



# Virtavia

## **E-2C HAWKEYE**

### **USER MANUAL**

Virtavia E-2C Hawkeye  
Manual Version 1.0

# INTRODUCTION

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The E-2C is an all-weather twin turboprop carrier-borne early warning aircraft that is also used for land-based operations. Its APS-139 radar, mounted in a 24 ft radome that rotates at 6 rpm, can detect targets as small as a cruise missile at 167 miles, track multiple airborne and surface targets and simultaneously control multiple airborne intercepts. The Hawkeye has been in service in the USN since the early sixties and its engines and electronics suite have been upgraded several times. It is also used by the USCG and US Customs and versions have been sold to Egypt, Israel, Japan and Singapore. This FSX aircraft represents an E-2C as flown in the mid-eighties.

# SUPPORT

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Should you experience difficulties or require extra information about the Virtavia E-2C Hawkeye, please e-mail our technical support on [tech.support@virtavia.com](mailto:tech.support@virtavia.com)

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# PACKAGE CONTENTS

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The Virtavia E-2C Hawkeye package contains a single model variant, two texture sets and a turboprop sound set.





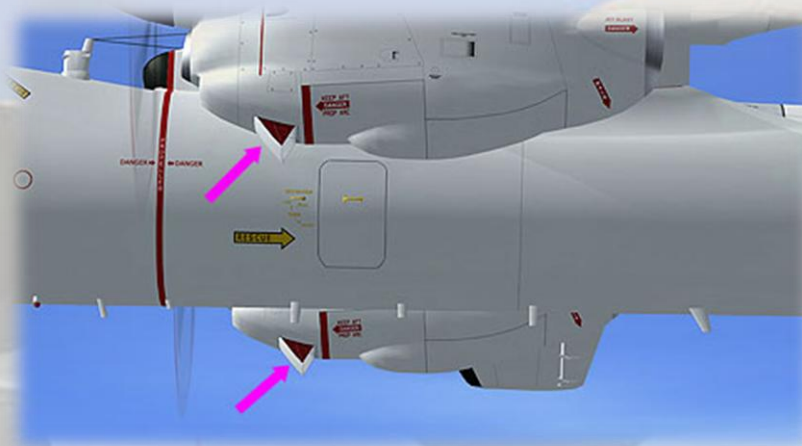
# EXTERIOR MODEL

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The exterior model has all the usual animations such as ailerons, elevators, crew entry hatch, wing fold, tail hook and landing flaps. There are no speedbrakes fitted to the Hawkeye.

## Oil Cooler Flaps

Each engine nacelle is fitted with a ventral oil cooler flap. These are opened by means of switches on the front vertical area of the pilot's overhead console.



## Exits

Shift-E opens the crew entry door on the left side of the aircraft.

## Crew figures

The crew figures can be toggled using Ctrl-W.

## Propellers

The propeller blade pitch is animated through the range from fine to coarse pitch (ctrl-F1 through ctrl-F4). There are no prop pitch levers in the Hawkeye, pitch would be controlled automatically, according to power demand. The keypresses mentioned above can nevertheless be used. Pressing and holding F2 on landing provides reverse thrust (beta range). Tap F1 to cancel reverse thrust.

# LIGHTING

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Pressing the L key will turn on all lights. You may however wish to turn them on using the appropriate switches in the cockpit, as the L key also turns the on navigation and both instrument and cabin flood lighting in the cockpit, which should ideally be switched separately.

The ventral beacon light is not used as it causes distracting flashing in the cockpit at night due to a limitation of FSX. It may be enabled if desired by 'uncommenting' its entry in the [Lights] section of the E-2C's aircraft.cfg file. The cabin flood light is enabled, but it will partially illuminate the front of the large dorsal air intake. This bleed-through of the cabin lighting is a known issue in FSX. This light can also be commented out in the aircraft.cfg file Lights Section in the same way as the ventral rotating beacon, if desired.

In common with other US Navy aircraft of this era, the E-2C Hawkeye was not fitted with landing lights. There are however two taxi lights mounted inside the nose lights compartment, these have been set up as landing lights in the model.

Please refer to the cockpit section of this manual for information regarding light switch location.

# ALTERNATIVE VIEWPOINTS IN FSX

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There are several different ways of looking at the aircraft and the cockpit, select these alternative views by right-clicking in an empty area and picking the 'Aircraft' menu for external views and the 'Cockpit' menu for views inside the cabin. It is possible to zoom and pan as normal in these alternative views. Cycle through the available ones by pressing the A key.

## External View Options

It is possible to pan and zoom as normal in all external views.

Right Wing View



Left Wing View





Tail View



Nose View



Cockpit View, Left





Cockpit View, Right



Undercarriage View, Main Right



Undercarriage View, Nose



Tail Hook View



## Interior Views

It is possible to pan and zoom as normal in all interior views.

