



UNS-1 FMS OPERATIONS MANUAL



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This manual is for the UNS-1 FMS integrated into the Just Flight Professional series of aircraft for Microsoft Flight Simulator.

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INTRODUCTION

This manual provides details of how to use the Universal UNS-1 Flight Management System (FMS) which is integrated into the Just Flight Professional series of aircraft for Microsoft Flight Simulator (MSFS).

Please note that some file directories mentioned in this manual include '*justflight-aircraft-146*'. The aircraft name in these instances will, of course, vary depending on which Just Flight aircraft you are flying with the UNS-1 FMS.



Page layout

Most pages are presented with this common structure:

Page title – shows the name of the current page on the top line of the page.

Page number – shows the current page number and the total number of available pages on the right of the top first line.

M – indicates that there is a menu related to this page, accessible by pressing the MENU key.

Content – page content is shown on the following lines. If a line content has an arrow that points to the adjacent key, it is an action that can be triggered by pressing that key.

Cursor – indicated by a line shown in highlighted text (black on white). This indicates that the content in the highlighted line can be edited or that it needs to be validated by pressing the ENTER key.

RETURN – pressing the adjacent key will return the UNS-1 to the previously displayed page.

MSG – indicates that new messages are available and accessible through the MSG key.

Examples

INIT page

```
POS      INIT 1/1
INITIAL POS      DATE
ID  <GPS>      UTC
S  37 00.4      20:49:17
E  174 48.1
STANDARD / EXTENDED
NAV DATABASE EXPIRES
22-FEB-24
←ACCEPT FMC VER      802.7
```

Page number 1/1 shows that no other pages are available.

The cursor is highlighting the ACCEPT text, indicating that it needs to be validated by pressing the ENTER key.

FUEL page

```
FUEL 1/2 [M]
BASIC WT KGS      ALTERNATE
25642      227
PAX (125) @ 77      HOLD
9639      227
CARGO      EXTRA
1100      45
ZFW      TOTAL RESRVS
36748      499
GROSS WT      FUEL ONBOARD
44144      7396
```

The page number 1/2 shows that page 1 is currently being displayed and one other page is available, accessible by pressing the NEXT key.

The CARGO value is being edited, as shown by the highlighted field, and can be validated by pressing the ENTER key.

An 'M' symbol at the top right of the screen indicates that a menu is available which is accessible by pressing the MENU key.

General usage

The Flight Management Computer (FMC) is composed of a screen and keys. The keys located immediately around the screen are called select keys and are used according to the page content. The five select keys on the left are the Left Select Keys (LSK) 1 to 5 and the ones on the right are the Right Select Keys (RSK) 1 to 5. They will be referred to in this way throughout this manual.

On the left and right of the device are the function keys. The role of each function key will be explained in depth later in this manual.

Below the screen are the alphanumeric keys used for data entry.



Some FMC function keys have the same function, whichever page is displayed:

- When multiple pages are available, shown on the first page with the page number:
 - NEXT key shows the next page
 - PREV key shows the previous page
- When a framed 'M' symbol is shown in the title line, this indicates that a menu is available for that page and can be accessed by pressing the MENU key.
- On some pages a selection can be made in a list instead of by entering data. In such cases, pressing the LIST button shows the relevant list.
- When user validation is required, the ENTER key is used. This key is used each time an active cursor is shown on the page.
- If messages are available, pressing the MSG key shows the message page with all the existing messages.
- The PWR DIM key can be used with any page to adjust the screen brightness or turn the FMC on/off.

QUICK START GUIDE

This section describes the way this FMC should be used to plan and fly a route, from departure to destination. It shows a typical sequence for the use of the different FMC pages that are explained in further detail in the following sections of this manual.

For a full tutorial flight, please refer to the [FLYING WITH THE UNS-1](#) section of the manual.

On the ground, prior to take-off

1. If it is off, turn the FMC on by pressing the PWR DIM key. Turn the FMC off and back on using the PWR DIM key and the OFF/STBY option if you wish to reset it.
2. Set the initial aircraft position on the INIT page. The GPS position should be set automatically and just needs to be cross-checked and confirmed by pressing the ENTER function key. The departure airport's ICAO code, date and time can also be entered manually if desired.
3. Create the flight plan through the FPL page:
 - Input the departure airport.
 - Select the departure runway and SID for departure (if available).
 - Manually input the waypoints on the flight plan, or use the FPL LIST to use airways to input the route more easily.
 - After the last waypoint is set, input the destination airport.
 - Select the arrival runway and STAR for arrival (if available).
4. Define the fuel and weight on the FUEL page. Most of the fields will be set automatically based on the aircraft's current fuel and payload, so will simply need to be cross-checked. Manual inputs can be made to most of these fields if desired.

When all this is done, the FMC is capable of managing lateral navigation and monitoring vertical navigation. The aircraft's autopilot needs to be set up in an R NAV or L NAV mode in order for it to track the FMC's lateral navigation. Please refer to the Operations Manual of the aircraft you are flying for further information on the aircraft's autopilot.

During the flight

1. The FPL page can be used to check the heading and distance to the next waypoints.
2. The NAV page can be displayed to check the aircraft's trajectory along the programmed route, especially regarding the cross-track error depending on the wind. The heading (HDG) page, accessible via the NAV page, provides control over the aircraft's heading with LNAV mode engaged, and the MANEUVER (MNVR) page allows holding patterns to be inputted into the flight plan.
3. The DIRECT TO (DTO) page can be used if Air Traffic Control clears you to fly direct to a waypoint.
4. The VNAV page can be used to calculate the top of descent and to monitor your rate of descent with respect to upcoming altitude restrictions.

DIRECT TO (DTO) PAGE

Pressing the DTO function key brings up the 'direct to' page. This is used to fly directly to any waypoint in the flight plan.



The DTO page lists all the waypoints in the flight plan. To fly directly to one of them, enter the reference number of the desired waypoint by using the alphanumeric keys and press ENTER. The selected waypoint will then turn magenta on the DTO, FPL and NAV pages, indicating that this is now the active waypoint and the aircraft will now start flying directly to that waypoint.

Pressing RSK 5 whilst on the DTO page will cancel the operation and return to the previous page.

FLIGHT PLAN (FPL) PAGE

The FPL page is accessed by pressing the FPL function key. If a flight plan has not yet been created but the departure airport's ICAO code was entered on the INITIAL POS ID field on the INIT page, the departure airport will automatically be entered on the first line.

If the departure airport was not entered on the INIT page and the current GPS position has been used, the FPL page will appear empty and the departure airport will need to be entered into the first line of the flight plan. To do this, highlight the first line by pressing LSK1 and then type the airport's four-letter ICAO code with the alphanumeric keys.



Press ENTER to confirm this selection and a new page will appear, showing the airport details. Check the details on the screen are correct and then press ENTER again.



With the departure airport entered into the first line of the flight plan, the cursor can then be placed on the second line by pressing LSK2, in preparation for adding the first waypoint on the flight plan.

Each waypoint can be inserted in two ways:

Method 1

The waypoint name can be entered by using the alphanumeric keys and then pressing the ENTER key to confirm. If the waypoint exists, a page shows the waypoint details with the option to confirm the waypoint insertion with ACCEPT or ignore it with RETURN.

Several waypoints with this name may exist; if this is the case, one of them will have to be selected. See the [Duplicate waypoint names](#) section for more details.

In the following screenshot, the waypoint named KARRL is added manually using the alphanumeric keys:



On pressing ENTER, the waypoint details are then shown to be confirmed or discarded. Note that in this example page number 1/2 is displayed, indicating that there are two waypoints in the database with the same name.



Press the PREV and NEXT keys until the desired waypoint details are showing on the screen and then press ENTER to add the waypoint to the flight plan.

Returning to the flight plan page, the waypoint is now inserted below the departure airport and is coloured magenta, indicating that it is the active waypoint, i.e. the next waypoint the aircraft will fly to.



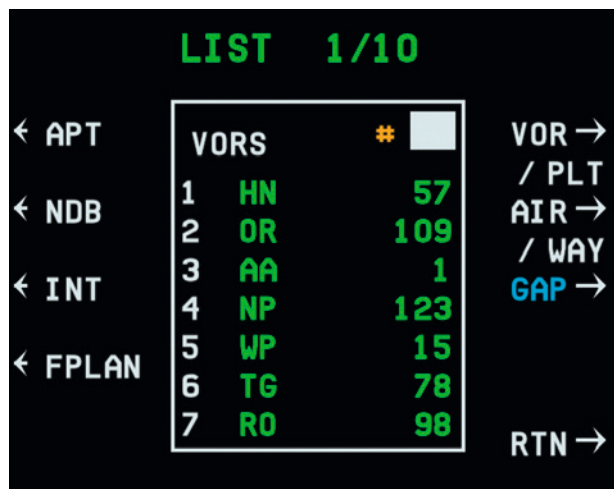
Oceanic waypoints that are comprised of latitude and longitude coordinates can be entered as waypoints by using a five-digit format. Some examples are listed below:

- N52 W75 can be entered as '5275N'
- N75 W170 can be entered as '75N70'
- N50 E20 can be entered as '5020E'
- N50 E210 can be entered as '50E20'
- S52 W75 can be entered as '5275W'
- S52 W120 can be entered as '52W20'
- S60 E30 can be entered as '6030S'
- S60 E130 can be entered as '60S30'



Method 2

The LIST function can be used to choose the next waypoint from a list of existing waypoints. When the cursor is shown for a new waypoint entry, the LIST key can be pressed to show a list of waypoints, ordered by distance.



VORs are shown first. The type of waypoint can be changed by using the LSK/RSK. For example, pressing LSK 1 gives access to the list of airports near the current position.

Any waypoint can be selected by entering its reference number in the list and pressing ENTER to confirm. It is then added as the next waypoint on the flight plan.

The flight plan is created by adding all the necessary waypoints, including SID and STAR waypoints (see the [Managing runways, SIDs/STARs and transitions](#) section for more details).

Note: The first waypoint of any flight plan should always be the departure airport and the last one should always be the arrival airport.

Duplicate waypoint names

When a waypoint name is inserted on the FPL page, there may be situations when there are several waypoints in the world that have the same name and the FMC does not know which one should be inserted. If several waypoints exist with the same name, the multiple detail pages will be available and navigation with the PREV and NEXT keys is possible.

In the following screenshot, NS has been inserted for the next waypoint. This page shows details for the NS VOR. The page number 1/4 shows that other pages are available as other waypoints with the same name exist in the database.



