MILTECH SIMULATIONS – MARYADI

OSPREY MV-22 TILTROTOR

FLIGHT MANUAL

MICROSOFT FLIGHT SIMULATOR

VERSION 1.0.4

TABLE OF CONTENTS

CHANGELOG

1.0.0 – Initial Release
1.0.1 – Nov 15th, 2022: https://miltechsimulations.talkyard.net/-28/product-update-changelog-nov-15th-2022
1.0.2 – Nov 17th, 2022: https://miltechsimulations.talkyard.net/-38/osprey-update-changelog-nov-17th-2022
1.0.3 – Nov 23rd, 2022: https://miltechsimulations.talkyard.net/-45/osprey-update-changelog-nov-23rd-2022
1.0.4 – Nov 29rd, 2022: https://miltechsimulations.talkyard.net/-47/osprey-update-changelog-nov-29th-2022

1. INTRODUCTION

I. Introduction

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

The Osprey MV-22 is a tiltrotor, VSTOL (Vertical/short takeoff and landing), multi-mission aircraft, developed to fill multi-service combat operational requirements. It's real-life counterpart, the MV-22B, 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 commencement of an amphibious operation. (1)

The V-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 V-22 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 V-22 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. (1)

The V-22 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 Osprey for a long time. As product of such collaboration, we now present our rendition of the Osprey MV-22 for Microsoft Flight Simulator.

The MV-22 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 systems that are simulated, what to do on your first flight, performance and limitations, and lots of unique V22-B features and characteristics that are simulated. 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 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.

II. Glossary

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	Seach 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)

III. Disclaimer

This product was exclusively developed and distributed with entertainment and educational purposes. Any commercial, training, professional, or military use of this product is strictly prohibited and not endorsed by Miltech Simulations, Maryadi or any other company or individual related to this project.

Although this simulated aircraft resembles its real-world counterparts in many aspects, the product does not accurately represent (nor intends to accurately represent) the performance, systems, design and/or features of the real life counterpart.

This product, though heavily inspired by the MV-22B Osprey, is not endorsed, supported by, related to, certified by or in any way connected to Bell Helicopter Textron, The Boeing Company, the US Air Force, Navy, Marine Corps, the Japanese Self Defense Army or any aircraft manufacturer or operator. The product has been exclusively inspired by readily available information. This product falls into Fair Use of all applicable copyrighted and trademarked materials, as a transformative work inspired by the real aircraft. The documentation included with this product is strictly restricted to Simulation Use Only, and represents the depth of systems, equipment and dynamics of this product.

This product has been developed using the available resources. The scope is limited to "As realistic as practical", and though some systems have been accurately developed, others have been greatly simplified. For that reason, the systems, performance, operations and procedures shall be considered purely fictional and not representative (nor intends to accurately represent) the real counterpart.

2. CREDITS

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

3. COPYRIGHT & LICENSE

Miltech Simulation is a Vantech brand.

hello@vantech.dev

4. SUPPORT

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: miltechsimulations@gmail.com

Emails are typically replied to in under 24hrs. Please check our FAQs before emailing: https://miltechsimulations.talkyard.net/-12/faq-and-known-issues-osprey-mv22

For company/business inquiries, please contact hello@vantech.dev

5. INSTALLATION & REMOVAL

I. Requirements

Microsoft Flight Simulator – PC. Latest version available.

A valid product license from ORBX or the MS Marketplace

Joystick Controller (Recommended)

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.

II. Installation from ORBX

1. Open ORBX Central with Administrator Rights
2. Verify ORBX Central has located your MSFS Community Folder Path
3. Search the product
4. Hit "Install" and wait for the product to install successfully
5. Close ORBX and launch Microsoft Flight Simulator

The product will be installed on your: (User)\AppData\Roaming\Microsoft Flight Simulator\Packages\Community\miltechsimulations-aircraft-osprey-mv22

III. Installation from the MS Marketplace

1. Launch Microsoft Flight Simulator
2. Open the Marketplace
3. Search the product
4. Hit "Install" and wait for the product to install successfully

The product will be installed on your: (User)\AppData\Roaming\Microsoft Flight Simulator\Packages\Community\miltechsimulations-aircraft-osprey-mv22

IV. Removal

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

6. IMPORTANT NEED-TO-KNOW

I. Nacelles

One of the unique characteristics of the MV-22 is the rotating nacelles, which increase/decrease in angle relative to the fuselage to allow for VTOL/STOL and transition over to regular flight. Nacelles are operated manually by the pilot. Nacelles are manually moved using the following commands:

Increase Cowl Flap 4 - Move Nacelles up (increase angle)

Decrease Cowl Flap 4 - Move Nacelles down (decrease angle)

These must be mapped to a key on your keyboard, or button on your joystick. Creating a new controller profile unique to this aircraft is highly recommended. The indicator on the PFD shows the current angle of Nacelles, as well as the operational limits given your current airspeed or situation.

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.

Figure: Nacelle Angle Indicator

Nacelles are limited to a minimum of 60 degrees when the aircraft is on the ground with the engines running. Upon shutting down the engines, the nacelles can be moved freely to any position. Engines will not start unless nacelle angle is at least 60 degrees.

In the air, Nacelle angle is given by a range depending on the airspeed of the aircraft. See Operating Limits. Hyd pressure must be at least 3800psi on at least one HYD system for nacelles to move.

II. MSFS Realism & Flight Model Settings

Due to the uncommon flight dynamics of this aircraft, the Assist Realism Settings for Piloting and Aircraft Systems must be set to “True to Life”. This is due to the limited compatibility of VTOL aircraft with MSFS, requiring special code for the flight dynamics.

UPDATE: After V1.0.4, the default mode for the aircraft is "Volocopter", and hence, "True to Life" is no longer required. It is, however, strongly recommended to switch "G-Effect" to Jet Pilot and "G-Suit" to On (under Assistance Options/User Experience)

The Flight Model (Options -> General -> Flight Model) must also be set to “MODERN”.

It is recommended to keep Crash Detection “OFF” due to unique handling characteristics of this aircraft, especially when used with one of our carrier products.

III. Aircraft Flight Reality

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.

IV. 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.

V. 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).

Vortex Ring State simulation can be deactivated by switching “Flight Reality” to EASY on the CDU.

