



X-Plane

Airbus Multipurpose Control and Display Unit (MCDU)

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Flight Management Systems



A Flight Management System (FMS) is a centralized computer system used in airliners, and other high-performance aircraft, to manage many of the aircraft systems, including (but not limited to) the flight plan.

Contemporary airliners rely on the FMS to automate a wide variety of tasks, previously performed by navigators and flight engineers. The presence of an FMS reduces the workload in the cockpit, allowing the aircraft to be operated by (usually) just two crew members.

To accomplish its assigned tasks, an FMS will interface with many aircraft systems, including engine, fuel, hydraulic, electrical, and navigation devices such as GPS, the on-board Inertial Navigation System, and the "Nav" radios.

A Flight Management System is an integration of several components, including:

- ✓ Multipurpose Control & Display Unit (MCDU)

A small screen and touch-keypad that provides the interface through which the pilot operates the FMS.

- ✓ Flight Management Computer

The computer hardware and software that runs the system. This is not visible to the pilot in the cockpit and is usually located elsewhere in the aircraft.

- ✓ Primary Flight Display (PFD) / Navigation Display (ND) / Electronic Centralized Aircraft Monitoring (ECAM)

One or more electronic displays (usually CRT or LCD) that provide the pilot with navigation direction and information, engine performance, and aircraft system information (depending on the mode selected).

The X-Plane Airbus Flight Management System

The Laminar Research / X-Plane Airbus flight management system resembles the Thales system, which can be found in the A320 and A330 series of aircraft in reality.

Rival systems are built by Honeywell. Despite differences, these systems perform many of the same functions.

Due to the immense complexity of a real-life Airbus flight management system, the version modelled in X-Plane is simplified and does not support every capability. However, the functions necessary to program and execute a flight plan are present, including the use of published arrival and departure procedures (SIDs and STARs) and instrument approaches.

The “Pop-Up” MCDU

For convenience, a pop-up MCDU is provided in every X-Plane default aircraft that features a flight management system. This is a 2D panel that can be moved and sized per the needs of the pilot. For the purposes of this guide, we will present the pop-up MCDU only. However, commands may also be input using the MCDU panel built into the 3D cockpit.

Invoking, moving, sizing, and closing the “Pop-Up” MCDU

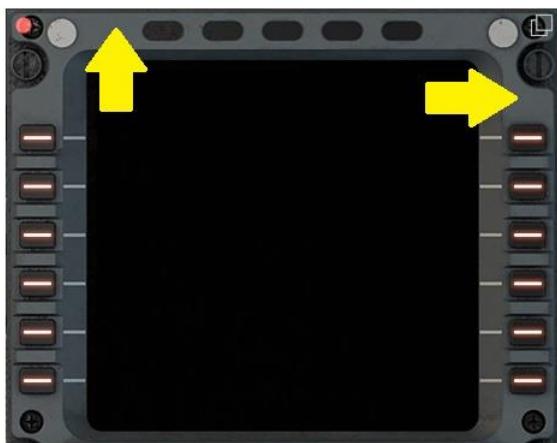
Invoking the pop-up MCDU



To invoke the pop-up MCDU panel, position and click the mouse-pointer anywhere inside the **DISPLAY** area of either panel in the 3D cockpit.

See highlighted areas in image to left.

Moving the pop-up CDU



To move the pop-up MCDU panel to the desired location on your computer screen, first place the mouse-pointer on the outer-frame, as indicated by the arrows.

Now click and drag the pop-up MCDU panel to the desired location on your computer screen.