Pressing NEXT will cycle through the various detail pages for all the waypoints whose code is also NS.

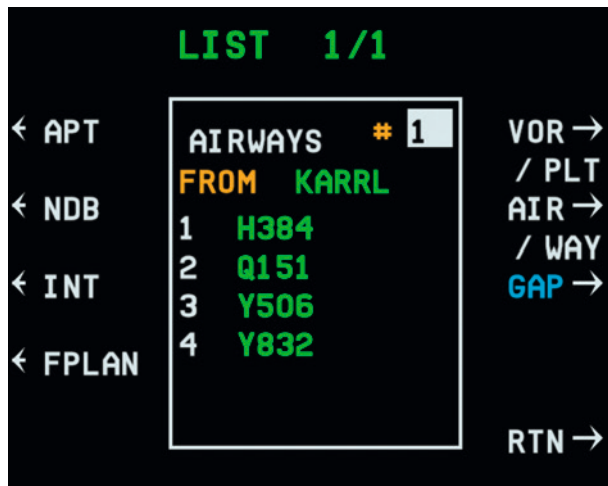


Once the correct waypoint is shown on the display, pressing the ENTER key or LSK 5 for ACCEPT will insert that waypoint into the flight plan.

Using airways

Airways from the specific waypoint can be viewed by pressing the LIST function key to get access to the list page. Pressing RSK 2 will then show a list of airways that propagate from the current waypoint. Any airway in the list can be selected by entering its reference number and then pressing the ENTER key.

In the following screenshot, KARRL is the current waypoint and pressing RSK 2 shows all the airways available from that waypoint. Four airways are available in this example.



When the airway is selected, the list updates to show all the waypoints on the selected airway. Again, any waypoint in this list can be selected through its reference number, and when you press ENTER all waypoints and the chosen airway between the two selected waypoints will be entered into the flight plan.

In the following example, all the waypoints on the H384 airway after KARRL are shown on this page. Selecting the NP waypoint by entering the number 1 and then pressing ENTER inserts all the waypoints from KARRL to NP into the flight plan.



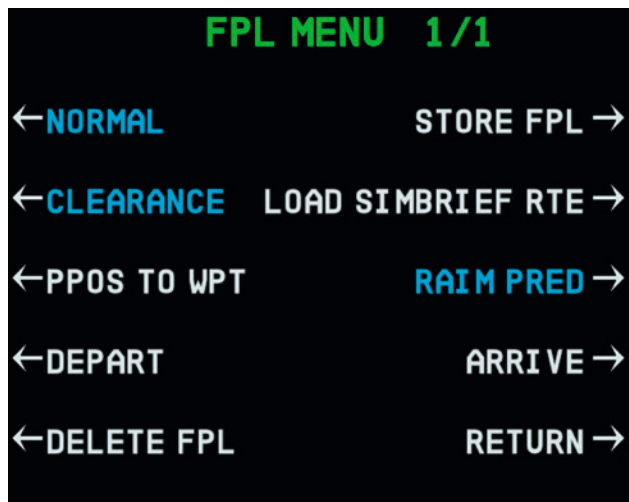
Managing runways, SIDs, STARs and transitions

Standard Instrument Departure (SID)

The departure runway and Standard Instrument Departure (SID) procedures are accessed through the flight plan page as follows:

Press the FPL function key to navigate to the flight plan page.

Press the MENU function key to open the flight plan menu.



Press LSK 4 to open the DEPARTURE page.



On the DEPARTURE page the runway must first be selected, as indicated by the cursor automatically highlighting the runway field. The departure page lists all the runways available at the departure airport in the flight plan. The page number indicates whether several pages are available; the number of pages depends on the number of runways at the departure airport.

The desired runway can be selected by entering its reference number from the list and then pressing ENTER to select it. Pressing RSK 5 (FPL) cancels the operation and returns you to the flight plan page.

Once a runway has been selected, the cursor will automatically move down to the SID field and a list of all available SIDs for that runway will be displayed. Several pages can be available, depending on the number of SIDs available for that runway. The desired SID is selected by entering its reference number from the list and then pressing ENTER.



If the SID splits off into multiple different routes, each with a different end point, there may be multiple transition waypoints available for selection. These are displayed and selected in the same way – by entering its reference number from the list and then pressing ENTER.



If no SID or transition is available for the selected runway, pressing RSK 3 when one of these fields is highlighted will remove the cursor from that field and leave it empty.

When the runway, SID and transition process is finished, the DEPARTURE page will show all of the pilot's selections and proposes a return to the flight plan page.



Pressing the FPL function key or RSK 5 returns you to the flight plan page.

All the waypoints of the selected SID and transition have been added to the flight plan between the departure airport and the first manually inputted waypoint.

Any altitude constraints/restrictions on the SID are shown in the right column of the FPL page.

An 'up' arrow next to the altitude indicates that you need to be above that altitude as you pass over the waypoint.

An '@' symbol indicates that you need to be at that exact altitude as you pass over the waypoint.

A 'down' arrow indicates that you should be at or below that altitude as you pass over the waypoint.

If a waypoint on a SID has both an upper and lower altitude constraint/restriction, the UNS-1 will display the upper altitude restriction and a 'down' arrow indicating that you should fly below the upper altitude limit.

If a waypoint on a STAR has both an upper and lower altitude constraint/restriction, the UNS-1 will display the lower altitude restriction and an 'up' arrow indicating that you should fly above the lower altitude limit.

Dashes '-----' indicate that there are no altitude constraints/restriction relating to that waypoint.

FPL		4/5	M
128°	6.9 NM	ALT / FL	
16>CH404		↑ 6000	
128°	10.3 NM		
17>ODISI		↑ 2000	
200°	4.0 NM		
18>DIVSU		↑ 2000	
199°	2.2 NM		
19>FI20		@ 2000	
200°	5.7 NM		
20>RW20		@ 143	

Standard Terminal Arrival Route (STAR)

Managing the Standard Terminal Arrival Route (STAR) for arrival uses the same process as for the SID.

On the flight plan menu page, pressing RSK 4 brings up the ARRIVAL page. An arrival airport must first be defined at the end of the flight plan on the FPL page in order for it to display on the ARRIVAL page.

With the arrival airport defined, the arrival runway, STAR and transition waypoints (if applicable) can be selected.

ARRIVAL		1/1
SEL RUNWAY	ARRIVE	
1 02	NZCH	
2 11	RUNWAY	
3 20	# --	
4 29	STAR	

		APPR

		FPL →

Once the arrival has been selected, a summary of the arrival airport, runway, STAR and transition will be displayed.



Pressing FPL or RSK 5 returns you to the flight plan page.

All the waypoints of the selected STAR and transition have been added to the flight plan between the last manually inputted waypoint on the flight plan and the arrival airport.

IMPORTANT! Any time a SID or STAR is entered into the flight plan, the pilot should review the resulting flight plan to verify that it is continuous, with no gaps or duplicated waypoints, and that it conforms with the expected flight plan.

Waypoint insertion and deletion

Pressing the FPL function key brings up the flight plan page, which lists all inputted waypoint in the flight plan. When displayed, pressing any LSK adjacent to an existing waypoint selects it.



Inserting a waypoint

To insert a new waypoint before an existing waypoint, first select the existing waypoint. Then proceed as if you wanted to create a new waypoint, by entering its name with the keyboard and then pressing ENTER, or by pressing the LIST function key to select it from a list.

The following example shows the insertion of the new waypoint TELIM between the NP and NS waypoints.

FPL	1/2	M	ALT / FL
1 >NZAA			-----
173°	59.6 NM		
2 >KARRL			-----
174°	63.7 NM		
3 >NP			-----
177°	144.8 NM		
4 >NS			-----
176°	96.0 NM		
5 >PEAKS			-----

The NS waypoint must first be selected by pressing the respective LSK, and then the new waypoint can be typed with the alphanumeric keys. Press ENTER to insert the waypoint into the flight plan.

FPL	1/2	M	
1 >NZAA			DEL →
173°	59.6 NM		
2 >KARRL			INFO →
174°	63.7 NM		
3 >NP			
177°	144.8 NM		
4 >TE LIM			OVFLY →
176°	96.0 NM		
5 >PEAKS			

A *NO LINK* or 'VECTORS' message may appear as a waypoint when inserting a new waypoint into the flight plan. If one of these messages appears, the pilot should check that the changes to the flight plan are correct before deleting the *NO LINK* or 'VECTORS' message from the flight plan in the same manner as for deleting a waypoint.

The newly added waypoint is now inserted at the same line of the flight plan as the previously highlighted waypoint, with all the following waypoints moved down one line.

FPL	1/2	M	ALT / FL
1 >NZAA			-----
173°	59.6 NM		
2 >KARRL			-----
174°	63.7 NM		
3 >NP			-----
177°	84.5 NM		
4 >TE LIM			-----
178°	60.2 NM		
5 >NS			-----

Deleting a waypoint

To delete an existing waypoint, the waypoint to be deleted must first be selected. A set of actions will then appear on the right side of the display.



Pressing RSK 1 triggers the DEL (delete) action that deletes the waypoint. This action must be confirmed by pressing RSK 1 twice – once to make the action active and a second time to confirm it and proceed. Once RSK 1 has been pressed twice, the waypoint will be deleted from the flight plan.

Flight plan summary page

A flight plan summary page can be accessed from the FPL page, either by pressing the FPL function key or the NEXT/PREV keys to cycle through the flight plan pages to find the summary page located between the first and last pages of the flight plan. This page can only be accessed when the aircraft is on the ground prior to departure and will become unavailable once the aircraft is airborne.



As the name suggests, the FPL SUMMARY page can be used to calculate and view a summary of the proposed flight plan:

DEPART – departure airport's ICAO code. This field will be filled automatically, based on the departure airport inputted on the FPL page.

ARRIVE – arrival airport's ICAO code. This field will be filled automatically, based on the arrival airport inputted on the FPL page. The distance between the two airports is shown in nautical miles between the two fields.

ETD UTC – estimated time of departure in UTC and local time. Once the ETD UTC and a time zone difference have been manually entered, the local time is automatically calculated.

ETA UTC – estimated time of arrival in UTC and local time. This field will be calculated automatically, based on the inputted ETD and the estimated time en route (shown between the two fields). A time zone difference of the arrival airport can be manually entered, allowing the local time of arrival to be calculated.

TAS – estimated true airspeed in knots. This will be automatically set with a realistic value for the current aircraft type, but can be manually adjusted.

