PRODUCT MANUAL

MV-22B Tiltrotor

45 articles · Complete website edition

Includes all article text, tables and available illustrations. Videos and interactive resources are linked. Printed page numbers restart with each article. Use the clickable contents or PDF bookmarks to navigate.

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Miltech Simulations MV-22B Tiltrotor

Welcome to the MV-22B

Caution
SIMULATION USE ONLY - DO NOT USE THIS DOCUMENTATION ON A REAL AIRCRAFT

Overview

The MV-22B is a tiltrotor aircraft, combining the Vertical Takeoff and Landing (VTOL) capabilities of a helicopter with the speed, range and service ceiling of a turbo-prop aircraft. The aircraft is a twin engine, twin proprotor, high wing, twin tail design with retractable landing gear.

The MV-22B is the variant especially built for the Marine Corps, and as such, features slightly different designs and systems compared to the Navy or Air Force variants. Our MV-22B features fictional Navy and USAF liveries for entertainment purposes, but it does not represent the real variants these agencies operate.

Our rendition of the MV-22B includes the following liveries:

- Marine “Golden Eagles” (MCAS New River)
- Marine “Thunder Chickens” (MCAS New River)
- Marine “Blue Knights” (MCAS New River)
- Marine “Evil Eyes” (MCAS Miramar)
- Marine “Presidential Nighthawks” (MCAS Quantico)
- Navy “Titans” (NAS North Island) (CMV-22B VARIANT)
- Air Force “Blackbirds” (AFB Hulburt Field) (CV-22B VARIANT)
- Japan Self-Defense Force
- Blank Livery

Get Started

We've put together some helpful guides for you to get set up with our product quickly and easily.

Requirements

- Microsoft Flight Simulator - PC or Xbox. Latest version available.
- A valid product license from ORBX or the MS Marketplace
- Joystick Controller (Recommended) or Xbox controller
- CPU: Quad-core processor or better.
- GPU: At least 6GB of dedicated memory, Nvidia 1060 or better.
- RAM: 8GB Minimum.
- Hard Disk: At least 4GB Recommended.

Where to Buy?

1. ORBX: https://orbxdirect.com/product/miltech-mv22b-osprey
2. Microsoft Flight Simulator in-game Marketplace

Installation - ORBX

1. Launch ORBX Central with Administrator Rights.
2. Verify ORBX Central has located your MSFS Community Folder Path
3. Search the product
4. Click “Install” and wait for the product to install successfully
5. Close ORBX and launch Microsoft Flight Simulator By default the product is installed on: (User)\AppData\Roaming\Microsoft Flight Simulator\Packages\Community\miltechsimulations-aircraft-osprey-mv2

Installation - MS Marketplace

1. Launch Microsoft Flight Simulator
2. Open the Marketplace
3. Search the product
4. Click “Install” and wait for the product to install successfully. The product is by default installed on: (User)\AppData\Roaming\Microsoft Flight Simulator\Packages\Official\miltechsimulations-aircraft-osprey-mv22

Ready to Fly? ✈

1. Get familiarized with the Important Need-to-Knows
2. Follow the Quick Start Guide

Removal

The product can be removed from ORBX Central or the MS Marketplace, by clicking on the uninstall button.

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Introduction

Thank you very much for purchasing Miltech Simulations - Maryadi MV-22B.

The MV-22B is a tiltrotor, VSTOL (Vertical/short takeoff and landing), multi-mission aircraft, developed to fill multi-service combat operational requirements. Its real-life counterpart replaced Marine Corps assault helicopters in the medium-lift category (CH-46E and CH-53D), contributing to the dominant maneuver of the Marine landing force, as well as supporting focused logistics in the days following the commencement of an amphibious operation.

The MV-22B has other variants, such as the CV-22B, developed for the US Air Force. Other variants for the Royal Navy, Anti-submarine Warfare and Search and Rescue have been proposed.

The aircraft is manned by a pilot, copilot, and enlisted aircrew appropriate for the specific service and type of mission being flown. The MV-22B is optimized to transport troops (i.e., 24 combat-equipped Marines, or 10,000 pounds of external cargo) to austere landing sites from aviation-capable amphibious ships and expeditionary forward operating bases ashore. The MV-22B would be capable of flying over 2,100 nautical miles with one aerial refueling, giving the Services the advantage of a Vertical/Short Takeoff and Landing aircraft that can rapidly self-deploy to any location in the world.

The MV-22B is currently operated by the United States Marine Corps (MV-22B), United States Navy (CMV-22B), United States Air Force (CV-22B) and Japan Self-Defense Forces (MV-22B). Israel, India and Indonesia have considered acquiring the aircraft for their own military operations.

Miltech Simulations has partnered with Maryadi, who has been developing the MV-22B for a long time. As product of such collaboration, we now present our rendition of the MV-22B for Microsoft Flight Simulator.

The MV-22B is a very complex and uncommon aircraft. We recommend that the users study this manual prior to flying the aircraft, due to the technicalities that make this aircraft unique. This simulated Flight Manual describes and explains the simulated systems, what to do on your first flight, performance and limitations, and lots of unique MV-22B features and simulated characteristics. It is important to mention that this product will continue to be improved upon and updated for many months, as the implementation of Heli/VTOL aircraft is improved on MSFS. At the time of release, VTOL-operation support is limited, and the aircraft handles according to such limitations.

We hope you enjoy the product,

Maryadi & Miltech Simulations

Miltech Simulations MV-22B Tiltrotor

Glossary

Acronym	Meaning
APLN	Airplane Mode (Nacelles at 0 deg)
BFWS	Blade Fold/Wing Stow
CDU	Control Display Unit
CONV	Conversion (VTOL to APLN or viceversa - Nacelles at 1 - 86 deg)
CPLD	Coupled
ENAV	External Navigation
INAV	Internal Navigation
INOP	Inoperative
MFD	Multifunction Display
Ng	Gas Generator Speed
PFD	Primary Flight Display
SRCH PAT	Search Pattern
STO(L)	Short Takeoff (and Landing) (Nacelles at 60 - 75 deg)
TCL	Thrust Control Lever
VTO(L)	Vertical Takeoff (and Landing) (Nacelles at 87 - 93 deg)

Miltech Simulations MV-22B Tiltrotor

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Credits

- Programming: Maryadi
- 3D Modeling & Texturing: Maryadi, Miltech Simulations
- Flight Dynamics: Maryadi
- Sounds: Maryadi, Asobo
- Documentation: Miltech Simulations
- Distribution: Miltech Simulations, ORBX, Microsoft
- Marketing: Miltech Simulations, ORBX
- Testing: Miltech Simulations, ORBX
- Video and Promotion Materials: AviationLads

Special Thanks to all independent Beta Testers:

- ORBX Team: Ed Correia, Giogio La Pira, Matt McGee, Ross Casey, Rob Abernathy, Darryl Wightman, John Burgess. John Dow.

- FSDeveloper Team: John Schiller, Josh Stewart, UsmcPetrie

Special thanks to all supporters on FSDeveloper.

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Miltech Simulations MV-22B Tiltrotor

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All support for this product will be handled initially by Miltech Simulations. Support is available via our support forum: https://miltechsimulations.talkyard.net/latest

Our support is also offered via email in a 1-to-1 manner, through our Email Address: contact@miltechsimulations.com

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Miltech Simulations MV-22B Tiltrotor

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A PDF Version of this manual is available for download here:

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Miltech Simulations MV-22B Tiltrotor

Important Need-to-Knows

Aircraft Flight Reality

- It is **REQUIRED** to keep Crash Detection “OFF” due to unique handling characteristics of this aircraft, especially when used with one of our carrier products.
- The aircraft does, however, include its own Flight Assist configuration, which deactivates Vortex Ring State and Engine Limitations to ease flight.
- This option can be located in the CDU/ACFT Init/MENU 3/Flight Reality.
- Please keep in mind that all flights start on the “Hardest” flight reality setting. If you desire to deactivate VRS and Limitations, you must perform this change every time you start a flight.

Proprotor Animations

- The real aircraft has a gearbox and drive shaft system connecting both engines and proprotors. This serves two purposes - the first one is syncing the rotation of both proprotors, and the second is providing thrust to both props with only one engine running. This means that by starting one engine, you will see both props rotate.

Vortex Ring State

- In VTOL config (Nacelles between 80 and 97 degrees) and airspeed < 30 Knots, the aircraft will start to roll/stall uncontrollably when V/S (Vertical Speed) gets over 1500 ft/min.
- This type of stall is common in helicopters and VTOL aircraft and requires special attention from the pilot when descending in VTOL mode. This can easily be avoided by controlling the descent speed and/or airspeed (avoid the “Red area” from the V/S Indicator).



Figure: Vortex Ring State and V/S Indicator

- If you enter a Vortex Ring State at sufficient altitude, throttle up and reduce the nacelles angle to increase airspeed and gain lift. Throttling up without decreasing nacelle angle won’t do much, as the rotors are unable to provide lift when in a Vortex Ring State.
- Vortex Ring State simulation can be deactivated by switching “Flight Reality” to EASY on the CDU.

Engine Start/Stop

- Do not Start/Stop engines using the FS Auto-Start/Auto-Shutdown commands (CTRL+E / CTRL+SHIFT+F1). The complexity of this aircraft requires manual interaction with the overhead panel Starter Levels.

Lights Command "L"

- The “All Lights Toggle” command is disabled for use in this aircraft. Use the light knobs/switches on the overhead panel and CDU to turn on/off the lights. See Aircraft Systems on EICAS and Exterior Lighting.

Engine Limitations

- Engines can afford high RPM (> 98% Ng) for a maximum period of 60 seconds continuously. Any longer and the engines will be damaged and shut down.

- This simulates the real counterpart, which can stand for limited amounts of time at high RPM.
- Engine limitations can be deactivated by switching “Flight Reality” to EASY on the CDU.
- Interm Power on the PFD and FLIR will blink red if the engine is overstressing.
- To reset all failures, see Aircraft Systems on CDU / ACFT INIT Submenu

Flap Controls

- The Osprey features a unique automatic flap system. Flaps are typically in “Auto” at all times. Flaps can be, however, manually operated as well.
- To manually operate Flaps, the user must first set the Flap Lever to 0, then operate the flaps with the regular controls. See Aircraft Systems on Center Console and Flaps.

Use of the Autopilot

- It is recommended that Autopilot and autothrottle be used during APLN mode only (Nacelles at 0 degrees).
- The autopilot does work and can be used during CONV (Conversion from VTOL to APLN), but functions are limited and the behavior can be unexpected.
- The CPLD “ARM” light illuminates when Autopilot is available.

Autohover

- The Osprey features an Autohover function within the Autopilot system. Autohover only functions when radioaltimeter is between 40ft and 300ft and at stable speeds.
- The “ARM” light illuminates when Autohover is available. Autohover disengages with high wind speeds or sudden input on the controls.

Pausing the Sim

- Do not use active pause if nacelles are at a position different to 0 degrees. Active pause (keypess P) only works if the aircraft is in APLN mode.
- Pausing the sim going into the menu (keypress ESC) is fine, regardless of the angle of nacelles.
- VTOL flight requires custom-coded flight dynamics, as it is not natively supported by MSFS. Currently, the simulator pausing system does not work correctly with custom code, allowing variables to continue changing even when the simulator is paused. This ends up in an unrealistic simulator experience after resuming the flight. Note that when nacelles are at zero degrees, the custom code stops executing, and the default MSFS Flight Dynamics take control of the aircraft. Under these conditions, the simulator can be paused without affecting the aircraft behavior.

Controller Settings

- As mentioned above, it is recommended that users of this aircraft create a unique Controller Profile for it. This applies to joysticks, yokes and Xbox Controllers.
- The controller profile shall include allocating two buttons to Cowl Flap 4 Up/Down to operate the nacelles. It is recommended that you map your regular Flaps Up/Down buttons to Cowl Flap 4 Up/Down, since the Flaps of this aircraft operate automatically.
- For those using an Xbox controller, it is recommended that you dampen the input of your controllers to your liking. The aircraft is very sensitive to input, especially during CONV mode, and the Xbox controller lacks the precision required to control the aircraft effectively.

- The Osprey uses a single "throttle" axis to control both engines, which then controls both engines through the aircraft computers. Each engine cannot be controlled independently. Therefore, having a multi-axis throttle quadrant would give you problems when mapping the axis to Throttle 1/Throttle 2. The Osprey shall be controlled with a single throttle lever, which is mapped to the "Throttle" axis on MSFS

Current Limitations

The aircraft presents a few limitations on the depth of systems. Some systems have not been modeled yet or require some further development. Such systems are, for example:

- Anti-Ice and Ice detection are INOP
- AutoNACs are INOP
- Aerial Refueling is INOP, though the probe can be extended.
- Flight Planning is limited to the World Map only. CDU does not support flight planning.

Miltech Simulations MV-22B Tiltrotor

Quick Start Guide

Before you launch a flight, you must understand and follow the following steps:

1. **Get yourself familiarized with the** Important Need-to-Knows
2. **Your MSFS Assist Realism Settings must be set to True to Life, and crash detection must be off.** This is a strict requirement for this aircraft to function properly.
3. **You must map two controller buttons/keyboard keys to “Increase Cowl Flap 4” and “Decrease Cowl Flap 4”.** These two keys will control the angle of nacelles.

> Note
> If you prefer following a video tutorial, follow this: https://www.youtube.com/watch?v=1yAO-eDkGvo&t=72s

4. MSFS Sets the starting flight mode based on the type of starting location for the flight. Parking - Cold and Dark, Runway - Ready to Fly, etc. For this guide, we will be starting from a Parking location (Cold and Dark).
5. All flight plans are to be created using the built-in MSFS Flight Map before starting the flight. CDU Input is not available. Create your flight plan through the MSFS Flight Map now.
6. Fuel and payloads are to be changed through the built-in MSFS Menu. Range and Endurance are calculated automatically based on these numbers. To perform a VTOL Takeoff, Takeoff Weight must not be greater than 52.000lbs at sea level. Load your fuel and decide if you will be performing a VTOL or STOL takeoff and landing now.
7. By default, the aircraft always starts in “Hard” Flight Mode. Under this mode, the aircraft is prone to Vertex Ring State and Engine Limitations that the pilot must take care of for a successful flight. Flight mode can be switched to “Easy” through the CDU to deactivate VRS and Limitations. Decide if you want to fly the aircraft in “Hard” Mode, or switch to “Easy” now.

Normal Procedures

Welcome to the cockpit of the Osprey MV-22! If you’re not used to Helicopters, it may feel like you’re seated on the copilot seat. In helicopters (and tiltrotors) the captain sits on the right seat, unlike aircraft.

Take a few minutes to familiarize yourself with the cockpit. There are two screens in front of the pilot and copilot, which are your Multi-Function Displays (MFD). In between both seats, you’ll find the Central Display Unit (CDU), with the two input keyboards. And above you, you’ll find the Overhead Panel.

The aircraft is Cold and Dark. It’s time to start the checklists now.

I. Pre – Start

1.	Landing Gear – Down	Center Console
2.	Flaps – AUTO	Center Console
3.	Displays – OFF	Main Panel
4.	Fire Suppression T Handle – Both NORM	Overhead
5.	Rotor Brake – OFF	Overhead
6.	Engine Control Levers (Silver, large levers) - Both OFF	Overhead
7.	APU – STOP	Overhead
8.	Primary Cockpit Lights – OFF	Overhead
9.	Emergency Egress – OFF	Overhead
10.	Secondary Cockpit Lighting – OFF	Overhead
11.	Cargo Hook Hoist Mode – OFF	Overhead
12.	Fuel Dump – OFF	Overhead
13.	Emergency Oxygen – OFF	Overhead
14.	Blade Unfold and Wing Unstow Procedure – As Required	Main Panel (MFD)

Note
The Osprey can fold and stow its wings for Hangar/Carrier storage. This is known as “Blade Fold/Unfold and Wing Stow” (BFWS) and can be accessed through the Multi-Function Display. For more information on BFWS: Blade Fold/Unfold and Wing Stow (BFWS) Procedures

II. Power Startup

1.	Battery – ON	Overhead
2.	APU - RUN/ENG check APU display is RUN	Overhead
3.	Turn ON ALL PFD/MFD/CDU Displays (Rotary Switch OFF/DAY/NIGHT)	Main Panel
4.	Exterior Lights as required	Center Console (CDU)

Note
Exterior lights are operated through the CDU. Find and click on the “LTS” button on the keyboard of the CDU. To operate the lights, Master CTRL must be on (white with *). Turn on/off the exterior lights by pushing the buttons on the CDU.

