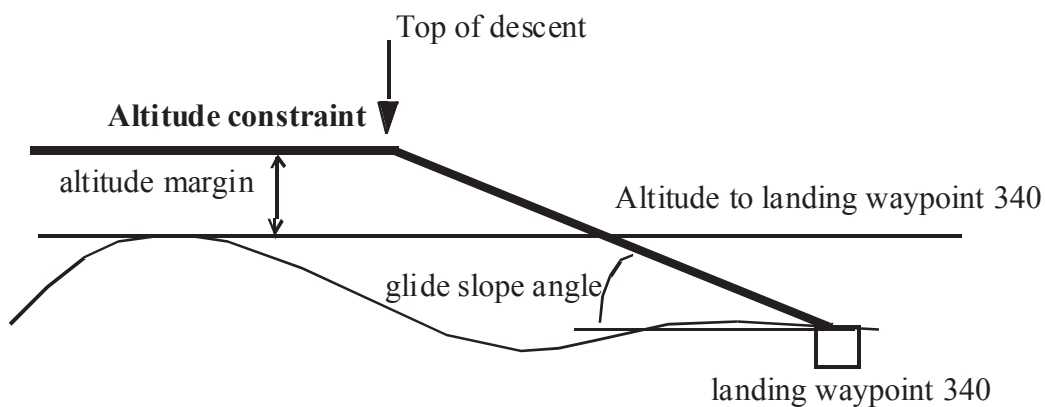
5.5.3 *Dropping waypoint*

Until the last reducing point, DISP_DP3 before and DIS_EOR after the CARP (Computed Air Release Point), the altitude constraint is computed by adding the altitude of the dropping zone to the height of dropping (DIS_DP3 and DIS_EOR are dropping profile parameters, defined in the Tactical Configuration Table).
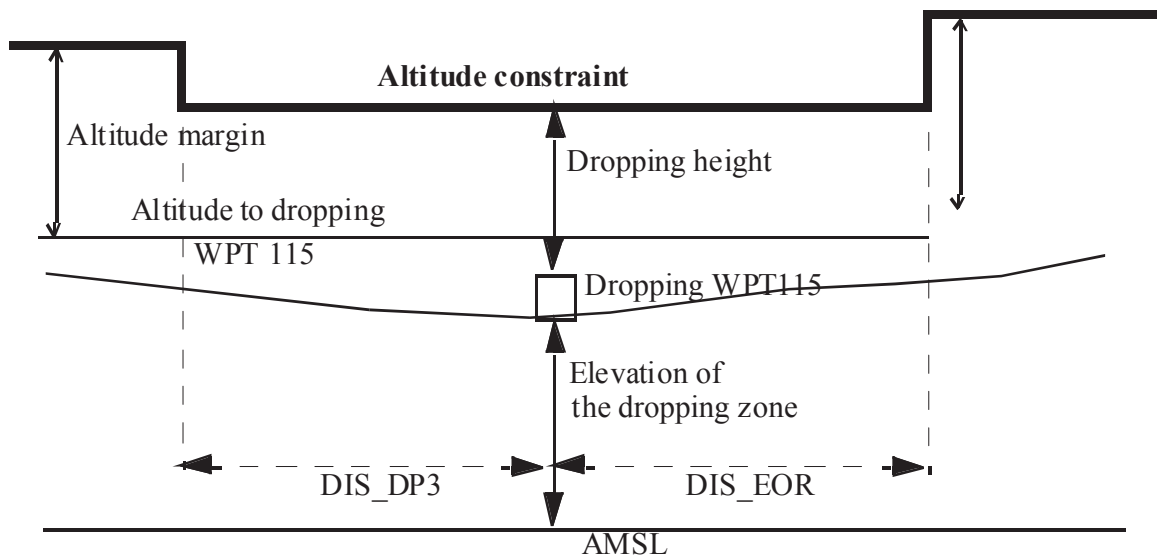
5.5.4 *Vertical revision page*

ACCESS : `FPLN key`, **ALT** Lsk on the desired waypoint.
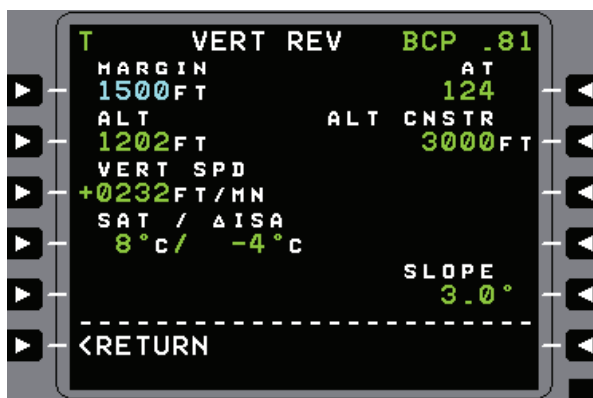
The following parameters are displayed:
- **MARGIN**, the altitude margin.
- **ALT**, Barometric Corrected altitude.
- **VERT SPD**, Baro Inertial Vertical speed.
- **SAT**, Static Air Temperature.
- **ΔISA**, Temperature discrepancy between static and standard temperature.

- **AT**, waypoint number.
- **ALT CNSTR**, Altitude constraint at the waypoint.
- **SLOPE**, glide slope in case of a landing waypoint.

To change the margin, enter the new value on the **MARGIN** Lsk.

NOTE : - Only the margin can be modified.
- The margin is the same for all the waypoints of the flight plan.

5.6 Drop page

```
M       DROP 102    GPS .04
TTD          HARP   OFST
 112S        +490/   L51M
DROP ALT            AXIS
10690FT            330.3°
WIND TYPE     FTT    FTD
>ALT/BAL     12.3S    50M
HV WIND      HV RF  PLOT
320°T/ 10KT 150FPS  256M
DPL WIND     DPL RF PLOT
320°T/  6KT  18FPS  295M
------------------------
<RETURN       DROP DATA>
```

Note : This page is accessible only when the TO waypoint is a dropping point or when the TO is a standard waypoint and the TO+1 is a dropping point.

Access : **DROP** Lsk on **PROG 1/3** page.

THALES
AVIONICS

1) The **DROP** page displays the dropping parameters :

- the dropping point identification in the title line.
- **TTD**, the Time To Drop, (time to reach the air release point). When the CARP or HARP is sequenced, **EOR** is displayed instead of **TTD** and time to End Of Drop parameter is displayed.
- **HARP OFST** (case of dropping with free fall) or **CARP OFST** (other cases), the longitudinal and lateral offset between the air release point and the dropping zone.
- **DROP ALT**, the altitude of dropping.
- **AXIS**, the dropping axis.
- **FTT,** the forward travel time before stabilisation.
- **FTD,** the forward travel distance before stabilisation.

In the case of a dropping with free fall :
- **HV RF,** the high velocity (free fall) phase rate of fall.
- **PLOT,** the high velocity (free fall) phase drift due to wind.
- **DPL REF,** the deployed phase rate of fall.
- **PLOT,** the deployed phase drift due to wind.
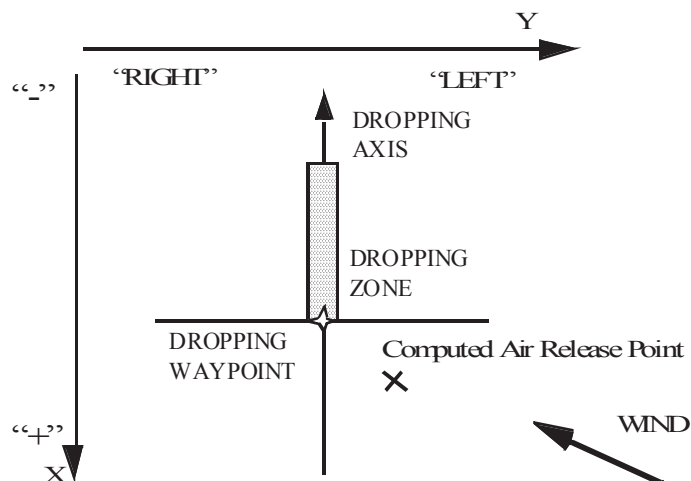
2) Press **WIND TYPE** Lsk to select the wind insertion type between **ALT**itude type and **BAL**listic type.

3) Enter wind parameters, according to the **WIND TYPE** value :

- If the **WIND TYPE** is **BAL** :
    - if the dropping computation mode is HARP then enter **HV WIND,** the high velocity phase wind origin / speed.
    - Enter **DPL WIND,** the deployed phase wind origin / speed.
- If the **WIND TYPE** is **ALT** :
    - Enter **ALT WIND,** the altitude wind origin / speed.
    - Enter **WIND FAC,** the wind factor in percentage.

NOTE : - The input value of **HV WIND** or **DPL WIND** speed shall be included into the range [0 ; 155 kt], else the value is refused.

- If valid, the current wind provided by the selected position fixing mode is taken as default for **HV WIND** and **DPL WIND**, else default value is 360°/ 0 kt.

- If the **WIND TYPE** is **ALT,** the winds (high velocity phase and deployed phase winds) used for dropping computation are identical.
Their origin and speed are :
  the **ALT WIND** origin and
  the **ALT WIND** speed x **WIND FAC.**

4) Press **DROP DATA** Lsk to access to the **DROP DATA** page. For more details, see Drop data page paragraph.

NOTE : If a leg sequence occurs such as neither the TO waypoint is a dropping waypoint nor (the TO waypoint is a standard waypoint and the TO+1 is a dropping waypoint)) or a new flight plan is selected then the **PROG 1/3** page is automatically displayed.
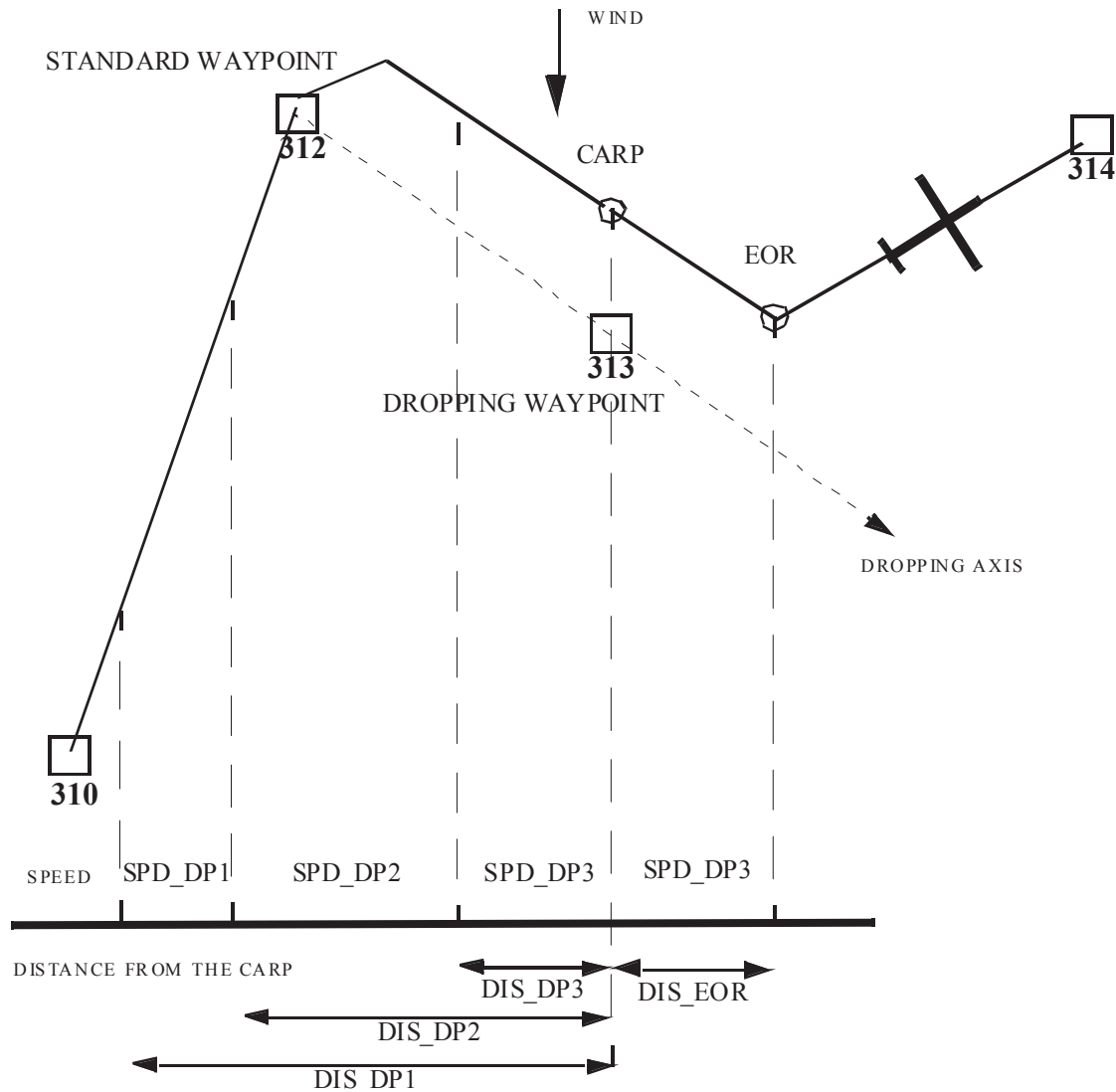
NOTE : - The computation of the Time To Drop takes into account the current wind projection on the legs, and the dropping profile.

- The dropping profile parameters (SPD_DP1, SPD_DP2, SPD_DP3, DIS_DP1, DIS_DP2, DIS_DP3, DIS_EOR) are defined in the Tactical Configuration Table.

5.7 Speed profile

5.7.1 *Landing*
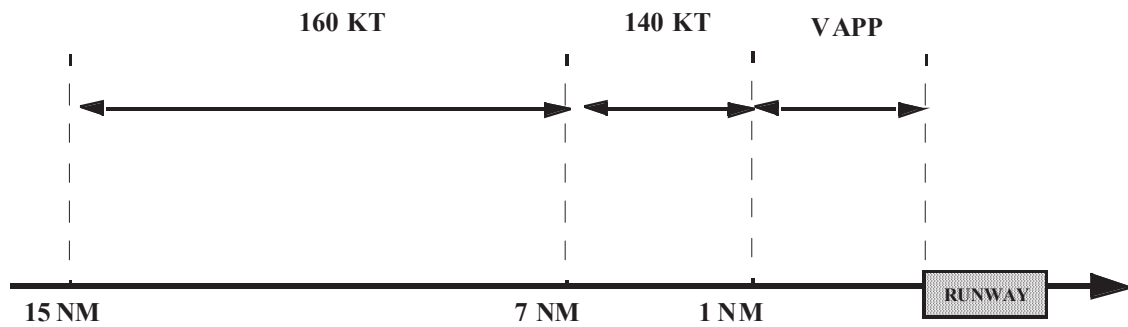
NOTE : - The landing speed profile is used when the TO waypoint is a landing waypoint.
- If the distance between the landing waypoint and the previous waypoint is smaller than 15 NM, the speed profile is limited to the distance of the leg.

5.7.2 *Dropping*
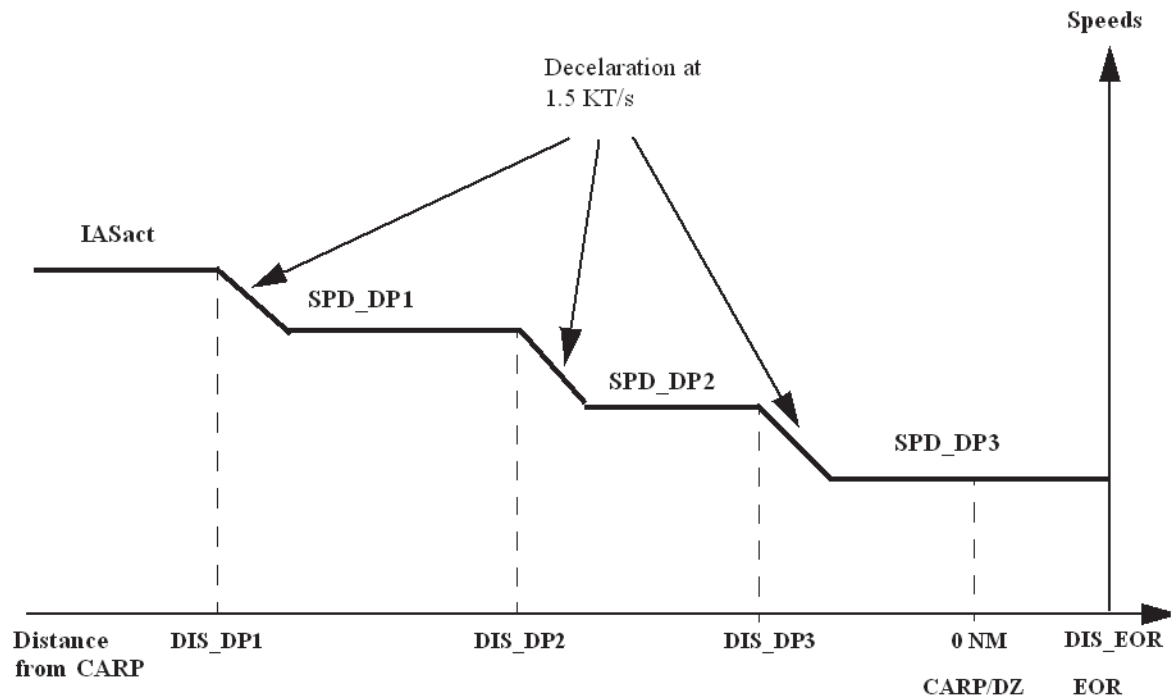
NOTE : - The dropping speed profile is used when the TO waypoint is a dropping waypoint or when the TO is a standard waypoint and the TO+1 is a dropping point.

- The dropping profile parameters (SPD_DP1, SPD_DP2, SPD_DP3, DIS_DP1, DIS_DP2, DIS_DP3, DIS_EOR) are defined in the Tactical Configuration Table.

6 SAR OPERATION

6.1 <u>SAR flight plan</u>

The FMS enable to activate SAR, Search And Rescue flight plan build on three types of pattern:

LADDER   EXPANDED SQUARE   SECTOR
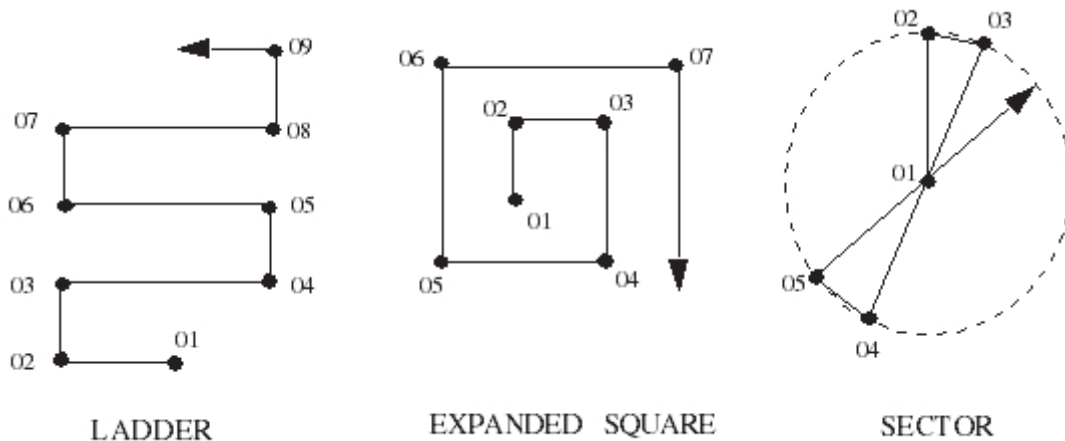
The waypoints of the SAR flight plan are identified by a number from 00 to 99, 01 is the SAR origin. When the waypoint 99 is reached, the next waypoint number starts from 00.

6.1.1 *SAR flight plan initialization*

1) Two cases for access according the SAR origin:

• The SAR origin is PPOS, press **HOLD** and **SAR INIT** Lsk.
Then the **SAR LADDER** page is displayed

.
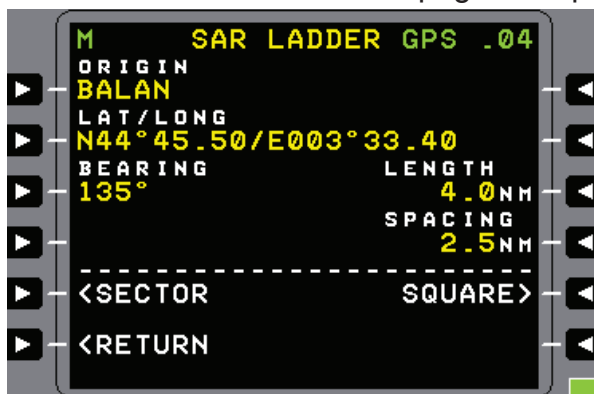
• For the others SAR origin definition, there are two possible access:
- On **INIT** page, press **FPLN INIT** Lsk.
- On **LTRL REV** page, press **NEW FPLN** Lsk.

- Press Lsk beside the desired type of SAR pattern (LADDER, SQUARE, SECTOR).

NOTE : - The SAR origin is the same for all pattern.
- When a SAR flight plan is activated, the heading reference is set to MAG.

2) To change the type of pattern, press **SECTOR** or **SQUARE** or **LADDER** Lsk.
3) Three ways to define the SAR origin:

- by the position frozen when the **HOLD** key has been pressed. This position is taken by default.
- by the position of a pilot or standard point, enter its identifier on **ORIGIN** Lsk.
- by its coordinates, enter its latitude/longitude on **LAT**/**LONG (**Case of geo representation**)** Lsk.

NOTE : - The SAR origin can't be a mowing waypoint.

4) Case of LADDER PATTERN

```
M        SAR LADDER GPS .04
ORIGIN
A2
LAT/LONG
N44°45.50/E003°33.40
BEARING           LENGTH
360°                 4.5NM
                 SPACING
                    8.6NM
------------------------------
<SECTOR            SQUARE>

<RETURN
```
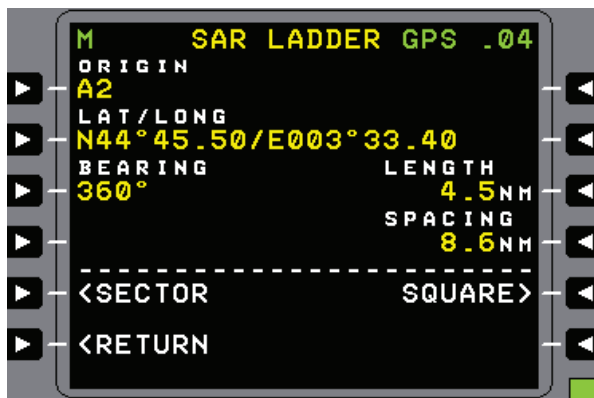
The SAR ladder pattern is defined by three parameters which have default values:
- **BEARING**.
- **LENGTH**.
- **SPACING**.

To modify one or several parameters of the pattern, enter the new value on the corresponding Lsk.

Press **EXEC** to activate the SAR LADDER flight plan.
When **ORIGIN** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with filter "ALL".
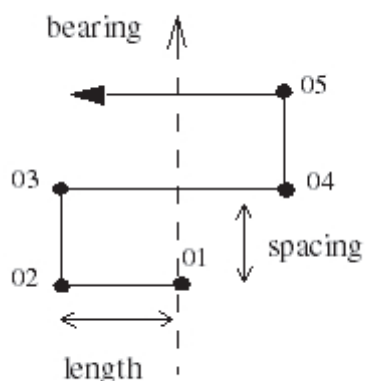
parameter	default value
bearing	0° (true)
length	6 NM
spacing	6 NM

5)   Case of SQUARE PATTERN
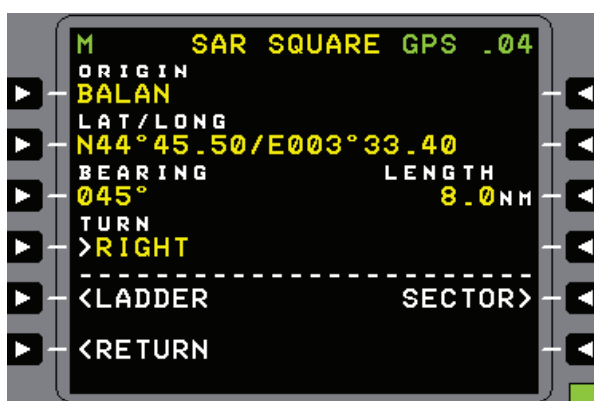
The SAR expanded square pattern is defined by three parameters which have default values :
  • **BEARING**.
  • **LENGTH**.
  • **TURN,** turn direction.

To modify one or several parameters of the pattern, enter the new value on the corresponding Lsk.

To change turn direction, press on **TURN** Lsk.

Press **EXEC** to activate the SAR SQUARE flight plan.

When **ORIGIN** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with filter "ALL".
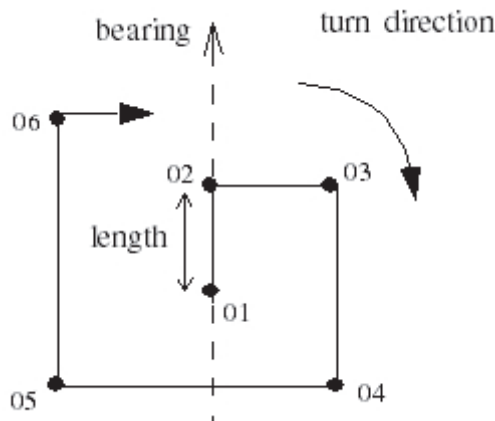
parameter	default value
bearing	0°(true)
length	3 NM
turn direction	right

6)   Case of SECTOR PATTERN
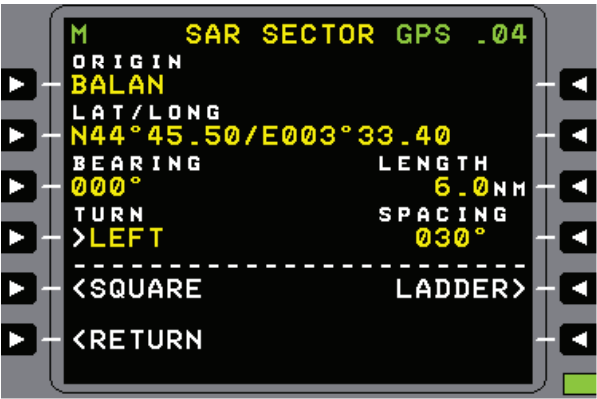
The SAR sector pattern is defined by four parameters which have default value:
- **BEARING**.
- **LENGTH**.
- **SPACING**.
- **TURN,** turn direction.

To modify one or several parameters of the pattern, enter the new value on the corresponding Lsk.

To change turn direction, press on **TURN** Lsk.

NOTE : For SAR SECTOR, the spacing range is [1°;90°].

Press **EXEC** to activate the SAR SECTOR flight plan.

When **ORIGIN** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with filter "ALL".

d

parameter	default value
bearing	0°(true)
length	6 NM
spacing	30°
turn direction	right

6.1.2 *SAR FPLN page*

Access : **FPLN** key.
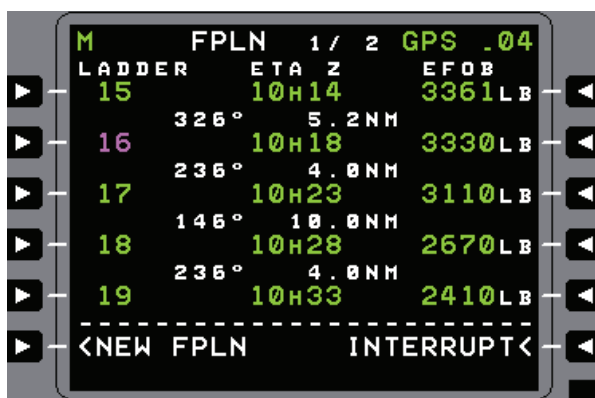
This page displays:

• the type of SAR pattern: **SECTOR**, **LADDER**, **SQUARE**.

- **ETA L/Z**, Time reference of the Estimated Time of Arrival, in local or zulu.
- **EFOB**, the Estimated Fuel On Board at the waypoint.
- For each point, the bearing and distance from the preceding and its Estimated Time of Arrival, ETA.
- On the third line page, the FROM point is displayed.

6.1.3 _LTRL REV page at PPOS_

Access : Press left Lsk beside FROM on FPLN page.