Virtual Cockpit View



Copilot's Seat View





Cockpit Center View



Cockpit Radios / Fire Panel View



Cockpit Overhead Panel View



## Cockpit Center Console View



## Cockpit Warning Lts / Stormscope View



### Moving Around the Cabin

Shift-Enter and Shift-Backspace : moves up and down

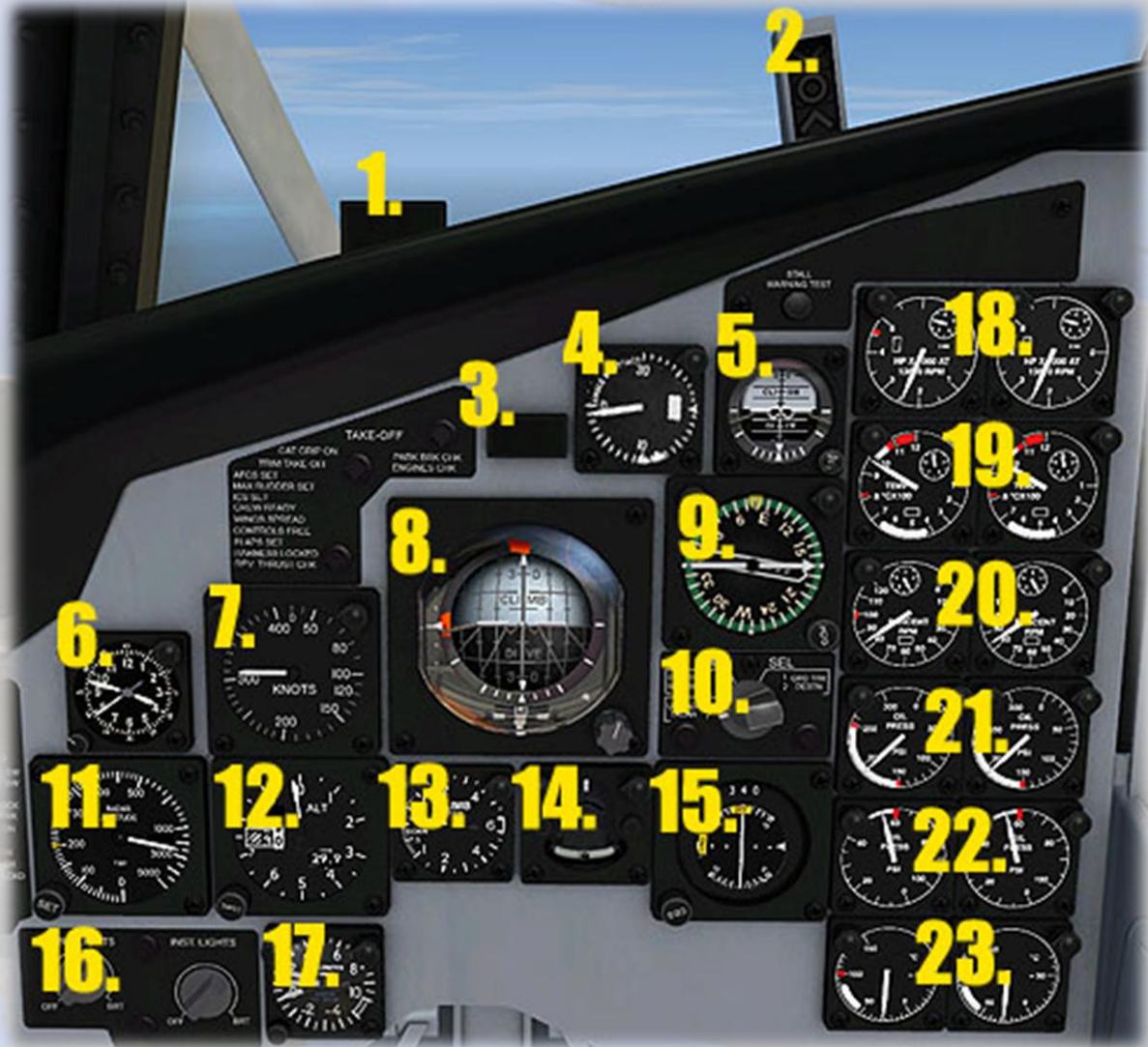
Ctrl-Shift-Enter and Ctrl-Shift-Backspace : moves side to side

Ctrl-Enter and Ctrl-Backspace : moves backwards and forwards



# VIRTUAL COCKPIT FUNCTIONS

## MAIN PANEL • LEFT SIDE



1) **Landing Gear Not Down Warning Lamp.** Flashes when flaps are down, either throttle is at less than 5% and gear is still retracted.

2) **Angle of Attack (AoA) Indexer.**

The AOA indexer is comprised of three lights. The light indications are a green chevron ( v ) showing 'too high AOA' at the top, a yellow doughnut ( O ) showing proper AOA in the center, and a red chevron ( ^ ) showing 'too low AOA' at the bottom.