RESERVES – estimated reserve fuel. This will be set automatically, based on the default value listed on the FUEL page, but can be manually adjusted.

FF – estimated fuel flow. This will be automatically set with a realistic value for the current aircraft type, but can be manually adjusted.

MIN FUEL – estimated minimum fuel required for the flight computed, based on the data entered in the other fields.

Other flight plan functions

Flight plan deletion

On the flight plan menu page, a DELETE FPL option can delete the entire flight plan. All the waypoints, procedures and other flight plan information will be cleared from the FMC's memory.

As this is a sensitive operation, it must be confirmed. Pressing LSK 5 once selects the DELETE FPL action without doing anything else. Pressing LSK 5 again, when the action has been selected, actually deletes the flight plan.



Flight plan import (SimBrief import)

A SimBrief Operational Flight Plan (OFP) can be imported directly into the UNS-1 by using the SimBrief API. This method is useful for both PC and Xbox users as it imports the flight plan directly from the SimBrief website and does not require any file management.

To import a SimBrief OFP directly into the UNS-1, press the FPL key followed by the MENU key to open the FPL MENU page. Press RSK 2 (LOAD SIMBRIEF RTE) to open the SIMBRIEF RTE page.



The SIMBRIEF RTE page provides a field where your SimBrief Pilot ID can be entered. Your SimBrief Pilot ID is a six- or seven-digit number which can be found in the 'Account Settings' on the SimBrief website. To input your SimBrief Pilot ID, press the LSK 1 key and type your SimBrief Pilot ID number with the alphanumeric keys. Press ENTER to accept the entry.

Your SimBrief Pilot ID will be saved between flights. To remove the SimBrief Pilot ID, press the LSK 1 key and press the BACK key until the field is empty. A new SimBrief Pilot ID can now be entered, or the field can be left empty if no SimBrief Pilot ID is desired. Press ENTER to accept the entry.

Press the LSK 3 key (REQUEST) to import the most recently generated OFP associated with the inputted SimBrief Pilot ID.



Once a flight plan has been imported into the UNS-1, the FPL page will automatically open, displaying the imported route. By default, the departure airport, destination airport and enroute waypoint and airways will be imported. The departure and arrival procedures, and cruise altitude, will not be imported, allowing the pilot to manually select these in the simulator.

For PC users, it is possible to change this logic so that the departure procedure (runway and SID) and/or cruise altitude are included with the flight plan import. This can be done by adding 'SimBriefImportSidStar=1' and/or 'SimBriefImportCruiseAlt=1' as new lines in the 'JF_146_UN.S.cfg' file. Note that the file directory where the config file is stored will differ slightly depending on the store where you purchased MSFS and the version of MSFS used:

- a. **MSFS 2020 – Microsoft Store:**
*C:\Users**USERNAME**\AppData\Local\Packages\Microsoft.FlightSimulator_8wekyb3d8bbwe\LocalState\packages\justflight-aircraft-146\work\JustFlight*
- b. **MSFS 2020 – Steam:**
*C:\Users**USERNAME**\AppData\Roaming\Microsoft Flight Simulator\Packages\justflight-aircraft-146\work\JustFlight*
- c. **MSFS 2024 – Microsoft Store:**
*C:\Users**USERNAME**\AppData\Local\Packages\Microsoft.Limitless_8wekyb3d8bbwe\LocalState\WASMMSFS2024\justflight-aircraft-146\work\JustFlight*
- d. **MSFS 2024 – Steam:**
*C:\Users**USERNAME**\AppData\Roaming\Microsoft Flight Simulator 2024\WASMMSFS2024\justflight-aircraft-146\work\JustFlight*

Note: The above file directories are for the Just Flight 146 Professional aircraft. Some names in the file directories may vary slightly between aircraft.

Flight plan import (local file save)

Flight plans can be imported by using the COPY PLT RTE function on the FPL page. This function is only available when no waypoints have been entered into the flight plan, or if only the departure airport has been entered into the first line. This feature is also only available to PC users due to the file management required.



Pressing RSK 3 opens a list of available routes that can be imported. The number of pages will depend on the number of stored flight plans and they can be accessed by using the NEXT/PREV keys. A flight plan can be imported by entering its reference number and pressing ENTER.



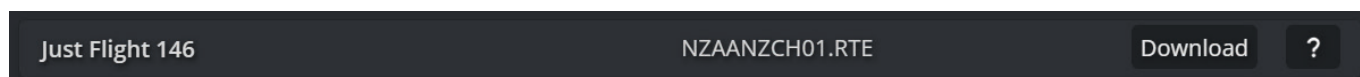
The import function imports the departure and arrival airports as well as all waypoints and airways between the two, but it will NOT import departure and arrival procedures. These will need to be set up manually by the pilot, depending on ATC and weather requirements.

Flight plans listed in the COPY PLT RTE menu are stored locally on your PC in an .RTE file format. Note that the file directory where these files are stored will differ slightly depending on the store where you purchased MSFS, and the version of MSFS used:

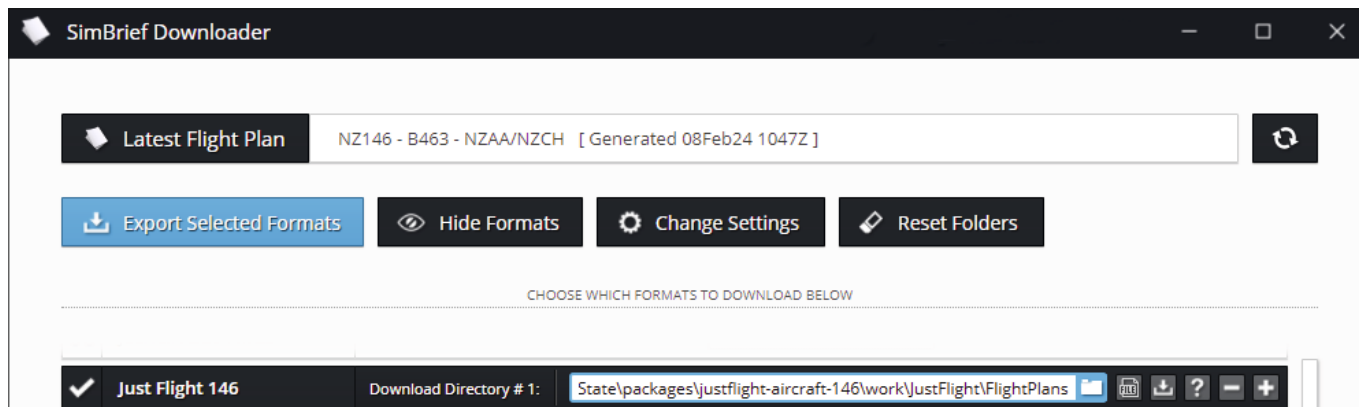
- MSFS 2020 – Microsoft Store:**
`C:\Users\**USERNAME**\AppData\Local\Packages\Microsoft.FlightSimulator_8wekyb3d8bbwe\LocalState\packages\justflight-aircraft-146\work\JustFlight\FlightPlans`
- MSFS 2020 – Steam:**
`C:\Users\**USERNAME**\AppData\Roaming\Microsoft Flight Simulator\Packages\justflight-aircraft-146\work\JustFlight\FlightPlans`
- MSFS 2024 – Microsoft Store:**
`C:\Users\**USERNAME**\AppData\Local\Packages\Microsoft.Limitless_8wekyb3d8bbwe\LocalState\WASMMMSFS2024\justflight-aircraft-146\work\JustFlight\FlightPlans`
- MSFS 2024 – Steam:**
`C:\Users\**USERNAME**\AppData\Roaming\Microsoft Flight Simulator 2024\WASMMMSFS2024\justflight-aircraft-146\work\JustFlight\FlightPlans`

Note: The above file directories are for the Just Flight 146 Professional aircraft. Some names in the file directories may vary slightly between aircraft.

For SimBrief users, once an OFP has been generated, the flight plan can be saved in an .RTE format by expanding the 'Flight Plan Downloads' box at the bottom of the page and then clicking the 'Download' button in the box displaying the name of the aircraft you are flying. The route file will then download to the normal download location on your PC and will need to be manually copied across to the file directory listed above.



The Simbrief Downloader app can also be used to automatically save the flight plan to the correct location whenever an OFP is generated on the SimBrief website. To do this, the file directory listed needs to be added to the 'Download Directory #1' field (next to the name of the aircraft you are flying) in the Simbrief Downloader app.



Flight plan files can be added to this file directory while the simulator is running or with the simulator closed. Adding a flight plan to this folder whilst the simulator is running should allow the flight plan to be shown on the COPY PLT RTE page and therefore does not require the simulator to be restarted.

Flight plan export

Flight plans can be exported from the FMC by using the STORE FPL function on the flight plan menu page. The page can be accessed from the FPL page by pressing the MENU function key and then RSK 1.



On the PLT RTE page, the current flight plan can be exported/stored by first giving the flight plan a name (typically the name should consist of the ICAO codes of the departure and destination airports on the flight plan, e.g. 'NZAANZCH'). Pressing ENTER will export the flight plan and save it at the following file directory. Note that the file directory where these files are stored will differ slightly based on the store where you purchased MSFS, as well as the version of MSFS:

- MSFS 2020 – Microsoft Store:**
`C:\Users\**USERNAME**\AppData\Local\Packages\Microsoft.FlightSimulator_8wekyb3d8bbwe\LocalState\packages\justflight-aircraft-146\work\JustFlight\FlightPlans`
- MSFS 2020 – Steam:**
`C:\Users\**USERNAME**\AppData\Roaming\Microsoft Flight Simulator\Packages\justflight-aircraft-146\work\JustFlight\FlightPlans`
- MSFS 2024 – Microsoft Store:**
`C:\Users\**USERNAME**\AppData\Local\Packages\Microsoft.Limitless_8wekyb3d8bbwe\LocalState\WASMMSFS2024\justflight-aircraft-146\work\JustFlight\FlightPlans`
- MSFS 2024 – Steam:**
`C:\Users\**USERNAME**\AppData\Roaming\Microsoft Flight Simulator 2024\WASMMSFS2024\justflight-aircraft-146\work\JustFlight\FlightPlans`

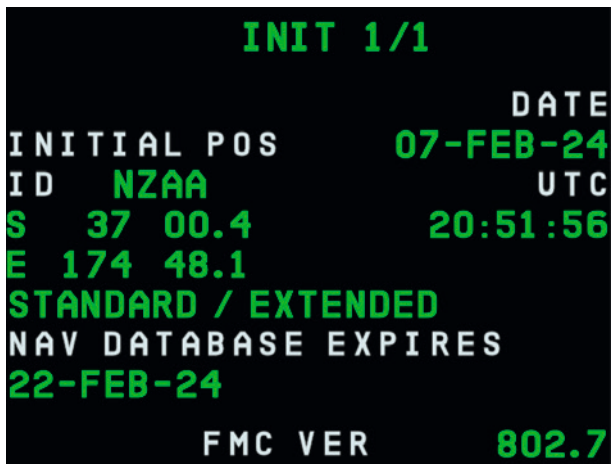
Note: The above file directories are for the Just Flight 146 Professional aircraft. Some names in the file directories may vary slightly between aircraft.



