

**FLIGHT 1**  
**SOFTWARE**



**CITATION**  
**MUSTANG**



# **PILOT'S GUIDE**

*Designed Exclusively for*

Microsoft  
**Flight Simulator X**

*Developed in Official Partnership  
with Cessna Aircraft Company*



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The Flight1 software Cessna Citation Mustang now comes standard with Navigraph FMS data. The AIRAC cycle that ships with this product is 0903 valid from 12/MAR/2009 to 08/APR/2009. If you would like to update the Navigraph FMS AIRAC data to the current, you will need to contact Navigraph directly at [www.navigraph.com](http://www.navigraph.com) as they provide support and upgrade services for this data. Flight1 Software is not responsible for errors in the AIRAC cycle data.

Navigraph Support Email: [fmsdata@navigraph.com](mailto:fmsdata@navigraph.com)

Navigraph Support Forum: <http://forum.navigraph.com>

Currently installed Navigraph AIRAC data information can be found in your Microsoft Games/Microsoft Flight Simulator X/Navigraph/Navdata folder.

## CREDITS

### Credits

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The Cessna Citation Mustang is a VLJ (Very Light Jet) class business jet. In the standard configuration, the Cessna Citation Mustang has four passenger seats in the aft cabin and seating for two in the cockpit. Like other small business jets, the Cessna Citation Mustang is certified to fly without a co-pilot.

The Cessna Citation Mustang first flew on April 23, 2005 and received full type certification from the FAA on September 8, 2006. This was a historic moment for Cessna and the Cessna Citation Mustang in general because the Cessna Citation Mustang was the first of its class to receive full type certification. It was also the first to receive certification to fly into known-icing conditions, the first VLJ to be delivered to a customer, and it is from the first company to obtain the FAA Production Certificate for a VLJ.

The Cessna Citation Mustang airframe is constructed primarily of aluminum alloys, with a three spar wing group. One main door is located in the forward left section of the aircraft, with an additional emergency exit located on the center right section of the aircraft.

Unlike many light jets, there is no overhead panel. All of the switches and gauges are on the instrument panel and the center console. The thrust levers, pitch trim wheel, flap lever, an alphanumeric keypad for the Flight Management System and the switches for aileron and rudder trim are also located on the center console. The instrument panel is dominated by the huge, centrally mounted multi-function display (MFD) and each pilot has a large Primary Flight Display (PFD).

The Cessna Citation Mustang is powered by Two Pratt & Whitney Canada PW615F turboprop engines, mounted in pods on the aft fuselage. The landing gear is fully retractable and is equipped with anti-skid protection.

On behalf of Flight1 Software and the Cessna Citation Mustang team members, I invite you to experience the Flight1 Software Cessna Citation Mustang for FSX and thank you for your continued patronage.

*Jim Rhoads*  
Flight1 Software  
[www.flight1.com](http://www.flight1.com)

## **About This Pilot's Guide**

Please read through this Pilot's Guide to become familiar with the Flight1 Software Cessna Citation Mustang. The Cessna Citation Mustang includes many avionics and features that you will want to familiarize yourself with. Taking the time to do this now will allow you to get the most enjoyment out of your new software.

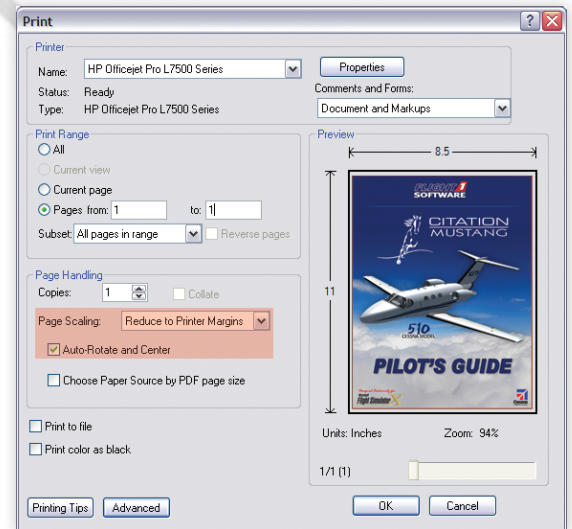
## **Flight Simulator FSX SP2 Requirements**

The Flight1 Software Cessna Citation Mustang requires Microsoft Flight Simulator FSX SP2 or Accelleration. This software is NOT compatible with Flight Simulator FSX SP1. For more information, and to download Flight Simulator SP2, please visit the Microsoft FSInsider website at [www.fsinsider.com](http://www.fsinsider.com)

## **Printing This Pilot's Guide**

Even though this Pilot's Guide is designed in color to make it easy to read on your computer screen, if you wish to print this Pilot's Guide and save ink at the same time, please choose to print in Grayscale, via your computer's print dialog screen.

To ensure that the entire Pilot's Guide prints, make sure to choose Reduce to Printer Margins and Auto-Rotate and Center in your Adobe Acrobat Reader print dialog box.



## **Customer Support**

Flight1 Software strives to provide timely, reliable support. The following support options are available:

- For support related to passwords, order numbers, and key files, please visit our Automated Support System at [www.flight1.com/view.asp?page=service](http://www.flight1.com/view.asp?page=service)
- If you need further support related to one or more of items above, please use our Support Ticket System at [www.flight1.com/ticket.asp](http://www.flight1.com/ticket.asp)
- For technical product support related specifically to the Cessna Citation Mustang software package, please visit our Technical Support Forum at [www.simforums.com/forums/](http://www.simforums.com/forums/)

Please note that the Support Ticket System should not be used for technical product support.

## **Disclaimer**

This software is designed for entertainment purposes only. Although we have designed the Cessna Citation Mustang for FSX to resemble and function as closely as possible the real Cessna Citation Mustang, it is not designed as a training device. Not all systems have been simulated, and some of those that have been simulated may not be entirely functional or simulated to 100%.



This Pilot's Guide is laid out in such a way to try to make it as easy as possible for you to become familiar with the Cessna Citation Mustang package. This includes the main panel layout, the different pop-up panels, the virtual cockpit and cabin, the gauges and related gauge and panel click-spots, the major aircraft systems, and the aircraft limitations, checklists and charts.

This Pilot's Guide details the most important aspects of the Garmin G1000 PFD and MFD. For more in-depth user information, please download and read the Garmin G1000 Reference Guide and the Garmin G1000 Pilot's Guide at:

[http://www8.garmin.com/manuals/G1000:CessnaMustang\\_CockpitReferenceGuide.pdf](http://www8.garmin.com/manuals/G1000:CessnaMustang_CockpitReferenceGuide.pdf)

[http://www8.garmin.com/manuals/G1000:CessnaMustang\\_PilotsGuide.pdf](http://www8.garmin.com/manuals/G1000:CessnaMustang_PilotsGuide.pdf)

Although we have strived to model as many important features in this version of the G1000 PFD and MFD, not all features have been simulated, and some of those that have been simulated may not be entirely functional.

Nearly every knob, switch, button, key, and lever in the Cessna Citation can be clicked on and has an associated function. The different sections of this Pilot's Guide detail each of the main panel sections and associated aircraft functions. Items that can be clicked on are referenced in orange and items that cannot be clicked on, but have a feature associated with it (such as the Supplemental Oxygen Pressure Gauge), are referenced in red. Knobs and levers that have multiple click-spots associated with them feature yellow boxes that surround the specific click-spot. Items such as keys, buttons and switches can be activated by simply clicking on them; therefore, no separate yellow box is displayed. Each feature that is referenced has a corresponding number with a description of the specific feature and its function.

**Key with Click-Spot** (points to callout 1)

**Feature / Function Description** (points to callout 1)

**Rotary Knob with Separate Click-Spot Zones** (points to callout 8)

**1) HDG** - Press to select or press to cancel Heading Select mode. Heading Select mode is a lateral mode that commands the aircraft to fly the current heading displayed by the Heading Bug on the HSI. When Heading Select mode is selected, (PIT) Pitch mode is also selected by default. PIT mode commands the aircraft to hold the current pitch angle.

Most aircraft system features are detailed and explained in the associated panel section. Some aircraft systems that require more detailed explanations, such as Ice Protection, have their own separate sections. Items that don't have a click-spot or function reference associated with them, are not currently modeled.

## **Beginning with a Cold and Dark Cockpit**

By default, when the Cessna Citation Mustang is loaded into the Flight Simulator, all aircraft systems are up and running. If you would prefer to start out with the aircraft 'Cold and Dark', follow the procedures below:

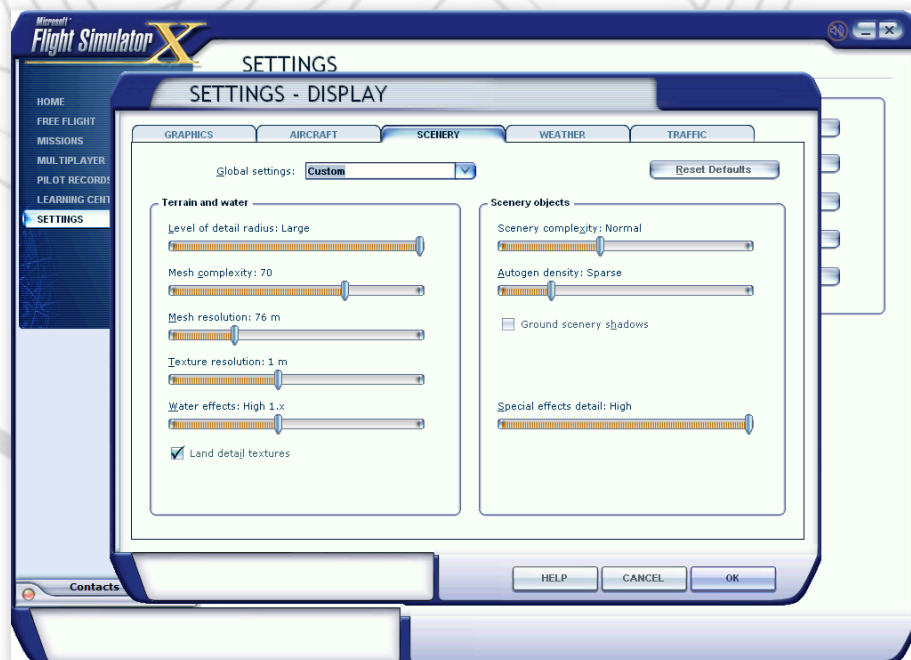
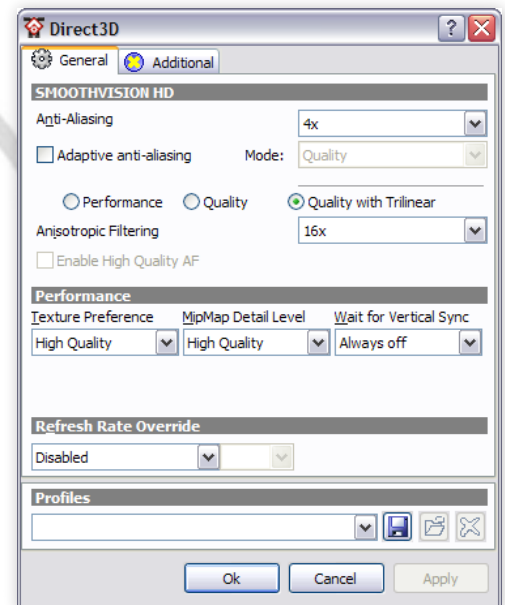
- 1) Create and load the default Flight Simulator flight as described on page 11.
- 2) Manually shut down all of the aircraft systems and save the flight as 'Cold and Dark'. You also have the option of making it your new default flight. If you do this, all subsequent flights will be Cold and Dark.
- 3) Switch to the Cessna Citation Mustang using the Flight Simulator Aircraft drop-down menu. The Cessna Citation Mustang should now load Cold and Dark.

In general, Flight Simulator X (FSX) is more demanding on system resources than any past version of Flight Simulator to date. This is mostly due to the added complexity of the scenery being displayed. The scenery is displayed at a much higher resolution and there is much more autogen, more highly-detailed 3D models, moving traffic, etc. Combine this with an intensively complex add-on aircraft like the Cessna Citation Mustang, and even more demand is placed on your system - much more so than if you're using one of the default aircraft. Because of this it's important that you optimize your system to get the best performance out of it.

If you're using a system that is at the high end of the recommended system specifications, you should be able to run the Cessna Citation Mustang without issue. If, however, you are using a system that is near the bottom of the system recommendations you may need to reduce some of your Flight Simulator settings to increase system performance. There are also changes that you can make to your video card settings to improve system performance.

We've listed some recommendations to help improve system performance. Since computer systems are so widely varied, these are general recommendations and may or may not help in all cases. It will be up to you to experiment with different settings until you are satisfied with the results.

- Ensure that you have installed the latest updates for both your Windows and FSX installations, and defragment your hard drive regularly.
- Many computer systems have programs running in the background that are not necessary for use during gaming. Many of these background tasks can be temporarily shut down to free up more processing power for FSX. Before launching FSX, make sure to shut down any non-essential background tasks.
- Adjust the settings for your video card directly through your video card and not through FSX. In most cases, allowing your video card to control Anti-Aliasing and Anisotropic Filtering is preferable to allowing FSX to control these settings. Keep in mind that although higher Anti-Aliasing and Anisotropic Filtering settings result in superior visuals, these settings can negatively affect FSX performance. You may need to lower these settings to find a balance between high-quality visuals and acceptable performance. For ATI users, we recommend using ATI Tray Tools. For NVidia users, we recommend using NVidia NHancer.



- Some of the major settings in FSX that affect performance are autogen, AI aircraft, road traffic, scenery complexity and water effects. These settings can cause even more of a performance hit if you are using add-on software that enhance these aspects of FSX. You may need to lower only some or maybe all of these settings to find a balance between high-quality visuals and acceptable performance. Again, it will be up to you to experiment with settings until you are satisfied with the results.



## **Backing Up Your Original Download File and Your Key File**

After you've installed your software, please take a moment to back up your original download file (the file you downloaded when you purchased the product - it has a red airplane icon and is labeled Flight One Purchasing Module) and your key file, both of which are saved to your hard disc in the folder that you specified before the download process. Both of these files should be backed up to a CD-ROM or a DVD-ROM so that you can reinstall the product in the future without needing to redownload it.

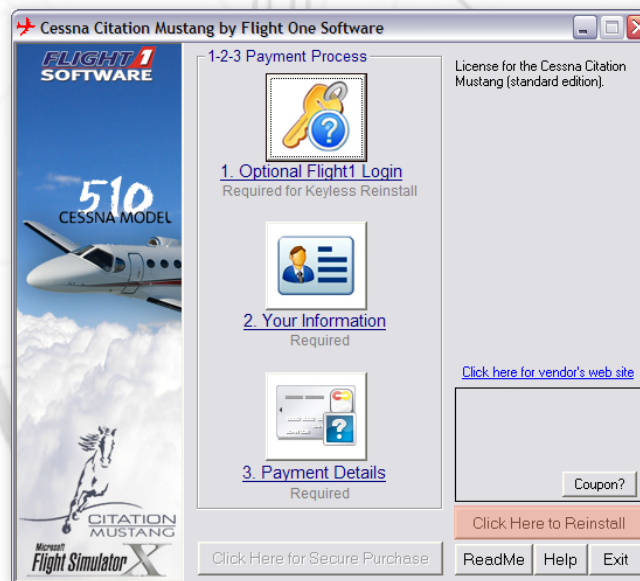
Do not back up the Extracted Program File that's located in your C:\Flight One Software folder. In most cases this file cannot be used to reinstall the product. If you reinstall the product using this file, you will most likely receive a license error when you run the software. Always be sure to back up and reinstall from the original file that you downloaded when you first made your purchase.

## **Reinstalling Your Software**

- 1) Double-click the original download file (the Flight One Purchasing Module) to run the installation wrapper.
- 2) Make sure to temporarily turn off any anti-virus software and any other disc utilities that may be running in the background.

If your computer is not connected to the Internet, choose the License Transfer option and follow the on-screen prompts.

- 3) On the main installation wrapper screen, press the Click Here to Reinstall button, or press the Optional Flight1 Login if you originally chose the keyless installation method.



- 4) Ensure that your computer is connected to the Internet, then follow the on-screen prompts to select your key file and enter your password (or enter your Flight1 login and password). Once your purchasing information is validated, the software will be extracted to your hard disc and the installation will start automatically.
- 5) After the installation completes, reboot your computer before running the software for the first time. This will ensure that any DLLs, fonts, etc register with Windows and will ensure trouble-free use.

If you're using the Windows Vista operating system and are having trouble reinstalling your software, please visit the Flight1 Windows Vista Online FAQ here: <http://www.flight1.com/view.asp?page=vista>

## **Engines**

Manufacturer ..... Pratt & Whitney Canada  
 Model ..... PW-615F (2)  
 Thrust Output at Sea Level (Each) ..... 1,460 Pounds (6.49 Kilonewtons)  
 Flat Rating Temperature ..... 77°F / 25°C  
 Overhaul Interval (TBO) ..... 3,500 Hours

## **Exterior Dimensions**

Length ..... 40 Feet 7 Inches (12.37 Meters)  
 Height ..... 13 Feet 5 Inches (4.09 Meters)  
 Wing Span ..... 43 Feet 2 Inches (13.16 Meters)  
 Landing Gear Wheelbase ..... 14 Feet 4 Inches (4.37 Meters)  
 Landing Gear Tread ..... 11 Feet 10 Inches (3.61 Meters)

## **Cabin Dimensions (with Typical Interior Installed)**

Length - Overall ..... 14 Feet 9 Inches (4.50 Meters)  
 Length - Excluding Cockpit ..... 9 Feet 9 Inches (2.97 Meters)  
 Height ..... 54 Inches (1.37 Meters)  
 Width ..... 55 Inches (1.40 Meters)  
 Passenger Cabin Volume ..... 144 Cubic Feet (4.08 Cubic Meters)

## **Accommodations**

Passenger Seats ..... 5  
 Baggage Capacity - Volume ..... 63 Cubic Feet (1.78 Cubic Meters)  
 Baggage Capacity - Weight ..... 718 Pounds (325 Kilograms)

## **Pressurization**

Differential ..... 8.3 PSI (0.57 BAR)  
 Sea Level Cabin to ..... 21,280 Feet (6,486 Meters)  
 8,000 Foot Cabin at ..... 41,000 Feet (12,497 Meters)

## **Altitudes**

Certified Ceiling ..... 41,000 Feet (12,497 Meters)  
 Service Ceiling - 1 Engine (MTOW) ..... 26,900 Feet (8,199 Meters)  
 Typical Cruise Altitudes ..... FL350 - FL390



## **Basic Performance**

Takeoff Distance, Sea Level, ISA, MTOW .....	3,110 Feet (948 Meters)
Landing Distance, Sea Level, ISA, MLW .....	2,380 Feet (725 Meters)
Rate of Climb - 2 Engines .....	3,010 Feet/Minute (917 Meters/Minutes)
Rate of Climb - 1 Engine .....	870 Feet/Minute (265 Meters/Minutes)
Typical Cruise Speed .....	320 KTAS - 345 KTAS

## **Airspeed Limitations**

Maximum Operating Limit	
$M_{MO}$ (27,120 Feet / 8,266 Meters and Above) .....	Mach 0.63 Indicated
$V_{MO}$ (Sea Level to 27,120 Feet / 8,266 Meters) .....	250 KIAS (463 Kilometers Per Hour)
Maximum Flap Extended Speed ( $V_{FE}$ )	
Takeoff and Approach - 15° .....	185 KIAS (343 Kilometers Per Hour)
Land - 30° .....	150 KIAS (278 Kilometers Per Hour)
Maximum Landing Gear Operation - Extending ( $V_{LO}$ ) .....	250 KIAS (463 Kilometers Per Hour)
Maximum Landing Gear Operation - Retracting ( $V_{LO}$ ) .....	185 KIAS (343 Kilometers Per Hour)
Maximum Landing Gear Extended Speed ( $V_{LE}$ ) .....	250 KIAS (463 Kilometers Per Hour)
Maximum Speed Brake Operation Speed ( $V_{SB}$ ) .....	No Limit
Minimum Control Speed, Air ( $V_{MCA}$ )	
Flaps - 0° .....	92 KIAS (170 Kilometers Per Hour)
Flaps - 15° .....	81 KIAS (150 Kilometers Per Hour)
Minimum Control Speed, Ground ( $V_{MCG}$ ) .....	73 KIAS (135 Kilometers Per Hour)

## **Certified Weights**

Maximum Ramp Weight .....	8,730 Pounds (3,960 Kilograms)
Maximum Takeoff Weight .....	8,645 Pounds (3,921 Kilograms)
Maximum Landing Weight .....	8,000 Pounds (3,629 Kilograms)
Maximum Zero Fuel Weight .....	6,750 Pounds (3,062 Kilograms)
Maximum Fuel Capacity (6.7 Pounds Per Gallon) .....	2,580 Pounds (1,170 Kilograms)

## **Basic Operating Weight**

Typically-Equipped Empty Weight .....	5,350 Pounds (2,427 Kilograms)
Single Pilot and Furnishings .....	200 Pounds (91 Kilograms)
Basic Operating Weight .....	5,550 Pounds (2,518 Kilograms)

## **Payload**

Useful Payload and Fuel .....	3,180 Pounds (1,442 Kilograms)
Maximum Payload .....	1,200 Pounds (544 Kilograms)
Payload at Full Fuel .....	600 Pounds (272 Kilograms)

## **V-Speed Symbols**

- $V_{SO}$  Stalling Speed or the minimum steady flight speed at which the aircraft is controllable in the landing configuration at maximum gross weight.
- $V_S$  Stalling Speed or the minimum steady flight speed at which the aircraft is controllable.
- $V_{FE}$  Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.
- $V_{LE}$  Maximum Landing Gear Extended Speed is the highest speed at which an aircraft can be safely flown with the landing gear extended.
- $V_{LO}$  Maximum Landing Gear Operating Speed. This is the maximum speed at which it is safe to extend or retract the landing gear.
- $V_A$  Maneuvering Speed is the maximum speed at which you may use abrupt control travel.
- $V_{NO}$  Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air, and then only with caution.
- $V_{NE}$  Never Exceed Speed is the speed limit that may not be exceeded at any time.
- $V_X$  Best Angle of Climb Speed provides the best altitude gain per unit of horizontal distance, and is usually used for clearing obstacles during takeoff.
- $V_Y$  Best Rate of Climb Speed provides the best altitude gain in the shortest amount of time.
- $V_G$  Best Rate of Glide Speed provides the best glide distance in an engine-out scenario.
- $V_{MCA}$  Minimum Control Speed (Air). The minimum speed at which control of a twin-engined aircraft can be maintained after failure of one engine in the air.
- $V_{MCG}$  Minimum Control Speed (Ground). The minimum speed at which control of a twin-engined aircraft can be maintained after failure of one engine on the ground.
- 

## **Airspeed Terminology**

- $KCAS$  Knots Calibrated Airspeed is indicated airspeed corrected for position and instrument error and expressed in knots. Knots calibrated airspeed is equal to  $KTAS$  in standard atmosphere at sea level.
- $KIAS$  Indicated Airspeed in Knots.
- $KTAS$  True Airspeed is the speed of an aircraft relative to undisturbed air which is the  $CAS$  corrected for altitude, temperature and compressibility.
- 

## **Meteorological Terminology**

- $OAT$  Outside Air Temperature is the free air static temperature obtained either from in-flight temperature indications or ground meteorological sources, adjusted for instrument error and compressibility effects.
- $ISA$  Standard Temperature is  $15^{\circ}C$  at sea level pressure altitude and decreases by  $2^{\circ}C$  for each 1000 feet of altitude.
- $PA$  Pressure Altitude is altitude measured from the standard sea level pressure of 29.92 in Hg by a pressure of barometric altimeter.
-

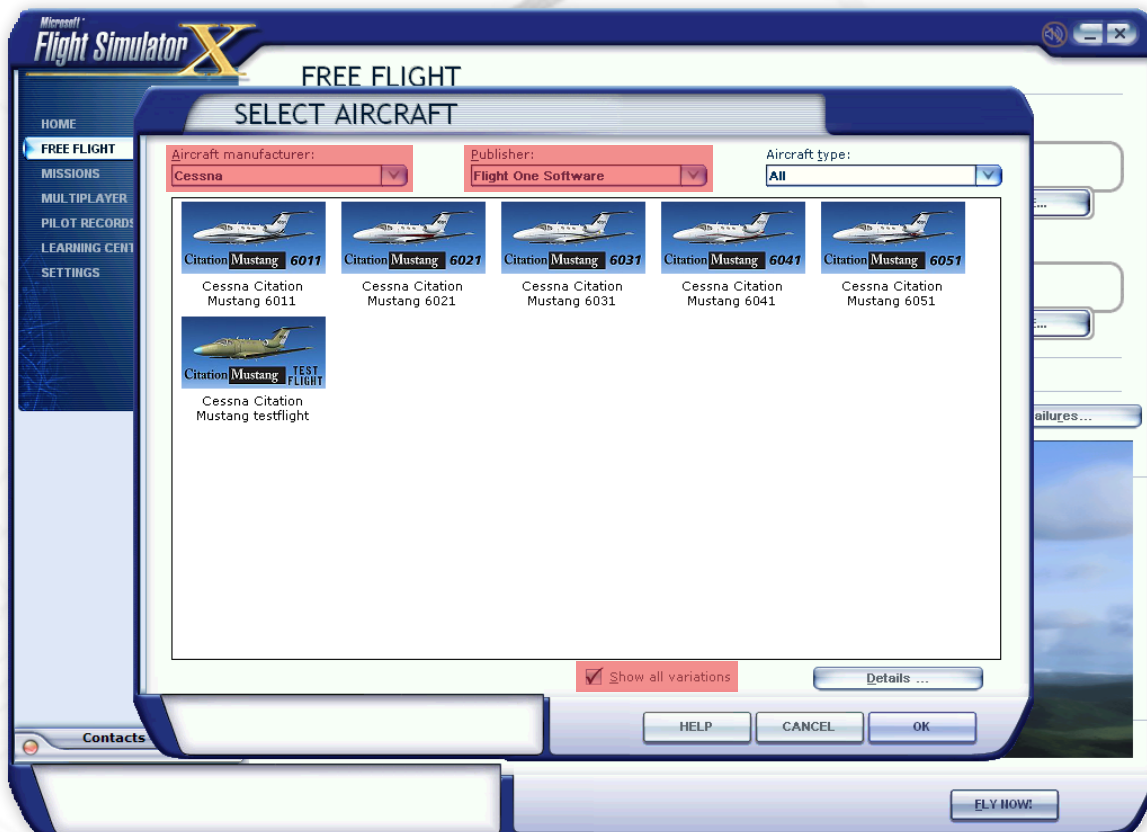


The Flight1 Software Cessna Citation Mustang is located under Cessna in the Flight Simulator Aircraft Manufacturer drop-down box and under Flight One Software in the Flight Simulator Publisher drop-down box.

Five different liveries are available to choose from:

- 6011 Gray, Silver and Blue
- 6021 Black, Burgundy and Silver
- 6031 Silver, Gray and Chrome
- 6041 Coral, Silver and Gray
- 6051 Blue, Red and Gray
- Certification Colors

In order to see all available liveries, make sure that 'Show all Variations' is selected in the Flight Simulator aircraft selection screen.



To prevent problems with panel initialization and aircraft performance upon loading the Cessna Citation Mustang into FSX, we strongly advise that you first load the FSX Default Flight, then switch to the Cessna Citation Mustang. This will ensure that previously saved panel settings will not carry over and interfere with the operation of the Cessna Citation Mustang. Just some of the problems you might encounter if you don't load the Cessna Citation Mustang as suggested are fuel draw imbalance issues, unusual autopilot behavior, and flight trimming issues. Please refer to the information below on how to create a new default flight to load prior to the Cessna Citation Mustang.

## **Creating a New Default Flight**


When you load the Default Flight in FSX, you will be flying out over the water. This is not the best situation for loading your aircraft, so you should create a new default flight to load your Cessna Citation Mustang from.

To create a new default flight, first load the default Flight Simulator flight, move the aircraft to the active runway of your choice, then save the flight as the new default flight. Load the new default flight, then SWITCH to the Cessna Citation Mustang (using the Aircraft drop-down selection in the Flight Simulator Menu Bar) and set up your flight parameters, such as location, time, weather, etc.

## Moving Around the Main Panels

We strongly suggest enabling Cockpit ToolTips to help you become familiar with the different gauges and click-spots.

Show cockpit ToolTips

 The Cessna Citation Mustang features six different main panel views. Moving around to the different main panel views is made easy using the direction arrows provided on each of the different panels. Choose from the six main panel views below at any time during your flight.





## Working with Pop-Up Panels

The Cessna Citation Mustang features a number of different pop-up panels that are used to access different areas of the cockpit. For instance, there is a pop-up panel for the throttle quadrant and a pop-up panel for the autopilot, etc.

The different pop-up panels can be toggled on and off using a combination of either the Panel Manager, keyboard shortcuts, or by clicking on the magnifying glass icon on the pop-up panel.

## Using Panel Manager to Work with Pop-Up Panels

Panel Manager is a separate gauge that by default is visible on your screen. It is a convenient tool that allows you to work with the major pop-up panels in one convenient location.



Click to Open and Close Pop-Up

Click and Hold to Drag

Click to Close

To open or close a pop-up panel, simply click on the graphical depiction of the desired pop-up panel on the Panel Manager gauge. Clicking once will open the desired pop-up panel and clicking a second time will close the pop-up panel.

Panel Manager can be moved to a different area of the screen by clicking and holding the blank area below the Auxiliary Panel click-spot and dragging it to the desired position. If you Undock the Panel Manager window, Panel Manager can even be dragged to a second monitor. Panel Manager can be closed when not needed by clicking on the small 'X' in the lower right corner.


## Using Keyboard Shortcuts to Work with Main Panels and Pop-Up Panels

A select number of main panels and pop-up panels can be opened or closed using keyboard shortcuts. Press the keyboard shortcut to open the panel and press the keyboard shortcut a second time to close the panel.

- (Shift+1) Pilot's Main Panel
- (Shift+2) Co-Pilot's Main Panel
- (Shift+3) Pilot's Full Panel
- (Shift+4) Co-Pilot's Full Panel
- (Shift+5) Pilot's MFD Panel
- (Shift+6) Co-Pilot's MFD Panel
- (Shift+7) Left Switch Panel
- (Shift+8) Gear and Lighting Panel
- (Shift+9) Right Switch Panel

Pressing the keyboard shortcut for one of the main panels will close that panel and leave you without any panel displayed. If you want to switch to another main panel, press the specific keyboard shortcut for that main panel.

## Using Special Icons to Work with Pop-Up Panels

Some pop-up panels can be opened by clicking on the Magnifying Glass icon  positioned on the current main panel. Pop-up panels can be closed by clicking on the small 'X', usually in the upper right corner of the pop-up panel.

The following pop-up panels can be opened using the magnifying glass magnifying glass icon:

- Audio Panels ..... Can Be Opened On .....All Six Main Panel Views
- Autopilot..... Can Be Opened On .....Pilot's Main Panel and Co-Pilot's Main Panel Views
- Left Switch Panel..... Can Be Opened On .....Pilot's Full Panel and Co-Pilot's Full Panel Views
- Right Switch Panel..... Can Be Opened On .....Pilot's Full Panel and Co-Pilot's Full Panel Views
- Gear and Lighting Panel..... Can Be Opened On .....Pilot's Full Panel and Co-Pilot's Full Panel Views
- Throttle Quadrant..... Can Be Opened On .....Pilot's Full Panel and Co-Pilot's Full Panel Views



## Cockpit Overview

The Cessna Citation Mustang features the Garmin G1000 PFD and MFD, plus an array of sensors and other avionics that present to the crew all of the information necessary for flight, navigation and situational awareness. The G1000 Avionics System is the centerpiece of the flight deck. It's comprised of dual 10.4 inch TFT LCD PFD displays (one for the pilot and one for the co-pilot) and a single 15 inch TFT LCD MFD. This, coupled with dual digital audio panels, a three-axis Automatic Flight Control System, and a Flight Management System / MFD control keyboard, plus ergonomically located throttle, trim and switch panels, makes for a much lower workload for one or two pilots.

## 2D Panel Layout

The items listed in this section will help you familiarize yourself with the main panel sections and click-spots for some pop-up panels. *Please note that this is a panoramic screenshot. This view is not available in Flight Simulator.*



- |  |  |
|--|--|
| 1) Panel Manager Pop-Up                            | 12) Supplemental Oxygen Display              |
| 2) Audio Panel                                     | 13) Operational Limits Placard               |
| 3) PFD (Primary Flight Display)                    | 14) MFD (Multi-Function Display)             |
| 4) Master Warning and Master Caution Reset Buttons | 15) Airspeed Limits Placard                  |
| 5) N-Number (Auxiliary Control Panel Pop-Up)       | 16) Supplemental Oxygen Control Valve        |
| 6) Left Engine Fire Controls                       | 17) Main Panel Directional Navigation Arrows |
| 7) Standby Altitude/Airspeed Placard               | 18) Left Switch Panel                        |
| 8) Autopilot                                       | 19) Gear and Lighting Panel                  |
| 9) Standby Instruments                             | 20) Throttle Quadrant and MFD Controller     |
| 10) Right Engine Fire Controls                     | 21) Right Switch Panel                       |
| 11) Rotary Test Knob                               |  |

Each item shown in red in the list above features a pop-up zoom panel that is not controlled using either the Panel Manager or keyboard shortcuts, but is controlled by clicking on that particular item.