**A GREEN chevron pointing down** indicates 'too slow' - the nose must be lowered and/or the throttle setting increased.

**An AMBER doughnut** indicates that AOA is optimum for the approach.

**A RED chevron pointing up** indicates 'too fast' - the nose must be raised and/or the throttle setting reduced.

At intermediate stages the AOA indexer may also display two symbols at a time. For example, a doughnut and a green chevron would indicate that the aircraft is nearing optimum AOA, providing the nose is lowered further. A doughnut and a red chevron would indicate the opposite.

3) **Master Caution Light.** Linked to the left and right Caution Light Panels, the Master Caution illuminates when any caution is registered. Clicking the lamp will reset it, but this should only be done after the Caution Light panel has been checked to see the cause of the alarm.

4) **Angle of Attack Indicator.** Shows the AoA in units, not actual degrees. The correct approach AoA of 20 units is indicated by the needle pointing at the 3-o'clock position.

5) **Standby Artificial Horizon.** This instrument provides a simplified safety backup to the main artificial horizon gauge. The right knob cages or locks in place both indicators during excessive maneuvering.

6) **Clock.** The knob can be clicked to toggle Local and Zulu time.

7) **Airspeed Indicator.** Shows the present airspeed in knots.

8) **Main Artificial Horizon.** The right side knob calibrates the indicator 'wings' vertically. The instrument also has locator and glideslope needles so can be used for VOR (NAV1) homing, as well as an ILS receiver. Warning flags display when there is no valid LOC or GS signal, if there is no power and if the FSX Flight Director is switched on.



9) **Radio Magnetic Indicator.** A standard RMI with the larger needle for indicating the direction of the tuned NAV 1 station and the smaller needle for indicating the direction of the tuned NDB. The yellow heading bug indicates the current autopilot heading setting.

10) **Flight Director Switch.** This knob is used to toggle the FSX Flight Director function and the Main Artificial Horizon will display the information using its GS and LOC needles.

11) **Radar Altimeter.** The gauge has a SET knob which is used to move the small triangular bug around the perimeter of the gauge. The position of the bug indicates the set low altitude warning threshold, when the red warning lamp on the gauge will illuminate.

12) **Altimeter.** Standard altimeter, knob right side for Baro Setting. Use left/right mouse click, mousewheel or left click drag to adjust. An orange 'OFF' flag will appear on the gauge face if power to the instrument is lost.

13) **Vertical Speed Indicator.** The Vertical Speed Indicator or VSI indicates the instantaneous rate of climb or descent in feet per minute.

14) **Turn and Slip Indicator.** The turn and slip indicator or turn and bank indicator is two flight instruments in one. One indicates the rate of turn, the other part indicates whether the aircraft is in coordinated flight.

Enabling "Auto-Coordination" in FSX Settings will automate this.

15) **Course Deviation Indicator.** Functions like a ILS indicator with the aircraft symbol acting as a pointer indicating deviation left or right from the current set NAV1 OBS. The gauge includes the usual vertical and horizontal bars to indicate the relative direction of the tuned VOR or runway LOC and the glideslope (GS). The numerical display shows the current course (NAV1 OBS) setting and is adjusted using the knob at the bottom right of the gauge. Warning flags display when there is no valid LOC or GS signal.

16) **Cockpit Lighting Switches.** These two knobs toggle cabin (flood) lights and the instrument / text lighting. The flood light is best left off for night flying, especially on approach.

17) **Accelerometer.** The accelerometer measures acceleration (both negative and positive g-forces) during flight. The button is used to reset the minimum and maximum needles back to zero.

18) **Engine – Torque Horsepower Indicators.** The engine torque is displayed, expressed as Horsepower x 1000.

19) **Engine – Turbine Inlet Temperature Indicators.** Records the temperature of the combustion gases as they enter the turbine section.

20) **Engine – Tachometers.** These instruments indicate propeller and reduction gear speed in percent of RPM.

21) **Engine – Reducton Gear Oil Pressure Indicators.** These indicate the pressure of the reduction gear lubricating oil at the outlet of the oil pumps.

22) **Engine – Power Section Oil Pressure Indicators.** These display the pressure readings at the engine-driven oil pumps.

23) **Engine – Power Section Oil Temperature Indicators.** These display the temperature of each engine’s lubricating oil.

## **SIDE PANEL**



1) **Sim Icons.** Quick links to FSX functions for ATC, Radios, GPS, Map, Kneeboard and Autopilot. The top icon will toggle the control yoke.