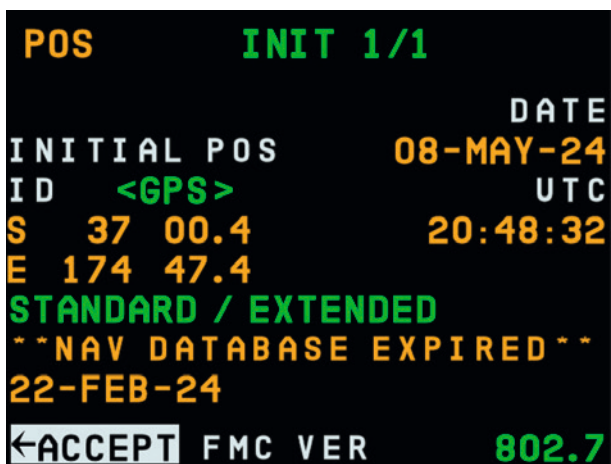
The flight plan is saved in an .RTE format to the same file directory as outlined in the [Flight plan import \(local file save\)](#) section, therefore the flight plan will subsequently be listed on the COPY PLT RTE page and can be imported by following the appropriate steps.

Updating the Nav database

A NAV DATABASE EXPIRES field is displayed on the INIT page and lists the date on which the current Navdata expires.

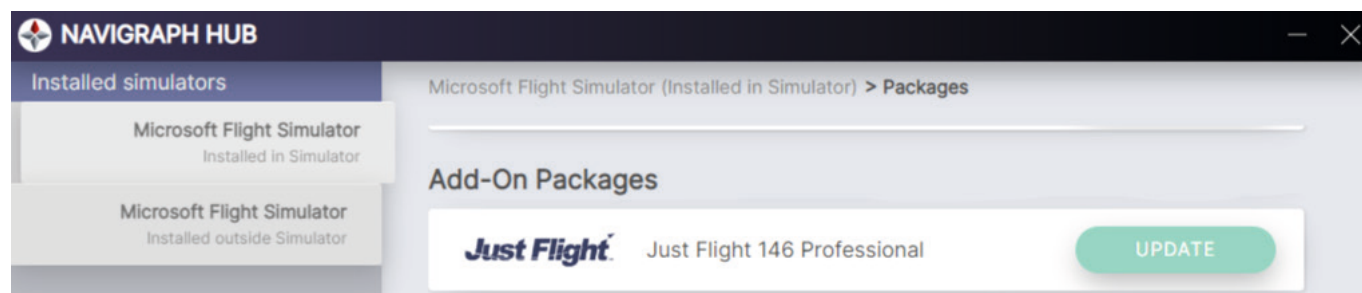


If the FMS detects out-of-date Navdata, this text will change to an amber ****NAV DATABASE EXPIRED****. The FMC references the date and time used at the start of your current Microsoft Flight Simulator flight, so setting the date in the simulator to be greater than one month different from the real date prior to the flight can cause the ****NAV DATABASE EXPIRED**** message to show. In this instance, the ****NAV DATABASE EXPIRED**** message can be ignored if you have verified that the latest Navdata is installed on your PC.



This simulation of the UNS-1 includes Navdata from the AIRAC 2401 cycle as standard which will probably generate a ****NAV DATABASE EXPIRED**** message on the INIT page. Although this is not the most up-to-date ARINC cycle, this Navdata should be sufficient in the majority of cases and should have little to no effect on your overall simulator experience.

Users with an active Navigraph subscription can update their Navdata by using the NAVIGRAPH HUB desktop application and clicking the green UPDATE button for the required Just Flight aircraft. Once the Navdata has been successfully updated, the button will turn red and show REMOVE, allowing you to remove this newly installed Navdata.



The Navdata for the UNS-1 is located in the following file directory. Note that the file directory where these file are stored will differ slightly based on the store where you purchased MSFS, as well as the version of MSFS:

- a. **MSFS 2020 – Microsoft Store:**
*C:\Users**USERNAME**\AppData\Local\Packages\Microsoft.FlightSimulator_8wekyb3d8bbwe\LocalState\packages\justflight-aircraft-146\work\JustFlight\navdata*
- b. **MSFS 2020 – Steam:**
*C:\Users**USERNAME**\AppData\Roaming\Microsoft Flight Simulator\Packages\justflight-aircraft-146\work\JustFlight\navdata*
- c. **MSFS 2024 – Microsoft Store:**
*C:\Users**USERNAME**\AppData\Local\Packages\Microsoft.Limitless_8wekyb3d8bbwe\LocalState\WASM\MSFS2024\justflight-aircraft-146\work\JustFlight\navdata*
- d. **MSFS 2024 – Steam:**
*C:\Users**USERNAME**\AppData\Roaming\Microsoft Flight Simulator2024\WASM\MSFS2024\justflight-aircraft-146\work\JustFlight\navdata*

Note: The above file directory is for the Just Flight 146 Professional aircraft. Some names in the file directories may vary slightly between aircraft.

FUEL MANAGEMENT (FUEL) PAGE

The FUEL page is accessed by pressing the FUEL function key. It has two sub-pages that manage the fuel quantity and the aircraft weight, which are important for performance calculations. The information shown on these pages is only relevant if a flight plan is defined.

The first page (1/2) shows the following information, some of which can be edited by the pilot. Note that when you enter a value and press ENTER, the cursor automatically jumps to the next editable value. If no data entry is necessary, the adjacent line select key can be pressed to cancel the entry and remove the cursor.

FUEL 1/2 M		
BASIC WT	KGS	ALTERNATE
25642		227
PAX (125) @	77	HOLD
9639		227
CARGO		EXTRA
1100		45
ZFW		TOTAL RESRVS
36748		499
GROSS WT		FUEL ONBOARD
44157		7409

BASIC WT – the aircraft's empty weight plus crew and provisions.

KG/LBS – weight units currently displayed. These can be toggled on the FUEL OPTIONS page.

PAX – weight of the passengers. This value can be edited by pressing LSK 2 and then entering the number of passengers. The passenger weight is then calculated according to the average passenger weight (79 kg / 174 lb). The average passenger weight can be changed on the FUEL OPTIONS page.

CARGO – cargo weight.

ZFW – Zero Fuel Weight, which is automatically calculated according to the information entered above.

GROSS WT – gross weight, i.e. the total aircraft weight.

ALTERNATE – quantity of fuel carried in case of a diversion to an alternate airport (this usually corresponds to 30 minutes of flight).

HOLD – quantity of fuel carried in case the aircraft is placed in a holding pattern.

EXTRA – any extra quantity of fuel the pilot wishes to carry in case of an emergency or an unplanned event.

TOTAL RESRVS – total of reserve fuel (the sum of the ALTERNATE, HOLD and EXTRA fields).

FUEL ONBOARD – total quantity of fuel on board.

The information displayed on the FUEL page will adjust automatically based on the aircraft current weight, and should match the aircraft's current fuel and weight values shown on the EFB.

When all fields have correct information, the FMC can compute all the data, especially the gross weight which takes all the fuel and weight information into account.

The second fuel page (2/2) shows computed information based on the information entered on page 1, including the current fuel flow and the ground speed shown on line 1. All values displayed on this page vary constantly depending on the aircraft's current state, therefore values such as fuel flow and range will vary depending on the aircraft's current speed and engine settings.

FUEL 2/2			[M]
FUELFLOW	KGS		GS
3095			337
T/O	00:08	ELAPSED	00+09
TO	NZCH	01:06	368 NM
ETA UTC	01:23		
12 LCL	13:23		
NOW	OVHD	NZCH	
6684	FUEL ONBRD	3302	
02+10	ENDURANCE	01+04	
727	RANGE	359	

T/O – take-off time. This will be blank if the aircraft is still on the ground.

ELAPSED – elapsed time since take-off. This will be empty if the aircraft is still on the ground.

TO – the destination airport as defined in the flight plan, with the distance to this destination.

ETA UTC – estimated time of arrival. The line below shows the ETA in local time, with the time difference between local and UTC.

The lines at the bottom of the page show fuel information, both current and at the planned destination:

FUEL ONBRD – fuel on board, both current and at destination.

ENDURANCE – flight time possible with the fuel on board, both current and at destination.

RANGE – the distance that can be flown with the current fuel quantity, both current and at destination.

Fuel menu (FUEL OPTIONS) page

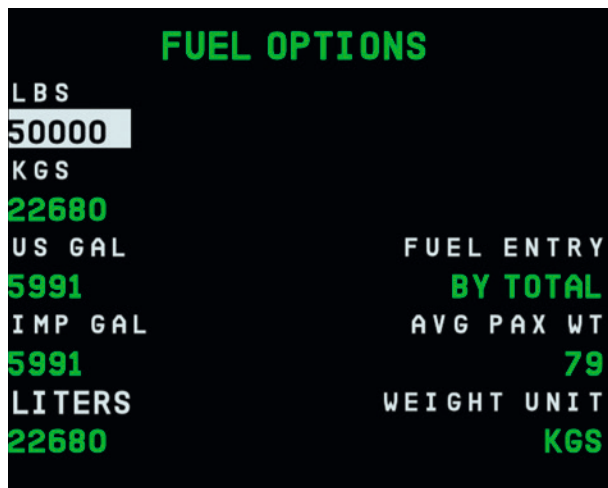
The FUEL OPTIONS page can be opened by pressing the MENU function key whilst on the FUEL page.

