

Aerosoft – Digital Aviation <b>CRJ-700 CRJ-900</b>	<b>FMS Guide</b>	VOL 6	1-1-1
			23-Apr-2017

# VOLUME VI

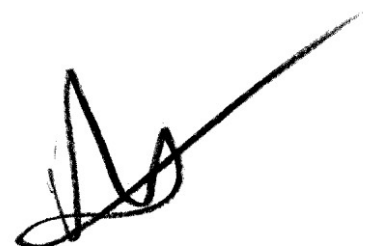
## FLIGHT MANAGEMENT SYSTEM

### - FMS GUIDE –

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Rev #	Date	Author	Change	Version
001	11-Oct-15	IV	Start of documentation	0.90
002	23-Apr-17	IV	Completing manual Vol. 6 and release for beta testers	0.95

On behalf of Authority



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## FLIGHT MANAGEMENT SYSTEM - INTRODUCTION

### GENERAL DESCRIPTION / INTRODUCTION

The CRJ is powered by two Collins FMS-4200 flight management computers. The control display units (CDU) are the interface between pilots and the FMS units itself by means of data / information display and data entry. The FMS provides lateral guidance and vertical advisories based on the entered flight route, performance data and data collected from several sensors.

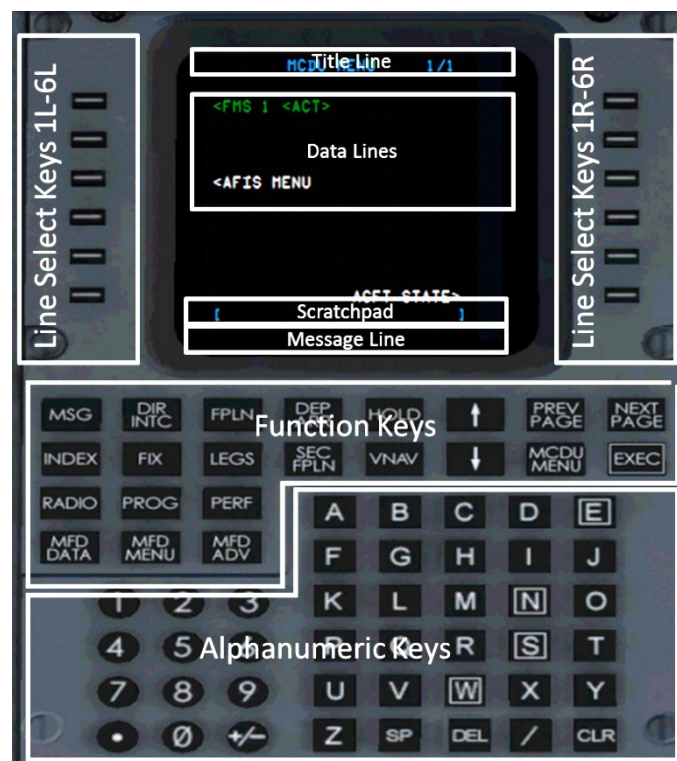
The stored performance database is advisory only, as the FMS has no ability to control vertical or speed modes of the autopilot. Only heading information based on the programmed route are provided to the autopilot in LNAV mode.

This chapter in the systems manual only provides a very basic introduction to the flight management system. More details will be introduced in the following chapters.

### WHERE TO FIND THE FMS/CDU AND BASIC LAYOUT

The control display units, CDUs sit on the upper part of the pedestal. Both CDUs are identical regarding functionality and layout.

The following picture shows the basic layout of the control display unit, CDU.



- **Title line**  
The title line shows the page title, or mode as well as the current page number and number of total pages, of applicable
- **Label line**  
The label lines are aligned with the respective line select keys. They show information related to the current page. Pressing the line select key adjacent to the label line, allows copying the indicated information into the scratchpad or vice versa.

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- **Prompts / Dashes**  
Boxes indicate where information need to be entered into the FMS.  
Dashes indicate where information may be entered.
- **Data lines**  
Provide further information to the indicated data in the same label line (i.e. distance information on the LEGS page)
- **Scratchpad**  
Text entered via the keypad or copied from a label line via the line select key is displayed in the scratchpad
- **Message line**  
The message line indicates system generated
- **Left Line Select Keys LSL1L to LSK6L**  
Allow to enter and copy data from the data lines into the scratchpad and vice versa.
- **Right Line Select Keys LSL1R to LSK6R**  
Allow to enter and copy data from the data lines into the scratchpad and vice versa.
- **Function Keys**  
Pressing a function key calls /opens the associated page
  - MSG  
Opens the FMS message page
  - DIR/INTC  
Opens the DIRECT-TO page
  - FPLN  
Opens the Flightplan page to enter and modify a flightplan
  - DEP/ARR  
Opens the Departure and Arrival page to select SIDs and STARs
  - HOLD  
Opens the HOLDING page to programm holdings
  - ↑ and ↓  
For scrolling up and down – for example to modify the center for the flight plan page
  - PREV PAGE  
Opens previous page
  - NEXT PAGE  
Opens next page
  - INDEX  
Opens INDEX page to access FMS functions which have no direct-access-keys
  - FIX  
Opens the FIX INFO page
  - LEGS  
Opens the LEGS page to modify a flightplan's legs
  - SEC FPLN  
Opens secondary flightplan page
  - VNAV  
Opens VNAV page for VNAV advisories
  - MCDU MENU  
Opens the ENU page
  - EXEC  
The EXEC button executes modifications made
  - RADIO  
Opens the radio programming page (NAV, COM, ADF)

- PROG  
Opens the Progress page to show a summary of the current flight status
- PERF  
Opens the Performance page
- MFD DATA  
Allows to switch between map and text display
- MFD MENU  
Allows to look deeper into the FMS data source regarding airports, nav aids, fixes and modify data
- MFD ADV  
Opens the DISPLAY ADVANCE page to move through the MFD text pages.
- **Keypad**  
Used to enter alpha-numerical data in to the scratchpad.

You may use your mouse to enter data into the FMS and select certain functions, nevertheless you may also activate a mode to use keyboard commands to directly enter data / select functions from the FMS. Please bear in mind that as long as the keyboard mode is activated other key assignments in your flightsim won't work.

Note
In case you are using the keyboard entry mode do not forget to deactivate it when entries are completed to gain full function of regular flightsim functions.

The table on the following page shows the available key commands.

Function	German Keyboard	U.S. Keyboard
Toggles left MCDU keyboard entry mode ON/OFF	Strg+Umschalt+1	Ctrl+Shift+1
Toggles right MCDU keyboard entry mode ON/OFF	Strg+Umschalt+2	Ctrl+Shift+2
LSK 1L	F1	F1
LSK 2L	F2	F2
LSK 3L	F3	F3
LSK 4L	F4	F4
LSK 5L	F5	F5
LSK 6L	F6	F6
LSK 1R	F7	F7
LSK 2R	F8	F8
LSK 3R	F9	F9
LSK 4R	F10	F10
LSK 5R	F11	F11
LSK 6R	F12	F12
MSG	Strg+F1	Ctrl+F1
Dir/Intc	Strg+F2	Ctrl+F2
Fpln	Strg+F3	Ctrl+F3
Dep/Arr	Strg+F4	Ctrl+F4
Hold	Strg+F5	Ctrl+F5
MCDU Menu	Strg+F6	Ctrl+F6
Index	Strg+F7	Ctrl+F7
Fix	Strg+F8	Ctrl+F8
Legs	Strg+F9	Ctrl+F9
Sec Fpln	Strg+F10	Ctrl+F10
VNAV	Strg+F11	Ctrl+F11

Exec	Return oder Strg+F12	Return or Ctrl+F12
Radio	Umschalt+F1	Shift+F1
Prog	Umschalt+F2	Shift+F2
Perf	Umschalt+F3	Shift+F3
MFD Data	Umschalt+F4	Shift+F4
MFD Menu	Umschalt+F5	Shift+F5
MFD Adv	Umschalt+F6	Shift+F6
A-Z	A-Z	A-Z
0-9	0-9	0-9
.	.	.
+	+	+
-	-	-
/	/	/
SP	Leertaste	Space
DEL	Entf	Delete
CLR	Zurück	Backspace

## PREFLIGHT SETUP AND SEQUENCE OF PAGES

During flight preparation the FMS is set up as well. This setup follows a certain sequence of events which will be briefly introduced in this chapter. Check the tutorial flight and FMS manual for more information.

1. Preflight
  1. MENU page  
Allows to select between several information and setup pages
  2. INDEX page  
Allows to select between FMS functions, payload options and aircraft status options (AFIS is not simulated)
  3. STATUS page  
After startup the FMS displays the STATUS page – review the displayed information for consistency
  4. POS Init  
Now you need to enter the aircrafts position.
2. Flight Planning
  1. FLTPLN
    - i. Enter Origin
    - ii. Enter Destination
    - iii. Enter Origin Runway
    - iv. Enter Alternate airport
    - v. DEP/ARR
      1. Enter a SID
      2. Enter a STAR
    - vi. Modify SID/STAR
    - vii. Enter route in FLTPLN page according your route string
  2. PERF  
Enter the respective performance data like number of passengers, cargo loaded, fuel loaded etc.
  3. VNAV  
Review / set up the selected climb, cruise and descent profiles
  4. LEGS



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- Check route & altitude / speed restrictions
  - 5. PROG
    - Review the data on the progress page
- 3. Enroute / Monitoring
  - 1. PROG
    - Review the data on the progress page
  - 2. HOLD
    - Used to enter/modify/leave Holdings at certain waypoints
  - 3. RADIO
    - Allows tuning of radio frequencies
  - 4. MFD DATA
    - Allows to switch between map and text display
  - 5. MFD MENU
    - Allows to look deeper into the FMS data source regarding airports, nav aids, fixes and modify data
  - 6. MFD ADV
    - Opens the DISPLAY ADVANCE page to move through the MFD text pages.