## OVERHEAD PANEL • RADIOS AND FIRE



- 1) **COM Radio Frequency Switches.** Use left and right mouse clicks at the base of the switches to adjust the COM 1 active frequency.
- 2) and 5) **NAV Radio Frequency Knobs.** Use left and right mouse clicks to adjust the NAV 1 active frequency.
- 3) **NAV Radio Frequency Select Switch.** This switch toggles the displayed frequency between the Active and the Standby.
- 4) **NAV Radio Swap Button.** Pressing the spring-loaded button inserts the present Standby frequency into the display and sets the original Active frequency as Standby.



6) and 9) **Emergency Engine Shutdown Handles**. Pulling the handle out (left mouseclick) shuts down the engine. The red button which is then exposed will, when pressed, trigger the fire extinguisher and put out an engine fire in about 8 seconds.

7) **Fire Warning Lamps Test Button**. Pressing the spring-loaded button lights the Fire Warning lamps in the T-Bar handles.

8) **Cabin Pressure Dump Switch**. Activating this switch will gradually release the cabin pressure. The effect can be seen on the Cabin Pressure indicator on the copilot's panel.

10) **Whiskey Compass**. The familiar standby magnetic compass.

## **OVERHEAD PANEL • ELECTRICS**



- 1) Engine Anti-Icing Switch.
- 2) Pitot Heater Switch.
- 3) Instrument Lights Switch.
- 4) Cabin Lights Switch.
- 5) Wing & Tail Anti-Icing Switch.
- 6) Propeller Anti-Icing Switch.

- 7) Navigation Lights Switch.
- 8) Rotating Beacon Lights Switch.
- 9) Landing Lights Switch.
- 10) Left and Right Engine Generator Switches.
- 11) Master Battery Switch.