FUEL OPTIONS	
LBS	

KGS	

US GAL	FUEL ENTRY
-----	BY TOTAL
IMP GAL	AVG PAX WT
-----	79
LITERS	WEIGHT UNIT
-----	KGS

Five different units of measurement are available on the left side of the screen which serve as a useful tool for converting weight between pounds, kilograms, US gallons, imperial gallons and litres ('LITERS'). Once a value has been entered into one of these fields, the conversion to each of the other units will be calculated and displayed. The weight/volume conversion is based on a fuel density of 6.7lb/gal and is rounded up to the nearest whole number.



On the right side of the page there are options to adjust the average passenger weight that is used by the FUEL page.

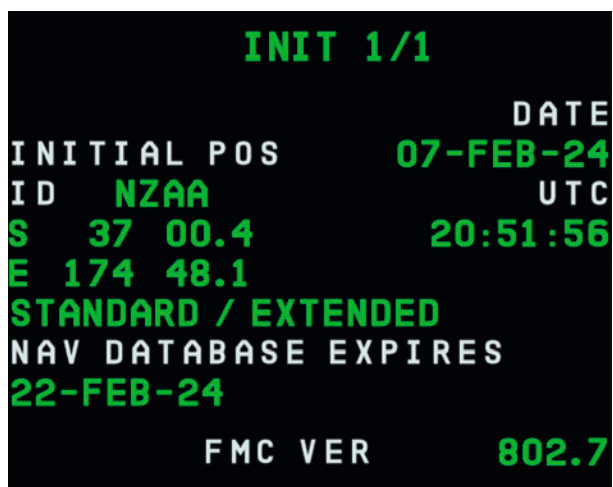
You can also toggle between metric and imperial units used on all pages of the FMC by pressing RSK 5.

INIT PAGE

The INIT page allows for the definition of the initial aircraft position. It shows the following information:

- Current aircraft position, as it was defined. If not defined, a yellow POS message appears in the top left corner of the screen.
- Current date and time as defined in the simulator.
- Navigation database expiry date as defined in the database according to the AIRAC cycle.
- FMC software version.

When the initialisation is complete, there is no need to have access to this page again and it can therefore only be accessed by powering OFF the FMC and then powering it back ON.



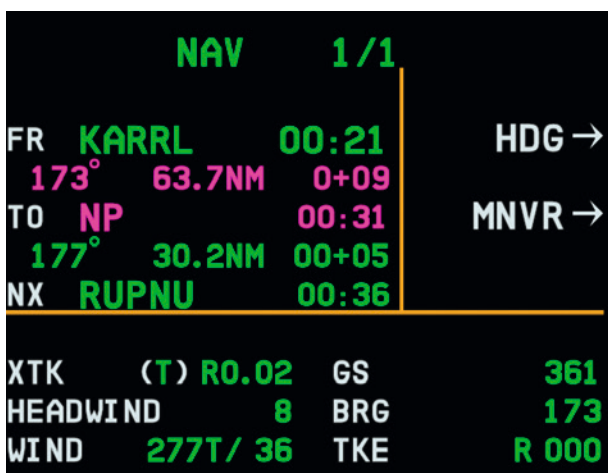
MESSAGES (MSG) PAGE

The messages page displays the FMC messages. If there is an unread message, a yellow MSG label appears in the top right corner of the screen. Pressing the MSG function key brings up the message page so you can read it.



NAVIGATION (NAV) PAGE

The NAV page is accessed via the NAV function key and is responsible for lateral navigation.



The NAV page provides an immediate overview of the flight plan, with the previous waypoint that you are flying from (FR), the active waypoint that you are flying towards (TO) and the next waypoint on your flight plan (NX):

FR – the previous ‘from’ waypoint.

TO – the active ‘to’ waypoint (the waypoint to which the aircraft is flying).

NX – the ‘next’ waypoint that follows the active waypoint. The heading and distance between these waypoints is also indicated.

Below these is the navigation information about the flight along the programmed route:

XTK – cross-track error. This is the lateral deviation, left or right, of the aircraft along the route leg it is flying, between the 'from' and 'to' waypoints.

HEADWIND – headwind component speed.

WIND – current wind speed and direction.

GS – current ground speed.

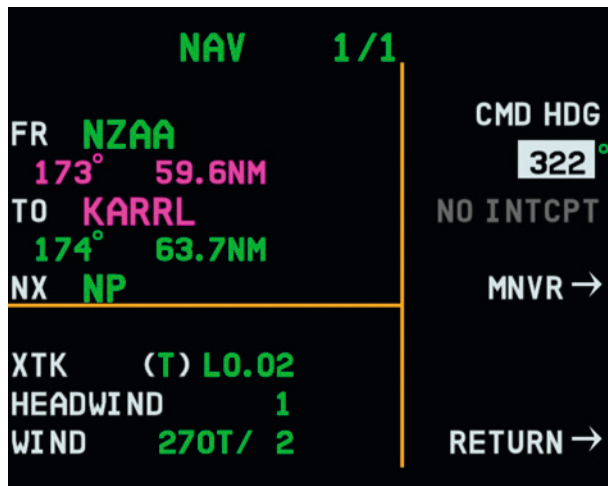
BRG – bearing to the active waypoint.

TKE – track angle error. This is the angular difference between the aircraft's trajectory and the bearing to the active waypoint.

Two further functions adjacent to the right select keys, labelled HDG and MNVR, allow for control over the aircraft's heading and intercept paths, and also allow for the programming of holding patterns.

Heading (HDG) page

Pressing RSK 1 on the NAV page will open the NAV HEADING page.



CMD HDG – the heading the FMC can use whilst the autopilot is still in an LNAV mode. A new heading can be entered by using the alphanumeric keys and then confirmed with the ENTER key. When a new heading is confirmed, the FMC assumes the shortest direction of turn and begins flying on that heading with the aircraft's LNAV mode still engaged.

Pressing RSK 2 on the NAV page will toggle between HDG SEL and INTERCEPT modes.

HDG SEL – the FMS will follow the assigned heading until manually changed or cancelled.

INTERCEPT – the FMS will follow the assigned heading until intercepting the active navigation leg. Once an active navigation leg is intercepted, the FMS will revert to normal navigation.

Maneuver (MNVR) page

Pressing RSK 3 on the NAV HEADING page will open the MANEUVER page.



HOLDING DEFN – opens the HOLDING FIX page where a holding pattern can be programmed.

The current TO waypoint will appear highlighted in the HOLD FIX field. To change the selected waypoint, press LSK 2, enter the reference number of the waypoint and then press ENTER.



The HOLDING PATTERN DEFINITION page will then open, displaying a visualisation of the holding pattern with default values. These values can be edited by pressing the respective LSK/RSK, inputting the new values with the alphanumeric keys and then pressing ENTER.



The holding pattern can be armed by pressing LSK 5. The ARM HOLD prompt will then change to a DTO HOLD prompt.

Once a holding pattern is armed, the FMC will automatically enter the holding pattern when the aircraft flies over the holding pattern's fix. DTO HOLD can also be triggered by pressing LSK 5 to fly a direct course to the holding fix. The holding pattern will now also be listed on the DTO, FPL and NAV pages.

Once a holding pattern is armed, several additional options will become available on the MANEUVER page.

PROCEED – when selected, will allow the aircraft to continue flying the current holding pattern circuit until overflying the holding fix, at which point the aircraft will proceed to the NX waypoint on the flight plan.

CONTINUE HOLD – appears after selecting PROCEED. Activating this will cancel the PROCEED selection and the aircraft will continue in the holding pattern.

DISARM HOLD – disarms the holding pattern prior to reaching the holding fix. If this is triggered when the aircraft is in a holding pattern circuit, the FMC will disarm the holding pattern and the aircraft will fly directly to the NX waypoint from its present position.

HDG – returns the FMS to the NAV HEADING page.

PVOR – not simulated.

SXTK – not simulated.

PERFORMANCE (PERF) PAGE

The performance (PERF) page is accessed by pressing the PERF function key. The PERF page shows some weight information that is also found on the FUEL pages. Similar to the FUEL page, all information displayed on the PERF page will adjust automatically based on the aircraft's current state.

PERF		1/1	M
GS	353	HEADWIND	2
ESAD	---	TEMP	-15
DIST	354	GND	NM/KG. 8.3
ETE	01:00	AIR	NM/KG. 11.6
	ETA 01:20	LCL	
	NOW	OVHD	NZCH
43306	WT	WT	39699
6558	FUEL ONBRD		3607
02+14	ENDURANCE		01+13
786.5	RANGE		432.6

GS – ground speed, computed or estimated, depending on whether the aircraft is flying or still on the ground.

HEADWIND/TAIWIND – current headwind/tailwind component speed.

ESAD – equivalent still air distance (the distance the aircraft would fly without wind).

TEMP – current outside air temperature.

DIST – flying distance, according to the flight plan.

ETE – estimated time en route (the time needed to reach the destination).

GND NM/KG. (or LB.) and **AIR NM/KG. (or LBKG.)** – estimated ground/air nautical miles per kilogram/pound, based on ground/true airspeed.

Below these are lines covering the aircraft's weight, both current and at the destination (destination is indicated as OVHD for overhead):

WT – aircraft's gross weight, now and at the destination.

FUEL ONBRD – fuel quantity, now and at the destination.

ENDURANCE – estimated time the aircraft can fly with the quantity of fuel on board, now and at the destination.

RANGE – estimated distance the aircraft can fly with the quantity of fuel on board, now and at the destination.

Performance menu (PERF MENU) page

The PERF MENU page can be opened by pressing the MENU function key whilst on the PERF page.



Text coloured blue is for items that are not relevant to the aircraft and are therefore inoperative. One option on this page that is functional is the ETP/PNR page.

Pressing LSK 5 will open the ETP/PNR page.

The first ETP/PNR page (1/2) is a useful tool for viewing the time, distance and fuel required to reach a selection of airports. Airports can be entered on this page by pressing the relevant LSK 2-5 keys, typing the four-digit airport ICAO code with the alphanumeric keys and then pressing the ENTER key.

ETP/PNR			1 / 2
	DT O T I M E	DT O D I S T N M	F U E L O V H D L B S
ARPT 1 NZAA	00+11	63	5969
ARPT 2 NZCH	00+57	339	3729
ARPT 3 NZWN	00+33	198	4876
ARPT 4 NZQN	01+23	492	2486

The second ETP/PNR page (2/2) shows information related to the ETP (Equal Time Point) and PNR (Point of No Return). The ETP is a time consideration and calculates the point of the flight plan which is exactly halfway timewise between the departure and destination airports. PNR is a fuel consideration that calculates the point at which there is only enough fuel remaining to continue to your destination airport.

ETP/PNR TYPE – the current mode used.