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## FLIGHT MANAGEMENT SYSTEM - PAGES

The following sections describe the FMS's pages, their functions, sub-pages and how to use them. For clarification the pages are sorted according a certain sequence:

- Setup  
All pages dealing with general settings, independent of a specific flight
- Preflight  
All the pages and general steps to prepare a flight
- Flight Planning  
Describing the pages and functions to do the flight planning
- Enroute / Monitoring  
Certain pages and functions to be used during the flight for monitoring or amendments which become necessary throughout a flight

## SETUP

### INDEX PAGE

The INDEX page is used to select FMS pages which are not selectable through function keys. The INDEX page offers eight selectable pages:



1. STATUS  
Opens the STATUS page (see respective chapter)
2. POS INIT  
Opens the POS INIT page (see respective chapter)
3. IRS CTL  
Opens a menu to configure the Inertial reference system, IRS
4. VOR CTL  
This menu configures usage of VOR stations during initial position estimation of the IRS
5. FMS CTL  
On this page you can toggle the heading display mode between magnetic and true heading and select between dependent and independent mode of the two FMS.
6. ROUTE MENU  
This page shows a list of stored routes
7. DATA BASE  
The data base page enables you to search for a certain waypoint, VOR/NDB or airport in the current FMS navigational data base and also enables you to define own waypoints.
8. DB DISK OPS  
Not simulated - Used for data base operations in the real aircraft
9. DEFAULTS  
This pages allows to modify several default values like weights
10. ARR DATA  
This page shows available information on the selected destination / arrival airfield.

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## IRS CTL SUB-PAGE

The IRS Control page displays position differences between each IRS sensor's calculated position, providing the following information:

- Direction difference displayed as a heading in XXX°
- Distance difference displayed as XX,X nm (values above 99,9 will be displayed as 99,9 as well)
- The position drift rate given in XX,X nm per hour



FMS\_30.jpg

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## VOR CTL STATE SUB-PAGE

The VOR control page allows you to configure whether certain VORs are used or not to be used to assist during initial position initialization. Press line select key 5L to either enable or disable VOR Control.

Enter the VOR's identifier into the scratchpad and then press the respective line select key to either select or inhibit certain VORs. Use LSK 1L and 1R to select VORs to be used during position initialization. Use LSKs 2L, 3L, 4L as well as 2R, 3R and 4R to enter VORs to be inhibited during position initialization.

The following picture shows VOR FFM to be used and VOR RID and MTR to be inhibited during position initialization.



FMS\_29.jpg

Entered VORs are used as long as they are stored in the FMS or unless a database update was performed.

## FMS CTL STATE SUB-PAGE

The FMS control page allows to toggle between displaying true or magnetic (magnetic north) heading as well as switching between dependent and independent mode of the two FMS.

Press LSK 1L to toggle between true and magnetic heading.

In case true heading is selected, the heading indications on the CDU and EFIS switch to true heading. Furthermore heading indications on the FMS are designated by a small "T". Whereas wind information (PROG page) and VOR bearing information (VOR/DME STATUS page) is always displayed as magnetic heading.

FMS\_31.jpg

Pressing LSK 2L would toggle between dependent and independent mode of the two FMS. Independent mode is not simulated though – for the sake of clarity the following section briefly describes its function though.

In dependent mode the flightplan information are synchronized between both FMS. When switching to independent mode both FMS may process different flightplan information. When switching to independent mode you are required to select one FMS as the master / source of information for the autopilot system.

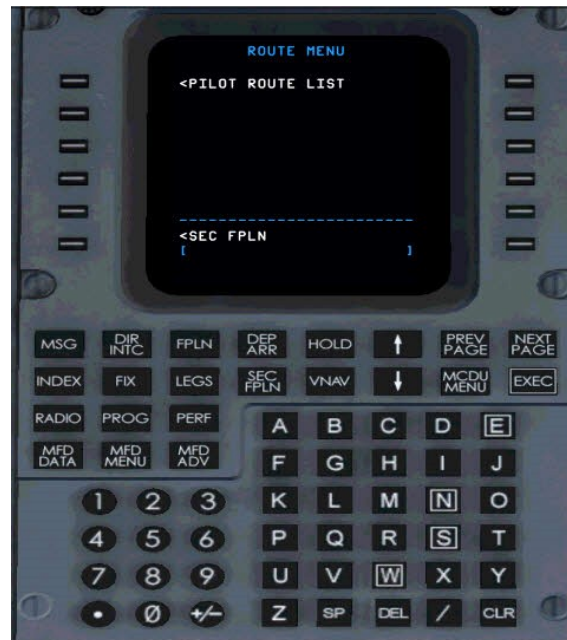
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When switching back from independent mode to sync mode, all information from the selected master FMS are written over the information of the other FMS. Accordingly you are required to confirm when switching back to sync mode.

#### ROUTE MENU SUB-PAGE

The ROUTE MENU page allows to store and load flightplans. When the ROUTE MENU page is opened, the option PILOT ROUTE LIST is displayed – press LSK 1L to open the PILOT ROUTE LIST.

The options CO ROUTE LIST and DISK ROUTE LIST of the real aircraft are not simulated.



FMS\_32.jpg

This opens the list of available flightplans. Press LSK 1L/R, 2L/R, 3L/R, or 4L/R to select and load a flightplan.

To store a flightplan enter a suitable filename into the scratchpad and press LSK 6L to store the active flightplan or LSK 6R to store the secondary flightplan. ROUTE SAVED is displayed in yellow font when saving the flightplan was successful.

Press LSK 5L to view the FLTPLN page for the secondary flightplan.

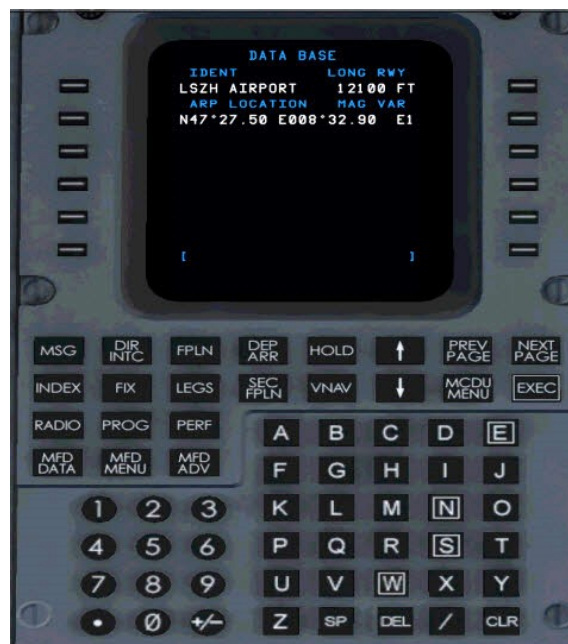
Press LSK 5R to return to the ROUTE MENU page.



FMS\_34.jpg

#### DATA BASE SUB-PAGE

The DATA BASE page allows to search for a certain waypoint, VOR, NDB or airport in the currently loaded navigational database. Simply enter the identifier into the scratchpad and press LSK 1L to start the search.

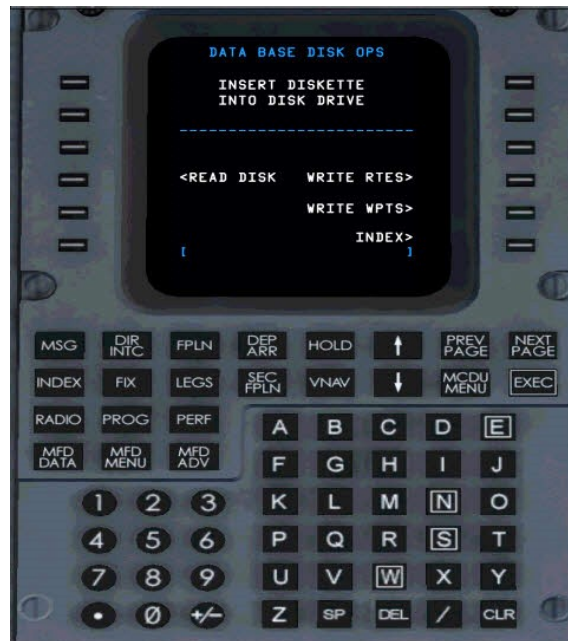


FMS\_35.jpg

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## DB DISK OPS SUB-PAGE

Even though the available options on the DATA BASE DISK OPS page are displayed they are not simulated.