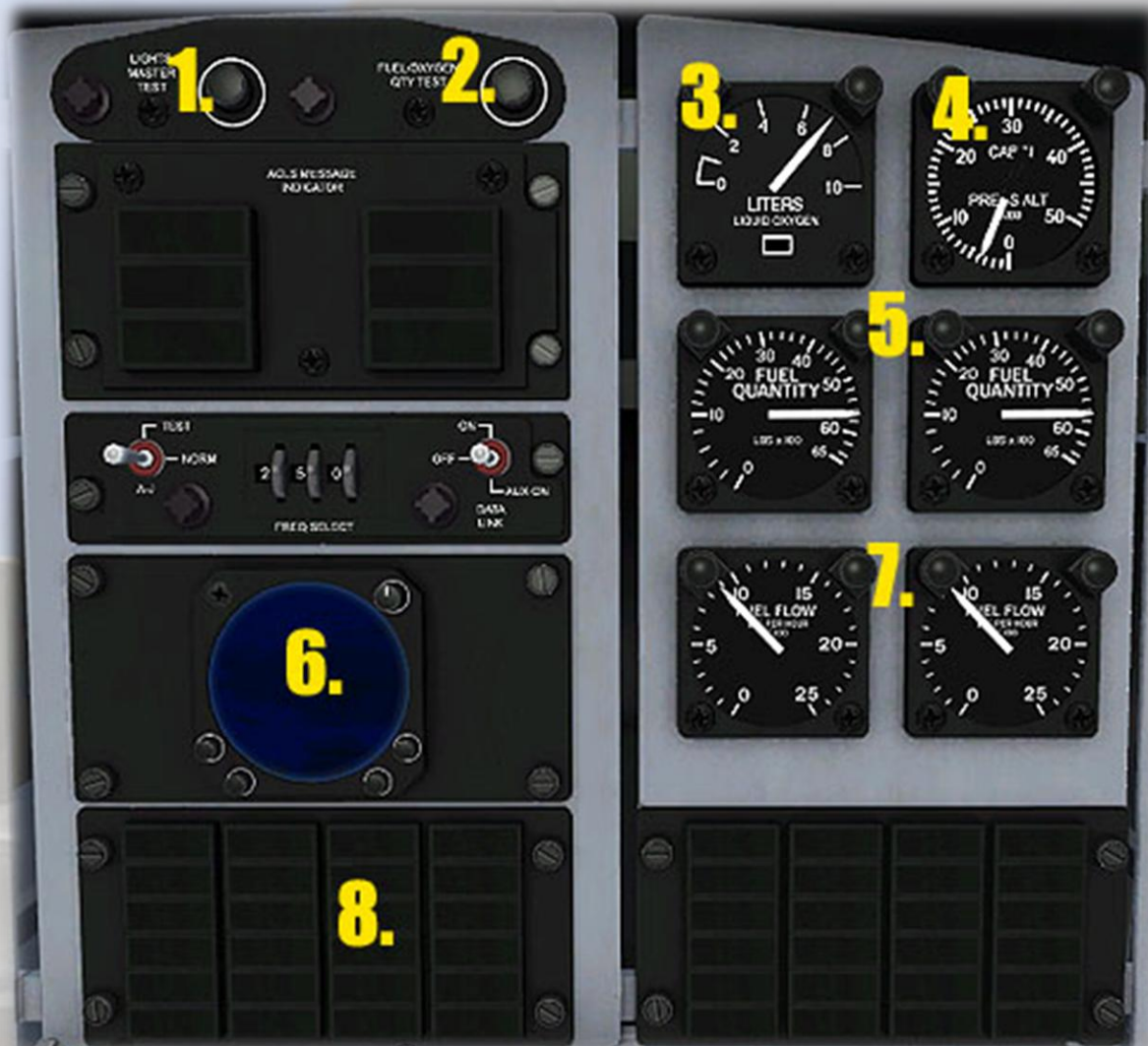
## OVERHEAD PANEL • LEFT SIDE



- 1) **Bleed Air Overheat Lamps Test Switch.**
- 2) **Wing & Tail Anti-Ice Pressure Gauge.** The gauge shows a reading when engine/wing anti-icing is switched on.
- 3) **Wing & Tail Anti-Ice Suction Gauge.** The gauge shows a reading when engine/wing anti-icing is switched on.
- 4) **Prop Anti-Ice Ammeter.** The gauge shows a reading when propeller anti-icing is switched on.



## MAIN PANEL • CENTER

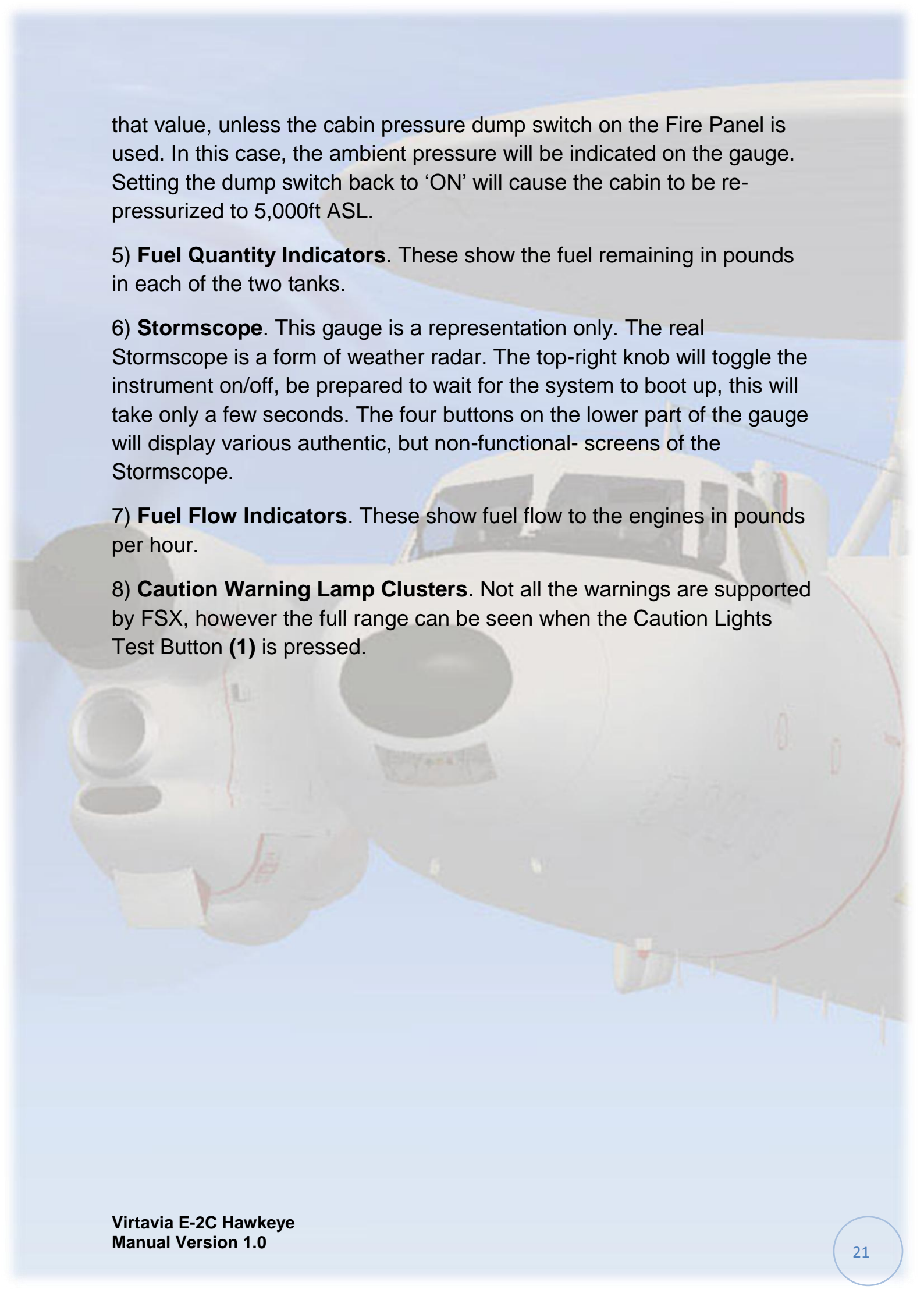


1) **Caution Lights Test Button.** This spring-loaded button will force illumination of both clusters of caution lights (8), as well as the six ACLS Message Indicator lights and the Air Data Computer annunciator block on the center console.