III. Engine Startup

1. Start Engines:

a.	Set CDU on EICAS display (Click “EICAS” Button)	Center Console (CDU)
b.	Parking brake – ON	Center Console
c.	Rotor Brake – OFF	Overhead
d.	Rotor Lock – OFF (MFD/SYST/BFWS)	Main Panel (MFD)
e.	Fuel Quantity – CHECK	Main Panel (MFD)
f.	Nacelles – 90 Degrees	Main Panel (MFD)

Note
Nacelles are operated with “Increase Cowl Flap 4” and “Decrease Cowl Flap 4”. Y**ou must map two buttons of your controller, or keys on your keyboard to these commands.** Hold the mapped keys to increase of decrease nacelle angle. **Note that an alert on the CDU, indicating to map these two buttons, will show up until the nacelles are moved up and down, and the aircraft registers that both**

commands are correctly mapped.

g. Check aircraft is clear from obstacles	
h. Move ENG2 Control Lever to START position.	Overhead
i. Proprotor – Observe ROTATE	
j. EICAS-NG – gaining % RPM after 30 sec	Center Console (CDU)
k. ENG2 - Wait for Np stabilize at 70-72 %	Center Console (CDU)
l. Switch respective Engine Control Lever – FLY	Overhead
m. ENG1 - Lever to START position	Overhead
n. ENG1 – Wait for Np stabilize at 70-72%	Center Console (CDU)
o. Switch respective Engine Control Lever – FLY	Overhead

IV. Taxi

1. Disengage APU – STOP Position	Overhead
2. Engine Control Levers – Check both FLY	Overhead
3. Parking Brake – OFF	Center Console
4. Nacelles and Throttle as Required (minimum 60 Deg)	
5. Speed under 20 Knots	

V. Before Takeoff

1. Flaps – AUTO	Center Console
2. Fuel Quantity – CHECK	Main Panel (MFD)
3. Doors and Ramp – CLOSED	Overhead
4. Decide if takeoff will be VTOL or STOL	
I. VTOL – Maximum Takeoff Weight: 52.000 lbs	
II. STOL – Maximum Takeoff Weight 60.000 lbs	
5. Contact tower for Takeoff Clearance. Radios are inputted in CDU	Center Console (CDU)

VI. Takeoff

VTOL

1. Check take-off Area- CLEAR from obstacles
2. Nacelles 87 – 92 Degrees
3. Check windspeed and direction – headwind / into the wind
4. Increase Thrust slowly and Take off VTOL – observe NG indication to avoid engine stress.
5. Establish hover at 20ft AGL

STOL

1. Taxi to runway (Take-off position) and check area is CLEAR from obstacles
2. Nacelles: as required, depending on available runway. Normally: 60 to 75 degrees
3. Take off STOL – observe NG indication to avoid engine stress.

Warning
If maximum throttle is applied for a period longer than 45 seconds, the aircraft engines may fail due to overstress. Reduce throttle after takeoff to maintain engines on the “green area”. Engine Stress damage can be deactivated through the CDU (ACFT INIT/Flight Reality to EASY)

VII. Airborne and Conversion

1. Observe aircraft attitude – LEVEL
2. Observe engine RPM% - GREEN — Center Console (CDU)
3. Landing Gear – UP — Center Console
4. Gain speed and gradually rotate nacelles forward – observe conversion corridor indication in the PFD (Conversion)
5. Gain altitude as required
6. Above 130 knots nacelles can rotate to 0 degrees (APLN)
7. Set and activate Autopilot after CPLD turns green to ARM

> Caution
> Gradually rotate nacelles as speed is gained until Nacelles are at 0 deg. The conversion process must be flown manually (Autopilot is not recommended). Follow the conversion corridor ("Green arc") from the nacelle angle indicator on the top left corner of the primary flight display.

VIII. Climb

1. Navigation Course – SET
2. Default Climb Rate – 1000 Feet/min

IX. Cruise

1. Ideal Cruise Altitude - 17,000ft
2. Ideal Cruising Indicated Airspeed – 180 KIAS

The Osprey is now cruising and enroute to its deployment mission. Continue monitoring the engines to avoid a flameout due to engine stress and start briefing for the descent.

X. Descent

1. Default Descent Rate – 1000 Feet/min. Always descend in "APLN" mode (nacelles 0 deg)
2. Keep Indicated Airspeed under 200 KIAS

XI. Conversion

1. Scrub Airspeed to begin Conversion
   a. Max Speed for Conversion: 200 KCAS
   b. Ideal Conversion: 150-170 KCAS at 5000ft (Radio Altimeter)
2. Limit Nacelles to <75 Degrees until 40 KCAS is reached (follow Conversion Corridor)
3. At Nacelle Angle >75 Degrees, beware of rate of descent is NO MORE than 1500ft/min. Otherwise, the risk of Vortex Ring State is high.

> Warning
> Vortex Ring State (VRS) is a type of aerodynamic stall that occurs in helicopters and tiltrotors as a result of a high descent rate and low airspeed. You must be careful when descending with Nacelles at an angle higher than 75 degrees and airspeed below 40 KCAS, as the risk of VRS is very high.
> The aircraft will alert of a high Sink Rate, as well as the Vertical Speed Indicator illuminates red if the aircraft is in danger due to VRS. An ideal VTOL descent speed is 1000ft/min.

If VRS occurs, move nacelles down and gain airspeed to retain lift, if altitude permits
VRS can be deactivated through the CDU (ACFT INIT/Flight Reality to EASY)
NOTE: From 180 KCAS to 0 KCAS/Hover, conversion requires around 1800 meters in length. Distance requires varies depending on windspeed and thrust.

XII. Landing

VTOL

1. Observe Landing Spot is CLEAR
2. Observe wind speed and direction – head INTO the wind and avoid crosswind conditions
3. Adjust speed and Nacelle Angle
    a. Limit Nacelle Angle >75 Degrees for speeds under 40 KCAS
    b. At Nacelle Angle >75 Degrees, beware of rate of descent is no more than 1500ft/min
4. Landing Gear – EXTENDED Center Console
5. Flaps – AUTO Center Console
6. At 300ft AGL, level fuselage altitude and start turning Final
7. Under 200ft AGL, descent rate must be no more than 400ft/min
8. Move nacelles to 90deg (±5 Deg) and establish a stable a 30-40ft hover over the landing area
9. Reduce throttle slowly to lower the aircraft
10. Cut the throttle and apply breaks upon touchdown to avoid aircraft movement on the ground

STOL

1. Approach the runway as a conventional aircraft – Speed and nacelle angles as required (follow conversion corridor)
2. Observe landing path
3. Landing Gear – EXTENDED Center Console
4. Flaps – AUTO or MANUAL as Required Center Console
5. On Final Approach
    a. Nacelles at 60 Degrees
    b. Maintain speed between 50-80 Knots, as required according to weight
    c. Vertical Speed as Required
6. Land with Main Landing Gear first
7. Cut throttle, apply braking as Required
8. Increase Nacelle Angle as Required

XIII. Taxi

1. Nacelles and Throttle as Required (minimum 60 Deg)
2. Speed under 20 Knots
3. APU – As Required, RUN/ENG — Overhead

XIV. Engine Shutoff

1. Throttle Control Lever – Closed/IDLE
2. Nacelles – 90 Degree
3. Parking Brake – SET — Center Console
4. ENG1 and ENG2 Engine Control Levers – OFF — Overhead
5. Blade Fold and Wing Stow Procedure – As Required, see BFWS Procedure Checklist

XV. Cockpit Switchoff

1. External Lights – OFF — Center Console (CDU)
2. MFDs / CDU / EICAS – OFF — Main Panel (MFD)
3. RFIS / Standby Instruments – Min Brightness — Main Panel (MFD)
4. Cockpit Lighting – OFF — Overhead
5. APU – STOP — Overhead
6. BATTERY – OFF — Overhead

Congratulations! You have finished your first flight with the Osprey.

Miltech Simulations MV-22B Tiltrotor

Normal Procedures

Caution
SIMULATION USE ONLY - DO NOT USE THIS DOCUMENTATION ON A REAL AIRCRAFT

Sim Operation Remarks

1. MSFS Sets the starting flight mode based on the type of starting location for the flight:
2. Hangar: Cold and Dark/Blades Folded
3. Parking: Cold and Dark
4. Taxiway: Ready to Fly
5. Runway: Ready to Fly
6. Flying: Ready to Fly
7. Flights starting from Miltech's Carrier products (LHA-6 America, USS George Bush CVN-77 or LPD-22 San Diego) may have the option to start on the "Runway" (ready to fly) or on the "Parking" (Cold and Dark). This must be selected at the time of starting the flight.
8. All flight plans are to be created using the built-in MSFS Flight Map before starting the flight. CDU Input is not available.
9. Fuel and payloads are to be changed through the built-in MSFS Menu. Range and Endurance are calculated automatically based on these numbers.
10. By default, the aircraft always starts in "Hard" Flight Mode. Under this mode, the aircraft is prone to Vertex Ring State and Engine Limitations that the pilot must take care of for a successful flight. Flight mode can be switched to "Easy" through the CDU to deactivate VRS and Limitations.

Pre-Start

1. Landing Gear - Down
2. Flaps - AUTO
3. Displays - OFF
4. Fire Suppression T Handle - Both NORM
5. Rotor Brake - OFF
6. Engine Control Levers - Both OFF
7. APU - STOP
8. Primary Cockpit Lights - OFF
9. Emergency Egress - OFF
10. Secondary Cockpit Lighting - OFF
11. Cargo Hook Hoist Mode - OFF
12. Fuel Dump - OFF
13. Emergency Oxygen - OFF

14. Blade Unfold and Wing Unstow Procedure - As required, see Blade Fold/Unfold and Wing Stow (BFWS) Procedures

Power Startup

1. Battery - ON
2. APU - RUN/ENG check APU display is RUN
3. Turn ON ALL PFD/MFD/CDU Displays
4. Exterior Lights as required
5. Interior Lights as required

Engine Startup

Start Engines:

1. Set CDU on EICAS display or set MFD on STAT-ENG display
2. Parking brake - ON
3. Rotor Brake - OFF
4. Rotor Lock - OFF
5. Fuel Quantity - CHECK
6. Nacelles - 90 Degrees
7. Check aircraft is clear from obstacles
8. Move ENG2 Control Lever to START position.
9. Proprotor - ROTATE
10. EICAS-NG - gaining % RPM after 30 sec
11. ENG2 - Wait for Np stabilize at 70-72 %
12. Switch respective Engine Control Lever - FLY
13. ENG1 - Lever to START position
14. ENG1 - Wait for Np stabilize at 70-72%
15. Switch respective Engine Control Lever - FLY

Taxi

1. Disengage APU - STOP Position
2. Engine Control Levers - Check both FLY
3. Parking Brake - OFF
4. Nacelles and Throttle as Required (minimum 60 Deg)
5. Speed under 20 Knots

Before Takeoff

1. Flaps - AUTO

2. Fuel Quantity - CHECK
3. Doors and Ramp - CLOSED
4. Decide if takeoff will be VTOL or STOL
5. VTOL - Maximum Takeoff Weight: 52.000 lbs
6. STOL - Maximum Takeoff Weight 60.000 lbs
7. Contact tower for Takeoff Clearance. Radios freqs are inputted in CDU

Takeoff - VTOL

1. Check MTOW for VTOL
2. Check take off Area- CLEAR from obstacles
3. Nacelles 87 - 92 Degrees
4. Check windspeed and direction - headwind / into the wind
5. Increase Thrust slowly and Take off VTOL - observe NG indication to avoid engine stress.
6. Establish hover at 20ft AGL

Takeoff - STOL

1. Check MTOW for STOL
2. Taxi to runway (Take-off position) and check area is CLEAR from obstacles
3. Nacelles: as required, depending on available runway. Normally: 60 to 75 degrees
4. Take off STOL - observe NG indication to avoid engine stress.

Airborne and Conversion

1. Observe aircraft attitude - LEVEL
2. Observe engine RPM% - GREEN
3. Landing Gear - UP
4. Gain speed and gradually rotate nacelles forward - observe conversion corridor indication in the PFD (Conversion)
5. Gain altitude as required
6. Above 130 knots nacelles can rotate to 0 degrees (APLN)
7. Set and activate Autopilot after CPLD turns green to ARM

Climb, Cruise and Descent

Climb

1. Navigation Course - SET
2. Default Climb Rate - 1000 Feet/min

Cruise

1. Ideal Cruise Altitude - 17,000ft

2. Ideal Cruising Indicated Airspeed - 180 KIAS

Descent

1. Default Descent Rate - 1000 Feet/min
2. Keep Indicated Airspeed under 200 KIAS

Conversion

1. Max Speed for Conversion: 200 KCAS (see the Conversion Corridor Figure Performance and Limits)
2. Ideal Conversion: 150-170 KCAS at 5000ft (Radio Altimeter)
3. **Limit Nacelles to <75 Degrees until 40 KCAS is reached (follow Conversion Corridor)**
4. **At Nacelle Angle >75 Degrees, beware of rate of descent is NO MORE than 1500ft/min.** Otherwise, the risk of Vortex Ring State is high.
5. If VRS occurs, move nacelles down and gain airspeed to retain lift, if altitude permits.

NOTE: From 180 KCAS to 0 KCAS/Hover, conversion requires around 1800 meters in length. Distance requires varies depending on windspeed and thrust.

Landing - VTOL

1. Observe Landing Spot is CLEAR
2. Observe wind speed and direction - head INTO the wind and avoid crosswind conditions
3. Adjust speed and Nacelle Angle
4. **Limit Nacelle Angle >75 Degrees for speeds under 40 KCAS**
5. **At Nacelle Angle >75 Degrees, beware of rate of descent is no more than 1500ft/min**
6. Landing Gear - EXTENDED
7. Flaps - AUTO
8. At 300ft AGL, level fuselage altitude and start turning Final
9. **Under 200ft AGL, descent rate must be no more than 400ft/min**
10. Move nacelles to 90deg (±5 Deg) and establish a stable a 30-40ft hover over the landing area
11. Reduce throttle slowly to lower the aircraft
12. Cut the throttle and apply breaks upon touchdown to avoid aircraft movement on the ground

Landing - STOL

1. Approach the runway as a conventional aircraft - Speed and nacelle angles as required (follow the Conversion Corridor Figure Performance and Limits)
2. Observe landing path
3. Landing Gear - EXTENDED
4. Flaps - AUTO or MANUAL as Required
5. On Final Approach
6. **Nacelles at 60 Degrees**

7. **Maintain speed between 50-80 Knots**, as required according to weight
8. **Vertical Speed as Required**
9. Land with Main Landing Gear first
10. Cut throttle, apply braking as Required
11. Increase Nacelle Angle as Required

Taxi

1. Nacelles and Throttle as Required (minimum 60 Deg)
2. Speed under 20 Knots
3. APU - As Required, RUN/ENG

Engine Shutoff

1. Throttle Control Lever - Closed/IDLE
2. Nacelles - 90 Degree
3. Parking Brake - SET
4. ENG1 and ENG2 Engine Control Levers - OFF
5. Blade Fold and Wing Stow Procedure - As Required, see Blade Fold/Unfold and Wing Stow (BFWS) Procedures

Cockpit Switchoff

1. External Lights - OFF
2. MFDs / CDU / EICAS - OFF
3. RFIS / Standby Instruments - Min Brightness
4. Cockpit Lighting - OFF
5. APU - STOP
6. BATTERY - OFF

Miltech Simulations MV-22B Tiltrotor

Other Procedures

- Blade Fold/Unfold and Wing Stow (BFWS) Procedures
- Single-Engine Operations (Engine Failure)
- APPR using NAV1/NAV2 (ILS Approach - Glideslope and Localizer)
- In-Flight Refueling
- Fuel Dumping

Miltech Simulations MV-22B Tiltrotor

Blade Fold/Unfold and Wing Stow (BFWS) Procedures

Flight Ready to Full Stow

1. Engine Control Levers - Check OFF
2. Nr - Check 0%
3. Rotor Brake - OFF
4. Battery - Check ON
5. APU - RUN/Engage
6. HYD Pressure - Check NORMAL
7. AREA - CLEAR
8. MFD -> SYST -> BFWS - SET
9. FLT RDY - Verify white with *
10. FULL STOW - Select
11. ROTOR LOCK - Select on MFD, verify white with *
12. Observe:

1. NAC Positioned to 90 deg
2. Proprotor blades index and lock
3. Left and right blades fold
4. Flaps position to 0 deg
5. Nacelles lower
6. Wing lockpin retraction
7. Wing Stow

13. FULL STOW - Verify white with *

Full Stow to Flight Ready

1. Engine Control Levers - Check OFF
2. Nr - Check 0%
3. Rotor Brake - OFF
4. Battery - Check ON
5. APU - RUN/Engage
6. HYD Pressure - Check NORMAL
7. AREA - CLEAR
8. MFD -> SYST -> BFWS - SET

9. FULL STOW - Verify white with *
10. FLT RDY - Select
11. ROTOR LOCK - Select on MFD, verify white with *
12. Observe:

1. Flaps positioned to 0 deg
2. Wing lockpin retraction
3. Wing unstow
4. NAC raise to 90 deg
5. Wing lockpin extension
6. Blades unfold

13. FLT RDY - Verify white with *
14. ROTOR LOCK - Deselect on MFD, verify green

Flight Ready to Fold Horizontal

1. Engine Control Levers - Check OFF
2. Nr - Check 0%
3. Rotor Brake - OFF
4. Battery - Check ON
5. APU - RUN/Engage
6. HYD Pressure - Check NORMAL
7. AREA - CLEAR
8. MFD -> SYST -> BFWS - SET
9. FLT RDY - Verify white with *
10. FOLD HORIZ - Select
11. ROTOR LOCK - Select on MFD, verify white with *
12. Observe:

1. NAC Positioned to 90 deg
2. Proprotor blades index and lock
3. Left and right blades fold
4. Flaps position to 0 deg
5. Nacelles lower

13. FOLD HORIZ - Verify white with *

Miltech Simulations MV-22B Tiltrotor

Single-Engine Operations (Engine Failure)

In the event of a Single-Engine Failure, the Osprey can maintain regular flight with degraded performance, via the gearbox driving both proprotors. This is fully simulated on this aircraft product, and it occurs automatically upon loss of one engine.