FMS\_36.jpg

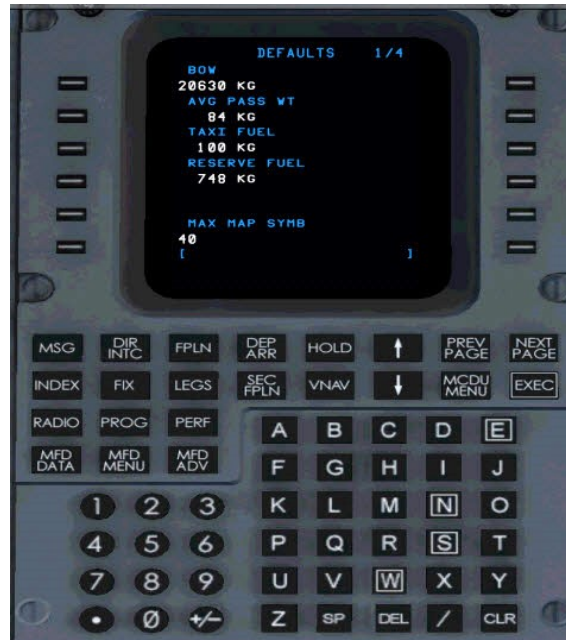


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## DEFAULTS SUB-PAGE

The DEFAULTS page allows to enter several default values for the CRJ.

Changing of the default value does not affect active flightplans (there are a few exceptions) but only when a new flightplan is created. Some of these values may be overwritten by the respective pages of the flightplan.



FMS\_37.jpg

- Page 1 of 4
  - BOW 20.630kg (CRJ 900)  
Basic Operation Weight used for performance calculation – amending this value affects also active flightplans
  - AVG PASS WT 84kg  
Assumed average passenger weight – the payload page allows you to enter the passenger number which multiplied with the average passenger weight yields the total weight of all passengers.
  - TAXI FUEL 100kg  
Default taxi fuel weight for performance calculations
  - RESERVE FUEL 748kg (CRJ900)  
Default reserve fuel weight for performance calculations

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FMS\_38.jpg

- Page 2 of 4
  - CLIMB SPEED 290/.74  
Selected speed /mach number for default climb profile
  - CRUISE SPEED 300/.74  
Selected speed /mach number for default cruise profile
  - DESCEND SPEED .74/290  
Selected speed /mach number for default descend profile
  - DESCEND ANGLE 3.0°  
Selected descend angle for default descend profile
  - SPD / ALT LIMIT 10.000ft  
Altitude at which 290kts are allowed
  - FL/TRANS ALT FL180  
Default transition altitude

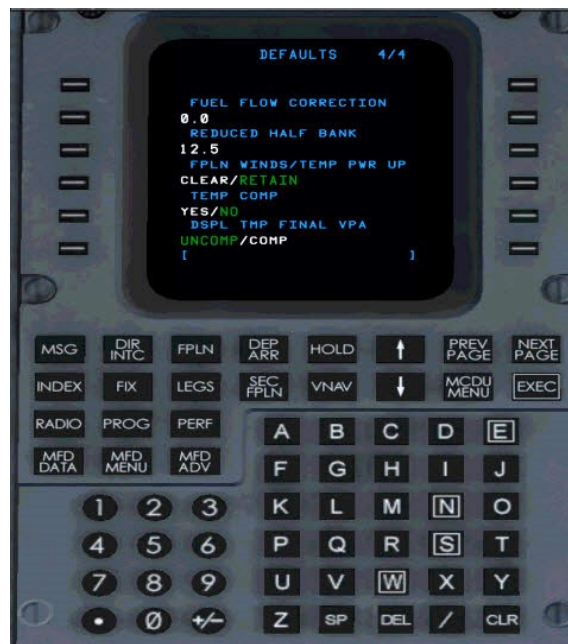
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FMS\_39.jpg

- Page 3 of 4
  - DME USAGE YES  
Toggles whether to use DMEs during position initialization
  - VOR USAGE NO  
Toggles whether to use VORs during position initialization
  - NEAREST APTS MIN RWY 4.000  
Minimum runway length to display airport
  - FLIGHT LOG ON LDG NO  
If set to yes the FLT LOG page opens automatically after landing

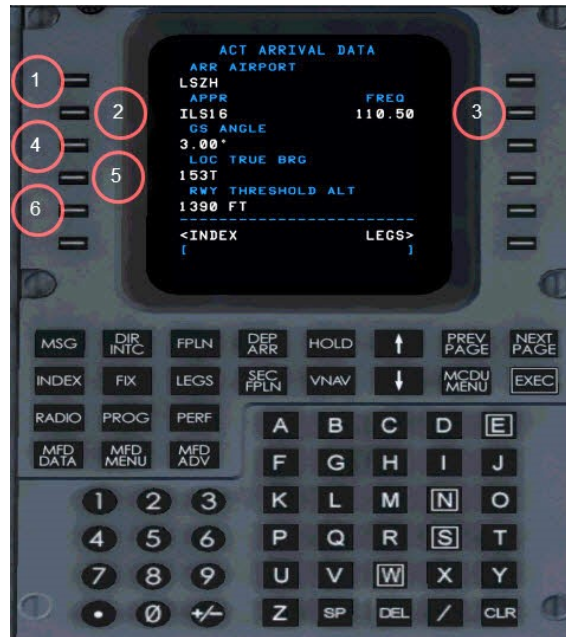
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FMS\_40.jpg

- Page 4 of 4
  - FUEL FLOW CORRECTION 0.0  
Not simulated
  - REDUCED HALF BANK 12.5  
Allowed values from 5° to 12.5° - selects default value when ½ bank mode is selected
  - FPLN WINDS / TEMP PWR UP RETAIN  
Not simulated - Toggles whether winds and temperatures of a flightplan are saved or deleted during power up
  - TEMP COMP NO  
???
  - DSPL TMP FINAL VPA UNCOMP  
???

## ARR DATA SUB-PAGE



FMS\_42.jpg

The ARRIVAL page is an information / display only page. It indicates the following information (if available) for the flightplan's destination airport:

1. ARR Airport  
ICAO code of the selected airport / airfield
2. APPR  
selected approach
3. FREQ.  
ILS frequency – if available
4. GS ANGLE  
Glideslope angle – if available
5. LOC TRUE BRG  
Localizer's bearing – if available
6. RWY THRESHOLD ALT  
Altitude at runway threshold

## MCDU MENU PAGE

The INDEX page basically offers four selectable options:



MCDU\_MENU\_pg.jpg

1. FMS 1 <ACT>  
Indicates that the current CDU controls FMS1
2. AFIS MENU  
Not simulated – AFIS stands for AlliedSignal Airborne Flight Information System which established a data link connection between a ground station and the aircraft to transfer messages, weather data or such
3. ACFT STATE  
Not available on the real aircraft - Opens a menu to select the aircrafts state (like cold & dark, engines running etc. pp.)

## ACFT STATE SUB-PAGE



MCDU\_ACFT\_State.jpg

1. COLD+DARK  
By selecting LSK 1R the pre-defined aircraft state "COLD + DARK" gets loaded – engines are shut down and all systems including the batteries are shut down
2. ENG STARTUP  
By selecting LSK 12 the pre-defined aircraft state "ENG STARTUP" gets loaded – the aircraft systems are set up in a way so that the engines may be started next.
3. ENG RUNNING  
By selecting LSK 3R the pre-defined aircraft state "ENG RUNNING" gets loaded – the engines are already running and all systems are up and running.
4. RETURN  
By pressing LSK 6R you return to the previous page (INDEX page)
5. SAVE STATE  
By entering a name into the scratchpad and then pressing LSK 6L you may save the current aircraft state to reload it another time. All user-defined aircraft states are listed on the left side and loadable through the LSK 1L to 5L.



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## STATUS PAGE

The status pages are indicated upon power-up of the FMS or if selected from the INDEX page. They are solely information pages.



FMS\_44.jpg

The status page indicates the following information:

- **NAV DATA**  
Indicates the Nav Data Bases name
- **ACTIVE DATA BASE**  
Indicates the Nav Data Bases revision / which AIRAC cycle is loaded
- **SEC DATA BASE**  
Indicates the secondary Nav Data Bases revision (not simulated)
- **UTC**  
Shows the current FS time in UTC
- **DATE**  
Shows the current FS date
- **PROGRAM**  
Indicates the FMS software part number (not simulated)
- **INDEX**  
Calls the INDEX page
- **POS INIT**  
Opens the FMS page for position initialization



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FMS\_45.jpg

- **MODEL**  
Shows the current aircraft model
- **MTOW**  
Shows the maximum takeoff weight
- **PERF DATA BASE**  
Shows the (software) partnumber of the performance database
- **INDEX**  
Pressing LSK 6L returns to the INDEX page
- **VARIANT**  
Shows the aircraft variant
- **ENGINES**  
Shows the aircraft's engine type
- **POS INIT**  
Pressing LSK 6R returns to the POS INIT page

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## PREFLIGHT

### POS INIT PAGE

The position initialization is a crucial step when programming the FMS. To fully understand the importance of this step, explaining the basic principle of inertial navigation systems is necessary. Basically an inertial navigation system determines the movements / variations in movement after it is initialized and operational. As soon as the initialization sequence is completed the INS is able to detect movement of the aircraft along any axis and compute the travelled distance. Nevertheless, the INS is somewhat stupid as it doesn't know its position on earth when it was initialized.

The POS INIT page now tells the INS where it is situated – so with computing the direction and distance of movements from a starting point on the INS is able to compute and display the aircrafts position. The more accurate the position compared to the aircrafts real position is the more accurate the aircrafts path is computed. That's why you find the aircraft stands position normally written on the positions sign (see picture below).



Gate\_POS\_Lat\_Lon.jpg

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The POS INIT page offers two sub-pages. Page 1 of 3 is opened by default when POS INIT page is selected.