2) **Fuel & Oxygen Quantity Gauges Test Button.** When pressed, the gauge needles will fall to zero to indicate proper functioning.

3) **Oxygen Quantity Indicator.** This gauge also has an 'OFF' flag when there is no power to the instrument.

4) **Cabin Pressure Indicator.** The gauge will show normal ambient pressure up to 5,000ft above sea level. The system will then maintain



that value, unless the cabin pressure dump switch on the Fire Panel is used. In this case, the ambient pressure will be indicated on the gauge. Setting the dump switch back to 'ON' will cause the cabin to be re-pressurized to 5,000ft ASL.

5) **Fuel Quantity Indicators.** These show the fuel remaining in pounds in each of the two tanks.

6) **Stormscope.** This gauge is a representation only. The real Stormscope is a form of weather radar. The top-right knob will toggle the instrument on/off, be prepared to wait for the system to boot up, this will take only a few seconds. The four buttons on the lower part of the gauge will display various authentic, but non-functional- screens of the Stormscope.

7) **Fuel Flow Indicators.** These show fuel flow to the engines in pounds per hour.

8) **Caution Warning Lamp Clusters.** Not all the warnings are supported by FSX, however the full range can be seen when the Caution Lights Test Button **(1)** is pressed.

## MAIN PANEL • RIGHT SIDE



- 1) **Gear and Flaps Position Indicator.** Shows landing gear and flaps position in and is mouseable.
- 2) **Voltmeter.** This gauge displays the voltage of the combined circuits of the aircraft.
- 3) **Clock.** The knob can be clicked to toggle Local and Zulu time.
- 4) **Master Caution Light.** Linked to the left and right Main Warning Panels, the Master Caution illuminates when any caution is registered. Clicking the lamp will reset it, but this should only be done after the Main Warning panel has been checked to see the cause of the alarm.
- 5) **Trim Indicator.** This gauge is mousable and can be used to adjust pitch, roll and yaw trim.
- 6) **Airspeed Indicator.** Shows the present airspeed in knots.



7) **Main Artificial Horizon.** The right side knob calibrates the indicator 'wings' vertically. The instrument also has locator and glideslope needles so can be used for VOR (NAV1) homing, as well as an ILS receiver. Warning flags display when there is no valid LOC or GS signal, if there is no power and if the FSX Flight Director is switched on.

8) **Radio Magnetic Indicator.** A standard RMI with the larger needle for indicating the direction of the tuned NAV 1 station and the smaller needle for indicating the direction of the tuned NDB. The yellow heading bug indicates the current autopilot heading setting.

9) **Hydraulic Pressure Indicators.** These gauges display the pressure of the flight hydraulics and combined hydraulics systems.

10) **Altimeter.** Standard altimeter, knob right side for Baro Setting. Use left/right mouse click, mousewheel or left click drag to adjust. An orange 'OFF' flag will appear on the gauge face if power to the instrument is lost.

11) **Vertical Speed Indicator.** The Vertical Speed Indicator or VSI indicates the instantaneous rate of climb or descent in feet per minute.

12) **Turn and Slip Indicator.** The turn and slip indicator or turn and bank indicator is two flight instruments in one. One indicates the rate of turn, the other part indicates whether the aircraft is in coordinated flight.