COAST OUT – departure airport and the fuel required to coast back to the airport.

COAST IN – destination airport and the fuel required to coast to the airport.

ETP – distance, estimated time en route and estimated time of arrival at the Equal Time Point of the flight plan.

PNR – distance, estimated time en route and estimated time of arrival at the Point of No Return of the flight plan.

ETP/PNR				2 / 2
ETP/PNR TYPE				
NORMAL				
			DTO	
			FUEL OVHD	
COAST OUT	NZAA	5910	KGS	
COAST IN	NZCH	3772	KGS	
	DTG	ETE	ETA	
ETP	141 NM	00+24	00:46	
PNR	375 NM	01+03	01:25	

POWER AND BRIGHTNESS

The PWR DIM function key gives access to the FMC's power and brightness control. This menu can be accessed from any page on the FMC.

If the FMC is off, pressing this button turns it on.

If the FMC is on, pressing the PWR DIM function key brings up a new set of options on the right of the screen, adjacent to the right select keys.



BRIGHT – increases the brightness of the FMC display.

DIM – decreases the brightness of the FMC display.

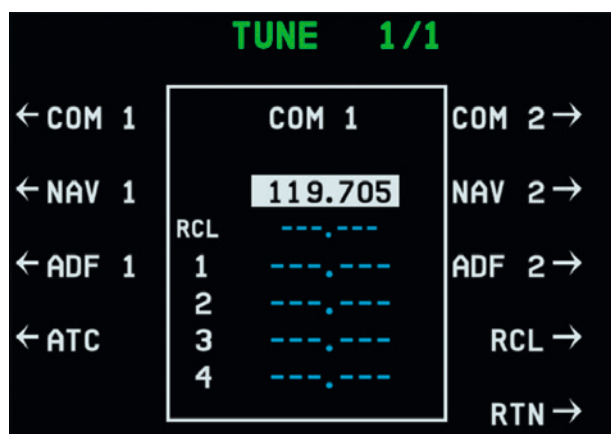
CANCEL – closes the menu.

DISPLAY – non-functional.

OFF/STBY – powers off the FMC.

TUNE PAGE

The TUNE page can be opened by pressing the TUNE function key and can be used to tune an aircraft's radios, as well as to select and store preset frequencies for each radio.



Selectable radios are listed down each side of the TUNE page with a control window in the centre of the display listing the active, recall and preset frequencies for the selected radio. Pressing a line select key adjacent to a radio's name will display that radio's frequencies in the control window.

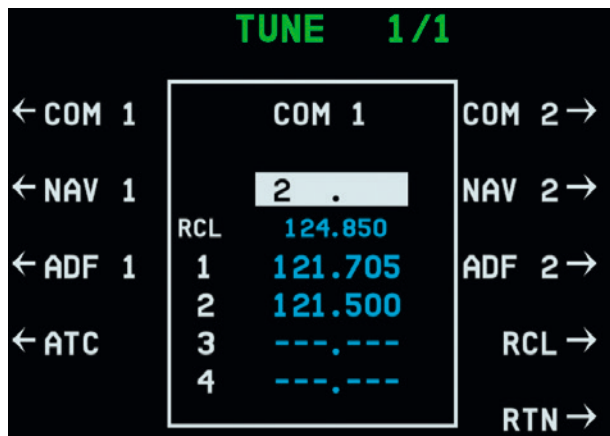
The first time any radio is displayed in the control window, the last tuned frequency will be displayed in the active field. The cursor will also be placed over the active field, allowing a new frequency to be entered into that field with the alphanumeric keys. Pressing the ENTER key will confirm the inputted frequency. ACT (active) will be displayed to the left of the active field when a signal is actively being received from that frequency.

When typing a frequency into the COM or NAV radios, the decimal point will automatically be placed in the correct position. For example, if the number '119705' is entered into a frequency field, the FMS will automatically convert that to '119.705'. The COM radio channels have also been made compatible with 8.33 kHz for maximum compatibility within the simulator.

Once a new frequency has been entered into the active field, the previous frequency will be displayed in the RCL (recall) line. Pressing the RSK 4 key (RCL) will swap the RCL frequency with the frequency in the active field.

Four preset frequencies can be stored in lines labelled 1-4. Pressing the ENTER key will move the cursor down one line with each press, returning to the active field position after it reaches the bottom of the list.

A preset frequency can be entered and changed by first moving the cursor to the desired line, then inputting the new frequency with the alphanumeric keys, and finally pressing the ENTER key. A preset frequency can be moved into the active field by inputting the reference number (1-4) of the desired preset frequency and then pressing the ENTER key.



Pressing the LSK 4 (ATC) key will display the transponder squawk codes in the cockpit window. The logic here is the same as described above for the ADF/COM/NAV radios but, due to squawk codes not having decimal places, only four-digit whole numbers will be accepted (e.g. '2000' or '3720'). Preset fields 3 and 4 are prefilled with codes 1200 (US VFR squawk code) and 7700 (general emergency squawk code) for easy access.

Any changes made to the active frequencies will be replicated on any analogue radio equipment in the cockpit. Likewise, any changes made to the frequencies on the analogue radio equipment in the cockpit will be replicated in the active frequency fields on the TUNE page.

VERTICAL NAVIGATION (PATH VNAV) PAGE

The PATH VNAV page can be opened by pressing the VNAV function key.



Once an arrival procedure (STAR) has been added to the flight plan, all of the arrival waypoints will be displayed here, along with any altitude constraints/restrictions. Use the PREV/NEXT keys to cycle through the pages.

On VNAV page 1, a target vertical speed (TGT V/S) can be entered by pressing RSK 1, entering the planned vertical speed of the descent with the alphanumeric keys and then pressing ENTER. This will update the VNAV page to provide the following descent information:

TO TOD – distance from the aircraft’s present position (PPOS) to the top of descent (TOD).

FR PPOS – distance from PPOS to the TO waypoint, as well as the current vertical speed required to fly over the TO waypoint at the listed altitude, based on the aircraft’s current speed and altitude.

TO – the first waypoint on the flight plan with an altitude constraint/restriction, and the waypoint used in the VNAV distance and vertical speed calculations.

NX – a list of the next waypoints in the flight plan that have altitude constraints/restrictions. Pressing the NEXT key will show any additional waypoints with altitude constraints/restrictions that are not shown on page 1.

PATH VNAV		2/2
DIVSU	@	2000
FI20	@	2000
RW20	@	143
NZCH	@	123
-----	@	-----

Once TOD has been reached, the TOD distance will be removed from view. The vertical speed display will then be updated constantly throughout the descent, providing a useful tool for the pilot to confirm that they are still on the correct descent path.

If the vertical speed displayed here is constantly followed by the aircraft, the aircraft will reach the waypoint at the specified altitude.

In order to stay on the planned descent path, the pilot should aim to keep the vertical speed displayed here matching the target vertical speed that was entered prior to the top of descent.

PATH VNAV		1/2
TO TOD	178.7 NM	TGT V/S
FR PPOS		-2200
	218.9 NM -400	4.2 °
TO PEAKS	↑ 11000	
NX BLUNT	↑ 7000	
	CH404 ↑ 6000	
	ODISI @ 2000	

FLYING WITH THE UNS-1

This tutorial flight will cover a generic flight between two airports and can be used with any Just Flight Professional series aircraft that is fitted with a Universal UNS-1 Flight Management Computer (FMC). It will therefore cover all the procedures required to set up and operate the UNS-1, but will not cover options of the aircraft itself. For information on how to operate the aircraft you are flying, please see the relevant Operations Manual located in the same folder as this manual.

In this tutorial flight we will be departing from Auckland International Airport, the busiest airport in New Zealand, and flying south to Christchurch Airport, the second busiest airport in the country and the gateway to Antarctica. We will be flying south down the western coastline of New Zealand's North Island before crossing the Cook Strait, the body of water that separates New Zealand's North and South Islands, and beginning our descent into Christchurch.

Covering approximately 413 nautical miles, this regional flight is the ideal length for learning UNS-1 operations on board any Just Flight Professional aircraft.

The flight plan in this tutorial flight was created using the 2401 AIRAC cycle that is included with the UNS-1 FMS. Some minor differences in the flight plan may occur if you are using a newer AIRAC cycle.

Here are the details for today's flight:

NZAA LEVR1P KARRL H384 NP H252 NS Y288 PEAKS PEAK8B NZCH



Estimated time en route: 80 minutes

Route distance: 413 nautical miles

Departure time: 1400 (local time)

Weather: Few Clouds

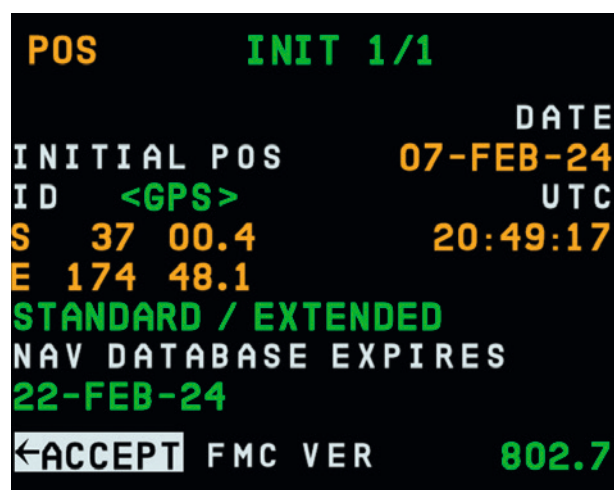
Pre-flight

With the aircraft powered up and passenger/cargo boarding in progress, we can run through the set-up process to get the UNS-1 ready for flight.

Turn on the unit by pressing the **PWR DIM** key. The unit will then run through a self-test procedure.



Once the self-test is complete, the first page shown will be the INIT page. Check that all data listed on the page is correct before pressing **LSK 5** or the **ENTER** key to accept.



We can now begin to input the flight plan for today's flight.

Press the **FPL** function key to open the flight plan page.

Input our departure airport into the first empty field in the flight plan. If it is not already highlighted white, press **LSK 1** to highlight the first field and input **NZAA** using the alphanumeric keys on the FMC.



Once this has been inputted, press **ENTER** and a page will pop up showing the name and coordinates of the airport you are attempting to input. Ensure the name and coordinates are correct before pressing **LSK 5** or the **ENTER** key to add the airport to the flight plan.



You will now be returned to the FPL page and NZAA will be inserted into the top field of the flight plan. We can now begin entering the waypoints on our flight plan.