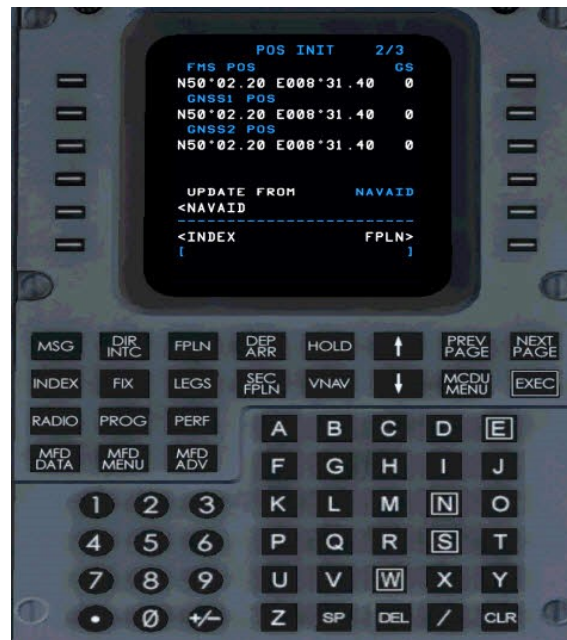


FMS\_46.jpg

- **FMS POS**  
This line indicates the actual geographical position, saved by the FMS
- **AIRPORT**  
By entering an IATA airport code the FMS displays the airports geographical position as saved in the Nav Database
- **PILOT / REF WPT**  
Not simulated.  
Allows to enter a position manually in lat/lon format
- **GATE**  
By entering a gate position the FMS displays the gate's geographical position as saved in the Nav Database
- **SET POS**  
As soon as an airport, pilot waypoint or gate is entered, the FMS indicates the associated coordinates for the entered reference point. You may copy the position into the scratchpad by pressing the LSK next to the right of the indicated position.  
By pressing the LSK 5L this entry gets copied in the SET POS brackets and the entered position is used as the reference point for the FMS.
- **INDEX**  
Returns to the INDEX page
- **FPLAN**  
Opens the flightplan page

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POS INIT page 2 indicates further information on computed positions.



FMS\_47.jpg

- FMS POS / GS  
Indicates the current geographical position used by the FMS as well as the computed ground speed (GS)
- GNSS1 POS / GS  
Indicates the current geographical position computed by GNSS (GPS) 1 as well as the computed ground speed (GS)
- GNSS2 POS / GS  
Indicates the current geographical position computed by GNSS (GPS) 2 as well as the computed ground speed (GS)
- UPDATE FROM NAVAID  
Used in the real aircraft to update the INS position relative to a navaid (not simulated)
- NAVAID  
Allows to select a certain navaid to update the INS position in reference to the navaid (not simulated)
- INDEX  
Opens the INDEX page
- FPLN  
Opens the flightplan page

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POS INIT page 3 indicates further information on computed positions.



FMS\_48.jpg

- **FMS POS / GS**  
Indicates the current geographical position used by the FMS as well as the computed ground speed (GS)
- **IRS POS 1 / GS**  
Indicates the current geographical position computed by INS 1 as well as the computed ground speed (GS)
- **IRS POS 2 / GS**  
Indicates the current geographical position computed by INS 2 as well as the computed ground speed (GS)
- **UPDATE FROM NAVAID**  
Used in the real aircraft to update the INS position relative to a navaid (not simulated)
- **NAVAID**  
Allows to select a certain navaid to update the INS position in reference to the navaid (not simulated)
- **INDEX**  
Opens the INDEX page
- **FPLN**  
Opens the flightplan page

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## FPLN PAGE

Entering a flightplan finally starts on the FPLN page. It follows a certain sequence of steps through different subpages:

1. Enter Origin
2. Enter Destination
3. Enter Origin Runway
4. Enter Alternate airport
5. DEP/ARR
  - a. Enter a SID
  - b. Enter a STAR
6. Enter route according route string
7. Check / modify route on LEGS page
8. Check / modify speed / altitude restrictions

But lets start on page 1 of the FPLN page:



FMS\_49.jpg

- **ORIGIN / DIST**  
Enter the origin airport in IATA code (4 letters) into the scratchpad and then copy it by pressing LSK 1L into the ORIGIN field.  
As soon as a route is entered, the distance from origin to destination is displayed below the DIST headline
- **DEST**  
Enter the destination airport in IATA code (4 letters) into the scratchpad and then copy it by pressing LSK 1R into the DEST field.
- **ROUTE**  
In case you already saved a route, you may load a route directly by entering the name it was saved under into the scratchpad and then copy it into LSK 2L
- **ALTN**  
Enter the alternate airport in IATA code (4 letters) into the scratchpad and then copy it by pressing LSK 2R into the ALTN field.

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- **ORIG RWY**  
In case the departure runway at your origin airfield is already known, you may enter the designator into the scratchpad and copy it into the ORIG RWY field by pressing LSK 3R.
- **VIA**  
The via field allows to enter airways which are to be followed to a certain waypoint.  
More information in the section on entering the route string.
- **TO**  
The TO field designates the certain waypoint until which the airway entered in the VIA field is to be followed.  
More information in the section on entering the route string.
- **FLT NO**  
You may enter the flight number into this field – it is displayed in the header throughout several fields in the FMS afterwards.
- **COPY ACTIVE**  
Pressing LSK 5L copies the active route to the secondary route.
- **CANCEL MOD**  
In case you modified the route yet, pressing LSK 6L cancels all modifications done since the last “EXEC”.  
In case you want to confirm modifications, press the EXEC button.
- **PERF INIT**  
Opens the PERF INIT page.

When the basic flightplan information is entered there are three options to proceed

Enter the route and enter the SID and STAR afterwards.

In this case proceed with section “

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Route strings and its appearance in the FMS” followed by section “



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- DEP / ARR sub-page”

Enter the SID and STAR first and the route afterwards

In this case proceed with section “

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DEP / ARR sub-page” followed by section “

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- Route strings and its appearance in the FMS”

Enter the SID, then the route and the STAR enroute (makes sense for longer flights when a change of the active runway at the destination is likely)

In this case proceed with section “

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DEP / ARR sub-page” to enter the SID followed by section “

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Route strings and its appearance in the FMS” and then with the “

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- DEP / ARR sub-page” enroute again to enter the STAR

## DEP / ARR SUB-PAGE

To open the DEP / ARR sub-page press the DEP/ARR button on the FMS.

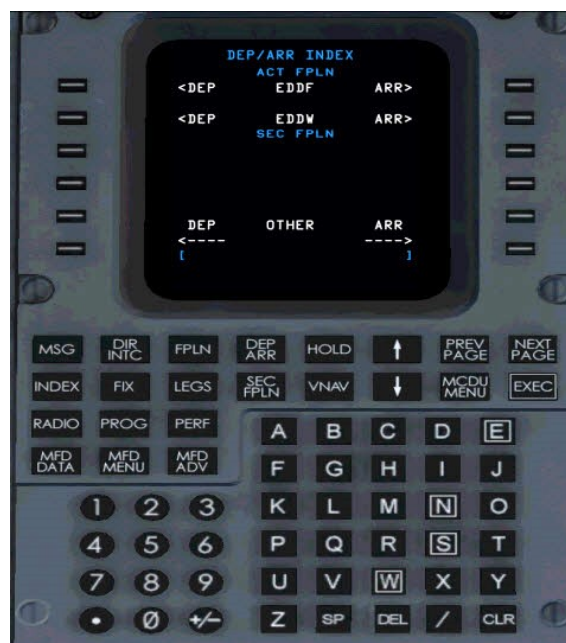
The DEP/ARR sub-page initially displays either the DEPART, ARRIVAL or DEP/ARR INDEX page depending on certain conditions.

If you want to display another sub-page than the one displayed initially, press the DEP/ARR button a second time, and use the appropriate line select key

Condition	Sub-page initially displayed
A/C still on ground or airborne and less than 50nm from the origin airport or less than halfway to the destination airport	DEPARTURE sub-page
A/C enroute and more than halfway to the destination airport	ARRIVAL sub-page
No active flight plan exists Or no origin airport is specified Or no destination airport is specified	DEP/ARR INDEX page

## DEP/ARR INDEX SUB-PAGE

The following picture shows the DEP/ARR INDEX page – press the appropriate line select key to either open the DEPARTURE or ARRIVAL page



FMS\_50.jpg

- DEP // LSK 1L (origin airport)  
Opens the DEPARTURE page to select the available runways and SIDs for the origin airport
- ARR // LSK 1R (origin airport)  
Opens the ARRIVAL page to select the available runways and STARS for the origin airport – in case a return to the airport is necessary

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- DEP // LSK 2L (destination airport)  
Opens the DEPARTURE page to select the available runways and SIDs for the destination airport
- ARR // LSK 2R (destination airport)  
Opens the ARRIVAL page to select the available runways and STARS for the destination airport

#### DEPARTURE SUB PAGE



FMS\_51.jpg

The DEPARTURE sub-page displays the available runways on the left-hand side and the available departure routes (SIDs) on the right-hand side. Depending on the number of available runways and/or procedures, there may be more than one page. Use the PREV PAGE and NEXT PAGE to scroll through the different pages, if more than one page is available.

Press the adjacent line select key to select a certain runway. As the available departure routes may differ depending on the selected departure runway, it is sensible to select the runway first.

Then press the adjacent line select key to select the desired SID / departure procedure.