When flying with a single engine running, the pilot must never perform a VTOL Landing. Landing is exclusively restricted to STOL. Under single-engine conditions, it is recommended to keep a cruise speed of 170 Knots at an altitude of 16,000ft. Beware of overstressing the engine (keep engine indications in Green)

Follow STOL checklist, and adjust nacelle angle, speed and thrust as required.

Miltech Simulations MV-22B Tiltrotor

APPR using NAV1/NAV2 (ILS Approach - Glideslope and Localizer)

1. Start the procedure, flying on AP (APLN mode)
2. HeadingHold On, and the Heading Selector at a heading that deviates 20 - 50 degrees from the ILS Localizer heading.
3. Check that this heading takes you to a point where it crosses the Localizer about
4. 10 - 15 nautical miles out.
5. AltHold On, flying at 2500 - 3000 ft above the ground, at an airspeed of 180 - 200 knots (APLN mode).
6. Set the CRS for the NAV radio (usually NAV1, but could be NAV2) with the ILS, equal to the Localizer heading of the ILS.
7. At DME 20, activate ApprHold.
8. When the Localizer becomes Active, HeadingHold is auto-switched off and the AP intercepts and tracks the Localizer. This is at DME 10 - 15.
9. When the Glideslope needle becomes Active (you are flying “into” the Glideslope), AltHold is auto-switched off, and the AP intercepts and tracks the Glideslope.
10. Reduce speed as required and gradually move nacelles to 60 deg (STOL Position)
11. Beware that the autopilot may behave oddly during Conversion. Use manual input as required
12. On final approach, take manual control. Nacelles at 60 deg and speed must be 50-80 Knots.

Miltech Simulations MV-22B Tiltrotor

In-Flight Refueling

The Osprey is capable of In-Flight Refueling. Unfortunately, this cannot be accurately modeled on MSFS at this time, as the “Refueler component” is missing in the sim. However, the refueling probe is fully animated, and refueling procedures can be somewhat simulated following a rather imaginative approach.

1. On APLN flight, and at stable speed and altitude:
2. CDU - STAT - FUEL - PROBE Extend
3. Wait for probe to extend fully (visible from cockpit)
4. Manually open the Fuel and Payload menu - Load Fuel
5. Verify new Fuel Amount
6. CDU - STAT- FUEL - PROBE Stow
7. Continue Flight normally.

Miltech Simulations MV-22B Tiltrotor

Fuel Dumping

The Osprey is also capable of dumping fuel. Fuel dumping occurs at a very fast rate, and the pilot must be careful to not dump more fuel than intended. Fuel dumping is fully simulated on this product.

1. Fuel dumping limited to 6000ft AGL and above, except during an emergency.
2. Airspeed - 80KCAS or Higher
3. Rate of Descent, 1000ft/min max, Rate of Climb, No limit
4. Nacelles - 0 deg to 75 deg
5. Landing Gear - Retracted
6. All Cabin Doors - Closed
7. Fuel Dump - Select
8. Feed Tank will not be dumped, the system automatically secures that a minimum amount of fuel is left in the tanks.

Miltech Simulations MV-22B Tiltrotor

Hardware Binding Guide

In this page you'll find the complete list of LVARs available for advanced Hardware Binding.

Warning
EXPERT ONLY - USE AT YOUR OWN RISK
Please beware that we cannot provide much assistance with these. The aircraft is not designed with hardware binding in mind, but rather for correct interaction with the WASM Module.
For this reason, setting some of these LVARs may result in CTDs, as WASM is prone to crashing.

Open interactive resource ↗

MV-22 LVAR LIST

Miltech Simulations MV-22B Tiltrotor

Overview - Exterior

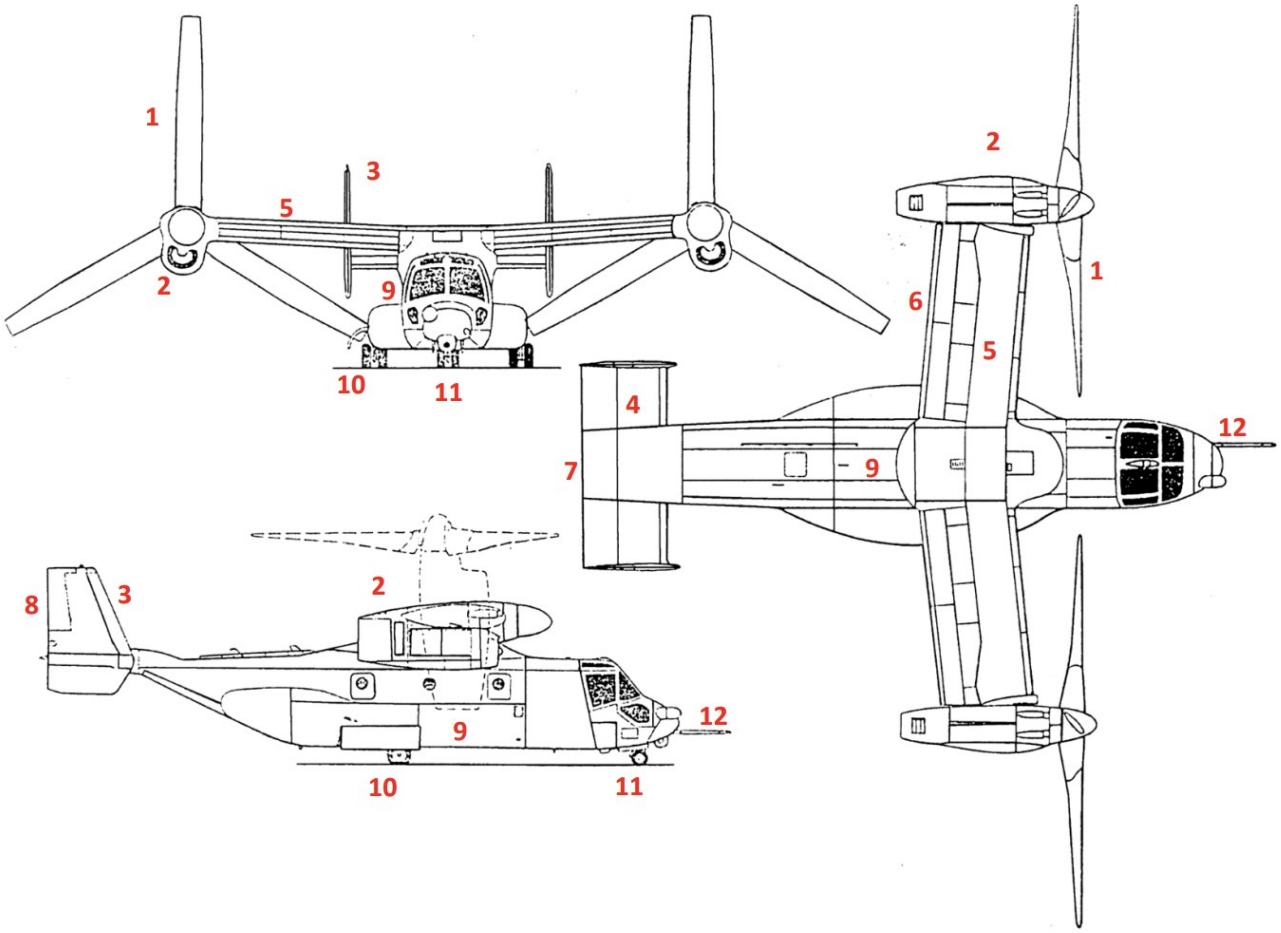


Figure: Osprey MV-22B Diagran

1. Proprotor
2. Engine Nacelle
3. Vertical Stabilizer
4. Horizontal Stabilizer
5. Wing
6. Flaperons
7. Elevator
8. Rudder
9. Fuselage
10. Main Landing Gear
11. Front Gear
12. Refueling Probe

Miltech Simulations MV-22B Tiltrotor

Overview - Cockpit



Figure: Osprey MV-22B Cockpit

1. Pilot’s Multi-Function Displays (MFD)
2. Copilot’s Multi-Function Displays (MFD)
3. Central Display Unit (CDU)
4. CDU Keyboards
5. Standby Instruments
6. Autopilot Console
7. Compass
8. Overhead Console
9. Communications Console
10. Master Alert
11. Center Console
12. Pilot’s Side Console
13. Copilot’s Side Console
14. Throttle / Collective
15. Stick / Cyclic
16. Rudder Pedals

Miltech Simulations MV-22B Tiltrotor

Aircraft Systems

- Multi-Function Displays (MFDs)
- Primary Flight Data (PFD)
- Hover Mode (HVR)
- Navigation Functions (NAV)
- Forward-Looking Infrared Camera (FLIR)
- Status Functions (STAT)
- System Functions (SYST)
- Center/Control Display Unit (CDU)
- CDU - Menu 1
- CDU - Menu 2
- Flight Plan (FPLN) Menu
- Waypoint (WYPT) Menu
- Mission (MSN) Menu
- Timer (TIMER) Menu
- Exterior Lighting (LTS) Menu
- Status Functions (STAT) Menu
- Engine Instrument Crew Alerting System (EICAS) & Standby Flight Display
- Autopilot Console
- Communications Console
- Standby Instruments
- Overhead Panel
- Center Console
- Side Consoles

Miltech Simulations MV-22B Tiltrotor

Multi-Function Displays (MFDs)

The Osprey is equipped with four Multi-function Displays (MFDs), two on the pilot and two on the copilot side. Each MFD is comprised of a square LCD Display, surrounded by a bezel containing switches and push buttons. The top left rotary knob controls the screen brightness mode (OFF, DAY, NIGHT).

The MFDs can display five different modes, which are selected with the five top bezel keys:

1. Primary Flight Data (PFD)
2. Navigation Functions (NAV)
3. Forward-Looking Infrared Camera (FLIR)
4. Status Functions (STAT)
5. System Functions (SYST)

Miltech Simulations MV-22B Tiltrotor

Primary Flight Data (PFD)

This page contains all the basic aircraft instrumentation and information necessary to fly the MV-22B.



Figure: Primary Flight Data

1. **Nacelles Indicator:** Indicates the angle of nacelles in degrees. It also visualizes the “Conversion Corridor” (See Performance for more details). Upper and lower limits based on airspeed are shown as two red indicators, safe area is in green.
2. **Indicated Airspeed** (Knots)
3. **Altitude Indicator** (Feet)
4. **Vertical Speed Indicator** (Feet/min): A warning red line appears below 60 knots IAS.

> Warning
> Vertical speeds inferior to 1500 ft/min that may result in Vortex Ring State (VRS). Avoid the red line when

flying at low speeds/high nacelle angles.

5. **Radio Altimeter:** Activates at an altitude between 1-5000ft (min altitude can be set in the CDU)
6. **Artificial Horizon**
7. **Interm Power:** Green = normal, Yellow = caution, Red = warning, Red Blinking = engine overstress

Warning
Engines cannot sustain full throttle for longer than 60 seconds. If Interm Power is blinking, reduce throttle to at least 98% for a few seconds to reduce stress on the engines.

8. **Heading/Compass Indicator**
9. **VOR/Waypoint Information:** Bearing, distance, estimated time arrival.
10. **Autopilot Active Data**: (not visible on screenshot)

Miltech Simulations MV-22B Tiltrotor

Hover Mode (HVR)

> Caution
> **Hover Mode is only available starting V1.4.0**

This page contains a special view of the Primary Flight Display specific for Hovers. To access the HVR Page, click on the PFD Button (Top left button) of any Multi Function Display in the MV22.



Hover Page

1. **Nacelles Indicator:** Indicates the angle of nacelles in degrees. It also visualizes the “Conversion Corridor” (See Performance for more details). Upper and lower limits based on airspeed are shown as two red indicators, safe area is in green.
2. **TO CARGO Display:** Will display only if external cargo has been selected. Displays distance and bearing to cargo.

3. **Compass Rose**
4. **Cargo Position Indicator:** Displays where is the cargo located with respect to aircraft, if external cargo has been selected.
5. **Radio Altitude and Vertical Speed Indicator:** Limited to maximum altitude of 500ft and vertical speeds of +500/-500. Beware of VRS Conditions

> Warning
> Vertical speeds inferior to 1500 ft/min that may result in Vortex Ring State (VRS). Avoid the red line when flying at low speeds/high nacelle angles.

6. **Interm Power:** Green = normal, Yellow = caution, Red = warning, Red Blinking = engine overstress

> Warning
> Engines cannot sustain full throttle for longer than 60 seconds. If Interm Power is blinking, reduce throttle to at least 98% for a few seconds to reduce stress on the engines.

7. **Horizontal Speed Indicator and Flight Path Vector Indicator:** This indicator will display the absolute value of the horizontal speed of the aircraft while in hover. The white rotating indicator displays the direction of flight of the aircraft (eg. direction of the speed vector).
8. **Hook Status Display:** Displays the current status of the hook and any loads attached to it. "HOOKED" indicates load has been successfully picked up by the aircraft, "HOOK BROKE" indicates the sling load has broke due to overstress.
9. **Hook Indications Display:** Displays important information regarding status of the sling loads - such as hover timers, pull up indications, and speed indications.

Miltech Simulations MV-22B Tiltrotor

Navigation Functions (NAV)

This page contains the Navigation, VOR and Flight plan data.



Figure: Navigation Data

Note that crossed-out options are INOP

1. **Mode:** CTR(Pictured): Centered; DCTR: Decentered
2. **Mode:** HDG: Heading, TRK(Pictured): Track; NUP: North Up
3. **Range** (Up/Down)
4. **Sequence** (Up/Down): INOP
5. **Map Mode:** Map OFF(Pictured); VID: Forward looking map; V/KL: Top map view

6. **HIS:** Horizontal Situation Indicator, gives information about heading, compass rose, direction, VOR and deviation. VOR 1 and VOR 2 are inputted on the EICAS and can be used for ILS landings.
7. **VOR Identification and DME Distance Information**
8. **Wind Direction and Speed**
9. **Ground Speed**

Miltech Simulations MV-22B Tiltrotor

Forward-Looking Infrared Camera (FLIR)

Infrared cameras are currently not supported by MSFS. Instead, the Forward-Looking Map or Top Map View is shown on the screen.



Figure: Forward-Looking “Infrared” Camera

1. **Nacelles Indicator** (Degrees)
2. **Indicated Airspeed** (Knots)
3. **Altitude Indicator** (Feet)
4. **Vertical Speed Indicator** (Feet/min)
5. **Radio Altimeter** (Feet)

6. **Interm Power:** Green = normal, Yellow = caution, Red = warning, Red Blinking = engine overstress

> Warning
> Engines cannot sustain full throttle for longer than 60 seconds. If Interm Power is blinking, reduce throttle to at least 98% for a few seconds to reduce stress on the engines.