## Pop-Up Panels

This section shows the various pop-up panels that are available. As described previously, the majority of these pop-up panels are accessed using the Panel Manager or keyboard shortcuts.

Some of the pop-up panels, such as the PFD Zoom, the MFD Zoom, the Rotary Test Knob Zoom, and the different Placard Zoom panels are accessed using only click-spots, as described 2D Panel Layout section on page 14.





## Pop-Up Panels, Continued....



## 2D Cockpit Static Views

Flight Simulator X does not support the use of 2D static interior views like previous versions of Flight Simulator; therefore, when you use the keyboard or your controller's hat switch to look left or right, etc. from within the 2D cockpit, the 3D Virtual Cockpit views will be displayed.



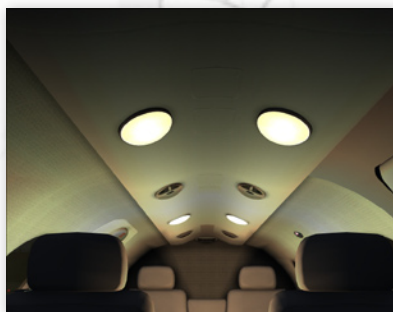
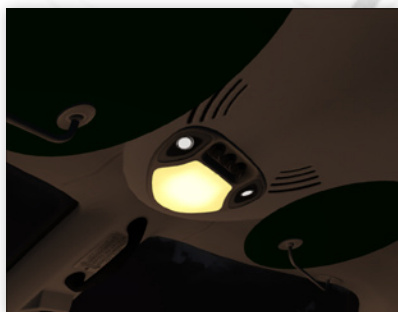
## Virtual Cockpit Overview

The Virtual Cockpit and Cabin is an immersive 3D environment that features many different animations and lighting options, in addition to the fully-clickable instrument panel and flight controls. You can navigate to the Virtual Cockpit by pressing the F9 key or by choosing Views - View Mode - Cockpit - Virtual Cockpit from the Flight Simulator Menu Bar.

Use the standard Flight Simulator view commands to navigate within the Virtual Cockpit and cabin. Use keystrokes to move your view back and forth and up and down, and hold down the space bar while you move your mouse to pivot your view. Default Flight Simulator view commands can be found by choosing Options - Settings - Controls - Buttons/Keys - Views from the Flight Simulator Menu Bar.

## Virtual Cockpit and Cabin Lighting

The following lighting options (in addition to the standard instrument lighting controlled via the instrument panel) are available in the Virtual Cockpit and Cabin. These items are controlled by clicking on the specific portion of the model.



- Cockpit Dome Light - The cockpit dome light illuminates the cockpit area and is turned on and off using the dome light switch (center switch) on the switch panel in the ceiling of the cockpit.
- Cockpit Map Lights - The cockpit map lights are turned on and off using the two map light switches (right and left switches) on the switch panel in the ceiling of the cockpit.
- Cabin and Cabin Door Lights - Two cabin door lights are located in the ceiling of the cabin, across from the cabin door and two cabin lights are located in the ceiling of the cabin, between the four seats. They can be turned on and off by clicking them with your mouse. Two of the lights are also controlled by the PAX SAFETY switch. The door lights can also be turned on and off by pressing the cabin entry light on the left side of the cabin entry shelf.
- Cabin Reading Lights - Four cabin reading lights are located in the ceiling of the cabin, over the four rear seats. They can be turned on and off by clicking them with your mouse.

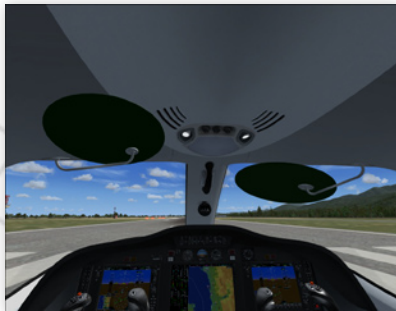
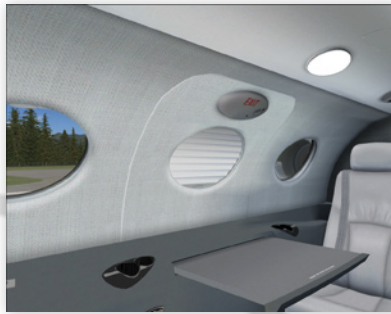
## Virtual Cockpit and Cabin Animations

The following animations are available in the Virtual Cockpit and Cabin. All of these items are controlled by clicking on the specific portion of the model, instrument panel, or lever.

- Knobs, Switches, Keys, Levers, Pilot and Co-Pilot Yokes and Rudder Pedals - All instrument panel knobs, switches, keys, levers, etc are clickable, just as they are in the 2D main panels and pop-up panels. Both the pilot and the Co-Pilot yokes and rudder pedals move and pivot corresponding to the control inputs from your controller. **Both yokes can be removed by clicking on the base of the yokes. They can be re-installed by clicking on the hole that the yoke shaft slides into.**



## Virtual Cockpit and Cabin Animations, Continued....



- Throttle Quadrant, Parking Brake and Emergency Brake - Like all the switches and keys on the instrument panel, the throttle levers, the flap lever, the landing gear lever, the spoiler lever, the elevator trim wheel, and the emergency landing gear release handle can all be controlled from the VC. The parking brake (black) and the emergency brake (red) can both be engaged and released by clicking on them.
- Cabin Door - The cabin door can be opened and closed by clicking the handle on the inside of the door itself. The door can only be opened if the aircraft is on the ground and engine N1 is below 25%.
- Cabin Tables - There is one stow-away cabin table on each side of the cabin wall, between the front and rear passenger seats. The cabin tables can be individually extended by clicking on the handle in the cabin wall and they can be stowed by clicking on the table.
- Cabin Window Shades - The cabin window shades can be lowered and raised by clicking on the individual window shade handles and the base of the window shades.
- Pilot and Co-Pilot Seat Armrests - The pilot and Co-Pilot armrests can be raised and lowered by clicking on them.
- Cabinets and Drawers - The cabinets and drawers located directly behind the pilot and co-pilot seats can be opened and closed individually by clicking on the latches.
- Pilot and Co-Pilot Cockpit Sunvisors - The pilot and Co-Pilot sunvisors can be lowered and raised individually by clicking on the sunvisors.
- Toilet Cover - The toilet cover can be opened and closed by clicking on the toilet cover.
- Oxygen Masks - The cabin oxygen masks will deploy from the cabin ceiling if cabin pressure is lost during flight. Cabin pressure can be lost in flight by both attempting to open the cabin door or by pressing the Cabin DUMP switch. Placing the Oxygen Control Valve in the DROP MASK position will deploy the cabin oxygen masks.

## Virtual Cockpit Zoom Views

In addition to those listed below, a number of other different views are available by pressing the 'A' key.

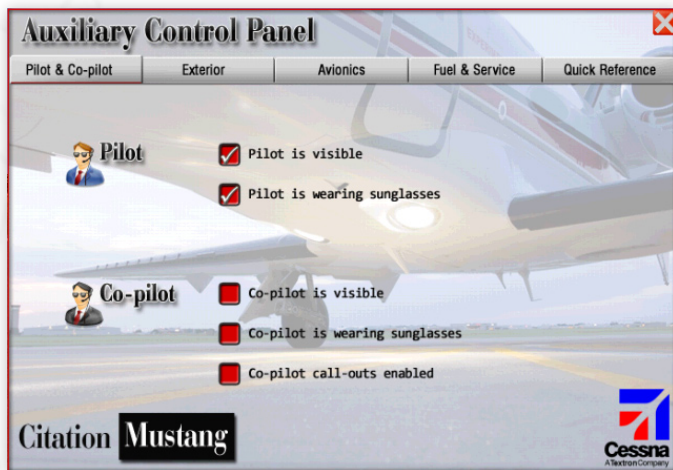
- Throttle Quadrant View
- Cabin Left and Right Wing Views
- Cabin Left and Right Wing Views
- MFD Controller View
- VC Left Seat - Slanted View
- Emergency Gear and Trim View

## Auxiliary Control Panel Overview

The Auxiliary Control Panel allows the user to change and number of different options that affect the look and operation of the aircraft. Aircraft services and the aircraft Quick Reference Guide are also available.

## Auxiliary Control Panel Functions

The Auxiliary Control Panel is designed to use tabbed choices to enable and disable the different options available. Clicking on a tab will display the options available within that group. When an option has a checkmark displayed, that option is enabled. If there is no checkmark next to an option, that option is disabled.



### Pilot & Co-Pilot

- Pilot is Visible - When selected, the pilot is visible inside the cockpit in the external view.
- Pilot is Wearing Sunglasses - When selected, the pilot is wearing sunglasses in the external view.
- Co-Pilot is Visible - When selected, the co-pilot is visible inside the cockpit in the external view.
- Co-Pilot is Wearing Sunglasses - When selected, the co-pilot is wearing sunglasses in the external view.
- Co-Pilot Call-Outs Enabled - When selected, the co-pilot callouts can be heard.

### Exterior

- Main Exit Open - When selected, opens the cabin door. Engine # 1 N1 must be 25% or less.
- Forward Baggage Hold Open - When selected, opens the forward baggage hold doors. Engine # 1 N1 must be 25% or less.
- Rear Baggage Hold Open - When selected, opens the rear baggage hold door. Engine # 1 N1 must be 25% or less.
- Carpet Rolled Out - When selected, rolls out a carpet walkway from the cabin door.
- Pilot Standing Outside - When selected, displays the pilot standing outside the aircraft. This option is only selectable if the Main Exit Open option is selected first.
- Wheels Chocked - When selected, displays the wheel chocks on both the main gear and the nose gear.
- Pitot Covers On - When selected, displays the pitot covers on the fuselage.
- Engine Intake Covers On - When selected, displays the engine intake covers over the engine intakes.
- Cones Placed - When selected, displays cones placed on the ground at the wing tips.

### Avionics

- GPWS is Active - When selected, enables GPWS (Ground Proximity Warning System) call-outs and functionality.

### Fuel & Service

- Call Fuel Truck - When pressed, initiates the default Flight Simulator fuel truck to come to your aircraft for refueling.
- Reload Aircraft - When pressed, clears any failures, refreshes the gauges, then displays the instrument panel. This is useful after initiating failures (such as an engine fire) from within Flight Simulator.

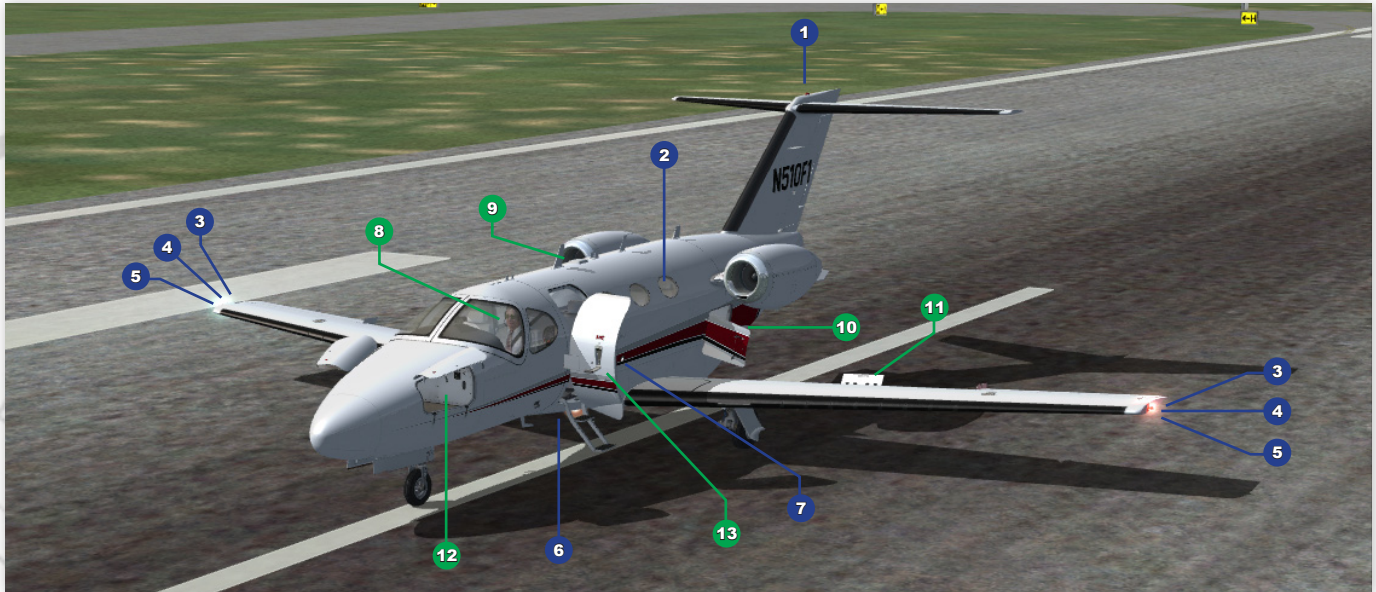
### Quick Reference

- Displays aircraft reference information, such as weight limits, take-off speeds, etc.



## Exterior Aircraft Lighting and Animations

In addition to the standard exterior aircraft animations, such as moving control surfaces and retractable landing gear and landing gear doors, the following exterior aircraft animations are also modeled. In addition, the exterior lighting map is also detailed.



- 1) **BEACON LIGHT** - The red beacon is turned on and off using the BEACON switch.
- 2) **CABIN AND COCKPIT LIGHTS** - The cabin and cockpit lights are operated separately and can be turned on and off using the VC cockpit dome light (cockpit) and the VC cabin light (cabin).
- 3) **AFT NAVIGATION LIGHTS** - The white aft navigation lights are turned on and off using the NAV switch.
- 4) **ANTI-COLLISION LIGHTS** - The anti-collision lights (strobe lights) are turned on and off using the ANT COL switch.
- 5) **NAVIGATION LIGHTS** - The red and green navigation lights are turned on and off using the NAV switch.
- 6) **LANDING AND RECOGNITION/TAXI LIGHTS** - The landing lights and recognition/taxi lights are turned on and off using the LANDING/RECOG TAXI switch.
- 7) **WING INSPECTION LIGHT** - The wing inspection light (ice light) is turned on and off using the WING INSP switch.
- 8) **PILOT** - The pilot head moves in concert with the flight controls.
- 9) **FAN BLADES** - The engine fan blades spin when the engines are running.
- 10) **AFT BAGGAGE DOOR** - The aft baggage door can be opened using the Shift+E+3 key command. Engine # 1 N1 must be 25% or less.
- 11) **SPEED BRAKES** - The speed brakes are raised and lowered using the '/' keyboard shortcut or the speed brake control switch on the throttle quadrant.
- 12) **FRONT BAGGAGE DOORS** - The front baggage doors are opened and closed using the Shift+E+2 key command. Engine # 1 N1 must be 25% or less. The interior of the front baggage doors also feature night lighting and is controlled using the VC cockpit dome light.
- 13) **MAIN CABIN DOOR** - The main cabin door is opened and closed using the Shift+E+2 key command. Engine # 1 N1 must be 25% or less.

## Primary Flight Display Overview

The Cessna Citation Mustang features two Primary Flight Displays (PFDs), which together with a large MFD, make up the G1000 avionics system. One PFD is installed for the pilot and one PFD is installed for the co-pilot. Both PFDs are 10.4 inch color LCDs and provide all necessary flight instrument displays and basic avionics indications. The PFDs also allow the creation and modification of flight plans and the option of an inset moving map that features de-clutter capability and displays topography and traffic.

This section provides an overview of the PFD and its basic functions. For more in-depth user information, please download and read the Garmin G1000 Quick Reference Guide at:

[http://www8.garmin.com/manuals/G1000:CessnaMustang\\_CockpitReferenceGuide.pdf](http://www8.garmin.com/manuals/G1000:CessnaMustang_CockpitReferenceGuide.pdf)

Although we have strived to model as many important features in this version of the G1000 PFD, not all features have been simulated, and some of those that have been simulated may not be entirely functional.

## Primary Flight Display Screen

The PFD display screen presents graphical flight instrumentation (attitude, heading, airspeed, altitude, and vertical speed) which replaces the traditional flight instrument cluster. Both COM and NAV radios, navigation information, wind speed and direction, moving map, and flight plan information are also displayed. The airspeed indicator and the altitude indicator display trends, and the airspeed indicator displays flap and airspeed references. Autopilot modes are also displayed. All of this information is presented to the pilot in an easy-to-view format that streamlines and lessens the pilot's workload.

The image shows a detailed view of the Garmin G1000 Primary Flight Display (PFD) screen. The screen is divided into several sections, each with specific data and indicators. Labels with yellow boxes point to various features on the screen:

- Top Section:**
  - NAV Frequency Window: NAV1 117.20 ↔ 113.70 YYJ, NAV2 116.80 110.60 PAE
  - AFCS Status Box: HDG, AP, YD, US, 1600, ALTS
  - Navigation Status Bar: DIS NH BRG ° 128.300 ↔ 128.250 COM1, 127.800 127.900 COM2
  - COM Frequency Window: COM1 128.250, COM2 127.900
- Left Side:**
  - Flight Director: TA, LD
  - Flap and Airspeed References: 17.5, 16.2
  - Airspeed Trend Vector: 17.5, 16.2
  - Airspeed Indicator: 164
  - Heading Box: 086°
  - Dialed Heading: 086°
  - Heading Bug: 086°
  - Wind Direction and Speed Box: M .251, 10
  - Horizontal Situation Indicator: HDG UP, 10
  - DME: DME NAV1 113.70 36.4NM
  - Map Inset: 20NM
  - RAM Air Temperature: RAT 62°F ISA +0°F
  - Softkeys: INSET, SENSOR, PFD, OBS, DOI, ADF/DME, XPR, IDENT, TMR/REF, NRST, MSG
- Center:**
  - Attitude Indicator: Shows pitch and roll with a horizon line and aircraft symbol.
  - Slip/Skid Indicator: Shows lateral deviation.
  - Heading Indicator: Shows heading with a heading bug.
  - Vertical Speed Indicator: Shows vertical speed with a trend vector.
  - Altimeter: Shows altitude with a trend vector.
  - Glideslope Indicator: Shows glideslope deviation.
  - Dialed Course: Shows the selected course.
  - Barometer Setting: Shows barometric pressure setting.
  - Flight Plan Screen\*: Shows flight plan details for KSNA / KSFO.
- Right Side:**
  - Selected Altitude Box: 11500
  - Vertical Speed Indicator: 1650
  - Altitude Trend Vector: Shows altitude trend.
  - Altimeter: 1060
  - Glideslope Indicator: 4A
  - Dialed Course: 299.2IN
  - Barometer Setting: 29.92IN
  - Flight Plan Screen\*: Shows flight plan details.
- Bottom Section:**
  - ISA Deviation Temperature: ISA +0°F
  - Bearing 1 Information: 086°
  - Course Deviation Indicator: 086°
  - Bearing 2 Information: 338°
  - Transponder Status Bar: XPDR 1200 ALT R UTC 19:06:11
  - Clock: 19:06:11

\*ADF/DME, TMR/REF, and NRST are also displayed here.



## Primary Flight Display Click-Spots and Functions

The PFD is controlled using softkeys and multi-function rotary knobs. The NAV, COM, and FMS knobs consist of a larger outer knob that can be turned right and left, a smaller inner knob that can be turned right and left, and that can also be pushed in. The softkeys along the bottom of the PFD correspond to different functions displayed directly above the particular softkey. For more information on softkeys, see page 22.



- 1) NAV SWAP** - The NAV frequency swap key toggles the standby and active NAV frequencies. Active NAV frequencies are displayed in green when the CDI for the specific active frequency (either NAV1 or NAV2) is selected.
- 2) NAV** - The NAV control knob is a three-function knob. Turn the larger outer knob (upper click-spots) to change MHz (large number) and turn the smaller inner knob (lower click-spots) to change KHz (small number). Turn the knobs to the right to increase the frequency values and turn the knobs to the left to decrease the frequency values. Press the smaller inner knob to switch the cyan tuning box between NAV1 and NAV2. You can only tune frequencies that are surrounded by the cyan tuning box. Active frequencies are displayed in green and standby frequencies are displayed in white.
- 3) COM SWAP** - The COM frequency swap key toggles the standby and active COM frequencies. Active COM frequencies are displayed in green.
- 4) COM** - The COM control knob is a three-function knob. Turn the larger outer knob (upper click-spots) to change MHz (large number) and turn the smaller inner knob (lower click-spots) to change KHz (small number). Press the smaller inner knob to switch the cyan tuning box between COM1 and COM2. Turn the knobs to the right to increase the frequency values and turn the knobs to the left to decrease the frequency values. You can only tune frequencies that are surrounded by the cyan tuning box. Active frequencies are displayed in green and standby frequencies are displayed in white.
- 5) BARO** - The barometer adjustment knob is a two-function knob. Turn the knob to the right to increase the barometer setting and turn the knob to the left to decrease the barometer setting. Push the knob to set the barometer to the standard setting of 29.92.
- 6) RANGE** - The range joystick is used to adjust the range of the inset map. Push the joystick to the left to decrease the range (zoom in) and push the joystick to the right to increase the range (zoom out). Values range from 500 feet to 4000 miles. The range value is displayed in cyan in the lower right corner of the inset map.



## Primary Flight Display Click-Spots and Functions, Continued....

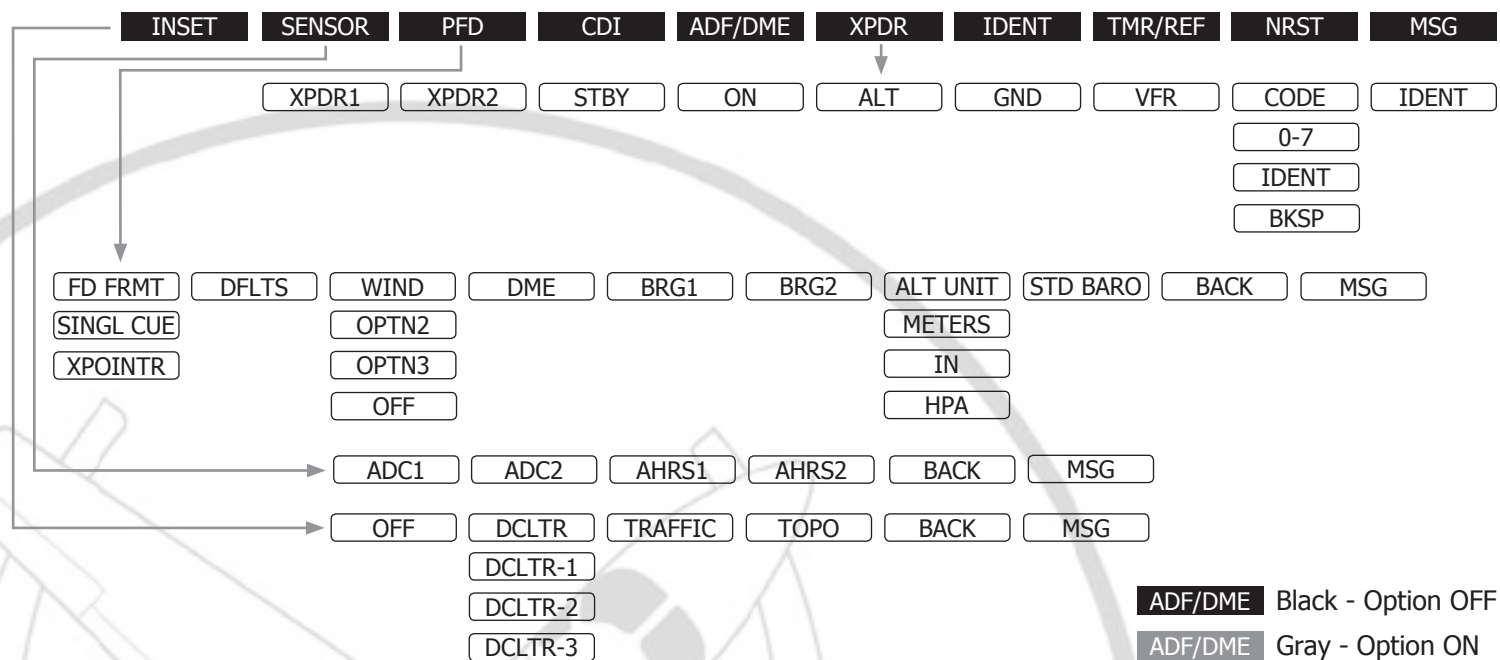


- 7) **Direct To** - The Direct To key allows you to enter a destination waypoint and establish a direct course to it from the current position.
- 8) **MENU** - The Menu key displays a list of options and additional features that can be selected.
- 9) **FPL** - The Flight Plan key displays the active flight plan page in the PFD. Press the FPL key once to open the flight plan display and press the FPL a second time to close the flight plan display.
- 10) **PROC** - The Procedure key accesses the IFR departure, arrival, and approach procedures for the currently loaded flight plan.
- 11) **CLR** - The Clear key erases information, clears entries, or removes page menus.
- 12) **ENT** - The Enter key confirms a menu selection or data entry.
- 13) **SOFTKEYS** - The softkeys along the bottom of the PFD are used to control a number of different features. These keys do not have a specific function, rather, they control different functions at different times. Some or all of the softkeys have labels displayed directly above the softkey. The labels will change depending upon pilot settings. When the label for a specific function is toggled off, the text is white on a black background and when the label for a specific function is toggled on, the text is black on a gray background.
- 14) **FMS** - The Flight Management System (FMS) control knob is a three-function knob and is used during flight planning and to modify the flight plan. It is also used to input and modify information in the ADF/DME and TMR/REF screens. Press the smaller inner knob to turn the selection cursor on and off. When the selection cursor is on, data can be entered into the highlighted field. Turn the larger outer knob (upper click-spots) to move the cursor up and down to different fields. Turn the smaller inner knob (lower click-spots) to input characters into the highlighted data field.

For more information on working with flight plans, please refer to the Flight Planning section on pages 31-34.

## Softkey Flow Chart

Shown below are the softkey menu options that are available, along with the corresponding sub-menu options. Most options are self-explanatory; however, we've provided more information on some of the options for further clarification.



- **CDI** - Press to toggle between VOR1, VOR2, and GPS navigation sources.
- **CODE** - Press to input the numerical transponder code.
- **ADF/DME** - Press to toggle the ADF/DME display on and off.
- **TMR/REF** - Press to toggle the timer and reference display on and off. This display is used to set timers, V-Speeds, minimums (see page 34), and the destination elevation used for the automatic pressurization system (see page 49).
- **NRST** - Press to toggle the Nearest Airports display on and off.
- **MSG** - Displays various messages referencing airspace boundaries.
- **FD FRMT** - Press to toggle between single cue and cross cue flight director options.
- **DFLTS** - Press to reset the softkey menu selections to the default options.
- **WIND** - Press to toggle between direction and speed display, direction with head and crosswind speed components display, and to turn the wind display box off.
- **DME** - Press to toggle the DME display on and off.
- **BRG1** and **BRG2** - Press to toggle the BRG1 and BRG2 displays on and off.
- **ALT UNIT** - Press to toggle between options to display the altimeter and barometer settings in metric units.
- **STD BARO** - Press to set the barometer to the standard setting.
- **DCLTR** - Press to toggle between three different levels of declutter on the inset map.
- **TRAFFIC** - Press to toggle traffic information on and off on the inset map.
- **TOPO** - Press to toggle topography on the inset map on and off.
- **SENSOR** - Allows selection of # 1 and # 2 AHRS and Air Data Computers.



## Multifunction Display Overview

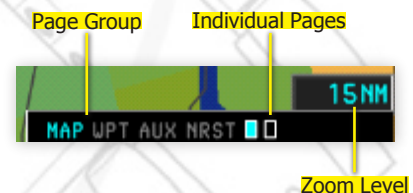
The Cessna Citation Mustang features a center-mounted 15 inch Multifunction display (MFD). The MFD provides a moving map and indications for most airframe and engine systems. The majority of the MFD displays the moving map, which indicates current aircraft position, topography, aviation facilities (such as airports, VORs, NDBs, etc). The left side of the MFD displays engine information, aircraft systems and crew alerts. Flight planning is also accomplished through the MFD, using the MFD/FMS controller. The MFD/FMS controller consists of a three-function rotary knob and an alphanumeric keypad to quickly and easily input letters and numbers. Moving through the different display screens in the MFD is also accomplished using the MFD/FMS controller knob.

## MFD Controller Click-Spots and Functions

The FMS knob is the main control for selecting most MFD functions. For data entry, the alphanumeric keypad is used. A range joystick is also feature which allows you to change the zoom level of the moving map.



**1) FMS** - The Flight Management System control knob is a three-function knob and is used during flight planning and to navigate through the various MFD pages as displayed in the lower right corner of the moving map. Turn the larger outer knob (upper click-spots) to display page groups and turn the smaller inner knob (lower click-spots) to display pages within the group. Press the smaller inner knob to turn the selection cursor on and off. When the selection cursor is on, data can be entered into the highlighted field. Turn the larger outer knob (upper click-spots) to move the cursor up and down to different fields. Turn the smaller inner knob (lower click-spots) to input characters into the highlighted data field.



- 2) FPL** - The Flight Plan key displays the active flight plan page in the MFD. Press the FPL key once to open the flight plan page and press the FPL key a second time to close the flight plan page. You are able to display the active flight plan, enter or edit a flight plan, and view stored flight plans.
- 3) D** - The Direct To key allows you to enter a destination waypoint and establish a direct course to it from the current position.
- 4) MENU** - The Menu key displays a list of options and additional features that can be selected.
- 5) PROC** - The Procedure key accesses the IFR departure, arrival, and approach procedures for the currently loaded flight plan.
- 6) RANGE** - The range joystick is used to adjust the range of the moving map. Push the joystick to the left to decrease the range (zoom in) and push the joystick to the right to increase the range (zoom out). Values range from 500 feet to 4000 miles. The range value is displayed in cyan in the lower right corner of the moving map.
- 7) 'X'** - Press to close the MFD Controller pop-up.
- 8) ALPHANUMERIC KEYS** - The alphanumeric keys allow quick and easy entry of airports, waypoints, and other data.
- 9) ENT** - The Enter key confirms a menu selection or data entry.

## MFD Controller Click-Spots and Functions, Continued....



- 10) **CLR** - The Clear key erases information, clears entries, or removes page menus.
- 11) **SPC** - The Space key adds a space character.
- 12) **BKSP** - The Backspace key moves the cursor back one space.

## Multifunction Display Screen

The MFD display screen presents graphical indications for most airframe and engine systems. The majority of the MFD displays the moving map, which indicates current aircraft position, topography, aviation facilities (such as airports, VORs, NDBs, etc). The left side of the MFD displays engine information, aircraft systems, and crew alerts.

This section provides an overview of the PFD and its basic functions. For more in-depth user information, please download and read the Garmin G1000 Pilots Guide at:

[http://www8.garmin.com/manuals/G1000:CessnaMustang\\_PilotsGuide.pdf](http://www8.garmin.com/manuals/G1000:CessnaMustang_PilotsGuide.pdf)

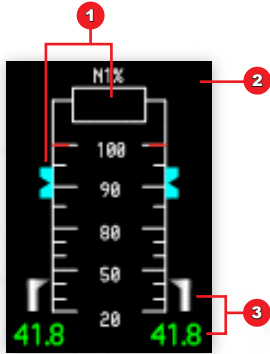
Although we have strived to model as many important features in this version of the G1000 PFD, not all features have been simulated, and some of those that have been simulated may not be entirely functional.

The diagram illustrates the Multifunction Display (MFD) screen with various sections labeled. On the left side, labels include Thrust Mode, Engine ITT, Engine N1%, Engine N2%, Engine Oil Pressure and Temperature, Electrical, Fuel Quantity and Usage, Pressurization, CAWS Warnings, Aileron and Rudder Trim Indicator, Flap Position Indicator, and Softkeys. The main display area shows a moving map with labels for Flight Path Information, Page Group and Page Title, and Map Orientation. On the right side, labels include Map Orientation, Moving Map, Map Zoom Level, and Map Page Group and Individual Pages. The screen displays various gauges and data points such as N1%, ITT, PSI, VOLTS, DC AMPS, FUEL, CAS, DEST ELV, TRIM AILERON, and RUDDER.



## Multifunction Display Engine, Electrical, and Fuel Indicating Gauges

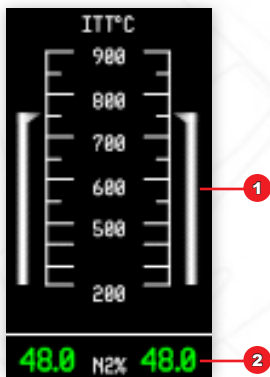
The left side of the MFD consists of various engine and aircraft system indicating gauges. These include the engine N1% gauge, the engine N2% gauge, the engine oil pressure and temperature gauge, the fuel quantity and usage gauge, and the electrical systems gauge, and are detailed below. Details of the remaining gauges can be found in their respective sections later in this Pilot's Guide.