The page is composed of the following fields :
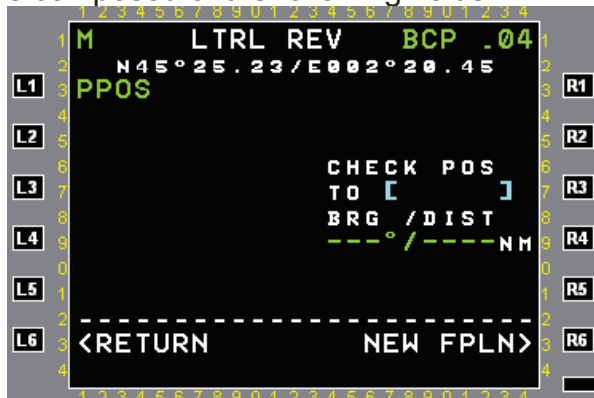
- Position : present position of the A/C in the selected position fixing mode.
- CHECK POS TO : used to calculate bearing/distance from the A/C position to a waypoint. WRITE the waypoint identifier in the scratchpad and press on CHECK POS TO Lsk. When CHECK POS TO Lsk is pressed with empty scratchpad, the DATA LIST page is displayed with filter "ALL".

This page enables to select a new flight plan, pressing the NEW FPLN Lsk.

NOTE : If a leg sequence or a flight plan modification happens, when the LAT REV page is displayed, then the first FPLN page is automatically displayed.

6.1.4 _SAR progress 1/3 page_

Access : **PROG** key
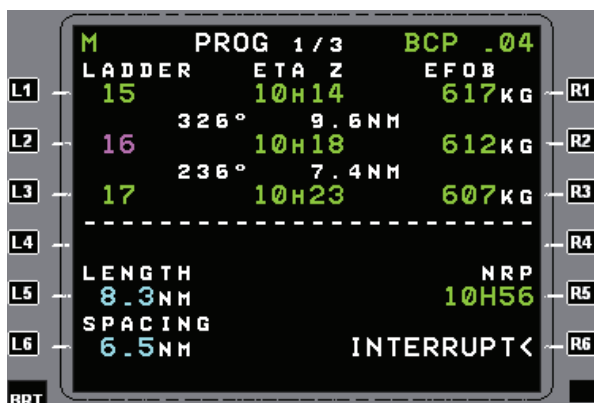
.This page displays:
- The FROM, TO (in magenta), NEXT TO waypoints as on **FPLN** page.

- **ETA L/Z**, Time reference of the Estimated Time of Arrival, in local or zulu.
- **EFOB**, the Estimated Fuel On Board at the waypoint.
- For each point, the bearing and distance from the preceding and its Estimated Time of Arrival, ETA.
- **LENGTH** and **SPACING** (except for square pattern) value of the SAR.
- **NRP,** the estimated time of arrival at the Non Return Point.

NOTE :   The **PROG 2/3** and **3/3** pages are described in GENERAL PROCEDURES section.

6.1.5 *Modifying SAR pattern*

It is possible to modify characteristics of the activated SAR, the length and spacing (except for square which has no spacing as parameter). When one of these parameters is modified, the active flight plan waypoints are recomputed from the TO+1 waypoints with the new characteristics.

1) Press **PROG** key

2) .Enter, on **PROG 1/3** page, **LENGHT** or **SPACING** Lsk, the new value.

NOTE : For SAR SECTOR, the spacing is limited to [1°;90°].

6.1.6 *SAR interrupt and resume*

A SAR flight plan can be interrupted and then reactivated to the computed resume point (R/P). R/P waypoint warrants that the A/C will fly over the point where SAR interruption occured aligned with the leg when resuming the flight plan.
After a SAR interruption, it is possible to select tactical or IFR navigation modes and then resume to the interrupted SAR. On the other hand, activation of a new SAR flight plan cancel the interrupted one.

6.1.6.1 *SAR interrupt*

Access : On SAR **FPLN** page or on **PROG 1/3** page, press the **INTERRUPT<** Lsk.

When a SAR flight plan is interrupted, two cases may occur :
- if the first waypoint of the SAR flight plan is not sequenced, then no R/P computation is performed and when SAR will be resumed, the former SAR flight plan will be activated.
- else a R/P waypoint is computed and displayed, and when SAR will be resumed, a new SAR flight plan with R/P as entry point will be activated.

6.1.6.2 *SAR resume*

Access : In SAR mode, on SAR **FPLN** page or on **PROG 1/3** page or on **FPLN INIT** page, press the **SAR RESUME<** Lsk. In tactical or IFR modes, on **FPLN INIT** page, press the **SAR RESUME<** Lsk.

When a SAR flight plan is resumed, different cases may occur :
- If the A/C is along the interrupted leg, the SAR flight plan is resumed on this leg.
- Otherwise, the AIRCRAFT returns ahead of the interruption point for leg capture : the SAR flight plan is resumed with R/P as entry point.

NOTE : After a SAR resume, if a second SAR INTERRUPT is demanded before R/P waypoint sequencement, the FMS would have to compute a new return point taking into account the current leg (which already includes the previous return point R/P). This action is forbidden in FMS specification, so the message NOT ALLOWED is displayed in the scratchpad.

7 GENERAL PROCEDURES

7.1 Direct to

This function enables to fly direct to a selected waypoint, which can be part of the logistical or tactical flight plan (see LOGISTICAL OPERATION section), or selected in the navigation database, or defined by its position.

7.1.1 Direct to closest airport

1) Press **DTO** key

2) Press **AIRPORTS** Lsk.

3) The 20 nearest airports belonging to standard or pilot database are displayed in increasing distance order. On each line, the airport identifier, its bearing and distance from the FMS position, its maximum runway length are displayed.
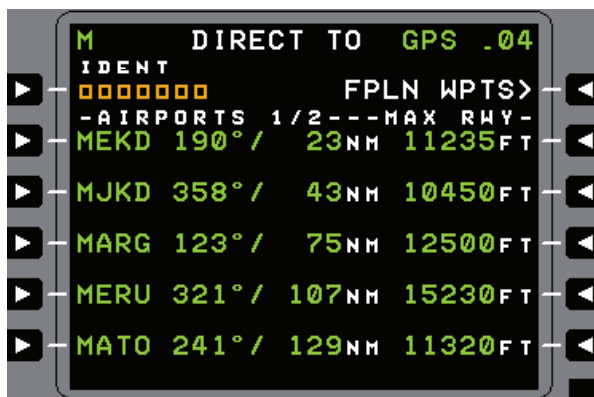
4) If necessary press **NEXT** / **PREV** key to scroll down/up the list.

5) Press on the Lsk corresponding to the desired airport identifier, then the **DIRECT TO** page is displayed, with the **IDENT** field filled

```
M        DIRECT TO  BCP .04
IDENT          BRG/DIST
DELTA        350°/82.3NM
INBND CRS      LAT/LONG
---°          N45°12.34
INTCP DIST    E002°21.44
---NM
ALT CNSTR
-----



<RETURN            TMPY>
BRT
```

6) Optional actions :
• Enter an inbound course on **INBND CRS** Lsk (e.g. the runway axis).
• Enter a distance of interception on **INTCP DIST** Lsk.
• Enter an altitude constraint on **ALT CNSTR** Lsk.

7) Press **EXEC** to confirm the DIRECT TO, the **FPLN** page appears.

NOTE : - Only airports within a radius of 240 NM of the FMS position belong to the list of nearest airports.
- The list of airports is updated every 2 minutes.
- The **INBND CRS** and **INTCP DIST** value can be cleared by a CLEAR action.
- The selected airport becomes the active destination airport and the previous flight plan is cleared.

7.1.2 *Direct to an off flight plan fix*

1) Press **DTO** key

2) Enter on **IDENT** Lsk:
   • The identifier of the fix, in the case of an airport, navaid, waypoint belonging to the standard or pilot database.
   • If it is a temporary waypoint, its position defined by:
     - its coordinates (e.g. N4512.03/ W00514.06).
     - its position relative to another fix (e.g. AGN/130/12).
     - its position defined by the intersection of 2 radials relative to 2 fixes (e.g. SAURG/20/ TOU/12).

Then the **DIRECT TO** page is displayed, with the **IDENT** field filled.

```
M        DIRECT TO   GPS .04
IDENT
▶  □□□□□□□        AIRPORTS>  ◀
   -----FPLN WPT  1/ 6-----
▶  TANCA    320°/   22NM    ◀

▶  BECHU    260°/   53NM    ◀

▶  JULEE    350°/   82NM    ◀

▶  DELTA    003°/  114NM    ◀

▶  IODAN    014°/  132NM    ◀
                            ■
```

```
      1234567890123456789012 34
   1  M     DIRECT TO   BCP .04  1
   2  IDENT        BRG/DIST      2
L1 3  JULEE       350°/82.3NM    R1
   4  INBND CRS    LAT/LONG      4
L2 5  ---°         N45°12.34     R2
   6  INTCP DIST   E002°21.44    7
L3 7  ---NM                      R3
   8  ALT CNSTR                  8
L4 9  -----                      R4
L5 1                             R5
L6 3  <RETURN         TMPY>      R6
   4                            ▭
      1234567890123456789012 34
```

3) Optional actions:
   - Enter an inbound course on **INBND CRS** Lsk.
   - Enter a distance of interception on **INTCP DIST** Lsk.
   - Enter an altitude constraint on **ALT CNSTR** Lsk.
4) Press **EXEC** to confirm the DIRECT TO, the **FPLN** page appears.

NOTE : - The flight plan is build as follows: the selected TO waypoint, followed by a discontinuity and the previous flight plan, if it was logistical.

If the designated waypoint is a moving waypoint and depending of the current flight conditions, the computer performs a RALLY operation, in other words, it guides the AIRCRAFT towards the point of intersection which it computes from the moving waypoint speed and the aircraft speed.
These computations take into account meteorological conditions (wind) and the current true air speed.
If the ralliement is impossible with the rally true air speed (RALLY TAS) or if |current latitude| or |ralliement latitude| > 89°, the ralli ement waypoint is the moving waypoint.

7.2 Lateral navigation

7.2.1 *Progress 2/3 page*

Access : **PROG** key, **NEXT** or **PROG** key.

This page displays the following navigation parameters:
- **TO**, the TO waypoint identifier.
- **WIND**, wind origin and speed of the selected navigation mode.
- **DTK**, Desired Track to reach the TO waypoint.
- **TTG**, Time To Go to the TO point.
- **BRG**, Bearing between the FMS position and the TO waypoint.
- **DIST**, direct Distance between the FMS position and the TO waypoint.
- **FUEL**, Total fuel weight.
- **TK**, Track angle provided by the selected navigation mode.
- **GS**, Ground Speed provided by the selected navigation mode.
- **IAS**, on first field the speed constraint to be on time at the next RTA if a valid RTA is specified, on second field the Indicated Air Speed.
- **DRIFT**, Drift angle.
- **XTK**, Cross Track Error
- **TKE**, Track Angle Error.
- **RNP**, Required Navigation Performance.
- **ANP**, Actual Navigation Performance.
- **OFFSET**, lateral Offset value, in case of LOGISTICAL flight plan.

NOTE : -   The **TO, DTK,** and Speed Constraint values are recommended to follow the flight plan, so they are in magenta.
-    When there is no Speed Constraint, this value is dashed.
-    The **OFFSET** is only displayed when a LOGISTICAL flight plan is activated.
-    The **RNP** value is displayed in small font, when it is the default value. Otherwise, if the value has been inserted, it is displayed in large font.

The Required Navigation performance, RNP default value:
- in LOGISTICAL navigation :
  - 5 NM after a long power interruption or when the flight area transitions to enroute area,
  - 2 NM when the flight area transitions to terminal area,
  - 1 NM when the flight area is terminal and GPS is used in aircraft position computation,
  - 0.7 NM when the flight area transitions to approach area, not due to the GPS integrity criteria (due to Radionav integrity area),
  - 0.3 NM when the flight area transitions to approach area, due to the GPS integrity criteria.
- in SAR navigation : RNP = 1 NM.
- In TACT navigation :
  - 0,3 NM when the flight area transitions to approach area
  - 1 Nm otherwise.
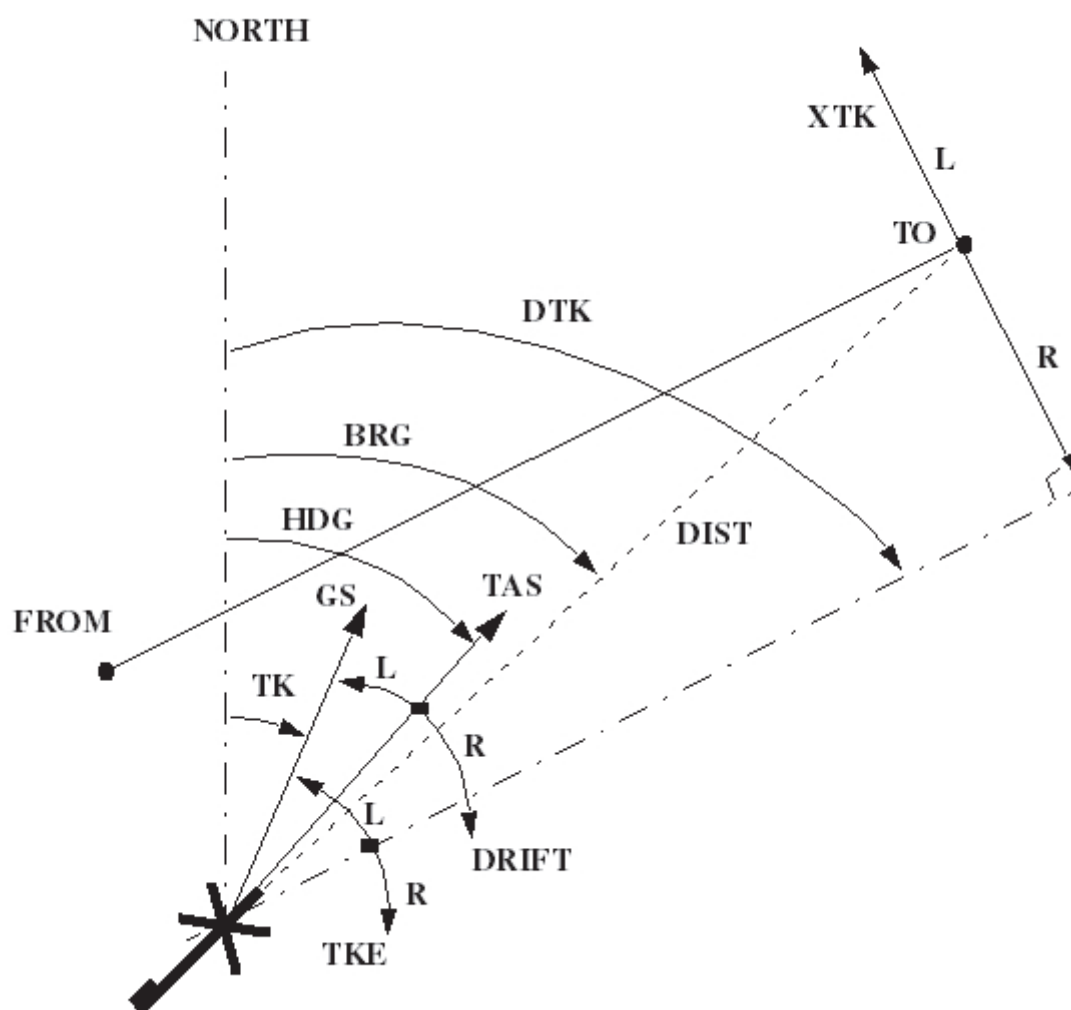
7.2.2 *RNP insertion*

1) Press PROG key

2) Press NEXT key to obtain the **PROG 2/3** page.


```
M         PROG 2/3      BCP .04
TO                   WIND
TOU/02         320°/ 12KT
DTK                  TTG
326°           00H15:25
BRG      DIST        FUEL
320°  /  5.4NM       1231LB
TK       GS       TGT/IAS
240°    135KT     ---/118KT
DRIFT    XTK        TKE
L02°    L.41NM      R002°
RNP      ANP       OFFSET
4.0NM   .83NM      [ ]NM
```

3) To change RNP, enter the desired value on **RNP** Lsk.

NOTE :   The range of the inserted value of **RNP** is between 0.2 NM and 20 NM.

                For PRNAV , enter RNP = 1 Nm.

4) To delete RNP, perform a CLEAR action on the **RNP** Lsk.

NOTE : -   The deletion is effective for inserted **RNP**, and has no effect otherwise.
-               When the inserted **RNP** is cleared, the value returns to its default value.

7.2.3 *Auto pilot / LNAV coupling*

7.2.3.1 *Engagement conditions*

The LNAV engagement is possible if the two following conditions are verified :
- A/C is inside the capture zone of the active leg:
  - the capture zone is unlimited for heading/track legs (Vx or Cx legs except CF legs)
  - for other legs, the capture zone is a 2 NM (in Terminal/Approach) or 4 NM (in Enroute) width zone.
- There is an active flight plan and prediction, XTK and TKE computed.

When the LNAV is engaged, it is maintained engaged as long as A/C is inside the extended capture zone, defined as followed:
For AF and RF legs:
- A/C is inside the capture zone extended to 10NM

For Hx legs:
- A/C is inside the capture zone extended to 10NM or in enroute flight area a 45° capture is possible (i.e a 45° from A/C Pos will in tercept the active leg, and current A/C Track crosses active leg).

For CF, DF, TF, FA, FM, PI legs:
- A/C is inside the capture zone extended to 45 NM or in enroute flight area a 45° capture is possible.

For Vx or Cx legs except CF legs:
- A/C is inside the capture zone.

The disengagement happens when at least one of the following conditions is verified
- active flight plan or lateral trajectory is not valid.
- active leg is a discontinuity.
- Aircraft Groud Speed<20kt.
- A/C is outside the extended capture zone.

NOTE : -   If LNAV mode is engaged, the FMS generates a waypoint alert 10 seconds before the initiation of a turn or prior to arrival at the waypoint when there is no turn anticipation.

7.2.3.2 *Turn limitations*

The maximum roll command value (Φmax) sent by the FMS to the AutoPilot depends on:
- the aircraft altitude
- the CAS
- the flight phase
- and is limited to 25° with a maximum variation of 3 °/s

Specifically for the P3 aircraft, when the "FITS authority" discrete is enabled, the maximum roll value is independent of altitude, CAS and phase and is fixed to 30° with a maximum roll variation of 10°/s. If the FITS authority is disabled, the maximum roll value and roll variation are defined as above.

For P3 aircraft, each time the guidance law is changed (FITS authority discrete changes from enabled to disabled or the opposite), the message **GUIDANCE LAW MODIFIED** is displayed in the scratchpad.

7.3 Radiocom and radionav management

This function enables to select the FMS tuning mode (AUTO/MAN) and to display the radionav raw data and the radiocom plan data.

7.3.1 *Tune 1/2 page*

1) Press **TUNE** Lsk on the **DATA MENU** page, **NEXT** or **PREV** keys on the **TUNE 2/2** page

2) The following data are displayed.

- **V/UHF1** (resp. **V/UHF2** and **V/ UHF3**),   the V/UHF1 (resp. V/UHF2 and V/UHF3) equipement frequency.
- **HF1** (resp. **HF2**), the HF1 (resp. HF2) equipement frequency.
- **IFF,** the IFF equipement codes.


```
M      TUNE 1/2   GPS .04
V/UHF1              IFF
142.850         M1/73
V/UHF2
150.750         M3/4260
V/UHF3
162.350
HF1
11048.5
HF2          TUNE MODE
12545.3      AUTO/MAN<
-ACT----COM PLAN----NXT-
<10H30:00     10H42:30>
```
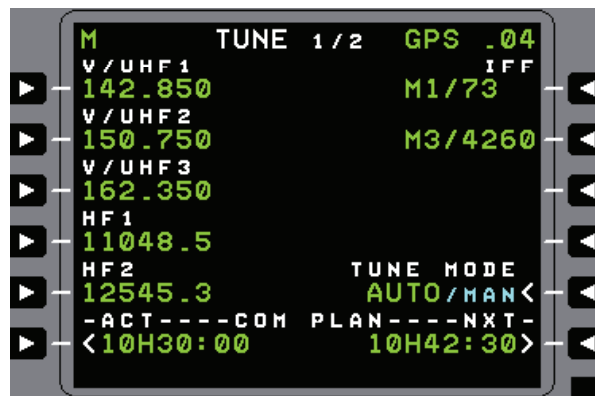
NOTE : - In what follows, data means frequency or code.
- The information (identifier and data) corresponding to a radiocom equipement is displayed only if that equipement is present.
- In AUTO mode, if there is a discrepancy between data transmitted by the FMC and the equipement, the corresponding parameter is displayed in amber.
- An RCOM plan is **ACTIVE** from its programmed time until either this plan is cancelled or the NEXT programmed time is reached.
- Whenever the operator selects the **AUTO** mode, the FMS will send to the radios and IFF the auto tune commands of the **ACTIVE** plan.

3) Select the radiocom **TUNE MODE** by alternation between **AUTO** and **MAN.**

- **AUTO** means that the data is autotuned by the FMS.

- **MAN** means that the data must be entered manually on the RMU control panel.

4) Press **ACT** Lsk (activation time of the active data set) to display the **COM PLAN** page with the current data set data.

5) Press **NXT** key (activation time of the next data set) to display the **COM PLAN** page with the next data set data.

NOTE : - If the **TUNE MODE** is **AUTO,** the activation times **ACT** and **NXT** are displayed in green. Otherwise, they are displayed in yellow.
   - When pressing the ACT or NXT Lsk, if no next frequency set exists and the number of free frequency set is not null, the **COM PLAN** page is displayed with invalid data.
   - The FMS sorts out the data sets in growing mandatory time between UTC time -12 hours and UTC time +12 hours. The active set corresponds to the nearest mandatory time from UTC time among those lower than UTC time.
In manual tuning, the transmission of data to the radiocom equipement is not performed. In autotuning, only valid data are transmitted when a set is activated or when a data of the active set is modified. Invalid data of the active set do not modify former data.
   - At power on the selected tune mode is MAN. Following the restart of one FMS its tuning mode could be different from the opposite one. However after a Crosstalk-Init its mode will be automatically changed to the mode of the opposite FMS (what was not switched off).

7.3.2 *COM plan page*

This page displays information about the radiocommunication plan data composed of up to 20 data sets.

1) Press **ACT** or **NXT** key on the **TUNE 1/2** page.

2) Radiocommunication informations are displayed.

NOTE : The information corresponding to a radiocom equipement is displayed only if that equipement is present.

3) The number of **FREE** places for data sets in the database is displayed.

4) Enter the following values :

- **V/UHF1, V/UHF2** and **V/UHF3** frequencies.
- **HF1** and **HF2** frequencies.
- **IFF** codes.

- **TIME,** the frequency set time.

```
123456789012345678901234
1 M      COM PLAN   GPS .04  1
2 V/UHF1            IFF     2
  142.850     M1/73
4 V/UHF2                    4
  150.750     M3/4260
6 V/UHF3                    6
  162.350
8 HF1                       8
  11048.5
0 HF2        TIME (UTC)     0
  12545.3     10H30:00
2 ---------------17 FREE-   2
  <RETURN          NEW>
4                           4
123456789012345678901234
```
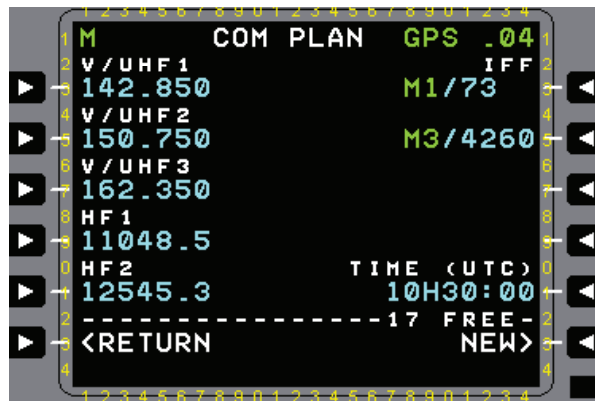
NOTE : - Clearing the frequency set **TIME** removes the frequency set from the
database and displays the next frequency set.
- If the frequency set **TIME** is already used for an other frequency set, the
entry is rejected with the **NOT ALLOWED** message. Otherwise, if the
number of **FREE** sets is not null, a new frequency set is created. Otherwise,
the frequency set **TIME** of the current frequency set is modified.

5) Press **NEW** Lsk to create a new frequency set. The page is displayed with
invalid parameters.

NOTE : The **NEW** Lsk is not displayed if the number of free places for frequency set
in the database is null.

6) Press **PREV** or **NEXT** key to access to the previous or next frequency set of
the database (circular access).

NOTE : If the **TIME** parameter is not valid, **PREV** access to the current frequency set
and **NEXT** access to the first frequency set.

7.3.3 *Tune 2/2 page*

1) Press **NEXT** or **PREV** keys on the **TUNE 1/2** page.

2) This page displays distance/QDM, identification, frequency, for each navaid :

- **NAV1** (resp. **NAV2)** is the VOR/ILS 1 (resp. VOR/ILS 2) receiver and the DME channel 1 (resp. 2).
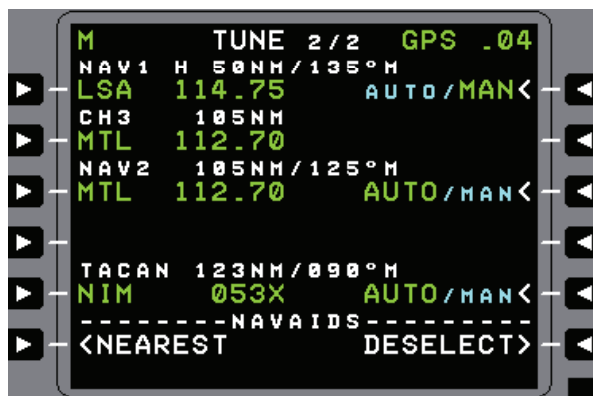
- **NAV1** (resp. **NAV2)** is the VOR/ILS 1 (resp. VOR/ILS 2) receiver and the DME channel 1 (resp. 2).
- The reverse video indication **H** corresponding to the channel means that the DME is in hold mode.
- **CH3** is the DME channel 3. NAV1 (resp. NAV2) is the VOR/ILS 1 (resp. VOR/ILS 2) receiver and the DME channel 1 (resp. 2) (one frequency for both of them),
- **ADF** is the ADF receiver (if one ADF receiver is interfaced with the FMC),
- **TACAN** is the TACAN receiver (if one TACAN receiver is interfaced with the FMC).

NOTE : - The DME channel 3 is always autotuned by the FMS.

- If no TACAN RECEIVER is interfaced with the FMS, the two TACAN lines are blank.

3) Press **AUTO/MAN** Lsk according to the desired radio to change the tuning mode:

- **AUTO** means that the frequency is autotuned by the FMS.
- **MAN** means that the frequency must be entered manually on the CMU control panel or must be manually tuned by selecting NAV1, NAV2 Lsk (see NAVAID MANUAL TUNING paragraph).

NOTE : - At power on, for all radios the selected mode is **AUTO**.

- Following the restart of one FMS its tuning mode could be different from the opposite one. However after a Crosstalk-Init its mode will be automatically changed to the mode of the opposite FMS (what was not switched off).
- If a frequency is modified on the RMU, the FMS selects automatically the **MAN** mode.
- If a frequency is manually tuned, the FMS selects automatically the **MAN** mode.
- If DME is not operating in normal mode, the FMS selects automatically the **MAN** mode.

- If a radio is selected as a nav source on the FGCP, the FMS selects automatically the **MAN** mode and the **AUTO** mode is forbidden. An attempt to select **AUTO** displays the message "NOT ALLOWED".
- When NAV1 or NAV2 are in the AUTO mode, priority is given to the navaid recommended by the current procedure, or defining the active leg when applicable.
- After a change of active FMS (Cf page FMS BITE), the crew must verify than the AUTO/MAN mode has not be modified

7.3.4 *Nearest VHF navaids page*

This page displays the list of the 20 nearest VHF navaids belonging to the standard and pilot data, sorted out by increasing distance. On each line, the navaid identifier, its type, frequency, the calculation of bearing and distance from the FMS position are shown.

1) On **TUNE 1/1** page, press **NEAREST** Lsk or on **NEAREST with NDB list** page, press **VHF NAV** prompt.