FMS\_52.jpg

To return to the DEP/ARR INDEX sub-page press line select key 6L.



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## ARRIVAL SUB PAGE

Basically the same applies for the ARRIVAL sub-page.



FMS\_53.jpg

The ARRIVAL sub-page displays the available runways on the left-hand side and the available arrival routes (STARS) on the right-hand side. Depending on the number of available runways and/or procedures, there may be more than one page. Use the PREV PAGE and NEXT PAGE to scroll through the different pages, if more than one page is available.

Press the adjacent line select key to select a certain runway. As the available arrival routes may differ depending on the selected runway, it is sensible to select the runway first.

Then press the adjacent line select key to select the desired STAR / arrival procedure.



FMS\_54.jpg

To return to the DEP/ARR INDEX sub-page press line select key 6L.

## ROUTE STRINGS AND ITS APPEARANCE IN THE FMS

The following descriptions are based on the assumption that at least the departure runway and the respective SID was selected on the DEP/ARR page. Accordingly the last waypoint of the SID appears on the FPLN page.



FMS\_55.jpg

Roughly 30-40 years ago aircraft navigation was mainly (especially flying cross-country) done navigating from VOR to VOR or NDB. Those navigation aids were connected by airways, somewhat comparable to highways connecting cities. The SIDs and STARS are the ramps to enter and leave the highway.

To cross the Atlantic ocean or other huge bodies of water inertial navigation systems were used. As VORs are also not available when passing oceans, waypoints were defined, which designate an identifier (the unique waypoint name) to a pair of coordinates (latitude and longitude). Accordingly the airways are connecting waypoints in this case.

As keeping VORs and NDBs running costs money and they can easily be replaced by a waypoint (it just needs to be defined and located at the very same coordinates) the trend is to use less VORs and NDBs and more waypoints.

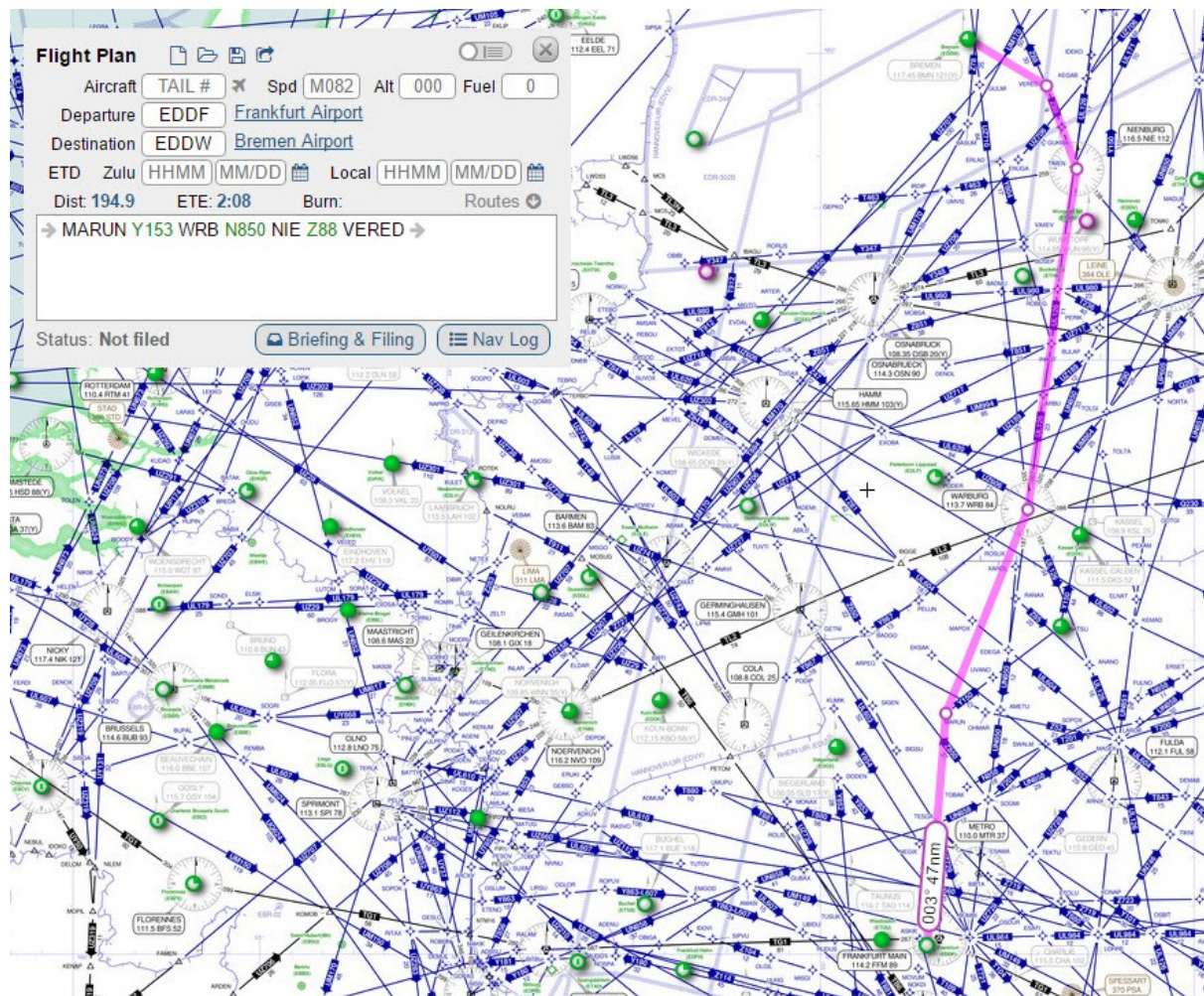
Similar to describing a route to drive with your car, route strings describe the route an aircraft is supposed to follow. For example:

EDDF MARUN Y153 WRB N850 NIE Z88 VERED EDDW

So let's take a closer look:

Waypoint 1	Airway	Waypoint 2	Comment
EDDF	MARU3T	MARUN	This example flight leaves Frankfurt/Main. The first waypoint on our route is MARUN, so we need a suitable SID ending at MARUN (for example MARU3T departing runway 18)
MARUN	Y153	WRB	The first leg of our flight starts at MARUN and follows airway Y153 to Warburg WRB VOR
WRB	N850	NIE	At Warburg WRB VOR we switch to airway N850, following to Nienburg NIE VOR
NIE	Z88	VERED	At Nienburg NIE VOR we switch to airway Z88 and follow it to waypoint VERED
VERED	VERE3P	EDDW	At VERED we follow the VERED3P STAR into Bremen (EDDW)

Displayed on a chart the route looks roughly like this:



Routing\_EDDF-EDBW.jpg

The following section explains how to enter this route into the FMS. As previously mentioned I assume the SID is already entered. So the FPLN page should look like this:



FMS\_56.jpg

To enter the route according the route string to waypoint RILAX proceed according the following steps:



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- Enter Y153 into the scratchpad and press line select key LSK 2L to copy the airway into the airway column below the line showing MARUN. The FMS automatically displays empty brackets in the waypoint column



FMS\_57.jpg

- Now enter WRB into the scratchpad and press line select key LSK 2R to copy it into the empty brackets to complete entering the first leg (from MARUN to Warburg WRB VOR following airway Y153)



FMS\_58.jpg

- To enter the next leg enter N850 into the scratchpad and press line select key LSK 3L to copy it into the airway column.
- Then enter NIE into the scratchpad and copy it into the waypoint column by pressing line select key LSK 3R.



FMS\_59.jpg

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Proceed in a similar fashion for the remaining leg to VEDER waypoint.

## SECONDARY FLIGHT PLAN

In case you need to make extensive modifications to your existing route you maybe don't want to do this with the active flight plan. In case you work on the active flightplan and something gets messed up you are in deep trouble as the autopilot will still try to follow that route.

To solve this issue you can work on a secondary flight plan which may be activated during a later stage of the flight.



FMS\_60.jpg

On the FPLN page press LSK 5L to copy active flightplan.

Then switch to the secondary flightplan by pressing LSK 6L.

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FMS\_61.jpg

The active flightplan gets copied to the secondary flightplan automatically and you are free to modify the flightplan without any influence on your active flightplan. As soon as you are happy with the modifications, you can activate the secondary flight plan by pressing LSK 5R.

## PERF PAGE

To open the PERF MENU press the PERF button on the FMS



FMS\_62.jpg

The PERF MENU allows to access several sub-pages to configure performance parameters

- **PERF INIT // LSK 1L**  
Opens the performance initialization page – see respective section for further information
- **VNAV SETUP // LSK 2L**  
Opens the VNAV sub-pages – see respective section for further information
- **FLX TEMP // LSK 4L**  
As the FADEC automatically computes the thrust setting for each throttle detent, entering a flex temperature simulates a higher ambient temperature which leads to a thrust reduction. The flex temperature depends on the runway length, aircraft weight and further parameters. Accordingly, the flex temperature is either determined using a plethora of charts and tables or using highly sophisticated IT tools. TOPCAT by FSS is the only flightsim-tool being basically capable of computing takeoff performance. Currently there is no CRJ profile available though.
- **ADVISORY VNAV // LSK 5L**  
Toggles the advisory VNAV off or on
- **VNAV PLAN SPD // LSK 6L**  
Indicates the speed, the FMS is using as soon as VNAV PLAN SPD is activated
- **FUEL MGMT // LSK 1R**  
Opens the FUEL MGMT, fuel management, sub-pages – see respective section for further information
- **FLT LOG // LSK 2R**  
Opens the FLT LOG, flight log, sub-pages – see respective section for further information
- **SEC PERF // LSK 4R**  
Opens the performance pages related to the secondary flight plan.