Figure: Vortex Ring State and V/S Indicator

However, 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.

VI. 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.

VII. 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.

VIII. 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 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.

IX. 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.

X. Use of the Autopilot

It is recommended that Autopilot and autothrottle is 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.

XI. 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.

XII. 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.

XIII. 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
- Fire Detection and Fire Suppression are INOP
- Entering Flightplans from the CDU is not possible at this time. This will be added on a future update. Flightplans can only be created through the World Map.
- Aerial Refueling is INOP, though the probe can be extended

XIV. 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 axis to Throttle 1/Throttle 2. <u>The Osprey shall be controlled with a single throttle lever, which is mapped to "Throttle" axis on MSFS.</u>

7. THE AIRCRAFT

I. <u>General</u>

The MV-22 Osprey 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-22 is the variant especially built for the Marine Corps, and as such, features slightly different design and systems compared to the Navy or Air Force variants. Our Osprey MV-22 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-22 Osprey 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)
- Air Force “Blackbirds” (AFB Hulburt Field)
- Japan Self Defense Force
- Blank Livery

8. THE EXTERIOR

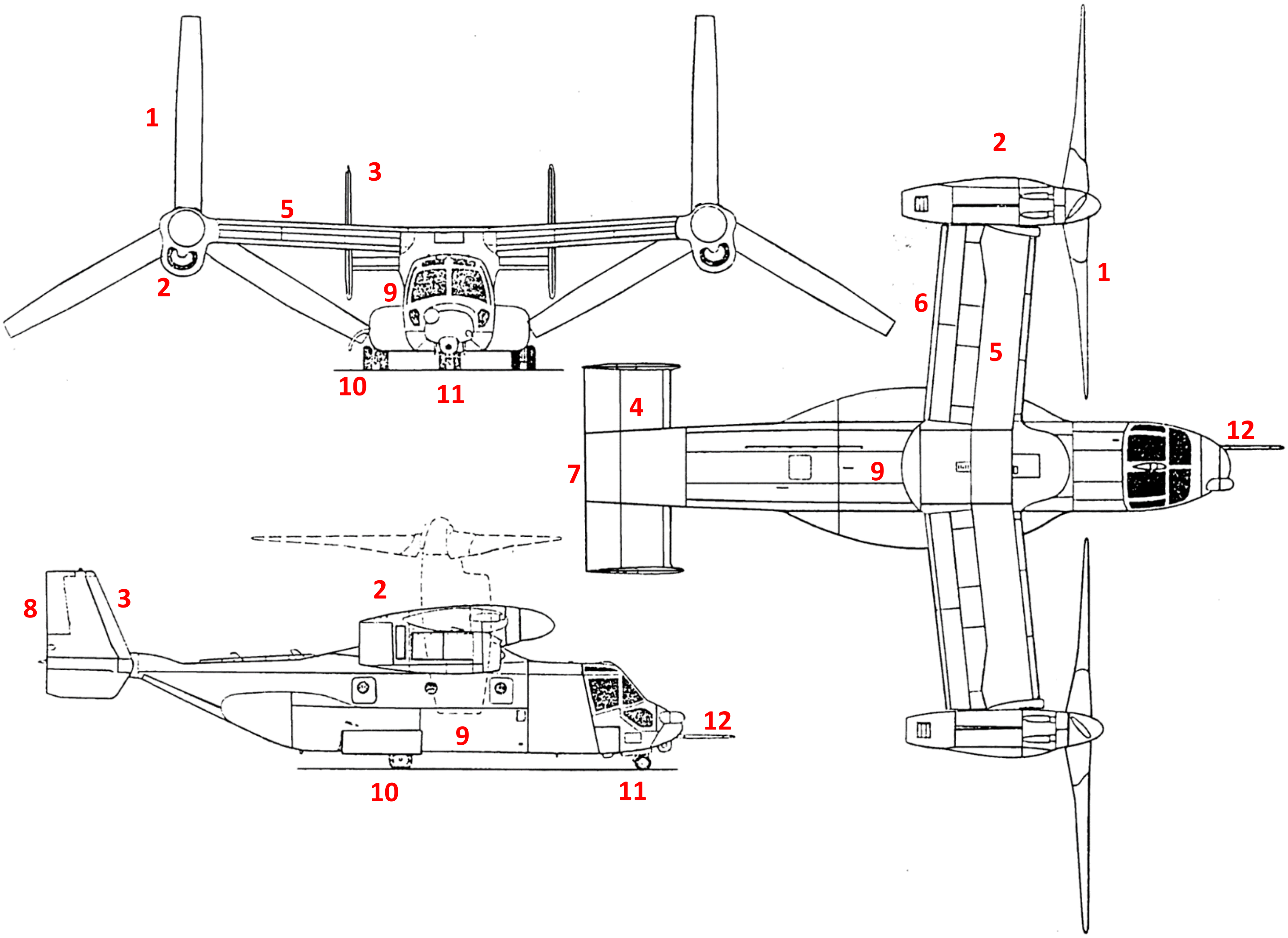


Figure: Osprey MV-22[1]

Legend

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

9. THE COCKPIT & SYSTEMS

I. Overview

Figure: Osprey MV-22

Legend

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

II. 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 by 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.

-Intentionally Left Blank-

- ***Primary Flight Data (PFD):*** This page contains all the basic aircraft instrumentation and information necessary to fly the MV-22.

Figure: Primary Flight Data

Legend

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 shown as two red indicators, safe area 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. The red line warns the pilot of vertical speeds inferior to 1500 ft/min that may result in Vortex Ring State (VRS)
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
8 – Heading/Compass Indicator
9 – VOR/Waypoint Information: Bearing, distance, estimated time arrival.
10 – Autopilot Active Data: (not visible on screenshot)

- ***Navigation Functions (NAV):*** This page contains the Navigation, VOR and Flight plan data.

Figure: Navigation Data

<u>Legend – Note that crossed out options are INOP</u>

1 – Mode: CTR(Pictured): Centered; DCTR: Decentered (Temporary INOP)
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

- ***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

<u>*Legend – Note that crossed out options are INOP*</u>

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
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

- ***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)***
  - ***Engines/Drive System - EICAS (ENG)***
  - ***Ice Protection (ICE)***
  - ***Electrical System (ELEC)***

See CDU on Status Functions for more information.