2) Nearest VHF NAVAIDS are displayed, using the following abbreviations:

V	VOR.
VD	VORDME.
VT	VOR TACAN.
D	DME.
T	TACAN.
LD	LOCDME.
ID	ILSDME.
IT	ILSTACAN.
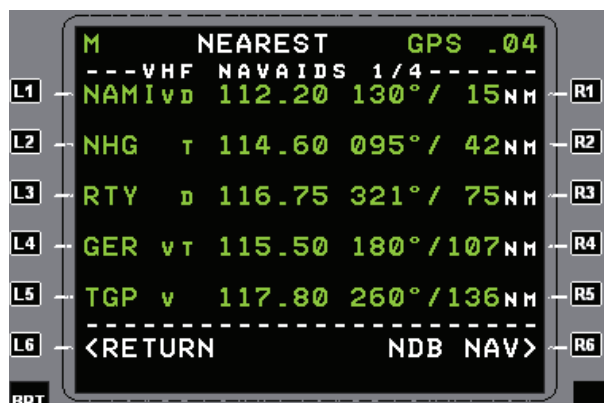
7.3.5 *Nearest NDB navaids page*

This page displays the list of the 20 nearest NDB navaids belonging to the standard data, sorted out by increasing distance. On each line, the navaid identifier, its frequency, the calculation of bearing and distance from the FMS position are shown.

1) On **NEAREST with VHF list** page, press **NDB NAV** prompt.
2) Nearest NDB NAVAIDS are displayed.

```
     M      NEAREST     GPS .04
     ----NDB  NAVAIDS  1/2-----
L1 — TOU      250.5 130°/ 28NM — R1

L2 — MAR      111.6 095°/ 75NM — R2

L3 — OSCA     320.0 321°/ 90NM — R3

L4 — DUPL     286.0 180°/149NM — R4

L5 — AB       390.0 260°/181NM — R5
     --------------------------
L6 — <RETURN          VHF NAV> — R6
BRT
```
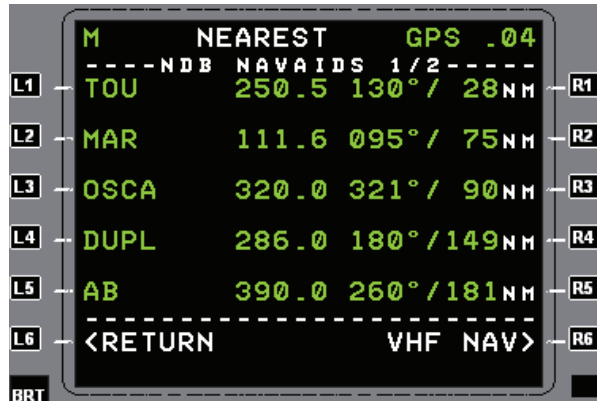
7.3.6 *Navaid Manual Tuning*

Navaids can be manually tuned via the MCDU by pressing the corresponding Lsk. When **NAV1** (resp. **NAV2**) Lsk is pressed, the **NAV1** (resp. **NAV2**) **TUNE** page is displayed with the nearest VHF navaids.
The selection of a navaid sends a manual tuning command with the frequency of the selected navaid and the display reverts to **TUNE 1/1** page.

1) On **TUNE 1/1** page, select **NAV1** (resp. **NAV2**), **NAV1** (resp. **NAV2**) **TUNE** page is displayed,

2) On **NAV1 TUNE** page (resp. **NAV2 TUNE** page), select an ident to perform a manual tuning.
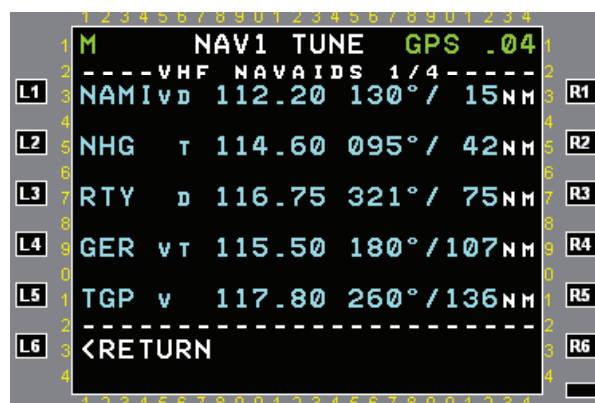
7.3.7 *Deselecting a navaid*

NOTE : - The list of the deselected navaids includes up to 10 navaids.
- Navaids are deselected from the BCP position computation and from the autotuning.
        - The deselected navaids list is deleted after a power on, on ground.

1) On **TUNE 1/1** page, press **DESELECT** Lsk
2) Enter on the Lsk near the brackets the identifier of the desired navaid. If the identifier corresponds to several navaids, the **DUPLICATE** page is then displayed to choose the desired navaid.

```
  M      DESELECTED GPS .61
              NAVAIDS
▶─LSA                 TDP  ─◀
▶─GAI                 [  ]  ─◀
▶─TAB                      ─◀
▶─LSS                      ─◀
▶─VE                       ─◀
  ─────────────────────────
▶─<RETURN                  ─◀
```
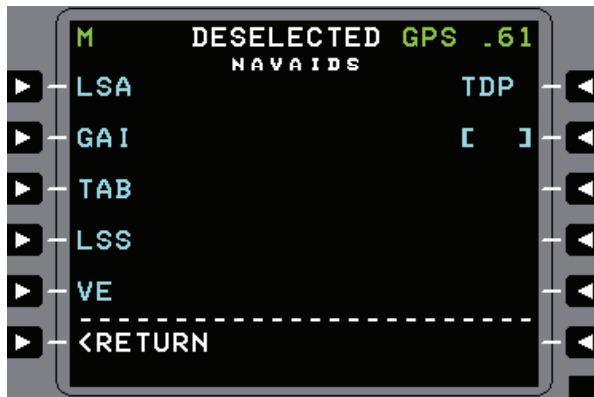
When **[ ]** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with standard and pilot VHF navaids filter.

7.3.8 *Reselecting a navaid*

1) Press Lsk near the desired navaid.
2) On **TUNE 1/1** page, press **DESELECT** Lsk.
3) Press **CLR** key

```
  M      DESELECTED GPS .61
              NAVAIDS
▶─LSA                 TDP  ─◀
▶─GAI                 [  ]  ─◀
▶─TAB                      ─◀
▶─LSS                      ─◀
▶─VE                       ─◀
  ─────────────────────────
▶─<RETURN                  ─◀
            CLEAR ?
```
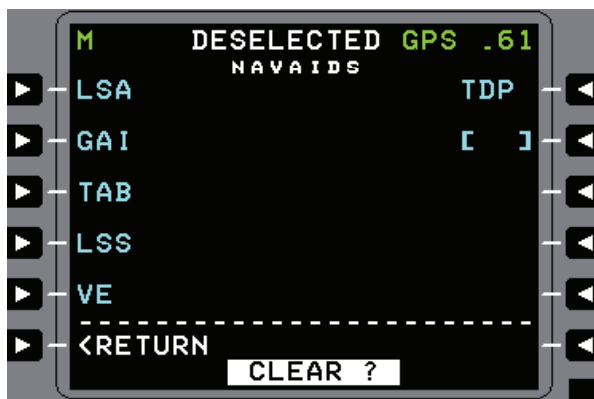
7.4 Performance

The **PERF** page is associated with each of the three flight phases: Take off, Cruise, Landing. Pressing the **PERF** key shows the **PERF** page of the current phase. The two others pages can be displayed by using the **PREV** or **NEXT** key.

7.4.1 *Take off performance*

Refer to the CLIMB performance paragraph page in the "PREFLIGHT" chapter.

7.4.2 *Cruise performance*

This function allows to estimate, knowing the wind features, the value of ETA, GWT, EFOB at the active destination and at an alternate destination.

1) Press **PERF** key, and if necessary **PREV** or **NEXT** key.

2) The parameters displayed depend of the PERF MODE (on STS XFER page) and Aircraft type:

PERFDATA – P3 aircraft   **PERFDATA – others aircrafts**

MANUAL :

The parameters are the followings :
- **DEST :** destination airport,
- **ALTN :** Alternate waypoint,
- **TGT ALT** :
  - in LOGISTICAL mode, the cruize altitude.
  - in SAR mode, the selected altitude,
- **VMAX** : Velocity Maximum operating,
- **VNE** : Velocity Never exceed,
- **VD** : Limit Dive speed,

3) If a LOGISTICAL flight plan is active :

- the last waypoint is displayed as the destination, **DEST** field**.** Enter on **MEANWIND** Lsk the average wind origin (in True reference) and speed, then the following parameters are calculated at the destination :
    - **ETA,** Estimated Time of Arrival.
    - **GWT**, gross weight.
    - **EFOB**, Estimated Fuel On Board.
- In PERFDATA PERF MODE, the **CRZ MODE** parameter is displayed. Selection is performed as on PERF INIT page.

4) Enter **ALTN,** the identifier of an airport of the standard or pilot database and **MEANWIND**, the average wind origin (in True reference) and speed . Then the estimated ETA, GWT, EFOB at this alternate destination are displayed (For those prediction computations, **MAX RANGE** and **4 ENGINES** (P3) or **LONG RANGE** (others cases) mode is taken into account). When **ALTN** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with standard and pilot airports filter.

NOTE : - If the **EFOB** at the destination or at the rerouting point is lower than the fuel reserve then the EFOB is displayed in amber and the FAL alert is triggered.
- The alternate airport is by default the origin airport when defined.
- In SAR mode, the **DEST** field is dashed, and the **ETA, EFOB** and **GWT** of the **DEST** are not computed.

7.4.3 *Approach or descent performance*

1) Press **PERF** key, and if necessary **PREV** or **NEXT** key.

The display page depends on the PERF MODE (on **STS XFER** page) :

MANUAL :

PERFDATA – P3 aircraft

PERFDATA – others aircrafts
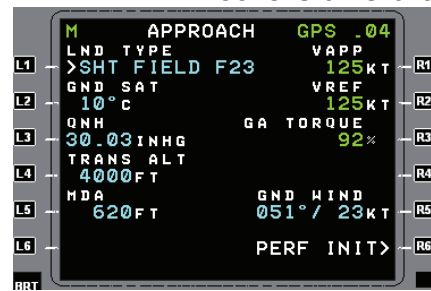
2) Enter the following parameters at destination airport:

- **QNH.** QNH
- **MDA,** minimum descent altitude,
- **GND WIND,** origin and speed of ground wind.

In MANUAL PERF MODE, enter
- **FUEL TO DSC,** fuel to descend,
- **∆ALT TO DSC,** altitude to descend,
- **DSC IAS,** Indicated Airspeed to descend

In PERFDATA PERF MODE and for aircraft different of P3, enter:
- **LND TYPE, landing** type,
- **GND SAT,** Ground Static Air Temperature
  (Airfield ambient temperature),

3) If the transition altitude at the arrival airport is valid, the **TRANS ALT** is displayed in small font. To enter one value or to overwrite it, enter a new transition altitude. A CLEAR action enables to return to the default value.

NOTE : - The **TRANS ALT** is invalid and cannot be inserted in SAR mode, or when the arrival waypoint of the logistical flight plan is not an airport.
- When the **TRANS ALT** has been inserted, it is displayed in large font.

7.5 <u>Weight management</u>

For the insertion of weight data refer to the PREFLIGHT section.

7.5.1 *Refuelling/jettisoning*

NOTE : THIS FUNCTION IS NOT AVAILABLE FOR P3 AIRCRAFT.

1) Press **PERF** key.

2) Press **PERF INIT** Lsk.

3) Press **WEIGHT** Lsk.

```
M     WEIGHT      GPS .20
BASIC WT      TOTAL FUEL
   1800KG          500KG
CARGO           RESERVE
    200KG          100KG
PAX/AVG        REFUELING
  3/100KG        +200LB
GWT           REFUEL UNIT
   2800KG     LB/KG/USG/L<
- - - - - - - - - - - - - - - - - -
<RETURN       FUEL FLOW>
 PRESS EXEC TO CONFIRM
```
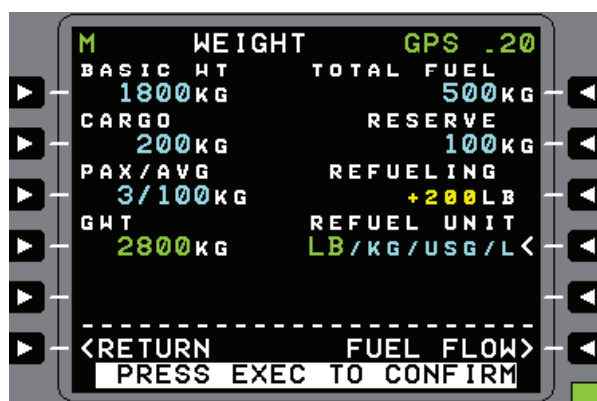
4) Select the desired unit of refueling by pressing successively the Lsk near **REFUEL UNIT**.

NOTE : If the unit chosen is a volumic one, the density used is 0,79.

5) Enter **REFUELING/JETTISONING** value (+ or -).

6) Press **EXEC** key to confirm this update.

7.5.2 *Fuel flow management*

Refer to the Monitoring fuel flow paragraph.

7.6 Hold

7.6.1 *Holding present position*

Pressing **HOLD** key freezes the position, stores it in the pilot database and displays the **HOLD** page.

This page allows :

    - to store a position by creating a new pilot waypoint. The new waypoint ident is the first available MRKxx (MRK01, MRK02,…)
    - to update the position.
    - to initialise the SAR flight plan at PPOS.
The position and time (**L** for local, **Z** for UTC) at the press on HOLD key is displayed.

7.6.2 *Storing held position*

This function enables to store in a new pilot waypoint, the position at **HOLD** key press. The new waypoint ident is the first available MRKxx (MRK01, MRK02,…).
If the memory is full, the message MEMORY FULL is displayed.

NOTE : - Execute a DATA SAVE to keep the waypoint in memory after a power off
     - .Pilot data can be downloaded to a DTM (refer to the Database operation Paragraph)

7.6.3 *Updating position*

1) Press **HOLD** key, then the position is frozen and the **HOLD** page is displayed.
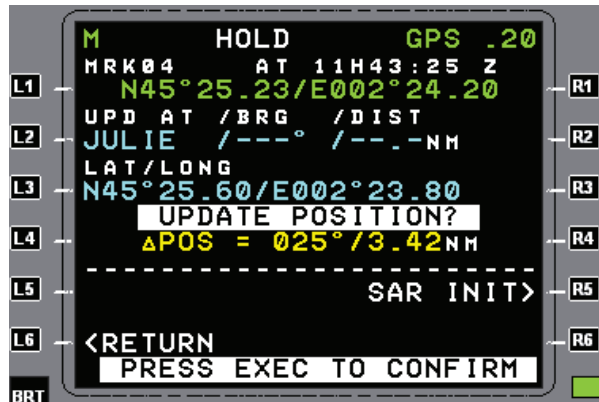
2) The position of the updated position which has been overflown can be defined by:

   - its identifier in the database, enter its identifier on **UPD AT** Lsk.
   - its position, enter its latitude, longitude, on **LAT/LON** Lsk.
   - its position relative to a database point, enter identifier point, bearing, distance from this point on **UPD AT / BRG / DIST** Lsk.
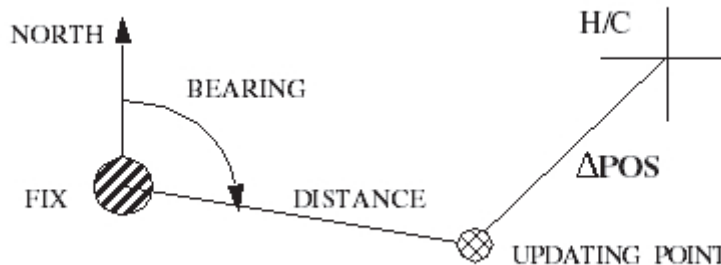
When **UPD AT** Lsk is pressed with empty scratchpad, the **DATA LIST** page is displayed with filter "ALL".

3) The position of updating point (**LAT/LON**), the discrepancy (ΔPOS) from the update point to the frozen position are displayed. Press **EXEC** key to confirm the update.

CAUTION : - It is recommended to check carefully the discrepancy between the frozen and updated position, because the update is irreversible.

NOTE : The update command is refused, if the distance between the update and frozen position exceeds 100 NM.

The update concerns all sources of localization whatever the navigation mode.

LOCALIZATION SOURCE	GPS	BCP
ACTION AT UPDATE	init of position in degraded mode	init of position

7.6.4 *SAR origin at held position*

Refer to the SAR paragraph page.

7.7 <u>Database operation</u>

7.7.1 *<u>Uploading/downloading of database</u>*

1) Insert a DTM in the ADL with the desired data (standard, pilot, tactical) in case of uploading.

2) Press **DATA** key.

3) Press **DATA XFER** Lsk.

```
  M        DATA XFER   BCP .04
     --------FMS DATA---------
     STD DATA        EXP DATE
     STDDTBID00      18-JUL-97
     PILOT DATA      LAST MOD
     PLTDTBID00      01-JUL-97
     TACTICAL        LAST MOD
     TACDTBID00      02-JUL-97
     ---------------------------
     >UPLOAD         DOWNLOAD<
     <RETURN
BRT
```
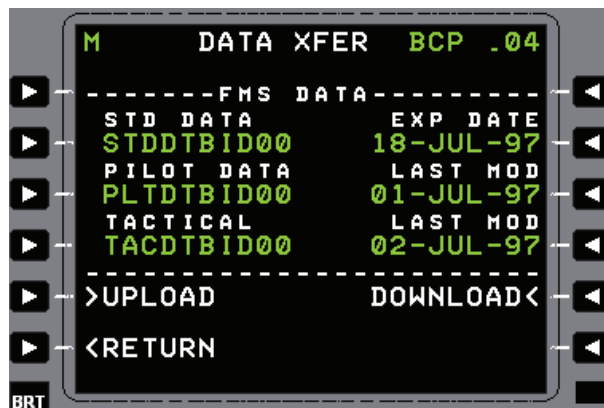
4) Press **UPLOAD/DOWNLOAD** Lsk, then the name and the expiration/modi-fication date of data which can be transfered, are displayed in yellow.

5) Press Lsk beside the type of data that have not to be transfered, then this field becomes green. By default all DTM data are selected for the uploading.

6) Press **EXEC** to confirm the transfer.

7) The message **XFER DATA IN PROGRESS** is displayed and the keyboard is locked.

CAUTION : The downloaded data erase those of the same type contained in the DTM.

NOTE : - During the uploading, a progress indicator is displayed.

- The downloading of the standard database is not allowed.

CAUTION : - Standard Data Base shall be generated with the Arinc 424 formatting tool

-    DO 200A process is complete only by using an Arinc 424 Data Base provided by a supplier which is qualified DO 200A.

DATA TRANSFER page after UPLOAD press :
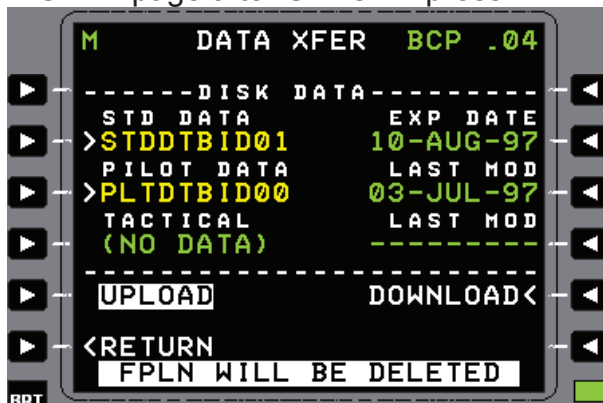
DATA TRANSFER page during UPLOAD command :
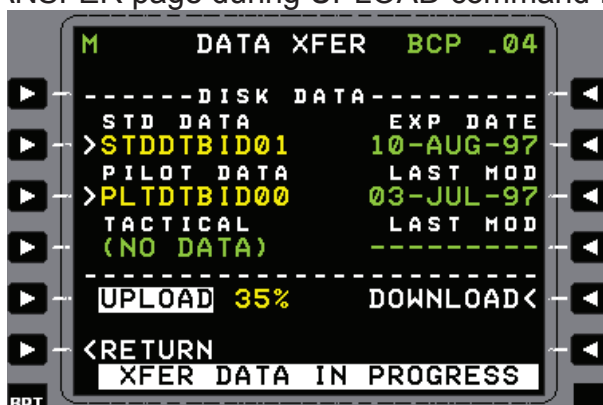
DATA TRANSFER page after DOWNLOAD press :
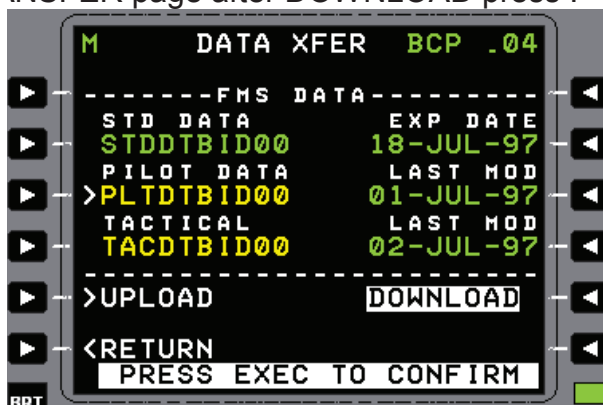
7.7.2 _Checking FMS database_

1) Press **DATA** key.

2) Press **DATA XFER** Lsk. The name of the standard database with its date of expiration, the name of the pilot and tactical data with their last date of modification are displayed.

```
M      DATA XFER   GPS .60
  --------FMS DATA---------
  STD DATA         EXP DATE
  FRGBSA2         16-JUL-98
  PILOT DATA       LAST MOD
  PLTDTBID00      20-APR-98
  TACTICAL         LAST MOD
  TACBD000        20-APR-98
  -------------------------

  <RETURN
```
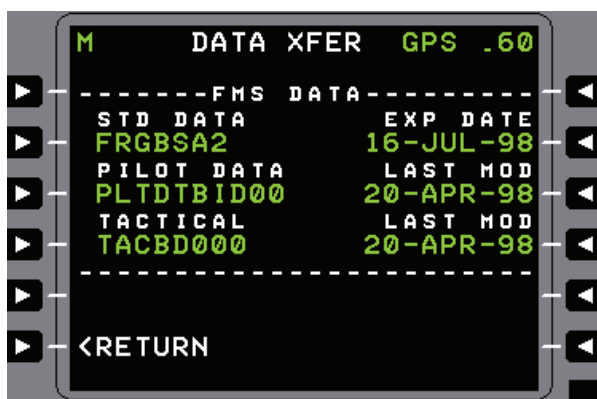
7.7.3 _Erasing user data_

NOTE : A push on the zeroize switch has the same result as the actions list on the MCDU described afterwards.

1) Press **DATA** key.

2) Press **ZEROIZE lsk**.

```
M  DTA DATA MENU   GPS .20
L1  <INIT         DATABASE>  R1
L2  <STATUS       DATA XFER> R2
L3  <UNITS                   R3
L4                DATA LIST> R4
L5                           R5
   -DATA------------DATA-
L6  >ZEROIZE        SAVE<    R6
    FPLN WILL BE DELETED
BRT
```
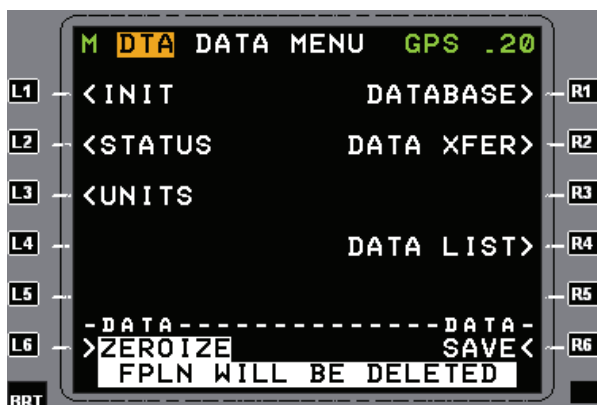
3) Press **EXEC**, this action is irreversible
   The following data are erased at the same time :
   - Pilot data
   - tactical data
   - DTM

NOTE : To allow the deletion,

     - the active flight plan

     - the temporary flight plan

     - the secondary flight plan

     are erased.

CAUTION : **DO NOT PUSH** the zeroise switch during an uploading or a downloading.

7.7.4 *Saving data*

1) Press **DATA** key.

2) Press **SAVE L**sk.

```
   1234567890123456789012 34
 1 M     DATA MENU  GPS .04 1
 2                          2
L1 3 <INIT        DATABASE> 3 R1
 4                          4
L2 5 <STATUS     DATA XFER> 5 R2
 6                          6
L3 7 <UNITS           TUNE> 7 R3
 8                          8
L4 9             DATA LIST> 9 R4
 0                          0
L5 1                        1 R5
 2                          2
L6 3 -DATA-----------DATA-  3 R6
 4 >ZEROIZE        SAVE<    4
   XFER DATA IN PROGRESS
   1234567890123456789012 34
```
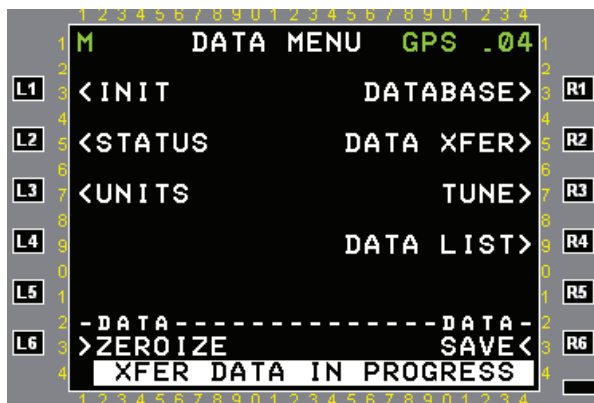
NOTE : This action enables to save pilot database in the FMS non-volatile memory, in order to recover them after a power off.

NOTE : The secondary flight plan is saved by this action.

7.7.5 *DATA LIST FUNCTION*

Access :

- Press **DATA** key twice
- Press **DATA** key + **DATA LIST** Lsk
- Specific access from several pages described on concerned pages.

THALES
AVIONICS

```
  1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4
 1  M      DATA LIST   GPS .04  1
                                2
L1 3 AL     N41/W005  LE NDB    3  R1
                                4
L2 5 AL     N48/E000  LF NDB    5  R2
   6  ALLERSBERG               6
L3 7 ALB    N49/E011  ED VORDME 7  R3
                                8
L4 9 ALBI   N45/E005     WPT    9  R4
   0  ALESSANDRIA              0
L5 1 ALES   N44/E008  LI APT    1  R5
   2 ----------------------    2
L6 3 <RETURN          ALL<      3  R6
   4  AL
  1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4
```
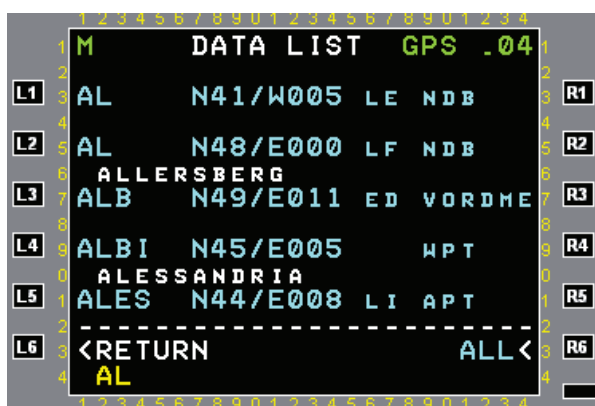
Data are displayed in alphanumerical order according to scratchpad entry.
Several filters are available:

- **ALL** for all the data of the standard and pilot databases,
- **APT** for all the airports of the standard and pilot databases,
- **VHF NAV** for all the VHF navaids of the standard and pilot databases,
- **WPT** for all the waypoints of the standard and pilot databases,
- **NDB NAV** for all the standard NDB navaids.

The features displayed are:

- Name associated to fix, if it exists.
- ident.
- **LAT/LON** abbreviation.
- country code.
- **TYPE** :
  - **WPT**: enroute waypoint
  - **TWPT**: terminal waypoint
  - **APT**: airport
  - **NDB**: enroute NDB
  - **TNDB**: terminal NDB
  - **VOR**, **VORDME**, **VORTAC**, **ILS**, **ILSDME**, **ILSTAC**, **LOC**, **LOCDME**, **DME**, **TACAN**: VHF navaid

A press on the right Lsk displays the standard or pilot database page corresponding to the selected item.
If **DATA LIST** page is accessed from **DATA MENU** page, a press on left Lsk inserts the data identification in the scratchpad (for waypoint insertion in flight plan for example). Otherwise, a press on left Lsk executes the previous command with the selected data and the previous page is displayed.