Re-sizing and closing the pop-up CDU

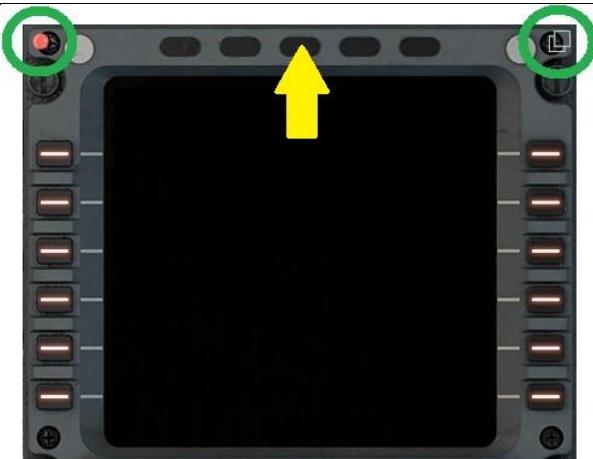
Place the mouse-pointer at the top-center of the CDU frame. Two click-spots will appear.

The click-spot in the UPPER-LEFT closes the pop-up.

The click-spot in the UPPER-RIGHT of the frame invokes "Window" mode.

In "Window" mode, the CDU panel can be re-sized by dragging the window frame - in the same manner as any other window supported by your operating system.

Clicking the top-center resizes all pop-up panels to their default aspect ratio.



Components of the MCDU

The Control Display Unit (CDU) provides the interface between the pilot and the flight management computer (FMC). It consists of a display panel, and a series of keys that are grouped together according to their function.



Display

This panel provides a simple output display to the pilot, allowing him to program the unit, make commands, and select available options.



Scratch Pad

This area of the MCDU Display is used for keypad input.

Inputs made by the pilot are initially displayed here, before a Line Select Key is chosen, to move this text to the appropriate line of the MCDU display (above the scratch pad).



Line Select Keys

These keys are used to make selections from the options provided alongside them, in the MCDU Display.

The keys on the left-side of the unit align with the options on the left-side of the display, and vice-versa.



Keypad

Used to input text into the scratch pad area on the MCDU display.



Page Keys

These keys are used to select the page presented in the Display Area.

The primary functions of the CDU are grouped by "Page". This simplifies the presentation and provides a logical workflow to the pilot.



Clear Key

These key clears text currently displayed in the "Scratch Pad"

(If the "Scratch Pad" is empty, the word CLR can be used with a line-select key to clear a line.)

Companion Video



A companion video to this manual is published at: <https://youtu.be/uE4oU6OjPZ0>

This video was captured in a level-D Airbus flight simulator and utilizes the same flight plan as featured here. Some of the MCDU functions discussed in this manual are NOT present in the video. Where the two gel, there is a video offset reference shown in the relevant chapter of the manual.

Programming the MCDU

In this section of the guide, the pilot will program the MCDU with initialization data, followed by a manually input flight plan.

The flight plan used in this example originates at EDDS (Stuttgart) and terminates at EDDF (Frankfurt).

We will depart runway 25 at EDDS and use the ETAS4B Standard Instrument Departure (SID).

The route-segment of the flight plan will be via the “T163” AIRWAY to SPESA.

We will arrive EDDF via the SPES3B Standard Instrument Arrival (STAR), followed by the ILS approach to runway 25.

The full route is as follows:

EDDS25 ETAS4B T163 SPESA SPES3B ILS25L

Important

Flight plan waypoints and procedures change over time. The sample flight plan used here may no longer be current, and some of these waypoints may not be available for selection during your flight. Therefore, it is not recommended you attempt to duplicate these steps in X-Plane - but instead use the examples below as guidelines for inputting and managing your own flight plan.

Loading a previously saved flight-plan is discussed later in this guide, in the section [Loading a \(saved\) Flight Plan](#).

INIT Page

Airbus MCDUs feature an “INIT” key that is used to initialize the flight management system at the start of a new flight.



The INIT page displays the following information:

- CO RTE: NONE
- ALTN/CO RTE: NONE
- FLT NBR: 00000000
- LAT: 33 57.0N
- LONG: 118 25.8W
- CRZ FL/TEMP: 36090
- FROM/TO: KIAD/KSFO
- WIND: TROPOL

The INIT button is highlighted with a yellow box. Below the MCDU is a numeric keypad and function keys.