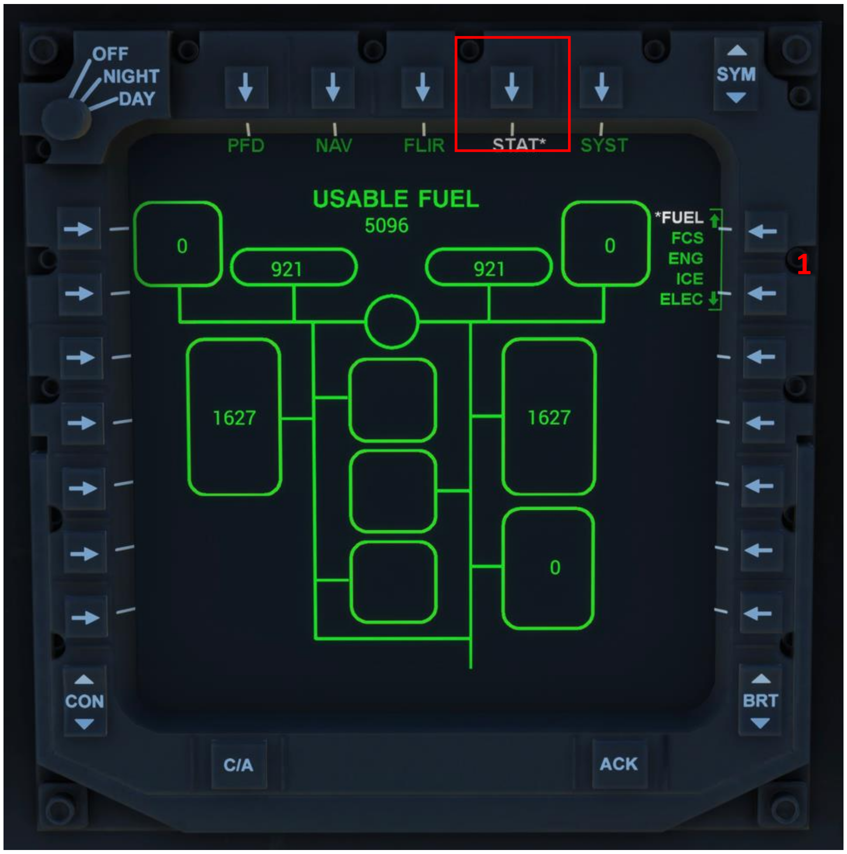


Figure: STAT Page (Fuel)

Legend

1 – Up/Down STAT Page Selector

- ***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 on 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

<u>*Legend (Functions not described are INOP)*</u>

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

III. 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.

- ***Overview***

Figure: Center/Control Display Unit Page

Legend

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, INOP. All Flight Plans must be created through the MSFS World Map.

13 – WYPT Button: Waypoint, INOP

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

- ***Control Display Unit (CDU):***
  - ***Menu 1:*** Accessible through a single click of the CDU Button

Figure: Menu 1 (CDU)

Legend (Functions not described are INOP)

1 – ACFT INIT: Opens the Aircraft Initialization menu. All functions are INOP, except for “FLIGHT REALITY” in Menu 3

1 – Flight Reality 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.

2 – Flight Reality 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.

- *Menu 2:* Accessible through a second click of the CDU Button

Figure: Menu 2 (CDU)

Legend (Functions not described are INOP)

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.

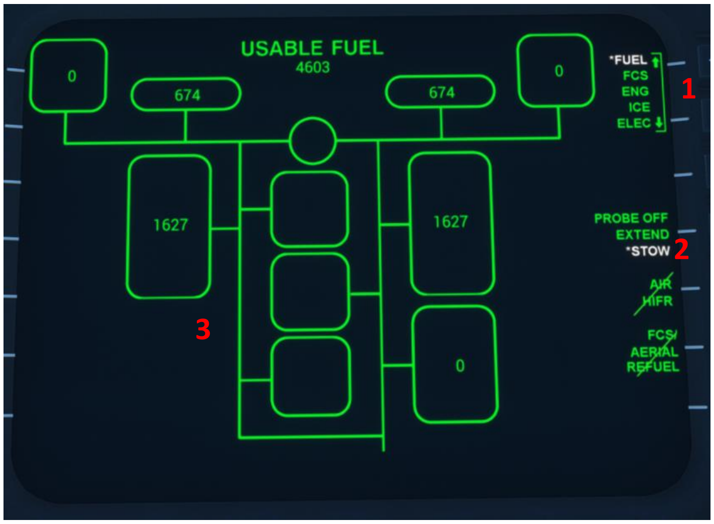
3 – VOR/ILS Freq: VOR/ILS Frequency. To input frequency, first click on the selector button. A green blinking box will appear. Type the VOR/ILS Frequency using the CDU Keyboard. Click ENTER to confirm. NAV1 is on the Left side, NAV2 on the right side.

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.

- ***Status Functions:*** Accessible through a single click of the STAT Button
  - ***Fuel (FUEL)***