7. **Artificial Horizon**
8. **Heading Indicator**
9. **VOR Identification and DME Distance Information**
10. **Map Mode:** Map OFF(Pictured); VID: Forward-looking map; V/KL: Top map view

Miltech Simulations MV-22B Tiltrotor

Status Functions (STAT)

Shows a summary of the information available on the CDU (Intended for display only). It consists of five different pages, containing information of the following systems:

- Fuel (FUEL)
- Flight Control Systems/Hydraulics (FCS)
- FCS Monitor Page (STAT-> FCS -> FCS MON): Monitors the position of trim and control surfaces.
- Engines/Drive System - EICAS (ENG)
- Ice Protection (ICE) o Electrical System (ELEC)

See CDU on Status Functions for more information

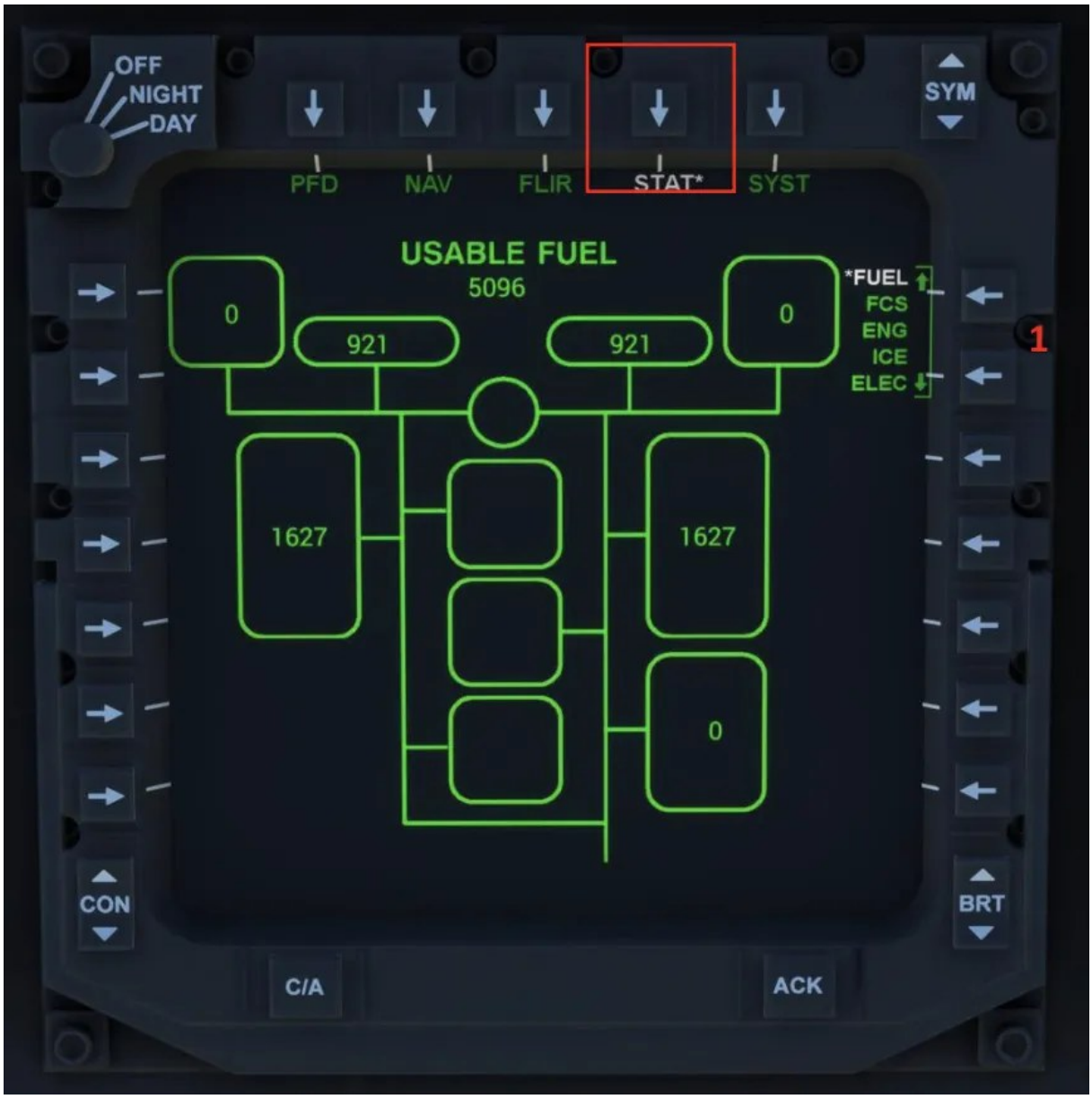


Figure: STAT Page (Fuel)

1. ◇ **Up/Down STAT Page Selector**

Miltech Simulations MV-22B Tiltrotor

System Functions (SYST)

Most functions on the SYST page are not simulated, and therefore INOP (crossed with a green mark)

- **Blade Fold/Wing Stow (BFWS):** One of the unique features of the Osprey is its capability of folding the wings, propellers and stowing the aircraft in a reduced space. This is particularly important when operating to/from Vessels and Carriers. BFWS procedures are fully modeled in our rendition of the Osprey.
- **NOTE: Simulated Aircraft Geometry remains the same when the wings are folded or unfolded. Crash Detection must be Off for this feature to work well in tight spaces.**



Figure: SYST/BFWS Page

1. **FLIGHT READY:** Command to start the unfolding/unstowing process (when aircraft is Folded and Stowed OR Folded Horizontally)
2. **FULL STOW:** Command to start the Folding and Stowing process (when aircraft is FLIGHT READY)

3. **ROTOR LOCK:** Command to lock rotors. Cannot be activated if props are rotating.
4. **FOLD HORIZONTAL:** Command for horizontal blade folding without fully stowing the wings. (when aircraft is FLIGHT READY).
5. **Checklist:** Arrow marks items that have been completed automatically. See Normal Procedures on BFWS for more information

Miltech Simulations MV-22B Tiltrotor

Center/Control Display Unit (CDU)

The Osprey is equipped with one Control Display Unit (CDU), located on the center console, between the pilot and copilot. It features a large LCD Display, surrounded by a bezel containing switches and push buttons. The top left rotary know controls the screen brightness mode (OFF, DAY, NIGHT). The CDU also features two keyboards, located just underneath the display, for data entry.



Figure: Center/Control Display Unit Page

1. ▣ **CDU Menu Buttons:** Opens the CDU menu on the CDU display. On first click: Menu 1, on second click: Menu 2.
2. **Cautions and Advisories Menu:** Opens the Cautions and Advisories screen on the CDU display.
3. ▣ **Stats Button:** Opens the Status Functions on the CDU Display.
4. ▣ **EICAS Button:** Opens the EICAS on the CDU Display.

5. ▣ **ACK Button:** INOP
6. **EICAS:** Engine Instrument Crew Alerting System
7. **Cautions and Advisories**
8. ▣ **EMCON Button:** Emissions Control, INOP
9. ▣ **INAV Button:** Internal Navigation, INOP
10. ▣ **ENAV Button:** External Navigation, INOP
11. ▣ **COMM Button:** Communications, INOP (See: Control Display Unit - Menu 2 for more information)
12. ▣ **FPLN Button:** Flight Plan (See: Control Display Unit - Flight Plan Menu for more information)
13. ▣ **WYPT Button:** Waypoint (See: Control Display Unit - Waypoint Menu for more information)
14. ▣ **ECS Button:** Engineering Control System, INOP
15. ▣ **IFF Button:** Identification Friend or Foe, INOP
16. ▣ **MSN Button:** Mission, INOP
17. ▣ **W/W Button:** Wipers, INOP
18. ▣ **LTS Button:** Lights Menu (See: Control Display Unit - Lights Menu for more information
19. ▣ **EMER Button:** Emergency, INOP
20. **Input Keyboard**
21. **PUSH 10X** - INOP
22. ▣ **BRT Button** - INOP

Pages

1. CDU - Menu 1
2. CDU - Menu 2
3. Flight Plan (FPLN) Menu
4. Waypoint (WYPT) Menu
5. Mission (MSN) Menu
6. Timer (TIMER) Menu
7. Exterior Lighting (LTS) Menu
8. Status Functions (STAT) Menu
9. Engine Instrument Crew Alerting System (EICAS) & Standby Flight Display

Miltech Simulations MV-22B Tiltrotor

CDU - Menu 1

Accessible through a single click of the CDU Button



Menu 1 (CDU)

Functions not described are INOP

1. **ACFT INIT:** Opens the Aircraft Initialization menu.

ACFT INIT Submenu

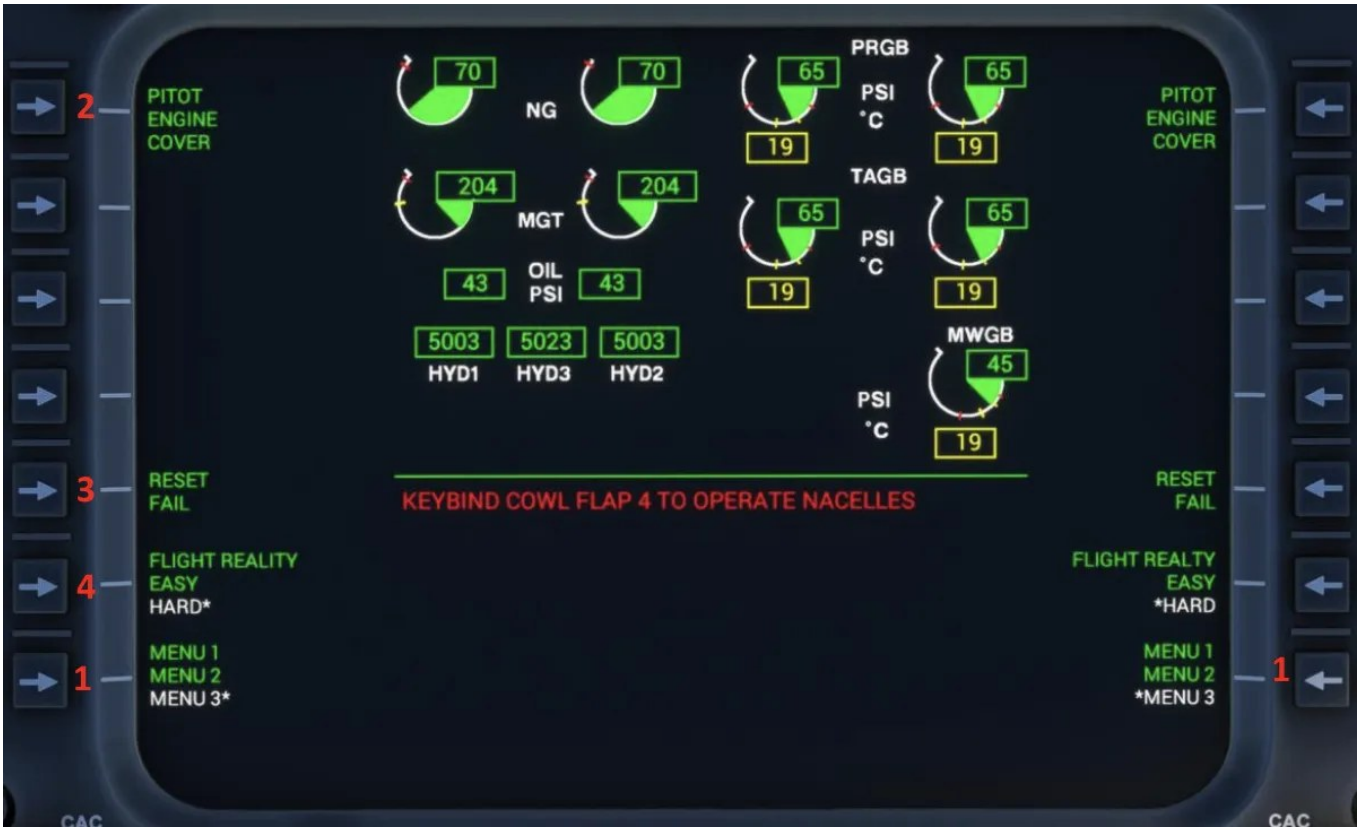


Figure: ACFT INIT Submenu (CDU) Menu 3

1. **↔ Menu 1 / Menu 2 / Menu 3:** Switch between ACFT INIT Menu Screens. All items on Menu 1 and Menu 2 are INOP. All items listed here and shown are Menu 3.
2. **Pitot & Engine Covers:** Toggles pitot and engine covers on/off. Engines must be off for pitot and engine covers to appear on the external model

> Note
> Wheel chocks are automatically activated when the aircraft’s ground speed is Zero and parking brake is ON.

3. **Handheld GPS (Not Pictured):** Enables Aera-style GPS for flight planning and NAV.
4. **Reset Fail:** Only becomes available if the aircraft has crashed into the ground or engines have overstressed (RESET FAIL shows active in white with *). To reset failures, move the Engine Control Levers to OFF, APU ON, Parking Brake ON and hit “Reset Fail” once (shows inactive in Green). Aircraft will be reset to a Clean configuration, ready for Engine Start.
5. **Flight Reality**
6. **EASY:** Deactivates Vortex Ring State and Engine Failures. Must be set before every flight (HARD is the standard). Prevents the aircraft from stalling under VRS conditions, and the engine from failing due to overstress
7. **HARD:** Activates Vortex Ring State and Engine Failures. Default mode. The aircraft will stall under VRS conditions, and the engines may fail due to overstress.

Miltech Simulations MV-22B Tiltrotor

CDU - Menu 2

Accessible through a second click of the CDU Button



Figure: Menu 2 (CDU)

1. **COMM1 Freq:** COMM1 Frequency. To input frequency, first click on the selector button. A green blinking box will appear. Type the COMM1 Frequency using the CDU Keyboard. Click ENTER to confirm.
2. **COMM2 Freq:** COMM2 is not supported by MSFS. COMM2 will always follow the value for COMM1.
3. **VOR/ILS Freq:** VOR/ILS Frequency. To input frequency, first click on the selector button. A green blinking box will appear. Type the VOR/ILS Frequency using the CDU Keyboard. Click ENTER to confirm. NAV1 is on the Left side, NAV2 on the right side.
4. **BARO Press:** Resets the Barometric Pressure to 27.99 inHg. To input pressure, first click on the selector button. A green blinking box will appear. Type the pressure in mmHg using the CDU Keyboard. Click ENTER to confirm. If pressure is out of range, it will automatically reset to the lower or higher allowed value.
5. **RAD ALT LOW SET:** Sets the minimum altitude at which the radio altimeter is activated. To input a value, first click on the selector button. A green blinking box will appear. Type the altitude in ft using the CDU Keyboard. Click ENTER to confirm. If value is out of range, it will automatically reset to the lower or higher allowed value.
6. **Mode 3A Code (Transponder):** Sets the transponder (Squawk) value. To input a value, first click on the selector button. A green blinking box will appear. Type the altitude in ft using the CDU Keyboard. Click ENTER to confirm.
7. **TACAN:** Tactical Air Navigation. To input, follow the same procedure as VOR/ILS Freq

Miltech Simulations MV-22B Tiltrotor

Flight Plan (FPLN) Menu

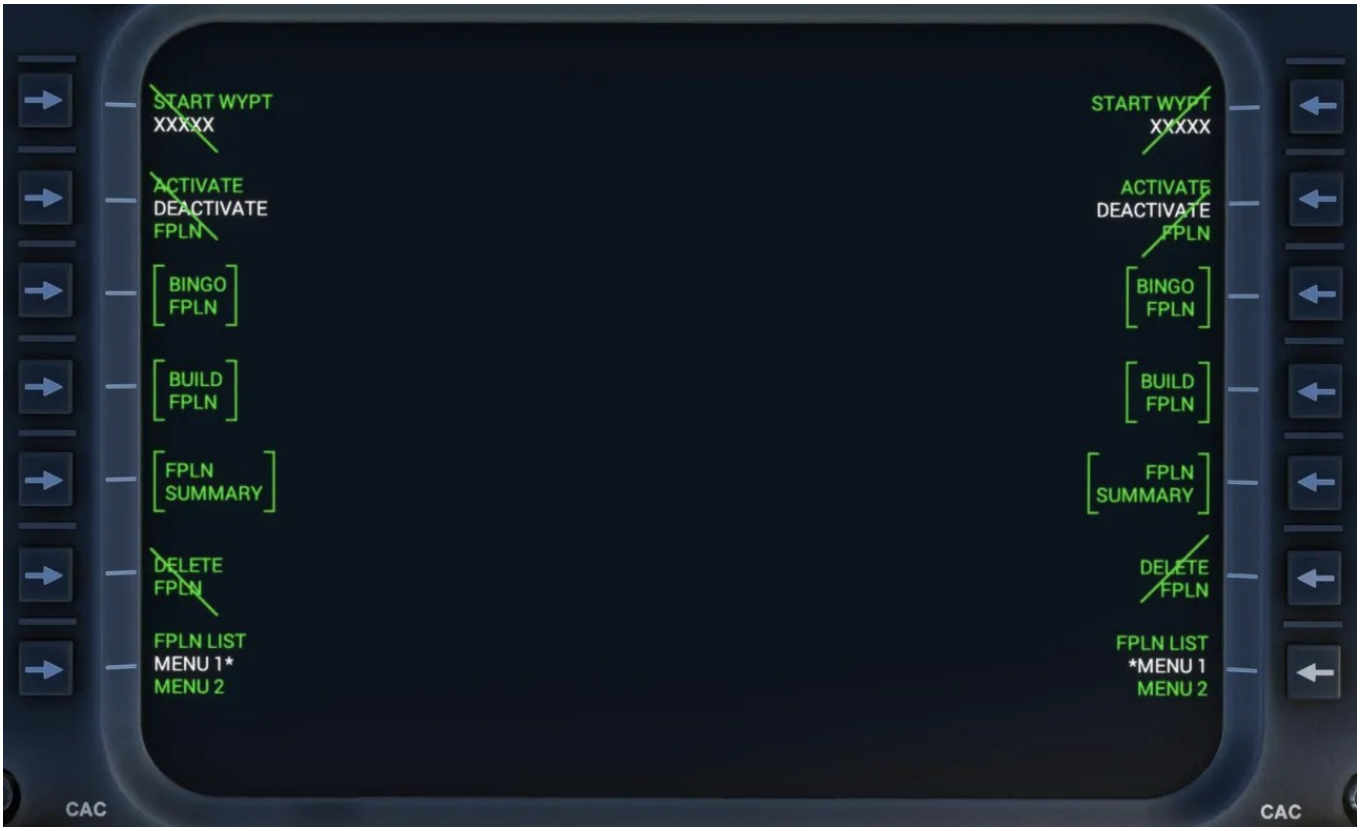


Figure: Flight Plan FPLN Menu (CDU)

For Display Only - All Flight Plans must be created through the MSFS World Map.