A pilot is seated in the cockpit, looking at the instrument panel which includes the MCDU. A digital timer in the bottom right corner of the image shows 0:00:50.

Hint: Use the “CLR” button to remove any existing text in the “Scratch Pad” before inputting new data.

Click the INIT button to invoke the INITIALIZATION page.

This page is used to input the:

- ✓ [Origin and destination airports](#)
- ✓ [The flight-number](#)
- ✓ [The cruising altitude and associated air temperature](#)

or

- An optional “Company Route” (saved flight plan)

Origin & Destination Airports



The INIT page now shows the entered origin and destination airports:

- CO RTE: NONE
- ALTN/CO RTE: NONE
- FLT NBR: 00000000
- LAT: 48 41.1N
- LONG: 009 12.1E
- CRZ FL/TEMP: EDDF/EDDF
- FROM/TO: EDDF/EDDF
- WIND: TROPOL

The line-select key adjacent to FROM/TO is highlighted with a yellow box. Below the MCDU is a numeric keypad and function keys.



A pilot is seated in the cockpit, looking at the instrument panel which includes the MCDU. A digital timer in the bottom right corner of the image shows 0:01:08.

Input the origin and destination airport codes into the scratch pad using the format shown here, with the codes delimited by a ‘/’ character.

Click the line-select key adjacent to FROM/TO to populate these.

Altitude / Flight Level



Input the cruise altitude for the flight. This may be in flight-level format (see example to the left, or in absolute altitude in terms of feet).

The expected temperature at that altitude will be auto populated. You may change this if desired by inputting the new temperature preceded by a '/' character. For example:

FL200 / -30

Click the line-select key adjacent to CRZ FL/TEMP to populate this.

Hint: Input prompts displayed in amber must be completed during pre-flight, otherwise some information will not be available.

Flight Number



Input the flight number into the scratch pad.

Click the line-select key adjacent to FLT NBR to populate this.

Wind



Click the WIND line-select key to invoke the CLIMB WIND and DESCENT WIND pages.

These pages are used to input the:

- ✓ Expected wind during climb
- ✓ Expected wind during descent

Input the wind in the format direction (degrees) / speed (knots).

The example here shows an expected climb wind of 065 degrees at 35 knots

Click the NEXT PHASE line-select key to proceed to the descent wind page and repeat as required.

Click the RETURN line-select key to complete this task and proceed with the Flight Plan.

FPLN Page

Airbus MCDUs feature an “FPLN” button that is used to invoke the FLIGHT PLAN (FPLN) page, for inputting the route and procedures for the upcoming flight.



The MCDU screen shows the FPLN page with the following data:

FROM	TIME	XP5120	SPD/ALT
EDDS	---	---	/ 1270
---F-PLN DISCONTINUITY---			
EDDF	---	---	/ 354
---- END OF F-PLN ----			
----- NO ALTN FPLN -----			
DEST	TIME	DIST	EFOB
EDDF	---	90	53.2 11
XP5120			

The keypad below the screen has the F-PLN button highlighted with a yellow box.



0:02:58

Click the FPLN button to invoke the FLIGHT PLAN page.

This page is used to input the:

- ✓ The departure procedure
- ✓ The arrival procedure
- ✓ The en-route portion of the flight plan

Programming the Departure



Click the line-select key adjacent to the departure airport code.

Info: [Discontinuity Messages](#)



Select the 'DEPARTURE' option.



Select the departure runway. In this example, we are departing on runway 25.

Selecting a Standard Instrument Departure (SID)



Standard instrument departure (SID) routes, also known as departure procedures (DP), are published flight procedures followed by aircraft on an IFR flight plan immediately after takeoff from an airport [Source Wikipedia]

Select the desired Standard Instrument Departure (SID) for the chosen runway. In this example, we will be following the ETAS4B procedure.

Hint: The white arrows displayed at the lower right of the screen indicate there is more content than can be displayed in the space available. Use the up-arrow, or down-arrow buttons to scroll the additional content into view.