7.8 Sensors monitoring

7.8.1 *Monitoring fuel flow*

1) Press **DATA** key.

2) Press **STATUS** Lsk.

3) Press **FUEL FLOW** Lsk. The following parameters are displayed:

   - **ENGx** the value taken by the flowmeter of each engine (number of engines depending of the aircraft configuration).
   - the global fuel flow computation **TOTAL CONSUMPTION.**
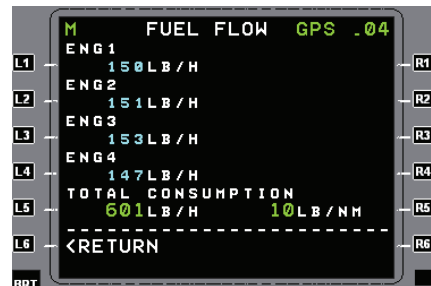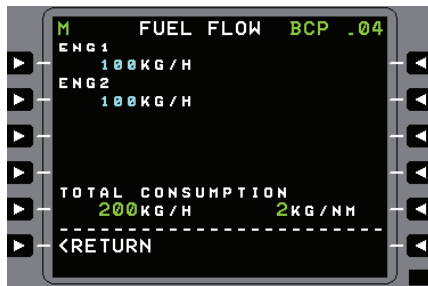
NOTE : - A dashed engine fuel flow dashes the global fuel flow, and the fuel predictions (**EFOB**).

   - The maximum value of the fuel flow (TOTAL CONSUMPTION) that can be entered is 270 kg/h.

4) Enter on the desired Lsk fuel flow, if it is dashed or if it has to be modified. Entered values are displayed in large font.

```
M       FUEL FLOW   BCP .04
ENG1
    100KG/H
ENG2
    ----KG/H


TOTAL CONSUMPTION
-----KG/H  -----KG/NM
-----------------------
<RETURN
```
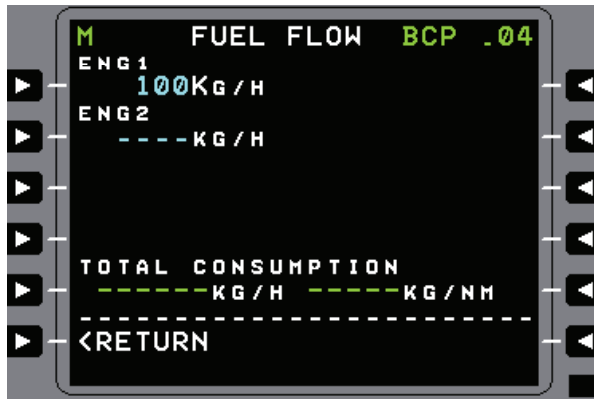
5) CLEAR action on a fuel flow in large font (value inserted) restores the value provided by the flow meter.

7.8.2 *Monitoring navigation modes*

1) Press **PROG** key.

2) Press **PREV** key.


```
M       PROG 3/3   GPS .04
         A/C POSITION

        N45°12.34      EPE
<BCP  E002°21.44    0.15NM
<GPS  356°/0.10NM   0.08NM
<IRS  091°/1.01NM   1.35NM
<HYB  120°/0.23NM   0.04NM
 FM2  355°/0.22NM   0.05NM
```
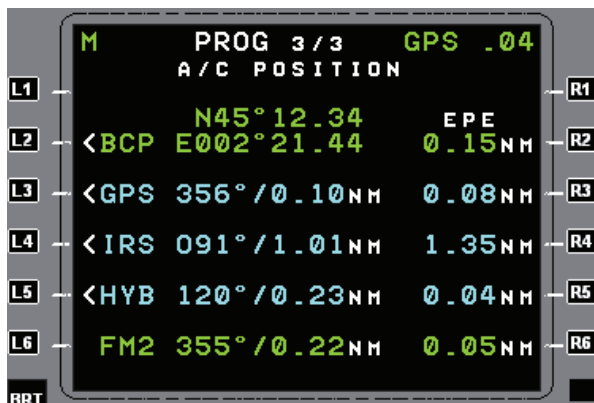
NOTE : When the FMS position is invalid, the **PROG 3/3** page is displayed after a single Press on **PROG** key.

3) The following parameters are displayed :

  • the FMS position (the coordinates) provided by the selected navigation mode (displayed in green).
  • the discrepancy (distance and bearing) from the FMS position to the other mode position.
  • the Estimated Position Error, **EPE**, of all navigation modes.

4) On the **PROG 3/3** page, press on the Lsk near the desired navigation mode.

5) The parameters of this navigation mode are displayed.
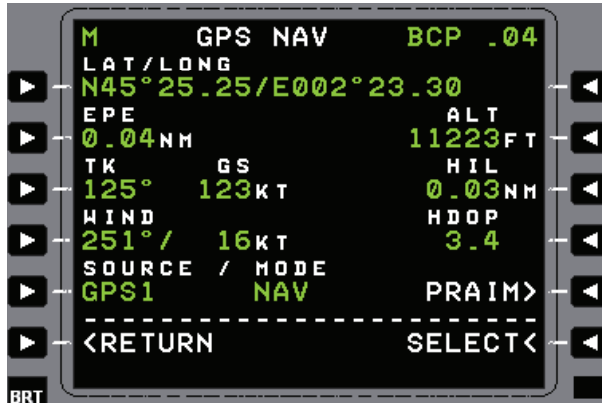
```
M       GPS NAV      BCP .04
LAT/LONG
N45°25.25/E002°23.30
EPE                    ALT
0.04NM              11223FT
TK      GS            HIL
125°    123KT        0.03NM
WIND                 HDOP
251°/   16KT           3.4
SOURCE / MODE
GPS1    NAV          PRAIM>
- - - - - - - - - - - - - - - - - - - - -
<RETURN             SELECT<
```

6) To select this navigation mode, press **SELECT** Lsk.

NOTE : The **SELECT** prompt is not displayed when the navigation mode is already selected.

7.8.3 _Monitoring BCP parameters_

1) Press **PROG** key one or three times, in order to display **PROG 3/3** page.

```
M        PROG 3/3    GPS .04
          A/C POSITION

          N45°12.34      EPE
<BCP  E002°21.44    0.15NM

<GPS  356°/0.10NM   0.08NM

<IRS  091°/1.01NM   1.35NM

<HYB  120°/0.23NM   0.04NM

 FM2  355°/0.22NM   0.05NM
```
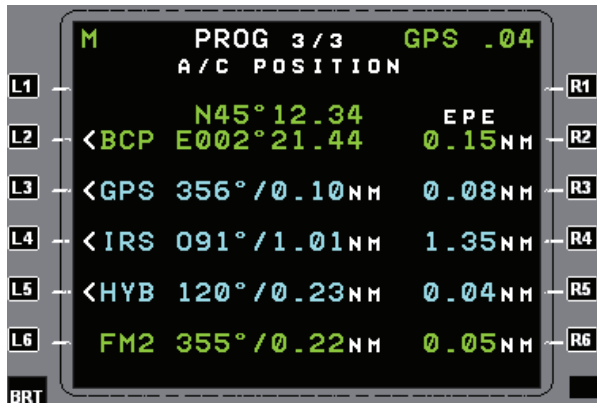
2) Press **BCP** Lsk on **PROG 3/3** page.

```
M       BCP NAV     GPS .04
LAT/LONG
N45°25.23/E002°23.23
EPE
0.30NM
TK      GS          IRS
125°    248NM       SEL<
WIND                GPS
251°/   30NM        SEL<
                    R/NAV
                    SEL<
- - - - - - - - - - - - - - - - - - -
<RETURN
```
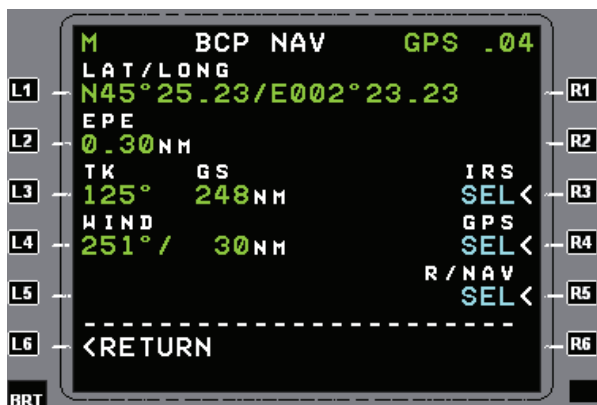
3) The following parameters calculated by the BCP function are displayed:

   • **LAT/LONG**, coordinates of the BCP position.
   • **EPE**, Estimated Position Error.
   • **TK**, TracK angle.
   • **GS**, Ground Speed.
   • **WIND**, wind origin and speed.

4) Press **Ri** Lsk in order to **SEL/DESEL** corresponding sensor data for the BCP computation.

NOTE : - "GPS deselection" deselects GPS and HYB from BCP.
       - "IRS deselection" deselects IRS and HYB from BCP.

According to the selected sensors, their availability and their calculated weight, the BCP uses in priority:

- IRS/GPS (HYB mode)
- GPS (only used if HYB not available or GPS selected & hybridization not active)
- IRS ground speed + Radio-Nav data (in flight)
- Radio-Nav data (in flight) combined with TAS vector (TAS + heading)
- IRS ground speed only (if no position data available)
- Air Data (AD) mode if no IRS, GPS, radio-nav data

CAUTION : Depending of the system configuration, IRS (inertial reference system sensor), R/NAV (radio navigation sensors) can be or not selected for the BCP computation. GPS sensor is always present.

NOTE : EPE computation for BCP

- In HYB or GPS mode the EPE is provided by the sensor.
- In IRS/radio-nav or Radio-Nav + TAS/hdg, the EPE is computed by the FMS taking into account the VOR, DME, TACAN accuracy and the navaid geometry (see chap. 11.2.6)
- In IRS ground speed mode, the EPE diverge at a rate of 2 m/s.
- In AD mode the EPE diverge at a rate of 5,15 m/s.

If IRS is in alignment on ground (IRS position is not valid), the BCP can use GPS if available with (GPS EPE), else BCP works in AD mode.

Radio-Nav signals are not taken into account on ground ((WOW on ground and Radio height < 15 ft) or (WOW on ground and Radio height invalid)).

7.8.4 *Monitoring IRS or HYB parameters*

1) Press **PROG** key, and if necessary **PREV** key.

2) Press **IRS** or **HYB** Lsk on **PROG 3/3** page.
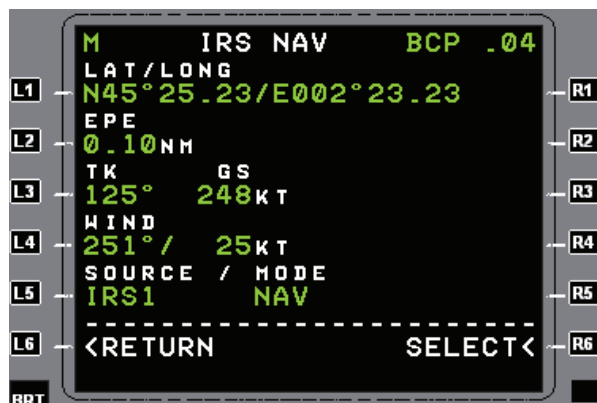
NOTE : Those pages are accessible only if the required equipements are present.

3) The following IRS or HYB parameters are displayed:

- **LAT/LONG**, coordinates of IRS or HYB mode.
- **EPE**, Estimated Position Error.
- **TK**, TracK angle.
- **GS**, Ground Speed.
- the monitored IRS **SOURCE**: **IRS1** or **IRS2**.
- the IRS and HYB **MODE** :

  Case of TOTEM3000 :
  - **STBY**, the IRS needs a GCA alignment.
  - **ALNXXX**, the GCA alignment is in progress, remaining time is displayed in second.
  - **ALNSHA,** the SHA alignment is in progress.
  - **ALNIFA,** the IFA alignment is in progress.
  - **ALNFLT,** the alignment is fault.
  - **EIA**, the Enhance Interrupted Alignment is in progress.
  - **EIAOK**, the Enhance Interrupted Alignment is achieved, but the mode is not navigation.
  - **NAV**, IRS in Navigation, hybridation IRS/GPS inactive.
  - **NAVGPS**, IRS in Navigation, hybridation IRS/GPS active.
  - **NAVEIA**, IRS and HYB Navigation with the achieved Enhance Interrupted Alignment.
  - **TEST,** IRS is in test mode.

  Case of LN100G :
  - **STBY,** the IRS needs an alignment.
  - **ALNXXX,** the GCA alignment is in progress, alignment time is displayed in second.
  - **ALNSHA,** the SHA alignment is in progress.
  - **ALNIFA,** the IFA alignment is in progress.
  - **ALNFLT,** the alignment is fault.
  - **NAV,** IRS in Navigation, hybridation IRS/GPS inactive.
  - **NAVGPS**, IRS in Navigation, hybridation IRS/GPS active.
  - **TEST,** IRS is in test mode.
  - **BATH,** IRS is in bath mode.

o **ATT,** IRS is in attitude mode.
o **------,** IRS mode is invalid.

7.8.5 *Monitoring GPS parameters*

1) Press **PROG** key, and if necessary **PREV** key.

```
M        GPS NAV      GPS .20
LAT/LONG
N45°25.25/E002°23.30
EPE                      ALT
0.04NM                4810FT
TK      GS            HIL
125°   189KT         0.06NM
WIND                 HDOP
251°/  31KT           3.4
SOURCE / MODE
GPS1     NAV
- - - - - - - - - - - - - - - - -
<RETURN
```
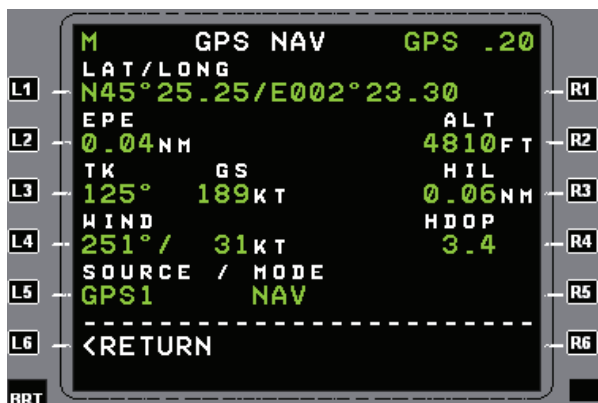
2) Press **GPS** Lsk on **PROG 3/3** page, the parameters provided by the GPS monitored by the FMS are displayed:

- **LAT/LONG**, coordinates of GPS position.
- **EPE**, Estimated Position Error.
- **TK**, TracK angle.
- **GS**, Ground Speed.
- **ALT**, GPS ALTitude (MSL).
- **WIND**, wind origin and speed.
- **HIL**, RAIM Horizontal Integrity Limit (if GPS receiver provides it)
- the monitored **SOURCE: GPS.**
- **HDOP**, Horizontal Dilution Of Precision.
- GPS **MODE**:
    - **INIT**, Initialisation, the GPS receiver is initialising time and position information.
    - **ACQ**, Acquisition, the receiver is tracking satellites.
    - **NAV**, Navigation, 3D position and time are provided.
    - **ALT**, Altitude/Clock aiding. The GPS receiver uses FMS informations of altitude or clock to perform a 3D localization. RAIM is not available.
    - **TEST**, Self Test
    - **AIDED**, The receiver uses external speed to update its position (until enough satellites can be received).
    - **FAULT**, GPS failure.

7.8.6 _Monitoring air/radioaltimeter data_

1) **DATA** key.

2) Press **STATUS** Lsk.

3) Press **AIR/RA** Lsk.

This page displays the following data from the ADU1 (or ADU2) and Radio Altimeter :
- **IAS**, Indicated Air Speed.
- **TAS**, True Air Speed.
- **VZ**, Barometric Vertical speed.
- **ZP**, Standard altitude.
- **ZC**, Barometric Corrected altitude.
- **SAT**, Static Air Temperature.
- **TAT**, Total Air Temperature.
- **RHT** , Radioaltimetric Height.
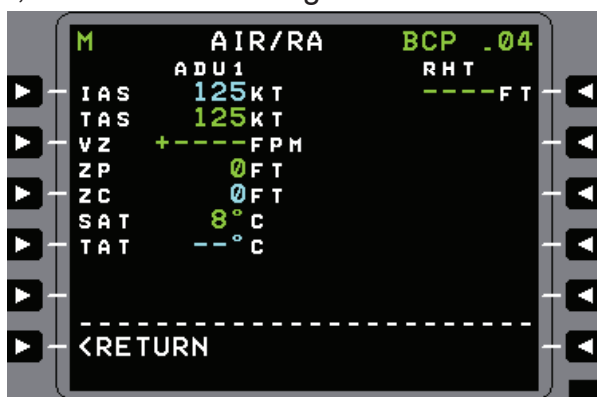
NOTE : The barometric setting is adjusted manually by the crew on the ICP.

When air parameters are invalid (dashed), speed, altitude and temperature have to be inserted in order to keep the FMS computations of performance, prediction, guidance.

NOTE : In this degraded mode: TAS=IAS, ZP=ZC, SAT= ISA SAT.

7.8.7 *Monitoring heading and attitude data*

1) Press **DATA** key.

2) Press **STATUS** Lsk.

3) Press **HDG/ATT** Lsk.

This page displays attitude and heading parameters of both sides:
- **ROLL.**
- **PITCH**.
- **HDG**

.Following the heading parameter value, an indication displays the heading reference used :
- "T" for the true heading
- "M" for the magnetic heading
- "D" for the directional heading.

```
M       HDG/ATT      BCP .04

             SIDE 1*     SIDE 2
   ROLL     R12.43°     R12.28°
   PITCH    U04.25°     U04.51°
   HDG      124.5°M     124.2°M

   VAR IGRF2000       TRU HDG
    W002.1°            122.0°T
   HDG REF            NAV HDG
   >MAG/TRU            127.0°
   - - - - - - - - - - - - - - - - - - -
   <RETURN
```
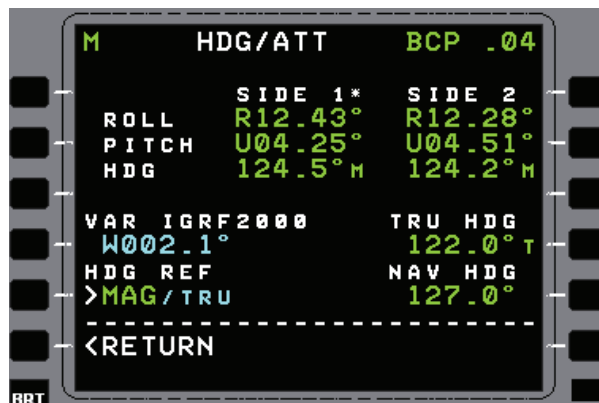
4) **VAR FIELD**

This parameter indicate the type of the magnetic variation (MAG VAR) used depending of the magnetic heading source.
- **VAR XXXXXXXX**,
  magnetic variation computed with the FMS position.
  XXXXXXXX is the model name. For example, IGRF2000 stands for the International Geomagnetic Reference Field model of Year 2000.

- **VAR MANUAL**, magnetic variation inserted by the crew.

NOTE : - The star character "*" indicates the selected side.
- Refer to the MAINTENANCE OPERATION section for the uploading of the earth magnetic variation model.

5) To change magnetic variation, enter value (E or W for the sign) near **VAR** Lsk.
→ **MANUAL** is then displayed.

6) A CLEAR action on **MANUAL** Lsk restores the value provided by the magnetic model.

NOTE : When the Directional mode is selected on the AHRS, it is not possible to clear a Manual magnetic variation

7) Press **HDG REF** Lsk, in order to change the Heading Reference.

NOTE : BY DEFAULT, THE HEADING REFERENCE IS SET TO MAG WHEN ENGAGING LOGISTICAL OR SAR NAVIGATION.

8) When the heading is dashed, in order to keep the FMS navigation and predictions computations, enter the heading of the navigation, on **NAV HDG** Lsk, in the reference (MAG or TRUE) of the FMS.

- This model is usually updated each 5 years.

8 ALARM

8.1 Alarm messages

8.1.1 *Message page*

Access : **MSG** key
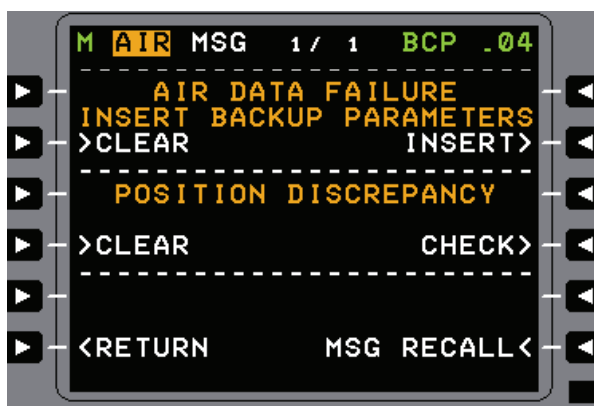
When there is at least one message alert, the MCDU annunciator **MSG** is illuminated, and the code of the highest priority message is displayed in reverse video in the title line.

On the **MESSAGE** page, the messages are sorted out in the list, by priority order.
Press **NEXT** / **PREV** to access to the following/preceding pages.
Press **CLEAR** Lsk to mask or clear the corresponding alert.
Press **MSG RECALL** Lsk to unmask alerts that have been masked by a clear action.

NOTE : The message code in the title line is always refreshed, but not the list of the **MESSAGE** page, as long as an action is performed.

8.1.2 *List of message codes*

The following table lists the FMS alerts in decreasing priority. Clear means the alert can be cleared, mask means the alert can be masked and then can be unmasked by a **MSG RECALL** command. The delay represents the time between cause coming and the alert triggering.

TYPE OF ALERT	MASK (Y/N)	CLEAR (Y/N)	DELAY	CAUSE, ALERT DESCRIPTION
PIN	N	N	-	FMC Program pins configuration modified

TYPE OF ALERT	MASK (Y/N)	CLEAR (Y/N)	DELAY	CAUSE, ALERT DESCRIPTION
CNF	N	Y	-	aircraft configuration modified
CTK	Y	N	-	FMS Cross Talk Bus failure
				CRC error
				Receiver init request
				Transmitter init request
INI	N	N	-	Check initial position and init sensors
ALN	N	N	-	IRS alignement in progress
AIR	Y	N	5 s	ZBC, IAS, TAT invalid
HDG	N	N	5 s	Heading failure
POS	N	N	5 s	Selected position invalid
				BCP will be reinitialized
	Y	N		Position discrepancy
				Horizontal position accuracy alert
FAL	Y	N	-	EFOB on destination or on rerouting point lower than reserve
	N	Y	-	Non Return Point alert
FFF	N	N	30 s	Flowmeter failure
DRP	N	Y		Carge update request
DTA	Y	N	-	Save data requested
VAR	Y	N	-	Variation discrepancy (inserted/computed)
2HR	Y	N	-	GPS key 2 hours alert
FPL	Y	N	-	Logistical flight plan discontinuity or flight plan end
	N	Y	-	A new flight plan is received from FITS
IRS	Y	N	5 s	IRS status fault
				IRS navigation fault
GPS	Y	N	5 s	GPS status fault
				GPS navigation fault
DPL	Y	N	5s	DOPPLER navigation fault
R/N	Y	N	10 s	Radionavigation data not sufficient for BCP
AIM	Y	N	30 s	GPS HIL invalid in enroute area
			10 s	GPS HIL invalid in terminal area
				GPS HIL invalid in approach area, before FAF
				GPS HIL invalid & GPS HDOP invalid in approach area, after FAF
			300 s	GPS HIL invalid & GPS HDOP degraded in approach area, after FAF
HIL	Y	N	20-30 s [1]	GPS HIL out of range in enroute area
			0-10 s [1]	GPS HIL out of range in terminal or in approach area

TYPE OF ALERT	MASK (Y/N)	CLEAR (Y/N)	DELAY	CAUSE, ALERT DESCRIPTION
APP	Y	N	-	Approach area alert, check TKE
				Approach area alert, check GPS HIL
RNP	Y	N	-	ANP discrepancy
			-	RNP RNAV type inconsistent with current airspace
TST	N	N	-	FMS output data are test data
FMS	Y	N	5 s	Bite function failure FMC
				Bite function failure MCDU
				Bite function failure ADL
BAT	N	N	5 s	Change FMC battery

8.1.3 *Meaning of alarm messages*

Hereafter, the list of the alerts defined with their code, text, meanings and the possible actions, are described in the alphabetic order.

8.1.3.1 *2HR*

GPS KEYS 2 HOURS ALERT

Explanation :

GPS SA/AS status: 2 hours alert is raised.

Possible actions :

- Press **CLEAR** Lsk to mask the alert.

8.1.3.2 *AIM*

NO GPS RAIM

Explanation :

The GPS HIL is invalid in enroute, terminal or approach area before FAF or the GPS HIL is invalid & the GPS HDOP is degraded or invalid in approach area after FAF.

Possible actions :

- Press **CHECK** Lsk to access to the **GPS NAV** page.
- Press **CLEAR** Lsk to mask the alert.

**GPS PRAIM NOT VALID
AT FAF OR MAP**

Explanation :

The GPS HIL at FAF or MAP is invalid or too high when flight area is terminal and distance to destination is less than 30NM.

Possible actions :

- Press **CHECK** Lsk to access to the **PRAIM** page.
- Press **CLEAR** Lsk to mask the alert.

8.1.3.3 *AIR*

AIR DATA FAILURE
INSERT BACKUP PARAMETERS

Explanation :

The Indicated Air Speed, or Barometric Corrected altitude, or Total Air Temperature are invalid.

Possible actions :

- Press **INSERT** Lsk, the **AIR/RADIOALTIMETER** page is then displayed. Enter the Indicated Air Speed (**IAS**), Barometric Corrected altitude (**ZC**), and Total Air Temperature (**TAT**).

Press **CLEAR** Lsk to mask the alert

8.1.3.4 *ALN*

IRS ALIGNMENT
IN PROGRESS

Explanation :

The IRS is performing its alignment.

Possible actions :

Press **CHECK** Lsk, the **SENSOR STS** page is then displayed. Check the alignment mode.

8.1.3.5 *APP*

APPROACH NOT ENABLE
CHECK TKE OR XTK

Explanation :

The TKE or XTK approach condition is not met.

Possible actions :

- Press **CHECK** Lsk to access to the **PROG 2/3** page and check the value of TKE and XTK.
- Press **CLEAR** Lsk to mask the alert.

**APPROACH NOT ENABLE
CHECK POS EPE OR GPS HIL**

Explanation :

The GPS or radio approach conditions are not met.

Possible actions :

- Press **CHECK** Lsk to access to the **PROG 3/3** page.
- Press **CLEAR** Lsk to mask the alert.

NOTE : When GPS is used for navigation and the sensor does not provide HIL, lack of GPS integrity knowledge prevents the FMS to select the approach mode and this alert is set.

8.1.3.6 *BAT*

**BATTERY LOW
CHANGE BATTERY**

Explanation :

The battery voltage is too weak. This message appears only when the aircraft is on the ground.

Possible actions :

Perform a maintenance action: change the battery of the concerned FMC.

8.1.3.7 *CTK*

**CROSS TALK FAILURE
NO COMMUNICATION FMS1/2**

Explanation :

Each FMC remains then in independent mode, two causes are possible:
- There is no activity on CROSS TALK bus, for more than 15s. In this case, on page **PROG 3/3** the position discrepancy between the two FMC is invalid.
- The software version is different between the two FMC.
Each FMC remains then in independent mode.

Possible actions :

- Perform maintenance actions: upload the FMC software, or check the ARINC bus.
- Press **CLEAR** Lsk to mask the alert.

**CTK DATA DISCREPANCY
UPLOAD STD DATABASE**

Explanation :

The two FMC do not have the same Standard Data Base, however, they remain in DUAL mode.

CAUTION : While this Standard Data Base discrepancy exists, the activation of a LOGISTICAL flight plan using standard data has to be avoided, because the two FMC would not have identical flight plans.

NOTE : This alert is set too with 2 FMC equiped with free data FlashProm (FMC before the first loading of a Standard-data base).

Possible actions :

- Press **UPLOAD**, the **DATA XFER** page is displayed to process to an uploading.
- Press **CLEAR** Lsk to mask the alert.

CROSS TALK INIT
CONFIRM ON THE OTHER FMS

Explanation :

The power on has occurred in flight or the first CROSS TALK initialization has not been correctly executed. Each FMC remains then in independent mode until the CROSS TALK INIT confirmation.

Possible actions :

- Confirm the transfer on the other FMC.
- Press **CLEAR** Lsk to mask the alert.