We can start by inputting the SID (Standard Instrument Departure) that is listed on our flight plan: **LEVR1P**.

Ensuring that we are on the FPL page (press the **FPL** function key if not), press the **MENU** key and then press **LSK 4** to open the DEPARTURE menu.

The DEPARTURE menu will open with the RUNWAY field highlighted and a list of available runways will be displayed on the left side of the display. We will be departing from runway 23L today which has the reference number **2**. Using the alphanumeric keypad, type '2' in the RUNWAY field and then press **ENTER**.

Note: The reference numbers are correct at the time of writing, but they may change depending on the Navdata and AIRAC cycle used.

The screenshot shows the 'DEPARTURE 1/1' screen. On the left, under 'SEL RUNWAY', there is a list: '1 05R' and '2 23L'. On the right, under 'DEPART', there is a list: 'NZAA' and 'RUNWAY'. Below 'RUNWAY', there is a field labeled '# 2' and 'SID'. A dashed line is visible below the 'SID' field. At the bottom right, there is a button labeled 'FPL →'.

The field highlighted will then automatically move down to the SID field and a list of available SIDs for the runway will be displayed. We will be flying the **LEVR1P** SID which has a reference number of **6**, so input the reference number into the SID field and press **ENTER**.

The screenshot shows the 'DEPARTURE 1/2' screen. On the left, under 'SEL SID', there is a list of 8 items: '1 BELR2P', '2 ELSA1P', '3 FIRT2P', '4 LENG2A', '5 LENG3P', '6 LEVR1P', '7 MEM02P', and '8 NZAA4A'. On the right, under 'DEPART', there is a list: 'NZAA', 'RUNWAY', and '23L'. Below '23L', there is a field labeled '# 6' and 'SID'. At the bottom right, there is a button labeled 'FPL →'.

The field highlighted will then automatically move to the TRANSITION field and a list of available transition points for that SID will be displayed. As **KARRL** is the first waypoint in our flight plan, and the last waypoint on the SID, this will be our transition point, so input the reference number into the transition field and press **ENTER**.

The screenshot shows the 'DEPARTURE 1/1' screen. On the left, under 'SEL TRANSITION', there is a list of 4 items: '1 KAPAI', '2 KARRL', '3 LAKES', and '4 TULMI'. On the right, under 'DEPART', there is a list: 'NZAA', 'RUNWAY', and '23L'. Below '23L', there is a field labeled 'LEVR1P. # 2' and 'SID'. At the bottom right, there is a button labeled 'FPL →'.

The SID has now been inputted into the flight plan. This can be viewed by returning to the FPL page by pressing **RSK 5**.

Note: The number of waypoints on the SID may extend over several pages, so be sure to press the **PREV/NEXT** keys to view the entire SID.

FPL 1/2		M	ALT / FL
1 > NZAA			-----
CRS231 °	1.9 NM		
2 > (430)			-----
231 °	6.2 NM		
3 > IRSIP			-----
175 °	11.5 NM		
4 > LEVRA			-----
168 °	18.6 NM		
5 > KAPAI			-----

We will follow a similar procedure later in the flight when we enter the arrival procedures, but for now we will focus on adding the remainder of the waypoints on our flight plan.

We could enter each waypoint manually but, as our flight plan includes airways, we can instead build our flight plan with a mixture of waypoints and airways to speed up the process.

To enter an airway from KARRL, ensure the next empty field in the flight plan is highlighted and then press the **LIST** function key.

On the LIST page, press **RSK 2** to open the AIRWAYS list, where all the airways that intersect the KARRL waypoint are shown.

As per our flight plan, we want to fly from KARRL, on the H384 airway, to NP. Therefore we need to input the reference number for the **H384** airway with the keypad and press **ENTER**.

LIST 1/1		
← APT	AIRWAYS # 1	VOR →
← NDB	FROM KARRL	/ PLT
← INT	1 H384	AIR →
	2 Q151	/ WAY
← FPLAN	3 Y506	GAP →
	4 Y832	
		RTN →

We will then see a list of all the waypoints on the H384 airway. As we will be flying on the airway as far as NP, we can select the **NP** waypoint by inputting its reference number and pressing **ENTER**.



Returning to the FPL page, all of the waypoints between KARRL and NP on the H384 airway will now be inserted into the flight plan. In this instance, NP was the next waypoint following KARRL on the H384 airway, so only the NP waypoint has been inserted. The number of waypoints added in this process will vary depending on how many waypoints are on the selected airway.



We will now repeat this process for the next airway on our flight plan. Highlight the next empty field on the FPL page, then press the **LIST** function key, and then **RSK 2** to open the AIRWAYS list. Input the reference number of the **H252** airway and press **ENTER**. Then input the reference number for the **NS** waypoint and press **ENTER**.

Returning to the FPL page, we can see that significantly more waypoints have been added to the flight plan this time due to the larger distance we will be travelling on the H252 airway. This shows why this method of flight plan entry is the most efficient, as adding each of those waypoints to the flight plan manually would be much more time consuming, whereas this method lets you add all of those waypoints by simply selecting an airway and a start and end point.



Repeat this process once more to add the required waypoints on the **Y288** airway between **NS** and **PEAKS**.

```

      FPL      3/3      [M]
178°      20.0 NM  ALT / FL
11 >MENO V    -----
178°      10.2 NM
12 >KUNVO     -----
178°      30.0 NM
13 >NS        -----
176°      96.0 NM
14 >PEAKS     -----
15 [ ]
  
```

Once all the waypoints on the flight plan have been inserted, input the destination airport (**NZCH**) as the last entry on the flight plan and press **ENTER**.

```

      FPL      3/4      [M]
178°      20.0 NM  ALT / FL
11 >MENO V    -----
178°      10.2 NM
12 >KUNVO     -----
178°      30.0 NM
13 >NS        -----
176°      96.0 NM
14 >PEAKS     -----
165°      39.1 NM
15 >NZCH      @      123
  
```

Now that all waypoints have been entered, it is good practice to double-check that the flight plan in the FMC matches our planned route, and to delete or edit any waypoints that are not correct.

Note: We have not yet inputted our arrival procedures and that is intentional, as typically we wouldn't be sure of what the wind direction will be on our arrival into Christchurch until we are further into our flight. To keep this tutorial realistic, therefore, we will save setting up our arrival procedure until later in the flight.

With the flight plan entered, we can now move to the FUEL page by pressing the **FUEL** function key.

```

      FUEL      1/2      [M]
BASIC WT  KGS      ALTERNATE
25642      227
PAX (125) @ 77      HOLD
9639      227
CARGO      EXTRA
1100      45
ZFW      TOTAL RESRVS
36748      499
GROSS WT      FUEL ONBOARD
43987      7239
  
```

On the FUEL page, ensure that the number of passengers in the PAX field matches up with the passenger number on the EFB and then press **ENTER**. If they do not match, press **LSK 2**, input the correct number into the highlighted field and press **ENTER**.

FUEL 1/2 [M]	
BASIC WT KGS	ALTERNATE
25642	227
PAX (125) @ 77	HOLD
9639	227
CARGO	EXTRA
1100	45
ZFW	TOTAL RESRVS
36748	499
GROSS WT	FUEL ONBOARD
43986	7239

The CARGO field, where the weight of the cargo can be inputted, will then be highlighted automatically. Ensure that the cargo weight matches up with the weight on the EFB and then press **ENTER**. If it is not correctly set, input the correct value and press **ENTER**.

FUEL 1/2 [M]	
BASIC WT KGS	ALTERNATE
25642	227
PAX (125) @ 77	HOLD
9639	227
CARGO	EXTRA
1100	45
ZFW	TOTAL RESRVS
36748	499
GROSS WT	FUEL ONBOARD
43986	7238

The FUEL ONBOARD field, where the weight of the fuel can be inputted, will then be highlighted automatically. This field should also be automatically synchronised with the current fuel level in the aircraft, so only a cross-check is normally required. Pressing **ENTER** will confirm the current figure.

FUEL 1/2 [M]	
BASIC WT KGS	ALTERNATE
25642	227
PAX (125) @ 77	HOLD
9639	227
CARGO	EXTRA
1100	45
ZFW	TOTAL RESRVS
36664	499
GROSS WT	FUEL ONBOARD
43901	7237

Note 1: Average passenger weight and the weight units can be adjusted in the FUEL MENU. This menu can be accessed by pressing the **MENU** function key when on the FUEL page.

Note 2: The fuel and passenger numbers on the FUEL page have no effect on the aircraft's actual weight; you are simply telling the FMC what these values are. The actual fuel load and number of passengers on the aircraft can be viewed and edited on the aircraft's EFB tablet.

The UNS-1 is now set up for departure. Pressing the NAV key will confirm that the TO waypoint (the first waypoint on the route) is an altitude restriction related to the SID. This is correct, as the altitude restriction is positioned just after the end of the runway, and the next (NX) waypoint is the first waypoint on the SID: IRSIP.

On departure the aircraft will begin to follow the FMC's lateral navigation as long as the correct LNAV/RNAV modes are configured on the aircraft's autopilot panel.

Note: Remember that the UNS-1 FMC does not provide vertical navigation to the autopilot, so vertical navigation has to be accomplished using the aircraft's standard vertical modes.

Climb

As we climb on the SID, we can monitor the UNS-1 FPL and NAV pages to confirm that the aircraft is tracking the correct waypoints, and that once a waypoint has been overflown, the next waypoint becomes active automatically.

NAV		1/1		
FR	IRSIP	20:35	HDG →	
	175° 11.5NM	0+01		
TO	LEVRA	20:38	MNVR →	
	168° 18.6NM	00+04		
NX	KAPAI	20:42		
XTK	(T) L0.09	GS	280	
HEADWIND	0	BRG	174	
WIND	270T/ 2	TKE	L 001	

If ATC instructions cleared you to perform a short cut on your route, you can achieve this by pressing the **DTO** function key and inputting the reference number of the waypoint you have been cleared direct to. Pressing the **ENTER** key will confirm this and will turn the selected waypoint magenta. The aircraft will then fly directly to the new active waypoint.

DTO		1/3		
DIRECT		5		
2	(430)			
3	IRSIP			
4	>LEVRA			
5	KAPAI		AUTO →	
6	KARRL			
7	NP		RETURN →	
8	RUPNU			

Cruise

On reaching cruising altitude we can continue to monitor the various pages on the UNS-1 and confirm correct lateral navigation.