1) **N1% TARGET BUG** - The N1% Target Bug displays the target N1% as determined by the FADEC system. A cyan bug, along with a box at the top of the scale are featured. The N1% target bugs vary depending on the throttle detent position and other variables. The N1% Target is displayed in the upper box only when the throttles are in the CRU, CLB, or TO detents.

2) **THRUST MODE** - The current thrust mode that the throttles are set to is displayed in cyan. If the throttles are set to a position between the thrust modes, the thrust mode indicators do not display.

3) **N1% RPM** - The N1% RPM displays the rotation speed of the N1 spool as a percentage of maximum N1 RPM and is the primary indication of engine thrust. A white tape that moves along the outside of a percentage scale, along with a digital readout for each engine, is featured.



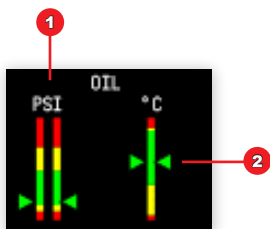
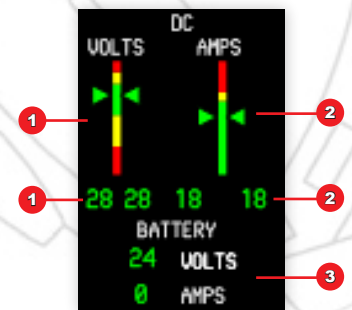
1) **ITT°C DISPLAY** - The ITT°C display indicates the Inlet Turbine Temperature for each engine. A white tape that moves along the outside of each scale calibrated in °Celsius, is featured.

2) **N2%** - The N2% display indicates the rotation speed of the N2 spool in percent of maximum N2 RPM as determined by the FADEC system. It is a key indicator of engine condition. During engine start, the N2% value will be displayed in white and change to green after engine start.

1) **DC VOLTS** - The DC Volts display indicates the current voltage at the right and left generators. Pointers indicate the current voltage range as indicated by the colored bands. Green indicates Normal, Yellow indicates Abnormal, and Red indicates Unsafe. A digital readout below the voltage scale indicates the actual voltage.

2) **DC AMPS** - The DC Amps display indicates the current amperage from the right and left generators to their respective DC feed bus. Pointers indicate the current amperage range as indicated by the colored bands. Green indicates Normal, Yellow indicates Abnormal, and Red indicates Unsafe. A digital readout below the amperage scale indicates the actual amperage.

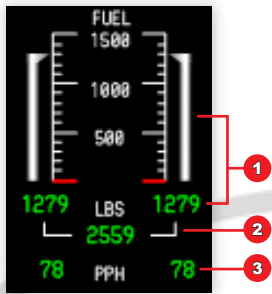
3) **BATTERY VOLTS AND AMPS** - The Battery Volts and Amps display indicates the voltage on the battery bus (Volts) and the current into or out of the battery (Amps). Positive amperage indicates the battery is charging. Negative amperage indicates the battery is discharging.



1) **OIL PSI** - The Oil Pressure for each engine is displayed. A pointer indicates the current oil pressure status as indicated by the colored bands. Green indicates Normal, Yellow indicates Abnormal, and Red indicates Unsafe.

2) **OIL °C** - The Oil Temperature for each engine is displayed in °Celsius. The right engine oil temperature is indicated by the right pointer and the left engine oil temperature is indicated by the left pointer. Both pointers indicate the current oil temperature range as indicated by the colored bands. Green indicates Normal, Yellow indicates Abnormal, and Red indicates Unsafe.

## Multifunction Display Engine, Electrical, and Fuel Indicating Gauges, Continued....

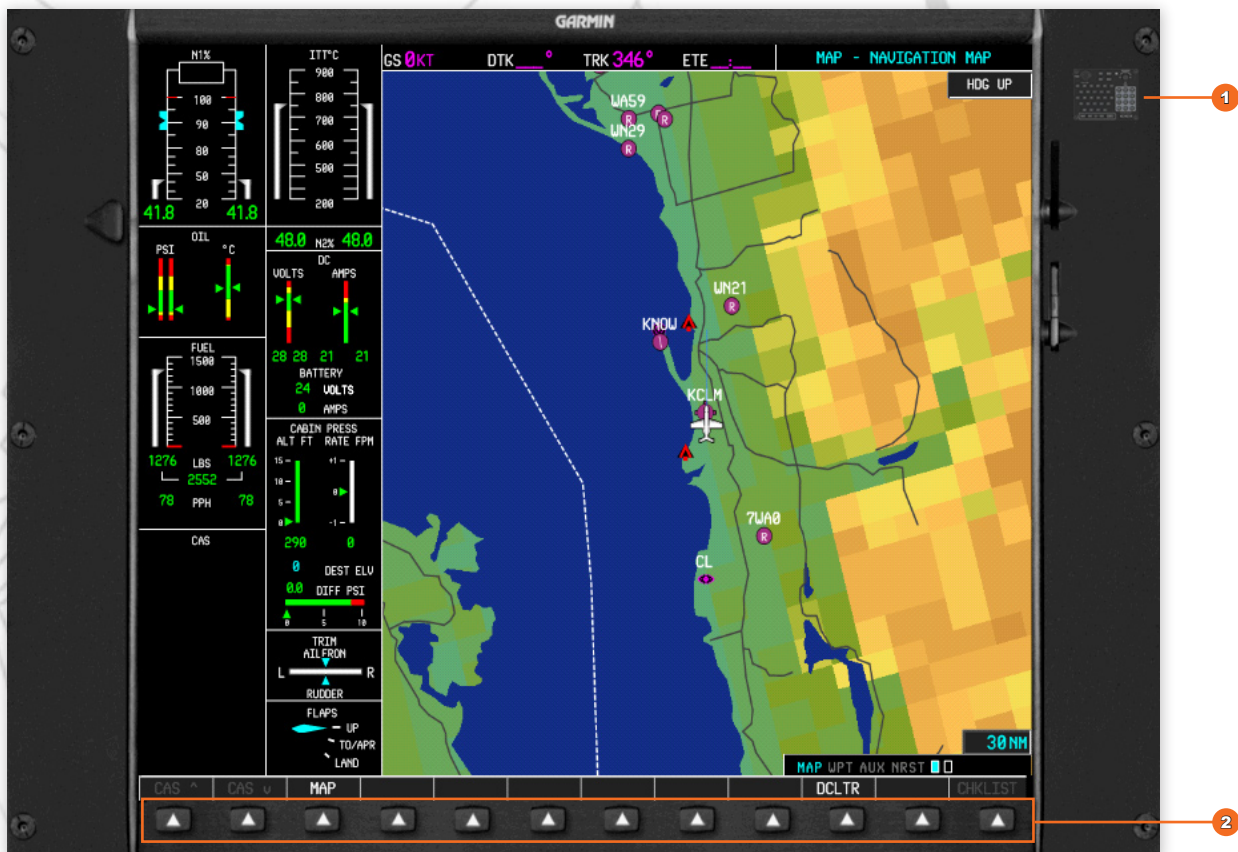


- 1) **FUEL QUANTITY** - The Fuel Quantity display indicates the fuel level for each fuel tank. One fuel tank is positioned in each wing. A white tape along the outside of the scale indicates the approximate fuel quantity remaining. A digital display indicates the actual fuel quantity remaining. The fuel quantity scale and the digital display are indicated in Pounds.
- 2) **TOTAL FUEL QUANTITY** - The Total Fuel Quantity display indicates the sum of the fuel quantity remaining for each fuel tank, and is indicated in Pounds.

- 3) **PPH FUEL FLOW** - The PPH Fuel Flow display indicates the current fuel flow for each engine. The fuel flow is indicated in Pounds Per Hour.

## Multifunction Display Click-Spots and Functions

The MFD is controlled using the MFD Controller described previously and softkeys along the bottom of the unit. The softkeys along the bottom of the MFD correspond to different functions displayed directly above the particular softkey. For more information on softkeys, see page 29.



- 1) **MFD CONTROLLER SHORTCUT** - Press to MFD Controller Shortcut to open the MFD Controller pop-up and press the MFD Controller Shortcut again to close the MFD Controller pop-up.
- 2) **SOFTKEYS** - The softkeys along the bottom of the MFD are used to control a number of different features. These keys do not have a specific function, rather, they control different functions at different times. Some or all of the softkeys have labels displayed directly above the softkey. The labels will change depending upon pilot settings. When the label for a specific function is toggled off, the text is white on a black background and when the label for a specific function is toggled on, the text is black on a gray background.



## Softkey Flow Chart

Shown below are the softkey menu options that are available, along with the corresponding sub-menu options. Most options are self-explanatory; however, we've provided more information on some of the options for further clarification.

### MAP Group

**P1** **MAP** **DCLTR**

TRAFFIC DCLTR-1

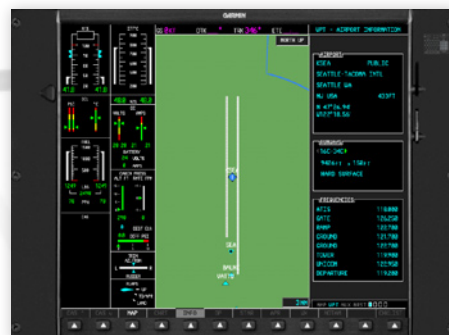
TOPO DCLTR-2

BACK DCLTR-3

**ADF/DME** Black - Option OFF

**ADF/DME** Gray - Option ON

**P2** **OPERATE**



### WPT Group

**P1** **MAP** **INFO**

TRAFFIC

TOPO

BACK

**P2** **MAP**

TRAFFIC

TOPO

BACK

**P3** **MAP**

TRAFFIC

TOPO

BACK

**P4** **MAP**

TRAFFIC

TOPO

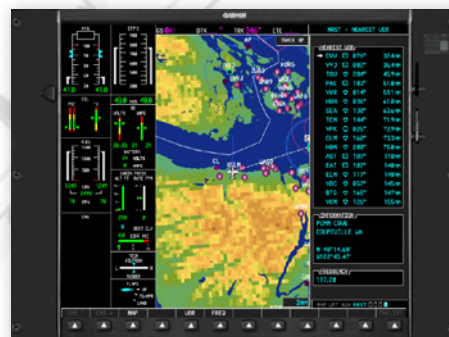
BACK



### AUX Group

**P2** **GPS1** **GPS2** **RAIM** **SBAS**

**P4** **LRU** **ARFRM** **DBASE**



### NRST Group

**P1** **MAP** **APT** **RNWX** **FREQ** **APR**

TRAFFIC

TOPO

BACK

**P3** **MAP**

TRAFFIC

TOPO

BACK

**P2** **MAP**

TRAFFIC

TOPO

BACK

**P4** **MAP** **VOR** **FREQ**

TRAFFIC

TOPO

BACK

- DCLTR - Press to toggle between three different levels of declutter on the map.
- TRAFFIC - Press to toggle traffic information on and off on the map.

## Softkey Flow Chart, Continued....

- TOPO - Press to toggle topography on the map on and off.
- GPS1 - Press to display the status of the GPS1 receiver.
- GPS2 - Press to display the status of the GPS2 receiver.
- RAIM - Press to view the RAIM (Receiver Autonomous Integrity Monitoring) Prediction field.
- SBAS - Press to view the SBAS (Satellite Based Augmentation System) field. By default, WAAS always enabled.
- LRU - Press to highlight the LRU (Line Replacement Unit) field. Displays the status, serial number and version of specific aircraft systems.
- ARFRM - Press to highlight the Airframe reference field.
- DBASE - Press to highlight the Database field. Scroll down to view the database information for a number of different installed databases.

## Page Groups

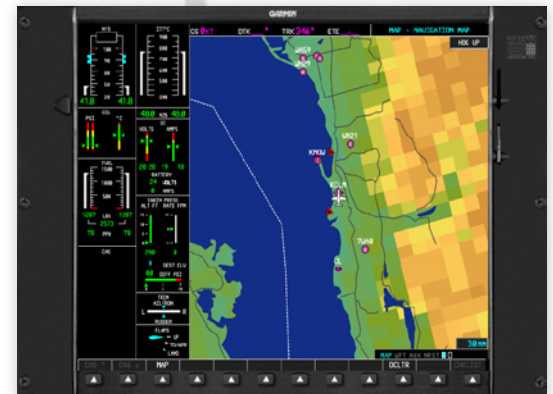
All of the information that the MFD can display to the pilot is categorized in separate groups and individual pages within those groups. This section describes the page groups that are displayed, along with the individual pages within a specific page group. Turn the MFD Controller larger outer knob to display page groups and turn the MFD Controller smaller inner knob to display individual pages within the group. Some pages simply display information. Other pages feature interactive elements, allowing feature changes or alphanumeric input.

### MAP Group

The Map Group consists of two pages:

**Navigation Map** - The Navigation Map displays visual information pertinent to the aircraft's current location and flight plan track. The map displays features such as topography, water, airports, and other navigational aids. Digital flight information is provided, including GS, DTK, TRK, and ETE.

**Traffic Map** - The Traffic Map displays the traffic around your aircraft. The display range can be changed using the Range knob on the MFD Controller. Traffic alerts are also displayed.



### WPT Group

The Waypoint Group consists of five pages:

**Airport Information** - Use the cursor to input an airport identifier to display that specific airport's information, including airport type, location, elevation, runways, and COM frequencies.

**Intersection Information** - Use the cursor to input an intersection identifier to display that specific intersection's information.

**NDB Information** - Use the cursor to input an NDB identifier to display that specific NDB's information, including location and frequency.

**VOR Information** - Use the cursor to input a VOR identifier to display that specific VOR's information, including location and frequency.





## Page Groups, Continued....

### AUX Group

The Auxiliary Group consists of four pages:

**Trip Planning** - The Trip Planning page operates in Automatic Mode. It displays a number of different telemetry and trip statistics regarding the current flight operation.

**GPS Status** - The GPS Status page provides a number of different statistics regarding the GPS system status. Aircraft position, altitude, ground speed, and track are also displayed.

**System Setup** - Use the cursor to make system setup selections to suit your preference. Choices include the Time Format, the Temperature Display, and the MFD Data Bar Fields. Remember, turn the outer knob to move the cursor to highlight the field, then turn the inner knob to see the list of choices. Press the ENT key to make your choice.

**System Status** - The System Status page displays the status of a number of different aircraft systems, and includes information on the various databases included.



### NRST Group

The Nearest Group consists of four pages:

**Nearest Airports** - Use the cursor to highlight and display information about the airports that are nearest to your aircraft's current position. When an airport is highlighted, that airport's information is displayed and a white line is drawn on the map from your aircraft to the highlighted airport.

**Nearest Intersections** - Use the cursor to highlight and display information about the intersections that are nearest to your aircraft's current position. When an intersection is highlighted, that intersection's information is displayed and a white line is drawn on the map from your aircraft to the highlighted intersection.

**Nearest NDB** - Use the cursor to highlight and display information about the NDBs that are nearest to your aircraft's current position. When an NDB is highlighted, that NDB's information is displayed and a white line is drawn on the map from your aircraft to the highlighted NDB.

**Nearest VOR** - Use the cursor to highlight and display information about the VORs that are nearest to your aircraft's current position. When a VOR is highlighted, that VOR's information is displayed and a white line is drawn on the map from your aircraft to the highlighted VOR.



## Flight Planning

This section details how to create and modify flight plans. Covered are topics ranging from inputting flight plan waypoints and activating your flight plan, to modifying your flight plan by entering a Direct To, and selecting, loading, and activating departures (SIDS), arrivals (STARS), and approaches.

### Working with Flight Plans

Flight plans can be created and modified through either the PFD, using the FMS knob and related keys, or through the MFD, using the FMS Controller. When you create or modify a flight plan in one display (for instance, the MFD), the same entries and selections are automatically made in the other display (in this case, the PFD). A flight plan can be created manually, or a flight plan can be created prior to your flight through the Flight Simulator flight planner. Once the Flight Simulator flight plan is saved and you load the Cessna Citation Mustang, the saved flight plan will be automatically activated and displayed in the MFD when the aircraft is loaded.

## Flight Planning, Continued....

Press the Scroll Lock key on your keyboard to allow you to enter alphanumeric data into the PFD or the MFD via your keyboard.

On some Flight Simulator installations, pressing the Scroll Lock key also opens the Flight Simulator ATC dialog box. If this occurs, delete or reassign that key assignment using the Flight Simulator Options - Settings - Controls drop-down menu.

### Creating a Flight Plan

To create and activate a flight plan manually through the MFD using the MFD Controller, follow the steps below:



- 1) Press the FPL key. The Flight Planning page will be displayed on the MFD.
- 2) Press the inner knob to activate the cursor.
- 3) Turn the inner knob right to display the waypoint information page.
- 4) Enter the identifier for your starting point using either the keypad, rotary knobs, or your keyboard, then press ENT.
- 5) Repeat steps 3 and 4 to enter the remainder of the waypoints and your destination point.
- 6) To activate the flight plan, turn the outer knob left to move the cursor to the waypoint directly below your starting point, then press the MENU key and select the Activate Leg option. Your flight plan course will now be displayed in magenta on the MFD and the Flight Planning page will display the waypoints and distances along your flight plan.
- 7) Press the FPL key to close the Flight Planning page. The first leg of the flight plan will be displayed along the top of the PFD.

### Deleting a Waypoint

To delete a waypoint from an active flight plan, follow the steps below:

- 1) Press the FPL key to open the Flight Planning page, then press the inner knob to activate the cursor.
- 2) Turn the outer knob right to scroll to and highlight the waypoint you want to delete, then press the CLR key.

### Adding a Waypoint

To add an additional waypoint to an active flight plan, follow the steps below:

- 1) Press the FPL key to open the Flight Planning page, then press the inner knob to activate the cursor.
- 2) Turn the outer knob right to scroll to and highlight the waypoint you want add the new waypoint **above**.
- 3) Turn the inner knob right to display the waypoint information page.
- 4) Enter the identifier for the waypoint you want to add using either the keypad, rotary knobs, or your keyboard, then press ENT.



## Flight Planning, Continued....

### Inverting a Flight Plan

Your current flight plan can be inverted. This is useful for return trips that follow the same course as your outbound trip. This saves you from having to reinput the flight plan for the trip back. To invert your flight plan, follow the steps below:

- 1) Press the FPL key to open your current flight plan.
- 2) Press the MENU key, then turn the outer knob right to scroll to and highlight the Invert Flight Plan option.
- 3) Press the ENT key to invert your flight plan. It may be necessary to activate the flight plan once again, following step 6 in the Creating a Flight Plan section on the previous page.

### Deleting a Flight Plan

An entire flight plan can be deleted. To delete a flight plan, follow the steps below:

- 1) Press the FPL key to open your current flight plan.
- 2) Press the MENU key, then turn the outer knob right to scroll to and highlight the Delete Flight Plan option.
- 3) Press the ENT key to delete your flight plan.

### Entering a Direct To

A Direct To can be entered at any time during flight to alter the course to a specifically chosen waypoint. To enter a Direct To, follow the steps below:



- 1) Press the  $\text{D}\blacktriangleright$  key. The Direct To waypoint information page will be displayed on the MFD.
- 2) Enter the identifier of your Direct To destination using either the keypad, rotary knobs, or your keyboard, then press ENT.
- 3) Press ENT again to verify that you want to Activate the Direct To. Once activated, the Direct To waypoint information page will close and the magenta course will update on the MFD to display the new Direct To course. The  $\text{D}\blacktriangleright$  will be displayed along the top of the PFD.

### Loading a Departure (SID)

The Citation Mustang features a number of airport departures that can be selected. A flight plan must be loaded and activated to choose a departure procedure. Note that not all airports feature departures. If a departure is not available, the Departure Menu will be blank. To load a departure, follow the steps below:

- 1) Press the PROC key to open the Procedures Menu. By default, the cursor highlights the Select Approach option.
- 2) Turn the outer knob right to scroll to and highlight the Select Departure option.





## Flight Planning, Continued....



- 5) Press the ENT key and a list of arrival transitions will be presented. Turn the outer knob right to scroll to and highlight your desired arrival transition.
- 6) Press the ENT key. LOAD near the bottom of the Procedure Menu will blink. To LOAD your selected arrival, press the ENT key. The Procedures Menu will disappear and your Flight Plan will be displayed on the MFD Map.
- 7) After loading your arrival, open your flight plan and scroll through the waypoint entries to ensure that there are no errors. You can also zoom out the Map display to visually view the flight plan if you're near your arrival airport. Once loaded, the first waypoint in the arrival procedure is automatically activated.

## Deleting an Arrival (STAR)

- 1) Press the FPL key to open the Flight Planning page, then press the inner knob to activate the cursor.
- 2) Turn the outer knob right to scroll to and highlight the arrival name. To clear the arrival, press the CLR key.
- 3) To reactivate the flight plan, turn the outer knob right to scroll to highlight the waypoint directly below your starting point, then press the MENU key and select the Activate Leg option.

Individual waypoints within an arrival procedure cannot be deleted, however, you can skip a waypoint by entering a Direct To to the waypoint following the waypoint you want to skip.

## Loading and Activating an Approach

The Citation Mustang features a multitude of different types of airport approaches and transitions that can be selected for your destination airport. A flight plan must be loaded and activated to choose an approach procedure. Note that not all airports feature approaches. To load and activate an approach, follow the steps below:



- 1) Press the PROC key to open the Procedures Menu. By default, the cursor highlights the Select Approach option.
- 2) Press the ENT key to see a list of available procedures for your destination.
- 3) Turn the outer knob right to scroll to and highlight your desired approach procedure.

## Flight Planning, Continued....

- 4) Press the ENT key and a list of transitions will be presented. Turn the outer knob right to scroll to and highlight your desired transition, then press the ENT key.
- 5) You can either choose to LOAD or ACTIVATE your approach. If you choose to LOAD your approach (press the ENT key), the approach will be loaded into the FMS and can be activated later. If you choose to ACTIVATE your approach (scroll to ACTIVATE and press the ENT key), the approach will be loaded and activated. If your aircraft is flying on autopilot with GPSS steering, the aircraft will immediately turn to the first approach waypoint when the approach is activated.
- 6) After loading your approach, you can check the waypoints and distances by opening your flight plan and scrolling down the waypoint entries. **To ACTIVATE the approach, follow the steps below:**
- 7) Press the PROC key to open the Procedures Menu. By default, the cursor highlights the Select Approach option.
- 8) Turn the outer knob left to scroll to and highlight the Activate Approach option.
- 9) Press the ENT key to ACTIVATE the approach. If your aircraft is flying on autopilot with GPSS steering, the aircraft will immediately turn to the first approach waypoint.
- 10) After loading your approach, you can check the waypoints and distances by opening your flight plan and scrolling down the waypoint entries.

### Activating Vector-to-Final

- 1) Press the PROC key to open the Procedures Menu. By default, the cursor highlights the Select Approach option.
- 2) Turn the outer knob left to scroll to and highlight the Activate Vector-to-Final option.
- 3) Press the ENT key. Your approach will be deleted except for the faf, the runway, and the missed approach vectors, allowing you to follow ATC commands to the Final Approach Fix.

### Setting V-Speeds

V-Speeds are set through the PFD. To set V-Speeds, follow the steps below:

- 1) Press the TMR/REF softkey. If the cursor is not active, press the FMS knob to display the cursor. Scroll the cursor down to highlight the first V-Speed. The V-Speed value can be changed by turning the inner knob.
- 2) After setting the V-Speed value, highlight the OFF/ON selection and use the inner knob to select ON. This will turn the V-Speed indicator on so that it displays on the PFD Speed Tape.
- 3) Repeat steps 2 and 3 to enter and set the remaining V-Speeds.

All V-Speed indicators can be turned ON or OFF at one time by pressing the MENU key, then choosing All References ON or All References OFF respectively. Press ENT to make your selection.

REFERENCES			
TIMER	00:00:00	UP	START?
V2	97KT	◀ ON ▶	
Venr	118KT	◀ ON ▶	
	LANDING		
Vr ef	94KT	◀ ON ▶	
Vapr	101KT	◀ ON ▶	
MINIMUMS	◀ BARO ▶		400FT
DEST ELEV			0FT

The Cessna Citation Mustang V-Speeds are very nearly the same for all various aircraft weights. The most common V-Speeds are displayed by default. More V-Speeds are listed in the V-Speeds chart on page 61.

### Setting Minimums

Minimums are set through the PFD. To set minimums, follow the step below:

- 1) Press the TMR/REF softkey. If the cursor is not active, press the FMS knob to display the cursor. Scroll the cursor down to highlight Minimums OFF.
- 2) Use the inner knob to change OFF to BARO. Scroll over to FT, then use the inner knob to input the desired minimums (displayed in feet).

REFERENCES			
TIMER	00:00:00	UP	START?
V2	97KT	◀ ON ▶	
Venr	118KT	◀ ON ▶	
	LANDING		
Vr ef	94KT	◀ ON ▶	
Vapr	101KT	◀ ON ▶	
MINIMUMS	◀ BARO ▶		400FT
DEST ELEV			0FT



## Audio Panel Overview

An audio panel is provided for both the pilot and the co-pilot. Each audio panel features a marker beacon receiver and controls for selecting and managing different audio sources, including COM receivers, NAV receivers, and ADF and DME receivers. A volume control knob is featured, and you can play music files (.wav) and capture screenshots using the audio panel, too.

## Audio Panel Click-Spots and Functions

Active audio functions display a white annunciator above the function button.



- 1) **COM1 MIC** - Selects the COM1 transmitter. Pressing COM1 MIC also turns on COM1 audio.
- 2) **COM1** - Press to turn COM1 audio on or off.
- 3) **COM2 MIC** - Selects the COM2 transmitter. Pressing COM2 MIC also turns on COM2 audio.
- 4) **COM2** - Press to turn COM2 audio on or off.

Both COM1 and COM2 can be selected at the same time, allowing you to hear audio from both the COM1 and COM2 receivers at the same time. COM1 MIC and COM2 MIC cannot both be selected at the same time.

- 5) **MKR MUTE** - Press to select and hear marker beacon sounds. When selected and a marker beacon sound is heard, press again to mute the marker beacon sound.
- 6) **DME** - Press to turn DME receiver ident audio on or off.
- 7) **NAV1** - Press to turn NAV1 receiver ident audio on or off.
- 8) **ADF** - Press to turn ADF receiver ident audio on or off.
- 9) **NAV2** - Press to turn NAV2 receiver ident audio on or off.
- 10) **'X'** - Press to close the audio panel pop-up. When closed, the icon will appear which you can press to open the audio panel pop-up.
- 11) **RECORD** - Press to capture a screenshot. Screenshots are automatically stored in your My Documents\My Pictures\Flight Simulator X Files folder.
- 12) **PLAY** - Press to play music. See the Playing Music section below.
- 13) **VOLUME** - Rotate left to decrease music volume and rotate right to increase music volume.

Active COM and NAV frequencies are displayed in green on the PFD. In order to hear COM, NAV, DME and ADF audio, a valid frequency must be tuned and the aircraft must be within receiving range.

## Playing Music

The Cessna Citation Mustang allows you to play music tracks and control the volume level of the music directly from the audio panel. You must first copy the desired music tracks to the following folder:

Microsoft Flight Simulator X\Sound\F1\_cessna\_mustang\music

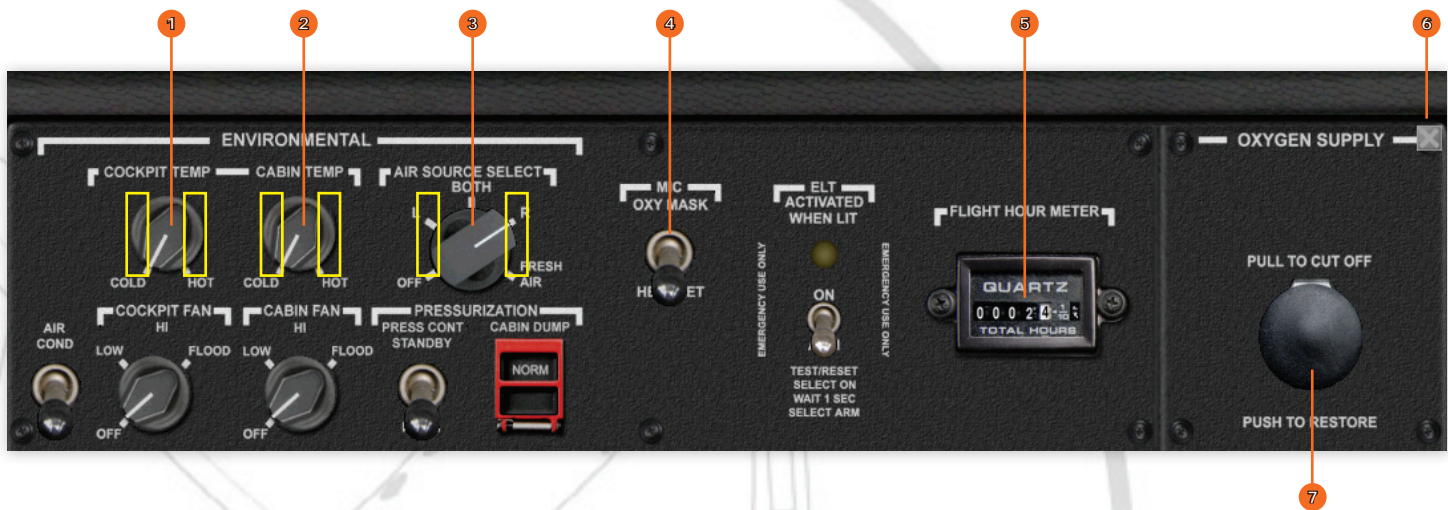
The music tracks must be in .WAV format. To play a track, press the PLAY button. To stop playing the track, press the PLAY button a second time. To skip to the next track, press the PLAY button a third time. Use the VOL knob to increase or decrease the music's volume. A sample track is provided courtesy of Cessna Citation Mustang beta-tester Dave Blevins.

## Right Switch Panel Overview

The right switch panel contains the environmental controls for features including the cockpit and cabin temperature, the cockpit and cabin fans, the air conditioning system, and the pressurization system. Also featured is the Emergency Locator Transmitter (ELT), the Flight Hour Meter (HOBBS meter), and the supplemental oxygen cutoff knob. These are all clustered in one easy-to-see and easy-to-access location.

## Right Switch Panel Click-Spots and Functions

Rotary knobs can be turned using click-spots on both the left and the right side of the knobs. They can also be rotated using your mouse's scroll wheel. Switches can be flipped by clicking on the middle of the switch. Be sure to follow the aircraft checklists to ensure that the settings are maintained for the different phases of flight.




- 1) **COCKPIT TEMP** - The Cockpit Temperature knob adjusts the temperature range inside the cockpit. Turning the knob toward COLD selects the coldest temperature and turning the knob toward HOT selects the hottest temperature. The knob can be set to anywhere in between COLD and HOT. The normal temperature range is 65°~85°F.
- 2) **CABIN TEMP** - The Cabin Temperature knob adjusts the temperature range inside the cabin. Turning the knob toward COLD selects the coldest temperature and turning the knob toward HOT selects the hottest temperature. The knob can be set to anywhere in between COLD and HOT. The normal temperature range is 65°~85°F.
- 3) **AIR SOURCE SELECT** - The Air Source Select knob selects the source of air that enters the cockpit and the cabin. OFF stops all bleed air (from the engines) and fresh air from entering the cockpit and the cabin. BOTH allows bleed air from both engines to enter the cockpit and the cabin. L and R allow bleed air from the left and right engines respectively to enter the cockpit and the cabin. FRESH AIR stops all bleed air from entering the cockpit and the cabin; however, if the aircraft is depressurized, fresh air is blown into the cockpit automatically.
- 4) **MIC** - The Microphone switch selects how microphone audio is transmitted to the crew members. Select OXY MASK to transmit microphone audio through the oxygen mask and select HEAD SET to transmit microphone audio through the head set. The default setting is HEAD SET. If OXY MASK is selected, breathing into the oxygen mask can be heard.
- 5) **FLIGHT HOUR METER** - The Flight Hour Meter keeps track of the total hours on the engines. Click on the Flight Hour Meter to enlarge it.
- 6) **'X'** - Press to close the right switch panel pop-up.
- 7) **OXYGEN SUPPLY CUTOFF** - The Oxygen Supply Cutoff handle closes the regulator at the base of the oxygen supply tank which supplies supplemental oxygen to the crew and passengers. The handle should be pushed in. When the handle is pulled out, bottled oxygen is vented overboard. Oxygen flow is controlled by the Oxygen Control Valve. See Oxygen Control Valve Click-Spots and Functions on the next page for more information.