CROSS TALK INIT
PRESS CTK TO CONFIRM

Explanation :

The power on has occurred in flight or the first CROSS TALK initialization has not been correctly executed. Each FMC remains then in independent mode until the confirmation.

Possible actions :

- Press **CTK** Lsk to Confirm the CROSS TALK INIT on the FMS. The CROSS TALK INITIALIZATION locks keyboard of the MCDU, except **BRT/DIM** and **MENU** key and can last until 2 min.
- Press **CLEAR** Lsk to mask the alert.

NOTE : This command is different of the command <CTK INIT (Lsk L5) that may be possible on inactive FMC (see FMS BITE page – CTK alert): In this case, the CTK INIT makes a log power off of the inactive FM.

8.1.3.8 *CMD*

**CROSS TALK
COMMAND REJECT**

Explanation :

The FMC has rejected the command transmitted by the other FMC.

Possible actions :

Press **CLEAR** Lsk to clear this alert.

8.1.3.9 *DPL*

**DPL FAILURE CHECK
DOPPLER DATA**

Explanation :

At least one parameter/status coming from the DOPPLER is invalid/fault.

Possible actions :

- Press **CHECK** Lsk. The **DOPPLER** page is displayed.
- Press **CLEAR** Lsk to clear this alert.

8.1.3.10 *DRP*

**DROPPING
UPDATE PAX/CARGO**

Explanation :

On a tactical navigation, 2 NM after the computed dropping point, the load, CARGO or PAX, has not yet been updated.

Possible actions :

- Press **UPDATE** Lsk, the **WEIGHT** page is displayed, perform a weight update.
- Press **CLEAR** Lsk to clear this alert.

8.1.3.11 *CNF*

<div align="center">**A/C CONFIGURATION MODIFIED**</div>

Explanation :

    The aircraft configuration has been changed since the last power on.

Possible action :

    - Press **CLEAR** Lsk to clear the alert.

8.1.3.12 *DTA*

<div align="center">**NAV DATA MODIFIED**
SAVE DATA</div>

Explanation :

    Data in Pilot has been modified but not saved. Those modifications will be lost after the power off.

Possible actions:

    - Press **SAVE** to access to the **DATA MENU** page and perform a **DATA SAVE**.

    - Press **CLEAR** Lsk to mask the alert.

8.1.3.13 *FAL*

<div align="center">**DESTINATION FUEL LESS**
THAN RESERVE</div>

Explanation :

    The Estimated Fuel On Board, EFOB, at the destination, or the EFOB on the rerouting point is lower than the reserve.

Possible actions:

    - Press **CHECK** Lsk. The **CRUISE** page is displayed.

    - Press **CLEAR** Lsk to mask the alert.

8.1.3.14 *FFF*

<div align="center">**FUEL FLOW FAILURE**
INSERT BACKUP PARAMETERS</div>

Explanation :

    One or more of the fuel flow values is invalid.

Possible actions:

    Press **INSERT** Lsk, the **FUEL FLOW** page is displayed. Enter the corresponding value.

8.1.3.15 *FMS*

FMS BITE FAILURE

Explanation :

An error in the internal test of the FMS, or MCDU, or ADL is detected.

Possible actions:

- Press **CHECK** Lsk. The **FMS BITE** page is displayed. Find the status set to 1, and report to the Analysis Status paragraph.

- Press **CLEAR** Lsk to mask the alert.

8.1.3.16 *FPL*

**FPLN DISCONTINUITY
OR END OF ROUTE**

Explanation :

When a LOGISTICAL flight plan is engaged and the FMS is coupled to the AUTOPILOT, a discontinuity or the end (end different from the destination) of the flight plan will be reached within 1 minute.

Possible actions:

- Press **CHECK** Lsk to access to the **FPLN** page.

- Press **CLEAR** Lsk to mask the alert.

NEW FPLN UPDATING

Explanation :

A new flight Plan is received from the FITS.

NOTE : This alert only appears when "FITS AUTO/MAN" is set to manual.

Possible actions:

- Press **CHECK** Lsk to access to the **FPLN** page.

- Press **CLEAR** Lsk to clear the alert.

8.1.3.17 *GPS*

**GPS FAILURE
CHECK GPS STATUS**

Explanation :

At least one parameter/status coming from the GPS is invalid/fault.

Possible actions:

- Press **CHECK** Lsk. The **SENSOR STS** page is then displayed. Check the status and mode of the GPS.

- Press **CLEAR** Lsk to mask the alert.

GPS KEY NOT LOADED

Explanation :

No GPS key.

Possible actions:

- Press **CHECK** Lsk. The **SENSOR STS** page is then displayed.

- Press **CLEAR** Lsk to mask the alert.

8.1.3.18 *HDG*

HEADING INPUT NOT VALID
INSERT NAV HEADING

Explanation :

The navigation heading provided by the IRS is invalid.

Possible action:

Press **INSERT** Lsk, the **HDG/ATT**page is then displayed. Enter the heading of navigation in the selected reference (MAG or TRUE).

8.1.3.19 *HIL*

GPS HORIZONTAL
INTEGRITY ALERT

Explanation :

The Horizontal Integrity Limit, HIL of the GPS is greater than :

- 0.3 NM in APPROACH flight area.
- 1 NM in TERMINAL flight area.
- 2 NM in ENROUTE flight area.

Possible actions:

- Press **CHECK** Lsk. The **GPS NAV** page is displayed.

- Press **CLEAR** Lsk to mask the alert.

8.1.3.20 *INI*

CHECK INITIAL POSITION
AND INIT SENSORS

Explanation :

The initial position is invalid.

Possible action:

Press **CHECK** Lsk, the **POS INIT** page is then displayed. Check the initial position and perform the SENSORS initialisation.

8.1.3.21 *IRS*

IRS FAILURE
CHECK IRS STATUS

Explanation :

At least one parameter/status coming from the IRS is invalid/fault.

Possible actions:

- Press **CHECK** Lsk. The **SENSOR STS** page is then displayed. Check the status and mode of the IRS.
- Press **CLEAR** Lsk to mask the alert.

8.1.3.22 *NRP*

NRP ALERT

Explanation :

The Non-Return Point will be reached within 30 s.

Possible actions:

- Press **CHECK** Lsk to access to the **PROG 1/3** page.
- Press **CLEAR** Lsk to clear the alert.

8.1.3.23 *PIN*

FMS PROGRAM PINS
MODIFIED

Explanation :

The FMS Program Pins has been changed since the last power on.

Possible action:

Press **CHECK** Lsk, then the **DISCRETES** PAGE is displayed with the Program Pins value. Store the new Pins configuration by performing a reset of Program Pins.

8.1.3.24 *POS*

SELECTED POS NOT VALID
CHANGE NAV MODE

Explanation :

The position of the selected navigation mode is invalid.

Possible action:

Press **CHANGE** Lsk, the **PROG 3/3** page is displayed in order to change the navigation mode.

POSITION DISCREPANCY

Explanation :

- The position discrepancy between the selected navigation mode and another valid non selected one is greater than the sum of each navigation mode EPE, Estimated Position Error if this sum is greater than 0,1NM.

- The position discrepancy between the selected navigation mode and another valid non selected one is greater than 0,1NM if the sum of each navigation mode EPE is lower than 0,1NM.

- In dual mode, the discrepancy between the 2 FMS positions is greater than RNP

Possible actions:

- Press **CHECK** Lsk to access to the **PROG 3/3** page to find the concerned source(s) of navigation.

- Press **CLEAR** Lsk to mask the alert.

<div align="center">

BCP POSITION UPDATING

IN 30S

</div>

Explanation :

The BCP, Best Computed Position will be re-initialised automatically within 30s, because there is a too large difference of position between the BCP position and the best sensor position.

Possible action:

Press **CHECK**, then the **BCP NAV** page is displayed.

<div align="center">

2D ACCURACY ALERT

EPE > EPE_MAX

</div>

Explanation :

The EPE of the selected source of navigation is greater than a constant called EPE_max.

Possible actions:

- Press **CHECK** Lsk to access to the **PROG 3/3** page to check the selected source of navigation.

- Press **CLEAR** Lsk to mask the alert.

8.1.3.25 *R/N*

<div align="center">

RADIO NAV DATA

NOT RECEIVED

</div>

Explanation :

The selected mode of navigation is BCP, the GPS is not selected for the position computation or the Horizontal Integrity Limit, HIL of the GPS is not nominal (HIL message triggered), and only one radionavigation information of position is received, bearing or distance.

<u>Possible actions:</u>

- Press **CHECK** Lsk. The **TUNE 1/1** page is displayed. Check the radionav data.

- Press **CLEAR** Lsk to mask the alert.

8.1.3.26 *RNP*

<div align="center">

ANP > RNP
DEGRADED NAVIGATION
</div>

<u>Explanation :</u>

The Actual Navigation Performance, ANP (sum of the cross track error and the estimated position error) is greater than the Required Navigation Performance, RNP.

<u>Possible actions:</u>

- Press **CHECK** Lsk. The **PROG 2/3** page is displayed.
- Press **CLEAR** Lsk to mask the alert.

<div align="center">

RNP > RNP_DEFAULT
AIRSPACE INCONSISTENCY
</div>

<u>Explanation :</u>

The Required Navigation Performance (RNP) inserted on page **PROG 2/3** is greater than the defaut value for the current airspace.

<u>Possible actions:</u>

- Press **CHECK** Lsk. The **PROG 2/3** page is displayed. Insert a new RNP value.
- Press **CLEAR** Lsk to mask the alert.

8.1.3.27 *TST*

<div align="center">

FMM OUTPUTS
ON TEST
</div>

<u>Explanation :</u>

The OUTPUT TEST is being performed.

<u>Possible action:</u>

Press **STOP TEST** Lsk to stop the OUTPUT TEST.

8.1.3.28 *VAR*

<div align="center">

INSERTED/COMPUTED
VAR DISCREPANCY

</div>

Explanation :

The difference between the calculated magnetic variation and the entered magnetic variation value is greater than 2°.

Possible action:

- Press **CHECK** Lsk, the **HDG/ATT** page is then displayed. Enter a new magnetic variation value.

- Press **CLEAR** Lsk to mask the alert.

<div align="center">

9 MAINTENANCE OPERATION

</div>

9.1 Analysing status

9.1.1 Sensor status page

Access : **DATA** key, **STATUS** Lsk, **SENSOR STS** Lsk.
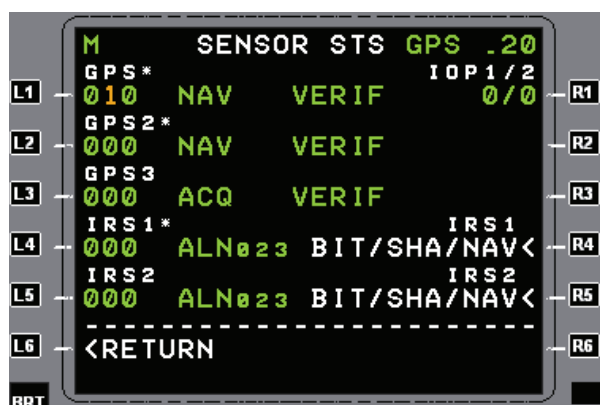
This page displays status and mode of sensors, for details about meaning of each mode see specific paragraphs.
A star character " * " besides an IRS or GPS sensor indicates that this sensor is activated, monitored by the FMS.

For all status 0 means normal, 1 means failed

IRS1 (resp. **IRS2**) status:


```
                                    0  0  0
Inertial Navigation System ──────────┘  │  └────── Attitude or heading or PQR

Air Data Computer ──────────────────────┘
```

GPS1 (resp. **GPS2**) status:

```
                              0  0  0
GPS Receiver ──────────────────┘  │  └────── GPS Sensor

GPS Radio Frequency ──────────────┘
```

IOP1/IOP2 status:

```
                        0 / 0
IOP1 bus reception ──────┘   └────── IOP2 bus reception
```
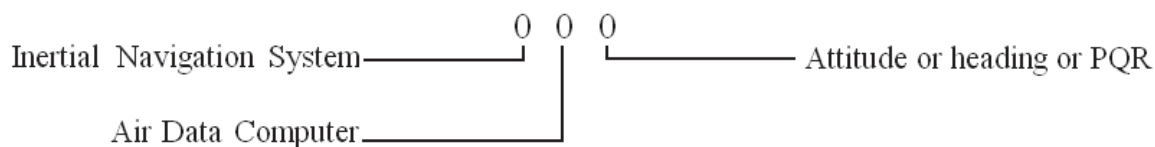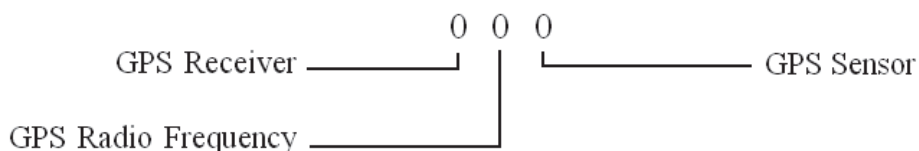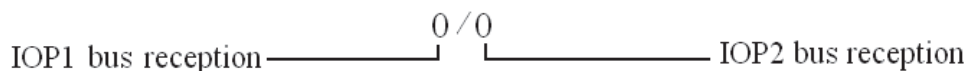
9.1.2 *FMS BITE page*

Access : DATA key, STATUS Lsk, FMS BITE Lsk.
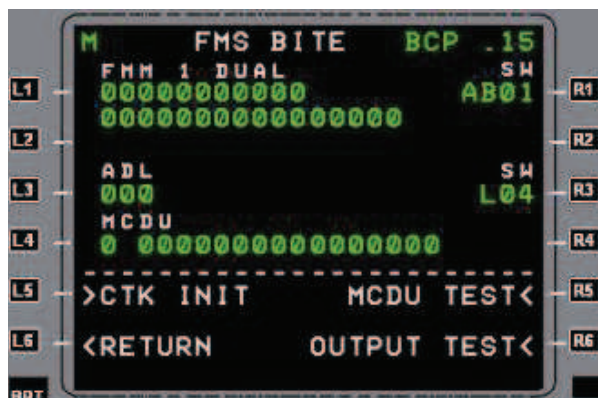
This page displays :
- FMC identification, CROSS TALK status and active FMC status,
- status and software version of the FMC,
- status and software version of the ADL,
- the status of the MCDU.

FMC side,CROSS TALK status and active FMC status,

The FMC side is displayed as 1 or 2 after the "FMC" label

The CROSS TALK status is displayed with the following values :
- DUAL if the CROSS TALK status is dual
- IND if the CROSS TALK status is single

The active FMC status is displayed with the following values :
- ACT is the FMC is the active FMC (side selected as FM navigation source)
- Blank otherwise

FMC and ADL status

For all status 0 means normal, 1 means failed.

The FMC status is PBIT (first line) + CBIT(second line).

CTK INIT prompt

The ">CTK INIT" prompt is displayed if the FMC is the inactive FMC (side not selected as FM navigation source).

If the prompt is present, the press on the Lsk L5 displays the "**PRESS EXEC TO CONFIRM**" message in the scratchpad line and the EXEC annunciator is illuminated. The "**>CTK INIT**" prompt becomes in reverse video.

A long power interruption of the FMC is commanded.

After the long power, the crew must select on the MCDU, the FMC.

NOTE : This command is different of the command CTK INIT< (Lsk Ri) that may be possible on active FMC (see message page – CTK alert): In this case, the CTK is initialised on the active FMC and doesn't powered off any FMC.

Status of the Power on Built In Test, PBIT :
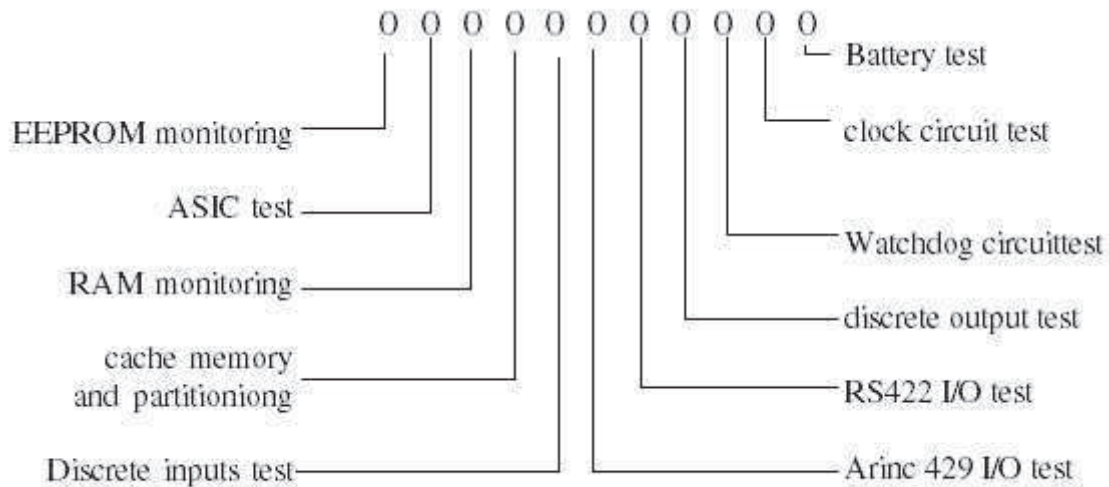
Status of the Continuous Built In Test, CBIT :
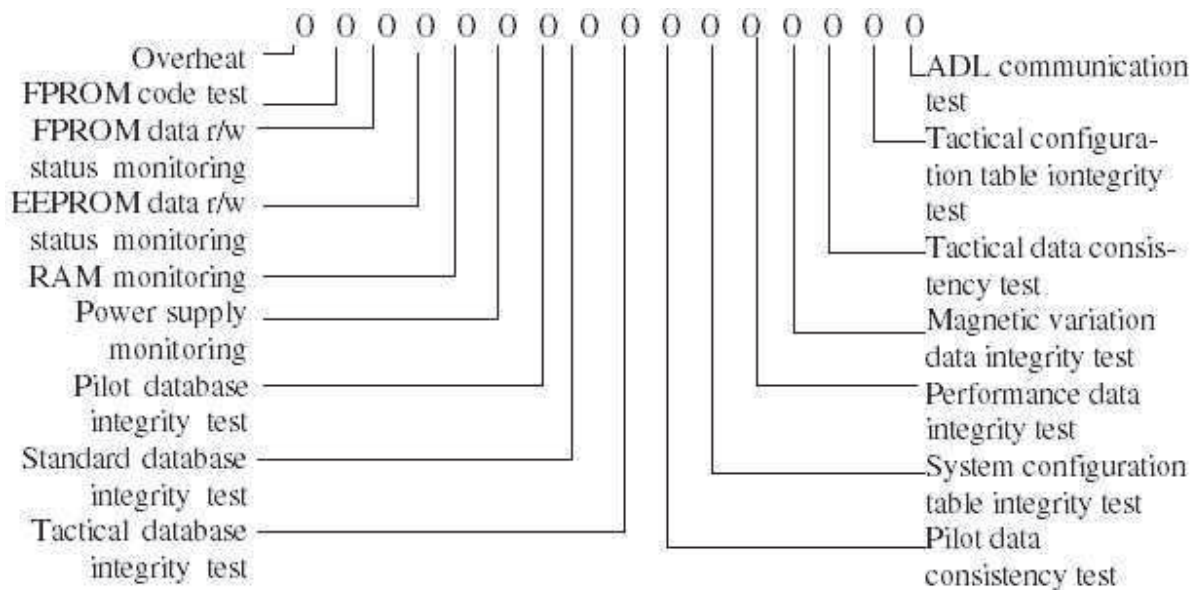
ADL status :
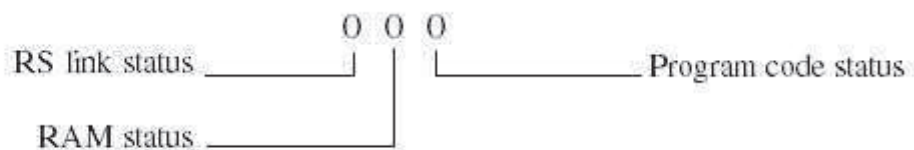
MCDU status :
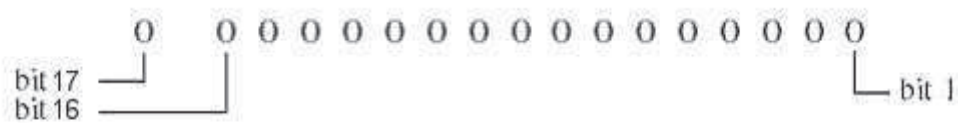
Bit number	Function
17	MCDU Status
16	Port 1 Receiver
15	Port 1 Data input
14	Port 2 Receiver
13	Port 2 Data input
12	Port 3 Receiver
11	Port 3 Data input
10	Port 4 Receiver
9	Port 4 Data input
8	Port 5 Receiver
7	Port 5 Data input
6	Port 6 Receiver
5	Port 6 Data input
4	Port 7 Receiver
3	Port 7 Data input
2	Port 8 Receiver
1	Port 8 Data input

NOTE : Data inputs for ports 3 to 8 are provisions and so always set to 0.

9.1.3 *Discretes page*

Access : **DATA** key, **STATUS** Lsk, **DISCRETES** Lsk

PROGRAM PINS

```
0  0  0  0    0  0  0  0
```

Spare —

Conf type —

FMC status (normal=0)

FMC side

Spare

ADL type (normal =1)
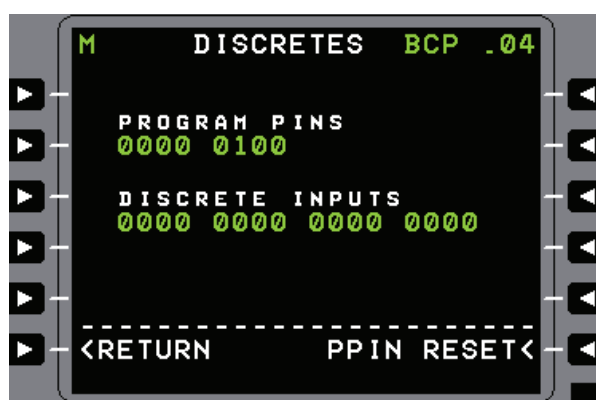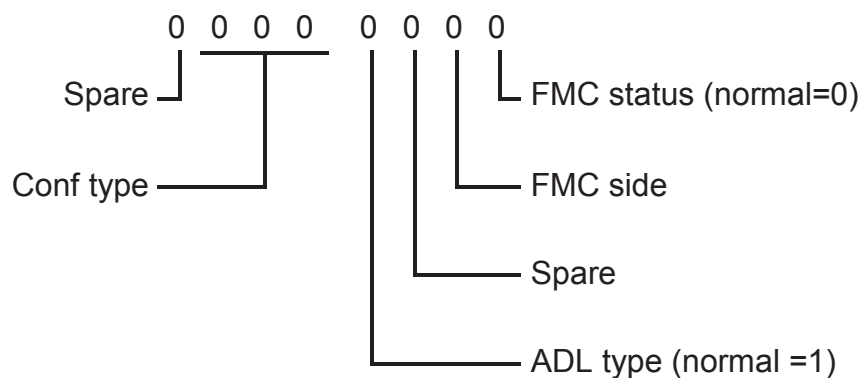
Conf type	
discretes	**aircraft**
1 0 0	C295
0 0 1	P3

FMC side	
Discrete	**FMC side**
0	1
1	2

DISCRETE INPUTS

```
0  0  0  0    0  0  0  0    0  0  0  0    0  0  0  0
```

Data zeroize
0 = no command

WOW 2
0 = flight

spare

WOW1
0 = flight

ATE-REQ
0=inactive

LOAD_REQ
0=inactive

ON BENCH.
0=inactive
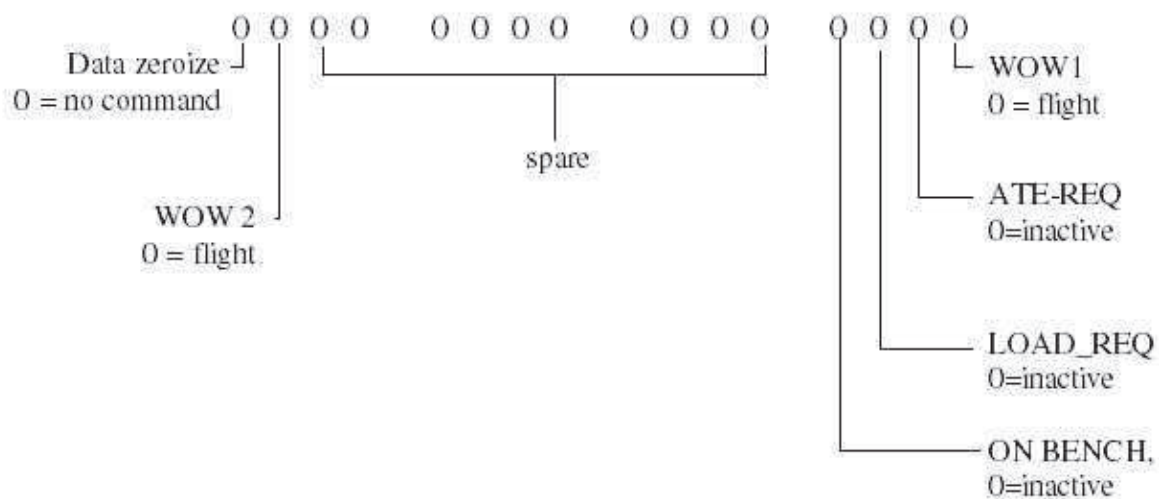
9.2 Maintenance procedures

9.2.1 *Performing FMS resynchronisation*

CTK INIT command allows to manually synchronize both FMS.

NOTE : This command is only available on the FMS not connected to AUTOPILOT.

1) Press **DATA** key
2) Press **STATUS** Lsk
3) Press **FMS BITE** Lsk
4) Press **CTK INIT** Lsk and confirm with **EXEC**. The CROSS TALK initialisation process is activated
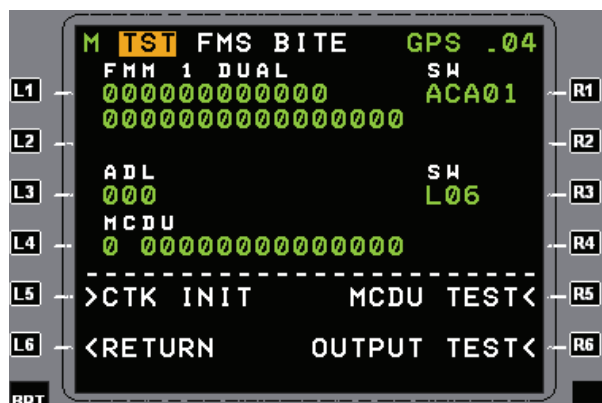
9.2.2 *Performing manual test*

1) Press **DATA** key.
2) Press **STATUS** Lsk.
3) Press **FMS BITE** Lsk.
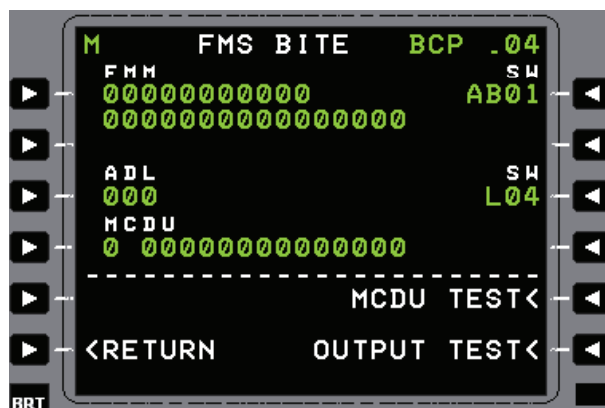
4) Press **MCDU TEST** Lsk, this test lasts 6 seconds and includes MCDU annunciators and display tests.

NOTE : The MCDU TEST command makes no action. However, the MCDU status is continuously monitored by CDS function.