Hint: The scroll direction is similar to a smart-phone, where an upward-swipe moves the content of the screen upwards.

Selecting a Standard Instrument Departure (SID) Transition

Note: None of the departure procedures at EDDS have transitions, so the example below is fictional. The transition waypoints shown in the example below are (in reality) for a different airport.

FICTIONAL



Standard instrument departure (SID) routes often feature en-route transition waypoints. When these are present, the flight crew will be presented with multiple options and should select the transition waypoint that is in the direction of the intended flight plan. This joins the departure procedure to the first waypoint of the en-route portion of the flight plan.

Click the line-select key adjacent to the desired transition waypoint. In this example, the transition waypoint is HENER.

The selected transition waypoint will be populated above (example is highlighted in red).

Reviewing the Flight Plan



Whenever TMPY <F-PLAN is displayed alongside a line-select key, you may use this function to review the flight plan, without committing.

Click the line-select key adjacent to TMPY <F-PLAN.



The flight plan as it currently stands is displayed in yellow, indicating it has not been committed.

Hint: The white arrows displayed at the lower right of the screen indicate there is more content than can be displayed in the space available. Use the up-arrow, or down-arrow buttons to scroll the additional content into view.

Committing the Flight Plan



Click the line-select key adjacent to TMPY INSERT to insert the latest updates to the flight plan if you are happy with what you see or select TMPY ERASE if not.



When committed, the flight plan will switch to green, indicating the latest revisions have been inserted.

In this example, the cruising altitude (specified during the INIT phase) is too high for the procedure(s) in the flight plan.

If the cruise altitude cannot be complied with (for the flight plan in question) the MCDU will display "UNABLE CRZ ALT" in the scratch pad.

Hint: CRUISE FL ABOVE MAX FL means the airplane is too heavy to reach the selected altitude until fuel is burned-off.

Hint: UNABLE CRZ ALT means the flight-plan is too short to achieve the selected altitude.

Adjusting the cruise altitude



Click the INIT line-select key to invoke the INITIALIZATION page.

Input a revised cruise altitude for the flight into the scratch pad (either in flight level format, or an absolute altitude) and click the line-select key adjacent to the existing cruise altitude.

If necessary, progressively reduce the flight level / altitude until the MCDU no longer displays the "UNABLE CRZ ALT" message.

The expected temperature at that altitude will be auto populated. You may change this if desired by inputting the new temperature preceded by '/' character. For example:

/ -30

Click the line-select key adjacent to CRZ FL/TEMP to populate this.

Discontinuity Messages



A discontinuity message indicates the MCDU has no knowledge of how to connect the preceding waypoint to the following waypoint.

This can be resolved by:

- [Inputting en-route waypoints](#)
- [Inputting en-route fixes](#)
- [Inputting en-route airways](#)
- [Clearing Discontinuity Messages](#)

Inputting en-route waypoints



When the en-route segment of your flight plan consists of one or more waypoints, these may be input individually.

[STEP 1] Click the line-select key adjacent to the final departure waypoint. This will usually be the final waypoint of the departure procedure, but if none was used, it will be the originating airport.

Hint: Use the up-arrow, or down-arrow buttons to scroll the additional content into view.



[STEP 2] Input the waypoint identifier into the scratch pad.

Click the line-select key adjacent to NEXT WPT to insert the waypoint into the flight plan.

Repeat STEP 1 and STEP 2 for each additional waypoint.

Inputting en-route fixes



Fixes are positions that are RELATIVE to another location. An example would be a specific radius around a waypoint, or a radial from a VOR.

Inputting a fix provides a useful **visual reference** on the flight plan when viewed on the Navigation Display (ND). However, fixes do not become 'waypoints' in your flight plan.

Click the line-select key adjacent to the waypoint in your flight plan that is PRIOR to the fix.

Hint: Use the up-arrow, or down-arrow buttons to scroll the additional content into view.



Click the line-select key adjacent to FIX INFO.