## Right Switch Panel Click-Spots and Functions, Continued....



- 8) **ELT** - The Emergency Locator Transmitter switch is used to arm or test the ELT system. To test the ELT system, you must tune COM1 or COM2 to 121.500, then select the ON position. The amber light will illuminate and an audible tone will be heard. For normal operation, the switch should be in the ARM position.
- 9) **CABIN DUMP** - The Cabin Dump switch releases pressure from the cabin. This manual switch is typically only used during emergency procedures and can be operated at any time DC or EMERGENCY power is available. The switch guard must first be released, then the CABIN DUMP switch can be actuated. Under normal conditions, NORM is displayed. When cabin pressure is manually released, DUMP is displayed in red. 
- 10) **PRESS CONT** - The Pressurization Controller switch selects the pressurization mode of operation during flight. When NORM is selected cabin pressurization is automatically controlled. When STANDBY is selected, cabin pressurization operates in a pneumatic backup mode in flight. This switch should always be left in the NORM mode. For more information, see the Pressurization section on page 49.
- 11) **CABIN FAN** - The Cabin Fan switch controls the fan that blows hot or cold air through ducts in the cabin. Choose from OFF (no fan), LOW, HI, and FLOOD (maximum fan speed).
- 12) **COCKPIT FAN** - The Cockpit Fan switch operates the fan that blows hot or cold air through ducts in the cockpit. Choose from OFF (no fan), LOW, HI, and FLOOD (maximum fan speed).
- 13) **AIR COND** - The Air conditioning switch controls the air conditioning system. Select OFF to turn the air conditioning system off and select AIR COND to turn the air conditioning system on.

## Oxygen Control Valve Click-Spots and Functions



The Oxygen Control Valve regulates how supplemental oxygen is supplied to the various parts of the aircraft. The Oxygen Control Valve is located on the lower left side of the instrument panel and is used in conjunction with the supplemental oxygen pressure gauge located on the right side of the instrument panel.

- 1) **OXYGEN CONTROL VALVE** - The Oxygen Control Valve controls supplemental oxygen flow to the passenger cabin. Three choices are available. CREW ONLY provides supplemental oxygen to only the crew and not to the passengers. NORMAL provides automatic oxygen mask drop-down to the passengers when cabin pressure altitude is greater than 14,800ft. DROP MASK allows the pilot to supply supplemental oxygen to the passengers at any cabin altitude.

The supplemental oxygen pressure gauge displays the volume of the supplemental oxygen supply. Normal pressure readings are between 1,600 and 1,800 PSI.



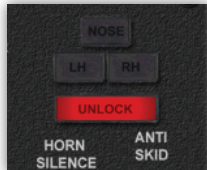
## Gear and Lighting Panel Overview

The gear and lighting panel features the retractable landing gear handle and corresponding indicator lamps, the gear horn silencer, the anti-skid switch, and various external and cabin lighting options. The gear and lighting panel also features the passenger seat belt safety switch.

## Gear and Lighting Panel Click-Spots and Functions

In addition to the standard rotary knobs and switches, the gear and lighting panel features a three-position switch for the taxi and landing lights. Three-position switches have a separate click-spot in the middle of the switch, in addition to the click-spots above and below the switches. For more information on exterior aircraft lighting, see the Exterior Aircraft Map section on page 20.



- 1) **LANDING GEAR INDICATOR LAMPS** - The Landing Gear Indicator Lamps provide landing gear position indications. Three green indicators confirm all three landing gear are down and locked. The red UNLOCK indicator lamp indicates when the landing gear is in motion, either retracting or extending. When the landing gear lever is moved from the GEAR DOWN position, the UNLOCK indicator illuminates and once the landing gear is retracted, both the UNLOCK indicator and the three position indicators will extinguish. When the landing gear lever is moved from the GEAR UP position, the UNLOCK indicator illuminates and once the landing gear are down and locked (indicated by three green position indicators), the UNLOCK indicator will extinguish.
 
- 2) **PAX SAFETY** - The Passenger Safety switch is a three position switch that illuminates the seat belt sign in the upper left side of the passenger cabin. When the switch is in the PAX SAFETY position, two cabin ceiling lights turn on and the seat belt sign is illuminated. The No Smoking sign is always illuminated.
- 3) **LANDING** - The Landing Light switch is a three position switch that controls both the recognition/taxi lights and the landing lights. Both the recognition/taxi and landing lights are illuminated from the same two positions on the bottom of the fuselage. When LANDING is selected, both landing lights illuminate at maximum brightness. When RECOG TAXI is selected, both landing lights dim to a lower intensity. When OFF is selected there is no illumination.
- 4) **BEACON** - The Beacon switch controls the red beacon on the top of the stabilizer. When BEACON is selected, the beacon is turned on. When OFF is selected, the beacon is turned off.
- 5) **ANT COL** - The Anti-Collision Lights switch controls the wing tip anti-collision strobe lights. When ANT COL is selected, the anti-collision strobe lights are turned on. When OFF is selected, the anti-collision lights are turned off.
- 6) **NAV** - The Navigation Lights switch controls the wing tip navigation lights. The navigation lights consist of two lights on each wing tip. There is a red light on the left wing tip, a green light on the right wing tip, and a white light on both wing tips. When NAV is selected, the navigation lights are turned on. When OFF is selected, the navigation lights are turned off.
- 7) **WING INSP** - The Wing Inspection Light switch controls the ice light. The ice light is located on the left side of the fuselage and illuminates the leading edge of the left wing. It is used to see any icing build-up on the wing at night. When WING INSP is selected, the ice light is turned on. When OFF is selected, the ice light is turned off.



## Gear and Lighting Panel Click-Spots and Functions, Continued....



- 8) **PANEL** - The Panel switch is a two-position switch that controls the standby instrument back-lighting. When the switch is in the down position, standby instrument back-lighting is turned off. When the switch is in the up position, standby instrument back-lighting is turned on. Also turns on the audio panel backlighting in the 2D panel. Panel backlighting is turned on by default in the VC.

The VC dome light also controls the 2D panel flood light. When turned on, this will cast a soft light over the entire 2D panel.

- 9) **DISPLAYS** - The Displays knob is a rotary knob that controls the brightness of both the PFD and the MFD displays in unison. The knob is adjustable from 0% (dark) to 100% (full brightness). It is recommended that the displays be dimmed to a comfortable level during night-time operation.



Backlighting

- 10) **'X'** - Press to close the Gear and Lighting Panel pop-up.

- 11) **ANTI SKID** - The Anti Skid switch controls the anti-skid system. The anti-skid system allows maximum braking efficiency and control on all types of runway surfaces. When the switch is in the up position, the anti-skid system is turned on. When the switch is in the down position, the anti-skid system is turned off. During wet runway operations, the anti-skid system should be turned on or aircraft roll-out will be longer.



Full Bright

- 12) **HORN SILENCE** - The Horn Silence button silences the landing gear aural warning. If the landing gear are not locked down under the following circumstances, an aural warning will sound, indicating that the landing gear is not extended.

- The throttles are below ~85% N2 and airspeed is below 130 KIAS.
- The flaps are extended beyond the TAKEOFF AND APPROACH setting.



Dimmed

To manually override and silence the aural warning, press the HORN SILENCE button.

The aural warning cannot be silenced using the HORN SILENCE button if the flaps are extended beyond the TAKEOFF AND APPROACH setting and the landing gear is not locked in the down position.

- 13) **PARKING BRAKE PULL** - In the 2D cockpit, the parking brake is controlled using the standard Flight Simulator key command (CTRL+.). In the Virtual Cockpit, the parking brake is controlled by the parking brake handle to the left of the center console.

- 14) **LANDING GEAR LEVER** - The Landing Gear Lever controls the operation of the retractable landing gear. When the landing gear lever is moved to the GEAR DOWN position, the landing gear will extend. When the landing gear lever is moved to the GEAR UP position, the landing gear will retract. The landing gear lever cannot be moved while the aircraft is on the ground.

## Left Switch Panel Overview

The left switch panel features the avionics and DC power switches, the engine start switches, the fuel pumps and transfer valve switches, and the anti-ice controls. The landing gear lever, the horn silence button, and the anti-skid switch are also included for convenience.

## Left Switch Panel Click-Spots and Functions

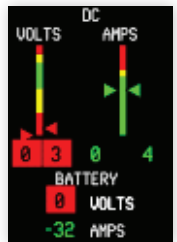
Like the gear and lighting panel, the left switch panel features a several three-position switches, in addition to the standard switches and buttons. Three-position switches have a separate click-spot in the middle of the switch, in addition to the click-spots above and below the switches.



- 1) L GEN** - The Left Generator switch is a three-position switch that controls the left electrical generator. With the switch in the L GEN position, the left electrical generator is online and feeding power to the aircraft systems as displayed on the ammeter on the MFD. With the switch in the OFF position, the left electrical generator is offline and no generator power is fed to the aircraft systems. An amber caution will be displayed on the CAS indicating that the left generator is offline.

The RESET selection is spring-loaded. When the switch is moved to the RESET position, the left generator is reset and automatically returns to the OFF position.

- 2) BATT** - The Battery switch is a three position switch that controls the battery power. With the switch in the BATT position, electrical power is fed to the aircraft systems from the onboard battery. With the switch in the OFF position, electrical power is cut off from the onboard battery. With the switch in the EMER position, only emergency power is available to the aircraft systems from either the battery or an external source.



If the battery switch is in the BATT position without the generators turned on, the aircraft's onboard battery will be drained in a short period of time.

- 3) R GEN** - The Right Generator Switch is a three-position switch that controls the right electrical generator. With the switch in the R GEN position, the right electrical generator is online and feeding power to the aircraft systems as displayed on the ammeter on the MFD. With the switch in the OFF position, the right electrical generator is offline and no generator power is fed to the aircraft systems. An amber caution will be displayed on the CAS indicating that the right generator is offline.



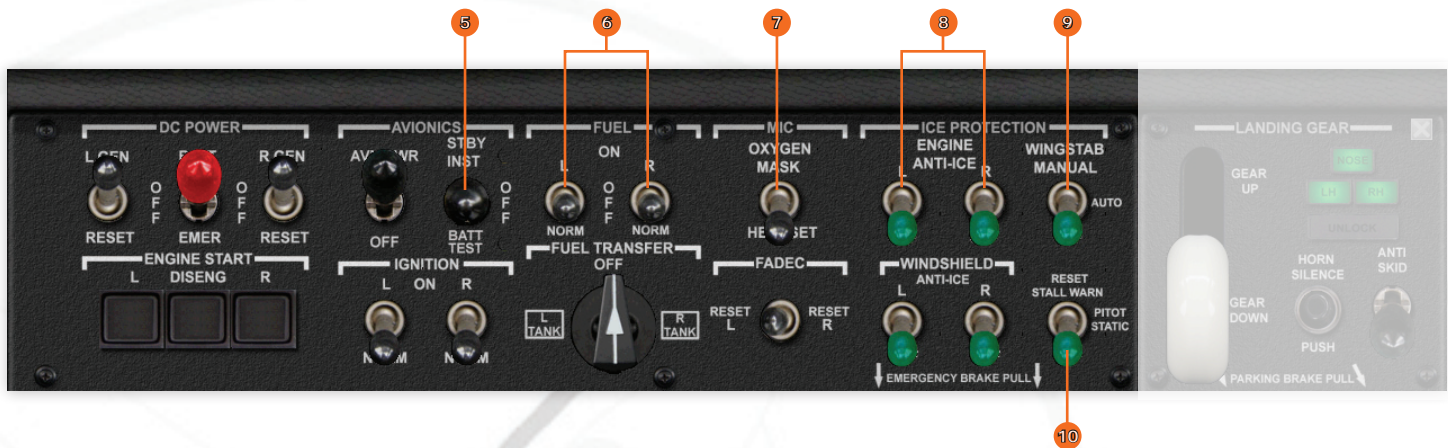
The RESET selection is spring-loaded. When the switch is moved to the RESET position, the right generator is reset and automatically returns to the OFF position.

- 4) AVN PWR** - The Avionics Power Switch controls power to the aircraft's avionics through the DC bus or through the emergency bus. When the switch is in the AVN PWR position, the avionics are powered on. When the switch is in the OFF position, the avionics are powered down, except for those that are powered directly from the battery.

If there is no DC power (left or right generators online) or no emergency power, the avionics cannot be powered on. Both generators should be in the L GEN and R GEN positions to ensure avionics power throughout the flight.



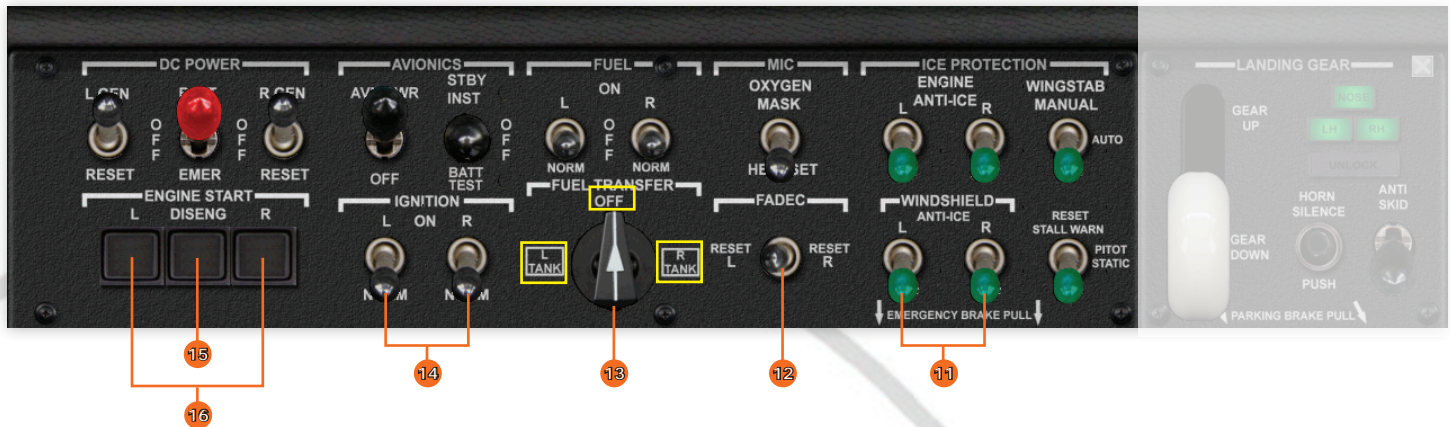
## Left Switch Panel Click-Spots and Functions, Continued....



- 5) **STBY INST** - The Standby Flight Instruments switch powers the standby instruments on and off. The standby instruments are powered from a dedicated backup battery. When the switch is in the STBY INST position, the standby instruments are powered on. If the Battery switch is in the OFF position, an amber LED illuminates, indicating that the standby instruments are drawing power from the backup battery. The amber LED does not illuminate when aircraft power is charging the backup battery and providing power to the standby instruments. When the switch is in the BATT TEST position, the state of the backup battery is tested. If the LED illuminates green, the backup battery is charged properly. If the LED does not illuminate, the backup battery is discharged and may not operate the standby instruments should DC power be lost.
- 6) **FUEL** - The left and right Fuel Boost Switches control the left and right fuel boost pumps respectively. Both of these switches are three-position switches. When the switches are in the ON position, the boost pumps are turned on (as displayed in white on the CAS). When the switches are in the OFF position, the boost pumps are shut off. When the switches are in the NORM position, the boost pumps are automatically controlled. The fuel boost switches are used on conjunction with the Fuel Transfer switch which is described on the next page.
- 7) **MIC** - The Microphone switch selects how microphone audio is transmitted to the crew members. Select OXY MASK to transmit microphone audio through the oxygen mask and select HEAD SET to transmit microphone audio through the head set. The default setting is HEAD SET. If OXY MASK is selected, breathing into the oxygen mask can be heard.
- 8) **ENGINE ANTI-ICE** - The left and right Engine Anti-Ice switches control the left and right engine inlet anti-ice system respectively. When the switches are in the UP position, bleed air is directed into the respective engine inlet. When the switches are in the OFF position, no bleed air is directed into the engine inlets. For more information, refer to the Ice Protection section on page 50.
- 9) **WINGSTAB** - The Wing and Stabilizer De-Icing switch controls the de-icing boots on the leading edges of the wing and the stabilizer. When the switch is in the OFF position, the de-icing boots are not activated. When the switch is in the AUTO position, the de-icing boots are inflated and deflated in 2-minute intervals to remove accumulated ice. The switch also features a spring-loaded MANUAL position. When the switch is pushed and held in the MANUAL position, the de-icing boots are inflated and stay inflated until the switch is released. For more information, refer to the Ice Protection section page 50.
- 10) **PITOT-STATIC** - The Sensor Anti-Ice switch controls the anti-ice system for the pitot probes and the stall warning vane. When the switch is in the OFF position, no heat is applied to the pitot probes or the stall warning vane. Amber cautions will be displayed on the CAS indicating that the switch is off. When the switch is in the PITOT-STATIC position, heat is applied to the pitot probes and the stall warning vane when prevents ice build-up. The switch also features a spring-loaded RESET STALL WARN position. When the switch is pushed and held in the RESET STALL WARN position, the stall warning will be reset to the normal stall airspeed.

During flight, the sensor anti-ice switch should be in the PITOT-STATIC position. On the ground, except during icing conditions or just prior to take-off, the sensor anti-ice switch should be in the OFF position to prevent overheating the sensors.

## Left Switch Panel Click-Spots and Functions, Continued....



- 11) WINDSHIELD ANTI-ICE** - The left and right Windshield Anti-Ice switches control the left and right windshield anti-ice systems respectively. When the switches are in the ANTI-ICE position, power is applied to both the defog and the anti-ice zones. When the switches are in the OFF position, no power is applied to the windshield anti-ice systems. For more information, refer to the Ice Protection section on page 50.
- 12) FADEC** - The FADEC Reset switch resets engine FADEC faults. It is a spring-loaded switch that defaults to the center (OFF) position. To reset the left engine FADEC, push the switch to the RESET L position and release. To reset the right engine FADEC, push the switch to the RESET R position and release.
- 13) FUEL TRANSFER** - The Fuel Transfer switch allows fuel to be transferred from one wing fuel tank to the other. Fuel is automatically drawn from both the left and the right fuel tanks simultaneously. The FUEL TRANSFER switch allows the pilot to transfer fuel between tanks to correct any fuel imbalance that occurs during flight. When the switch is in the L TANK position fuel is pumped from the right wing tank into the left wing tank (as displayed in white on the CAS). When the switch is in the R TANK position fuel is pumped from the left wing tank into the right wing tank (as displayed in white on the CAS). When the switch is in the OFF position, no fuel transfer takes place.



Fuel transfer is dependent on the fuel boost pumps. Both fuel boost pumps should be set to NORM to ensure that fuel transfer can occur.

- 14) IGNITION** - The left and right Ignition Switches control the left and right engine ignition systems respectively. When the switches are in the NORM position, ignition is automatically controlled by each engine's FADEC. When the switches are in the ON position, each engine's ignition ignitor operates continuously. For more information, refer to the Starting Engines Checklist on page 64.
- 15) DISENG** - The Starter Disengage switch is a spring-loaded push-button switch. When the switch is pushed and held, the engine starter is manually disengaged from the engine. If you press the DISENG switch during engine start, but before the engine lights off, the engine start will be aborted.
- 16) ENGINE START** - The left and right Engine Start switches control the left and right engine starters respectively. When pressed, the switch lamps illuminate with white stripes indicating that the starters are in use. After engine start, the switch lamps turn off. The switches can only be pressed if the engines are not running. For more information, refer to the Starting Engines Checklist on page 64.



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## Throttle Quadrant Overview

The throttle quadrant consists of the right and left throttle levers, the pitch trim wheel, the flap lever, the speed brake switch and the go-around switch pop-up panel, the rudder and aileron trim switches, the MFD controller and the emergency landing gear release handle. Each throttle lever contains a sensor which sends information to the FADEC system, which controls the aircraft's engines. The flap lever features sensors that actuate the flaps. The flaps are powered by an electric motor and are linked by a solid bar to ensure that both flaps always operate in tandem.

## Throttle Quadrant Click-Spots and Functions

The throttle levers can be controlled using either click-spots on the throttle quadrant or by clicking and grabbing between the two throttle levers. They can also be controlled using your controller's throttle lever. The flap handle is controlled using click-spots on the throttle quadrant. The pitch trim wheel can be controlled using either click-spots on the pitch trim wheel or by using your mouse's scroll wheel.



1) **'X'** - Press to close the throttle quadrant pop-up.

2) **FLAP LEVER** - The flap lever controls the operation of the wing flaps. The flaps are electrically operated and have three detent positions:

**UP** - Flaps are fully retracted. If the flaps are already extended into the LAND position, the UP detent should not be selected until after the flaps have been put in the TO/APR position.

**TO/APR** - Flaps are in the Takeoff/Approach position. This flap position is used for takeoff and approach. 185 KIAS should not be exceeded with the flaps in the TO/APR position.

**LAND** - Flaps are in the Landing position. This flap position is used on short final and landing. If the flaps are already in the UP position, the LAND detent should not be selected until after the flaps are in the TO/APR position. 150 KIAS should not be exceeded with the flaps in the LAND position.



The current position of the flaps is displayed on the EICAS display on the MFD.

3) **PITCH TRIM POINTER** - The pitch trim pointer indicates the current amount of pitch trim. For take-off, the trim wheel should be adjusted so that the pitch trim pointer is positioned in the 'TO' area of the scale.

4) **PITCH TRIM WHEEL** - The pitch trim wheel manually adjusts each trim tab on both elevators. Rotating the trim wheel forward trims the nose down and rotating the trim wheel backward trims the nose up. The amount of trim is indicated by the pointer to the right of the trim wheel.

5) **ENGINE SYNC** - The Engine Sync switch enables or disables engine synchronization capabilities. When the switch is in the OFF position, engine synchronization is disabled. When the switch is in the NORM position, engine synchronization is enabled. Engine synchronization works only when the landing gear is retracted, the throttle levers are out of the TO detent and above the IDLE detent, and when both throttle levers are within 5° of each other and both N1 values are within 5% of each other.

## Throttle Quadrant Click-Spots and Functions, Continued...

The throttle levers can be controlled using several different methods. The first method is to use your controller's throttle lever. When your controller's throttle lever is pulled all the way back, both throttle levers will be in the IDLE detent. As you move your controller's throttle lever forward, both throttle levers will move proportionally from the IDLE detent up to the CRU detent. Continuing to move your controller's throttle lever will move both throttle levers into the CLB detent, and then into the TO detent. Another method is to click and drag the throttle levers. Clicking and dragging on the middle of each throttle lever will control that specific throttle lever. Clicking and dragging between the two throttle levers will control both throttle levers in sync. The third method is to click on the specific area of the throttle quadrant (on the left or right) to control the throttle levers independently, or click on the specific area of the throttle quadrant (on the center) to control both throttle levers in together.



**6) Throttle Levers** - The throttle levers can be operated independently or both together. Each throttle lever has five detents at various thrust-level positions:

**CUTOFF** - When the throttle levers are in the CUTOFF detent, fuel cut-off is initiated and the engine ignitors are turned off to shut down the engines.

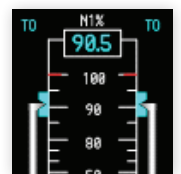
**IDLE** - When the throttle levers are in the IDLE detent, minimum safe continuous power is commanded. The IDLE detent is used for descent, landing, and stationary ground operations.

**CRU** - When the throttle levers are in the CRU detent, maximum cruise power is commanded. The CRU detent is used during the cruise phase of flight.

**CLB** - When the throttle levers are in the CLB detent, maximum climb power is commanded. The CLB detent is used for the climb phase of flight after takeoff and up to cruise altitude.

**TO** - When the throttle levers are in the TO detent, maximum takeoff power is commanded. The TO detent is designed for brief use during takeoff only.

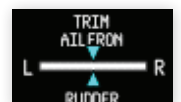
The throttle levers can be moved to any of the detent positions and can be positioned proportionally at any point between the IDLE and the CRU detents. The throttle lever detent position (thrust mode) is displayed on the in the upper corners of the N1 window on the MFD EICAS display.



**7) SPEED BRAKE/GO AROUND** - When pressed, this opens the speed brake and go around pop-up panel. For more information, please see the next page.

**8) MFD CONTROLLER** - For more information, please see the separate MFD controller section on page 23.

**9) RUDDER TRIM** - The rudder trim switch adjusts the rudder (yaw) trim of the aircraft. Pressing the switch to the right trims the nose to the right and pressing the switch to the left trims the nose to the left. The amount of trim is indicated by the bottom pointer on the MFD trim display.



**10) AILERON TRIM** - The aileron trim switch adjusts the aileron (roll) trim of the aircraft. Pressing the switch to the right trims the right wing down and pressing the switch to the left trims the left wing down. The amount of trim is indicated by the upper pointer on the MFD trim display.

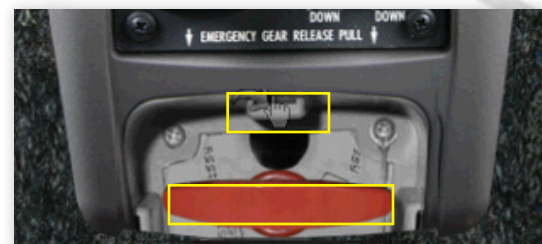


## Throttle Quadrant Click-Spots and Functions, Continued...



- 11) EMERGENCY GEAR RELEASE** - The Emergency Gear Release Handle is used if normal landing gear down actuation fails. Each landing gear strut is held up in place by a mechanical hook. These hooks are also linked by a cable to the emergency gear release handle.

Press the EMERGENCY GEAR RELEASE cover to open it. Next, press the red handle to pull it out and release the landing gear into the down position. The EMERGENCY GEAR RELEASE cover can be closed by clicking just above the red handle.



## Speed Brake and Go Around Pop-Up Click-Spots and Functions

The Go Around function is used for both aborted landings (when a missed approach is declared) and for takeoff. It is controlled by a push-button switch and the mode engaged (either GA or TO) is displayed on the PFD.

There is one speed brake in the top of each wing panel. The speed brakes are used to increase drag and slightly reduce lift. The speed brakes are controlled by a two-position sliding switch.



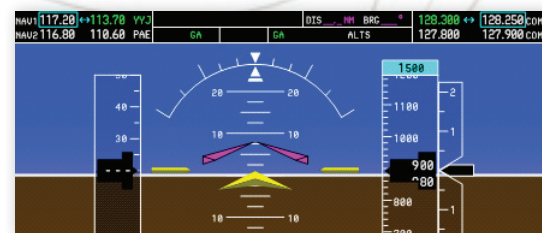
- 1) GA SWITCH** - The Go Around push-button switch engages Go Around Mode. When engaged, the Automatic Flight Control System (AFCS or simply Autopilot) is set for optimum single-engine climb configuration during takeoff or go-around. When the GA Switch is pressed, the following occurs:

- The autopilot and the yaw damper is disengaged. The autopilot and the yaw damper can be re-engaged manually by pressing the AP key on the AFCS.
- If in the air, enables go-around mode, in which the Flight Director (FD) is engaged and command bars appear on the PFD directing an 8° nose-up pitch. GA is displayed in the AFCS status bar at the top of the PFD.
- If on the ground, enables takeoff mode, in which the FD commands 10° nose-up pitch. TO is displayed in the AFCS status bar at the top of the PFD.

- 2) SPD BRK** - The Speed Brake switch is a two-position sliding switch. When the switch is in the RET position, the speed brakes are retracted. When the switch is in the EXT position, the speed brakes are extended. The speed brakes cannot be extended with N2 above 85%. When the speed brakes are extended, a white CAS message is displayed on the MFD.



Takeoff Mode



Go Around Mode

To close the Speed Brake and Go Around pop-up, press the Speed Brake/Go Around click-spot a second time as described on the previous page.

## Autopilot Overview

The autopilot (Automatic Flight Control System or AFCS) provides flight guidance and automatic flight control. Three primary functions are included: the Flight Director (FD), the Autopilot (AP), the Yaw Damper (YD), and manual electric pitch trim. The autopilot commands the aircraft to follow the FD by providing signals to the pitch, roll, yaw and pitch trim servos.

## Autopilot Click-Spots and Functions

The autopilot is controlled by turning the various knobs and pressing the various keys. The AFCS status box on the PFD indicates the status of active and pending flight modes. All flight modes can be cleared by pressing the FD key.



- 1) HDG** - Press to select or press to cancel Heading Select mode. Heading Select mode is a lateral mode that commands the aircraft to fly the current heading displayed by the Heading Bug on the HSI. When Heading Select mode is selected, (PIT) Pitch mode is also selected by default. PIT mode commands the aircraft to hold the current pitch angle.

ROL	AP	YD	PIT	ALTS
-----	----	----	-----	------

- WHITE - Armed Modes
- GREEN - Active Modes

When the HDG key is pressed a second time, (ROL) Roll mode is selected. ROL mode commands the aircraft to hold wings level. Press the HDG key again to select HDG mode.

HDC	AP	YD	ALTS	ALT
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- 2) APR** - Press to select or press to cancel Approach mode. Approach mode is both a vertical and a lateral mode that commands the aircraft to capture and track the WAAS glidepath on approach or the ILS glideslope on approach. The aircraft is able to fly both WAAS approaches and fully-coupled ILS approaches with glideslope tracking.

- 3) NAV** - Press to select or press to cancel Navigation mode. Navigation mode is a lateral mode that commands the aircraft to fly the current navigation course, either GPS or VOR. If the CDI is in VOR mode and NAV is pressed, the autopilot will arm VOR mode. When the aircraft is within intercept capture range, the aircraft will turn toward and follow the VOR radial. If the CDI is in GPS mode and NAV is pressed, the autopilot will arm GPS mode. When the aircraft is within intercept capture range, the aircraft will turn toward, and follow the GPS flight path.

VOR	ROL	AP	YD	ALTS	ALT
-----	-----	----	----	------	-----

GPS	ROL	AP	YD	ALTS	ALT
-----	-----	----	----	------	-----

For ILS tracking, use APR mode.

- 4) FD** - Press to turn on or press to turn off the Flight Director. When the flight director is turned on ROL and PIT modes are active and (ALTS) Altitude Select mode is armed by default. The FD Command Bars also appear. Pressing FD a second time will turn off the flight director and clear all flight modes.

ROL		PIT	ALTS
-----	--	-----	------

- 5) ALT** - Press to select or press to cancel Altitude Hold mode. Altitude Hold mode is a vertical mode that commands the aircraft to hold the current altitude at the time the selection is made. By default, ALTS mode is armed. This allows the autopilot to capture (level off) the altitude displayed in the Selected Altitude Box. When the aircraft is within ~200 feet of the Selected Altitude, ALTS mode will become active and capture the selected altitude. Altitude Hold mode can also be engaged manually. The current altitude that the aircraft is at when the ALT key is pressed is displayed in AFCS Status Box.

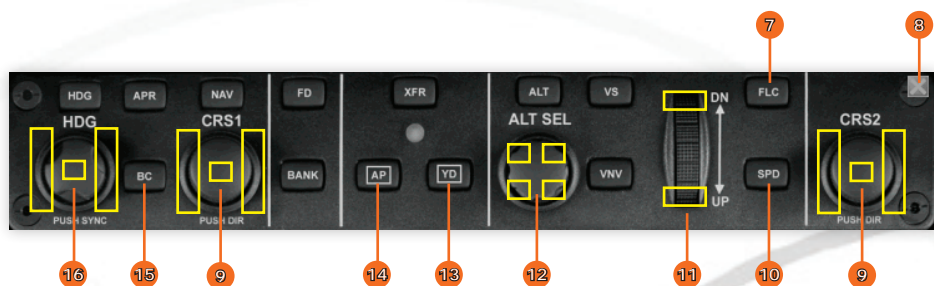
ALT	300	ALTS
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- 6) VS** - Press to select or press to cancel Vertical Speed mode. VS mode is a pitch mode that commands the aircraft to climb or descend at a specific rate as selected using the VS Wheel. While in VS mode, the aircraft will attempt to hold the currently selected VS setting regardless of power settings. While in VS mode, it's important to watch your speed closely.

VS	1400	ALTS
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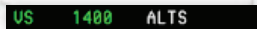
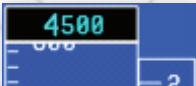

## Autopilot Click-Spots and Functions, Continued....



7) **FLC** - Press to select or press to cancel Flight Level Change mode. Flight Level Change mode is a vertical mode that maintains the current airspeed while the aircraft is either climbing or descending to the selected altitude. The autopilot will command aircraft pitch changes in an attempt to

hold the current airspeed. The current selected airspeed is indicated by a triangle on the speedtape and can be adjusted using the VS wheel to allow the autopilot to fly the aircraft at the pitch attitude desired for the desired flight profile. When climbing, the throttles should be in the CLB detent and when descending, the throttles should be in the IDLE detent. You need to be in a climb or a descent, prior to engaging Flight Level Change mode.



- 8) **'X'** - Press to close the autopilot pop-up.
- 9) **CRS1/2** - The Course 1 and Course 2 control knobs are three-function knobs that are used to adjust the selected course in 1° increments on the HSI. Press the smaller inner knob to center the course deviation indicator and cause the course pointer to point directly toward the bearing of the active waypoint/station (an active bearing source must be tuned for this feature to work). Turn the larger outer knob right and left to rotate the course pointer on the HSI right and left. In this simulation both the Course 1 and the Course 2 control knobs control both the VOR1 and VOR2 course pointers.
- 10) **SPD** - Press to toggle airspeed reference between IAS and Mach for FLC mode.
- 11) **VS Wheel** - Rotate forward or backward to adjust the vertical speed in PIT mode, VS mode, and FLC mode. VS mode is a pitch mode that commands the aircraft to either climb or descend at the selected rate in (FPM) Feet Per Minute. Press the bottom of the VS wheel to increase vertical speed in 100 foot increments and press the top of the VS wheel to decrease vertical speed in 100 foot increments. To increase or decrease vertical speed, VS mode must be active. The vertical speed profile selected is displayed on the AFCS Status Box.
 