5) Press **OUTPUT TEST** Lsk

```
M  TST  FMS BITE    BCP .04
   FMM                    SW
   000000000000          AB01
   000000000000000000

   ADL                    SW
   000                    L04
   MCDU
   0 00000000000000
   - - - - - - - - - - - - - - - - - - -
                    MCDU TEST<
   <RETURN          OUTPUT TEST<

BRT
```
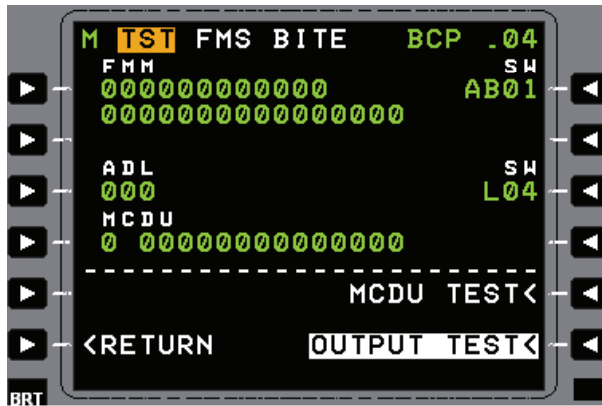
check :

• the **TST** message code is generated.
  • all discrete outputs are in the active state, except FMC validity discrets which are not affected by the output test.
  • The EFIS displays the test data and the test flight plan.
  • The FMS sends the following radionav frequencies to the radio navigation equipment ;

Equipemnt	Freq
VOR 1	108.10 MHz
VOR 2	109.10 MHz
DME channel 3	110.10 MHz

  • The FMS sends the following radiocom frequencies to the radio communication equipment :

Equipemnt	Freq
V/UHF 1	120.025 MHz
V/UHF 2	135.060 MHz
V/UHF 3	310.075 MHz
HF 1	8.7003 MHz
HF 2	22.0009 MHz
IFF M1 code	3200
IFF M3 code	7213

NOTE : -   In flight, **OUTPUT TEST** is not displayed and so impossible.

- During the test, data sent by the FMS are in nominal state.

6) Press **OUTPUT TEST** Lsk to stop the test, then the **TST** code is deleted and discrete outputs, data sent, return to the current values.

9.2.3 *Resetting program pins*

```
M  PIN DISCRETES   BCP .04


   PROGRAM PINS
   0000 0001

   DISCRETE INPUTS
   0000 0000 0100 0000


   --------------------------
   <RETURN      PPIN RESET<
```

If the PIN alarm is triggered :
1) Press **DATA** key.
2) Press **STATUS** Lsk.
3) Press **DISCRETES** Lsk.
4) Press **PPIN RESET** Lsk, the new program pins configuration is stored in non volatil memory. **DISCRETES** Lsk.

9.2.4 *Uploading data*

```
M       STS XFER   GPS .20
   UPLOAD     FMS DATA
L1 >SYS CONF   SYS-000152  R1

L2 >PERF DATA  PERF01       R2

L3 >MAG VAR    IGRF2005     R3

L4 >TACT CONF  TACT-00012   R4
   DOWNLOAD
L5 >STATUS                  R5
   ----------------PERF MODE-
L6 <RETURN         MANUAL<  R6
BRT
```

1) Insert a DTD, with the desired type of data in the ADL. Different types of data can be uploaded :

- the configuration database.
- the performance database.
- the model of the earth's magnetic field.
- the tactical configuration database (including only WARNING ZONES for P3 aircraft).

NOTE : -   If a performance database is not uploaded, the FMC automatically creates and uses a default PerfDB named 'MANUAL' and the PERF MODE is MANUAL.
If the event a performance database was uploaded, the crew can even select the MANUAL PERF MODE by pressing the corresponding Lsk on the **STS XFER** page.

2) Press **DATA** key.
3) Press **STATUS** Lsk.
4) Press **STS XFER** Lsk.
5) Press the Lsk corresponding to the type of data to upload :

- **CONF DATA** to upload the configuration database.
- **PERFDATA** to upload the performance database.
- **MAG VAR** to upload the model of earth's magnetic field.
- **TACT CONF** to upload the tactical configuration database (not displayed for P3 aircraft)

6) Then the message "**XFER DATA IN PROGRESS**" is displayed on the MCDU and deleted at the end of the uploading.

9.2.5 *Downloading of FMS status*

1) Insert a DTD in the ADL.
2) Press **DATA** key.
3) Press **STATUS** Lsk.
4) Press **STS XFER** Lsk.
5) Press **STATUS** Lsk, then the message **XFER DATA IN PROGRESS** is displayed and deleted at the end of the downloading.

NOTE : These data are used only for THALES AVIONICS analysis, and do not include maintenance data.

10 PAGES HIERARCHY

10.1 General organisation of the man machine interface

The Man Machine Interface is composed of 10 volumes :

Volume	Function
INITIALIZATION	Initialisation of preflight parameters.
FLIGHT PLAN	Flight plan management
PROGRESS	Navigation and position fixing management
DIRECT-TO	Direct to navigation management
PERFORMANCE	A/C performance management
TUNE	Radio-navigation management
MESSAGE	Alert display and management
HOLD	A/C position updating or memorization of frozen position
DATA	Standard, pilot database management
STATUS	FMS input check and maintenance information display

The following paragraphs describe the pages hierarchy organized by volume.

NOTE : WARNING : In this description, some parameters values displayed in the pages may be not representative of operational functioning.

10.2 INITIALIZATION volume

The INITIALIZATION volume comprises the following pages :

Page	Function
POWER ON	Displays the power on self test results and provides access to the INIT page.
INIT	Displays time and date and gives access to the pages used for the FMC parameter initialization.
POS INIT	Initialization of the A/C position.
UNITS	Choice of units for display.
DATUM	Display of geodetic datum system list.
GEO DATUM	Display/selection of a geodetic data.

FMC
POWER ON

THALES AVIONICS
FMS 210
PERF DATA   SW P/N
MANUAL   G6919ACA01
STD DATA   CONF
THAVWW0204   ABCDA152
15-MAY-06

FMM1   : OK
FMS DATA : TEST
STD DATA :

<FMS BITE   INIT>

>INIT

DATA MENU page

DATA XFER page

WEIGHT page

PERF INIT page

FPLN INIT page

M   POS INIT   GPS .20
INIT POS
Noo°oo.oo/Eooo°oo.oo
LAST POS
>N48°43.52/E002°22.18
GPS POS
>N48°43.50/E002°22.24
WPT
[   ]
WPT POS
---°--.--/----°--.--

<RETURN   SENSOR STS>

M   UNITS   BCP .04
HEADING REF   TEMP
>MAG/TRU   °F/°C<
ALTITUDE   WEIGHT
>FT/M   LB/KG<
DISTANCE
>NM/KM
COORD
>GEO DMH
DATUM
<WGS84

<RETURN

M   DATUM   GPS .20
------GEO DATUM 5/5-----
<QATAR   TOKYO   >
<QORNOQ   ZANDERI >
<SCHWARZ   WGS72   >
<SAD69   USER   >
<TYMB48   WGS84   >
<RETURN

M   GEO DATUM   GPS .20
DATUM
WGS84
SPHEROID   △X
>WGS84   +0.0M
△A   △Y
  +0M   +0.0M
△F   △Z
+0.0000 E +00   +0.0M

<RETURN

INITIALIZATION volume

10.3 FLIGHT PLAN volume

The FLIGHT PLAN volume comprises the following pages :

Page	function
IFR FPLN	Displays flight plan legs and allows lateral or vertical revision on the active or temporary flight plan.
TMPY	Displays the temporary flight Plan
SEC FPLN	Displays the secondary flight Plan
TACTICAL FPLN	Displays the tactical Flight plan (not available for P3)
SAR FPLN	Displays the SAR flight plan.
DEPARTURE	Displays and selection of the departure procedure.
LTRL REV	Selection of overfly or of a new destination modification or insertion of an HM leg in the flight plan, insertion of an OFFSET value.
ARRIVAL	Displays and selection of the arrival procedure.
VERT REV (in IFR mode):	Displays the vertical navigation information and the constraints at the revise point.
VERT REV (in tactical mode):	Displays the vertical navigation information and the constraints at the revise point. Allows the modification of the MARGIN value.
FPLN INIT	Selection of the type of flight plan.
ROUTE SELECT	Displays and selection of a route.
SAR SECTOR	Displays and selection of a SAR SECTOR pattern.
SAR LADDER	Displays and selection of a SAR LADDER pattern.
SAR SQUARE	Displays and selection of a SAR SQUARE pattern.
HOLDING	Allows the modification or the insertion of an holding pattern in the active flight plan.

THALES AVIONICS

NEW FPLN >

< FPLN INIT

```
M        FPLN INIT  BCP .04
<ROUTE          SAR SECTOR>
<SEC INIT       SAR LADDER>
<TACT 1         SAR SQUARE>
-----------------------------
                SAR RESUME<
<RETURN         CANCEL FPLN<
```

See
SEC-FPLN

See
TACT-FPLN

```
M      ROUTE SEL  GPS .04
IDENT     1/ 3     FLT ID
LFBOLFML01        AF0358
FROM/TO
LFBO/LFML         REVERSE<
-----------------------------
      INDIA        FOX
      ALPHA        GOLF
      CHAR         JULIE
      DELTA        ZULU
      ECHO         ---->
-----------------------------
<RETURN           TMPY<
```

```
M       PILOT DATA BCP .04
------ROUTE    1/ 1------
LFBO/LFLL      LFPO/LFMN
<LFBOLFLL01          R1A>
LFBO/LFLL
<LFBOLFLL02           1A>
LFBO/LFPO
<LFBOLFPO            21>
<ROIS
----------- 93 FREE-
<RETURN            NEW>
```

- route identification insertion
- FROM/TO insertion

```
M      ROUTE SEL  GPS .04
IDENT     1/ 3     FLT ID
LFBOLFML01        AF0358
FROM/TO
LFBO/LFML         REVERSE<
-----------------------------
      INDIA        FOX
      ALPHA        GOLF
      CHAR         JULIE
      DELTA        ZULU
      ECHO         ---->
-----------------------------
<RETURN           TMPY<
```

```
M      ROUTE SEL  GPS .04
IDENT     1/ 3     FLT ID
LFBOLFML01        AF0358
FROM/TO
LFML/LFBO         REVERSE<
------REVERSED------
      TANGO        FOX
      ROMEO        ECHO
      ZULU         DELTA
      JULIE        CHAR
      GOLF         ---->
-----------------------------
<RETURN           TMPY<
```

EXEC

FPLN page

FPLN volume   1/8

FPLN

```
M      FPLN  1/ 2 BCP .04
AF0358   ETA Z SPD/ ALT
LFBO33R --H-- ---/-----
MEN3B  H326°  5.4NM  OFST
TOU/02  --H-- ---/  900A
  "    H023°  11NM
INTCP    --H-- ---/-----
  "    C068°  22NM
BISBIΔ  --H-- ---/-----
  "    240°   23NM
MEN      --H-- ---/ STEP
-------------------------
<NEW FPLN       ETE/EFOB<
 -
```

```
M      LTRL REV   GPS .04
  N45°12.34/E023°45.67
MINDI
 OVERFLY      NEXT WPT
>YES/NO         [    ]
              NEW DEST
<HOLDING        [    ]

              MISSION>
-------------------------
<RETURN       NEW FPLN>
```

MISSION page

```
M    HOLDING AT BCP .04
BISBI
INBND CRS    TIME/DIST
000°       1.5'/ 4.0NM
TURN           IAS
>LEFT         164KT
    NEXT EXIT
   ETA    EFOB
  --H--   ------LB
-------------------------
<RETURN        TMPY>
```

```
M      VERT REV   GPS .20
 AT        ALT CNSTR
 MEN          -----
STEP TO    SPD CNSTR
FL150         ---KT
STEP MODE     FPA
>MAX SPEED    -.-°
RTA L / ETA
A18H57:08/-01:45
-------------------------
<RETURN
```

FPLN volume   2/8

FPLN

LTRL REV page

```
M        MISSION     GPS .04
          AT MINDI
L1                              R1
   DRAG INDEX      CRZ ALT
L2  200              FL210      R2
                    CRZ MODE
L3               LONG RANGE<    R3
   DURATION
L4  02H02:13                    R4
L5  >START                      R5
   -----------------------------
L6  <RETURN                     R6
BRT
```

```
M        MISSION     GPS .04
          AT MINDI
L1                              R1
   DRAG INDEX      CRZ ALT
L2  200              FL210      R2
                    CRZ MODE
L3               LONG RANGE<    R3
   DURATION
L4  02H02:13                    R4
L5  >START                      R5
   -----------------------------
L6  <RETURN                     R6
    PRESS EXEC TO CONFIRM
BRT
```

FPLN

```
M      FPLN  1/ 2 GPS .04
AF0358   ETA Z SPD/ ALT
T-P      10H15 382/1202
          240°    45KM
BISBI*△  11H41 ---/-----

---FPLN DISCONTINUITY---
G5       260°    37KM
MINDI    11H57 287/ FL80
         270°    83KM
MURRO    12H03 283/ 7000
------------------------
<NEW FPLN       ETE/EFOB<
```

```
M     DEPARTURE  BCP .04
RWY       FROM        SID
□□□       LFBO     (NONE)
                   TRANS
                   (NONE)
----RUNWAY LIST 1/1-----
>15L  3000 M    3000 33R<
>15R  3476 M
>33L  3494 M
```

```
M      DEPARTURE  BCP .04
RWY       FROM        SID
15L       LFBO     (NONE)
                   TRANS
                   (NONE)
------SID LIST 2/3------
>(NONE)       SID-3 <
>SID01        SID-4 <
>SID02        SID-5 <
<RETURN
```

```
M      DEPARTURE  BCP .04
RWY       FROM        SID
15L       LFBO     SID-4
                   TRANS
                   (NONE)
-----TRANS LIST 1/1-----
>(NONE)       WELL <
>TEXEL
>VALKO
<RETURN
```

```
M      DEPARTURE  BCP .04
RWY       FROM        SID
15L       LFBO     SID-4
                   TRANS
                   TEXEL



------------------------
<RETURN          TMPY>
```

```
M     TMPY  1/ 2 BCP .04
AF0358   ETA Z SPD/ ALT
LFBO33R --H-- ---/-----
MEN3B  H326°  5.4NM
TOU/02 --H-- ---/  900A
       H023°   11NM
INTCPT --H-- ---/-----
       C068°   22NM
BISBI△ --H-- ---/-----
       240°    23NM
MEN    --H-- ---/-----
------------------------
>CLR TMPY       ETE/EFOB<
```

EXEC → IFR FPLN page

FPLN volume   4/8

FPLN

FPLN volume   5/8

EXEC → IFR FPLN page

THALES
AVIONICS

FPLN

```
M        FPLN INIT    BCP .04
L1  <ROUTE         SAR SECTOR>   R1
L2  <SEC INIT      SAR LADDER>   R2
L3  <TACT 1        SAR SQUARE>   R3
L4  ------------------------     R4
L5                 SAR RESUME<   R5
L6  <RETURN        CANCEL FPLN<  R6
```

```
M        TACT 1    GPS .04
    MARGIN
L1  □□□□□FT           1ST/2ND<   R1
L2  101     108     117         R2
L3  102     109     119 LND     R3
    103     110
L4  104     111                 R4
    105  OPT 112
L5  106     113                 R5
    107     114
L6  <RETURN ------------------  R6
```

FPLN   **EXEC**

```
M       FPLN  1/ 2 GPS .04
    TAC 1        ETA L     ALT
L1  116      10H25:10      312   R1
         260°   12NM
L2  117△ OPT 10H30:05     2500   R2
    2ND  270°    7NM
L3  118      10H33:30     3000   R3
    "    260°    22NM
L4  119△     10H40:50     3000   R4
    "    240°   20NM   3.0°
L5  122  LND 10H58:55     3500   R5
L6  >1ST/2ND ---------------     R6
```

```
M      TACT WPT    GPS .04
    WPT            WPT TYPE
L1  101△  USED    STANDARD<     R1
    LAT/LONG
L2  N48°12.34/E003°35.51        R2
L3  ------------------------    R3
    ALT TO WPT     OPTION 2ND
L4   1150FT            ---       R4
    RTA (UTC)      OVERFLY
L5  12H45:30        YES/NO<      R5
L6  <RETURN        NEW FPLN>    R6
```

```
M       VERT REV    GPS .04
    MARGIN              AT
L1  1000FT             122       R1
    ALT            ALT CNSTR
L2  3010FT           3000FT      R2
    VERT SPD
L3  +1055FPM                    R3
    SAT / △ISA
L4  -5°C/ -15°C                 R4
                   SLOPE
L5                    3.0°       R5
L6  <RETURN ------------------  R6
```

FPLN volume   6/8

FPLN volume (SAR)   7/8

THALES
AVIONICS

< FPLN INIT

```
M        FPLN INIT  BCP .04
L1 ─ <ROUTE        SAR SECTOR>  R1
L2 ─ <SECT INIT    SAR LADDER>  R2
L3 ─               SAR SQUARE>  R3
L4 ─                            R4
L5 ─ ─────────────  SAR RESUME< R5
L6 ─ <RETURN       CANCEL FPLN< R6
BRT
```

```
M        SEC INIT  BCP .04
L1 ─ <ROUTE          ACTIVATE>  R1
L2 ─ >COPY FPLN     SWAP FPLN>  R2
L3 ─                            R3
L4 ─                            R4
L5 ─                SEC PERF>   R5
L6 ─ <RETURN       CANCEL SEC<  R6
BRT
```

1

2

```
M        SEC INIT  BCP .04
L1 ─ <ROUTE          ACTIVATE>  R1
L2 ─ >COPY FPLN     SWAP FPLN>  R2
L3 ─                            R3
L4 ─                            R4
L5 ─                SEC PERF>   R5
L6 ─ <RETURN       CANCEL SEC<  R6
     PRESS EXEC TO CONFIRM
BRT
```

```
M        SEC INIT  BCP .04
L1 ─ <ROUTE          ACTIVATE>  R1
L2 ─ >COPY FPLN     SWAP FPLN>  R2
L3 ─                            R3
L4 ─                            R4
L5 ─                SEC PERF>   R5
L6 ─ <RETURN       CANCEL SEC<  R6
     PRESS EXEC TO CONFIRM
BRT
```

```
M        SEC PERF   BCP .04
     CRZ ALT  -CRZ-  MEANWIND
L1 ─ FL150         251°/  15KT  R1
     CRZ MODE
L2 ─ >LONG RANGE                R2
     QNH      -APP-  GND WIND
L3 ─  1015HPA      120°/  5KT   R3
     TRANS ALT
L4 ─  5000FT                    R4
     PAX      -T/O-   CARGO
L5 ─  16            12000KG     R5
                   TOTAL FUEL
L6 ─ <RETURN        8500KG      R6
BRT
```

1   And   2   : see next page

FPLN volume (SEC)   8/8

THALES
AVIONICS

1

```
M     ROUTE SEL  GPS .04
IDENT              FLT ID
[        ]      [        ]
FROM/TO
[   ]/[   ]
- - - - - - - - - - - - - - - -

- - - - - - - - - - - - - - - -
<RETURN            FPLN<
```

```
M     ROUTE SEL  GPS .04
IDENT    1/ 3      FLT ID
LFBOLFML01       AF0358
FROM/TO
LFBO/LFML       REVERSE<
     INDIA        FOX
     ALPHA        GOLF
     CHAR         JULIE
     DELTA        ZULU
     ECHO        ....>
- - - - - - - - - - - - - - - -
<RETURN            SEC<
```

Empty scratchpad

```
M     PILOT DATA BCP .04
- - - - -ROUTE  1/ 1- - - - - -

 LFBO/LFLL    LFPO/LFMN
<LFBOLFLL01        R1A>
 LFBO/LFLL
<LFBOLFLL02         1A>
 LFBO/LFPO
<LFBOLFPO           21>

<ROIS
- - - - - - - - - - - 93 FREE-
<RETURN            NEW>
```

```
M     PLT ROUTE  GPS .20
IDENT          FROM/TO
LFBOLFLL01    LFBO/LFLL
-01/11- - - - - - - - -05- - - -
 INDIA           FOX
 02              06
 ALPHA           HOTEL
 03              07
 CHAR            JULIE
 04              08
 ECHO          ----->
- - - - - - - - - - - 93 FREE-
<RETURN   ROUTE SELECT>
```

2

```
M      SEC  1/ 2 BCP .04
AF0358  ETA Z SPD/ ALT
LFBO33R --H-- ---/-----
MEN3B  H326°  5.4NM  OFST
TOU/02  15H26  ---/  900A
  "    H023°   11NM
INTCP  15H28 ---/-----
  "    C068°   22NM
BISBI△ 15H36 ---/-----
  "    240°   23NM
MEN    15H36 ---/ STEP
- - - - - - - - - - - - - - - -
<NEW FPLN        ETE/EFOB<
  PRESS EXEC TO CONFIRM
```

FPLN

```
M      FPLN  1/ 2 BCP .04
AF0358  ETA Z SPD/ ALT
LFBO33R --H-- ---/-----
MEN3B  H326°  5.4NM  OFST
TOU/02  --H-- ---/  900A
  "    H023°   11NM
INTCP  --H-- ---/-----
BISBI△ --H-- ---/-----
  "    240°   23NM
MEN    --H-- ---/ STEP
- - - - - - - - - - - - - - - -
<NEW FPLN        ETE/EFOB<
  -
```

```
M      SEC  1/ 2 BCP .04
AF0358  ETE        EFOB
LFBO33R           1322LB
MEN3B  H326°  5.4NM
TOU/02 00H04:25  1312LB
  "    H023°   11NM
INTCP  00H09:10  1289LB
  "    C068°   22NM
BISBI△ 00H14:20  1248LB
  "    240°   23NM
MEN    00H19:45  1201LB
- - - - - - - - - - - - - - - -
<NEW FPLN      ETA/SPD/ALT<
```

SEC INIT

```
M      SEC  1/ 2 BCP .04
AF0358  ETA Z SPD/ ALT
LFBO33R --H-- ---/-----
MEN3B  H326°  5.4NM
TOU/02  15H26  ---/  900A
  "    H023°   11NM
INTCP  15H28 ---/-----
  "    C068°   22NM
BISBI△ 15H36 ---/-----
  "    240°   23NM
MEN    15H36 ---/ STEP
- - - - - - - - - - - - - - - -
<NEW FPLN        ETE/EFOB<
```

10.4 <u>PROGRESS volume</u>

The PROGRESS volume comprises the following pages :

Page	Function
PROG 1/3 (in IFR mode)	Displays the FROM, TO, NEXT and DEST fix of the active FPLN and the NEXT vertical pseudo-waypoint information.
VNAV	Displays the VNAV information.
PROG 1/3 (in SAR mode)	Displays the FROM, TO, NEXT fix of the active FPLN and allows the modification of the pattern parameters.
PROG 2/3 page	Displays the navigation parameters.
PROG 3/3 page	Displays the localization modes (selected or not) and their related information.
BCP NAV page	Displays the BCP localization parameters.
GPS NAV page	Displays the GPS localization parameters

PROG

```
M      PROG 1/3    BCP .15
AF0358   ETA Z SPD/ ALT
LFBO33R --H-- ---/-----
MEN3B   H326°   5.4NM  OFST
TOU/02  --H-- ---/ 900A
  "     H023°  11NM
INTCP   --H-- ---/-----
-----------------------
<VNAV  ↓11000        NRP
     10H40/ 60NM  10H55

DEST      ETA  DIS
LFLL    11H04  16
```

PREV
PROG / NEXT

PREV

```
M      PROG 2/3    GPS .20
L1  TO              WIND
    TOU/02     320°/ 12KT  R1
L2  DTK             TTG
    326°        00H15:25   R2
L3  BRG    DIST     FUEL
    320° / 5.4NM   1231LB  R3
L4  TK     GS      TGT/IAS
    240°  135KT   ---/118KT R4
L5  DRIFT  XTK     TKE
    L02°  L.41NM   R002°    R5
L6  RNP    ANP     OFFSET
    4.0NM  .83NM   0.0NM    R6
```

PROG
NEXT

```
M      PROG 3/3    BCP .15
      A/C POSITION
L1                           R1
        N45°12.34    EPE
L2  <BCP E002°21.44  0.15NM  R2
L3  <GPS 356°/0.10NM 0.08NM  R3
L4  <IRS 091°/1.01NM 1.35NM  R4
L5  <HYB 120°/0.23NM 0.04NM  R5
L6   FM2 355°/0.22NM 0.05NM  R6
```

```
M      VNAV       BCP .04
L1  ↑3000       TGT ALT
    10H40        3000FT     R1
L2  MEN   ↑FL110 TGT IAS
    12H05  12H30   82KT     R2
L3  AGD   ↑FL120 TGT VS
    12H55  13H20  -----MPM  R3
L4  TOD   DEST    VDEV
    13H55  14H10  +101FT    R4
L5                          R5
            SAT /△ISA
           -5°C/-15°C
L6  <RETURN                 R6
```

```
M      BCP NAV    GPS .04
L1  LAT/LONG
    N45°25.23/E002°23.23     R1
L2  EPE
    0.30NM                   R2
L3  TK    GS        IRS
    125° 248NM      SEL<     R3
L4  WIND            GPS
    251°/ 30NM      SEL<     R4
L5                  R/NAV
                    SEL<     R5
L6  <RETURN                  R6
```

```
M      GPS NAV    GPS .20
L1  LAT/LONG
    N45°25.25/E002°23.30     R1
L2  EPE            ALT
    0.04NM         4810FT    R2
L3  TK    GS       HIL
    125° 189KT     0.06NM    R3
L4  WIND           HDOP
    251°/ 31KT     3.4       R4
L5  SOURCE / MODE
    GPS1    NAV             R5
L6  <RETURN                  R6
```

PROG volume

PROG

| PROG / NEXT |
| See actions as in IFR mode |

```
M      PROG 1/3   BCP .04
LADDER    ETA Z     EFOB
 15        10H14      617KG
      326°     9.6NM
 16        10H18      612KG
      236°     7.4NM
 17        10H23      607KG
- - - - - - - - - - - - - - - - - - - - -

LENGTH              NRP
 8.3NM            10H56
SPACING
 6.5NM      INTERRUPT<
```

PROG volume case of SAR mode

10.5 DIRECT TO volume

The DIRECT TO volume comprises the following pages :

Page	Function
«DIRECT TO with FPLN fix list»	Selection of a FIX identification for DIRECT TO function.
«DIRECT TO with nearest airport list»	Selection of an airport for DIRECT TO function.
«DIRECT TO with IDENT filled»	Selection of parameters for DIRECT TO function.
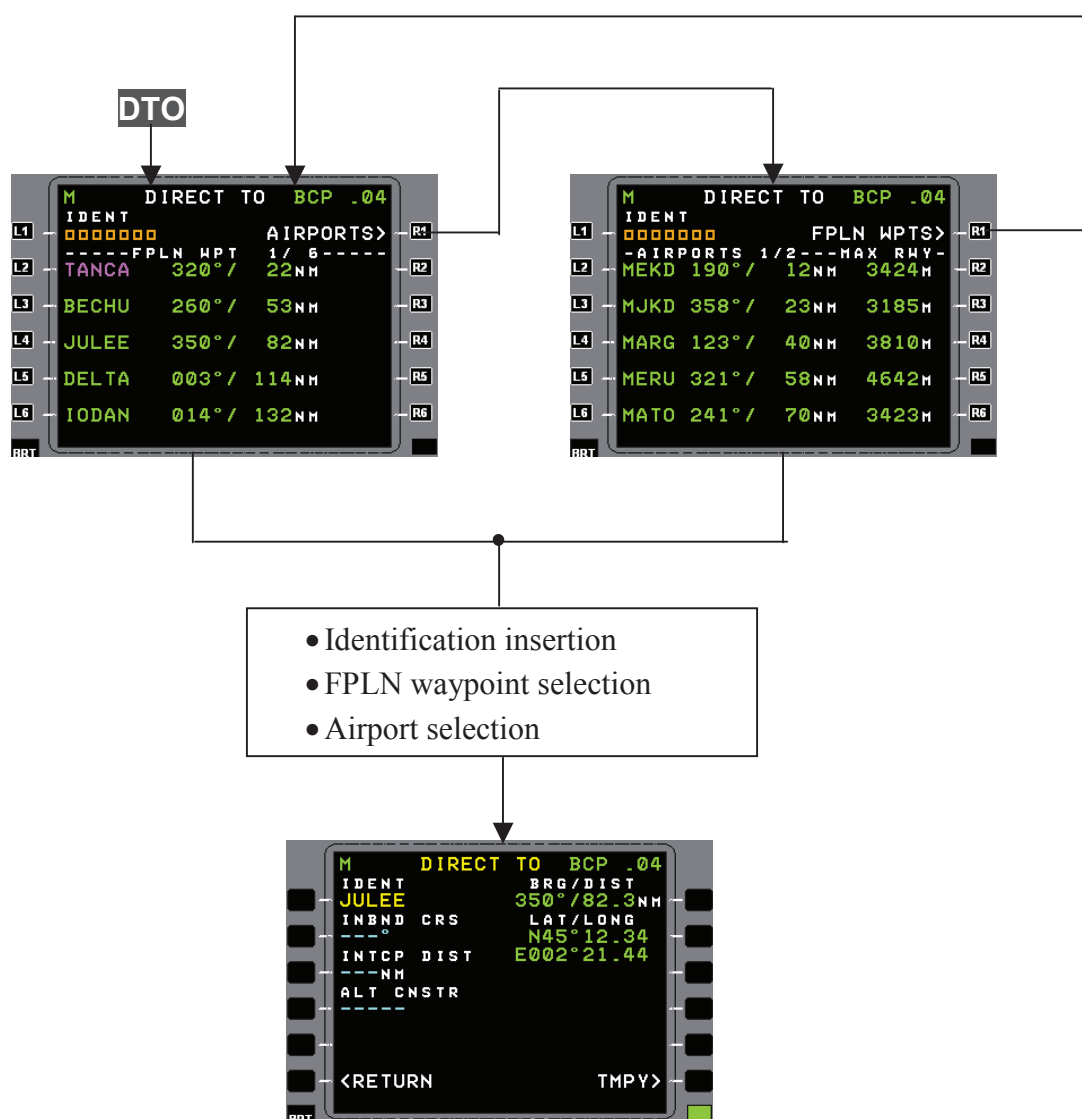
DIRECT - TO volume

10.6 PERFORMANCE volume

The PERFORMANCE volume comprises several pages, the organization of the pages depends on the PERF MODE

The volume comprises the following pages :

Page	Function
PERF INIT	Displays performance database identification and allows performance parameters initialization or modification.
CLIMB or TAKE OFF (1)	Displays the climb (take off) performance parameters.
CRUISE	Displays the cruise performance parameters.
DESCENT or APPROACH (1)	Displays landing performance parameters.
WEIGHT	Displays weight information for the A/C.