Input the identifier of the waypoint the fix will be RELATIVE to. In this example we are using airport EDDL (Dusseldorf).

Click the line-select key adjacent to REF FIX.



Input the radius around the waypoint that will be highlighted on the flight plan.

Note: If the fix-identifier were a VOR, another option here would be a radial from the VOR station.

Click the line-select key adjacent to RETURN.



The fix will be displayed on the Navigation Display when in 'Plan' mode, provided it is within the selected zoom range.

Inputting en-route airways



Click the line-select key adjacent to the final departure waypoint. This will usually be the final waypoint of the departure procedure, or a waypoint where the airplane enters the enroute structure. Airports are not usually associated with airways.



Click the line-select key adjacent to AIRWAYS.



[STEP 1] Input the airway identifier ("T163" in this example) into the scratch pad.

Click the line-select key adjacent to VIA to populate this.



[STEP 2] Input the destination waypoint (on the airway) into the scratch pad.

Click the line-select key adjacent to TO.

Repeat STEP 1 through STEP 2 for each additional airway and destination waypoint.



[STEP 3] Click the line-select key adjacent to TMPY INSERT to commit the flight plan when all airway/destination combinations have been input.

Programming the Arrival



Click the line-select key adjacent to the destination airport code.

Info: [Discontinuity Messages](#)



Click the line-select key adjacent to ARRIVAL.



Select the arrival runway. In this example, we are arriving via the ILS for runway 25L.

Selecting a Standard Instrument Arrival (STAR)



A standard terminal arrival (STAR) is a published flight procedure followed by aircraft on an instrument flight rules (IFR) flight plan just before reaching a destination airport. [Source Wikipedia]

Select the desired Standard Terminal Arrival (STAR) for the chosen runway. In this example, we will be following the SPES3B procedure.

Hint: Use the up-arrow, or down-arrow buttons to scroll the additional content into view.

Selecting an Approach Transition (Via)



Click the line-select key adjacent to <VIAS to view a list of approach transitions or initial approach fixes (IAFs).



Click the line-select key adjacent to the chosen transition or initial approach fix (IAF). In this example we are using "CHA"

Committing the Flight Plan



Click the line-select key adjacent to TMPY INSERT to insert the latest updates to the flight plan.



The flight plan will switch to green, indicating it has been inserted.

Clearing Discontinuity Messages



Use the up-arrow, or down-arrow buttons to scroll the F-PLN DISCONTINUITY message into view.

Click the CLR button to enable the CLEAR function.

Click the line-select key adjacent to the F-PLN DISCONTINUITY message to remove this and stitch together the flight plan waypoints immediately above and below.



Click the line-select key adjacent to TMPY INSERT to commit the flight plan.

Reviewing the completed Flight Plan

Navigation Display (ND) Review

Place the Navigation Display (ND) in PLAN mode and adjust the Range rotary until all legs in the plan are visible on the ND. Ensure the shape of the flight plan matches that shown in your Electronic Flight Bag (EFB) or other documentation.



MCDU Review



Click the F-PLN button to display the beginning of the flight plan.

Use the up-arrow, or down-arrow buttons to scroll through each waypoint in the plan

Note the location of the speed restrictions, top of climb and top of descent, and deceleration point for flap deployment.

Note also the blue missed-approach waypoints at the end of the flight plan - should the landing be aborted.

Inputting the Takeoff Performance Data



Click the PERF button to display the PERFORMANCE page.



[STEP 1] Input the computed V1 speed from your Electronic Flight Bag (EFB) into the scratch pad.

[STEP 2] Click the line-select key adjacent to the V1 marker to set this.

Repeat STEP 1 and STEP 2 for each the VR and V2 speeds.



Input the take-off flap position (1,2 or 3) and take-off trim into the scratch pad as follows:

1 / DN.7

[Meaning take-off flap position 1 and downward trim of 0.7]

Click the line-select key adjacent to FLAPS/THS to set this.



Input the computed FLEX temperature from your Electronic Flight Bag (EFB) into the scratch pad.