- 12) **ALT SEL** - The Altitude Select knob is used to input the selected altitude that the autopilot will command the aircraft to level off at. This knob includes four different click-spots. The two upper click-spots increase (right) and decrease (left) the altitude in 1000 foot increments and the two lower click-spots increase (right) and decrease (left) the altitude in 100 foot increments. The currently selected altitude is displayed the Selected Altitude Box above the Vertical Speed Tape on the PFD.
 
- 13) **YD** - Press to engage or press to disengage the Yaw Damper. When engaged, YD is displayed on the PFD Autopilot Mode Box. The Yaw Damper stabilizes the aircraft in flight to prevent yaw instability. The yaw damper is automatically engaged when the autopilot is engaged and automatically disengaged when the autopilot is turned off. If YD is pressed when the AP is engaged, both YD and AP will be turned off. The yaw damper can be re-engaged independently without turning on the autopilot, if desired. The yaw damper should be turned off during takeoff and landing.
- 14) **AP** - Press to engage or press to disengage the Autopilot. When engaged, the flight director command bars are displayed, the yaw damper is engaged, the Roll and Pitch flight modes are active, and the ALTS mode is armed, as displayed in the AFCS Status Box. ROL mode commands the aircraft to hold wings level and PIT mode commands the aircraft to hold the current pitch angle. When disengaged, the yaw damper is disengaged, however ROL and PIT modes remain active, and ALTS mode remains armed.
 
- 15) **BC** - Press to select or press to cancel Backcourse mode. When selected, backcourse mode captures and tracks the localizer in the backcourse direction.
- 16) **HDG** - The Heading knob is a three-function knob that is used to adjust the heading bug in 1° increments on the HSI. Turn the knob to the right to move the heading bug to the right and turn the knob to the left to move the heading bug to the left. Press the knob to snap the heading bug to the current aircraft heading.

## Standby Instruments Overview

Four standby flight instruments are provided. These include an airspeed indicator, an attitude indicator, an altitude indicator, and a compass (in the VC only). The standby flight instruments can function independently from the aircraft electrical system. The airspeed indicator, the attitude indicator, and the altitude indicator are powered from their own stand-alone battery, which is continually charged by the aircraft DC electrical system. If the DC electrical system goes off-line, the standby instruments can be powered for approximately 30 minutes before the stand-alone battery is depleted.

## Standby Instruments Click-Spots and Functions

The standby instruments must be powered on using the Standby Instrument Switch located on the Left Switch Panel. As described in that section, move the switch into the STBY position to power on the standby instruments.



The standby airspeed indicator provides airspeed information. It consists of an altitude/airspeed placard (click to pop up), two self-test LEDs, and a test button. Indicated airspeed is displayed from 0 to 300 knots.  $V_{MO}$  is marked with a red line at 250 KIAS.

The standby altitude indicator displays aircraft altitude information. It displays barometric-corrected altitude information in both a digital readout and using an indicator needle. Digital readouts for barometric pressure, in both millibars (MB) and inches of mercury (HG) are displayed. A barometric setting knob, two self-test LEDs, and a test button are also featured.

The standby attitude indicator provides aircraft pitch and roll information. A Pull to Cage knob is provided to align the gyro prior to flight. When the standby attitude indicator is off, a red flag is displayed in the lower left corner.



1) **STBY ALT/AS** - The Standby Altitude and Airspeed placard is used to determine MMO limits using the indicated altitude on the Standby Altimeter and the corresponding ALT FL on the placard to determine the recommended KCAS.

2) **RED AND GREEN LEDs** - The red and green LEDs provide a self-test indication when the standby instruments are turned on. When the standby instruments are turned on, the red and green LEDs flash and the airspeed indicator needle rotates clockwise to the maximum limit, then rotates counter-clockwise to the zero-park position, then returns to the measured pressure position. A green LED indicates that the instrument is working correctly.

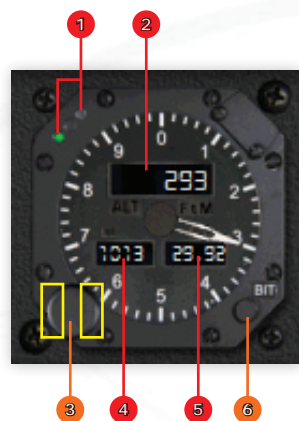
3) **BIT** - The BIT button is used to test the function of the airspeed indicator needle while the standby instruments are turned on. Pressing the BIT button initiates the same self-test as described above.



1) **PULL TO CAGE** - The pull to cage knob is used to center the attitude indicator. Press the pull to cage knob just prior to takeoff, and at any time it's deemed necessary to re-center the attitude indicator during flight.



## Standby Instruments Click-Spots and Functions, Continued....



- 1) **RED AND GREEN LEDs** - The red and green LEDs provide a self-test indication when the standby instruments are turned on. When the standby instruments are turned on, the red and green LEDs flash and the altitude indicator needle rotates clockwise to the maximum limit, then rotates counter-clockwise to the zero-park position, then returns to the measured pressure position. A green LED indicates that the instrument is working correctly.
- 2) **ALTIMETER DIGITAL DISPLAY** - Displays the current barometric-corrected altitude in an easy-to-read digital format.
- 3) **BAROMETRIC SETTING KNOB** - The barometric setting knob is used to change the MB and HG setting to match the current barometric pressure setting to ensure correct altitude display. Turning the knob to the right increases the setting and turning the knob to the left decreases the setting.
- 4) **MB DIGITAL DISPLAY** - Displays the current millibars (MB) setting via the barometric setting knob.
- 5) **HG DIGITAL DISPLAY** - Displays the current inches of mercury (HG) setting via the barometric setting knob.
- 6) **BIT** - The BIT button is used to test the function of the altitude indicator needle while the standby instruments are turned on. Pressing the BIT button initiates the same self-test as described above.

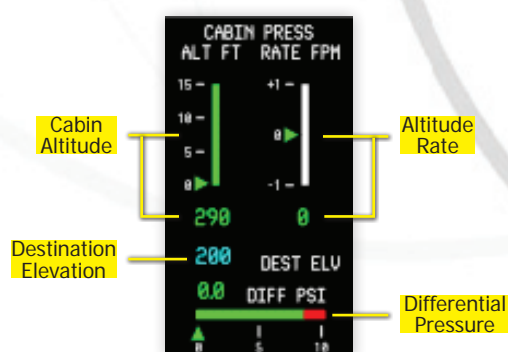
# PRESSURIZATION

## Pressurization System Overview

The pressurization system maintains a comfortable cabin altitude environment inside the cockpit and the cabin for both the crew and the passengers. To achieve this, a constant supply of engine bleed air is directed into the cabin and the outflow of air is allowed to escape overboard automatically. Other than inputting the destination altitude, the system is otherwise completely automatic. The maximum cabin pressure differential is 8.6 psid. Normal cabin pressure differential is 8.3psid.

## Using the Pressurization System

The pressurization system is controlled using the various switches on the Right Switch Panel. Pressurization system indications are displayed on the MFD.



For normal operation, set the Air Source Select Knob to receive air from a currently running engine (either L, R, or BOTH).

Place the PRESS CONT Switch in the NORM position.

Enter the Destination Field Elevation into the system using the PFD softkeys as described below:

Press the TMR/REF softkey, then use the FMS control knob to scroll down to the DEST ELEV field. Use the FMS control knob to input the destination field elevation, then press the FMS control knob to finish. The destination field elevation will now be displayed on the MFD.

Destination Elevation



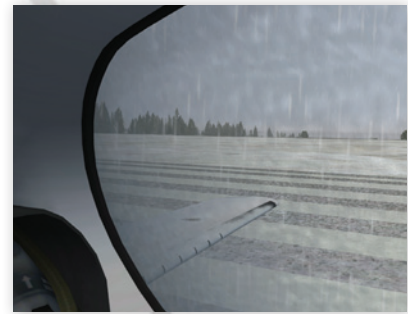
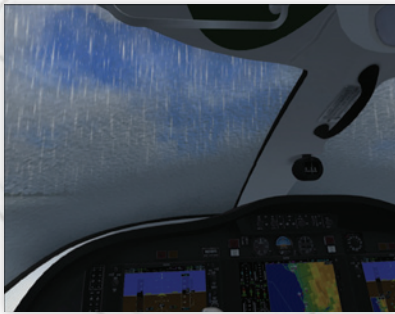
## Ice Protection System Overview

Anti-icing is provided for both engine inlets, external instrument sensors, and both windshields and side windows. Deicing is provided for the wings, and the horizontal and vertical stabilizers. This simulation actually visually depicts the accumulation and removal of ice.

When flying through icing conditions, the windshields, the wings, the horizontal and the vertical stabilizer leading edges, and both engine inlets can ice up under the following conditions if the RAT is 10°C or below:

- 1) In a cloud with rain or snow.
- 2) In rain or snow, but not in a cloud.

It is not possible to see visual ice accumulation and removal on the 2D cockpit forward view windshields. Visual depiction can be seen in the 3D cockpit and in the 2D cockpit when looking at a view other than the forward view, and on the external model.



## Using Engine Anti-Ice

When flying in icing conditions or when anticipating flying into icing conditions, set the ENGINE ANTI-ICE switches to the L and R positions. After a period of time, and depending on the amount of accumulation, ice accumulation will begin to be removed. At all other times, both switches should both be in the OFF position.

## Using Wing and Stabilizer Deice

When flying in icing conditions or when anticipating flying into icing conditions, set the WING STAB switch to the AUTO position. After a period of time, depending on the amount of accumulation, ice accumulation will begin to be removed.

If the ice accumulation is more rapid than can be removed by the 2-minute boot inflation interval in AUTO mode, move and **hold** the WING STAB switch in the MANUAL position until the ice is removed.

Ice accumulation and removal can be viewed by looking at the left wing leading edge from within the cockpit.

## Using Windshield Anti-Ice

When flying in icing conditions or when anticipating flying into icing conditions, set both WINDSHIELD ANTI-ICE switches to the L and R positions. After a period of time, depending on the amount of accumulation, ice accumulation will begin to be removed. At all other times, both switches should be in the OFF position.

## Using Sensor Anti-Ice (Pitot Heat)

During flight, the SENSOR ANTI-ICE switch should be in the PITOT-STATIC position. On the ground, except during icing conditions or just prior to take-off, the SENSOR ANTI-ICE switch should be in the OFF position to prevent overheating the sensors.



## Master Warning System Overview

The Master Warning System provides warnings of system malfunctions, indications of unsafe operating conditions, and indications that certain systems are in operation. Two master warning and two master caution lights are positioned above the PFDs on the instrument panel and a Crew Alerting System (CAS) system display is integrated into the MFD. The CAS displays visual messages to the pilot. Certain systems also feature aural warnings. The Rotary Test Knob is tied to the Master Warning System and is used to test the various warning annunciations and aural sounds.

## Master Warning System Click-Spots and Functions

A red warning light / CAS message indicates a serious problem that requires immediate attention to correct. An amber caution light / CAS message indicates a potential issue that does not require immediate attention, but that may require attention in the future. A white CAS message indicates an advisory that could indicate either an abnormal condition, a change in an aircraft system, or the normal operation of a specific device or system.



- 1) **ROTARY TEST KNOB** - The Rotary Test Knob is used to test the specific cautions, warnings and annunciator LEDs as printed around the Rotary Test Knob. For information on using the Rotary Test Knob, refer to page 43.
- 2) **MASTER CAUTION LIGHT** - The amber Master Caution Light indicates a caution. This light can be pressed to extinguish it. A caution tells the pilot that there may be a future need to correct the specific issue. When an amber CAS message appears, the message flashes along with the Master Caution Light to notify the pilot of the potential issue. Pressing the Master Caution Light tells the system that you're aware of the potential issue, extinguishes the Master Caution Light and changes the flashing CAS message to a steady ON state.
- 3) **MASTER WARNING LIGHT** - The red Master Warning Light indicates a warning. This light can be pressed to extinguish it. A warning tells the pilot that there is a severe problem that needs immediate corrective action. When a red CAS message appears, the message flashes along with the Master Warning Light to notify the pilot of the problem. Pressing the Master Caution Light tells the system that you're aware of the problem, extinguishes the Master Warning Light and changes the flashing CAS message to a steady ON state.
- 4) **CAS MESSAGE WINDOW** - The CAS Message Window displays the different CAS messages. These include red warnings, amber cautions, and white advisories. All red warnings are grouped together at the top of the display and all white advisories are grouped together at the bottom of the display.
- 5) **CAS SOFTKEYS** - The CAS Message Window can display up to 14 CAS messages. If there are more CAS messages than can be displayed at any one time, pressing the Scroll Up and Scroll Down softkeys allows you to view all CAS messages.

## CAS Messages

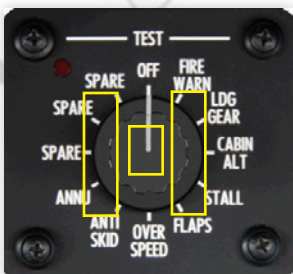
The following CAS messages can be displayed in the CAS display window:

<b>GEN OFF L-R</b>	Indicates a failure of both generators.
<b>OIL PRESS LO L-R</b>	Indicates oil pressure is below minimum pressure for both engines.
<b>OIL PRESS LO L</b>	Indicates oil pressure is below minimum pressure for left engine.
<b>OIL PRESS LO R</b>	Indicates oil pressure is below minimum pressure for right engine.
<b>AFT DOOR</b>	Indicates the tail cone baggage door is not closed and secured.
<b>CABIN DOOR</b>	Indicates the cabin door is not closed and secured.
<b>FUEL LVL LO L-R</b>	Indicates that fuel level in either fuel tank is low - less than approximately 170 pounds/25 gallons.
<b>FUEL LVL LO L</b>	Indicates that fuel level in left tank is low - less than approximately 170 pounds/25 gallons.
<b>FUEL LVL LO R</b>	Indicates that fuel level in right tank is low - less than approximately 170 pounds/25 gallons.
<b>GEN OFF L</b>	Indicates that the left generator is off-line.
<b>GEN OFF R</b>	Indicates that the right generator is off-line.
<b>NOSE DOOR L-R</b>	Indicates that one or both nose baggage doors are not closed and secure.
<b>NOSE DOOR L</b>	Indicates that left baggage door is not closed and secure.
<b>NOSE DOOR R</b>	Indicates that left baggage door is not closed and secure.
<b>P/S HTR L-R</b>	Indicates that no current is detected to the pitot-static heater.
<b>STALL WARN HTR</b>	Indicates that no power is being delivered to the stall warning heater.
<b>STALL WARN FAIL</b>	Indicates that a failure is detected in the stall warning system.*
<b>ANTISKID FAIL</b>	Indicates a fault in the antiskid system. Deactivate the antiskid system.*
<b>FLAPS FAIL</b>	Indicates that a flap system failure has occurred.*
<b>FUEL BOOST L-R</b>	Indicates that both fuel boost pumps are operating.
<b>FUEL BOOST L</b>	Indicates that the left fuel boost pump is operating.
<b>FUEL BOOST R</b>	Indicates that the right fuel boost pump is operating.
<b>FUEL TRANSFER</b>	Indicates that the fuel transfer valve is open.
<b>STALL WARN HI</b>	Indicates that the stall warning system is operating.*
<b>NO TIRE SPINDOWN</b>	Indicates that the antiskid control spindown function is not functioning.*
<b>ENG A/I COLD L-R</b>	Indicates that the engine inlet temperature is below a safe level for engine anti-ice protection.
<b>PRESS OFF</b>	Indicates that there is no bleed-air to pressurize the cockpit or cabin.

\*Only displayed when used in conjunction with the Rotary Test Knob.

## Rotary Test Knob

The Rotary Test Knob is used to test specific aircraft system warnings to ensure that both visual and audible warnings are functioning properly.



Click on the center of the knob to enlarge the Rotary Test Knob for easier viewing.

Click on the right and left sides of the knob to turn the knob right and left to the various test positions. When the knob is turned to a specific system warning test, the results of the test will display as described in the table on the next page.

The positions labeled spare do not have any warning system tied to them.



## Rotary Test Indications

POSITION	INDICATIONS	ILLUSTRATIONS
FIRE WARN	<ul style="list-style-type: none"> <li>Each red L and R ENGINE FIRE light illuminates.</li> <li>Both MASTER WARNING lights illuminate.</li> </ul>	
LDG GEAR	<ul style="list-style-type: none"> <li>Three green locked down gear lights illuminate.</li> <li>Red gear unlocked gear light illuminates.</li> <li>Gear warning horn sounds.</li> </ul>	<p>((Audio))</p>
CABIN ALT	<ul style="list-style-type: none"> <li>Red CABIN ALT message appears on CAS.</li> <li>Amber CABIN ALT message appears on CAS.</li> <li>MASTER WARNING and MASTER CAUTION lights illuminate.</li> </ul>	
STALL	<ul style="list-style-type: none"> <li>Amber STALL WARN FAIL message appear on CAS.</li> <li>Stall warning tone sounds.</li> <li>Amber STALL WARN HTR message appears on CAS.</li> <li>White STALL WARN HI message appears on CAS.</li> <li>MASTER CAUTION lights illuminate.</li> </ul>	<p>((Audio))</p>
FLAPS	<ul style="list-style-type: none"> <li>The flap indicator on the MFD is 'X' out for 3 seconds.</li> <li>Amber FLAPS FAIL message appears on CAS.</li> <li>Amber STALL WARN FAIL message appears on CAS for 3 seconds.</li> <li>MASTER CAUTION lights illuminate.</li> </ul>	
OVERSPEED	<ul style="list-style-type: none"> <li>The overspeed warning tone sounds.</li> </ul>	<p>((Audio))</p>
ANTISKID	<ul style="list-style-type: none"> <li>Amber ANTISKID FAIL message appears on CAS for 6 seconds.</li> <li>White NO TIRE SPINDOWN message appears on CAS for 6 seconds.</li> <li>MASTER CAUTION lights illuminate for 6 seconds.</li> </ul>	
ANNU	<ul style="list-style-type: none"> <li>MASTER CAUTION lights illuminate and cannot be cancelled.</li> <li>MASTER WARNING lights illuminate and cannot be cancelled.</li> <li>Audio panel indicators illuminate.</li> <li>Red DUMP illuminates on Cabin Dump switch.</li> </ul>	

## Fire Protection System Overview

The fire protection system consists of two separate fire detection systems - one for each engine. The fire protection system provides visual warnings via the red L ENGINE FIRE and R ENGINE FIRE indicator lamps on the instrument panel. Engine fire suppression consists of one fire bottle that is activated by the BOTTLE ARMED PUSH button on either side of the instrument panel. The single fire bottle can feed both engines separately.

## Fire Protection System Click-Spots and Functions

When an engine fire is detected, immediate corrective action must be taken to put out the fire using the Fire Protection System. In addition to the visual warning provided by the L or R ENGINE FIRE lights when an engine fire occurs and the corresponding ENGINE FIRE light is pressed, the fuel and generator for the affected engine will be shut down as indicated by CAS messages and the MASTER WARNING and MASTER CAUTION lights.



- 1) **L ENGINE FIRE** - The Engine Fire Lights (L & R) provide visual indication that an engine fire is present in either the (L) left or (R) right engine. If an engine fire is detected the corresponding engine fire light will illuminate.
- 2) **BOTTLE ARMED** - The Bottle Armed lights indicate that the fire bottle is armed. When pressed, the contents of the fire bottle will be discharged to extinguish the fire. Although there is only one fire bottle, it can feed both engines separately, so the bottle armed light for the corresponding engine that is on fire must be pressed.

## Using the Fire Protection System

If a fire is detected, the ENGINE FIRE light that is tied to the corresponding engine ('R' or 'L') will illuminate and the Master Warning light will begin to flash.

To begin the fire-suppression process, press the illuminated ENGINE FIRE light once. When pressed, the fuel supply and generator will be shut off to the corresponding engine, as indicated by the CAS messages and the blinking Master Warning and Master Caution lights. The BOTTLE ARMED light will also illuminate, indicating that the fire bottle is armed and ready to be discharged.



Press the BOTTLE ARMED light directly below the illuminated ENGINE FIRE light to release the fire suppressant. The BOTTLE ARMED light extinguishes and the engine fire will be put out. The CAS messages can then be cleared by pressing the Master Warning and Master Caution lights.

The white BOTTLE ARMED light will not illuminate and will not function until AFTER the corresponding FIRE ENGINE light is pressed. The white BOTTLE ARMED light directly below the illuminated FIRE ENGINE light must be used. If you press the opposite white BOTTLE ARMED light, the fire bottle will not operate.



The limitations and memory items listed in this section are taken directly from the actual Cessna Citation Mustang Pilot's Operating Handbook. Although we have designed the Flight1 Software Citation Mustang to resemble and function as closely as possible the real Cessna Citation Mustang, it is not designed as a training device. Not all systems have been simulated, and some of those that have been simulated may not be entirely functional or simulated to 100%. It's possible that some limitations and memory items listed may not be accomplished in this simulation.

## **Weight**

Maximum Ramp Weight.....	8,730 POUNDS
Maximum Takeoff Weight.....	8,645 POUNDS
Maximum Landing Weight .....	8,000 POUNDS
Maximum Zero Fuel Weight.....	6,750 POUNDS

## **Airspeed**

<b>Maximum Operating Limit</b>	
$M_{MO}$ (27,120 Feet and Above).....	0.63 MACH
$V_{MO}$ (Sea Level to 27,120 Feet) .....	250 KIAS
Maximum Autopilot Speed .....	250 KIAS / 0.63MACH
Turbulent Air Penetration Speed .....	160KIAS
<b>Maximum Flap Extended Speed (<math>V_{FE}</math>)</b>	
Takeoff and Approach - 15° .....	185 KIAS
Land 30° .....	150 KIAS
Maximum Landing Gear Operation - Extending ( $V_{LO}$ ) .....	250 KIAS
Maximum Landing Gear Operation - Retracting ( $V_{LO}$ ) .....	185 KIAS
Maximum Landing Gear Extended Speed ( $V_{LE}$ ) .....	250 KIAS
Maximum Tire Ground Speed .....	160KNOTS
Maximum Speed in Sustained Icing (Limit) .....	160KIAS
<b>Minimum Control Speed, Air (<math>V_{MCA}</math>)</b>	
Flaps 0° .....	92 KIAS
Flaps 15° .....	81 KIAS
Minimum Control Speed, Ground ( $V_{MCG}$ ) .....	73 KIAS
Best Angle of Climb Speed - Multi Engine, Flaps 15° ( $V_X$ ).....	105KIAS
Best Rate of Climb Speed - Multi Engine, Flaps 15° ( $V_Y$ ) .....	150KIAS

## **Pressurization**

- The pressurization system will be in high altitude mode if Takeoff or Destination Elevation is > 8,000 feet and the aircraft is below 24,500 feet.
- Cabin Altitude is not displayed when the aircraft is on the ground.

## RVSM (Reduced Vertical Separation Minimum)

Minimum Speed in RVSM Airspace.....	110 KIAS
Minimum Weight in RVSM Airspace.....	6300 POUNDS

- The following equipment must be installed and operating normally upon entering RVSM airspace:

- 1) Pilot and Co-Pilot Primary Altimeters
- 2) Autopilot
- 3) Altitude Alerter
- 4) ATCRBS Transponder

The goal of RVSM is to reduce the vertical separation above flight level (FL) 290 from the current 2000-ft minimum to 1000-ft minimum.

- The Standby Altimeter is not approved for RVSM operations.

---

## Takeoff and Landing Operations

Maximum Altitude Limit .....	14,000 FEET MSL
Maximum Tailwind Component .....	10 KNOTS
Maximum Demonstrated Crosswind (Not Limiting) .....	25 KNOTS
Minimum Fuel Quantity Per Wing for Takeoff .....	200 POUNDS

- A satisfactory check of the following systems prior to takeoff must be accomplished:

- 1) Stall Warning
- 2) Flight Controls
- 3) Electric Elevator Trim
- 4) Flaps
- 5) Standby Instruments

- Dispatch with antiskid inoperative is prohibited if the destination approach and landing will require the use of Anti-Ice ON (Flap TO/APR) landing data.
- Takeoff and Landings are limited to paved runway surfaces.
- The Autopilot and Yaw Damper must be disengaged for takeoff and landing.
- Use of flaps in the LAND position is prohibited with ice adhering anywhere on the outside of the aircraft. Anti-Ice ON landing performance data is predicated on the use of Flaps TO/APR for landing.
- Speed Brakes must be retracted prior to 50 feet AGL before landing.
- Cabin must be depressurized for landing.

---

## FADEC (Full Authority Digital Engine Control)

- Dispatch with an engine FADEC fault (ENG CTRL SYS L or R message displayed) is prohibited.



## Engine Start

ITT .....	862° CELCIUS
Maximum Tailwind Component .....	10 KNOTS
Maximum Quartering Tailwind (Within Tailwind Components Limits) .....	15 KNOTS
Maximum Crosswind Component .....	25 KNOTS
Maximum Time to Light Off .....	10 SECONDS
Maximum Time to Stabilized Idle (Ground or Inflight Starter Assist) .....	45 SECONDS
Maximum Time to Stabilized Idle (Inflight/Windmilling) .....	90 SECONDS
Minimum Engine Oil Temperature .....	-40° CELCIUS
Maximum Temperature for Engine Start .....	50° CELCIUS
Maximum Airport Elevation for Ground Battery Start .....	10,000 FEET
Maximum Airport Elevation for GPU Start .....	10,000 FEET

- Oil temperature must be above 22°C for at least 5 minutes before takeoff. Once oil temperature is +10°C or warmer, it is acceptable to increase power up to the CRU detent to decrease the time required to warm the oil to 22°C.

## Engine Operating Limits

THRUST SETTING	TIME LIMIT (MIN)	ITT TEMP °C	N <sub>2</sub> %
START	---	862	---
GND IDLE	Continuous	---	48.6
FLT IDLE	Continuous	----	56.8 (Minimum)*
TAKEOFF (To Detent)	5	830	100.0
CLB DETENT	Continuous	830	100.0
CRU DETENT	Continuous	830	100.0
TRANSIENT	20 Seconds	862	102.0

**\*Note:** Idle speed is a function of ambient pressure and temperature.

## Starter Cycle

- Starter Cycle - Three engine starts per 30 minutes. Three cycles of operation with a 60 second rest period between cycles is permitted. This limitation is independent of starter power source (i.e. battery generator assisted cross start, or GPU) and applies to both starting and dry motoring of the engine.

## GARMIN 1000

- Category II approaches are prohibited.
- Dispatch with a display in reversionary mode is prohibited.
- Autopilot:
  - A) Autopilot operation is prohibited if either PFD is in AHRS reversion.
  - B) Autopilot Minimum-Use Height:
    - 1) Takeoff and Climb ..... 700 FEET AGL
    - 2) Enroute and Descent ..... 1000 FEET AGL
    - 3) Approach (GP or GS Mode) ..... 200 FEET AGL
    - 4) Approach (FLC, VS, PIT or ALT Mode) ..... HIGHER OF 400 FEET AGL OR APPROACH MDA

## Emergency Bus Items

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• PFD1 - Reversion Mode</li> <li>• COM1</li> <li>• NAV1 Including Marker Beacon</li> <li>• GPS1</li> <li>• ADC1</li> <li>• AHRS1</li> <li>• Transponder 1 (XPDR 1)</li> <li>• Pilot's and Co-Pilot's Audio Panels</li> <li>• ELT GPS Position Interface</li> </ul> | <ul style="list-style-type: none"> <li>• Autopilot Control Panel (HDG, CRS, ALT Knobs Only)</li> <li>• Cabin Dump System</li> <li>• Cockpit Flood Light</li> <li>• Pilot's Pitot-Static Heat</li> <li>• Landing Gear Indicator Lights</li> <li>• Avionics Audio Warnings</li> <li>• Standby Instruments (Airspeed, Altitude, Attitude)</li> <li>• Magnetic Compass Lighting</li> </ul> |
|---|--|

## Battery

Battery Start Limitation.....	THREE ENGINE STARTS PER HOUR
Minimum Voltage for Start .....	24 VDC LEAD ACID, 22 VDC NICD

- Three generator assisted cross starts are equal to one battery start.
- If a ground power unit is used for start, no battery cycle is counted.

## Baggage Compartment

Nose Baggage (L-R) .....	320 POUNDS MAXIMUM (COMBINED)
Tailcone.....	300 POUNDS MAXIMUM



## Automatic Load Shedding

In the event of an inflight generator failure, the:

- 1) Vapor cycle air conditioning is inoperative.
- 2) Windshield Heat: If the left generator fails, the middle zone on the pilot side will be heated. If the right generator fails, only the inner zone on the pilots side will be heated.

## Enroute Operational

Maximum Operating Altitude.....	41,000 FEET MSL
Maximum Ambient Temperature.....	50° CELCIUS
Minimum Ambient Temperature.....	-72° CELCIUS
Maximum Altitude for Extension of Flaps.....	18,000 FEET MSL
Minimum Temperature of Operation of Flaps.....	-40° CELCIUS

- Yaw Damper must be engaged above FL300.

## Electrical Power System

STATUS	LIMIT
On Ground, Idle	150 Amps
On Ground, Above Idle	300 Amps
Air ≤ 30,000 Feet	300 Amps
Air > 30,000 Feet	280 Amps

**Note:** These limits are steady state limits. Following an engine battery start, generator current may exceed 150A at ground idle for up to 5 minutes while the battery is recharging. Above idle or during flight, transients up to 450A are permitted for up to 2 minutes.

## Ground Operation

- Continuous engine ground operation up to and including five minutes at takeoff thrust is limited to ambient temperature as defined above.
- Ground operation of Pitot-Static heat to two minutes to preclude damage to the pitot tubes and stall warning vane.
- Movement of the flaps is prohibited at temperatures colder than -40°C.

## Ground Power

Minimum / Maximum Current.....	800 / 1100 AMPERES
Maximum Voltage .....	29 VDC

**Caution:** Normal starter current draw is approximately 1000 amperes peak.

## **Fuel**

Fuel Temperature (Jet A, Jet A-1) .....	-35°C (-31°F)
Fuel Temperature (JP-8) .....	-35°C (-31°F)

- The corresponding electric fuel boost pump must be turned ON when the FUEL LO L-R CAS message is displayed or at 170 lbs. or less of indicated fuel in either tank.
  - Maximum approved fuel imbalance is 200 lbs. An emergency fuel imbalance of 600 lbs. has been demonstrated for safe return and landing.
  - Minimum fuel quantity for takeoff is 200 lbs. per wing.
- 

## **Ice and Rain**

- The ENGINE ANTI-ICE switches must be selected ON at a RAT of +10°C (50°F) or colder when in visible moisture.
  - WING STAB deice must be selected to AUTO at the first sign of ice accretion anywhere on the aircraft.
  - Except for the ground preflight check, maximum RAT for operation of engine anti-ice with the throttles above idle is +20°C (+68°C).
  - The aircraft must be free of ice prior to takeoff. Anti-ice systems must not be used to deice engine inlets prior to takeoff. Dispatch with polished frost is prohibited.
  - In icing conditions, operation at other than flaps UP and landing gear retracted is prohibited except during approach and landing.
  - If icing conditions are inadvertently encountered and any ice remains on the wing leading edge, use TO / APR flaps for landing.
  - The use of wing or tail de-ice boots is prohibited below -30°C (-22°F) RAT.
- 

## **Passenger Compartment**

- The maximum passenger seating, not including two crew seats, is four.
- 

## **Autopilot**

- The AP button on the autopilot control panel may be pressed two times to cancel the autopilot disconnect tone.
- 

## **Unusable Fuel**

- Unusable fuel is the fuel remaining in the fuel tanks when the fuel quantity indicator reads zero. This fuel is not usable in flight.
- 

## **Approved Oils**

- Maximum oil consumption is 1 U.S. quart per 13.5 hour period. The oil level must be serviced to the MAX indication on the sight glass for any flight planned to exceed 5 hours duration.
-



The procedures and checklists listed in this section are taken directly from the actual Cessna Citation Mustang Pilot's Operating Handbook. Although we have designed the Flight1 Software Citation Mustang to resemble and function as closely as possible the real Cessna Citation Mustang, it is not designed as a training device. Not all systems have been simulated, and some of those that have been simulated may not be entirely functional or simulated to 100%. It's possible that some procedures and checklists listed may not be accomplished in this simulation.

## General

This section contains information and flight profiles likely to be encountered during most daily flight operations. The flight profiles in this section show detailed Normal Operating Procedures. They are general in nature. Actual in-flight procedures may differ due to aircraft configuration, weight, weather, traffic, ATC instructions, etc.