Note
NEW ON V1.3.0: Toggable Aera-style GPS for flight planning and NAV. (CDU -> ACFT Init -> Page 3 -> Handheld GPS)
More Info: CDU - Menu 1

Miltech Simulations MV-22B Tiltrotor

Waypoint (WYPT) Menu



Figure: Waypoint WTPT Menu (CDU)

For Display Only - All Flight Plans must be created through the MSFS World Map.

Note
NEW ON V1.3.0: Toggable Aera-style GPS for flight planning and NAV. (CDU -> ACFT Init -> Page 3 -> Handheld GPS)
More Info: CDU - Menu 1

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Mission (MSN) Menu

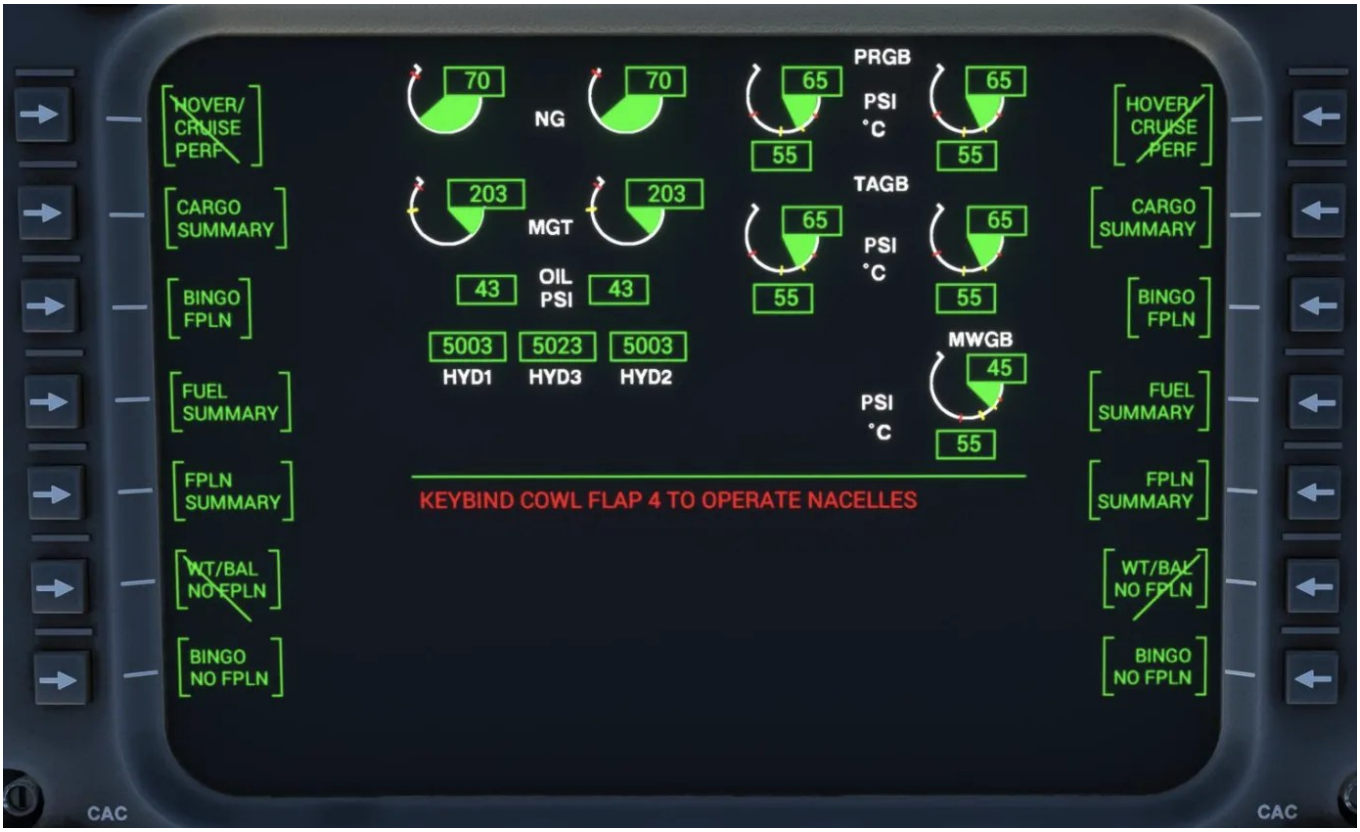


Figure: Mission MSN Menu (CDU)

For Display Only - All Flight Plans must be created through the MSFS World Map.

Miltech Simulations MV-22B Tiltrotor

Timer (TIMER) Menu

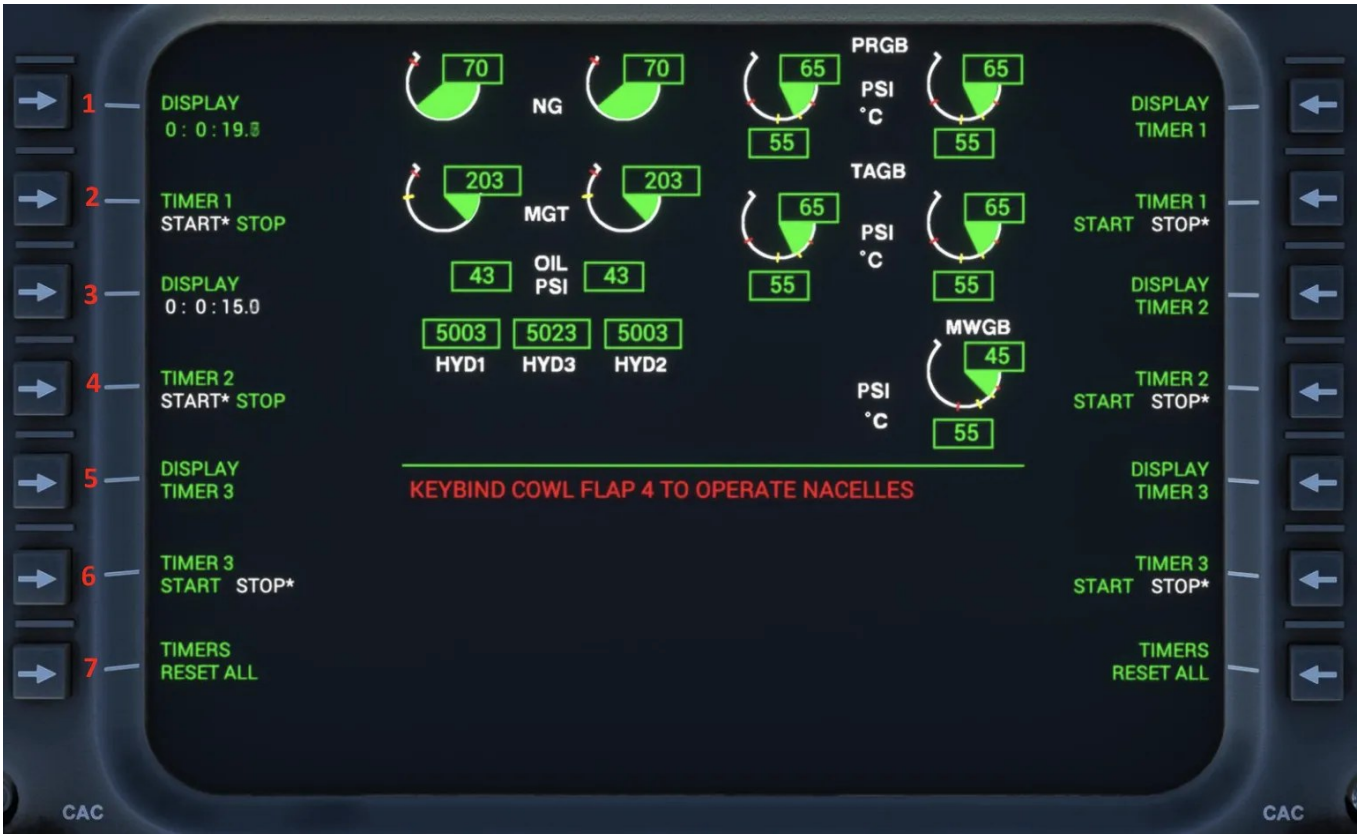


Figure: Timer Menu (CDU)

1. **Display (Timer 1):** Displays current time on Timer 1, adds Timer display on the PFD
2. **Timer 1 Start/Stop:** Starts/Stops Timer 1
3. **Display (Timer 2):** Displays current time on Timer 2, adds Timer display on the PFD
4. **Timer 2 Start/Stop:** Starts/Stops Timer 2
5. **Display (Timer 3):** Displays current time on Timer 3, adds Timer display on the PFD
6. **Timer 3 Start/Stop:** Starts/Stops Timer 3
7. **Timer Reset All:** Resets all Timers to Zero

Miltech Simulations MV-22B Tiltrotor

Exterior Lighting (LTS) Menu

Accessible through a single click of the LTS button, located on the upper right area of the CDU Keyboard.



Figure: Exterior Lights Menu 1 (Left), Exterior Lights Menu 2 (Right)

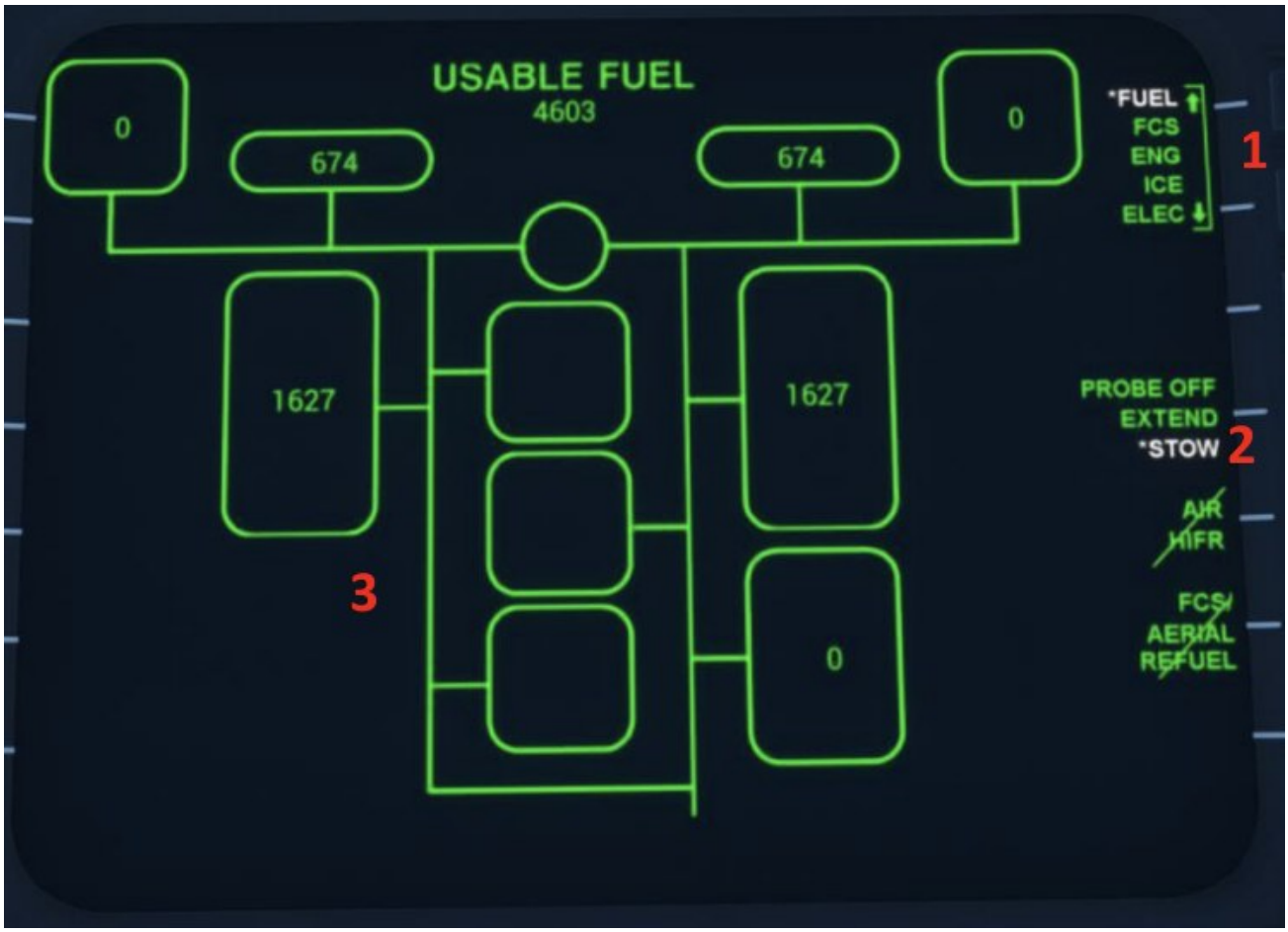
1. **Master CTRL:** Master Control off/on. Master switch for all exterior lighting. **Must be ON** (clicking the arrow button) for any exterior lighting to function.
2. **Top Strobe:** Controls the top Strobe light. Off / Normal / Navigation Modes
3. **Bottom Strobe:** Controls the bottom Strobe light. Off / On
4. **Position Lights:** Controls the Position Lights. Off / Both / Nacelles Only / Tail Only Modes
5. **Position Lights Brightness:** Bright / Dim (Position Lights must be “Both”, “NAC” or “TAIL”)
6. **Position Lights Flash:** Flashing / Steady (Position Lights must be “Both”, “NAC” or “TAIL”)
7. ◇ **Exterior Lighting Menu Selector**
8. **Propeller Tip Lights:** Controls the green lights at the tip of the propellers. Off / Bottom Lights / Top Lights
9. **Formation Level (0-10):** Formation Light Level of Brightness from 0 - 10
10. **Landing Gear Lights:** Controls the Landing Gear Lights. Off / Auto