Click the line-select key adjacent to FLEX TO TEMP set this.

When the takeoff weight is lower than the maximum performance-limited weight, the takeoff can be made with a reduced thrust. Airbus achieves this using a FLEX temperature (short for flexible temperature). The maximum takeoff thrust is limited by outside air temperature (OAT). Therefore, by inputting a higher temperature than the actual one, the thrust will be reduced to a level that will deliver only the minimum safe thrust.

Fuel Prediction Page



Click the FUEL PRED button to display the FUEL PREDICTION page.



The highlighted areas here are:

- Computed remaining fuel at conclusion of flight;
- Current fuel on board (FOB)

Note: These figures differ from the companion video, which started with a total fuel on board of 4.8 metric tons (10,560 lbs.).

Climb Page



When in PERFORMANCE mode, the MCDU will automatically switch from the TAKE OFF page to the CLIMB (CLB) page once the flight is underway.



The highlighted areas here are:

- Top of Climb (flight level 160 in this example);
- Distance to Top of Climb

Note: These figures differ from the companion video

Cruise Page



When in PERFORMANCE mode, the MCDU will automatically switch from the CLIMB (CLB) Page to the CRUISE (CRZ) Page when top of climb is reached.



The highlighted areas here are:

- Estimated time at destination / Estimated remaining fuel on board (FOB);
- Estimated time at Top of Descent (TOD) / Distance to Top of Descent

Note: These figures differ from the companion video

Descent Page



When in PERFORMANCE mode, the MCDU will automatically switch from the CRUISE (CRZ) Page to the DESCENT (DES) Page when top of descent is reached.



The highlighted areas here are:

- Estimated time at end of descent;
- Distance to end of descent
- Speed mode (MANAGED = auto-thrust);
- Speed expressed as Mach number / Knots

Note: These figures differ from the companion video

Activating Approach Phase



When in PERFORMANCE mode, and while the MCDU is displaying the DESCENT (DES) Page, the crew may manually activate the approach phase of the flight plan. This will also invoke the APPROACH (APPR) Page.

When the MCDU is in APPROACH phase mode, the airspeed will be managed automatically, according to the flap selection made by the crew.

Note: The approach phase activates automatically when the deceleration point of the flight plan is reached, if not previously manually activated by the crew.



Confirm activation of the approach phase by clicking the line-select key adjacent to CONFIRM APPR PHASE.

Approach Page



When in PERFORMANCE mode, the MCDU will automatically switch from the DESCENT (DES) Page to the APPROACH (APPR) Page when the deceleration point in the flight plan is reached. Alternatively, the crew may manually activate the approach phase (see: [Activating Approach Phase](#)).

When the MCDU is in APPROACH phase mode, the airspeed will be managed automatically, according to the flap selection made by the crew.



- QNH = Altimeter setting at destination;
- O = airspeed for maximum endurance in case of a holding pattern if instructed by ATC;
- S = initial SLAT deploy speed (Flap setting 1);
- F = Final FLAP deploy speed (Flap setting FULL);
- FINAL (approach type) = ILS 25 LEFT in this example;
- MAG/WIND = wind direction and speed at destination;
- TRANS ALT = Transition altitude at destination (threshold where altitude is expressed as a flight level)
- VAPP = Final Approach Speed
- MDA or DH

[Pilot input Minimum Descent Altitude (MDA) or Decision Height (DH) from approach chart. For many CAT-I ILS approaches (like the example in the video) the DH will 200 ft]

Note: These figures differ from the companion video

Inserting waypoints into an active Flight Plan

During a flight, deviations can occur from the expected route, due to factors such as weather, traffic, and ATC instructions. Sometimes there is a need to insert a new waypoint into the plan.

Changes to waypoints are made using the FLIGHT PLAN (F-PLN) page.



Place the MCDU in FLIGHT PLAN (F-PLN) mode.

Use the up-arrow, or down-arrow buttons to scroll to the appropriate leg of the flight plan.