(1) : in MANUAL PERF MODE : CLIMB and DESCENT pages
         in PERFDATA PERF MODE : TAKE OFF and APPROACH pages

10.6.1 *MANUAL PERFDATA*

(1) depending of the flight phase
- take –off or ground → CLIMB page
- climb or cruise → CRUISE page
- descent or go around → DESCENT page

(2) NEXT/PREV or PERF key
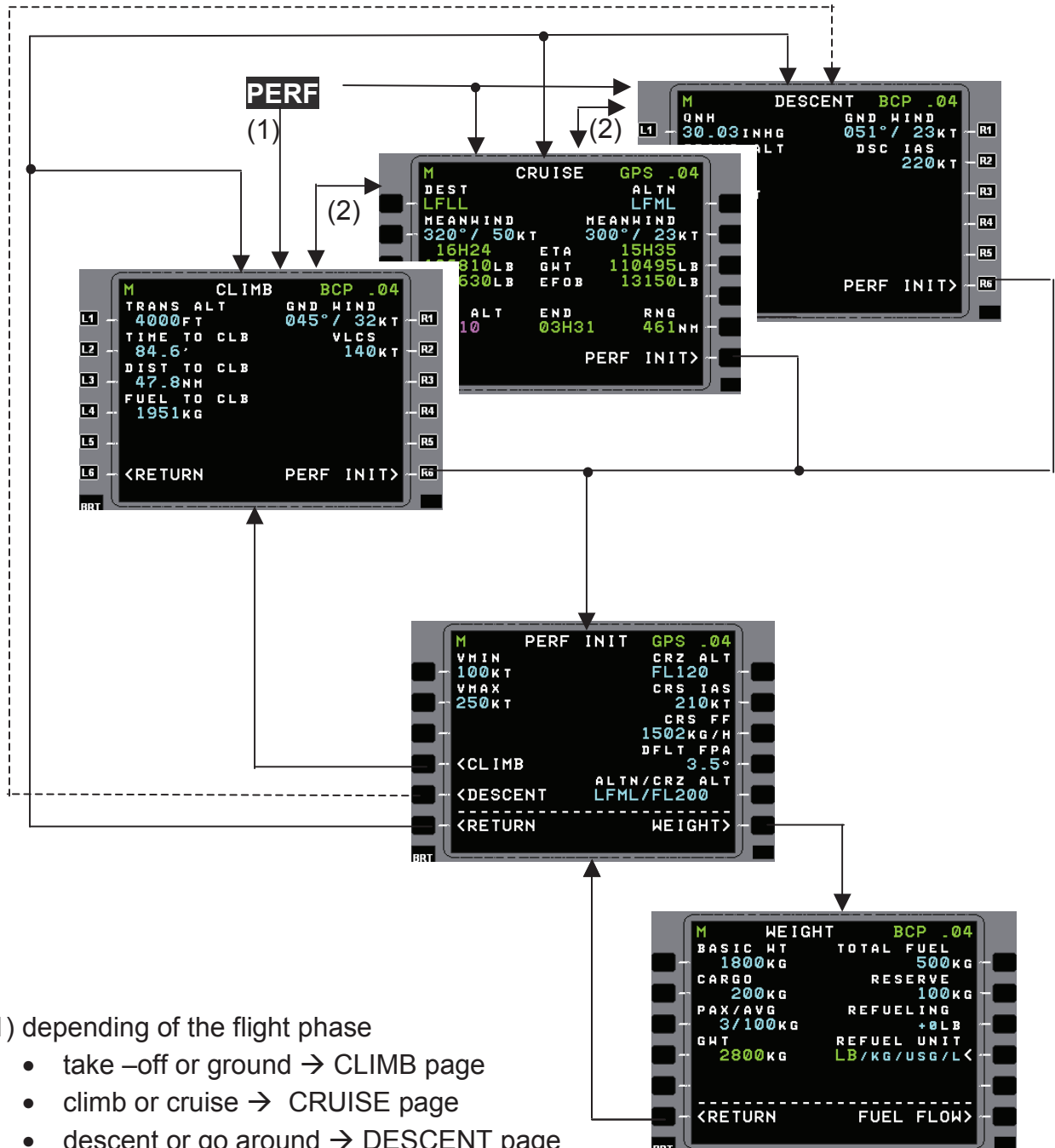
PERFORMANCE volume / Manual Perf data

10.6.2 *PerfDb PERFDATA*

PERF
(1)   (2)

APPROACH screen:

```
M        APPROACH    GPS .04
QNH              GND WIND
30.03INHG        051°/ 23KT
TRANS ALT

                    PERF INIT>
```

CRUISE screen:

```
M         CRUISE     GPS .04
DEST              ALTN
LFLL             LFML
MEANWIND         MEANWIND
320°T/ 50KT  300°T/ 23KT
 16H24     ETA    15H35
  5370LB   GWT    5650LB
   870LB   EFOB   1150LB

TGT ALT    END      RNG
FL120      03H31    461NM
CRZ MODE
>LONG RANGE  PERF INIT>
```

TAKE OFF screen:

```
M       TAKE OFF    GPS .04
T/O TYPE          V1
>NORMAL          112KT
GND SAT          VRO
 10°C            121KT
RWY LNG/AXIS    V50-3ENG
 6000FT/120°     128KT
SLOPE           MIN SHP
+0.0%            3527HP
                GND WIND
                045°/ 32KT
RCR
 23         PERF INIT>
```

PERF INIT screen:

```
M        PERF INIT   GPS .04
DRAG INDEX      CRZ ALT
100             FL120
FF FACTOR       CRZ MODE
+1.1%           LONG RANGE<
OPS TYPE        DFLT FPA
>LOGISTIC       3.5°


ANTI-ICE      ALTN/CRZ ALT
>ON/off       LFML/FL200
----------------------
<RETURN          WEIGHT>
```

WEIGHT screen:

```
M         WEIGHT     BCP .04
BASIC WT       TOTAL FUEL
 1800KG          500KG
CARGO          RESERVE
 200KG           100KG
PAX/AVG        REFUELING
 3/100KG         +0LB
GWT            REFUEL UNIT
 2800KG        LB/KG/USG/L<

----------------------
<RETURN        FUEL FLOW>
```

1) : depending of the flight phase :
  - take –off or ground → TAKE OFF page
  - climb or cruise → CRUISE page
  - descent or go around → APPROACH page
2) NEXT/PREV or PERF key

PERFORMANCE volume / PerfDb

10.7 TUNE volume

The TUNE volume comprises the following pages :

Page	Function
TUNE 1/2	Displays the active V/UHF and HF frequencies and the active IFF codes of the radio communication equipment. Gives access to the radiocom plan data.
TUNE 2/2	Displays identification, frequency, bearing (QDM) and distance of the tuned navaids and the autotune state.
COM PLAN	Displays information about the communication plan data
NEAREST NAVAIDS	Displays the nearest VHF or NDB navaids list.
DESELECTED NAVAIDS	Allows selection or deselection of navaids.

```
┌─────────────────────────────────────────────────────┐
│  TUNE  key                                          │
│  NEXT or PREV  key on the TUNE 2/2 page             │
└─────────────────────────────────────────────────────┘
```

```
              TUNE  1/2    GPS  .04
     V/UHF1                      IFF
L1   142.850              M1/4500      R1
     V/UHF2
L2   150.750              M3/4260      R2
     V/UHF3
L3   162.350                          R3
     HF1
L4   11048.5                          R4
     HF2                    TUNE MODE
L5   12545.3              AUTO/MAN<    R5
     -ACT----COM PLAN----NXT-
L6   <10H30:00            10H42:30>    R6
```

```
┌─────────────────────────────┐     ┌─────────────────────────────┐
│  Current frequency set data │     │   Next frequency set data   │
└─────────────────────────────┘     └─────────────────────────────┘
```

```
              COM PLAN   GPS  .04
     V/UHF1                      IFF
L1   142.850              M1/4500      R1
     V/UHF2
L2   150.750              M3/4260      R2
     V/UHF3
L3   162.350                          R3
     HF1
L4   11048.5                          R4
     HF2                    TIME (UTC)
L5   12545.3              10H30:00     R5
     ----------------------17 FREE-
L6   <RETURN                   NEW>    R6
```

```
              COM PLAN   GPS  .04
     V/UHF1                      IFF
L1   ---.---               M1/----     R1
     V/UHF2
L2   ---.---               M3/----     R2
     V/UHF3
L3   ---.---                           R3
     HF1
L4   -----.-                           R4
     HF2                    TIME (UTC)
L5   -----.-               ooHoo:oo    R5
     ----------------------17 FREE-
L6   <RETURN                    NEW>   R6
```

TUNE volume 1/3

NEXT or PREV on the TUNE 1/2 page

Cf next
page

```
  1234567890123456789 01234
1 M        TUNE 2/2   GPS .04
2 NAV1 H 50NM/135°M
3 LSA   114.75      AUTO/MAN<
4 CH3    105NM
5 MTL   112.70
6 NAV2   105NM/125°M
7 MTL   112.70      AUTO/MAN<
8
9
0 TACAN 123NM/090°M
1 NIM    053X       AUTO/MAN<
2 --------NAVAIDS--------
3 <NEAREST       DESELECT>
4
  1234567890123456789 01234
```

L1 R1
L2 R2
L3 R3
L4 R4
L5 R5
L6 R6

```
  1234567890123456789 01234
1 M      NEAREST    BCP .04
2 ----VHF NAVAIDS 1/4-----
3 NAMI VD 112.20 130°/ 15NM
4
5 NHG  T 114.60 095°/ 42NM
6
7 RTY  D 116.75 321°/ 75NM
8
9 GER  VT 115.50 180°/107NM
0
1 TGP  V  117.80 260°/136NM
2 ----------------------
3 <RETURN       NDB NAV>
4
  1234567890123456789 01234
```

L1 R1
L2 R2
L3 R3
L4 R4
L5 R5
L6 R6

```
  M      DESELECTED BCP .04
         NAVAIDS
 -ALTA            UER
 -COU             VIO
 -MRG             [   ]
 -TIPO
 -TOP
 -----------------------
 <RETURN
 BRT
```

```
  M      NEAREST    GPS .04
  ----NDB NAVAIDS 1/2-----
 -TOU     250.5 130°/ 28NM
 -MAR     111.6 095°/ 75NM
 -OSCA    320.0 321°/ 90NM
 -DUPL    286.0 180°/149NM
 -AB      390.0 260°/181NM
 ------------------------
 <RETURN          VHF NAV>
 BRT
```

L1 R1
L2 R2
L3 R3
L4 R4
L5 R5
L6 R6

TUNE volume 2/3

THALES
AVIONICS

NEXT or PREV on the TUNE 1/2 page

```
      1234567890123456789 01234
   1 M        TUNE 2/2  GPS .04 1
     NAV1 H 50NM/135°M
L1 2 LSA   114.75    AUTO/MAN< 3 R1
   4 CH3    105NM               4
L2 5 MTL   112.70              6 R2
     NAV2  105NM/125°M
L3 7 MTL   112.70    AUTO/MAN< 8 R3
L4 9                           8 R4
   0 TACAN 123NM/090°M          0
L5 1 NIM    053X     AUTO/MAN< 1 R5
   2 --------NAVAIDS---------  2
L6 3 <NEAREST    DESELECT>     3 R6
     1234567890123456789 01234
```

Cf TUNE 1/2

```
   M     NAV1 TUNE  BCP .04
   ------NAVAIDS 1/4-------
L1 NAMIᵥᴅ 112.20 130°/ 15ɴᴍ R1
L2 NHC  ᴛ 114.60 095°/ 42ɴᴍ R2
L3 RTY  ᴅ 116.75 321°/ 75ɴᴍ R3
L4 GER ᵥᴛ 115.50 180°/107ɴᴍ R4
L5 TGP ᵥ  117.80 260°/136ɴᴍ R5
   ------------------------
L6 <RETURN                  R6
RRT
```

```
   M     NAV2 TUNE  BCP .04
   ------NAVAIDS 1/4-------
L1 LSA ᵥᴅ 114.60 130°/ 25ɴᴍ R1
L2 MTL ᵥᴛ 115.50 195°/ 32ɴᴍ R2
L3 PAR ᵥ  117.60 311°/ 85ɴᴍ R3
L4 GBR ᵥᴅ 112.20 170°/107ɴᴍ R4
L5 TOU  ᴅ 116.75 140°/136ɴᴍ R5
   ------------------------
L6 <RETURN                  R6
RRT
```

TUNE volume 3/3

10.8 MESSAGE volume

The MESSAGE volume comprises the following page :

Page	Function
MSG	Displays the list of alerts.
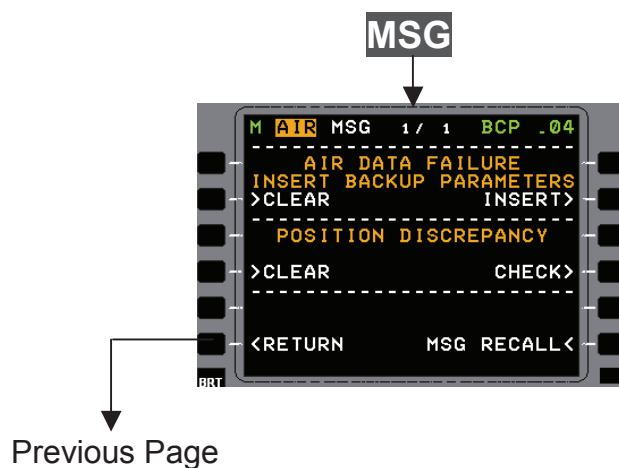
MESSAGE volume

10.9 HOLD volume

The HOLD volume comprises the following page :

Page	Function
HOLD	Displays the frozen position and allows the storage of this position in the pilot database, the update at this position or the SAR pattern execution from this position.
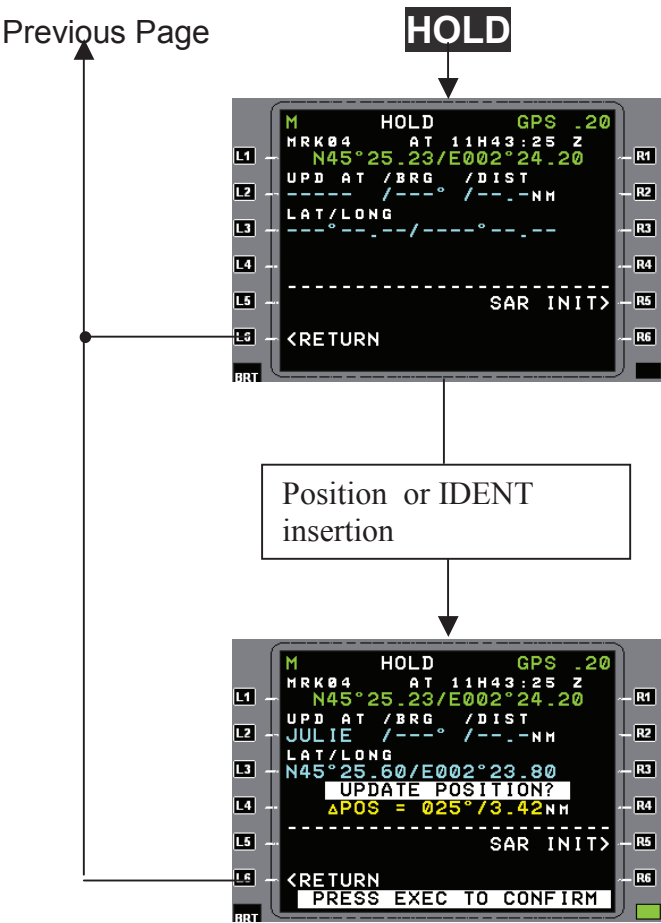
Previous Page   **HOLD**

Position or IDENT insertion

HOLD volume

10.10 DATA volume

The DATA volume comprises the following pages :

Page	Function
DATA MENU	Provides access to the INIT, STATUS and DATA volumes.
DATABASE	Provides access to the standard, pilot, data.
STANDARD AIRPORT	Displays information about the airports stored in the standard database.
STANDARD NAVAID	Displays information about ILS or VHF navaid stored in the standard database.
STANDARD WAYPOINT	Displays information about the waypoints stored in the standard database.
STANDARD NDB.	Displays information about the NDB navaids stored in the standard database.
"PILOT DATA with AIRPORT list"	Displays the list of airports stored in the pilot database.
"PILOT DATA with NAVAID list"	Displays the list of navaids stored in the pilot database.
"PILOT DATA with WAYPOINT list"	Displays the list of waypoints stored in the pilot database.
"PILOT DATA with ROUTE list"	Displays the list of routes stored in the pilot database.
PILOT AIRPORT	Displays information about an airport stored in the pilot database. The crew can modify parameters of stored data or create new pilot airport data.
PILOT NAVAID	Displays information about a navaid stored in the pilot database. The crew can modify parameters of stored data or create new pilot navaid data.
PILOT WAYPOINT	Displays information about a waypoint stored in the pilot database. The crew can modify parameters of stored data or create new pilot waypoint data.
PILOT ROUTE	Displays information about a route stored in the pilot database. The crew can modify or create a pilot route.
TACTICAL WAYPOINT	Displays information about a tactical waypoint. The crew can modify some parameters on this page or create new tactical data. (not available for P3 aircraft)
DROP DATA	Selection of the dropping parameters at a dropping waypoint. (not available for P3 aircraft)

Page	Function
WARNING ZONE LIST	Displays the list of the warning zone stored in the database.
WARNING ZONE	Displays information about a warning zone stored in the datbase. The crew can modified parameters of stored data or create a new warning zone.
DATA TRANSFER	Displays information about the databases loadded in the FMC and allows the UPLOAD or DOWNLOAD of the databases.
DATA LIST	Displays information about standard and pilot data. Information displayed can be filtered (airports, VHF navaids,...).
NEW DATA	Selection of the type of FIX to create.
DUPLICATE	Allows the crew to choose the required data in database.this

DATA

INIT Volume
STATUS Volume
UNITS page

DATABASE page
DATA XFER page
TUNE Volume
DATA LIST Page

DATA volume

DATA / DATA LIST

DATA volume : DATA LIST page

DATA / DATA XFER

```
M        DATA XFER   GPS .20
L1   --------FMS DATA---------   R1
     STD DATA         EXP DATE
L2   STDDTBID00       18-JUL-97   R2
     PILOT DATA       LAST MOD
L3   PLTDTBID00       01-JUL-97   R3
     TACTICAL         LAST MOD
L4   TACDTBID00       02-JUL-97   R4
     --------------------------
L5   >UPLOAD          DOWNLOAD<   R5
L6   <RETURN                      R6
BRT
```

```
M        DATA XFER   GPS .20
L1   -------DISK DATA---------   R1
     STD DATA         EXP DATE
L2   >STDDTBID01      10-AUG-97   R2
     PILOT DATA       LAST MOD
L3   >PLTDTBID00      03-JUL-97   R3
     TACTICAL         LAST MOD
L4   (NO DATA)        ---------   R4
     --------------------------
L5   UPLOAD          DOWNLOAD>   R5
L6   <RETURN                      R6
BRT      FPLN WILL BE DELETED
```

```
M        DATA XFER   BCP .04
     --------FMS DATA---------
     STD DATA         EXP DATE
     STDDTBID00       18-JUL-97
     PILOT DATA       LAST MOD
    >PLTDTBID00       01-JUL-97
     TACTICAL         LAST MOD
     TACDTBID00       02-JUL-97
     --------------------------
    <UPLOAD          DOWNLOAD
    <RETURN
BRT      PRESS EXEC TO CONFIRM
```

DATA volume : DATA TRANSFER

DATA / DATABASE

```
M       DATABASE    GPS .04
   STANDARD        PILOT
L1 <AIRPORT      AIRPORT>  R1
L2 <NAVAID        NAVAID>  R2
L3 <WAYPOINT    WAYPOINT>  R3
L4 <NDB            ROUTE>  R4
                 TACTICAL
L5 <WARN ZONE    ROUTE 1>  R5
   -----------------------
L6 <RETURN                 R6
BRT
```

```
M      STD APT    BCP .04
IDENT
 LFLL  LF
LAT/LONG
 N45°43.62/
ELEVATION
    250M
MAX RWY
  3993M
NAME
 SATOLAS
 ----------------
 <RETURN
BRT
```

```
M     STD NAVAID BCP .04
IDENT        CHL/  FREQ
 NIM   LF    53X/111.60
TYPE             FOM
 TACAN
LAT/LONG
 N43°44.45
ELEVATION
   323FT
NAME
 NIMES
 -----------------
 <RETURN
BRT
```

```
M      STD WPT   BCP .04
IDENT        TYPE    APT
 MAR   LF    TNDB   LFML
LAT/LONG
 N43°29.32/E00



 -----------------
 <RETURN
BRT
```

```
M      STD NDB   BCP .04
IDENT            FREQ
 MAR   LF        111.6
TYPE              APT
 TNDB            LFML
LAT/LONG
 N43°29.32/E005°08.25


 -----------------
 <RETURN
BRT
```

```
M      WARN ZONE GPS .04
   ---------LIST---------
L1 <ALPHA1                R1
L2 <SABATT                R2
L3                        R3
L4                        R4
L5                        R5
   ----------------8 FREE-
L6 <RETURN          NEW>  R6
BRT
```

```
M      WARN ZONE GPS .04
   IDENT
L1  ALPHA1                R1
   RADIUS       SAFE ALT
L2  13NM        30300FT   R2
   LAT/LONG
L3  N45°34.00/E003°34.65  R3
L4                        R4
L5                        R5
   ----------------8 FREE-
L6 <RETURN                R6
BRT
```

DATA volume : Standard DATABASE
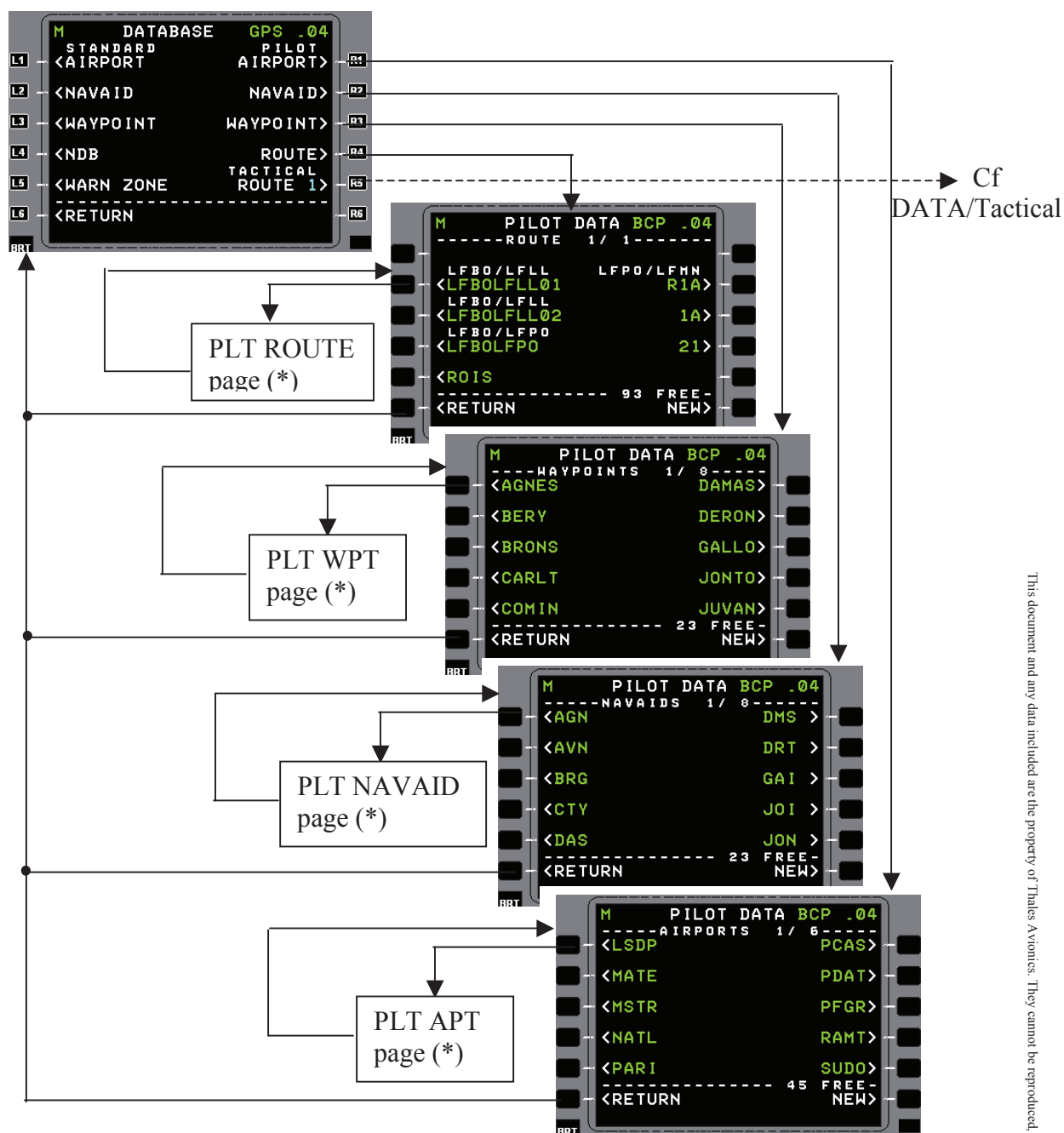
DATA volume : Pilot DATABASE 1/2

PILOT DATA
page (route)

```
M      PLT ROUTE   GPS .20
 IDENT            FROM/TO
L1 LFBOLFLL01      LFBO/LFLL  R1
  -01/11-----------05----
L2  INDIA           FOX      R2
   02              06
L3  ALPHA           HOTEL    R3
   03              07
L4  CHAR            JULIE    R4
   04              08
L5  ECHO            ----->   R5
  -------------- 93 FREE-
L6 <RETURN   ROUTE SELECT>   R6
BRT
```

PILOT DATA
page (waypoints)

```
M      PLT WPT    GPS .04
 IDENT        SPD VECTOR
L1 AGNES        ---°T/--KT   R1
 LAT/LONG
L2 N43°45.50/E002°30.55      R2
 PLACE/BRG    /DIST
L3 -----/---.-°T/--.-KT      R3
 PLACE/BRG1 /PLACE/BRG2
L4 -----/---°T/-----/---°T   R4
 NAME
L5 [          ]              R5
  ------------- 23 FREE-
L6 <RETURN                   R6
BRT
```

PILOT DATA
page (navaids)

```
M      PLT NAVAID BCP .04
 IDENT       CHL/  FREQ
  AGN  USED  74X/112.70
 TYPE             FOM
 >VOR            HIGH<
 LAT/LONG
 N46°21.60/E005°45.90
 ELEVATION       DECLN
   650FT        W001.8°
 NAME
 AGEN
 --------------- 23 FREE-
 <RETURN
BRT
```

PILOT DATA
page (airports)

```
M      PLT APT    BCP .04
 IDENT
L1 LSDP  USED                R1
 LAT/LONG
L2 N42°33.20/E002°12.90      R2
 ELEVATION     MAG VAR
L3   619FT       W002.3°     R3
 RWY LNG
L4  3063FT                   R4
 NAME
L5 SALON DE PROVEN           R5
  ------------- 45 FREE-
L6 <RETURN                   R6
BRT
```

DATA volume : Pilot DATABASE 2/2

DATA volume : Tactical 1/1

10.11 STATUS volume

The STATUS volume comprises the following pages:

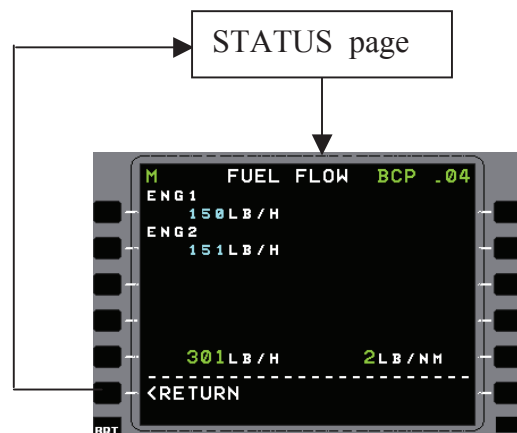| Page	Function
STATUS	Access to the different pages of the STATUS volume.
AIR/RA	Displays the AIR parameters and the Radio-Altimeter height.
HDG/ATT	Displays the heading and attitude parameters.
FUEL FLOW	Displays the fuel flow information.
FMS BITE	Displays the results of the built in test of the FMS.
SENSOR STATUS	Displays GPS, IRS and DCF sensor status and modes.
DISCRETES	Displays the FMC discrete status.
STATUS TRANSFER	Allows the uploading of the system configuration table, the performance data and the magnetic variation model. Allows the downloading of the FMS status.
PAD	Allows display and modifications of the FMC memory. That page is only used for ground and fly test purpose.