Miltech Simulations MV-22B Tiltrotor

Status Functions (STAT) Menu

Accessible through a single click of the STAT Button

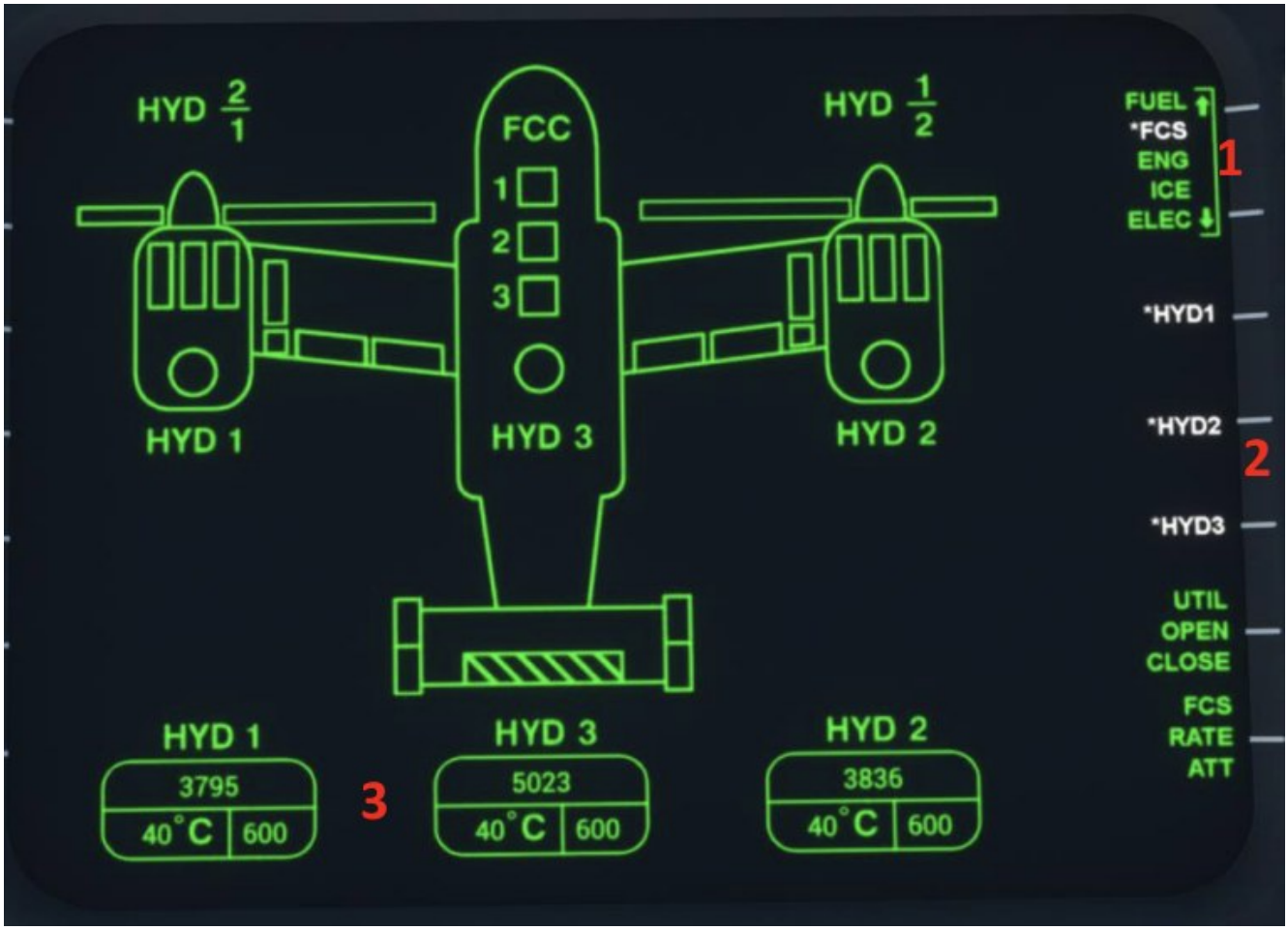
Fuel (FUEL)



FUEL Page

1. ◇ **Up/Down STAT Page Selector**
2. **Refueling Probe:** Extends and Stows the Fuel Probe. Refueling is INOP, but it can be simulated by extending the probe and refueling through the MSFS Default fueling panel in-flight.
3. **Fuel Tanks Indicators:** Indicates the available fuel quantities of each tank in pounds. (Intended for display only)

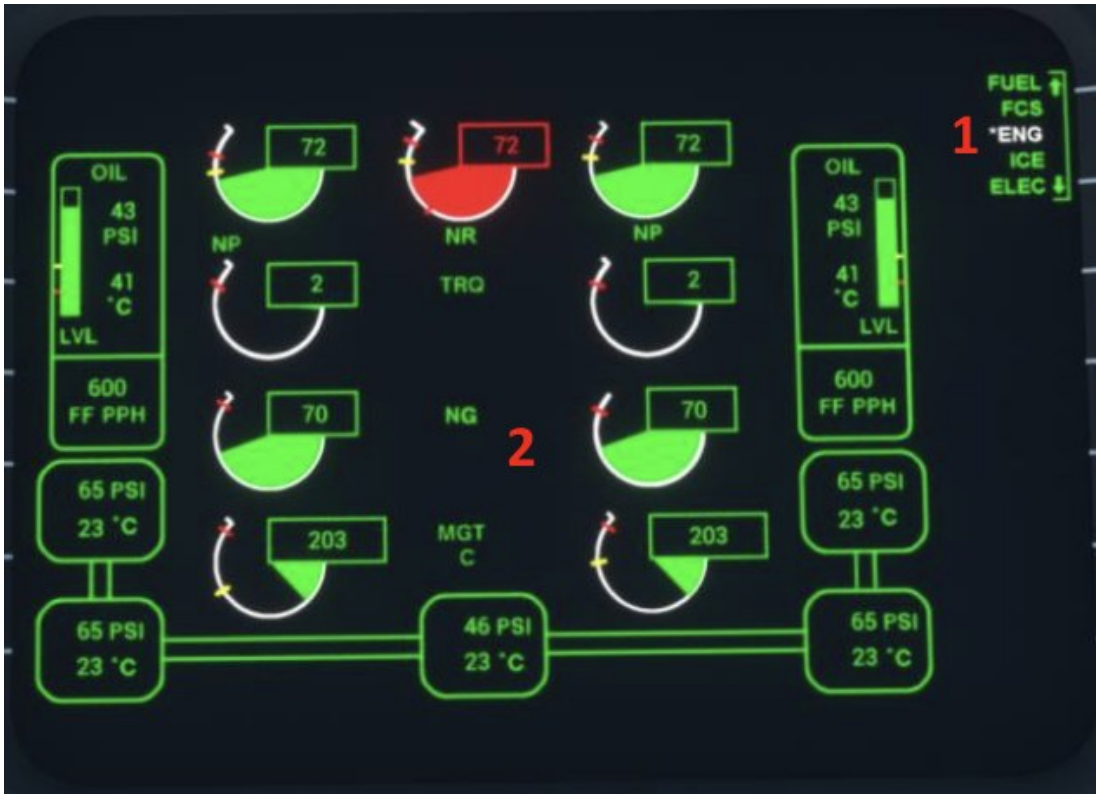
Flight Control Systems/Hydraulics (FCS)



FCS Page

1. ◇ **Up/Down STAT Page Selector**
2. **HYD Systems:** Hydraulic Systems, INOP
3. **Hydraulic Pressures and Temperatures:** For display only

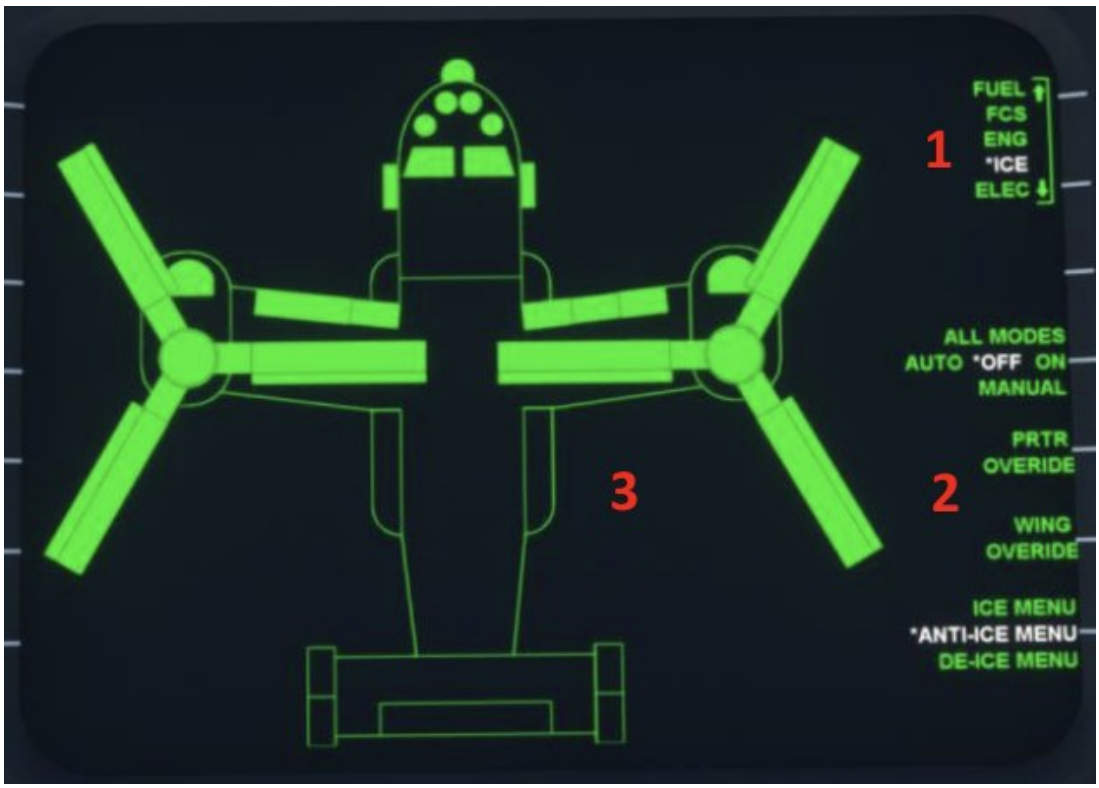
Engine/Drive System - EICAS (ENG)



ENG Page

1. ◇ **Up/Down STAT Page Selector**
2. **Engine and Drive System:** for display only - See: Engine Instrument Crew Alerting System

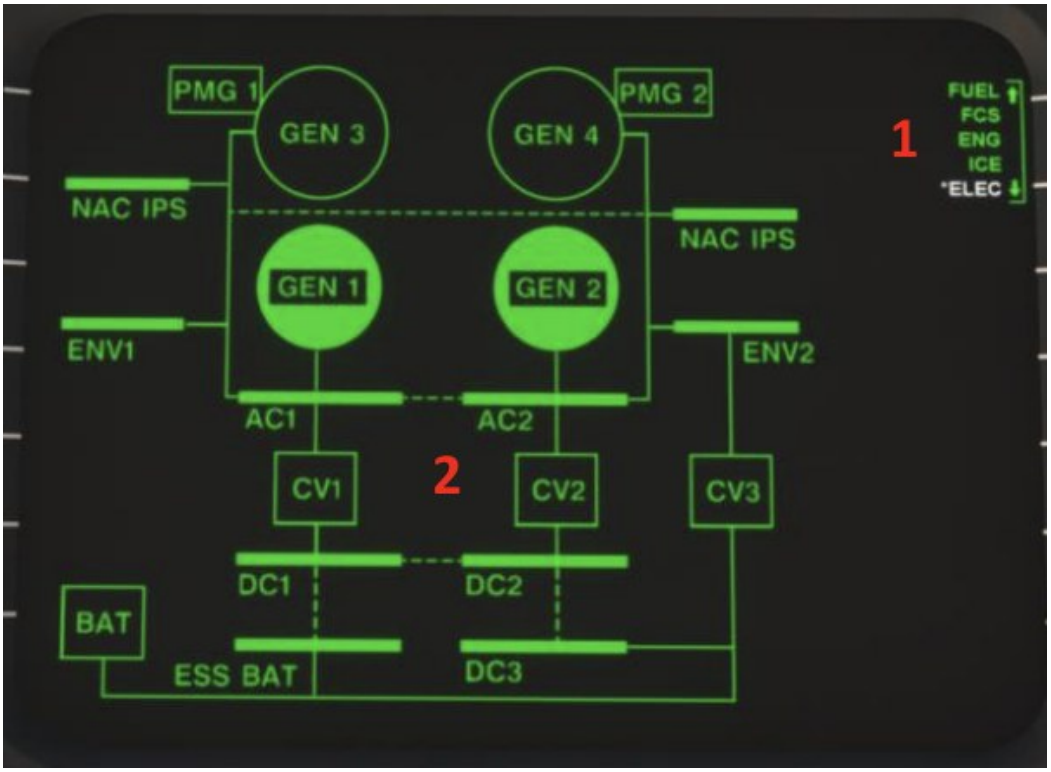
Ice Protection (ICE)



ICE Page

1. ◇ **Up/Down STAT Page Selector**
2. **Anti-Ice/De-Ice System:** INOP
3. **Icing Detection Indicator:** INOP, for display only

Electrical System (ELEC)



ELEC Page

1. ◇ **Up/Down STAT Page Selector**
2. **Electrical System Indicator:** for display only

Miltech Simulations MV-22B Tiltrotor

Engine Instrument Crew Alerting System (EICAS) & Standby Flight Display

Accessible through a single click of the EICAS button, or the CDU button. EICAS is by default always shown in the center of the CDU, except when navigating the STAT pages. The EICAS display is used to give the crew an overview of aircraft systems operation. Some of the key engine indications are also shown on the Standby Flight Display.



Figure: Standby Flight Display (Left), EICAS Display (Right)

1. **Nacelle Angle Indicator**
2. **Fuel Quantity**
3. **Nr:** Percentage of Nominal Proprotor Speed (rpm)
4. **Np:** Percentage of Nominal Turbine Shaft Power
5. **Flaps Level Indicator**
6. **ENG TRQ:** Engine Torque
7. **Ng:** Gas Generator Speed (e.g. compressor shaft)
8. **MGT:** Measured Gas Generator Temperature
9. **OIL PSI:** Oil Pressure
10. **HYD:** Hydraulic Pressure: Hyd pressure must be at least 3800psi on at least one HYD system for nacelles to move.
11. **PRGB:** Proprotor Gearbox oil Pressure/Temperature
12. **TAGB:** Tilt Axis Gearbox oil Pressure/Temperature
13. **MWGB:** Midwing Gearbox oil Pressure/Temperature
14. **Alerting System**

Miltech Simulations MV-22B Tiltrotor

Autopilot Console

The Osprey is equipped with a completely modeled autopilot system.

> Note
> Autopilot functions are limited during CONV/VTOL/STOL mode, as the simulation cannot correctly handle the angle of the nacelles. During APLN flight, the autopilot behaves normally.

Autopilot buttons are equipped with green “ARM”, “CAP” and “ACT” indicators:

- **ARM:** Indicates that the current mode is available and can be activated. This can light up under different conditions (Nacelles angle, indicated airspeed, windspeed, etc.)
- **CAP:** Indicates that current mode is active (only for INAV and ENAV buttons)
- **ACT:** Indicates that respective autopilot mode is active (HVR CPLD, CPLD, AutoNAC)

The aircraft also references two types of navigation systems:

- **ENAV:** External Navigation (VOR, ILS, TACAN and GPS)
- **INAV:** Internal Navigation



Figure: Autopilot Panel

1. ▣ **CPLD (Coupled) Buttons:** Autopilot master button. Both have the exact same functionality. CPLD engages CRS, HDG, SPEED, ALT and V/S Control. CPLD lights up with “ARM” under APLN flight, and therefore this mode is only fully available when nacelles are at 0 deg.
2. **ENAV:** External Navigation - Must be activated to use ILS/VOR and WYPT Navigation.
3. **Search Path INAV:** INOP
4. **VOR/ILS:** Two modes are available - NAV 1 and NAV 2. VOR frequencies are inputted through the CDU. ENAV must be ON for VOR/ILS to engage.
5. **APPR (Approach):** Used for ILS Approaches. See Normal Procedures on BFWS for more information
6. **TACAN:** Enables TACAN. TACAN Frequencies are inputted through CDU. ENAV must be ON.
7. **WYPT (Waypoint):** Uses default GPS Waypoint navigation. Used in conjunction with MSFS flight plans for GPS Navigation. ENAV Must be ON for WYPT to engage.
8. ◉ **Brightness Knob:** Controls the screen brightness of the autopilot LCDs
9. ◉ **CRS Knob:** Selects the desired course. The outer knob increases amount by the unit, while the inner increases amount by tens (degrees). CRS is followed with active navigation (VOR-1, VOR-2 and WYPT)

10. ◉ **HDG Knob and Hold Button:** Selects the desired heading. The outer knob increases amount by the unit, while the inner increases amount by tens (degrees).
11. ◉ **Speed Knob and Hold Button:** Selects the desired Indicated Airspeed. The outer knob increases amount by the unit, while the inner increases amount by tens (knots). Autothrottle is only designed to be used on APLN mode.
12. ◉ **ALT Knob and Hold Button:** Selects the desired Altitude. The outer knob increases amount by hundreds, while the inner increases amount by thousands (feet).
13. ◉ **V/S Knob and Hold Button:** Selects the desired Vertical Speed. The outer knob increases amount by hundreds, while the inner increases amount by thousands (feet/min).
14. **Auto NAC:** INOP
15. **HVR CPLD (Hover Coupled):** Hover-hold functionality. This function only becomes available (“ARM” comes on) under stable hover (VTOL) and calm wind conditions. Radio altitude must be between 40ft and 300ft, at stable forward and lateral speeds. Vertical speed must be no more than 500ft/min, either upwards or downwards, and wind speed must not be more than 25kts(Forward), 20kts(Sideways) and/or 10kts(Backwards). HVR CPLD will automatically deactivate if any of these variables go out of the specified bounds, sudden input from the control stick or throttle/collector, or change of nacelles angle
16. **TF:** INOP
17. **REM HVR (Remove Hover):** INOP

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Communications Console

The Remote Frequency Indicator Selectors (RFIS), also referred to as the Communications Consoles, are two panels located above the MFDs. Each selector displays the standby and active channel/frequency and associated information for the radios selected. RFIS allows the crew to communicate via SATCOM, Maritime and Antijam radios. Therefore, the functionality of this system is not modeled in our rendition of the Osprey, as radio communications in MSFS are limited to COMMs radios. The panel is, however, fully animated following the real-life counterpart.