Click the line-select key adjacent to the waypoint in your existing flight plan that is immediately BEFORE the new waypoint.



Input the waypoint identifier into the scratchpad.

Click the line-select key adjacent to NEXT WPT.



The new waypoint will be inserted after the selected waypoint.

Click the line-select key adjacent to TMPY INSERT to commit the change to the flight plan.

Deleting waypoints from an active Flight Plan

During a flight, deviations can occur from the expected route, due to factors such as weather, traffic, and ATC instructions. Sometimes there is a need to delete a waypoint from the plan.

Changes to waypoints are made using the FLIGHT PLAN (F-PLN) page.



Place the MCDU in FLIGHT PLAN (F-PLN) mode.

Use the up-arrow, or down-arrow buttons to scroll to the appropriate leg of the flight plan.



Click the CLR Button.

Click the line-select key adjacent to the waypoint to be deleted.



Click the line-select key adjacent to TMPY INSERT to commit the change to the flight plan.

Direct to a Waypoint

During a flight, deviations can occur from the expected route, due to factors such as weather, traffic, and ATC instructions. Sometimes there is a need to proceed directly to a waypoint in the flight plan (bypassing interim waypoints).

Direct To instructions are made using the FLIGHT PLAN (F-PLN) page.



Place the MCDU in FLIGHT PLAN (F-PLN) mode.

Click the DIR (DIRECT TO) button.



Click the line-select key adjacent to the desired waypoint.



Click the line-select key adjacent to TMPY INSERT to commit the change to the flight plan.

Radio / Navigation Page

The RADIO NAVIGATION (RADIO NAV) page is used for the manual selection of radio-type navigation aids, such as ILS approaches, VOR and NDB stations.



Click the NAV RAD button to invoke the RADIO NAVIGATION page.



Setting a VOR frequency and radial

- Input the VOR identifier or frequency into the scratch pad
- Click the line-select key adjacent to either VOR1/FREQ or VOR2/FREQ
- Input the desired VOR radial into the scratch pad
- Click the line-select key adjacent to CRS



Setting an ILS frequency or GLS Channel Number

- Input the ILS identifier or frequency or GLS channel number into the scratch pad
- Click the line-select key adjacent to LS /FREQ

Resetting the Flight Plan



Click the INIT button to invoke the INITIALIZATION page.

Input a new origin and destination airport in the format shown.

Click the line-select key adjacent to FROM/TO.

Hint: When in the approach phase, the flight plan will automatically reset when the airplane has been on the ground for 30 seconds or more.

Loading a (saved) Flight Plan

Saved flight plans are stored in the [Output/FMS Plans](#) folder.

Flight plans that have been generated previously (and saved in the appropriate format for X-Plane) may be loaded into the Flight Management System. The following file (extension) types are acceptable:

- **FLP** (compatible with aircraft for both X-Plane and other simulators, supports airways)
- **FMS** (compatible with X-Plane, with support for airways and procedures)



Click the INIT button to invoke the INITIALIZATION page.

Input the name of your flight plan file into the scratch pad. Do not include the pathname.



Click the line-select key adjacent to CO RTE.

Saving a Flight Plan

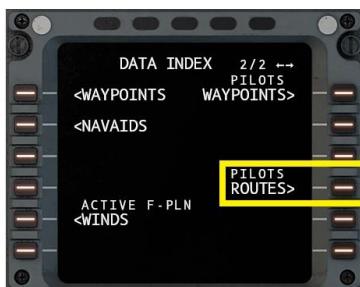
Saved flight plans are stored in the *Output/FMS Plans* folder.

Flight plans may be saved for use again later. A saved flight plan in X-Plane uses a. fms extension.



Click the DATA button to invoke the DATA INDEX page.

Click the 'Next' arrow button to advance to the next page.



Click the line-select key adjacent to PILOTS ROUTES.



Input the file name. Do not include the path.

Click the line-select key adjacent to CO RTE.



Click the line-select key adjacent to STORE ACTIVE F-PLN.