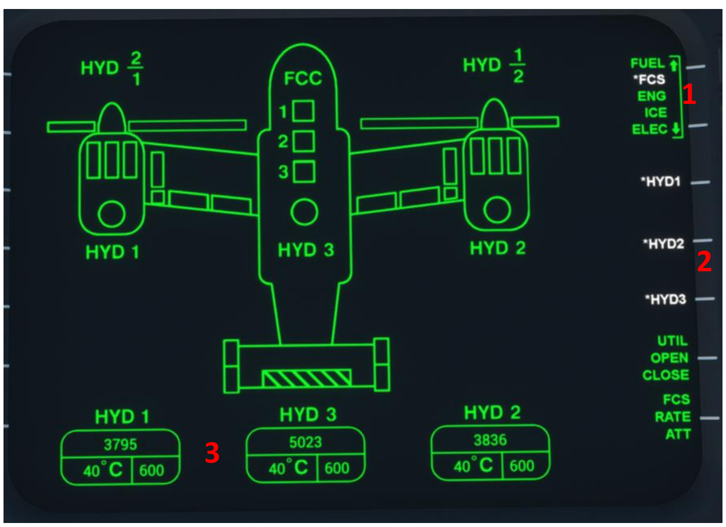
Legend

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)***



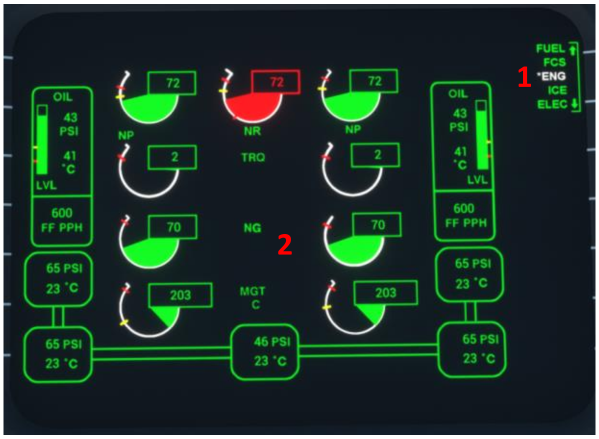
Legend

1 – Up/Down STAT Page Selector

2 – HYD Systems: Hydraulic Systems, INOP

3 – Hydraulic Pressures and Temperatures: Intended for display only.

- ***Engines/Drive System - EICAS (ENG)***



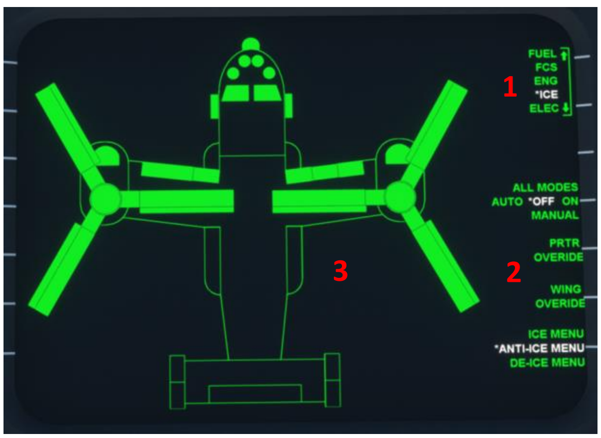
Legend

1 – Up/Down STAT Page Selector

2 – Engine and Drive System: Intended for display only.

See: Engine Instrument Crew Alerting System

- ***Ice Protection (ICE)***



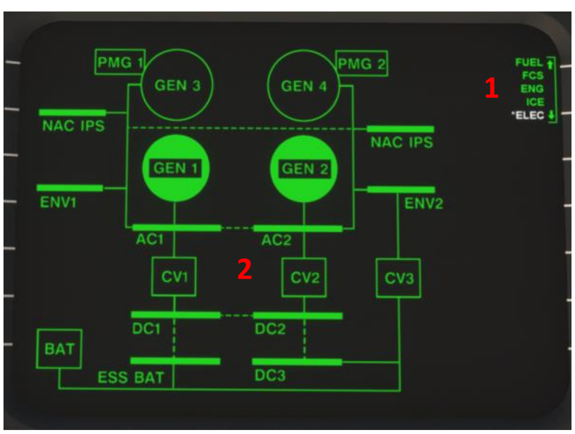
Legend

1 – Up/Down STAT Page Selector

2 – Anti-Ice/De-Ice System: INOP.

3 – Icing Detection Indicator: INOP, Intended for display only.

- ***Electrical System (ELEC)***



Legend

1 – Up/Down STAT Page Selector

2 – Electrical System Indicator: Intended for display only

- ***Engine Instrument Crew Alerting System (EICAS) & Standby Flight Display:*** Accessible through a single click of the EICAS button, or the CDU button. The 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)

<u>*Legend*</u>

1 – Nacelle Angle Indicator

2 – Fuel Quantity

3 – Nr: Proprotor Speed (rpm)

4 – Np: Power Turbine Speed

5 – Flaps Level Indicator

6 – ENG TRQ: Engine Torque

7 – Ng: Gas Generator Speed (Engine Throttle)

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

- ***Exterior Lighting:*** 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)

<u>*Legend*</u>

1 – Master CTRL: Master Control off/on. Master switch for all exterior lighting. <u>Must be ON</u> (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

IV. Autopilot Console

The Osprey is equipped with a completely modeled autopilot system. 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

Legend

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: INOP
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

V. 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, 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.

VI. 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

Legend

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.

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VII. 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

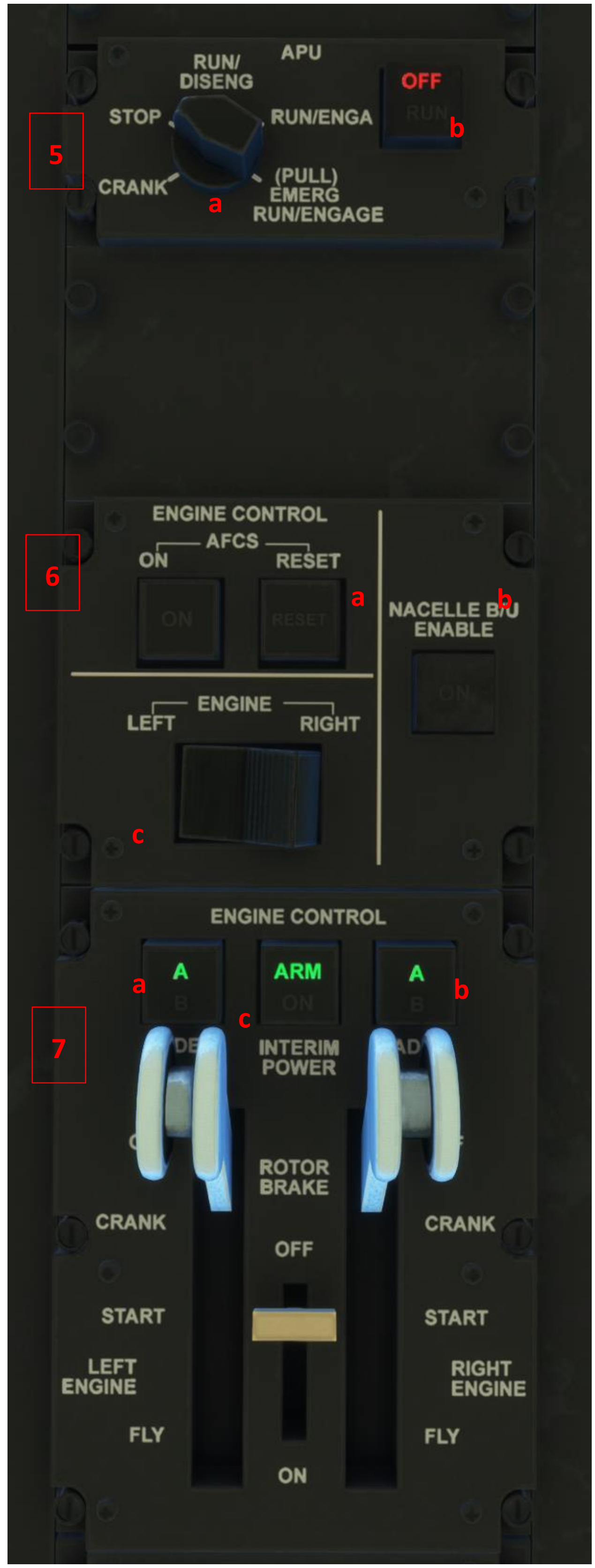
b. APU Indicator: Indicates the current status of the APU (OFF / RUN)