## PERF INIT SUB-PAGE

As the payload may be controlled through Dave they are closely linked. Furthermore weights selected in Dave may be transferred directly to the PERF INIT pages by pressing the associated button on Dave's graphical user interface.



MCDU\_PERF\_Init\_Dave



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The performance pages are split over three pages. Page 1 shows the following information.



MCDU\_PERF\_Init.jpg

- BOW // LSK 1L  
Basic Operation Weight – display only, can only be edited on the DEFAULTS page
- PASS / WT // LSK 2L  
Allows to enter the number of passengers and the average weight used to calculate the weight for all passengers and their luggage
- CARGO // LSK 3L  
Allows to enter the amount of cargo loaded in lbs or kg
- FUEL // LSK 4L  
Allows to enter the amount of fuel loaded in lbs or kg
- CRZ ALT // LSK 1R  
Allows to enter the cruise altitude for the current flight
- ALTN CRZ ALT // LSK 2R  
Allows to enter the cruise altitude for the segment to the alternate airport
- ZFW // LSK 3R  
Indicates the computed zero fuel weight (BOW + PAX + CARGO)
- GWT // LSK 4R  
Indicates the computed gross weight (ZFW + FUEL)

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FMS\_63.jpg

- ISA DEV // LSK 2L  
Allows to enter a temperature deviation compared to standard atmosphere in °C
- CLIMB WIND // LSK 1R  
Allows to enter winds during the climb phase in the following formats: direction and speed (090/17), headwind / tailwind (H17 or T11), plus- (=tail) or minus-wind (P45 or M23)
- CRUISE WIND // LSK 2R  
Allows to enter winds during the cruise phase in the following formats: direction and speed (090/17), headwind / tailwind (H17 or T11), plus- (=tail) or minus-wind (P45 or M23)
- DESCENT WIND // LSK 3R  
Allows to enter winds during the descent phase in the following formats: direction and speed (090/17), headwind / tailwind (H17 or T11), plus- (=tail) or minus-wind (P45 or M23)
- VNAV SETUP // LSK 6R  
Opens page for VNAV setup

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FMS\_64.jpg

- **RESERVES // LSK 1L**  
Allows to enter the reserve fuel in lbs or kg
- **ETD or ATD // LSK 2L**  
Allows to enter the Estimated Time of Departure (ETD). The ETD switches to Actual Time of Departure, ATD, after liftoff.
- **TAXI FUEL // LSK 1R**  
Allows to enter the taxi fuel in lbs or kg
- **ETE / ETA / FUEL**  
Displays the Estimated Time Enroute (ETE), Estimated Time of Arrival (ETA) and computed amount of fuel at arrival for the destination and alternate airport
- **VNAV SETUP // LSK 6R**  
Opens page for VNAV setup

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## VNAV SETUP SUB-PAGE

Please bear in mind, that the CRJ's VNAV is an advisory VNAV only!

To open the VNAV pages press the VNAV button FMS.

The FMS detects the current flight phase and opens the respective VNAV page accordingly. When opening the VNAV pages in cruise the sub-page for the cruise phase (page 2 of 3) opens.

There are three available VNAV pages:

- Climb phase VNAV (page 1 of 3)
- Cruise phase VNAV (page 1 of 3)
- Descent phase VNAV (page 1 of 3)

## CLIMB PHASE VNAV (PAGE 1 OF 3)



FMS\_13.jpg

- **TGT SPEED**  
Allows to change the default speed / mach number for the current aircraft / flight
- **SPD/ALT LIMIT**  
Allows to modify possible speed restrictions – it indicates the maximum speed below the provided altitude. 250/10000 for example indicates a maximum speed of 250 knots below 10000 feet.
- **TRANS ALT**  
Allows to change the transition altitude / transition flight level – it is interconnected to the transition altitude on the descent page
- **PERF INIT // LSK 6R**  
Returns to the PERF INIT page

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## CRUISE PHASE VNAV (PAGE 2 OF 3)



FMS\_14.jpg

- **TGT SPEED**  
Allows to change the default cruise speed / mach number for the current aircraft / flight
- **CRZ ALT**  
Allows to change the cruise altitude
- **PERF INIT // LSK 6R**  
Returns to the PERF INIT page

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## DESCENT PHASE VNAV (PAGE 3 OF 3)



FMS\_15.jpg

- **TGT SPEED**  
Allows to change the default speed / mach number for the current aircraft / flight
- **SPD/ALT LIMIT**  
Allows to modify possible speed restrictions – it indicates the maximum speed below the provided altitude. 250/10000 for example indicates a maximum speed of 250 knots below 10000 feet.
- **TRANS ALT**  
Allows to change the transition altitude / transition flight level – it is interconnected to the transition altitude on the climb page
- **DESC INFO // LSK 6L**
- **PERF INIT // LSK 6R**  
Returns to the PERF INIT page

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## FUEL MGMT SUB-PAGE

The fuel management pages are mainly information pages. Initially all values are calculated but may partially be altered manually. All information are split over three sub-Pages:

- Page 1 of 3 shows:
  - Total quantity of fuel
  - Total FUEL FLOW
  - Total RESERVES
  - Ground Speed
  - Time to reserves
  - Range to reserves
  - Specific range for the current fuel burn
- Page 2 of 3 shows:
  - Fuel FLOW
  - USED flow for each engine and TOTAL for both
- Page 3 of 3 shows:
  - Origin airfield
  - Destination airfield
  - Distance
  - Ground speed
  - Estimated time enroute
  - Fuel flow
  - Fuel required



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## FUEL MGMT SUB-PAGE 1 OF 3



FMS\_65.jpg

- **FUEL**  
Indicates the total quantity of fuel
- **FUEL FLOW**  
Indicates total fuel flow in lbs per hr
- **RESERVES**  
Indicates fuel reserves as entered in the flight plan
- **GND SPD**  
Indicates the current ground speed
- **PERFORMANCE MODE**  
There are three different modes:  
PREDICTED – all values are calculated based on information entered in the FMS  
MEASURED / MANUAL – FUEL FLOW and GND SPD may be either entered manually or based on measurements from the aircraft's sensors.
- **TIME TO RESV**  
Indicates calculated time until the fuel reserves are being used
- **Range to reserves**  
Indicates the calculated distance when the reserves are being used
- **Specific range for the current fuel burn**  
Range of the aircraft based on current fuel and flow flow

## FUEL MGMT SUB-PAGE 2 OF 3





FMS\_66.jpg

- Fuel FLOW
- USED flow for each engine and TOTAL for both

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## FUEL MGMT SUB-PAGE 3 OF 3



FMS\_67.jpg

- Origin airfield
- Destination airfield
- Distance
- Ground speed
- Estimated time enroute
- Fuel flow
- Fuel required

## FLT LOG SUB-PAGE

The FLT LOG page is an information only page which may be accessed by pressing the PERF button and then selecting the FLT LOG line from the PERF page.



MCDU\_FLT-Log\_Pg.jpg

Several information are displayed on the FLT LOG page



FMS\_69.jpg

- T/O // LSK 1L  
Displays the time of takeoff
- FUEL USED // LSK 2L  
Displays the fuel used
- AIR DIST // LSK 3L  
Displays the distance travelled in air
- EN ROUTE // No LSK  
Displays the time en route (difference between landing and takeoff)
- LDG // LSK 1R  
Displays the time of landing
- AVG TAS/GS // LSK 2R  
Displays the average true airspeed and average ground speed
- GND DIST // LSK 3R  
Displays the distance travelled over ground

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## CHECKING & MODIFYING A ROUTE: LEGS PAGE, DISCOS AND WAYPOINT FORMATS

In most cases you are going to enter the route on the FPLN page. Nevertheless you sometimes need to amend particular parts of the routing. This may start with removing a so-called DISCONTINUITIES.

After entering the SID, the route and the STAR for the destination airport, the FMS most likely shows a DISCONTINUITY between the last waypoint of the route and the first waypoint of the STAR.

The following picture shows an example on the ACT LEGS page.



FMS\_75.jpg

The ACT LEGS page is normally comprised of several pages, depending on the length of the route and accordingly number of waypoints along the route.

## THE LEGS PAGE

Each waypoint of a flightplan is displayed on the LEGS page. The FPLN page on the other side only shows waypoints where an airway is changed but not the waypoints inbetween. Those are displayed on the LEGS page though – accordingly the LEGS page may spread several pages.



FMS\_75.jpg

Each LEGS page displays five waypoints of the flightplan.

Each line shows the following information:

- Identifier
- Heading from the previous waypoint
- The distance from the previous waypoint
- Speed and altitude restrictions

For example:



FMS\_75.jpg

- |                                  |       |
|----------------------------------|-------|
| • Identifier                     | PITEN |
| • Heading from BKD to PITEN      | 182°  |
| • Distance between BKD and PITEN | 18nm  |
| • Speed restriction              | none  |
| • Altitude restriction           | none  |

Line select keys 6L and 6R allow to toggle displaying LEG DATA or LEG WIND data.

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## HOW TO DEAL WITH DISCONTINUITIES

Back to the initially mentioned DISCONTINUITIES. The following picture shows how the DISCONTINUITY is displayed on the LEGS page by the empty boxes between waypoint VIBIS and VIBIS.