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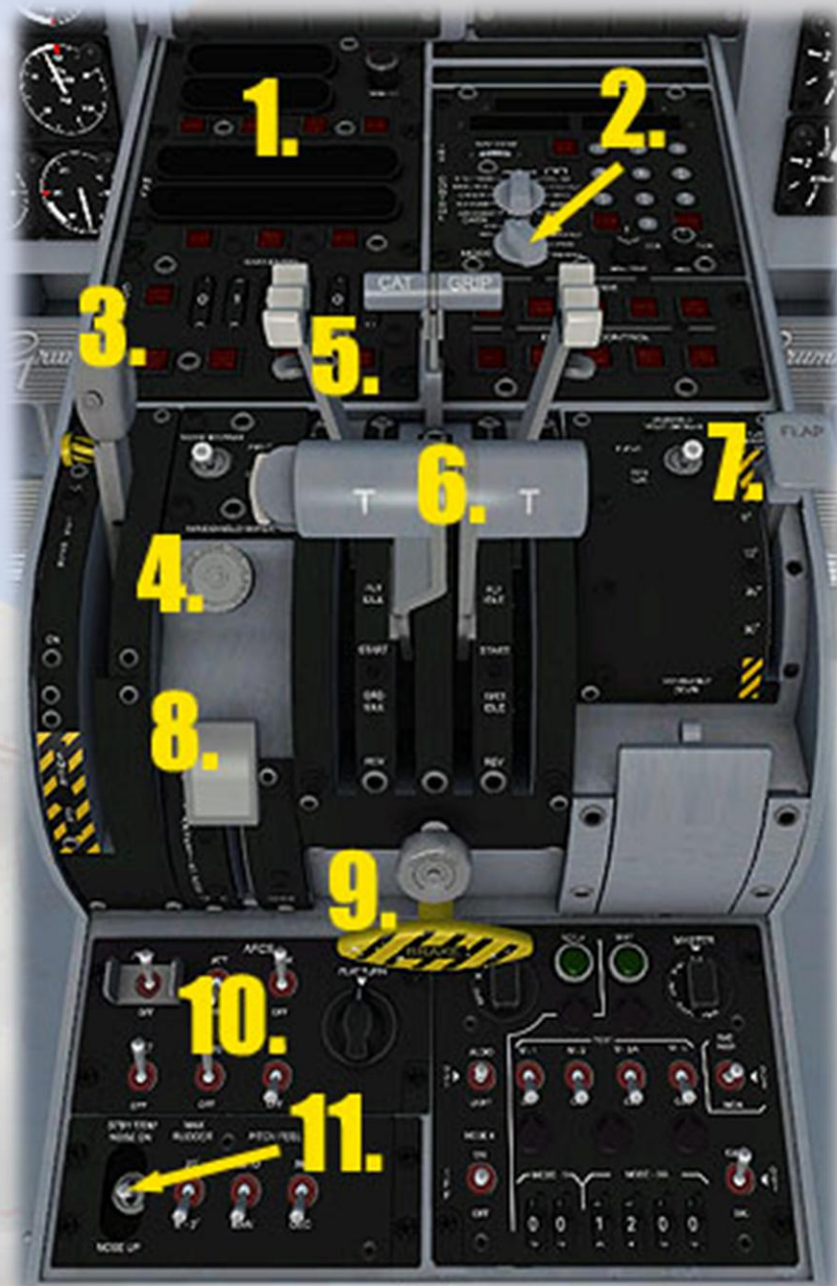
13) **Course Deviation Indicator.** The copilot has a simpler ILS instrument with the vertical locator (LOC) and horizontal glideslope bar (GS) to aid instrument landings. The gauge is driven by the NAV1 signal only. Warning flags are displayed when no LOC (VOR) or GS (glideslope) are being received.

14) **Outside Air Temp. Indicator.** The mouse tooltip displays the temperature in both Centigrade and Fahrenheit.

15) **Cockpit Lighting Switches.** These two knobs toggle cabin (flood) lights and the instrument / text lighting. The flood light is best left off for night flying, especially on approach.



## CENTER CONSOLE



1) **Air Data Computer Displays.** Four banks of nixie lights display, from front to rear : Miles to Destination, Time to Destination, Aircraft Altitude and Speed, Ambient Wind Speed and Direction.

2) **Air Data Computer on/off Switch.**

3) **Landing Gear Lever.** Mousable. Right-click and drag backwards to extend gear. Right-click and drag forwards to retract gear.

4) **Windshield Wiper Switch.** Mousable. Click on right side to turn wipers on and left side to turn them off. The simulation only has one speed.

5) **Engine Condition Levers.** Control engine fuel flow. Setting the levers to the fully back position will shut down the engine. The levers can be moved independently with the mouse by dragging on any part of the lever. This does not affect engine performance in FSX.

6) **Engine Throttle Levers.** Control engine power delivery. The levers can be moved independently with the mouse by dragging on any part of the lever.

7) **Wing Flaps Lever.** Right-click and drag backwards to extend flaps. Right-click and drag forward to retract flaps. Has three positions, marked in degrees of rotation.

8) **Tail Hook Lever.** A Single mouse click will deploy the tail hook. Clicking again will retract it.

9) **Parking Brake Lever.** Click to activate the parking brake.

10) **Autopilot Controls.** Toggle switches left to right control : AP on/off, Attitude Hold, Approach Hold, Altitude Hold, Heading Hold and Course (NAV1) Hold. Note, the NAV-GPS switch on the pilot's left side console can be used to force CRS to track a GPS course rather than a NAV1 VOR. FSX does not support Speed Hold on turboprops, so careful management of the throttles is essential at all times.

11) **Pitch Trim Adjuster.** Use left or right mouse to move the switch forwards or aft respectively. As the switch is rather awkward to use in flight, it is recommended to use the keyboard or the Trim Indicator on the copilot's panel to adjust pitch trim.

## REFERENCE INFORMATION

### **Virtavia E-2C Hawkeye Procedures**

#### Location of Starter Switches

The starter switches are located on the pilot's upper panel. They are labelled as 'FUEL ENRICH'. Mouse over each switch to confirm its function.