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

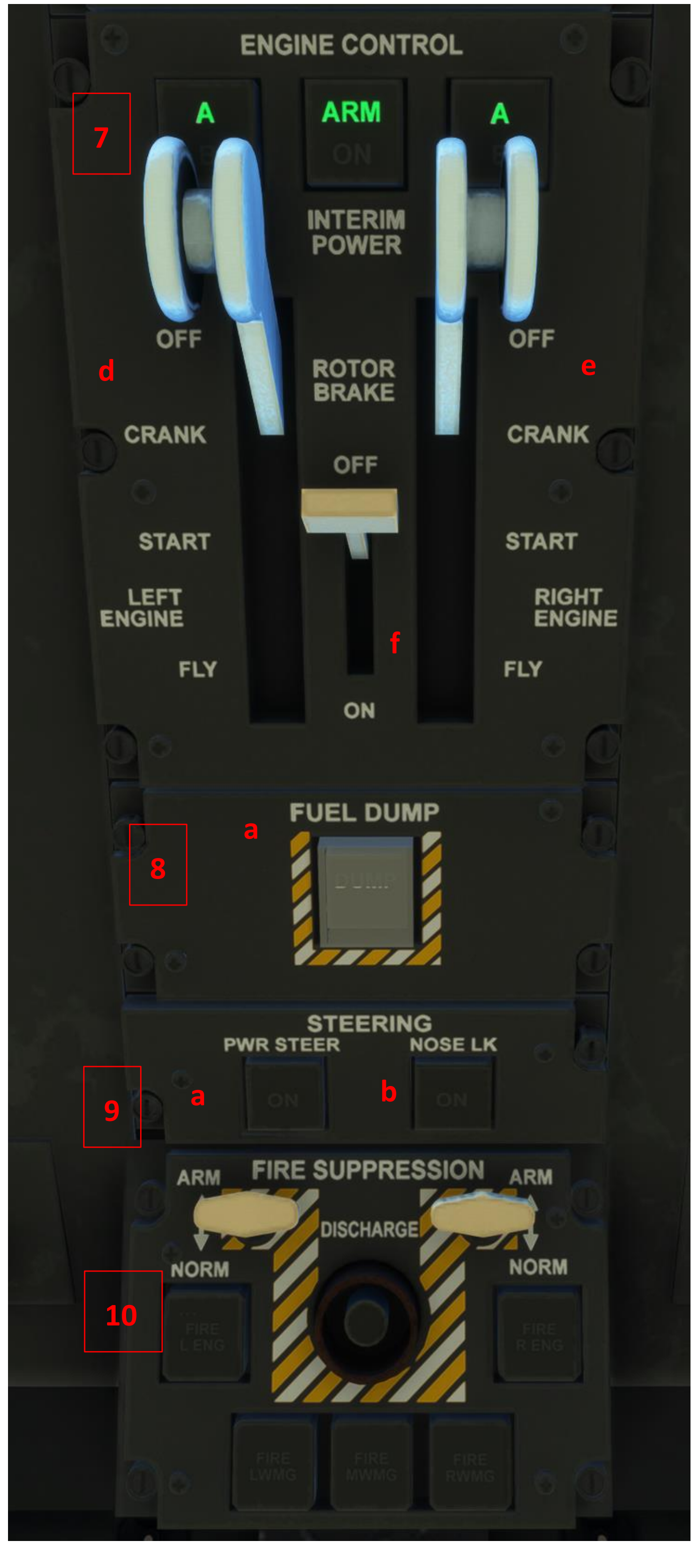


7 – Bottom Engine Control Panel (Cont.):

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: Fire suppression is not supported, and therefore, INOP.