FMS\_75.jpg

To remove the DISCONTINUITY press LSK 5L to copy VIBIS into the scratchpad and then press LSK 4L to copy the data from the scratchpad into the empty boxes.



This removes the boxes – please note two items:

- Next to LSK 6L ,CANCEL MOD' is displayed – by pressing LSK 6L the modifications just done are being removed again.
- EXEC being displayed in the lower right corner.

In case you are happy with the modifications, you still need to activate them by pressing the EXEC button.



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## MODIFYING THE ROUTE ON THE LEGS PAGE

On some occasions you want to make little modifications to the existing and active flightplan.

### SKIPPING OR REMOVING A CERTAIN OR SOME WAYPOINTS OF AN EXISTING FLIGHTPLAN

Basically there are two ways to remove or skip one or more waypoints.

In case you just want to remove a single waypoint just press the DEL button in the lower right corner of the FMS and then press the LSK left to the waypoint you intend to delete. This will create a DISCONTINUITY which you need to deal with afterwards.

A different approach shall be explained with the following example.

Please have a look at the snippet of the flightplan shown in the picture below. Let's assume you want to remove the waypoints between waypoints GESTO and GURLO so that you fly directly from GESTO to GURLO. As a first step press LSK 5L next to GURLO waypoint – this copies GURLO into the scratchpad.



FMS\_77.jpg

As a second step press LSK 3L to remove RIDNI and REBUN from the flightplan. The LEGS page should look like this.



FMS\_78.jpg

In case you are happy with the changes press the EXEC key to accept the changes.

Otherwise press LSK 6L, next to 'CANCEL MOD' to cancel any changes to the flightplan.

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## ADDING A NEW WAYPOINT

To add a new waypoint proceed like this:

- 1.) Enter the waypoints identifier into the scratchpad – say you want to ,FFM' VOR after NEBUN for example.



FMS\_81.jpg

- 2.) Now press LSK 5L to enter FFM after waypoint NEBUN.



FMS\_82.jpg



FMS\_83.jpg

In case you are happy with the changes press the EXEC key to accept the changes.

Otherwise press LSK 6L, next to ,CANCEL MOD' to cancel any changes to the flightplan.



## ENTERING DIRECTS VIA THE DIR INTC PAGE

In case you are enroute during a flight and you get a clearance to proceed directly to a waypoint further along the waypoint. The DIR INTC page allows to enter directs and accordingly skip all waypoints of the original flightplan between your current position and the waypoint you are directly cleared to.

Press the DIR INTC button to open the DIR INTC page.

The DIR INTC page shows all selectable waypoints along the waypoint. Waypoints which are already passed can't be selected. In case you don't find the desired waypoint make sure to scroll through the pages pressing the PREV PAGE and NEXT PAGE buttons.



FMS\_79.jpg

Let's assume you are cleared to the waypoint RIDNI. Scroll through the list until you find the waypoint and then press the line select key left of the waypoint. Afterwards the LEGS page looks like this:



FMS\_80.jpg

In case you are happy with the changes press the EXEC key to accept the changes. Otherwise press LESK 6L, next to 'CANCEL MOD' to cancel any changes to the flightplan.

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## ENROUTE / MONITORING

The FMS offers several pages to monitor and modify information when travelling along the route

### PROG PAGE

The progress, PROG, page displays data on the route. The data is split on two pages and for information only page as well.

#### PROG PAGE 1 OF 2



FMS\_26.jpg

The progress page displays certain information for:

- The last waypoint - LAST
- The waypoint the aircraft is right now flying to – TO
- The next waypoint after the one the aircraft is right now flying to – NEXT
- The destination airfield – DEST
- The alternate airfield – ALTN

The following information are displayed per previously mentioned waypoint:

- Waypoint name  
The waypoint's name entered in the flightplan
- DIST  
The distance from or to the waypoint indicated
- ETE  
The estimated time en route from or to the waypoint indicated
- FUEL  
The estimated fuel level when arriving at the waypoint indicated

The last line indicates the currently used navigation sensors to determine the aircraft's present position. The indication depends on the aircraft's equipment. Possibly indications are:

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- DME/DME  
two or more DMEs are used for position estimation
- VOR/DME1  
VOR 1 and the DME are used for position estimation
- VOR/DME2  
VOR 2 and the DME are used for position estimation
- GNSS1  
Inertial navigation system 1 is used for position estimation
- GNSS2  
Inertial navigation system 2 is used for position estimation
- GPS1  
Global positioning system 1 is used for position estimation
- GPS2  
Global positioning system 2 is used for position estimation

#### PROG PAGE 2 OF 2

Progress page 2 shows more environmental information.



FMS\_27.jpg

- HEADWIND // LSK 1L  
Indicates the head- or tailwind component
- WIND // LSK 2L  
Indicates the current wind direction and speed
- XTK // LSK 3L  
Indicates the cross track distance in nautical miles. The cross track distance is the distance between the planned track/route and the current aircraft position (measured perpendicular to the planned track)
- POS ACCURACY // RNP // NO LSK  
Allows the pilot to enter the needed RNP – required navigation performance
- CROSSWIND // LSK 1R  
Indicates the crosswind component (left or right)

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- SAT/ISA DEV // LSK 2R  
Indicates the deviation of current temperature vs. standard atmosphere
- TAS // LSK 3R  
Indicates current true airspeed

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## HOLD PAGE

Every here and then a flight needs to enter a holding due to delays, advisory by ATC or similar reasons. The CRJ's FMS offers means to add, modify and also remove holdings from the flightplan.

Accordingly this section is split in three parts:

- Add and modify a holding
- Exit or remove a holding

## ENTER A HOLDING

To add a holding to an existing flightplan, open the HOLD page.

To open the HOLD page please press the HOLD key on the FMS. Depending on the number of holdings already added to the flight plan, different pages open, when pressing the HOLD button:

- |                                   |   |
|-----------------------------------|---|
| No holding entered yet            | ACT LEGS page with HOLD AT prompt appears |
| One holding entered yet           | ACT FPLN HOLD page appears                |
| More than one holding entered yet | ACT HOLD LIST page appears                |



MCDU\_Hold\_1.jpg

In case no holding was added to the flightplan yet, the ACT LEGS page opens, displaying the LEGS pages and boxes at LSK 6L. Now proceed to the desired waypoint in the flightplan and press the LSK adjacent to the waypoint to select a holding at the desired waypoint.

For the current example waypoint XX is selected.

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MCDU\_Hold\_2.jpg

As soon as the waypoint is selected the HOLD page to modify the holding opens.

- **FIX ENTRY // LSK 1L**  
Indicates the fix / waypoint where the holding is added
- **QUAD / RADIAL // LSK 2L**  
Indicates the quadrant and radial. The quadrant specifies the orientation on where the inbound and outbound leg are situated relative to the fix. Imagine a holding around SAMPLE VOR; you are approaching the VOR with a heading of 000°. A northern quadrant indicates that after passing the VOR you continue along the heading as long as the selected leg time and then start the turn. The inbound and outbound leg are both north of the VOR.  
In case you select a southern quadrant, you start turning as soon as you have passed the VOR – so the inbound and outbound leg are both south of the VOR.  
The radial provides the heading for the outbound leg (when approaching a VOR with a heading of 000° you'll expect most likely a radial of 180).
- **INBD CRS / DIR // LSK 3L**  
INBD CRS is the inbound course, when approaching the fix where the holding shall take place. In our example 000°. DIR provides the turning direction – either L(ef) or R(ight).  
Changes may be entered by entering XXX / L or XXX / R into the scratchpad and then press LSK 3L, where XXX is the heading of the inbound course.
- **LEG TIME // LSK 4L**  
LEG TIME is the amount of time for the inbound and outbound leg. The default is 1 to 1.5 minutes depending on the speed.
- **LEG DIST // LSK 5L**  
The LEG DIST is the leg distance – can be estimated by multiplying speed and leg time.
- **FAA/ICAO // LSK 1R**  
Indicates whether FAA or ICAO standard holdings are flown. Pressing LSK 1R lets to toggle between FAA and ICAO.
- **MAX KIAS // LSK 2R**  
Shows the speed flown throughout the holding



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- **FIX ETA // LSK 3R**  
Estimated time or arrival at the fix
- **EFC TIME // LSK 4R**  
Expect Further Clearance time – point in time when the clearance from the holding is to be expected. This is important in case all communication with ATC is lost you both at least have a mutual understanding when you are going to leave the holding.
- **NEW HOLD // LSK 5R**  
In case a holding is already added to the flightplan, pressing the HOLD key opens the already available holding. Press LSK 5R to add a new holding

The following picture shows the HOLD page and the respective flightplan.



MCDU\_Hold\_3.jpg

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## EXITING OR REMOVING A HOLDING

In case you want to remove a holding you already added to the flightplan please perform the similar steps as described in the chapter Checking & Modifying a route: LEGS page, DISCOS and waypoint formats

Sooner or later you want to leave a holding. As soon as you have entered the holding the HOLD page indicates a new option “EXIT HOLD” at LSK 6R.

Press LSK 6R to arm exiting the holding.



MCDU\_Hold\_4.jpg

As soon as this option is available the message ‘exit armed’ is indicated.



MCDU\_Hold\_5.jpg



## RADIO PAGE

The radio tuning page enables the pilot to check and modify the currently tuned frequencies.