#### **Starting Engines**

Use Ctrl-E (autostart) to start the aircraft, or:

1. Check Parking Brake ON.
2. Check Crew Entrance Hatch is CLOSED.
3. Check Anti-Ice switches are OFF.
4. Check Generator Switches are ON.
5. Set throttles to IDLE.
6. Check Condition Levers at Air Start position (fully fwd).
7. Check Pitot Heat switch is OFF.
8. Set Prop Pitch to fully FINE (ctrl-F1).
9. Set Master Battery switch ON.
10. Set Navigation Lights switch to ON.
11. Set Rotating Beacon Lights switch to ON.
12. Start Engine 1 using the engine start switch.
13. Monitor engine RPM. Check that engine has not failed to start.  
Repeat for engine 2.
14. Check temperatures & pressures.

#### **Taxi**

1. Set Pitot Heat ON.
2. Set Anti-Ice (as required) ON.
3. Nav aids, Autopilot SET.
4. Set Parking Brake OFF.
5. Advance throttles to begin taxiing.



## Takeoff

1. Check Autopilot OFF.
2. Check Wings Spread.
3. Set Pitot Heat ON.
4. Set flaps to takeoff (normal 25 %, 100 % if catapult launched).
5. Set nose-up Pitch Trim as required.
6. Brakes ON, maximum power CHECK.
7. Throttles to IDLE, Brakes OFF.
8. Set Holdback using shift-i (carrier take-off only).
9. Set Prop Pitch COARSE (default FSX setting, ctrl-F4 if needed).
10. Apply power smoothly to full throttle.
11. Press shift-spacebar to trigger catapult (carrier take-off only)
12. Begin Rotation at approx. 100 KTS IAS (land take-off only).

## After Takeoff

1. When airborne, raise GEAR.
2. At 125 KTS raise FLAPS.
3. Allow the aircraft to accelerate to normal climb speed 154 KTS.

## Cruising

1. Level off at desired cruise altitude.
2. Reduce throttle setting.
3. Adjust speed to cruise at 260 KTS.
4. Use autopilot to set cruise parameters (shift-2).

## Descent

1. Begin descent 40 miles from the airfield or carrier.
2. Check Pitot Heat ON.
3. Set descent rate and speed as desired using the autopilot (shift-2).

## Approach

1. Set Autopilot OFF.
2. Check Parking Brake OFF.
3. Set Altimeter Baro Pressure to match landing zone pressure.
4. Lower Landing Gear BELOW 190 KTS.
5. Enter downwind leg at 175 KTS.
6. Set Flaps to 25%.
7. Check AOA Indexer to maintain correct attitude.
8. Lower Arresting Hook (if required).

## Landing

1. Check Autopilot is OFF.
2. Maintain 120 KTS.
3. Set FLAPS FULLY DOWN.
4. Adjust throttles to compensate for drag.
5. Visual check airfield / deck is safe for landing.
6. Sink Rate not greater than 500 ft/min.
7. Touchdown speed is 110 KTS.
8. Ground Landing only : prop reverse ENGAGE (press & hold F2).
9. Apply brakes only below 80 KTS.
10. Carrier Landing only : set Throttles to FULL (in case of bolter).

## After Landing / Wire Trap

1. Set Throttles to IDLE.
2. Set Arresting Hook UP (carrier landing only).
3. Set Flaps fully UP (ground landing only).
4. Set Flaps to 1/3 (carrier landing only).
5. Fold Wings (carrier landing only).
6. Begin taxi to parking area (ground landing only).

## Shutdown

1. Stop engines using Condition Levers.
2. Set Pitot Heat and all external lights to OFF.
3. Set all cockpit and cabin lighting to OFF.
4. Set Generator Switches to OFF.
5. Set Master Battery Switch to OFF.

## E-2C Hawkeye Specifications and Speed References

### **Specifications**

- Crew: 5
- Engines: 2 x Allison T56-A-425 Turboprops
- Power: 4,600 i.h.p. each
- Wingspan: 80' 7" (29' 4" folded)
- Length: 57' 7"
- Height: 18' 4"
- Empty Weight : 39,561 lbs
- Combat Weight : 48,040 lbs
- MTOW : 53,000 lbs
- Max. Landing Weight : 46,500 lbs (field or arrested)

### **Flight Reference Data**

- Maximum speed : 330 kts at 15,000 ft
- Average cruising speed / altitude : 260 kts at 25,000 ft
- Ferry Range : 1,462 nautical miles
- Service Ceiling : 34,700 ft
- Max. Fuel Load : 12,220 lbs
- Stalling Speed, dirty, max. weight – power off : 93 kts
- Stalling Speed, dirty, max weight – power on : 75 kts
- Stalling Speed, clean, max. weight – power off : 112 kts
- Stalling Speed, clean, max weight – power on : 90 kts