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

VIII. Center Console

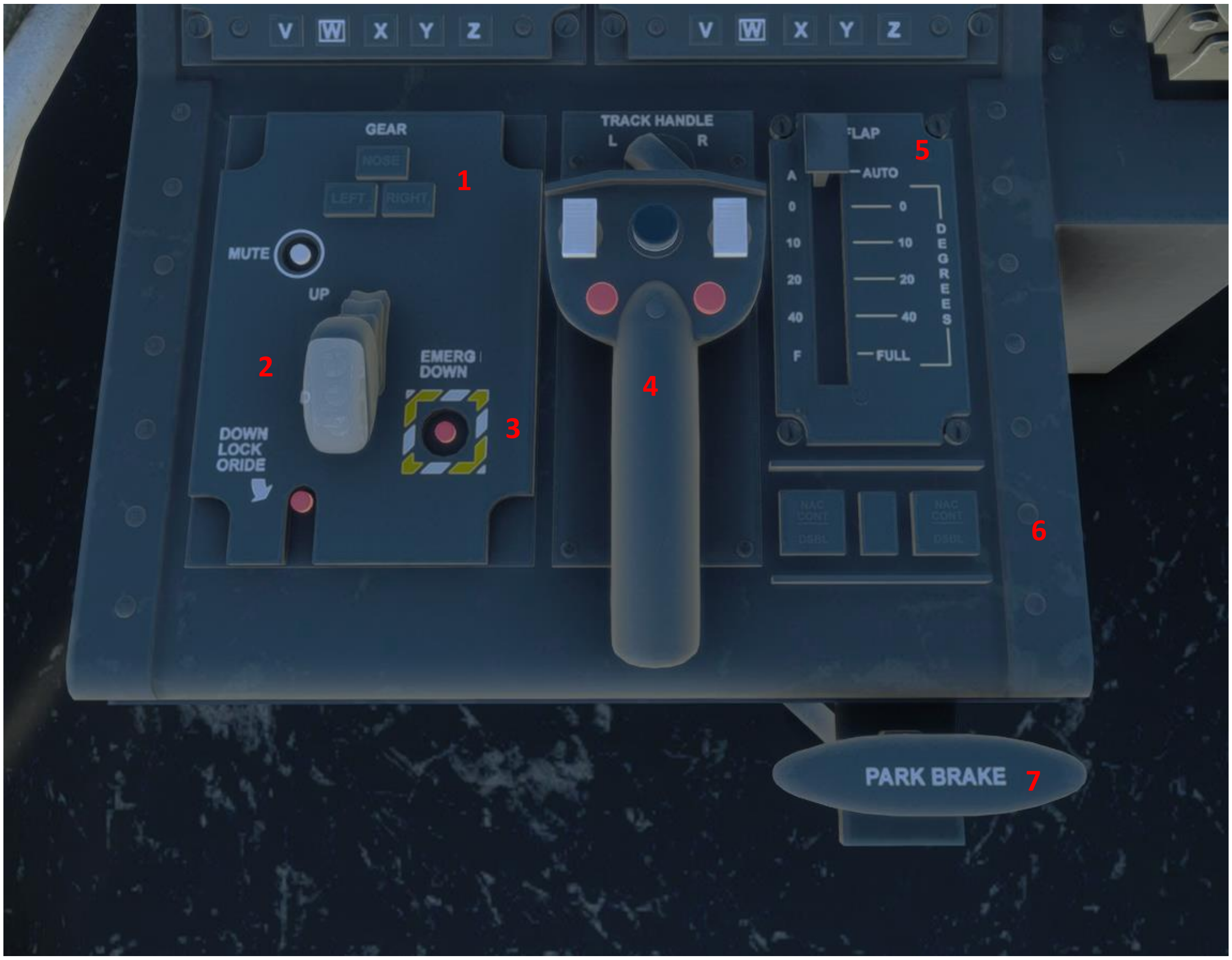


Figure: Center Console

Legend

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:

In CONV/VTOL Config, the Flaps are always in Auto-mode (position A), meaning that the flaps are auto-commanded depending on nacelles position and airspeed.

In APLN config, the flaps can be manually controlled, via this lever or the standard flaps controllers.

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

6 – Nacelle Control Disable Switches: INOP

7 – Parking Brake

IX. Side Consoles

Right Figure: Pilot’s Side Panel

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

10. PERFORMANCE & 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	

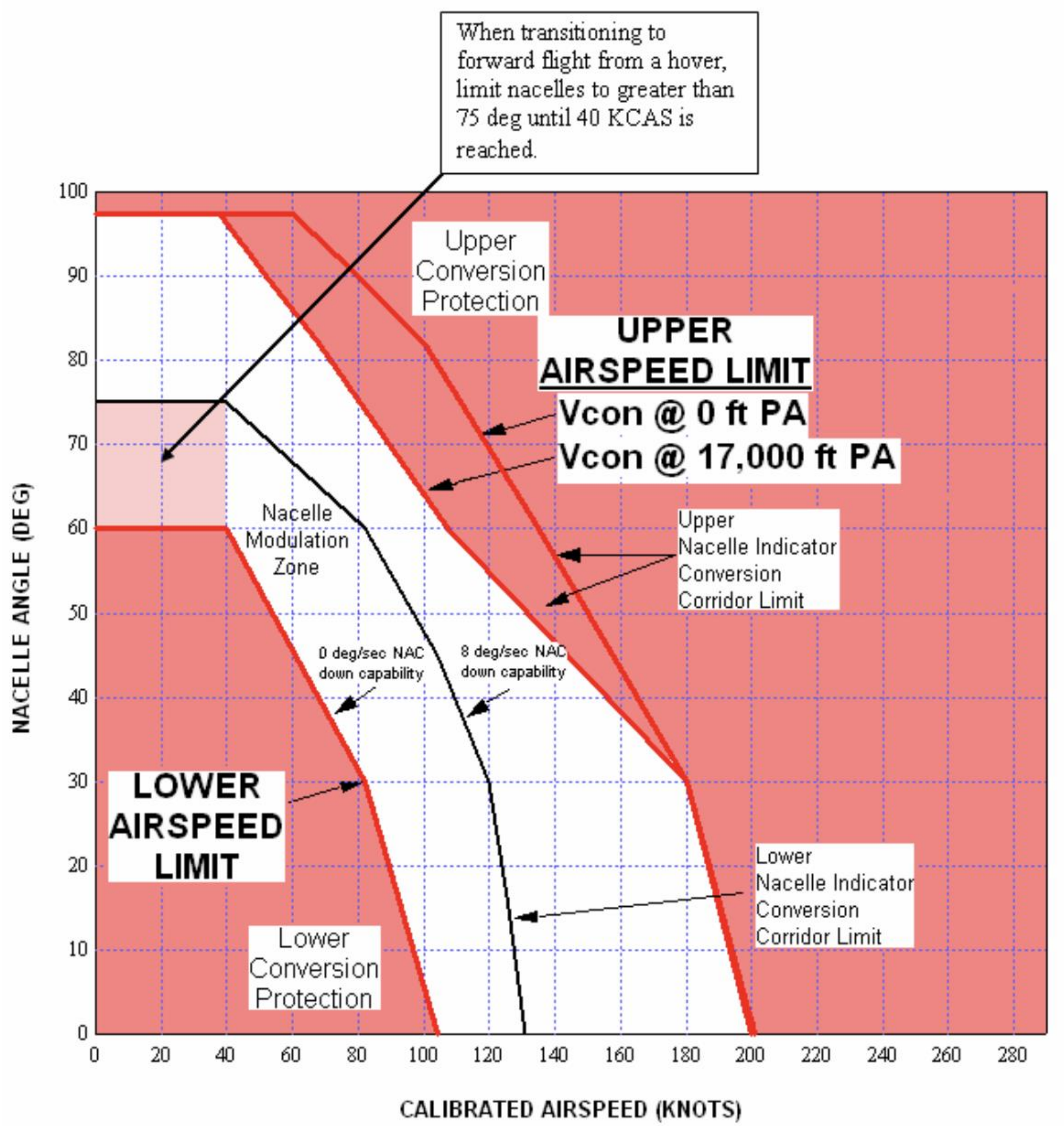


Table 1: VTOL/CONV Mode Conversion (2)