## Speeds for Normal Operation

### Takeoff - Simplified Criteria:

Maximum Ramp Weight.....8,730 POUNDS  
 Maximum Takeoff Weight..... 8,645 POUNDS

It is recommended to use the flight director during takeoff. Press the TO/GA button on the left throttle, then select HDG mode. After lining up on the centerline, press the heading knob. Advance power to takeoff detent. Rotate at  $V_R$  toward the command bars. With a positive rate of climb, raise the gear; raise flaps no earlier than  $V_2 + 12$ .

<b>WEIGHT</b>	<b>8,645 POUNDS OR LESS</b>	<b>8,645 POUNDS OR LESS</b>	<b>8,645 POUNDS OR LESS</b>
ALTITUDE OF AIRPORT	2000 FEET OR BELOW	4000 FEET TO 2001 FEET	6000 FEET TO 4001 FEET
AMBIENT TEMPERATURE	30°C OR LESS	30°C OR LESS	30°C OR LESS
TAKEOFF DECISION SPEED (V1)	90 KIAS	90 KIAS	91 KIAS
ROTATION SPEED (VR)	90 KIAS	90 KIAS	91 KIAS
TAKEOFF SAFETY SPEED (V2)	97 KIAS	97 KIAS	97 KIAS
SINGLE ENGINE CLIMB SPEED (VENR)	118 KIAS	118 KIAS	118 KIAS

**Note:** The simplified takeoff criteria above can only be used if the following conditions are met:

- No Obstacle in Flight Path
- Throttles -- TAKEOFF Detent (Thrust Mode Indicator - Green TO)
- Takeoff and Approach Flaps (15°)
- Anti-Ice OFF or ON
- Takeoff Field Length Available = 5,000 Feet or Longer
- No Tail Wind
- Runway Gradient - Takeoff = Zero to -2.0% (Downhill)
- Dry Paved Runway

## Climb:

Refer to the performance charts for more information.

Ensure gear and flaps are up, set power to climb detent and select autopilot (if desired). Continue the climb at desired climb speed until nearing the assigned cruise altitude. Once level, allow the aircraft to accelerate to the desired cruise airspeed/Mach.

Best Angle of Climb Speed - Multi Engine, Flaps 15° ( $V_X$ ) .....	105 KIAS
Best Rate of Climb Speed - Multi Engine, Flaps 15° ( $V_Y$ ) .....	150 KIAS

## Cruise:

Refer to the performance charts for more information.

**Note:** The throttles should be reduced to the CRU detent or below within 10 minutes after reaching an intermediate or final cruise altitude. The use of CLB during normal operations beyond 10 minutes after reaching cruise altitude will significantly decrease engine life and increase operator costs.

<b>Maximum Operating Limit:</b>	
$M_{MO}$ (27,120 Feet and Above) .....	0.63 MACH
$V_{MO}$ (Sea Level to 27,120 Feet) .....	250 KIAS
Maximum Autopilot Speed .....	250 KIAS / 0.63 MACH
Turbulent Air Penetration Speed .....	160 KIAS

## Descent:

Refer to the performance charts for more information.

Complete the appropriate descent checklist to include checking ATIS and programming the G1000 for the arrival, approach, and landing runway. Review the planned approach and missed approach, and cross-check the flight plan page on the MFD to include headings, courses, altitudes, DA/MDA and MAP procedures. Begin arrival/approach tasks. Complete appropriate checks.

## Approach and Landing:

Refer to the performance charts for more information.

Ensure proper navigation aids are set for the planned approach. Ensure that proper navigation aids and navigation presentations are set, tuned, and identified for the planned approach.

Maximum Landing Weight .....	8,000 POUNDS
Maximum Flap Extended Speed ( $V_{FE}$ )	
Land 30° .....	150 KIAS
Maximum Landing Gear Operation - Extending ( $V_{LO}$ ) .....	250 KIAS
Maximum Landing Gear Extended Speed ( $V_{LE}$ ) .....	250 KIAS
Minimum Control Speed, Air ( $V_{MCA}$ )	
Flaps 0° .....	92 KIAS
Flaps 15° .....	81 KIAS
Minimum Control Speed, Ground ( $V_{MCG}$ ) .....	73 KIAS



## Cockpit Preparation Checklist

- L / R GEN Switches ..... GEN (OFF IF GROUND POWER IS TO BE USED FOR START)
- STBY INST Switch ..... BATT TEST (5 SECONDS); GREEN LIGHT ON
- STBY INST Switch ..... STBY INST; AMBER LIGHT ON
- Battery Switch ..... EMER (CHECK POWER TO EMERGENCY BUS ITEMS)
- Battery Switch ..... BATT
- STBY INST Amber Light ..... OFF
- Parking Brake ..... SET
- AVN POWER Switch ..... ON
- ATIS / Clearance ..... AS REQUIRED
- Rotary TEST Switch ..... WARNING SYSTEMS CHECK
- Fuel Quantity and Balance ..... CHECK
- Avionics Flight Plan (If Desired) ..... ENTER
- L / R IGNITION Switches ..... NORM
- L / R FUEL BOOST Switches ..... NORM
- FUEL TRANSFER Knob ..... OFF
- Pilot MIC Switch ..... HEADSET
- Wing Stab Deice System (If Required) ..... CHECK
  - WING STAB Deice Switch ..... HOLD IN MANUAL THEN RELEASE
  - WING STAB Deice Switch ..... OFF
- PITOT-STATIC Switch ..... RESET STALL WARN THEN OFF
- All Other ICE PROTECTION Switches ..... OFF
- LANDING GEAR Handle ..... DOWN - THREE GREEN LIGHTS / NO RED LIGHT
- ANTISKID Switch ..... ON
- PAX SAFETY Switch ..... OFF
- All Exterior Light Switches ..... AS REQUIRED
- Cockpit Lighting ..... AS REQUIRED
- AIR CONDITIONING Switch ..... OFF
- COCKPIT / CABIN TEMP Knobs ..... AS DESIRED
- COCKPIT / CABIN FAN Knobs ..... OFF
- AIR SOURCE SELECT Knob ..... BOTH
- PRESS CONT Switch ..... NORM
- CABIN DUMP Switch ..... NORM
- Co-Pilot MIC Switch ..... HEADSET
- ELT Switch ..... ARM
- OXYGEN SUPPLY Handle ..... PUSHED IN
- THROTTLES ..... CUTOFF
- ENGINE SYNC Switch ..... NORM
- AUXILIARY GEAR CONTROL Handle ..... STOWED

## Before Starting Engines Checklist

- Preflight Inspection ..... COMPLETE
- Wheel Chocks ..... REMOVED
- Cabin Door ..... CLOSED
- BEACON Light Switch ..... ON
- AIR CONDITIONING Switch ..... OFF
- EICAS..... CHECK
- Battery Voltage ..... CHECK

## Starting Engines Checklist

- ENGINE START Button..... PRESS MOMENTARILY (VERIFY BUTTON ILLUMINATES)
- THROTTLE ..... IDLE
- Engine Instruments ..... MONITOR
  
- N1 ..... ABORT START IF NO N1 INDICATION BY 40% N2
- ITT ..... CHECK FOR RISE (DO NOT EXCEED 830°C FOR MORE THAN 5 SECONDS)
- Oil Pressure ..... STEADY INCREASE
- Engine Must Reach Stabilized Idle Within 45 Seconds
  
- Engine Instruments ..... CHECK NORMAL
- DC AMPS / VOLTS ..... CHECK
  
- L GEN Switch..... OFF (L AMP DECREASE, R AMP INCREASE, BATTERY VOLTAGE 24 VOLTS)
- L GEN Switch..... GEN (L AMPS INCREASE, BATTERY VOLTAGE 24 VOLTS)
- R GEN Switch ..... OFF (R AMP DECREASE, L AMP INCREASE, BATTERY VOLTAGE 24 VOLTS)
- R GEN Switch ..... GEN (CHECK GENERATORS PARALLEL AND BATTERY VOLTAGE 24 VOLTS)
- Battery Switch .....OFF (BATTERY VOLTAGE 0 VOLTS)
- Battery Switch ..... BATT (CHECK BATTERY VOLTAGE 24 VOLTS)

## Before Taxi Checklist

- EXTERIOR LIGHT Switches ..... AS REQUIRED
- PAX SAFETY Switch ..... SEAT BELT
- Windshield Anti-Ice Switches..... AS REQUIRED FOR DEFOG (L / R ON IF REQUIRED)
- PRESS CONT Switch ..... NORM
- COCKPIT / CABIN TEMP Knobs..... AS DESIRED
- COCKPIT / CABIN FAN Knobs ..... AS DESIRED
- AIR CONDITIONING SWITCH..... AS DESIRED



## Before Taxi Checklist, Continued....

- AIR SOURCE SELECT ..... CHECK THEN BOTH
  - Air Source Select Knob ..... OFF (NO INFLOW)
  - Air Source Select Knob ..... L (INFLOW TO COCKPIT)
  - Air Source Select Knob ..... R (INFLOW TO CABIN AND COCKPIT)
  - Air Source Select Knob ..... BOTH
  
- Electric Elevator Trim ..... CHECK AND SET TRIM WITH TAKEOFF BAND
- Flight Controls ..... FREE AND CORRECT
- Flaps ..... SET
- Speed Brakes ..... CHECK AND RETRACT
  - Speed Brakes ..... EXTEND
  - Advance Throttles to the CRU Detent; Verify Speed Brakes Retract and the SPD BRK EXTEND CAS Message Extinguishes; Throttles IDLE
  
- Avionics Setup and Charts ..... AS REQUIRED
- Altimeters (Pilot, Standby and Co-Pilot) ..... SET AND COMPARE
- Takeoff Data ..... SET
- Destination Field Elevation ..... SET
- CAS Messages ..... CHECK

**\*\*CLEARED AND READY TO TAXI\*\***

- Brakes ..... APPLY AND HOLD
- Parking Brake ..... RELEASE

## Taxi Checklist

- Brakes ..... CHECK

### **CAUTION**

**IF DURING TAXI, A NO BRAKING CONDITION IS ENCOUNTERED, OPERATE THE EMERGENCY BRAKE SYSTEM. MAINTENANCE IS REQUIRED BEFORE FLIGHT.**

- Nosewheel Steering ..... CHECK
- Flight Instruments ..... CHECK

## Before Takeoff Checklist

- Anti-Ice / Deice Systems (If Required) ..... CHECK
- Engine Speed at or Above 70% N<sub>2</sub> ..... CHECK
- L / R ENGINE ANTI-ICE Switches ..... ON
- L / R ENGINE ANTI-ICE Switches ..... OFF
- WING STAB Deice Switch ..... AUTO
- Verify WING DE-ICE FAIL and TAIL DE-ICE Fail Messages are Not Displayed ..... CHECK
- WING STAB Deice Switch ..... OFF
- Throttles ..... IDLE
- PITOT-STATIC Switch ..... RESET STALL WARN THEN OFF
- STBY INST Switch ..... BATT TEST; GREEN LIGHT; STBY INST ON

**CAUTION**

**DO NOT OPERATE DEICE BOOTS WHEN AMBIENT AIR TEMPERATURE IS BELOW -30°C (-22°F)**

- AIR SOURCE SELECT Knob ..... BOTH
- Flaps ..... SET FOR TAKEOFF
- Trim ..... SET FOR TAKEOFF
- Transponder ..... GND
- Displays / Avionics / Navigation Systems ..... SETUP

**\*\*CLEARED AND READY TO TAKEOFF\*\***

- PITOT-STATIC Switch ..... PITOT-STATIC

**CAUTION**

**LIMIT GROUND OPERATION OF PITOT-STATIC HEAT TO TWO MINUTES TO PRECLUDE DAMAGE TO THE PITOT-STATIC AND STALL WARNING HEATERS.**

- Anti-Ice / Deice Systems ..... ON (IF REQUIRED)
- Windshield Anti-Ice Switches ..... ON
- PAX Safety Switch ..... PAX SAFETY
- LANDING Light Switch ..... AS DESIRED
- Anti-Collision Light Switch ..... ON
- Speed Brakes ..... RETRACTED
- EICAS ..... CHECK



## Takeoff Checklist

- THROTTLES ..... TO DETENT (THRUST MODE INDICATOR - GREEN T/O)
- Engine Instruments ..... CHECK NORMAL (N1 MATCHES COMMAND BUG)
- Brakes ..... RELEASE
- Elevator Control ..... ROTATE AT V2 TO +10° INITIAL PITCH ATTITUDE (USE FLIGHT DIRECTOR TO MODE)

## After Takeoff - Climb Checklist

- LANDING GEAR Handle ..... UP
- Flap Handle ..... UP (V2 + 12 AND CLEAR OF OBSTACLES)
- THROTTLES ..... CLB DETENT
- Yaw Damper ..... AS DESIRED (ON ABOVE FL300)
- Anti-Ice / Deice Systems ..... AS REQUIRED
- PAX SAFETY Switch ..... AS REQUIRED
- LANDING Light Switch ..... AS REQUIRED
- Pressurization ..... CHECK
- Altimeters ..... SET TO 29.92 (1013MB) AT TRANSITION ALTITUDE AND CROSSCHECK

## Cruise Checklist

- THROTTLES ..... CRU DETENT OR AS DESIRED
- Anti-Ice / Deice Systems ..... AS REQUIRED

**CAUTION**

**DO NOT OPERATE DEICE BOOTS WHEN INDICATED RAT IS BELOW -30°C.**

- Pressurization ..... CHECK
- In RVSM Airspace: .....
- Autopilot ..... ALT MODE UNLESS SEVERE TURBULENCE IS ENCOUNTERED
- Altimeters ..... CROSSCHECK PILOT AND CO-PILOT ALTIMETER AT 1 HOUR INTERVALS.

## Descent Checklist

- Pressurization ..... VERIFY DESTINATION FIELD ELEVATION SET
- Anti-Ice / Deice Systems ..... AS REQUIRED
- THROTTLES ..... AS REQUIRED FOR ANTI-ICE / DEICE SYSTEMS
- Altimeters ..... SET AT TRANSITION LEVEL AND CROSSCHECK
- Landing Data ..... SET AND VERIFY
- LANDING Light Switch ..... AS REQUIRED

## Approach Checklist

- Landing Data ..... CONFIRM
- Avionics and Flight Instruments ..... CHECK
- Minimums ..... SET
- PAX SAFETY Switch ..... PAX SAFETY
- FUEL TRANSFER Knob ..... OFF
- Anti-Ice / Deice Systems ..... AS REQUIRED
- ANTISKID Switch ..... ON
- LANDING Lights Switch ..... ON
- CAS Messages ..... CHECK
- Flap Handle ..... TO/APR

### VREF - KIAS (Anti-Ice OFF)

	WEIGHT - POUNDS					
	6000	6500	7000	7500	8000	*8645
V <sub>REF</sub> LAND 30°	82	85	88	91	94	98
V <sub>APP</sub> 15°	87	91	95	98	101	105

\* Use in an emergency which requires landing at weights in excess of 8,000 pounds.

### VREF - KIAS (Anti-Ice ON)

	WEIGHT - POUNDS					
	6000	6500	7000	7500	8000	*8645
V <sub>REF</sub> 15°	98	102	105	109	112	117
V <sub>APP</sub> 15°	98	102	105	109	112	117

\* Use in an emergency which requires landing at weights in excess of 8,000 pounds.

## Before Landing Checklist

- Landing Gear ..... DOWN AND LOCKED
- Speed Brakes ..... RETRACTED
- Flap Handle ..... LAND (ANTI-ICE OFF ONLY)
- Pressurization ..... CHECK ZERO DIFFERENTIAL
- Autopilot and Yaw Damper ..... OFF
- Airspeed ..... VREF



## Landing Checklist

- THROTTLES ..... IDLE
- Brakes ..... APPLY (AFTER NOSEWHEEL TOUCHDOWN)
- Speed Brakes ..... EXTEND (AFTER NOSEWHEEL TOUCHDOWN)

### CAUTION

IF A NO BRAKING CONDITION IS ENCOUNTERED DURING LANDING,  
OPERATE THE EMERGENCY BRAKE SYSTEM.

### LANDING DISTANCE - FEET

### FLAPS - LAND

ACTUAL DISTANCE

ANTI-ICE OFF

PA	SEA LEVEL					
TEMP °C	LANDING WEIGHT - POUNDS					
	6000	6500	7000	7500	8000	*8645
50	2070	2190	2330	2460	--	--
45	2050	2170	2300	2430	2580	--
40	2020	2140	2270	2400	2540	2730
35	2000	2120	2240	2370	2510	2690
30	1980	2090	2210	2340	2470	2660
25	1960	2070	2190	2310	2440	2620
20	1940	2050	2160	2280	2410	2580
15	1910	2020	2130	2250	2380	2550
10	1890	2000	2110	2220	2350	2510
5	1870	1980	2080	2190	2320	2480
0	1850	1960	2060	2170	2290	2440
-5	1830	1940	2030	2140	2250	2410
-10	1810	1910	2010	2110	2220	2380
-15	1790	1890	1990	2090	2190	2340
-20	1770	1870	1970	2060	2170	2310
-25	1750	1850	1940	2030	2140	2280

**Note:** All landing distances predicated on zero wind and zero runway gradient.

\* Use in an emergency which requires landing at weights in excess of 8,000 pounds.

## All Engines GO-Around Checklist

- THROTTLES ..... TO DETENT (THRUST MODE INDICATOR - GREEN TO)
- Aircraft Pitch Attitude ..... POSITIVE ROTATION TO +8° (USE FD GO-AROUND MODE)
- Flap Handle ..... TO/APR
- Climb Speed ..... VAPP MINIMUM
- LANDING GEAR Handle ..... UP (WHEN POSITIVE RATE OF CLIMB ESTABLISHED)
- Flap Handle ..... UP
- THROTTLES ..... CLB DETENT

## After Landing Checklist

- Flap Handle ..... UP
- Speed Brakes ..... RETRACT
- PITOT-STATIC Switch ..... OFF
- Windshield Anti-Ice Switches ..... AS REQUIRED FOR DEFOG (L / R ON)
- Engine Anti-Ice Systems ..... AS REQUIRED
- Anti-Collision Light Switch ..... AS REQUIRED
- LANDING Light Switch ..... AS REQUIRED
- Transponder ..... VERIFY GND

## Shutdown Checklist

- Parking Brake ..... SET OR WHEELS - CHOCK
- ANTI-ICE / DEICE Switches ..... OFF
- Windshield Anti-Ice Switches ..... OFF
- PAX SAFETY Switch ..... OFF
- LANDING Light Switch ..... OFF
- AIR CONDITIONING Switch ..... OFF
- Flap Handle ..... TO/APR
- AVIONICS POWER Switch ..... OFF
- THROTTLES ..... CUTOFF (AFTER ALLOWING ITT TO STABILIZE AT MINIMUM VALUE FOR 2 MINUTES)
- EXTERIOR LIGHT Switches ..... OFF
- Cockpit / Cabin Fans ..... OFF
- OXYGEN SUPPLY Handle ..... PULL TO CUTOFF
- Battery Switch ..... OFF
- STBY INST Switch ..... VERIFY AMBER LIGHT ON; THEN OFF

## Turbulent Air Penetration Checklist

### CAUTION

**FLIGHT THROUGH SEVERE TURBULENCE SHOULD BE AVOIDED IF POSSIBLE. THE FOLLOWING PROCEDURES ARE RECOMMENDED FOR FLIGHT THROUGH SEVERE TURBULENCE.**

- Airspeed ..... APPROXIMATELY 160 KIAS (DO NOT CHASE AIRSPEED)
- Maintain a Constant Attitude Without Chasing the Altitude. Avoid Sudden Large Control Movements
- Operation of Autopilot is Recommended in Basic Modes Only (ROL and PIT Only)
- PAX SAFETY Switch ..... PAX SAFETY

## General

This section contains the required performance data for aircraft operation. The performance information presented in this section is derived from actual flight test data corrected to standard day conditions and analytically expanded for the different parameters such as weight, altitude, temperature, etc.

The performance charts listed in this section are taken directly from the actual Cessna Citation Mustang Pilot's Operating Handbook. Although we have taken great pains to ensure that the Flight1 Software Cessna Citation Mustang flies as closely to the real thing as possible, in some cases performance of the sim aircraft may not match exactly the performance of the real aircraft due to programming limitations of Flight Simulator.

## TAKEOFF (SIMPLIFIED CRITERIA)

Maximum Ramp Weight.....	8,730 POUNDS
Maximum Takeoff Weight.....	8,645 POUNDS

It is recommended to use the flight director during takeoff. Press the TO/GA button on the left throttle, then select HDG mode. After lining up on the centerline, press the heading knob. Advance power to takeoff detent. Rotate at  $V_R$  toward the command bars. With a positive rate of climb, raise the gear; raise flaps no earlier than  $V_2 + 12$ .

WEIGHT	8,645 POUNDS OR LESS	8,645 POUNDS OR LESS	8,645 POUNDS OR LESS
ALTITUDE OF AIRPORT	2000 FEET OR BELOW	4000 FEET TO 2001 FEET	6000 FEET TO 4001 FEET
AMBIENT TEMPERATURE	30°C OR LESS	30°C OR LESS	30°C OR LESS
TAKEOFF DECISION SPEED (V1)	90 KIAS	90 KIAS	91 KIAS
ROTATION SPEED (VR)	90 KIAS	90 KIAS	91 KIAS
TAKEOFF SAFETY SPEED (V2)	97 KIAS	97 KIAS	97 KIAS
SINGLE ENGINE CLIMB SPEED	118 KIAS	118 KIAS	118 KIAS

**Note:** The simplified takeoff criteria above can only be used if the following conditions are met:

- No Obstacle in Flight Path
- Throttles -- TAKEOFF Detent (Thrust Mode Indicator - Green TO)
- Takeoff and Approach Flaps (15°)
- Anti-Ice OFF or ON
- Takeoff Field Length Available = 5,000 Feet or Longer
- No Tail Wind
- Runway Gradient - Takeoff = Zero to -2.0% (Downhill)
- Dry Paved Runway



## MAXIMUM TAKEOFF WEIGHT - POUNDS -- FLAPS UP (Anti-Ice OFF)

Altitude	Temp (°C)	Max Weight (LBS)	Altitude	Temp (°C)	Max Weight (LBS)
Sea Level	-54 to 49	8645	10,000 Feet	-54 to 10	8645
	50	8560		15	8180
1000 Feet	-54 to 45	8645		20	7690
	47	8490		25	7180
2000 Feet	-54 to 42	8645		27	6960
	45	8290		11,000 Feet	-54 to 5
3000 Feet	-54 to 38	8645	10		8220
	40	8440	15		7690
	43	8090	20		7230
4000 Feet	-54 to 33	8645	24	6840	
	35	8520	12,000 Feet	-54 to 1	8645
	40	7990		5	8280
5000 Feet	-54 to 29	8645		10	7750
	30	8620		15	7240
	35	8100		20	6790
6000 Feet	-54 to 26	8645	22	6600	
	30	8240	13,000 Feet	-54 to -3	8645
	35	7720		0	8340
	36	7610		5	7800
7000 Feet	-54 to 22	8645		10	7260
	25	8380		15	6800
	30	7860		20	6300
8000 Feet	-54 to 18	8645	14,000 Feet	-54 to -8	8645
	20	8520		-5	8450
	25	8000		0	7860
	30	7470		5	7330
31	7360	10		6810	
9000 Feet	-54 to 15	8645	15	6400	
	20	8110	17	6190	
	25	7620			
	29	7170			

## MAXIMUM TAKEOFF WEIGHT - POUNDS -- FLAPS 15° (Anti-Ice OFF)

Altitude	Temp (°C)	Max Weight (LBS)	Altitude	Temp (°C)	Max Weight (LBS)	
Sea Level	-54 to 44	8645	10,000 Feet	-54 to 3	8645	
	45	8520		5	8510	
	50	7890		10	8010	
1000 Feet	-54 to 40	8645		15	7530	
	45	8080		20	7080	
	47	7830		25	6620	
2000 Feet	-54 to 36	8645		27	6420	
	40	8220		11,000 Feet	-54 to -1	8645
	45	7650			0	8550
3000 Feet	-54 to 31	8645	5		8040	
	35	8290	10		7560	
	40	7770	15		7080	
4000 Feet	43	7460	20		6660	
	-54 to 27	8645	24	6300		
	30	8350	12,000 Feet	-54 to -6	8645	
	35	7840		-5	8620	
40	7360	0		8120		
5000 Feet	-54 to 23	8645		5	7620	
	25	8470		10	7130	
	30	7940		15	6660	
	35	7450	20	6250		
	38	7170	22	6080		
6000 Feet	-54 to 19	8645	13,000 Feet	-54 to -10	8645	
	20	8640		-5	8180	
	25	8070		0	7670	
	30	7590		5	7180	
	35	7110		10	6680	
	36	7020		15	6260	
7000 Feet	-54 to 16	8645	18	6020		
	20	8240	14,000 Feet	-54 to -14	8645	
	25	7710		-10	8270	
	30	7240		-5	7760	
	33	6950		0	7240	
8000 Feet	-54 to 12	8645		5	6740	
	15	8370		10	6260	
	20	7840	13	6040		
	25	7370				
	30	6880				
	31	6790				
9000 Feet	-54 to 8	8645				
	10	8450				
	15	7950				
	20	7560				
	25	7020				
	29	6610				

## MAXIMUM TAKEOFF WEIGHT - POUNDS -- FLAPS UP (Anti-Ice ON)

Altitude	Temp (°C)	Max Weight (LBS)
Sea Level	-54 to 10	8645
1000 Feet	-54 to 10	8645
2000 Feet	-54 to 10	8645
3000 Feet	-54 to 10	8645
4000 Feet	-54 to 6	8645
	10	8360
5000 Feet	-54 to 3	8645
	5	8470
	10	8120
6000 Feet	-54 to -1	8645
	0	8630
	5	8170
	10	7860
7000 Feet	-54 to -4	8645
	0	8290
	5	7880
	10	7620
8000 Feet	-54 to -7	8645
	-5	8450
	0	7960
	5	7610
	10	7360
9000 Feet	-54 to -11	8645
	-10	8610
	-5	8110
	0	7640
	5	7360
	10	7080

Altitude	Temp (°C)	Max Weight (LBS)
10,000 Feet	-54 to -13	8510
	-10	8300
	-5	7760
	0	7370
	5	7100
11,000 Feet	10	6780
	-54 to -14	8310
	-10	7940
	-5	7430
12,000 Feet	0	7100
	5	6820
	10	6430
	-54 to -16	8130
	-15	8080
13,000 Feet	-10	7600
	-5	7120
	0	6840
	5	6530
	10	6110
	-54 to -17	7920
14,000 Feet	-15	7770
	-10	7250
	-5	6840
	0	6580
	5	6200
15,000 Feet	7	6020
	-54 to -19	7750
	-15	7430
	-10	6900
	5	6590
	0	6290
16,000 Feet	3	6040



## MAXIMUM TAKEOFF WEIGHT - POUNDS -- FLAPS 15° (Anti-Ice ON)

Altitude	Temp (°C)	Max Weight (LBS)
Sea Level	-54 to 10	8645
1000 Feet	-54 to 10	8645
2000 Feet	-54 to 10	8645
3000 Feet	-54 to 10	8645
4000 Feet	-54 to 6	8645
	10	8360
5000 Feet	-54 to 3	8645
	5	8470
	10	8120
6000 Feet	-54 to -1	8645
	0	8630
	5	8170
	10	7860
7000 Feet	-54 to -4	8645
	0	8290
	5	7880
	10	7620
8000 Feet	-54 to -7	8645
	-5	8450
	0	7960
	5	7610
	10	7360
9000 Feet	-54 to -11	8645
	-10	8610
	-5	8110
	0	7640
	5	7360
	10	7080

Altitude	Temp (°C)	Max Weight (LBS)
10,000 Feet	-54 to -13	8510
	-10	8300
	-5	7760
	0	7370
	5	7100
	10	6780
11,000 Feet	-54 to -14	8310
	-10	7940
	-5	7430
	0	7100
	5	6820
12,000 Feet	-54 to -16	8130
	-15	8080
	-10	7600
	-5	7120
	0	6840
13,000 Feet	5	6530
	10	6110
	-54 to -17	7920
	-15	7770
	-10	7250
14,000 Feet	-5	6840
	0	6580
	5	6200
	7	6020
	-54 to -19	7750
-15	7430	
-10	6900	
5	6590	
0	6290	
3	6040	

## CRUISE CLIMB

170 KIAS/0.44 INDICATED MACH

TIME, DISTANCE, FUEL, AND RATE OF CLIMB

ANTI-ICE SYSTEMS OFF

T.O. WEIGHT	8645	8000	7500	7000	6500	8645	8000	7500	7000	6500	8645	8000	7500	7000	6500
<b>5000 FEET</b>	ISA = 5°C = 41°F					ISA = -5°C = 23°F					ISA = -15°C = 6°F				
MIN	2	2	2	2	2	5	5	4	4	4	9	8	7	6	6
ISA NM	7	7	6	6	5	16	15	14	12	11	28	25	23	21	19
+20°C LB	50	45	41	38	35	100	91	83	77	70	154	139	128	117	107
FPM	1956	2166	2350	2559	2796	1663	1853	2019	2206	2419	1264	1424	1564	1722	1900
MIN	2	2	2	2	1	4	4	4	3	3	7	6	6	5	5
ISA NM	6	5	5	5	4	13	12	11	10	9	22	20	18	17	15
+10°C LB	44	40	37	34	31	88	79	73	68	62	132	120	110	101	93
FPM	2419	2667	2886	3134	3416	2114	2341	2541	2767	3023	1805	2011	2192	2395	2626
MIN	2	2	1	1	1	4	3	3	3	3	6	5	5	4	4
ISA NM	5	5	4	4	4	11	10	9	9	8	18	17	15	14	13
+10°C LB	40	36	34	31	29	80	72	67	62	57	119	108	100	92	84
FPM	2706	2979	3220	3492	3803	2461	2718	2944	3199	3490	2186	2424	2633	2869	3138
MIN	1	1	1	1	1	3	3	3	2	2	5	4	4	4	3
ISA NM	4	4	3	3	3	9	8	7	7	6	14	13	12	11	10
-10°C LB	36	33	31	28	26	71	65	60	55	51	105	95	88	82	75
FPM	3415	3747	4039	4371	4751	3193	3510	3790	4107	4469	2850	3144	3402	3695	4028
<b>25000 FEET</b>	ISA = -19°C = -2°F					ISA = -23°C = -9°F					ISA = -27°C = -16°F				
MIN	10	9	8	8	7	12	11	10	9	8	14	12	11	10	9
ISA NM	34	31	28	26	24	41	37	34	31	28	49	44	40	36	33
+20°C LB	178	160	146	134	122	202	181	166	152	138	228	203	186	170	155
FPM	1200	1356	1493	1646	1819	1078	1226	1356	1500	1663	963	1104	1226	1362	1516
MIN	8	7	7	6	6	9	8	8	7	6	10	9	9	8	7
ISA NM	26	24	22	20	18	31	28	25	23	21	36	32	30	27	25
+10°C LB	151	136	125	115	105	169	153	141	129	118	188	169	156	143	131
FPM	1712	1912	2087	2284	2508	1580	1771	1938	2125	2338	1500	1686	1848	2030	2237
MIN	7	6	6	5	5	8	7	6	6	5	9	8	7	7	6
ISA NM	22	20	18	17	15	25	23	21	19	18	29	26	24	22	20
+10°C LB	135	122	113	104	95	151	136	126	116	106	166	151	139	128	117
FPM	2119	2354	2559	2791	3055	2054	2285	2487	2715	2974	1917	2139	2333	2551	2799
MIN	5	5	4	4	4	6	6	5	5	4	7	6	6	5	5
ISA NM	17	15	14	13	12	20	18	16	15	14	23	21	19	17	16
-10°C LB	118	108	100	92	85	132	120	111	102	94	146	132	122	113	104
FPM	2680	2962	3209	3489	3808	2522	2793	3030	3299	3605	2402	2665	2895	3155	3452
<b>45000 FEET</b>	ISA = -31°C = -23°F					ISA = -35°C = -30°F					ISA = -38°C = -37°F				
MIN	16	14	13	12	11	19	16	15	14	12	22	19	17	16	14
ISA NM	58	52	47	43	39	69	61	55	50	45	82	72	65	59	53
+20°C LB	255	227	207	189	172	284	253	230	209	190	317	280	255	231	209
FPM	851	984	1099	1228	1372	745	870	979	1100	1236	624	741	842	954	1080
MIN	12	11	10	9	8	13	12	11	10	9	15	13	12	11	10
ISA NM	41	37	34	31	28	48	43	39	36	33	55	49	45	41	37
+10°C LB	207	187	172	157	144	227	204	187	172	157	248	222	204	187	170
FPM	1409	1589	1747	1923	2123	1302	1475	1626	1795	1987	1138	1300	1441	1598	1775
MIN	10	9	8	7	7	11	10	9	8	8	12	11	10	9	8
ISA NM	34	30	28	26	23	38	35	32	29	27	44	39	36	33	30
+10°C LB	183	165	152	140	128	199	180	166	152	139	216	195	179	165	151
FPM	1788	2001	2187	2397	2634	1659	1863	2041	2242	2469	1521	1716	1886	2077	2293
MIN	8	7	7	6	6	9	8	7	7	6	10	9	8	8	7
ISA NM	26	24	22	20	18	30	27	25	23	21	34	31	28	26	24
-10°C LB	160	145	134	124	113	174	158	146	134	123	189	171	158	146	134
FPM	2206	2454	2673	2918	3198	2008	2243	2449	2680	2943	1803	2024	2216	2433	2678
<b>65000 FEET</b>	ISA = -42°C = -44°F					ISA = -46°C = -52°F					ISA = -50°C = -59°F				
MIN	25	22	19	18	16	28	24	22	20	18	31	27	24	22	19
ISA NM	96	84	76	68	61	111	96	86	77	69	127	109	97	87	77
+20°C LB	350	308	279	252	228	382	334	302	272	245	416	362	325	292	263
FPM	657	792	907	1036	1180	595	731	848	977	1121	501	636	752	880	1023
MIN	17	15	14	12	11	18	16	15	14	12	20	18	16	15	14
ISA NM	62	56	51	46	42	70	62	57	52	47	79	70	63	57	52
+10°C LB	268	240	220	201	183	288	257	235	215	195	309	275	251	228	208
FPM	1182	1363	1519	1694	1891	1083	1264	1419	1592	1787	1000	1181	1337	1511	1705
MIN	13	12	11	10	9	15	13	12	11	10	16	14	13	12	11
ISA NM	49	44	40	37	34	55	49	45	41	37	61	54	50	45	41
+10°C LB	232	209	193	177	161	248	223	205	188	172	265	238	218	199	182
FPM	1624	1843	2034	2247	2488	1438	1650	1834	2039	2270	1296	1504	1685	1886	2111
MIN	11	10	9	8	8	12	11	10	9	8	13	12	11	10	9
ISA NM	39	35	32	30	27	44	39	36	33	30	50	44	41	37	34
-10°C LB	204	184	170	156	143	218	197	182	167	153	234	211	194	178	162
FPM	1811	2048	2255	2486	2748	1599	1827	2025	2246	2495	1382	1601	1790	2002	2239