FMS\_68.jpg

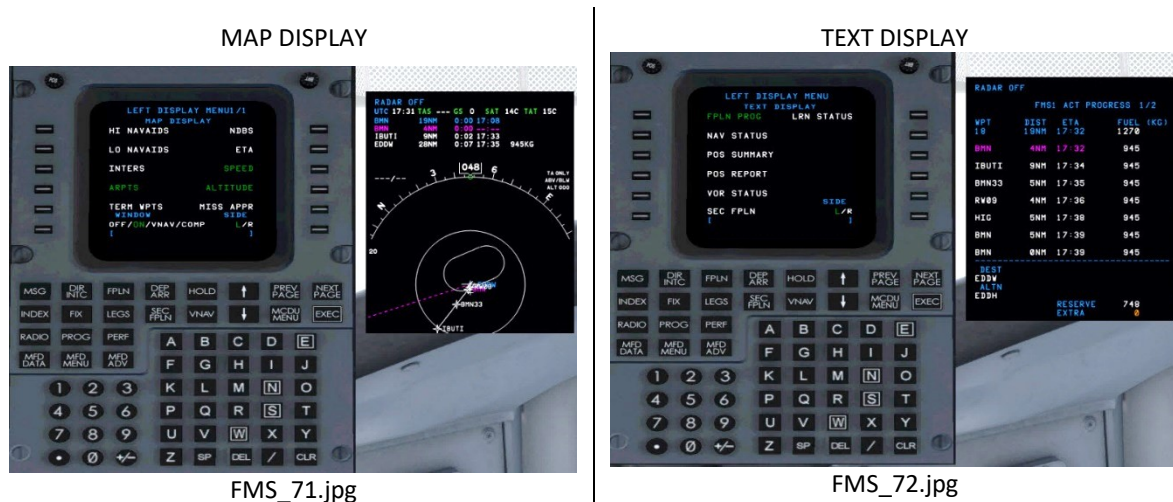
- COM 1 // LSK 1L  
Indicates currently set COM1 frequency
- PRE/RCL 1 // LSK 2L  
Indicates currently set Pre-Set COM1 frequency.  
In case the pre-set frequency is activated the previously active frequency is displayed as the recall (RCL) frequency
- NAV 1 // LSK 3L  
Indicates currently set NAV1 frequency
- NAV1 tuning mode // LSK 4L  
Allows to toggle between manual and automatic tuning of NAV1 by pressing LSK 4L
- ATC1 // LSK 6L  
Indicates currently set transponder 1 frequency
- COM 2 // LSK 1R  
Indicates currently set COM2 frequency
- PRE/RCL2 // LSK 2R  
Indicates currently set Pre-Set COM2 frequency.  
In case the pre-set frequency as activated the previously active frequency is displayed as the recall (RCL) frequency
- NAV 2 // LSK 3R  
Indicates currently set NAV2 frequency
- NAV2 tuning mode // LSK 4R  
Allows to toggle between manual and automatic tuning of NAV2 by pressing LSK 4R
- ADF // LSK 5R  
Indicates currently set ADF frequency
- ATC2 // LSK 6R  
Indicates currently set transponder 2 frequency

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## MFD DATA PAGE

The MFD DATA key enables the pilot to toggle between the MAP DISPLAY and TEXT DISPLAY on the MFD and CDU. Please note that the MFD MENU page must be selected first.

The following pictures show the difference between MAP and TEXT DISPLAY mode:



The following section describes how to setup the display options in either mode.

## MFD MENU PAGE

The MFD Menu page enables you to select the display of airports, navigation aids and other navigation-related elements for the FMS MAP, PLAN MAP and TEXT PG display mode of the MFDs

Push the MFD MENU button to open the MFD MENU page. As there are 2 sub-pages available, pressing the MFD MENU button opens page 1 of 2 first. Use the PREV PAGE / NEXT PAGE buttons to switch to page 2 of 2. The number of displayed elements is limited by the MAX MAP SYMBOLS on the DEFAULTS page. Enabled display symbols are indicated in green, disabled display options are indicated in white.

Changes to the display options are only visible when the FMS MAP, PLAN MAP or TEXT PG mode is activated.

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## MFD MENU PAGE 1 OF 2



FMS\_71.jpg

- HI NAVAIDS // LSK 1L  
Toggles display of high altitude nav aids on or off
- LO NAVAIDS // LSK 2L  
Toggles display of low altitude nav aids on or off
- INTERS // LSK 3L  
Toggles display of intersections on or off
- ARPTS // LSK 4L  
Toggles display of high airports on or off
- TERM WPTS // LSK 5L  
Toggles display of terminal waypoints on or off
- WINDOW // LSK 6L  
Toggles display of a navigation window at the top of the MFD on and off. Furthermore it selects the displayed information in the window between ON, OFF, VNAV Information, COMPass rose
- NDBS // LSK 1R  
Toggles display of nondirectional beacons (ADF) on or off
- ETA // LSK 2R  
Toggles display of ETA (estimated time of arrival) adjacent to the waypoints on or off
- SPEED // LSK 3R  
Toggles display of current speed adjacent to waypoints, intersections or nav aids on or off
- ALTITUDE // LSK 4R  
Toggles display of reference altitude data adjacent to waypoints, intersections or nav aids on or off
- MISS APPR // LSK 5R  
Toggles display of the published missed approach procedure (if available) for the selected approach on or off
- SIDE // LSK 6R  
Toggles which MFD is controlled by the CDU (Left or Right)

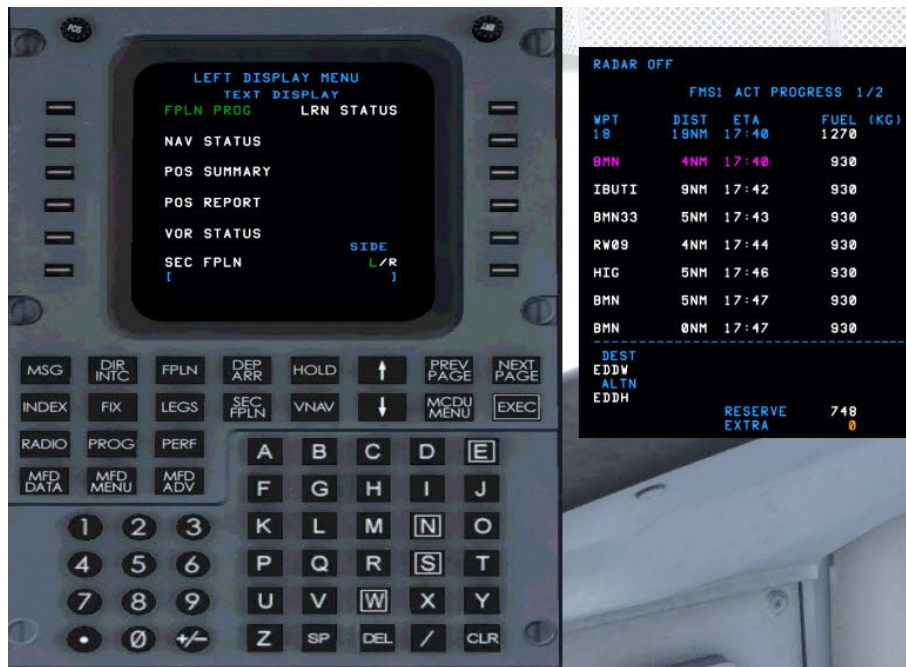
MFD MENU PAGE 2 OF 2



FMS\_73.jpg

- **RNG TO ALT // LSK 1L**  
Toggles display of the arch symbol along the flight path to indicate where the aircraft reaches the selected altitude
- **LRN POS // LSK 2L**  
Toggles display of the LRN sensor position
- **ALTN FPLN // LSK 3L**  
Toggles display of the alternate flight plan route on the MFD PLAN MAP

## TEXT DISPLAY MENU



FMS\_74.jpg

- FPLN PROG // LSK 1L  
Shows the DIST, ETA and FUEL information for a number of waypoints of the flightplan
- NAV STATUS // LSK 2L  
Displays navigation information on the TO waypoint
- POS SUMMARY // LSK 3L  
Displays which navigation sensors are used and their position calculation relative to the FMS current position
- POS REPORT // LSK 4L  
Indicates all information needed for marking position reports
- VOR STATUS // LSK 5L  
Indicates all available information for VOR/DME navigation like identifier, frequency, bearing and distance
- SEC FPLN // LSK 6L  
Shows the DIST, ETA and FUEL information for a number of waypoints of the secondary flightplan
- LRN STATUS // LSK 1R  
Indicates status information for the long range navigation sensors

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#### MFD ADV / DISPLAY ADVANCE PAGE

The MFD ADV Key opens the DISPLAY ADVANCE page. This page is used to move through MFD text pages or select another center waypoint on the MFD PLAN MAP. Depending on the selected MFD display mode the DISPLAY ADVANCE page slightly differs.

#### TEXT DISPLAY MENU

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Use the PREV PAGE and NEXT PAGE line select keys to cycle through the different pages.

#### PLAN MAP MENU

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Use the PREV WPT and NEXT WPT line select keys to move the MFD PLAN MAP center from waypoint to waypoint. To center the MFD PLAN MAP display on the current TO waypoint, press the line select key adjacent to TO WPT. If you want to center the map on an arbitrary waypoint (must not be part of the flightplan), enter the waypoint name into the scratch pad and press LSK 4L to copy it to CTR WPT.