On the **NAV** page we can see an overview of our position on the flight plan as well as view information regarding our current position, such as the current wind conditions and how this affects our groundspeed and flight path offset.

NAV		1/1	
FR	NP	20:56	HDG →
	176° 30.2NM	0+02	
TO	RUPNU	21:00	MNVR →
	176° 24.6NM	00+04	
NX	TONUS	21:04	
XTK	(T) R0.01	GS	396
HEADWIND	0	BRG	176
WIND	270T/ 0	TKE	R 000

On the **PERF** page we can see the aircraft's current fuel situation, including the time at which we are currently estimated to arrive at NZCH and the amount of fuel we expect to have remaining once we land. If, for instance, we had a very strong headwind, we could be burning more fuel than expected and would be able to tell from this page if we could still make it to NZCH with a safe amount of fuel remaining. As we are flying a short route today with full fuel tanks, this shouldn't be an issue.

PERF		1/1	[M]
GS	396	HEADWIND	0
ESAD	---	TEMP	-40
DIST	265	GND	NM/KG. 5.5
ETE	00:40	AIR	NM/KG. 8.7
ETA	21:39	LCL	
NOW		OVHD	NZCH
42491	WT	WT	38112
5828	FUEL ONBRD		4380
02+42	ENDURANCE		02+02
1067.9	RANGE		802.5

Continuing on the **PERF** page, pressing the **MENU** key followed by **LSK 5** will open the ETP/PNR page. This page shows us the direct distance to our departure and destination airports, as well as the estimated time it would take to fly there and the amount of fuel remaining upon landing. In one of the empty fields we can enter Wellington Airport, **NZWN**. Wellington airport is located on the southern coast of New Zealand's North Island, so it would be a good choice of an alternate airport if we suddenly had to divert. With the time, distance and fuel indicated on this page, we could quickly plan our top of descent and know far in advance if we were going to be under or over our maximum landing weight.

ETP/PNR			1 / 2
	DTO TIME	DTO DIST NM	FUEL OVHD LBS
ARPT1			
NZAA	00+22	142	5210
ARPT2			
NZCH	00+40	261	4705
ARPT3			
NZWN	00+19	127	5273
ARPT4			
----	**+**	0	-----

Descent preparations

As New Zealand's South Island comes into view out of the cockpit windows, we can start setting up our arrival procedure.

With only light winds out of the west, we will be flying the **PEAK8B** STAR (Standard Arrival Route) onto an **ILS approach** for **runway 20**.

Press the **MENU** button on the UNS-1's **FPL** page to access the FPL MENU page.

Press **RSK 4** to open the ARRIVAL page.

The ARRIVAL page will open with the RUNWAY field highlighted and a list of available runways will be displayed. As we will be arriving on **runway 20**, input the reference number in the RUNWAY field and press **ENTER**.

ARRIVAL		1 / 1
SEL RUNWAY		ARRIVE
1 02		NZCH
2 11		RUNWAY
3 20		# 3
4 29		STAR

		APPR

		FPL →

The field highlighted will then move down to the STAR field and a list of available STARs for that runway will be displayed. We will be flying the **PEAK8B** STAR so press **NEXT** to scroll through the pages until we find the correct STAR, then input the reference number into the STAR field and press **ENTER**.

ARRIVAL		2/3
SEL STAR		ARRIVE
9 KIDA7B		NZCH
10 LADI2F		RUNWAY
11 LADI6B		20
12 MESI7B		STAR
13 MOLG2F		# 15
14 MOLG6B		APPR
15 PEAK8B	-----.	
16 PEHR2F		FPL →

The field highlighted will then move down to the APPROACH field and a list of available approaches for the selected runway will be displayed. As we will be flying the ILS for runway 20, we can input the reference number for the **ILS approach** into the APPR field and then press **ENTER**.

ARRIVAL		1/2
SEL APPROACH		ARRIVE
1 VDMO 20		NZCH
2 VDMS 20		RUNWAY
3 ILSO 20		20
4 ILSS 20		STAR
5 LOCO 20	-----.	PEAK8B
6 LOCS 20		APPR
7 RNVS 20		# 3
8 RNVW 20		FPL →

The field highlighted will then move across to the TRANSITION field and a list of available transition points for the STAR will be displayed. We will be flying the **ODISI** transition, which is the waypoint at the end of the STAR and the beginning of the ILS approach. Input the reference number for ODISI into the transition field and then press **ENTER**.

ARRIVAL		1/1
SEL TRANSITION		ARRIVE
1 D290M		NZCH
2 ODISI		RUNWAY
3 DIVSU		20
		STAR
	-----.	PEAK8B
		APPR
	# 2.	ILS020
		FPL →

The arrival procedure has now been inputted into the flight plan and this can be viewed by pressing **RSK 5** to return to the FPL page.

As always, it is good practice to double-check that the flight plan in the FMC matches our planned route and we can delete or edit any waypoints that are not correct.

We can now begin to plan our descent. Although this UNS-1 is simulated to be fitted to an aircraft without a VNAV autopilot mode, the VNAV page can still be used to determine an accurate top of descent point and descent path.

Press the **VNAV** function key to open the PATH VNAV page.

This page is currently in its inactive state and displays the waypoints on the approach as well as their respective altitude constraints/restrictions. The first altitude restriction on our approach is at PEAKS, where we need to be above **11,000ft** when we pass overhead, so this will be the initial altitude we descend to.



We can now input the target vertical speed of our descent by pressing **RSK 1** and then inputting the desired figure. For this flight we will input **2000** and then press **ENTER**.



The PATH VNAV page is now in cruise mode and a new line of data indicating the distance still to fly until the top of descent will appear at the top of the page.

Underneath this line the required vertical speed from the aircraft's current position to the first altitude restriction is displayed. This is a useful tool during the descent as it provides a visual reference as to how high or low the aircraft is, compared to the target vertical speed. In order to achieve a smooth, on-target descent, the aircraft's vertical speed should match the target vertical speed shown here throughout the descent.

PATH VNAV		1/2
TO TOD	134.2 NM	TGT V/S
FR PPOS		-2000
	196.5 NM -600	3.0 °
TO PEAKS	↑ 11000	
NX BLUNT	↑ 7000	
	CH404 ↑ 6000	
	ODISI @ 2000	

Descent

When the distance to top of descent reaches 0NM on the PATH VNAV page, the page now enters descent mode and will provide vertical speed guidance. As we have entered a target vertical speed of **-2000ft/min**, our aim is to keep this indicator at -2000ft/min throughout the entire descent.

PATH VNAV		1/2
TO TOD	64.4 NM	TGT V/S
FR PPOS	-2000	-2000
		2.9 °
TO PEAKS	↑ 11000	
NX BLUNT	↑ 7000	
	CH404 ↑ 6000	
	ODISI @ 2000	

If the indicator starts to indicate -1700ft/min, that means we are too low with respect to the target descent path and we need to reduce our descent rate to -1700ft/min in order to still reach our first altitude restriction at the correct altitude.

PATH VNAV		1/2
TO TOD	57.8 NM	TGT V/S
FR PPOS	-1700	-2000
		3.2 °
TO PEAKS	↑ 11000	
NX BLUNT	↑ 7000	
	CH404 ↑ 6000	
	ODISI @ 2000	

If the indicator starts to indicate -2300ft/min, that means we are too high with respect to the target descent path and we need to increase our descent rate to -2300ft/min in order to still reach our first altitude restriction at the correct altitude.

PATH VNAV			1/2
			TGT V/S
FR	PPOS		-2000
	44.2 NM	-2300	3.1 °
TO	PEAKS	↑ 11000	
NX	BLUNT	↑ 7000	
	CH404	↑ 6000	
	ODISI	@ 2000	

As we pass over the PEAKS waypoint, the TO waypoint on the PATH VNAV page will automatically change to the next waypoint with an altitude restriction. This is **BLUNT**, which we have to cross above **7,000ft**.

PATH VNAV			1/2
			TGT V/S
FR	PPOS		-2000
	7.0 NM	-2000	4.6 °
TO	BLUNT	↑ 7000	
NX	CH404	↑ 6000	
	ODISI	@ 2000	
	DIVSU	@ 2000	

As we descend, the PATH VNAV page will continue to show and update the required vertical speed for the remainder of the descent, so it is a useful tool to monitor.

During the approach we can continue to monitor the NAV, FPL and VNAV pages to keep track of our progress. If the aircraft has multiple UNS-1s fitted, it can be useful to have each UNS-1 displaying a different screen during these high workload situations.

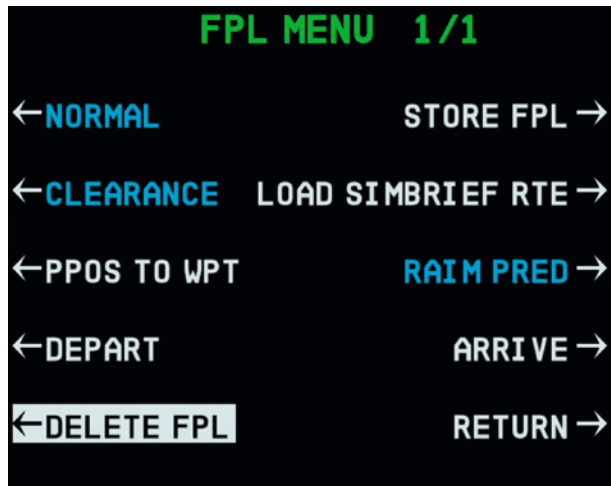
Approach

As the aircraft turns onto the final approach course for runway 20, it is important to remember that the UNS-1 does not have any command over the aircraft's vertical navigation. In order for the aircraft to intercept and track the ILS localiser and glideslope, therefore, the correct course and frequency must be tuned into the aircraft's NAV radios. The ILS for runway 20 at Christchurch uses a course of **196 degrees** and a frequency of **110.30 MHz**.

Once within intercept range of the localiser and glideslope, we can disengage the aircraft's LNAV/RNAV capability and engage the aircraft's traditional autopilot approach modes.

Shutdown

After a successful landing and parking at the gate, we can now shut down the aircraft and power off the UNS-1. As we don't need the flight plan loaded in the UNS-1 anymore, we can delete it by opening the **FPL** page, pressing the **MENU** key and then pressing **LSK 5** twice.



We can then switch off all UNS-1 units in the cockpit by pressing the **PWR DIM** function key, followed by **RSK 5**.



Congratulations – you have completed the UNS-1 tutorial flight!

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Thank you to all the testers.

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