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## CRUISE CLIMB

170 KIAS/0.44 INDICATED MACH

TIME, DISTANCE, FUEL, AND RATE OF CLIMB

ANTI-ICE SYSTEMS OFF

T.O. WEIGHT	8645	8000	7500	7000	6500	8645	8000	7500	7000	6500	8645	8000	7500	7000	6500	
PRESSURE ALTITUDE	36000 FEET ISA = -54°C = -66°F					37000 FEET ISA = -57°C = -70°F					39000 FEET ISA = -57°C = -70°F					
+20°C	MIN 36	31	27	24	21	42	35	31	27	24	* 133	* 53	36	31	27	
ISA	NM 147	124	110	97	86	173	143	125	110	97	598	227	149	128	111	
LB	455	391	350	313	281	503	426	378	336	300	1209	564	419	367	324	
FPM	400	534	648	775	916	247	372	481	600	733	175	175	256	366	488	
+10°C	MIN 22	20	18	16	15	25	22	20	18	16	29	25	22	20	18	
ISA	NM 88	77	70	63	57	100	87	78	70	63	116	100	89	79	71	
LB	330	293	266	242	220	354	312	284	257	233	387	337	304	274	247	
FPM	854	1031	1184	1353	1542	638	805	948	1106	1282	396	553	688	835	999	
MIN	18	16	15	13	12	20	18	16	15	13	22	20	18	16	15	
ISA	NM 68	60	55	50	45	76	67	61	55	50	87	76	69	62	56	
LB	283	253	231	211	193	302	269	246	224	204	326	288	262	238	216	
FPM	1096	1297	1470	1663	1879	906	1099	1265	1449	1654	631	813	968	1140	1330	
MIN	15	13	12	11	10	17	15	14	12	11	19	17	15	14	13	
ISA	NM 56	50	46	41	38	64	57	51	47	42	75	65	59	53	48	
LB	250	225	206	189	172	269	240	220	201	183	292	259	236	214	196	
FPM	1169	1379	1561	1763	1989	899	1095	1264	1451	1659	658	847	1008	1185	1382	
PRESSURE ALTITUDE	41000 FEET ISA = -57°C = -70°F															
+20°C	MIN * 259	* 179	* 111	* 43	33	1169	798	498	180	136	2090	1445	945	445	361	
ISA	NM 1169	798	498	180	136	2090	1445	945	445	361	154	154	154	154	259	
LB	2090	1445	945	445	361	154	154	154	154	259	MIN * 78	30	26	23	20	
FPM	154	154	154	154	259	78	30	26	23	20	ISA	NM 357	120	104	92	81
+10°C	MIN * 78	30	26	23	20	357	120	104	92	81	LB	775	373	331	296	265
ISA	NM 357	120	104	92	81	775	373	331	296	265	FPM	241	304	431	569	721
LB	775	373	331	296	265	241	304	431	569	721	MIN	27	23	20	18	16
FPM	241	304	431	569	721	27	23	20	18	16	ISA	NM 105	89	79	70	63
MIN	27	23	20	18	16	105	89	79	70	63	LB	359	312	282	255	230
ISA	NM 105	89	79	70	63	359	312	282	255	230	FPM	367	540	687	848	1026
LB	359	312	282	255	230	367	540	687	848	1026	MIN	23	20	18	16	14
FPM	367	540	687	848	1026	23	20	18	16	14	ISA	NM 90	76	68	61	54
MIN	23	20	18	16	14	90	76	68	61	54	LB	322	281	254	230	208
ISA	NM 90	76	68	61	54	322	281	254	230	208	FPM	430	613	769	939	1127
LB	322	281	254	230	208	430	613	769	939	1127						
FPM	430	613	769	939	1127											

\* INDICATES STEP CLIMB REQUIRED  
NOTE: STEP CLIMB DATA INCLUDES TIME, DISTANCE, AND FUEL USED IN CRUISE PORTION. BASED ON MAXIMUM CRUISE THRUST.

PRESSURE ALTITUDE - FEET									
0	5000	10000	15000	20000	25000	30000	35000	40000	41000
170	170	170	170	170	160	143	127	124	

WIND EFFECT ON CLIMB DISTANCE - NM  
(SUBTRACT FOR HEADWIND, ADD FOR TAILWIND)

CLIMB TIME (MIN)	WIND		
	25KTS	50KTS	100KTS
5	2	4	8
10	4	8	16
15	6	12	25
20	8	16	33
25	10	20	41
30	12	25	50

NOTE: FOR CLIMB CONDITIONS REQUIRING A STEP CLIMB, THE FOLLOWING TABLE GIVES THE WEIGHT AT THE END OF THE STEP CRUISE AT THE STEP ALTITUDE, REQUIRED TO CONTINUE CLIMB.

STEP CLIMB ALT IN FEET	TEMPERATURE	
	ISA +10°C	ISA +20°C
37000	—	7490
39000	7913	6608



## CRUISE CLIMB

170 KIAS/0.44 INDICATED MACH

TIME, DISTANCE, FUEL, AND RATE OF CLIMB

ANTI-ICE SYSTEMS ON

T.O. WEIGHT	8645	8000	7500	7000	6500	8645	8000	7500	7000	6500	8645	8000	7500	7000	6500
5000 FEET ISA = 5°C = 41°F															
MIN	2	2	2	2	1	4	4	4	3	3	7	6	6	5	5
ISA +10°C	6	5	5	5	4	13	12	11	10	9	22	20	19	17	16
LB	45	41	38	35	32	90	81	75	69	63	136	123	113	104	95
FPM	2373	2618	2834	3078	3356	2055	2278	2473	2694	2945	1767	1969	2147	2347	2574
10000 FEET ISA = -5°C = 23°F															
MIN	2	2	1	1	1	4	3	3	3	3	6	5	5	5	4
ISA +10°C	5	5	4	4	4	11	10	9	9	8	19	17	16	14	13
LB	41	37	34	32	29	81	74	68	63	58	121	110	102	94	86
FPM	2691	2962	3202	3473	3782	2431	2685	2909	3161	3449	2143	2378	2584	2817	3081
ISA -10°C	1	1	1	1	1	3	3	3	2	2	5	4	4	4	3
MIN	4	4	3	3	3	9	8	7	7	6	14	13	12	11	10
ISA +10°C	37	33	31	29	26	72	65	61	56	52	106	97	90	83	76
LB	3411	3742	4034	4365	4745	3174	3490	3768	4083	4443	2853	3147	3406	3698	4032
FPM															
15000 FEET ISA = -15°C = 6°F															
MIN	8	7	7	6	6	9	8	8	7	7	11	10	9	8	7
ISA +10°C	27	24	22	20	19	32	28	26	24	22	37	33	31	28	25
LB	155	140	129	118	108	174	157	145	133	121	194	175	161	147	135
FPM	1644	1838	2008	2199	2416	1505	1690	1851	2032	2238	1412	1591	1747	1922	2120
ISA -10°C	7	6	6	5	5	8	7	7	6	5	9	8	7	7	6
MIN	22	20	18	17	15	26	23	21	20	18	30	27	25	23	21
ISA +10°C	138	125	115	106	97	154	139	128	118	108	170	154	142	131	120
LB	2077	2307	2510	2738	2998	1987	2212	2410	2632	2885	1844	2060	2249	2461	2702
FPM															
ISA -10°C	5	5	5	4	4	6	6	5	5	4	7	6	6	5	5
MIN	17	15	14	13	12	20	18	16	15	14	23	21	19	17	16
ISA +10°C	120	109	101	93	86	134	122	113	104	95	148	134	124	114	105
LB	2684	2965	3213	3493	3812	2527	2797	3036	3304	3610	2406	2689	2900	3160	3457
FPM															
17000 FEET ISA = -19°C = -2°F															
MIN	12	11	10	9	8	14	12	11	10	9	16	14	13	12	11
ISA +10°C	43	39	35	32	29	50	44	41	37	34	57	51	47	43	39
LB	214	193	177	162	148	235	211	194	178	162	258	231	212	193	176
FPM	1318	1490	1641	1809	2000	1207	1372	1516	1677	1859	1041	1195	1328	1477	1645
ISA -10°C	10	9	8	8	7	11	10	9	8	8	12	11	10	9	9
MIN	34	31	28	26	24	39	35	32	30	27	45	40	37	34	31
ISA +10°C	187	169	156	143	131	204	184	170	156	142	222	200	184	169	154
LB	1712	1919	2100	2303	2533	1612	1813	1988	2184	2407	1444	1633	1798	1982	2191
FPM															
ISA -10°C	8	7	7	6	6	9	8	7	7	6	10	9	8	8	7
MIN	26	24	22	20	18	30	27	25	23	21	34	31	28	26	24
ISA +10°C	162	147	136	125	115	176	160	148	136	125	192	174	160	148	135
LB	2210	2459	2677	2923	3203	2014	2249	2455	2687	2950	1810	2031	2224	2441	2687
FPM															
19000 FEET ISA = -23°C = -9°F															
MIN	17	16	14	13	12	19	17	16	14	13	22	19	17	16	14
ISA +10°C	66	59	53	48	44	74	66	60	54	49	84	74	67	60	55
LB	280	250	229	209	190	302	269	245	224	203	324	288	262	238	216
FPM	1073	1244	1393	1558	1745	985	1156	1305	1469	1654	902	1075	1224	1389	1574
ISA -10°C	14	12	11	10	10	15	14	12	11	10	17	15	14	12	11
MIN	51	45	42	38	35	56	50	46	42	38	63	56	51	47	42
ISA +10°C	239	215	197	181	165	255	229	211	193	176	272	244	224	205	187
LB	1553	1767	1952	2160	2394	1387	1594	1774	1975	2201	1257	1462	1639	1837	2059
FPM															
ISA -10°C	11	10	9	8	8	12	11	10	9	8	13	12	11	10	9
MIN	39	35	32	30	27	44	39	36	33	30	49	44	41	37	34
ISA +10°C	206	187	172	158	145	221	200	184	169	155	237	213	196	180	165
LB	1819	2057	2264	2496	2758	1607	1836	2035	2256	2506	1391	1610	1800	2012	2250
FPM															
21000 FEET ISA = -27°C = -16°F															
MIN	12	11	10	9	8	14	12	11	10	9	16	14	13	12	11
ISA +10°C	43	39	35	32	29	50	44	41	37	34	57	51	47	43	39
LB	214	193	177	162	148	235	211	194	178	162	258	231	212	193	176
FPM	1318	1490	1641	1809	2000	1207	1372	1516	1677	1859	1041	1195	1328	1477	1645
ISA -10°C	10	9	8	8	7	11	10	9	8	8	12	11	10	9	9
MIN	34	31	28	26	24	39	35	32	30	27	45	40	37	34	31
ISA +10°C	187	169	156	143	131	204	184	170	156	142	222	200	184	169	154
LB	1712	1919	2100	2303	2533	1612	1813	1988	2184	2407	1444	1633	1798	1982	2191
FPM															
ISA -10°C	8	7	7	6	6	9	8	7	7	6	10	9	8	8	7
MIN	26	24	22	20	18	30	27	25	23	21	34	31	28	26	24
ISA +10°C	162	147	136	125	115	176	160	148	136	125	192	174	160	148	135
LB	2210	2459	2677	2923	3203	2014	2249	2455	2687	2950	1810	2031	2224	2441	2687
FPM															
23000 FEET ISA = -31°C = -23°F															
MIN	17	16	14	13	12	19	17	16	14	13	22	19	17	16	14
ISA +10°C	66	59	53	48	44	74	66	60	54	49	84	74	67	60	55
LB	280	250	229	209	190	302	269	245	224	203	324	288	262	238	216
FPM	1073	1244	1393	1558	1745	985	1156	1305	1469	1654	902	1075	1224	1389	1574
ISA -10°C	14	12	11	10	10	15	14	12	11	10	17	15	14	12	11
MIN	51	45	42	38	35	56	50	46	42	38	63	56	51	47	42
ISA +10°C	239	215	197	181	165	255	229	211	193	176	272	244	224	205	187
LB	1553	1767	1952	2160	2394	1387	1594	1774	1975	2201	1257	1462	1639	1837	2059
FPM															
ISA -10°C	11	10	9	8	8	12	11	10	9	8	13	12	11	10	9
MIN	39	35	32	30	27	44	39	36	33	30	49	44	41	37	34
ISA +10°C	206	187	172	158	145	221	200	184	169	155	237	213	196	180	165
LB	1819	2057	2264	2496	2758	1607	1836	2035	2256	2506	1391	1610	1800	2012	2250
FPM															

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## CRUISE CLIMB

170 KIAS/0.44 INDICATED MACH

TIME, DISTANCE, FUEL, AND RATE OF CLIMB

ANTI-ICE SYSTEMS ON

T.O. WEIGHT	8645	8000	7500	7000	6500	8645	8000	7500	7000	6500	8645	8000	7500	7000	6500
PRESSURE ALTITUDE	35000 FEET ISA = -54°C = -66°F					37000 FEET ISA = -57°C = -70°F					39000 FEET ISA = -57°C = -70°F				
ISA +10°C	MIN	21	19	17	15	---	---	21	19	17	---	---	---	---	19
	NM	82	74	67	60	---	---	83	75	67	---	---	---	---	76
	LB	307	279	253	229	---	---	298	269	243	---	---	---	---	260
	FPM	941	1088	1250	1431	---	---	832	982	1148	---	---	---	---	806
ISA	MIN	18	16	15	14	20	18	16	15	14	---	---	18	17	15
	NM	70	62	57	51	79	70	63	57	52	---	---	71	64	58
	LB	291	260	238	217	312	277	253	230	209	---	---	270	245	222
	FPM	1038	1235	1404	1591	834	1021	1182	1359	1558	---	---	866	1030	1211
ISA -10°C	MIN	15	13	12	11	17	15	14	12	11	19	17	15	14	13
	NM	56	50	45	41	64	56	51	46	42	74	65	58	53	47
	LB	254	228	209	192	273	244	223	204	186	296	262	239	217	197
	FPM	1177	1389	1571	1774	908	1105	1274	1461	1670	667	856	1018	1196	1394
PRESSURE ALTITUDE	41000 FEET ISA = -57°C = -70°F														
ISA +10°C	MIN	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	NM	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	LB	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	FPM	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ISA	MIN	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	NM	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	LB	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	FPM	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ISA -10°C	MIN	23	20	18	16	14	12	11	10	9	19	17	15	14	13
	NM	89	76	68	60	54	47	42	37	33	74	65	58	53	47
	LB	326	285	257	233	211	190	171	154	139	296	262	239	217	197
	FPM	439	622	779	950	1139	1338	1547	1766	2005	667	856	1018	1196	1394

### CRUISE CLIMB SPEED - KIAS

PRESSURE ALTITUDE - FEET

	0	5000	10000	15000	20000	25000	30000	35000	40000	41000
170	170	170	170	170	170	170	160	143	127	124

### WIND EFFECT ON CLIMB DISTANCE - NM

(SUBTRACT FOR HEADWIND, ADD FOR TAILWIND)

CLIMB TIME (MIN)	WIND		
	25KTS	50KTS	100KTS
5	2	4	8
10	4	8	16
15	6	12	25
20	8	16	33
25	10	20	41
30	12	25	50

## CRUISE 10000 FEET

ANTI-ICE SYSTEMS OFF

TWO ENGINES

WT LBS	TEMP	RAT °C	FAN PERCENT RPM	FUEL FLOW LBS/HR	KIAS	IND MACH	KTAS	NAUTICAL MILES / 100 LBS FUEL						
								HEAD WIND			ZERO WIND	TAIL WIND		
								100 KT	50 KT	25 KT		25 KT	50 KT	100 KT
8645	ISA+20°C 15°C	27 (1)	86.4	1024	247	.45	297	19.3	24.2	26.6	29.0	31.5	33.9	38.8
		26	84.6	966	238	.430	286	19.3	24.4	27.0	29.6	32.2	34.8	40.0
		25	82.4	904	226	.410	273	19.1	24.6	27.4	30.2	32.9	35.7	41.2
		24	80.1	847	215	.390	260	18.8	24.7	27.7	30.7	33.6	36.6	42.5
		23 (2)	78.2	804	206	.37	249	18.5	24.7	27.8	31.0	34.1	37.2	43.4
	ISA+10°C 5°C	17 (1)	85.5	1016	250	.45	295	19.2	24.1	26.6	29.1	31.5	34.0	38.9
		16	83.2	944	238	.430	281	19.2	24.5	27.1	29.8	32.4	35.1	40.4
		15	81.0	883	226	.410	268	19.0	24.7	27.5	30.3	33.2	36.0	41.7
		14	78.8	827	215	.390	255	18.7	24.8	27.8	30.8	33.9	36.9	42.9
		13 (2)	76.9	785	206	.37	244	18.4	24.8	27.9	31.1	34.3	37.5	43.9
	ISA+0°C -5°C	6 (1)	84.1	992	250	.45	290	19.1	24.2	26.7	29.2	31.7	34.3	39.3
		5	81.8	922	238	.430	276	19.1	24.5	27.2	29.9	32.7	35.4	40.8
		4	79.6	862	226	.410	263	18.9	24.7	27.6	30.5	33.4	36.3	42.1
		3	77.4	807	215	.390	250	18.6	24.8	27.9	31.0	34.1	37.2	43.4
		3 (2)	75.3	761	205	.37	239	18.2	24.8	28.1	31.3	34.6	37.9	44.5
ISA-10°C -15°C	-4 (1)	82.6	967	250	.45	284	19.1	24.2	26.8	29.4	32.0	34.6	39.7	
	-5	80.3	899	238	.430	271	19.0	24.6	27.3	30.1	32.9	35.7	41.3	
	-6	78.2	841	226	.410	258	18.8	24.8	27.7	30.7	33.7	36.7	42.6	
	-7	76.0	788	215	.390	246	18.5	24.8	28.0	31.2	34.4	37.5	43.9	
	-7 (2)	74.3	749	207	.37	236	18.1	24.8	28.1	31.5	34.8	38.2	44.8	
8000	ISA+20°C 15°C	27 (1)	86.4	1024	248	.45	299	19.4	24.3	26.8	29.2	31.6	34.1	39.0
		26	84.3	968	238	.430	286	19.4	24.6	27.3	29.9	32.5	35.1	40.3
		25	82.0	895	226	.410	273	19.3	24.9	27.7	30.5	33.3	36.1	41.7
		24	79.6	837	215	.390	260	19.1	25.0	28.0	31.0	34.0	37.0	43.0
		23 (2)	76.4	767	200	.36	242	18.5	25.0	28.3	31.5	34.8	38.1	44.6
	ISA+10°C 5°C	17 (1)	85.2	1008	250	.45	295	19.4	24.3	26.8	29.3	31.8	34.2	39.2
		16	82.9	936	238	.430	281	19.3	24.7	27.4	30.0	32.7	35.4	40.7
		15	80.6	874	226	.410	268	19.2	24.9	27.8	30.7	33.5	36.4	42.1
		14	78.3	818	215	.390	255	19.0	25.1	28.1	31.2	34.2	37.3	43.4
		13 (2)	74.9	743	199	.36	236	18.3	25.0	28.4	31.8	35.1	38.5	45.2
	ISA+0°C -5°C	6 (1)	83.8	984	250	.45	290	19.3	24.4	26.9	29.4	32.0	34.5	39.6
		5	81.4	914	238	.430	276	19.3	24.7	27.5	30.2	32.9	35.7	41.2
		4	79.3	853	226	.410	263	19.1	25.0	27.9	30.8	33.8	36.7	42.6
		3	77.0	798	215	.390	250	18.8	25.1	28.2	31.4	34.5	37.6	43.9
		2 (2)	73.2	718	197	.36	230	18.1	25.0	28.5	32.0	35.5	39.0	45.9
ISA-10°C -15°C	-4 (1)	82.3	960	250	.45	284	19.2	24.4	27.0	29.6	32.2	34.8	40.0	
	-5	80.0	891	238	.430	271	19.2	24.8	27.6	30.4	33.2	36.0	41.6	
	-6	77.9	832	226	.410	258	19.0	25.0	28.0	31.0	34.0	37.0	43.0	
	-7	75.6	778	215	.390	246	18.7	25.1	28.3	31.6	34.8	38.0	44.4	
	-8 (2)	72.7	719	202	.37	231	18.2	25.1	28.6	32.1	35.5	39.0	46.0	
7500	ISA+20°C 15°C	27 (1)	86.4	1024	249	.45	300	19.5	24.4	26.9	29.3	31.7	34.2	39.1
		26	84.0	962	238	.430	286	19.6	24.8	27.4	30.1	32.7	35.3	40.6
		25	81.8	888	226	.410	273	19.5	25.1	27.9	30.7	33.5	36.3	42.0
		24	79.3	830	215	.390	260	19.2	25.3	28.3	31.3	34.3	37.3	43.3
		22 (2)	74.8	733	195	.35	235	18.4	25.2	28.7	32.1	35.5	38.9	45.7
	ISA+10°C 5°C	17 (1)	85.1	1003	250	.45	295	19.5	24.5	26.9	29.4	31.9	34.4	39.4
		16	82.6	930	238	.430	281	19.5	24.8	27.5	30.2	32.9	35.6	41.0
		14	79.2	839	221	.400	262	19.3	25.2	28.2	31.2	34.2	37.1	43.1
		13	75.6	758	204	.370	242	18.7	25.3	28.6	31.9	35.2	38.5	45.1
		12 (2)	72.7	701	191	.35	227	18.1	25.2	28.8	32.3	35.9	39.5	46.6
	ISA+0°C -5°C	6 (1)	83.6	979	250	.45	290	19.4	24.5	27.1	29.6	32.2	34.7	39.8
		5	81.2	908	238	.430	276	19.4	24.9	27.6	30.4	33.2	35.9	41.4
		4	77.9	819	221	.400	257	19.2	25.3	28.3	31.4	34.4	37.5	43.6
		3	74.3	740	204	.370	238	18.6	25.4	28.7	32.1	35.5	38.9	45.6
		2 (2)	71.6	687	192	.35	224	18.0	25.3	28.9	32.5	36.2	39.8	47.1
ISA-10°C -15°C	-4 (1)	82.1	955	250	.45	284	19.3	24.6	27.2	29.8	32.4	35.0	40.3	
	-5	79.8	885	238	.430	271	19.3	24.9	27.8	30.6	33.4	36.2	41.9	
	-6	76.5	798	221	.400	252	19.0	25.3	28.4	31.6	34.7	37.8	44.1	
	-8	72.8	722	204	.370	233	18.4	25.4	28.8	32.3	35.8	39.2	46.2	
	-8 (2)	70.6	679	194	.35	222	17.9	25.3	29.0	32.6	36.3	40.0	47.4	
7000	ISA+20°C 15°C	27 (1)	86.3	1021	250	.45	300	19.6	24.5	27.0	29.4	31.9	34.3	39.2
		25	82.7	913	232	.420	279	19.6	25.1	27.9	30.6	33.3	36.1	41.5
		24	79.0	823	215	.390	260	19.4	25.5	28.5	31.5	34.6	37.6	43.7
		23	75.2	742	199	.360	240	18.8	25.5	28.9	32.3	35.6	39.0	45.8
		22 (2)	72.1	684	185	.34	223	18.1	25.4	29.0	32.7	36.4	40.0	47.3
	ISA+10°C 5°C	17 (1)	84.9	998	250	.45	295	19.6	24.6	27.1	29.6	32.1	34.6	39.6
		15	81.3	892	232	.420	275	19.6	25.2	28.0	30.8	33.6	36.4	42.0
		14	77.7	804	215	.390	255	19.3	25.5	28.6	31.7	34.8	37.9	44.1
		12	74.0	725	199	.360	235	18.7	25.6	29.0	32.5	35.9	39.4	46.3
		11 (2)	70.7	663	184	.33	218	17.9	25.4	29.2	32.9	36.7	40.5	48.0
	ISA+0°C -5°C	6 (1)	83.4	974	250	.45	290	19.5	24.6	27.2	29.8	32.3	34.9	40.0
		5	79.9	871	232	.420	270	19.5	25.2	28.1	30.9	33.8	36.7	42.4
		3	76.4	785	215	.390	250	19.2	25.5	28.7	31.9	35.1	38.3	44.6
		2	72.7	708	199	.360	231	18.5	25.6	29.1	32.7	36.2	39.7	46.8
		1 (2)	70.2	662	188	.34	219	18.0	25.5	29.3	33.1	36.9	40.6	48.2
ISA-10°C -15°C	-4 (1)	82.0	950	250	.45	284	19.4	24.7	27.3	29.9	32.6	35.2	40.5	
	-6	78.5	850	232	.420	264	19.4	25.2	28.2	31.1	34.1	37.0	42.9	
	-7	75.0	766	215	.390	246	19.0	25.6	28.8	32.1	35.3	38.6	45.1	
	-8	71.2	691	199	.360	227	18.4	25.6	29.2	32.8	36.5	40.1	47.3	
	-9 (2)	67.9	627	182	.33	209	17.3	25.3	29.3	33.3	37.2	41.2	49.2	

(1) MAXIMUM CRUISE THRUST

(2) THRUST FOR MAXIMUM RANGE (APPROXIMATE)

ANTI-ICE SYSTEMS ON		
MAX FAN % RPM		
5°C	-5°C	-15°C
85.0	83.6	82.1
INCREASE FUEL FLOWS AND DECREASE SPECIFIC RANGES BY 4%		



## CRUISE 15000 FEET

ANTI-ICE SYSTEMS OFF

TWO ENGINES

WT LBS	TEMP	RAT °C	FAN PERCENT RPM	FUEL FLOW LBS/HR	KIAS	IND MACH	KTAS	NAUTICAL MILES / 100 LBS FUEL						
								HEAD WIND			ZERO WIND	TAIL WIND		
								100 KT	50 KT	25 KT		25 KT	50 KT	100 KT
8645	ISA+20°C 5°C	17 (1)	86.3	875	227	.45	295	22.3	28.0	30.9	33.7	36.6	39.5	45.2
		16	85.1	844	221	.440	288	22.2	28.1	31.1	34.1	37.0	40.0	45.9
		15	84.1	818	216	.430	281	22.1	28.2	31.3	34.3	37.4	40.5	46.6
		14	83.1	794	211	.420	275	22.0	28.3	31.4	34.6	37.7	40.9	47.2
		14 (2)	81.4	754	202	.40	263	21.7	28.3	31.6	35.0	38.3	41.6	48.2
	ISA+10°C -5°C	8 (1)	88.6	960	245	.49	312	22.1	27.3	29.9	32.5	35.1	37.8	43.0
		7	86.7	905	236	.470	302	22.3	27.8	30.6	33.3	36.1	38.8	44.4
		6	84.7	850	226	.450	289	22.2	28.1	31.0	34.0	36.9	39.9	45.8
		5	82.7	799	216	.430	276	22.0	28.3	31.4	34.5	37.7	40.8	47.1
		4 (2)	80.0	735	202	.40	258	21.6	28.4	31.8	35.2	38.6	42.0	48.8
	ISA+0°C -15°C	-2 (1)	88.0	969	250	.50	312	21.9	27.1	29.6	32.2	34.8	37.4	42.5
		-3	85.2	882	236	.470	296	22.2	27.9	30.7	33.5	36.4	39.2	44.9
		-4	83.2	829	226	.450	283	22.1	28.2	31.2	34.2	37.2	40.2	46.3
		-5	81.2	779	216	.430	271	21.9	28.3	31.6	34.8	38.0	41.2	47.6
		-6 (2)	78.5	716	202	.40	253	21.4	28.4	31.9	35.4	38.9	42.4	49.3
	ISA-10°C -25°C	-12 (1)	86.4	945	250	.50	306	21.8	27.1	29.8	32.4	35.1	37.7	43.0
		-14	83.6	860	236	.470	290	22.1	27.9	30.8	33.7	36.6	39.5	45.4
		-15	81.7	807	226	.450	278	22.0	28.2	31.3	34.4	37.5	40.6	46.8
		-15	79.7	759	216	.430	266	21.8	28.4	31.7	35.0	38.3	41.6	48.2
		-17 (2)	77.1	699	202	.40	249	21.3	28.4	32.0	35.6	39.2	42.7	49.9
8000	ISA+20°C 5°C	17 (1)	86.2	875	228	.45	297	22.6	28.3	31.1	34.0	36.8	39.7	45.4
		16	84.7	834	221	.440	288	22.5	28.5	31.5	34.5	37.5	40.5	46.5
		15	82.6	783	211	.420	275	22.3	28.7	31.9	35.1	38.3	41.4	47.8
		14	80.6	736	200	.400	262	22.0	28.8	32.2	35.6	38.9	42.3	49.1
		14 (2)	79.6	716	196	.39	256	21.7	28.7	32.2	35.7	39.2	42.7	49.7
	ISA+10°C -5°C	8 (1)	88.5	959	246	.49	314	22.3	27.5	30.1	32.7	35.3	37.9	43.1
		7	85.3	868	231	.460	295	22.5	28.3	31.1	34.0	36.9	39.8	45.5
		6	83.2	814	221	.440	282	22.4	28.5	31.6	34.7	37.7	40.8	47.0
		5	81.2	764	211	.420	270	22.2	28.7	32.0	35.3	38.5	41.8	48.4
		4 (2)	78.2	698	196	.39	251	21.6	28.8	32.4	35.9	39.5	43.1	50.3
	ISA+0°C -15°C	-2 (1)	87.7	961	250	.50	312	22.1	27.3	29.9	32.5	35.1	37.7	42.9
		-3	84.8	874	236	.470	296	22.4	28.1	31.0	33.9	36.7	39.6	45.3
		-5	81.8	794	221	.440	277	22.3	28.6	31.7	34.9	38.0	41.2	47.5
		-6	78.8	722	206	.410	258	21.9	28.8	32.3	35.8	39.2	42.7	49.6
		-7 (2)	76.7	678	195	.39	245	21.4	28.8	32.5	36.2	39.9	43.6	50.9
	ISA-10°C -25°C	-12 (1)	85.1	936	250	.50	306	22.0	27.4	30.0	32.7	35.4	38.0	43.4
		-14	83.3	851	236	.470	290	22.3	28.2	31.1	34.1	37.0	39.9	45.8
		-15	80.3	774	221	.440	272	22.2	28.6	31.9	35.1	38.3	41.6	48.0
		-16	77.3	704	206	.410	253	21.8	28.9	32.4	36.0	39.5	43.1	50.2
		-17 (2)	75.5	667	197	.39	243	21.4	28.9	32.6	36.3	40.1	43.8	51.3
7500	ISA+20°C 5°C	17 (1)	86.2	874	230	.46	299	22.7	28.4	31.3	34.2	37.0	39.9	45.6
		16	84.4	827	221	.440	288	22.7	28.7	31.7	34.8	37.8	40.8	46.9
		15	82.3	775	211	.420	275	22.5	29.0	32.2	35.4	38.6	41.9	48.3
		14	80.2	728	200	.400	262	22.2	29.1	32.5	36.0	39.4	42.8	49.7
		13 (2)	77.8	682	190	.38	248	21.7	29.0	32.7	36.4	40.0	43.7	51.0
	ISA+10°C -5°C	8 (1)	88.5	959	247	.49	315	22.4	27.6	30.2	32.8	35.4	38.0	43.3
		7	85.1	861	231	.460	295	22.7	28.5	31.4	34.3	37.2	40.1	45.9
		5	81.9	782	216	.430	276	22.5	28.9	32.1	35.3	38.5	41.7	48.1
		4	78.8	710	200	.400	257	22.1	29.1	32.6	36.2	39.7	43.2	50.2
		3 (2)	76.5	666	190	.38	244	21.6	29.1	32.8	36.6	40.3	44.1	51.6
	ISA+0°C -15°C	-2 (1)	87.5	955	250	.50	312	22.2	27.5	30.1	32.7	35.3	37.9	43.2
		-3	84.6	867	236	.470	296	22.6	28.3	31.2	34.1	37.0	39.9	45.6
		-5	81.5	787	221	.440	277	22.5	28.8	32.0	35.2	38.4	41.5	47.9
		-6	78.4	715	206	.410	258	22.1	29.1	32.6	36.1	39.6	43.1	50.1
		-7 (2)	75.0	646	189	.38	238	21.4	29.1	33.0	36.8	40.7	44.6	52.3
	ISA-10°C -25°C	-12 (1)	86.0	930	250	.50	306	22.2	27.5	30.2	32.9	35.6	38.3	43.7
		-14	83.0	845	236	.470	290	22.5	28.4	31.4	34.3	37.3	40.2	46.1
		-15	80.0	767	221	.440	272	22.4	28.9	32.1	35.4	38.7	41.9	48.4
		-16	77.0	697	206	.410	253	22.0	29.2	32.8	36.3	39.9	43.5	50.7
		-17 (2)	73.8	637	191	.38	236	21.3	29.1	33.1	37.0	40.9	44.8	52.7
7000	ISA+20°C 5°C	17 (1)	86.2	874	231	.46	300	22.9	28.6	31.5	34.3	37.2	40.0	45.8
		16	84.1	821	221	.440	288	22.9	29.0	32.0	35.0	38.1	41.1	47.2
		15	81.9	768	211	.420	275	22.7	29.2	32.5	35.7	39.0	42.2	48.8
		14	79.8	720	200	.400	262	22.4	29.4	32.9	36.3	39.8	43.3	50.2
		13 (2)	75.9	647	184	.37	240	21.6	29.3	33.2	37.1	40.9	44.8	52.5
	ISA+10°C -5°C	8 (1)	88.5	959	248	.49	316	22.5	27.7	30.3	32.9	35.6	38.2	43.4
		7	84.8	855	231	.460	295	22.8	28.7	31.6	34.5	37.4	40.4	46.2
		5	81.6	775	216	.430	276	22.7	29.2	32.4	35.6	38.8	42.1	48.5
		4	78.4	703	200	.400	257	22.3	29.4	33.0	36.5	40.1	43.7	50.8
		3 (2)	74.4	628	183	.36	234	21.4	29.4	33.3	37.3	41.3	45.3	53.2
	ISA+0°C -15°C	-2 (1)	87.4	949	250	.50	312	22.4	27.6	30.3	32.9	35.5	38.2	43.4
		-4	83.3	834	231	.460	290	22.7	28.7	31.7	34.7	37.7	40.7	46.7
		-5	80.1	756	216	.430	271	22.6	29.2	32.5	35.8	39.1	42.4	49.1
		-6	77.0	685	200	.400	252	22.2	29.5	33.1	36.8	40.4	44.1	51.4
		-8 (2)	73.3	618	184	.37	232	21.3	29.4	33.5	37.5	41.6	45.6	53.7
	ISA-10°C -25°C	-12 (1)	85.8	925	250	.50	306	22.3	27.7	30.4	33.1	35.8	38.5	43.9
		-14	81.8	813	231	.460	284	22.6	28.8	31.9	34.9	38.0	41.1	47.2
		-15	78.7	737	216	.430	266	22.5	29.3	32.7	36.0	39.4	42.8	49.6
		-17	75.4	668	200	.400	247	22.0	29.5	33.3	37.0	40.7	44.5	52.0
		-18 (2)	71.2	590	181	.36	223	20.9	29.3	33.6	37.8	42.0	46.3	54.7