DATA / STATUS

Previous page

```
┌─────────────────────────────┐
│ M      STATUS      BCP .04  │
│ <AIR/RA         FMS BITE>   │
│ <HDG/ATT       SENSOR STS>  │
│ <FUEL FLOW      DISCRETES>  │
│ <DOPPLER                    │
│ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─    │
│ <RETURN         STS XFER>   │
└─────────────────────────────┘
```

STS XFER
Page (*)

FUEL FLOW
Page

DISCRETES
Page (*)

HDG/ATT
Page

SENSOR STS
Page (*)

AIR/RA
Page

FMS BITE
Page (*)

DATA volume : DATA STATUS   1/3

STATUS page

```
M        AIR/RA      GPS .04
           ADU1          RHT
IAS       148KT      1530FT
TAS       125KT
VZ       +560FPM
ZP      12400FT
ZC      12300FT
SAT       8°C
TAT      18°C

--------------------------------
<RETURN
```

STATUS page

```
M        HDG/ATT     BCP .04

           SIDE 1*    SIDE 2
ROLL     R12.43°    R12.28°
PITCH    U04.25°    U04.51°
HDG      124.5°M    124.2°M

VAR IGRF2000        TRU HDG
 W002.1°             122.0°T
HDG REF             NAV HDG
>MAG/TRU             127.0°
--------------------------------
<RETURN
```

STATUS page

```
M       FUEL FLOW    BCP .04
ENG1
        150LB/H
ENG2
        151LB/H



        301LB/H      2LB/NM
--------------------------------
<RETURN
```

DATA volume : DATA STATUS 2/3

THALES
AVIONICS

STATUS page

```
M      FMS BITE   BCP .04
FMM                    SW
00000000000          AB01
0000000000000000

ADL                    SW
000                   L04
MCDU
0 00000000000000
------------------------
          MCDU TEST<
<RETURN   OUTPUT TEST<
```

STATUS page

```
M     SENSOR STS BCP .04
GPS*              DCF1/2
000  NAV            0/0



------------------------
<RETURN
```

STATUS page

```
M      DISCRETES  BCP .04


PROGRAM PINS
0000 0000

DISCRETE INPUTS
0000 000 000 000000


------------------------
<RETURN    PPIN RESET<
```

STATUS page

```
M     STS XFER   GPS .20
UPLOAD       FMS DATA
>SYS CONF    SYS-000152
>PERF DATA   PERF01
>MAG VAR     IGRF2005
>TACT CONF   TACT-00012
DOWNLOAD
>STATUS
------------PERF MODE-
<RETURN        MANUAL<
```

L1 R1
L2 R2
L3 R3
L4 R4
L5 R5
L6 R6

DATA volume : DATA STATUS 3/3

11 POSITION COMPUTATION

11.1 FLIGHT AREA AND CURRENT RNP

11.1.1 INTRODUCTION

The computation of the aircraft position and the associated monitorings depend on :

- the flight area, or,
- the current RNP.

This paragraph describes the computation of theses parameters.

11.1.2 FLIGHT AREA

The FMC manages three flight area :

- en-route,
- terminal,
- approach.

The flight area becomes "terminal" when :

- the direct distance from aircraft to the departure or destination airport is smaller than 30 Nm, and,
- the aircraft is less than 15 000 feet above the departure or destination airport (the nearest of theses two airports) and,
- the flight area is not "approach"

Note : Therefore, at take-off, the flight area is "terminal"

The "terminal" flight area becomes "en-route" :

- when the conditions for "terminal" and "approach" flight area are not verified and
- if the altitude above the departure or destination airport are greater than 16000 feet.

The flight area becomes "approach" when :

- the active flight plan contains an approach procedure, and
- an Final Approach Fix (FAF) is defined in this approach procedure, and,
- if the distance between the aircraft and the FAF is equal or less than 2 Nm and,
- the geometry aircraft/procedure is acceptable (lateral error less than 0.3 Nm and angular error less than 90 degrees) and

. the GPS is used in selected aircraft position with GPS HIL less than 0.3 Nm and predicted RAIM at FAF and MAP (Missed Approach Point) less than 0.3 Nm. So, the FMC is in "GPS approach" mode

The "approach" flight area becomes "terminal" if the interrupted approach procedure (missed approach) is activated;

11.1.3 *COMPUTATION OF THE CURRENT RNP*

The current RNP is computed by the FMC according to the flight area :

- 5 Nm in "en-route" flight area
- 2 Nm in "terminal" flight area if the GPS is not used in the selected aircraft position (TSO C115b mode)
- 1 Nm in "terminal" flight area if the GPS is used in the selected aircraft position (TSO C129a mode)
- 0.7 Nm in not-GPS approach flight area
- 0.3 Nm in GPS approach flight area (TSO C129a mode)

This value is a default value. The crew can insert an other value that will have priority. If the inserted value is or becomes greater than the computed value (depending on the flight area), an alert is raised.

In PRNAV mode, the RNP value is 1NM. As a result, in "terminal" flight area if the GPS is not used in the selected aircraft position, the value 1NM shall be inserted by the pilot in order to remain in PRNAV mode.

11.2 RADIO-NAVIGATION MANAGEMENT

11.2.1 *CONFIGURATION*

Basically, the FMC manages two VOR and one DME receivers (triple channels).

11.2.2 *ACQUISITION*

The FMC receives data from VOR and DME receivers through each Data concentrator (DC).

At the beginning of each 200 ms cycle (5 Hz), the FMC reads each ARINC output line of the DC. It uses the last received value for each label.

The FMC inputs the following data from each VOR receiver :

- VOR navaid bearing from aircraft (QDM),
- frequency of the received VOR navaid.

Theses data are sent each 50 milliseconds by the VOR receiver and each 50 ms by the DC.

The FMC inputs the following data from from each DME channel :

- distance from the navaid to the aircraft,
- frequency of the received DME navaid.

Theses data are sent each 100 milliseconds by the DME receiver and each 100 ms by the DC.

11.2.3 *ASSOCIATION RECEIVED FREQUENCIES - NAVAIDS*

The FMC searches the 100 nearest navaids from the selected aircraft position which have a VOR or DME mean and located at less than 200Nm from the aircraft position.

This list is updated each 2 minutes. This list is empty if the aircraft position is invalid.

The FMC manages a list of manually deselected navaids by the pilot, up to 10 elements. The list is not saved after a long power interruption.

For each received frequency from VOR and DME, the FMC searches the nearest compatible navaids (ex : VOR or VOR-DME for a VOR frequency) in the list of the 100 nearest navaids.

If this navaid is not deselected, it is associated to the data of bearing or distance associated to this frequency.

This association is done each second. Otherwise, if the received frequency has not changed, and a navaid was associated to this frequency, the association is kept.

11.2.4 *SELECTION OF VOR AND DME FREQUENCIES*

The navaids selection concerns the determination of frequencies to be used by the receivers which are not in manual tuning mode.

Autotuning or manual tuning

The following receivers can be in autotuning or manual tuning mode :

- VOR1 and DME - channel 1 (The VOR1 frequency sent by the FMC is supposed to be also used by the channel 1 of DME)
- VOR2 and DME - channel 2 (same remarks as VOR1)

Channel 3 of DME is always in autotuning mode.

Autotuning mode is selected by default at FMC power up (after a long power interruption).

The receiver switches to manual tuning mode if

- it is selected as navigation source on the adequate control panel or,
- the received frequency is different from the selected frequency or,
- the selected frequency is not received or,

• the DME is in HOLD mode.

Eligible navaids

The algorithm of VOR and DME navaids selection is performed each 5 seconds.

The navaids selection includes the nearest navaids (see above) which have the followings features :

- the navaid is not "ineligible".

- the navaid belongs to the standard Database

- the navaid is not deselected by the pilot,

- the aircraft is not in the confusing cone determined by $D > 740 + max (h,0)/1.2$

- the aircraft is above the radio-electric horizon seen from navaid : aircraft height (h) above the navaid greater than "$0.06*(D/1000)^2 -50$" (D = aircraft-navaid distance-all in meters)

- the aircraft is in the navaid using area, determined from the FOM (figure of merit) of the navaid :

  - Aircraft-navaid distance less than 140 Nm for "extended high altitude"
  - Aircraft-navaid distance less than 130 Nm for "high altitude" or "unrestricted" navaids
  - Aircraft-navaid distance less then 40 Nm for "low altitude" navaids
  - Aircraft-navaid distance less then 25 Nm and aircraft height above navaid lower than 12000 ft for terminal navaids,

- The distance between the Navaid and the aircraft satisfies the the RNP (Required Navigation Performance) criteria :

Distance Max (NM)	RNP<1	RNP<2	RNP≥2
Data of distance	25	55	140
Data of bearing	20	40	100

- Another navaid is not received on the same frequency. In the case of two navaids with the same frequency, if one of theses is a recommended Navaid of the active leg, it is kept, otherwise none of theses two navaids are kept.

A navaid becomes ineligible during 10 minutes if the aircraft is in flight (with a radio altimeter greater 500 ft or invalid) and if the selected navaid is not received for more than 30 seconds.

Navaid selection management

In the data base, the FMC first determines the eligible navaids (see above). Among this list, the FM looks for navaids which allow to work in the following orders (in preference order) :

- DME/DME (so called D/D)
- VOR/DME (V/D) collocated

Theses modes are PRNAV modes. Then, the FM selects the nearest navaids :

- VOR/DME not collocated
- VOR/VOR

The optimisation criteria for the D/D mode is to maximise the distance to the limit of the zone where the angle between two navaids becomes less than 45°.

Only the less good navaid is changed at a time (to improve the continuity)

When an angle greater than 30° is not possible, the V/D collocated geometry is searched by minimising the distance between the navaid and the aircraft.

Due to the fact that V/V is not a PRNAV mode, the V/V geometry is not optimised (the nearest navaids are searched).

To optimise the geometrical criteria, the followings navaids are preferred (decreasing order) :

- Manual navaids
- Recommended navaids (in the flight plan) is eligible. The criteria of the confusing cone is not applied to theses navaids
- FROM or TO if it is an eligible navaid that enables a convenient geometry.
  If the FROM and the TO are two navaids, the nearest is retained.
  The criteria of the confusing cone is not applied to this navaid.

DME-channel 3 selection

The frequency to use for the DME-channel 3 is performed as follows (by decreasing priority) :

- the nearest eligible navaid, not VOR , and not selected above and not used in manual tuning,
- no selection

Receiver Frequency command

In bi-FMC configuration, only the master FMC sends frequency commands to the RMU. The master FMC is the one connected to the Autopilot, or the one located on the same side than the PFD coupled to the autopilot.

If the selected frequency is different from the received frequency, the FMC sends, during a second, each different frequency every 200 ms.
If the receiver does not re-emit this frequency in the 3 seconds, the FMC commutes this receiver in manual tuning mode.
The autotuning can be reselected only by the crew on the MCDU.

11.2.5 *BCP LOCALISATION SUB-MODES*

The BCP sub-mode is used to indicate to the crew, the most preponderant sensor among the available sensors. It permits to verify that the BCP mode uses the adequate sensors.

The selection is essentially based on Horizontal Figure Of Merit(HFOM orEPE) and Horizontal Speed Figure Of Merit (HSFOM) of used sensors.

The BCP sub-mode can take one of the following values :

- **GPS (GPS in green)** : the GPS position is the most used in the BCP position computation. This mode is also used when the GPS/IRS hybrid position is preponderant (because the GPS position is preponderant).
  If hybridation stops, and if GPS is no longer valid (FMS inputs), the BCP sub-mode will be IRS.
- **DME/DME (D-D in green)** : a couple of DME distances contributes the most to the BCP position.
- **VOR/DME (V-D in green)**: a couple of VOR/DME bearing and distance contributes the most to the BCP position. This couple of data is compliant with PRNAV.
- **VOR/DME (V-D in amber)**: a couple of VOR/DME bearing and distance contributes the most to the BCP position.
- **VOR/VOR (V-V in amber)** : a couple of VOR bearings contributes the most to the BCP position.
- **IRS (IRS in amber)** : No position is available for BCP and IRS provides the main source of speed .
- **DOPPLER (DOP in amber)** : No position is available for BCP and the main source of speed is doppler radar.
- **A-D (A-D in amber)** : No position is available for BCP and the main source of speed is the TAS vector and wind (can be inserted)
- **Invalid (--- in amber)**: the BCP position is not computed.

Note   The navigation sensor selected for the FM navigation appears in the top line (right side) of the MCDU screen. The different associated colors are the followings

- Blue : navigation selected

- Green : mean sensor taken into account in the BCP computation

- amber : degraded

The GPS, DME/DME, VOR/DME and VOR/VOR sub-modes are the available modes if position is available for BCP with at least one used sensor. The current sub-mode corresponds to the most accurate sensor.

The IRS, DOPPLER and A-D sub-modes are used in decreasing priority when the BCP is in dead- reckoning mode : no position is available for BCP but BCP position is computed with a known ground speed.

11.2.6 *EPE-RADIO AND MODE RADIO IN RADIO-NAV MODE*

With the available information from the radios and in consistency with the BCP :
- the EPE_{radio}
- the $MODE_{radio}$
  are computed

The BCP filter uses an internal mode and gives an external mode. The internal mode determines the inputs of the filter. It depends on the valid inputs. The external mode represents the sensor with the most contribution in the BCP. It is gave for display.

Initialisation

At the beginning of each computation cycle, EPE_{radio} and $MODE_{radio}$ are invalidated. The DME/DME , VOR/DME and VOR/VOR are then successively tested.

The RNP criteria for PRNAV modes ,for bearings and distances , are defined as follow (D : maximum distance from navaid to Aircraft)

	RNP		
	< 1NM	< 2 Nm	≤2 Nm
bearing	D ≤ 20Nm	D ≤ 20Nm	D ≤ 20Nm
distance	D ≤ 20Nm	D ≤ 20Nm	D ≤ 20Nm

Test of DME/DME – PRNAV mode

A distance data can be used by the DME/DME – PRNAV mode if
- it is valid,
- the aircraft is out of the uncertainty area around the navaid (defined as a cone – Cf "restrictions" paragraph)
- the RNP criteria for distance is respected.

If at least, two distances are useful,
- for each possible couple (i,j) of distances, the angular angle of Navaids seen from the BCP towards 90°:
  $$\delta\theta_{ij} = |(\theta_i - \theta_j)_{modulo\ 180°} - 90|$$
- if the minus difference $\delta\theta_{min}$ is less than 60°:
  - $MODE_{radio}$ = DMEDME

  - EPE_{radio} = $\sqrt{\dfrac{Qf_{p1}^2 + Qf_{p2}^2}{\cos(\delta\theta_{min})}}$

    With Qf_{p1} and Qf_{p2} : the quality factors associated to the two received distances.

    EPE_{radio} is minimized by the maximal absolute difference between the measure distance and the computed distance for each TACAN or DME navaid used.
    - EPE_{radio} = MAX (EPE_{radio} ; max $|d\rho_i|$)

Note : the minoration of the EPE radio avoids to take into account a low position error if a sensor mesuares a most importante value.

Else EPE_{radio} and $MODE_{radio}$ stay invalid.

Test of VOR/DME – PRNAV mode

A couple (p_i, Θ_i) can be used by the VOR/DME – PRNAV if
- p_i and Θ_i are valid
- it comes from a navaid of type
  - collocated VOR/DME or collocated VOR/TACAN for NAV receivers,
  - TACAN, VOR/TACAN or ILS/TACAN for TACAN receivers
- Aircraft is out of the out of the uncertainty area around the navaid
- the RNP criteria for bearings is respected.

If at least a couple (distance , bearing) is received
and $MODE_{radio}$ is invalid or EPE_{radio} is greater then min (Qf_{pi})

$$i \in \{\text{usable bearings}\}$$

Then
- Maximal difference between BCP and measures :

$$EPE_{default} = \max (\max |\rho pp_i * d\Theta_i| ; \max |d\rho_j|)$$

$$i \in \{\text{usable bearings}\}$$
$$j \in \{\text{usable distances}\}$$

- For each usable couple (p_i, Θ_i) :

$$EPE_i = \sqrt{Qf_{pi}^2 + Qf_{\Theta i}^2}$$

Qf_{pi}, $Qf_{\Theta i}$: quality factors for bearings ans distances taken into account
- $EPE_{vordme} = \max (EPE_{default} ; \min EPE_i)$
- EPE_{radio} and $MODE_{radio}$ computation :
  If $MODE_{radio}$ is valid and $EPE_{radio} > EPE_{vordme}$ or $MODE_{radio}$ is invalid,
  $EPE_{radio} = EPE_{vordme}$ and $MODE_{radio} = \text{VORDME-PRNAV}$
  else EPE_{radio} and $MODE_{radio}$ are not modified
Else EPE_{radio} and $MODE_{radio}$ are not modified.

Test of VOR/DME mode (not PRNAV)
If $MODE_{radio}$ is invalid and at least a distance and a bearing are received
Or EPE_{radio} is greater then min (Qf_{pi}) $i \in \{\text{received bearings}\}$

Then
- Maximal difference between BCP and measures :

$$EPE_{default} = \max (\max |\rho pp_i * d\Theta_i| ; \max |d\rho_j|$$

$$i \in \{received\ bearings\}$$

$$j \in \{received\ distances\}$$

- For each received bearing, the minimum angle difference between the navaid given the bearing and each of the navaid given a distance is egal to

$$d\Theta_{min} = \min |\Theta_i - \Theta_{ppj}) \pm 180°| \quad j \in \{received\ distances\}$$

If the minus difference $d\theta_{min}$ is less than 60°:

$$EPE_i = \sqrt{\frac{Qf_{p1}^2 + Qf_{p2}^2}{\cos(\delta\theta_{min})}}$$

With Qf_{p1} and Qf_{p2} : the quality factors respectively associated to the bearing and distance measures taken into account.

Else EPE_{radio} stay invalid.

- If at least, an EPE_i is valid

$$EPE_{vordme} = \max (EPE_{default} ; \min EPE_i))$$

Else EPE_i is invalid

- If the EPE_{vordme} is valid

If $MODE_{radio}$ is valid and $EPE_{radio} > EPE_{vordme}$ or $MODE_{radio}$ is invalid,

$$EPE_{radio} = EPE_{vordme} \text{ and } MODE_{radio} = VORDME$$

else EPE_{radio} and $MODE_{radio}$ stay invalid

Else EPE_{radio} and $MODE_{radio}$ are not modified.

Test of VOR/VOR mode (not PRNAV)
If $MODE_{radio}$ is invalid and the two VOR bearings are received :

Then

- Difference angle between the two VORS saw by BCP towards 90°:

$$\delta\theta_{ij} = |(\theta_i - \theta_j)_{modulo\ 180°} - 90°|$$

If the minus difference $d\theta_{min}$ is less than 60°:

$$EPE_{radio} = \frac{\overline{Qf_{p1}^2 + Qf_{p2}^2}}{\sqrt{\cos(\delta\theta_{min})}}$$

With Qf_{p1} and Qf_{p2} : the quality factors associated to the two VOR.

EPE_{radio} is minimized by the maximal absolute difference between the measure distance and the computed distance.

  ○ $EPE_{radio} = MAX (EPE_{radio} ; \max |\rho pp_i * d\Theta_i|)$

   $i \in \{received\ VOR\ bearings\}$

$MODE_{radio} = VORVOR$

else $MODE_{radio}$ and $MODE_{radio}$ stay invalid

Else EPE_{radio} and $MODE_{radio}$ stay invalid too.

11.2.7 *SELECTION OF NAVIGATION SENSORS*

The crew can deselect the following sensors in the BCP computation (according to installations) :

- Doppler,
- IRS and HYB position (hybridization GPS and IRS)

- GPS

- radionavigation (VOR and DME)

- radionavigation (VOR, DME and TACAN)

The BCP computation will use

- all the valid sensors not deselected by the pilot (providing valid data) and,

- the true air speed and the true heading

with the following restrictions :

- In order not to degrade the GPS position (or HYB -see above), when the GPS position integrity is OK (HIL valid and less than 0.3 Nm) and GPS is not deselected, the others sensors will not be used.

- Depending of the hybridation mode, the IRS/GPS hybridation gives a speed and a position highly corrolated with IRS and GPS speed and postion. So, to avoid to take into account twice the same data, the following logic is used :

		Hybridation status			
		Selected and active	Selected	Not selected	invalid
Sensors available	IRS	0	1	1	1
	GPS	0	1	0	1
	HYB	1	0	1	0

(1) : sensor available for BCP - (0) not avaliable for BCP

11.2.8 *RESTRICTION IN USING VOR/DME NAVAIDS*

The followings restrictions are applied before using bearings and distances in the BCP filter :

- If the aircraft is in the uncertainty area around the navaid (computed as a cone of half-angle of 40 degree and a top of 0.48 Nm under the navaid), recieved bearing and/or distance will not be used:

- Bearing or distance is not used if the navaid if too far from the aircraft, according to the current RNP :
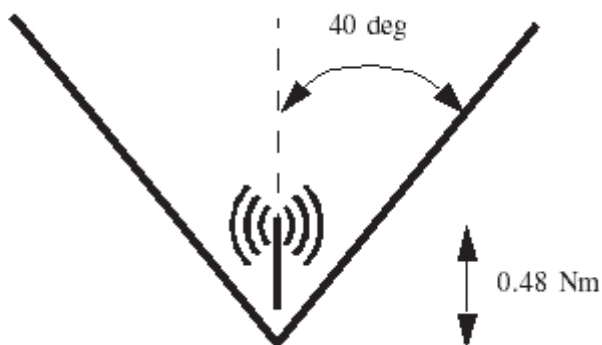
Bearing/distance using limitations according to RNP

RNP	Maximum distance for bearings	Maximum distance for distances
< 1 Nm	20 Nm	25 Nm
< 2 Nm	40 Nm	55 Nm
≥ 2 Nm	100 Nm	140 Nm

12 GLOSSARY

A/C	Aircraft
ACARS	Arinc Communication Addressing and Reporting System
ADC	Air Data Computer
ADL	Airborne Data Loader
AGL	Above Ground Level
AHRS	Attitude and Heading Reference System
ALT	ALTitude
ALTN	Alternate
ALT SEL	SELected ALTitude
ANP	Actual Navigation Performance
AP	Auto Pilot
APT	Airport
BCP	Best Computed Position
BITE	Built In Test Equipment
BRG	BeaRinG
CARP	Computed Air Release Point
CAS	Computed Air Speed
CLR	Clear
CMS	Communication Management System
CMU	Communication Management Unit
CRZ	Cruize
DA	Drift Angle
DC	Data Concentrator
DCF	Data Concentrator Function
DEST	DESTination
DIST	DISTance
DME	Distance Measuring Equipment
DTK	Desired TracK angle
DTM	Data Transfer Module
DTO	Direct-TO
DVS	Doppler Velocity System
EFCP	EFis Control Panel
EFIS	Electronic Flight Instrument System
EFOB	Estimated Fuel On Board
EIA	Enhanced Interrupted Alignment
EPE	Estimated Position Error
ETA	Estimated Time of Arrival
ETE	Estimated Time En route
FCM	Flight Control Module
FITS	Full Integrated Tactical System
FF	Fuel Flow
FL	Flight Level (altitude)
FGCP	Flight Guidance Control Panel

FMC	Flight Management Computer
FMS	Flight Management System
FOM	Factor Of Merit
FPA	Flight Path Angle
FPLN	Flight PLaN
FPS	Flight Planning System
FREQ	Frequency
FRQ	Frequency
GCA	GyroCompass Alignment
GPIRS	Global Positioning + Inertial Reference System
GPS	Global Positioning System
GS	Ground Speed
HARP	High Altitude Release Point
HDG	HeaDinG
HFOM	Horizontal Figure Of Merit
HGT	HeiGhT
HIL	Horizontal Integrity Limit
HSFOM	Horizontal Speed Figure of Merot
IFF	Identification Friend and Foe
IAS	Indicated Air Speed
ICAO	International Civil Aviation Organization
IDENT	IDENTification
IFA	In Flight Alignment
IFC	Integrated Flight Cabinet
IFR	Instrument Flight Rules
IGRF	International Geomagnetic Reference Field
ILS	Instrument Landing System
IRS	Inertial Reference System
IRU	Inertial Reference Unit
KM	KiloMeter
KH	KiloMeter(s) per Hour
KT	KnoTs
LAT	LATitude
LB	pounds
LCD	Liquid Crystal Display
LNAV	Lateral NAVigation
LNG	Length
LOC	LOCalizer
LONG	LONGitude
Lsk	Line Select Key
MAG	MAGnetic
MCDU	Multifunction Control and Display Unit
MDA	Minimum Descent Altitude
MFD	Multi Fonction Display
MGRS	Military Grid Reference System
MSL	Mean Sea Level
NAV	NAVigation
NAVAID	NAVigation AID
ND	Navigation Display
NDB	Non Directional Beacon

NRP	Non Return Point
NM	Nautical Mile
PFD	Primary Flight Display
POS	POSition
PPOS	Present POSition
PPS	Precise Positioning Service
RA or R/ALT	Radio Altimeter
RAIM	Receiver Autonomous Integrity Monitoring
RCR	Runway Condition Reading
RFI	Rolling Condition Index
PRR/NAV	Precise R/NAVRadio/NAVigation
RMS	Radio Management System
RNP	Required Navigation Performance
R/P	Resume Point
RTA	Required Time of Arrival
RWY	RunWaY
SAR	Search And Rescue
SEC	Secondary flight plan
SEL	altitude SELected
SHA	Stored Heading Alignment
SID	Standard Instrument Departure
SPD	SPeeD
SPS	Standard positioning service
STAR	Standard Terminal Arrival Route
TAC	TACan
TAS	True Air Speed
TAT	Total Air Temperature
TGT	TarGeT
TKE	TracK angle Error
TERM	TERMinal
T/O	Take-Off
TOC	Top Of Climb
TOD	Top Of Descent
TRANS ALT	TRANSition ALTitude
TTG	Time To Go
UTC	Universal Time Coordinated
UTM	Universal Transverse Mercator
VAPP	APProach speed
VAR	VARiation
VFR	Visual Flight Rules
VNAV	Vertical NAVigation
VNE	Velocity Never Exceeded
VOR	VHF Omnidirectional Ranging
VORDME	VOR/DME
VORTAC	VOR/TACAN
VRC	Recommended Climb speed
WGS	World Geodesic System
WND	Wind
WPT	WayPoinT
XTK	cross Track Error

Z   Zulu time, UTC time
ZC   barometric Corrected altitude
ZP   standard altitude