COMM, Transponder and ILS/VOR Radio frequencies are inputted through the CDU. See CDU Menu 2 for more information.

Miltech Simulations MV-22B Tiltrotor

Standby Instruments

The Standby Flight Instruments provide essential flight and system information when the normal CDU and/or the MFDs become inoperative.



Figure: Standby Flight Instruments

1. **Standby System Indicators:** Include nacelle position, fuel quantity, Nr (Proprotor rpm), Np (Power turbine rpm), Engine Torque, Flaps Indication, etc.
2. ◇ **Data Selector Switch:** Switches the data feed from the Flight Computer 1, 2 or BIT. INOP.
3. ◉ **Brightness Knob**
4. **Standby Primary Flight Display:** Includes altitude, airspeed, vertical speed, TCAS, artificial horizon, etc.
5. ↔ **BARO Adjust Switches:** Increase or Decrease barometric pressure to adjust altimeters. Adjusting the BARO through this switch will also adjust the altimeters on the PFD. BARO Pressure can also be inputted through the CDU. See CDU Menu 2 for more information

Miltech Simulations MV-22B Tiltrotor

Overhead Panel



Figure: Overhead Panel

1 – Battery Console:

a. Battery Test: INOP
b. Master Battery Bus: Turns on/off the batteries
c. DC Voltage Indicator

2 – Cargo Hoist Console:

a. Hook Mode Selector: INOP
b. Hoist Controls: INOP

3 – Ramp / Doors Console:

a. Indicator Screen:
   I. OFF: All doors closed
   II. DOOR: Side door open
   III. RAMP: Ramp open
   IV. DOOR + RAMP: Side door and ramp open
b. Open Partial Button: INOP
c. Ramp Door Switch:
   I. CLOSE: Ramp is fully closed
   II. OPEN: Ramp is fully opened
d. Door Mode Switch:
   I. AUTO: Doors are partially or fully closed based on speed and altitude, if Ramp and Side doors switches are on the OPEN position:
      1. Speed 0 kts: Ramp is fully opened (down position), side door is fully opened (stairs down)
      2. Speed >1kts: Ramp is "leveled", side door stairs are retracted.
      3. at >1000ft OR Speed>200kts, both doors close.
   II. Manual: Doors are manually controlled
e. Side Door Switch:
   I. CLOSE: Side door is fully closed
   II. OPEN: Side door is fully opened

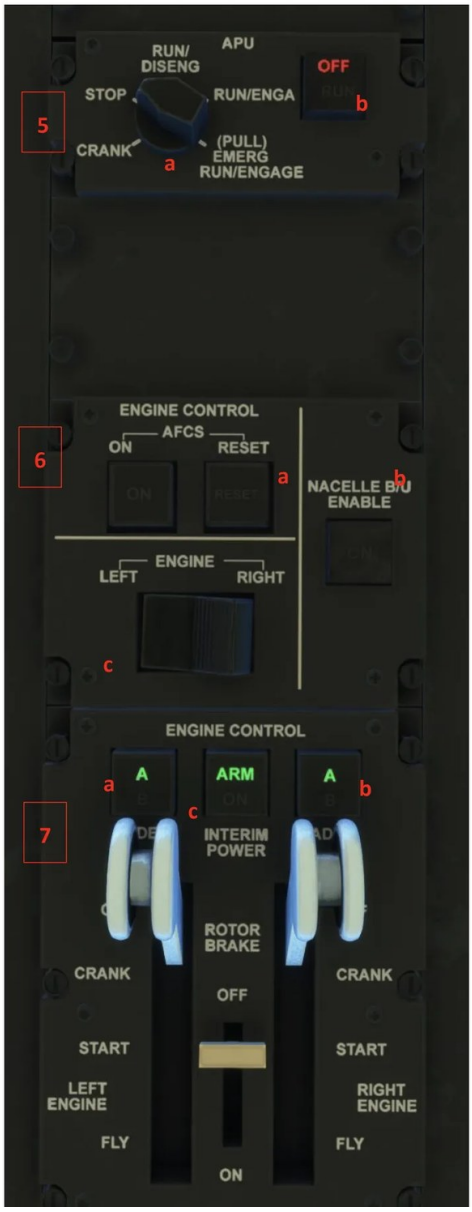
4 – Blade Fold / Wing Stow Button: INOP



5 – Auxiliary Power Unit Console:

a. APU Mode Selector:
   I. Crank: Engages the APU Starter and motors the APU with fuel and ignition off. Can be set to crank when inflight.
   II. Stop: Automatically shuts down the APU.
   III. Run/Diseng: Allows the APU to perform BIT and start automatically. INOP
   IV. Run/ENGA: Starts the APU under normal operations.
   V. Emerg RUN/Engage: INOP

b. APU Indicator: Indicates the current status of the APU (OFF / RUN)



6 – Top Engine Control Panel:

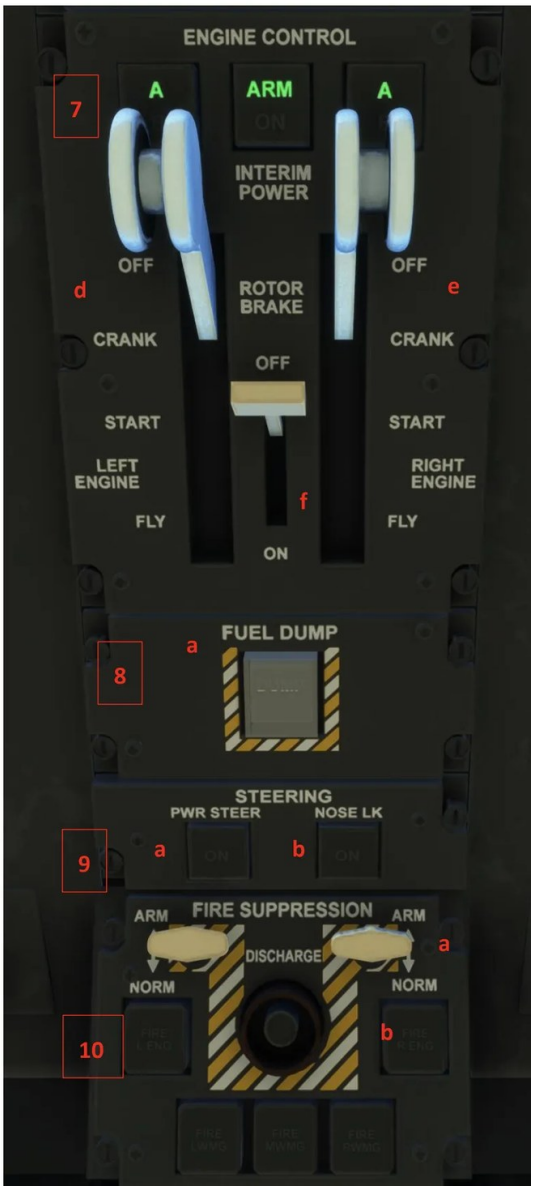
a. Automatic Flight Control System: On/Reset, INOP
b. Nacelle Backup: INOP
c. Engine Drive Selector: Right/Left, INOP

7 – Bottom Engine Control Panel:

a. Left Engine FADEC (Full Authority Digital Engine Control) Selector: Allows the pilot to select the source FADEC Computer for the left engine control. FADEC A/FADEC B
b. Right Engine FADEC: Allows the pilot to select the source FADEC Computer for the right engine control. FADEC A/FADEC B
c. Interim Power: INOP

7 – Bottom Engine Control Panel (Cont.):

d. Engine Control Lever (Left Engine):
   I. OFF: Engine stops
   II. CRANK
   III. START: Engine Starter. Engines will only start when voltage is above 26 volts (APU must be on)
   IV. FLY: Engines in FLY Position
e. Engine Control Lever (Right Engine)
f. Rotor Brake: Rotor brakes OFF/ON
   I. During engine shutdown: Props will slowdown and stop faster.
   II. During engine startup: Engine won't start (Engine Control Levers won't go past crank)



8 – Fuel Dump Panel

a. Fuel Dump: ON/OFF, starts fuel dumping process. Fuel is dumped at a rate of 12 lbs per second.

9 – Steering Panel

a. PWR STEER: INOP
b. NOSE LK: INOP

10 – Fire Suppression Console:

a. FIRE SUPRESSION: ARM/NORM
b. ENGINE FIRE EXTINGUISH: Extinguishes fire on the selected engine. Engine shuts off as result.

11 – Secondary Lighting Control Panel

a. Cockpit Dome Lights: Rotary dimmer switch
b. Cockpit Secodary Lightings: Rotary dimmer switch
c. Emergency Egress Lights: INOP
d. Mode Selector:
   I. NVG/NORM Mode: NORM is the default mode, NVG is only available at night.
   II. Day/Night Mode: On Day mode, primary lighting will act as an off-on switch. On Night mode, primary lighting will instead act as a dimmer switch.

12 – Primary Lighting Control Panel

a. Copilot Instrument Lighting
b. Overhead Instrument Lighting
c. Pilot Instrument Lighting

13 – NVG/HUD Control Panel: Not Supported, INOP

14 – Emergency Oxygen: Not Supported, INOP

15 – Radio Control: Not Supported, INOP



Miltech Simulations MV-22B Tiltrotor

Center Console



Figure: Center Console

1. **Landing Gear Indicator**: Indicates status of the nose, left and right gears
2. **Landing Gear Lever**
3. **Emergency Gear Release:** INOP
4. **Forward Camera Control:** INOP
5. **Flaps:**
6. In CONV/VTOL Config, the Flaps are always in Auto-mode (position A), meaning that the flaps are autocommanded depending on nacelles position and airspeed.
7. In APLN config, the flaps can be manually controlled, via this lever or the standard flaps controllers.

1. Airspeed > 220 knots, Flaps 0
2. Airspeed 180 - 220 knots, Flaps >10
3. Airspeed < 180 knots, all flaps positions are allowed.

8. **↔ Nacelle Control Disable Switches:** INOP

9. **Parking Brake**

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Side Consoles

Side consoles include the Backup Brake Panel, ICS Control Panel, Radios and the Mission Data loader. These instruments are INOP.



Figure: Pilot’s Side Panel

Miltech Simulations MV-22B Tiltrotor

FS24 - Navigation Systems

Note
Only applicable to FS24, starting on version V1.6.0

Navigation systems, flight planning, and mapping have evolved significantly with the introduction of FS24. The use of the new Electronic Flight Bag has become standard for flight planning, and the new mapping system has necessitated a complete reimplementation on the aircraft. As a result, a new system has been constructed and implemented, starting on version V1.6.0.

New FS24 MFD NAV Page



New FS24 NAV Page

Fixes, VOR, Airports, NDBs, and Routing are now displayed on the MFD NAV Page.

- Routes can be created and edited from the FS24 EFB. After creating or modifying a route, use the "SEND TO AVIONICS" button on EFB to sync the new routings with the aircraft instruments. More information: Creating Flightplans with the FS24 EFB
- **(1)** Fixes, VORs, Airports and NDB (also known as "Facilities") can be displayed/hidden individually, or configured to show icon/text/icon+text through the MAP CTRL submenu:





- **(a)** NAV OVERLAY CONTROL Submenu
- (a.1) Airports (On/Off)
- (a.2) Navaids - VOR, NDBs (On/Off)
- (a.3) Fixes (On/Off)
- (a.4) Waypoints (On/Off)
- (a.5) Label Options (Off/Tag/Ident/Both)
- **(2)** New map rendering modes are now supported: Use bezel option CHART/TRN/IMAGE to configure the map rendering mode.
- CHART displays flight route, compass rose, and facilities only.
- TRN displays flight route, compass rose, and facilities, along with the terrain heightmap.
- IMAGE displays flight route, compass rose, and facilities, along with a background aerial image.
- **(3)** CENTERED/DECENTERED Map modes are supported through their corresponding bezel option.

- **(4)** HEADING/TRACK/NORTH UP Map modes are supported through their corresponding bezel option.

New CDU Options in FS24



Waypoint Page

- **WYPT Page**
- WYPT/NRST WYPT Submenu displays nearest airport/navaids/fixes data, including IDENT, Distance and Bearing, and latitude/longitude to each corresponding point.



Flightplan Page

- **FLPN Page**
- FLPN/FLPN Summary displays all waypoints on the current active flight plan, along with corresponding CRS and ETAs to each waypoint.
- Bezel option ETA/ETE/DIST cycles the display between Estimated Time of Arrival (ETA), Estimated Time En Route (ETE), and Distance (DIST).
- SEQ UP and SEQ DOWN keys on CDU will enable navigation up/down throught Flight Plan Summary list.

Creating Flightplans with the FS24 EFB

Creating a Flightplan for EFB Sync, routing display on MFD

- Flight Plans can be created either from the WorldMap prior to starting a flight, or from in-flight using the FS24 EFB
- Once the routing is properly set up (including departure and arrival airports, procedures, and enroute waypoints), you must press **SEND TO ATC AND AVIONICS** to synchronize the changes with the aircraft systems.
- Flight plan route will display on the MFD Map, along with the CDU WYPT Page. However, please be aware that for Autopilot to function correctly, you must follow the guide below.

Creating a Flightplan for EFB Sync, routing display on MFD + Autopilot WYPT Mode

Due to an existing bug or missing endpoint, a specific flightplanning sequence must be followed for the autopilot WYPT Mode to engage correctly. We have reported the problem to Asobo: https://devsupport.flightsimulator.com/t/flight-plan-sync-and-gps-drives-nav1/13937

- Using the WorldMap, select the Departure Airport and Arrival Airport
- Open the EFB using the TAB Button on your keyboard
- Add the departure, arrival and en route procedures using the EFB
- Click SEND ROUTE TO ATC AND AVIONICS button
- Close the EFB, and only after click on **Start Flight**
- **After flight has started,** open EFB again and click on SEND ROUTE TO ATC AND AVIONICS
- Route should display correctly on the MFD.
- Once in Stable APLN File, engage Master Autopilot (CPLD)
- Engage WYPT (CAP light should be lit)
- Engage INAV (CAP light should be lit)
- The aircraft will follow the flight plan as filed.

Modifying the flight plan while on route may result in the WYPT Mode disconnecting and being unable to reconnect, due to the bug described above.

Miltech Simulations MV-22B Tiltrotor

Performance and Limits

Takeoff/Landing Limitations

Limit	VTOL (Vertical Takeoff and Landing)	STOL (Short Takeoff and Landing	Remarks
MTOW: Maximum Takeoff Weight	52.000lbs (Sea Level)	60.000lbs (Sea Level)	Decreases with altitude.
Max VTOL Altitude	5500ft	N/A	
Nacelle Limits	Typically 90 degrees	60 degrees (Minimum, normal) 75 degrees (Tactical)	
Minimum Required Runway Length	N/A	20ft	Depends on Nacelles Angle, Thrust, Weight and Altitude.

Powerplant & Proprotor Limitations

Limit	Value	Remarks
Gas Generator (Ng)	>98% Ng no longer than 60 segs	Engine shuts down due to damage.
Power Turbine Speed (Np)	>114% Np no longer than 60 segs	Engine shuts down due to damage.
Proprotor Speed (Nr)	Must be >94% and <105% (VTOL/CONV) Must be >82% and <105% (APLN Mode)	
Minimum Hydraulic Pressure for Nacelles	4000 Psi	

Aerodynamic

Limit	Value	Remarks
Airspeed Limitations (APLN) at 84% Nr	280 KCAS or 0.48 Mach, whichever is less.	