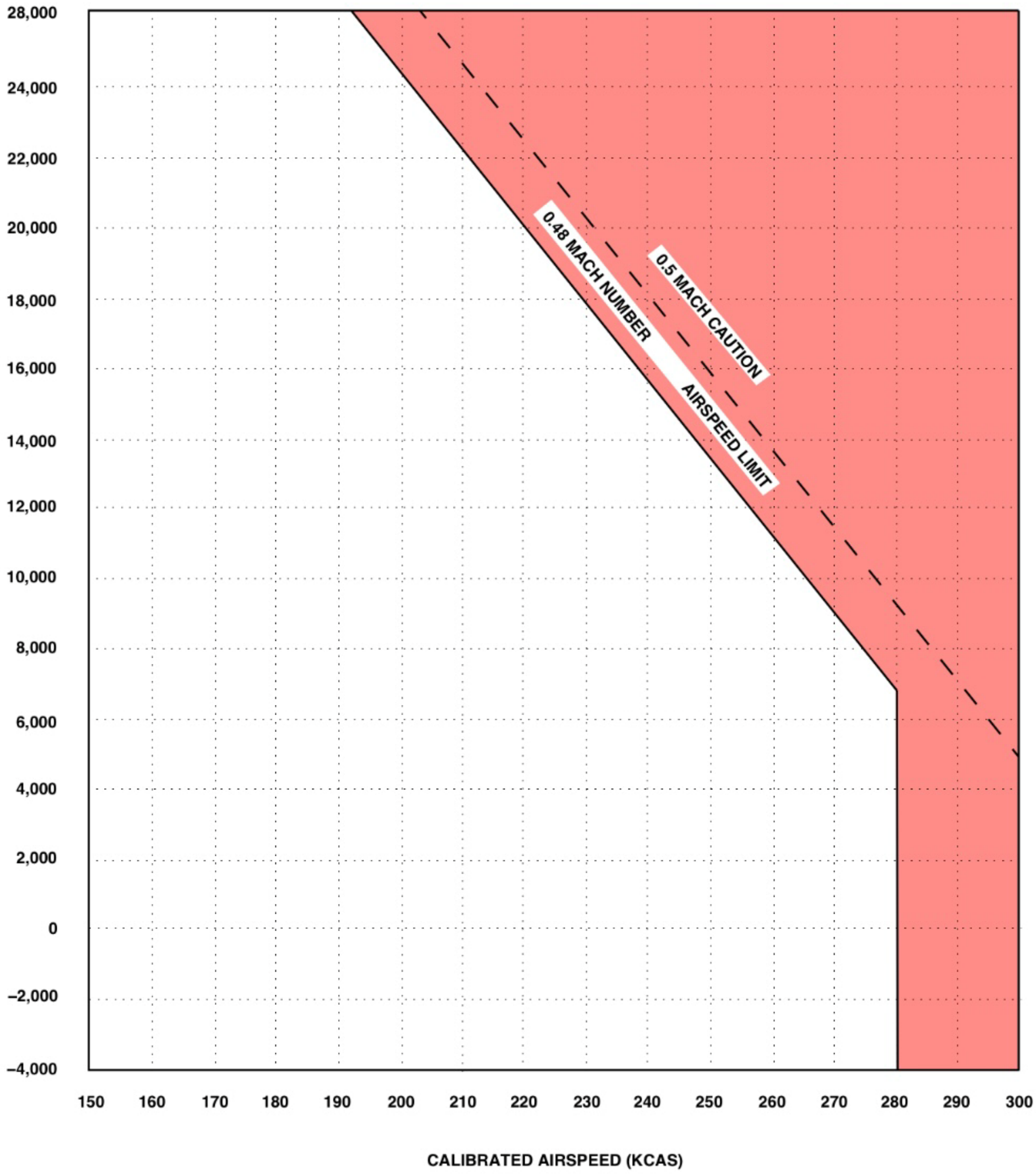


Table 2: APLN Mode (84% Nr) Airspeed [(2)]