Airspeed Limitations (APLN) at 100% Nr	220 KCAS	
Altitude at 84% Nr	25,000 ft	See Table 2 for altitude limitations
Max Airspeed/Mode for Flaps operation	0 deg Flaps; APLN Mode Only 10 deg Flaps; APLN, < 220 KCAS 20 deg Flaps; APLN, < 180 KCAS 40 deg Flaps; All modes, < 180 KCAS Full Flaps; VTOL/CONV, <45 KCAS	Controlled automatically by "Auto" Setting
Max Airspeed for Landing Gear operation	< 140 KCAS	
Ramp Limitations	Max Speed Ramp Open; < 260 KCAS Negative – g are prohibited	
Maximum Touchdown Rate	GW < 46,000 LBS; 720 fpm GW> 46,000 LBS; 600 fpm	
Max Turn Rate, Hover	30 deg/sec	
Max Bank Angle	VTOL: ± 30 deg CONV < 60 KCAS: ± 30 deg CONV/APLN > 60 KCAS: ± 60 deg	
Max Pitch Altitude	< 20 deg Nose Up, all conditions	
Nacelle Angle VTOL/CONV Conversion	See Table 1	
Maximum Descent Rate (Vortex Ring State Protection)	See Table 3	

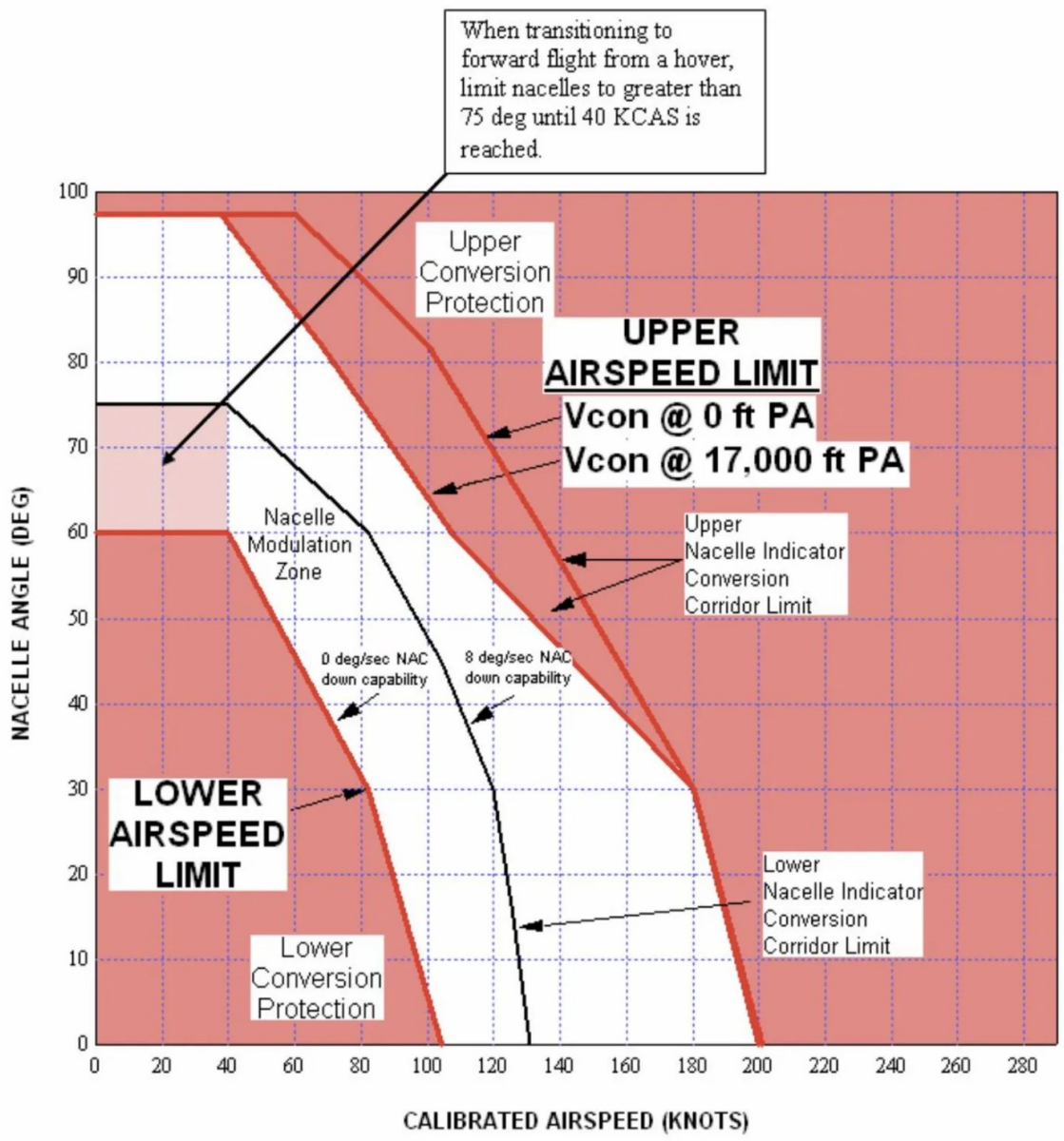


Table 1: VTOL/CONV Mode Conversion

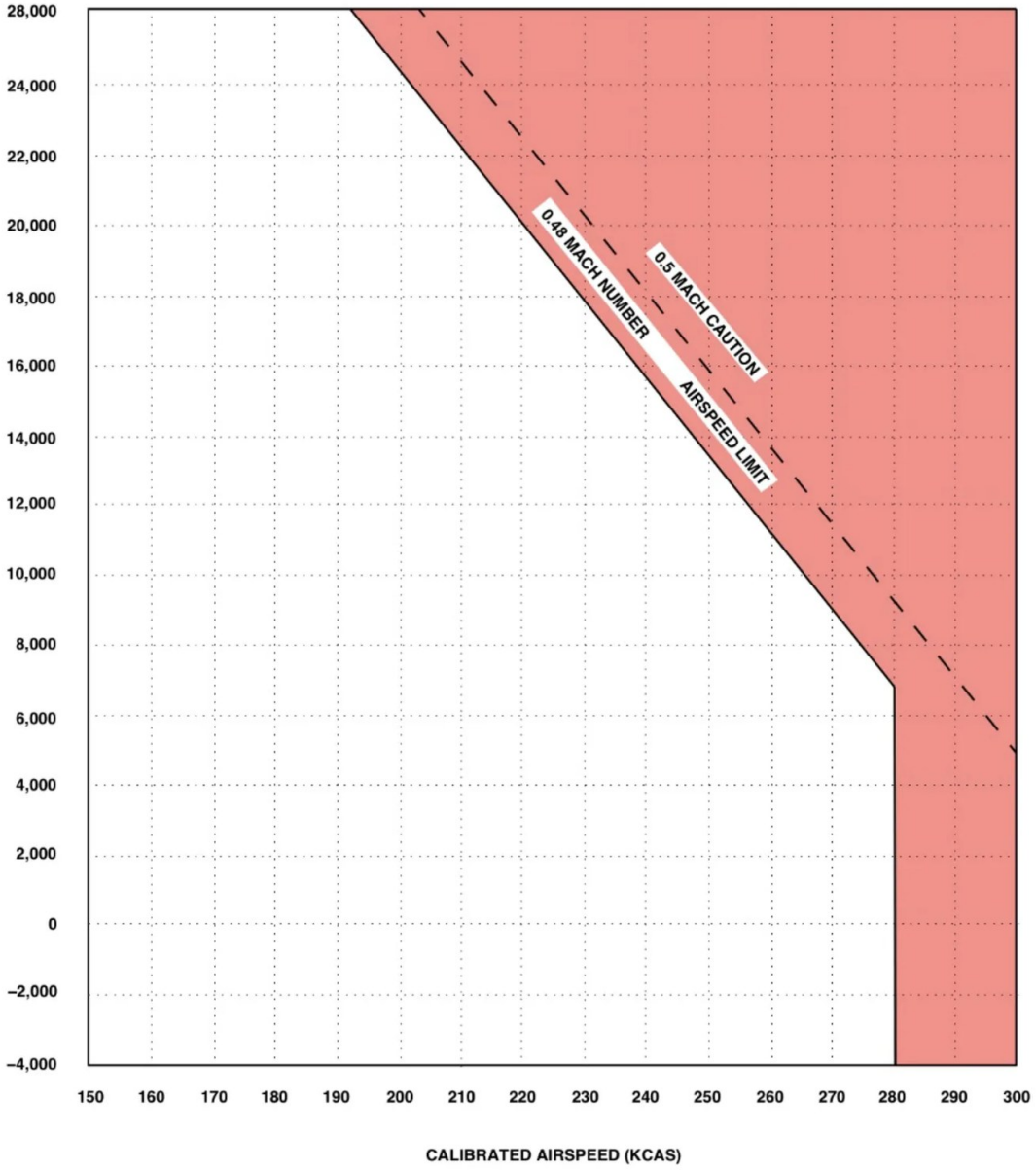


Table 2: APLN Mode (84% Nr) Airspeed

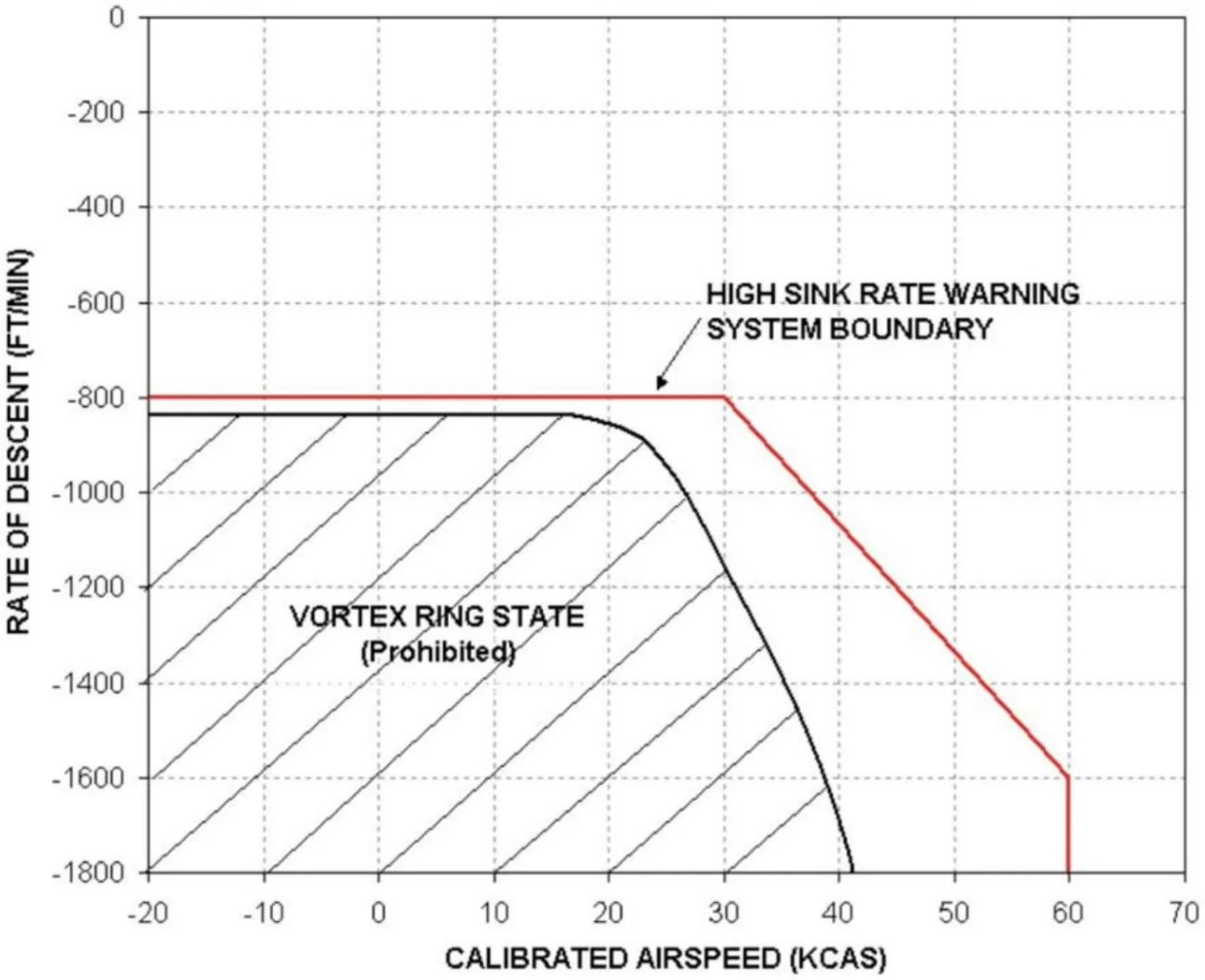


Table 3: Vortex Ring State

Miltech Simulations MV-22B Tiltrotor

Cargo Load Capabilities

Caution
AVAILABLE STARTING V1.4.0

The MV22 is a highly versatile aircraft, designed to carry heavy cargo loads and transport troops from land and sea into the battlefield.

Starting V1.4.0, the MV22 offer full cargo-loading and carrying capabilities, both in the internal cargo bay, and externally using sling loads.

Accessing the Cargo Loads Menu (MSN)

- The **Cargo Summary** is available on the Central Display Unit (CDU), under the "MSN" (Mission) Menu.
- Press the MSN Button on the CDU Keyboard
- Select **Cargo Summary**



Accssing the Cargo Summary Menu

- The Cargo Summary Menu includes a summary of current aircraft weights in Kg and Lbs
- Cargo can be loaded through the **Cargo Setup Menu**



Cargo Summary Menu

Loading Internal Cargo

Loading cargo internally to the Cargo Bay is as simple as selecting the desired load using the arrow buttons, and clicking on LOAD CARGO. The selected option will automatically spawn in the cargo bay, and weight will be added to the aircraft. Cargo bay seats will automatically fold as required.

Unloading is as simple as hitting the Unload Cargo button.

1. ▣ **UP ARROW Button:** Navigate through the load options. Currently supported loads: Troops, F35 Engine
2. ▣ **DOWN ARROW Button:** Navigate through the load options. White options means highlighted.
3. **LOAD CARGO:** The option highlighted white will load automatically to the cargo bay. You may open the cockpit door and move the camera to see the selected option loaded in.
4. **UNLOAD CARGO:** If cargo is loaded, selecting Unload Cargo will automatically remove any cargo loaded into the aircraft cargo bay
5. ↔ **INT CARGO/EXT CARGO Menu Switch:** Changes mode between internal and external cargo.



Internal Cargo Setup Menu

Loading External Cargo

Loading external cargo is slightly more complicated than Internal Cargo, as you will have to take-off and hover near the load to pick it up. First, navigate to the EXT CARGO Menu using the button #5 as above. The UI Interface does not change, so please refer to the photo above.

- **Use the arrows in [1] and [2] to select the desired cargo load.** Available loads are: Humvee, Cargo on Net, Water Bucket.
- **Use button [3] to load cargo.** This will automatically spawn the selected cargo near the aircraft.
- **You may use the HVR Mode to easily locate the cargo.** To access HVR Mode, press once on the PFD Button of any Multi Function Display in the cockpit. More information on Hover Mode here: Hover Mode (HVR)



Hover Mode on Multi Function Display

- In the Upper Right corner, you will see "TO Cargo", displaying distance and bearing to cargo. Additionally, a moving yellow icon will display on the compass rose showing the position of the cargo with reference to the aircraft.
- **Aircraft must be configured for external cargo** - meaning that the hoist doors must be opened, and hoist lowered to position. To do so, **set Cargo Hoist to the ON Position** on the overhead panel.



Cargo Hoist Mode must be set to ON

- **You may now take off and enter a hover.** Slowly move towards load and establish a close hover at an altitude of approx. 50ft above ground. Watch the yellow icon on [1] Below.
- **Keep an eye at the bottom right green box in [2].** A 3 Second counter will display in close proximity to the object while the object is attached to the aircraft. Shortly after, the box in [3] will display "Hooked", showing that the object was successfully picked up, and that you may increase altitude.



HVR Page Picking Up Loads

- **Cargo will be automatically dropped upon crossing below 50ft.**
- **The cargo sling may break in high G/violent maneuvers, as well as speeds higher than 200 knots. Be very careful with your speed, as the Osprey may easily accelerate beyond.**
- **Dropped cargo can be picked up again. However, you must increase the altitude >100ft before dropped cargo is available for pickup again**
- **In circumstances of broken slings, or after dropping cargo, you may have to UNLOAD the cargo via the CDU before loading a different cargo option.**