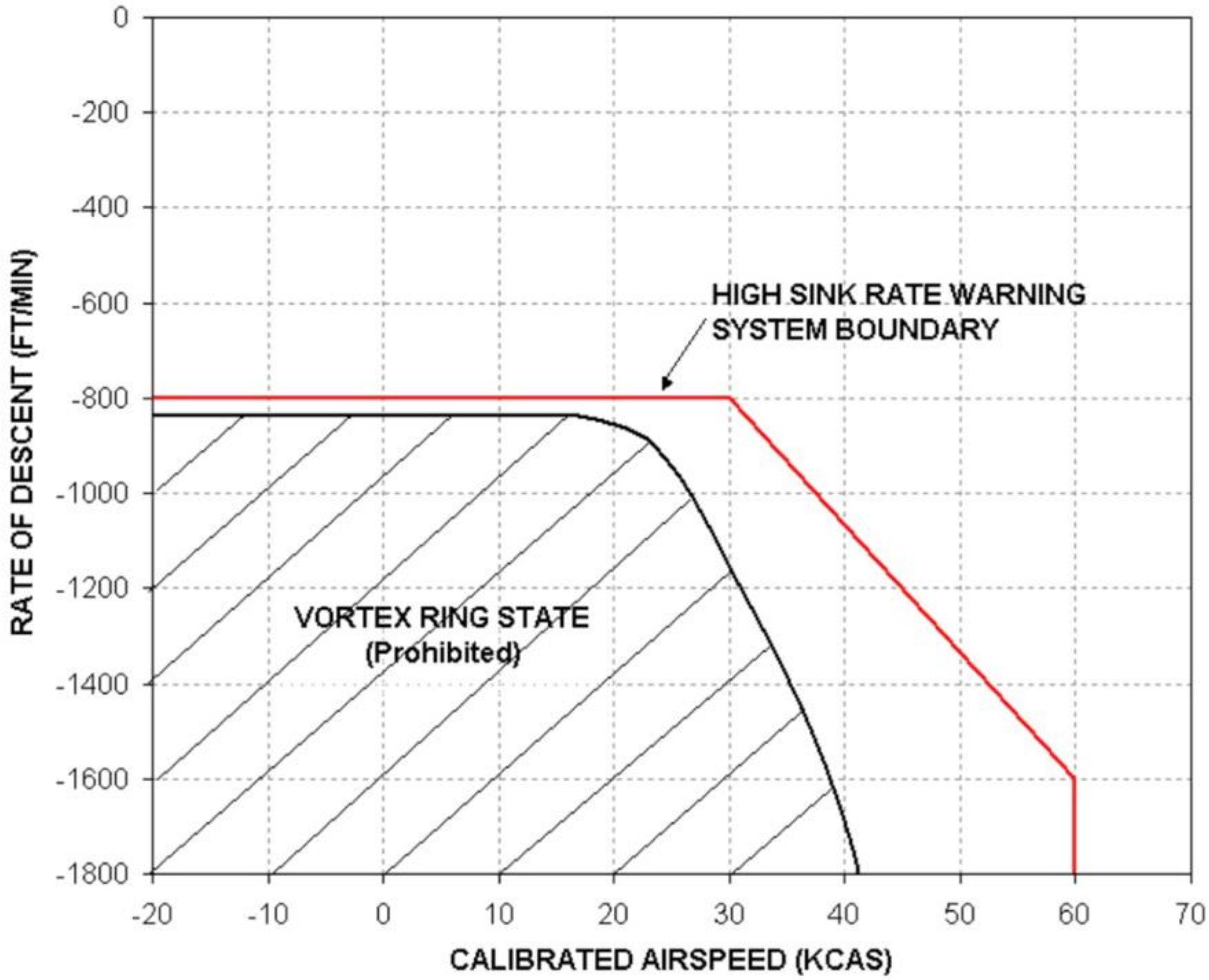


Table 3: Vortex Ring State [(2)]

11. NORMAL PROCEDURES

I. Sim Operation Remarks:

i. MSFS Sets the starting flight mode based on the type of starting location for the flight:

Hangar: Cold and Dark/Blades Folded

Parking: Cold and Dark

Taxiway: Ready to Fly

Runway: Ready to Fly

Flying: Ready to Fly

ii. 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.

iii. All flight plans are to be created using the built-in MSFS Flight Map before starting the flight. CDU Input is not available.

iv. Fuel and payloads are to be changed through the built-in MSFS Menu. Range and Endurance are calculated automatically based on these numbers.

v. 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.

II. Pre – Start

1. Landing Gear – Down
2. Flaps – AUTO
3. Displays – OFF
4. Rotor Brake – OFF
5. Engine Control Levers - Both OFF
6. APU – STOP
7. Primary Cockpit Lights – OFF
8. Emergency Egress – OFF
9. Secondary Cockpit Lighting – OFF
10. Cargo Hook Hoist Mode – OFF
11. Fuel Dump – OFF
12. Emergency Oxygen – OFF
13. Blade Unfold and Wing Unstow Procedure – As required, see BFWS Procedure Checklist

III. 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

IV. Engine Startup

1. Start Engines:
    a. Set CDU on EICAS display or set MFD on STAT-ENG display
    b. Parking brake – ON
    c. Rotor Brake – OFF
    d. Rotor Lock – OFF
    e. Fuel Quantity – CHECK
    f. Nacelles – 90 Degrees
    g. Check aircraft is clear from obstacles
    h. Move ENG2 Control Lever to START position.
    i. Proprotor – ROTATE
    j. EICAS-NG – gaining % RPM after 30 sec
    k. ENG2 - Wait for Np stabilize at 70-72 %
    l. Switch respective Engine Control Lever – FLY
    m. ENG1 - Lever to START position
    n. ENG1 – Wait for Np stabilize at 70-72%
    o. Switch respective Engine Control Lever – FLY

V. 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

VI. Before Takeoff

1. Flaps - AUTO
2. Fuel Quantity – CHECK
3. Doors and Ramp – CLOSED
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

VII. 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

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.

VIII. 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

IX. Climb

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

X. Cruise

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

XI. Descent

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

XII. Conversion

1. Max Speed for Conversion: 200 KCAS (see the Conversion Corridor Figure)
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.
    a. 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.

XIII. 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
5. Flaps - AUTO
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
4. Flaps – AUTO or MANUAL as Required
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

XIV. Taxi

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

XV. 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 BFWS Procedure Checklist

XVI. 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

OTHER PROCEDURES

I. Blade Fold/Unfold and Wing Stow (BFWS) Procedures

a. 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:
    a. NAC Positioned to 90 deg
    b. Proprotor blades index and lock
    c. Left and right blades fold
    d. Flaps position to 0 deg
    e. Nacelles lower

f. Wing lockpin retraction
g. Wing Stow

13. FULL STOW – Verify white with *

b. 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:
    a. Flaps positioned to 0 deg
    b. Wing lockpin retraction
    c. Wing unstow
    d. NAC raise to 90 deg
    e. Wing lockpin extension
    f. Blades unfold
13. FLT RDY – Verify white with *
14. ROTOR LOCK – Deselect on MFD, verify green

a. 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 *

II. 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 over stressing the engine (keep engine indications in Green)

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

III. 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 Positon)
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.

IV. 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:
    a. CDU – STAT – FUEL – PROBE Extend

b. Wait for probe to extend fully (visible from cockpit)
c. Manually open the Fuel and Payload menu – Load Fuel
d. Verify new Fuel Amount
e. CDU – STAT- FUEL – PROBE Stow

2. Continue Flight normally.

V. 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.

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8. REFERENCES

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