(1) MAXIMUM CRUISE THRUST

(2) THRUST FOR MAXIMUM RANGE (APPROXIMATE)

ANTI-ICE SYSTEMS ON		
MAX FAN % RPM		
-5°C	-15°C	-25°C
88.4	87.5	85.9
INCREASE FUEL FLOWS AND DECREASE SPECIFIC RANGES BY 4%		

## CRUISE 17000 FEET

ANTI-ICE SYSTEMS OFF

TWO ENGINES

WT LBS	TEMP	RAT °C	FAN PERCENT RPM	FUEL FLOW LBS/HR	IND MACH	KTAS	NAUTICAL MILES / 100 LBS FUEL								
							HEADWIND			ZERO WIND	TAILWIND				
							100 KT	50 KT	25 KT		25 KT	50 KT	100 KT		
8645	ISA+20°C 1°C	13	(1)	87.3	846	224	.46	301	23.7	29.6	32.6	35.5	38.5	41.4	47.3
		13		86.0	813	217	.450	292	23.6	29.8	32.8	35.9	39.0	42.0	48.2
		12		85.0	790	212	.440	286	23.5	29.8	33.0	36.2	39.3	42.5	48.8
		12		84.0	767	207	.430	279	23.4	29.9	33.1	36.4	39.7	42.9	49.4
		11	(2)	82.6	734	200	.42	269	23.1	29.9	33.3	36.7	40.1	43.5	50.3
	ISA+10°C -9°C	5	(1)	89.4	930	241	.50	317	23.3	28.7	31.4	34.1	36.8	39.5	44.8
		4		87.5	872	232	.480	306	23.6	29.3	32.2	35.1	37.9	40.8	46.5
		3		85.5	818	222	.460	293	23.6	29.7	32.8	35.8	38.9	41.9	48.1
		2		83.5	770	212	.440	280	23.4	29.9	33.1	36.4	39.6	42.9	49.4
	ISA+0°C -19°C	1	(2)	81.2	717	200	.42	265	23.0	30.0	33.4	36.9	40.4	43.9	50.9
		-5	(1)	89.5	968	250	.52	322	22.9	28.1	30.7	33.3	35.9	38.4	43.6
		-6		87.0	881	237	.490	306	23.4	29.1	31.9	34.7	37.6	40.4	46.1
-8			84.0	797	222	.460	287	23.5	29.8	32.9	36.1	39.2	42.3	48.6	
ISA-10°C -29°C	-9		81.1	729	207	.430	269	23.1	30.0	33.4	36.9	40.3	43.7	50.6	
	-10	(2)	79.8	700	200	.42	260	22.9	30.0	33.6	37.1	40.7	44.3	51.4	
	-16	(1)	87.8	943	250	.52	316	22.9	28.2	30.8	33.5	36.1	38.8	44.1	
	-17		85.4	858	237	.490	300	23.3	29.1	32.0	35.0	37.9	40.8	46.6	
	-18		83.4	801	227	.470	288	23.4	29.7	32.8	35.9	39.0	42.2	48.4	
	-19		81.4	754	217	.450	276	23.3	29.9	33.3	36.6	39.9	43.2	49.8	
	-20	(2)	78.3	683	201	.42	255	22.7	30.0	33.7	37.4	41.0	44.7	52.0	
8000	ISA+20°C 1°C	13	(1)	87.3	846	225	.47	303	24.0	29.9	32.8	35.8	38.7	41.7	47.6
		13		85.5	803	217	.450	292	23.9	30.1	33.2	36.3	39.5	42.6	48.8
		12		83.5	756	207	.430	279	23.7	30.3	33.6	36.9	40.2	43.5	50.2
		11		81.5	711	198	.410	266	23.4	30.4	33.9	37.4	40.9	44.4	51.5
		10	(2)	81.0	700	195	.40	263	23.2	30.4	34.0	37.5	41.1	44.7	51.8
	ISA+10°C -9°C	5	(1)	89.4	930	242	.50	319	23.5	28.9	31.6	34.3	37.0	39.6	45.0
		4		87.2	863	232	.480	306	23.8	29.6	32.5	35.4	38.3	41.2	47.0
		3		85.1	808	222	.460	293	23.9	30.1	33.2	36.3	39.3	42.4	48.6
		2		83.1	760	212	.440	280	23.7	30.3	33.6	36.9	40.2	43.4	50.0
	ISA+0°C -19°C	0	(2)	79.6	684	195	.41	258	23.1	30.4	34.1	37.7	41.4	45.1	52.4
		-5	(1)	89.3	959	250	.52	322	23.1	28.4	31.0	33.6	36.2	38.8	44.0
		-6		86.7	872	237	.490	306	23.6	29.4	32.2	35.1	38.0	40.8	46.6
-8			83.5	788	222	.460	287	23.8	30.1	33.3	36.5	39.7	42.8	49.2	
ISA-10°C -29°C	-9		80.6	719	207	.430	269	23.5	30.4	33.9	37.4	40.9	44.3	51.3	
	-10	(2)	78.1	665	195	.40	253	22.9	30.5	34.2	38.0	41.8	45.5	53.0	
	-16	(1)	87.6	934	250	.52	316	23.1	28.4	31.1	33.8	36.5	39.1	44.5	
	-17		85.1	849	237	.490	300	23.5	29.4	32.4	35.3	38.3	41.2	47.1	
	-18		82.0	767	222	.460	282	23.7	30.2	33.4	36.7	40.0	43.2	49.7	
	-20		79.1	700	207	.430	263	23.3	30.5	34.0	37.6	41.2	44.8	51.9	
	-21	(2)	76.7	650	195	.41	248	22.8	30.5	34.3	38.2	42.0	45.9	53.6	
7500	ISA+20°C 1°C	14	(1)	87.2	846	227	.47	305	24.2	30.1	33.0	36.0	38.9	41.9	47.8
		13		85.2	796	217	.450	292	24.1	30.4	33.5	36.7	39.8	43.0	49.2
		12		83.1	748	207	.430	279	23.9	30.6	34.0	37.3	40.7	44.0	50.7
		11		81.1	703	198	.410	266	23.6	30.8	34.3	37.9	41.4	45.0	52.1
		10	(2)	79.4	670	190	.39	256	23.3	30.7	34.5	38.2	41.9	45.7	53.1
	ISA+10°C -9°C	5	(1)	89.3	930	243	.50	320	23.6	29.0	31.7	34.4	37.1	39.8	45.2
		4		86.9	856	232	.480	306	24.0	29.9	32.8	35.7	38.6	41.6	47.4
		2		83.7	777	217	.450	287	24.0	30.5	33.7	36.9	40.1	43.3	49.8
		1		80.7	707	202	.420	268	23.7	30.8	34.3	37.8	41.4	44.9	52.0
	ISA+0°C -19°C	0	(2)	78.1	654	190	.39	251	23.1	30.8	34.6	38.4	42.3	46.1	53.7
		-5	(1)	89.1	953	250	.52	322	23.3	28.5	31.2	33.8	36.4	39.0	44.3
		-7		85.3	834	232	.480	300	23.9	29.9	32.9	35.9	38.9	41.9	47.9
-8			82.2	757	217	.450	281	23.9	30.5	33.8	37.1	40.4	43.7	50.3	
ISA-10°C -29°C	-10		79.2	690	202	.420	263	23.6	30.8	34.4	38.1	41.7	45.3	52.6	
	-11	(2)	76.4	632	188	.39	245	22.9	30.8	34.8	38.7	42.7	46.6	54.5	
	-16	(1)	87.4	928	250	.52	316	23.2	28.6	31.3	34.0	36.7	39.4	44.8	
	-17		84.8	843	237	.490	300	23.7	29.7	32.6	35.6	38.6	41.5	47.5	
	-18		81.7	761	222	.460	282	23.9	30.4	33.7	37.0	40.3	43.6	50.2	
	-20		78.7	693	207	.430	263	23.6	30.8	34.4	38.0	41.6	45.2	52.4	
	-21	(2)	75.2	625	191	.40	243	22.8	30.8	34.8	38.8	42.8	46.8	54.8	
7000	ISA+20°C 1°C	14	(1)	87.2	846	228	.47	306	24.3	30.3	33.2	36.2	39.1	42.1	48.0
		13		84.9	789	217	.450	292	24.3	30.7	33.8	37.0	40.2	43.3	49.7
		12		82.8	740	207	.430	279	24.2	30.9	34.3	37.7	41.1	44.4	51.2
		11		80.7	695	198	.410	266	23.9	31.1	34.7	38.3	41.9	45.5	52.7
		9	(2)	77.5	635	183	.38	247	23.2	31.1	35.0	39.0	42.9	46.8	54.7
	ISA+10°C -9°C	5	(1)	89.3	930	244	.50	321	23.8	29.1	31.8	34.5	37.2	39.9	45.3
		3		85.5	821	227	.470	299	24.3	30.4	33.4	36.5	39.5	42.6	48.7
		2		82.4	746	212	.440	280	24.2	30.9	34.2	37.6	40.9	44.3	51.0
		0		79.3	678	198	.410	261	23.8	31.2	34.9	38.5	42.2	45.9	53.3
	ISA+0°C -19°C	-1	(2)	75.9	615	182	.38	241	23.0	31.1	35.2	39.2	43.3	47.3	55.5
		-5	(1)	88.9	947	250	.52	322	23.4	28.7	31.4	34.0	36.6	39.3	44.6
		-7		85.1	828	232	.480	300	24.1	30.2	33.2	36.2	39.2	42.2	48.3
-8			81.9	751	217	.450	281	24.1	30.8	34.1	37.5	40.8	44.1	50.8	
ISA-10°C -29°C	-10		78.9	682	202	.420	263	23.8	31.1	34.8	38.5	42.1	45.8	53.1	
	-11	(2)	74.6	601	182	.38	237	22.8	31.1	35.3	39.5	43.6	47.8	56.1	
	-16	(1)	87.3	923	250	.52	316	23.4	28.8	31.5	34.2	36.9	39.6	45.0	
	-17		83.5	807	232	.480	294	24.0	30.2	33.3	36.4	39.5	42.6	48.8	
	-19		80.4	731	217	.450	276	24.0	30.8	34.3	37.7	41.1	44.5	51.4	
	-20		77.4	665	202	.420	257	23.7	31.2	34.9	38.7	42.5	46.2	53.7	
	-22	(2)	73.0	585	182	.38	232	22.6	31.1	35.4	39.7	44.0	48.2	56.8	

(1) MAXIMUM CRUISE THRUST

(2) THRUST FOR MAXIMUM RANGE (APPROXIMATE)

ANTI-ICE SYSTEMS ON		
MAX FAN % RPM		
-9°C	-19°C	-29°C
88.8	89.0	87.4



## CRUISE 21000 FEET

ANTI-ICE SYSTEMS OFF

TWO ENGINES

WT LBS	TEMP	RAT °C	FAN PERCENT RPM	FUEL FLOW LBS/HR	KIAS	IND MACH	KTAS	NAUTICAL MILES / 100 LBS FUEL						
								HEAD WIND			ZERO WIND	TAIL WIND		
								100 KT	50 KT	25 KT		25 KT	50 KT	100 KT
8545	ISA+20°C -7°C	5 (1)	87.9	759	210	.47	302	26.6	33.2	36.5	39.7	43.0	46.3	52.9
		5	86.8	733	205	.460	294	26.5	33.3	36.7	40.1	43.5	46.9	53.8
		4 (2)	85.6	707	199	.45	286	26.3	33.4	36.9	40.4	44.0	47.5	54.6
	ISA+10°C -17°C	-3 (1)	90.0	845	229	.51	321	26.2	32.1	35.0	38.0	41.0	43.9	49.8
		-4	88.9	811	223	.500	313	26.3	32.5	35.6	38.7	41.7	44.8	51.0
		-5	87.1	759	214	.480	301	26.5	33.1	36.4	39.7	43.0	46.3	52.9
	ISA+0°C -27°C	-6	85.2	715	205	.460	289	26.4	33.4	36.9	40.4	43.9	47.4	54.4
		-6 (2)	84.1	690	199	.45	281	26.2	33.4	37.1	40.7	44.3	47.9	55.2
		-12 (1)	91.0	917	243	.54	333	25.5	30.9	33.7	36.4	39.1	41.8	47.3
	ISA-10°C -37°C	-13	89.0	846	232	.520	319	25.9	31.9	34.8	37.8	40.7	43.7	49.6
		-14	87.3	790	223	.500	307	26.2	32.6	35.7	38.9	42.1	45.2	51.6
		-15	85.5	739	214	.480	295	26.4	33.2	36.6	39.9	43.3	46.7	53.5
ISA-10°C -37°C	-17 (2)	82.5	671	199	.45	275	26.0	33.5	37.2	40.9	44.7	48.4	55.8	
	-22 (1)	90.6	940	250	.56	336	25.1	30.4	33.0	35.7	38.3	41.0	46.3	
	-23	88.2	853	237	.530	319	25.7	31.5	34.5	37.4	40.3	43.3	49.1	
ISA-10°C -37°C	-25	85.6	769	223	.500	301	26.1	32.6	35.9	39.2	42.4	45.7	52.2	
	-26	82.9	698	209	.470	283	26.2	33.4	37.0	40.6	44.1	47.7	54.9	
	-27 (2)	81.0	654	199	.45	269	25.9	33.5	37.4	41.2	45.0	48.8	56.5	
8000	ISA+20°C -7°C	6 (1)	87.8	759	212	.48	305	27.0	33.6	36.9	40.1	43.4	46.7	53.3
		5	87.1	743	209	.470	300	27.0	33.7	37.1	40.4	43.8	47.1	53.9
		5	86.2	721	205	.460	294	26.9	33.8	37.3	40.8	44.2	47.7	54.6
	ISA+10°C -17°C	4	85.2	701	200	.450	288	26.8	33.9	37.5	41.0	44.6	48.2	55.3
		3 (2)	83.5	667	192	.43	276	26.4	33.9	37.7	41.4	45.2	48.9	56.4
		-3 (1)	89.9	844	230	.52	323	26.4	32.3	35.3	38.2	41.2	44.2	50.1
	ISA+0°C -27°C	-4	87.6	773	218	.490	307	26.8	33.3	36.5	39.7	43.0	46.2	52.7
		-5	85.6	725	209	.470	295	26.9	33.8	37.2	40.7	44.1	47.6	54.5
		-6	83.7	684	200	.450	282	26.7	34.0	37.6	41.3	45.0	48.6	55.9
	ISA+0°C -27°C	-7 (2)	82.1	651	192	.43	271	26.3	34.0	37.8	41.7	45.5	49.4	57.0
		-12 (1)	91.0	917	244	.55	335	25.6	31.1	33.8	36.5	39.3	42.0	47.4
		-13	88.7	837	232	.520	319	26.2	32.2	35.2	38.2	41.2	44.2	50.1
ISA-10°C -37°C	-15	86.0	753	218	.490	301	26.7	33.3	36.7	40.0	43.3	46.6	53.2	
	-16	83.1	685	205	.460	283	26.7	34.0	37.6	41.3	44.9	48.6	55.9	
	-17 (2)	80.6	635	193	.43	266	26.2	34.0	38.0	41.9	45.9	49.8	57.7	
ISA-10°C -37°C	-22 (1)	90.4	932	250	.56	336	25.3	30.6	33.3	36.0	38.7	41.4	46.7	
	-23	87.9	844	237	.530	319	25.9	31.9	34.8	37.8	40.8	43.7	49.6	
	-25	85.2	759	223	.500	301	26.5	33.1	36.4	39.7	42.9	46.2	52.8	
ISA-10°C -37°C	-26	82.4	687	209	.470	283	26.6	33.9	37.5	41.2	44.8	48.5	55.7	
	-28 (2)	79.2	620	193	.43	261	26.0	34.1	38.1	42.1	46.2	50.2	58.3	
	7500	ISA+20°C -7°C	6 (1)	87.8	759	214	.48	307	27.2	33.8	37.1	40.4	43.7	47.0
5			86.7	735	209	.470	300	27.3	34.1	37.5	40.9	44.3	47.7	54.5
5			85.7	713	205	.460	294	27.2	34.2	37.7	41.2	44.7	48.3	55.3
ISA+10°C -17°C		4	84.8	693	200	.450	288	27.1	34.3	37.9	41.5	45.1	48.8	56.0
		3 (2)	82.0	637	187	.42	269	26.5	34.4	38.3	42.2	46.1	50.1	57.9
		-3 (1)	89.9	844	231	.52	324	26.6	32.5	35.5	38.4	41.4	44.3	50.3
ISA+0°C -27°C		-4	87.3	766	218	.490	307	27.1	33.6	36.9	40.1	43.4	46.7	53.2
		-5	85.2	717	209	.470	295	27.2	34.2	37.6	41.1	44.6	48.1	55.1
		-6	83.3	675	200	.450	282	27.0	34.4	38.1	41.8	45.5	49.2	56.6
ISA+0°C -27°C		-7 (2)	80.6	622	187	.42	264	26.4	34.4	38.5	42.5	46.5	50.5	58.6
		-12 (1)	91.0	918	245	.55	337	25.8	31.2	33.9	36.7	39.4	42.1	47.6
		-13	88.5	830	232	.520	319	26.4	32.5	35.5	38.5	41.5	44.5	50.5
ISA-10°C -37°C	-15	85.7	746	218	.490	301	27.0	33.7	37.0	40.4	43.7	47.1	53.8	
	-16	82.7	677	205	.460	283	27.0	34.4	38.1	41.8	45.4	49.1	56.5	
	-18 (2)	79.1	607	187	.42	259	26.2	34.5	38.6	42.7	46.9	51.0	59.2	
ISA-10°C -37°C	-22 (1)	90.2	925	250	.56	336	25.4	30.9	33.6	36.3	39.0	41.7	47.1	
	-24	86.8	808	232	.520	313	26.4	32.5	35.6	38.7	41.8	44.9	51.1	
	-25	84.0	726	218	.490	295	26.9	33.7	37.2	40.6	44.1	47.5	54.4	
ISA-10°C -37°C	-26	81.1	659	205	.460	277	26.8	34.4	38.2	42.0	45.8	49.6	57.2	
	-28 (2)	77.8	595	188	.42	255	26.1	34.5	38.7	42.9	47.1	51.3	59.7	
	7000	ISA+20°C -7°C	6 (1)	87.7	759	215	.48	309	27.5	34.1	37.4	40.7	44.0	47.2
5			85.3	706	205	.460	294	27.5	34.6	38.1	41.7	45.2	48.8	55.9
4			83.4	665	196	.440	281	27.3	34.8	38.5	42.3	46.1	49.8	57.3
ISA+10°C -17°C		3	81.4	627	187	.420	269	26.9	34.9	38.9	42.8	46.8	50.8	58.8
		2 (2)	80.4	609	182	.41	262	26.6	34.9	39.0	43.1	47.2	51.3	59.5
		-3 (1)	89.9	844	232	.52	326	26.7	32.7	35.6	38.6	41.6	44.5	50.4
ISA+0°C -27°C		-4	87.0	759	218	.490	307	27.3	33.9	37.2	40.5	43.8	47.1	53.7
		-6	83.8	688	205	.460	289	27.4	34.7	38.3	41.9	45.6	49.2	56.5
		-7	80.9	630	191	.430	270	27.0	34.9	38.9	42.9	46.8	50.8	58.7
ISA+0°C -27°C		-8 (2)	79.1	596	183	.41	258	26.5	34.9	39.1	43.3	47.5	51.7	60.1
		-12 (1)	91.0	919	246	.55	338	25.9	31.3	34.1	36.8	39.5	42.2	47.7
		-13	88.3	823	232	.520	319	26.7	32.7	35.8	38.8	41.8	44.9	51.0
ISA-10°C -37°C	-15	85.4	739	218	.490	301	27.2	34.0	37.4	40.8	44.1	47.5	54.3	
	-16	82.3	670	205	.460	283	27.3	34.7	38.5	42.2	45.9	49.7	57.1	
	-18 (2)	77.6	579	182	.41	252	26.3	35.0	39.3	43.6	47.9	52.2	60.9	
ISA-10°C -37°C	-22 (1)	90.0	920	250	.56	336	25.6	31.0	33.8	36.5	39.2	41.9	47.4	
	-24	86.6	802	232	.520	313	26.6	32.8	35.9	39.0	42.2	45.3	51.5	
	-26	82.7	695	214	.480	289	27.2	34.4	38.0	41.6	45.2	48.8	56.0	
ISA-10°C -37°C	-27	78.8	615	196	.440	265	26.8	35.0	39.0	43.1	47.2	51.2	59.3	
	-29 (2)	76.0	565	182	.41	248	26.1	35.0	39.4	43.8	48.2	52.7	61.5	

(1) MAXIMUM CRUISE THRUST

(2) THRUST FOR MAXIMUM RANGE (APPROXIMATE)

ANTI-ICE SYSTEMS ON		
MAX FAN % RPM		
-17°C	-27°C	-37°C
89.3	90.0	90.1
INCREASE FUEL FLOW AND DECREASE SPECIFIC RANGES BY 4%		



## CRUISE 25000 FEET

ANTI-ICE SYSTEMS OFF

TWO ENGINES

WT LBS	TEMP	RAT °C	FAN PERCENT RPM	FUEL FLOW LBS/HR	KIAS	IND MACH	KTAS	NAUTICAL MILES / 100 LBS FUEL							
								HEAD WIND			ZERO WIND	TAIL WIND			
								100 KT	50 KT	25 KT		25 KT	50 KT	100 KT	
8645	ISA+20°C -15°C	-2	(1)	88.3	684	197	.48	303	29.7	37.0	40.6	44.3	47.9	51.6	58.9
		-3	(2)	87.6	666	193	.47	297	29.6	37.1	40.8	44.6	48.3	52.1	59.6
	ISA+10°C -25°C	-10	(1)	90.8	779	218	.53	327	29.2	35.6	38.8	42.1	45.3	48.5	54.9
		-11		89.9	752	214	.520	321	29.4	36.0	39.4	42.7	46.0	49.3	56.0
		-11		89.1	728	209	.510	315	29.5	36.4	39.8	43.2	46.7	50.1	57.0
		-12		88.3	706	205	.500	309	29.6	36.7	40.2	43.7	47.3	50.8	57.9
	ISA+0°C -35°C	-13	(2)	86.0	648	193	.47	291	29.5	37.2	41.0	44.9	48.7	52.6	60.3
		-19	(1)	91.8	843	232	.56	340	28.5	34.4	37.4	40.3	43.3	46.3	52.2
		-21		89.8	781	222	.540	326	29.0	35.4	38.6	41.8	45.0	48.2	54.6
		-22		88.2	732	214	.520	314	29.3	36.1	39.5	43.0	46.4	49.8	56.6
	ISA-10°C -45°C	-22		86.6	687	205	.500	302	29.5	36.7	40.4	44.0	47.7	51.3	58.6
		-24	(2)	84.3	631	193	.47	285	29.3	37.2	41.2	45.2	49.1	53.1	61.0
-28		(1)	93.5	934	248	.60	355	27.3	32.6	35.3	38.0	40.6	43.3	48.7	
-30			90.7	840	235	.570	337	28.2	34.2	37.2	40.1	43.1	46.1	52.0	
-31			88.1	760	222	.540	319	28.9	35.5	38.7	42.0	45.3	48.6	55.2	
-33			85.7	689	209	.510	302	29.3	36.5	40.2	43.8	47.4	51.0	58.3	
-34	(2)	82.7	615	193	.47	279	29.2	37.3	41.4	45.4	49.5	53.6	61.7		
8000	ISA+20°C -15°C	-2	(1)	88.3	683	200	.49	307	30.2	37.5	41.2	44.9	48.5	52.2	59.5
		-3		87.7	669	197	.480	302	30.2	37.7	41.4	45.2	48.9	52.6	60.1
		-3		86.8	650	192	.470	296	30.2	37.8	41.7	45.5	49.4	53.2	60.9
	ISA+10°C -25°C	-3	(2)	86.3	639	190	.46	292	30.1	37.9	41.8	45.7	49.6	53.5	61.3
		-10	(1)	90.7	778	220	.53	330	29.5	36.0	39.2	42.4	45.6	48.8	55.2
		-11		89.5	740	214	.520	321	29.8	36.6	40.0	43.3	46.7	50.1	56.8
		-12		87.8	694	205	.500	309	30.1	37.3	40.9	44.5	48.1	51.7	58.9
	ISA+0°C -35°C	-13		86.1	652	197	.480	296	30.1	37.8	41.6	45.5	49.3	53.1	60.8
		-14	(2)	84.7	623	190	.46	287	29.9	38.0	42.0	46.0	50.0	54.0	62.0
		-19	(1)	91.8	843	233	.57	342	28.7	34.6	37.6	40.6	43.5	46.5	52.4
		-21		89.4	771	222	.540	326	29.4	35.8	39.1	42.3	45.6	48.8	55.3
		-22		87.0	697	209	.510	308	29.9	37.0	40.6	44.2	47.8	51.4	58.5
-23			84.4	635	197	.480	290	30.0	37.9	41.8	45.7	49.7	53.6	61.5	
-24	(2)	83.1	607	190	.46	281	29.8	38.0	42.2	46.3	50.4	54.5	62.8		
ISA-10°C -45°C	-28	(1)	93.5	935	249	.60	357	27.4	32.8	35.4	38.1	40.8	43.5	48.8	
	-30		90.3	830	235	.570	337	28.5	34.6	37.6	40.6	43.6	46.6	52.6	
	-32		86.9	725	218	.530	314	29.5	36.4	39.8	43.3	46.7	50.2	57.0	
	-33		83.6	637	201	.490	290	29.9	37.7	41.6	45.6	49.5	53.4	61.3	
	-35	(2)	81.4	589	189	.46	274	29.6	38.1	42.3	46.6	50.8	55.1	63.6	
	-35		81.4	589	189	.46	274	29.6	38.1	42.3	46.6	50.8	55.1	63.6	
7500	ISA+20°C -15°C	-2	(1)	88.2	683	201	.49	309	30.6	37.9	41.6	45.2	48.9	52.6	59.9
		-3		87.2	660	197	.480	302	30.6	38.2	42.0	45.8	49.6	53.4	61.0
		-3		86.3	641	192	.470	296	30.6	38.4	42.3	46.2	50.1	54.0	61.8
		-4	(2)	85.1	617	187	.46	288	30.4	38.5	42.5	46.6	50.6	54.7	62.8
	ISA+10°C -25°C	-10	(1)	90.7	778	221	.54	332	29.8	36.2	39.4	42.6	45.9	49.1	55.5
		-11		89.2	732	214	.520	321	30.2	37.0	40.4	43.8	47.2	50.6	57.5
		-12		87.4	685	205	.500	309	30.4	37.7	41.4	45.0	48.7	52.3	59.6
		-13		85.6	643	197	.480	296	30.5	38.3	42.2	46.1	50.0	53.9	61.7
	ISA+0°C -35°C	-14	(2)	83.5	602	187	.46	282	30.3	38.6	42.7	46.9	51.0	55.2	63.5
		-19	(1)	91.7	843	234	.57	344	28.9	34.8	37.8	40.7	43.7	46.7	52.6
		-21		89.2	763	222	.540	326	29.6	36.2	39.5	42.7	46.0	49.3	55.8
		-22		86.6	689	209	.510	308	30.2	37.5	41.1	44.7	48.3	52.0	59.2
-23			84.0	626	197	.480	290	30.4	38.4	42.4	46.4	50.4	54.4	62.4	
-25		(2)	81.8	584	186	.46	276	30.1	38.6	42.9	47.2	51.5	55.7	64.3	
ISA-10°C -45°C	-28	(1)	93.4	931	250	.60	357	27.6	33.0	35.7	38.3	41.0	43.7	49.1	
	-30		90.1	824	235	.570	337	28.8	34.8	37.9	40.9	44.0	47.0	53.1	
	-32		86.6	717	218	.530	314	29.8	36.7	40.2	43.7	47.2	50.7	57.6	
	-33		83.2	628	201	.490	290	30.2	38.2	42.2	46.2	50.1	54.1	62.1	
	-35	(2)	80.2	567	186	.45	269	29.9	38.7	43.1	47.5	51.9	56.3	65.1	
	-35		80.2	567	186	.45	269	29.9	38.7	43.1	47.5	51.9	56.3	65.1	
7000	ISA+20°C -15°C	-2	(1)	88.2	683	203	.49	311	31.0	38.3	41.9	45.6	49.3	52.9	60.2
		-3		86.7	651	197	.480	302	31.1	38.7	42.6	46.4	50.3	54.1	61.8
		-3		85.8	632	192	.470	296	31.0	38.9	42.9	46.8	50.8	54.8	62.7
		-3		84.8	614	188	.460	290	30.9	39.0	43.1	47.2	51.3	55.3	63.5
	ISA+10°C -25°C	-4	(2)	83.2	584	181	.44	278	30.5	39.1	43.3	47.6	51.9	56.2	64.7
		-10	(1)	90.6	778	222	.54	333	30.0	36.4	39.6	42.9	46.1	49.3	55.7
		-11		88.9	725	214	.520	321	30.5	37.4	40.8	44.3	47.7	51.2	58.1
		-12		87.1	677	205	.500	309	30.8	38.2	41.9	45.6	49.2	52.9	60.3
	ISA+0°C -35°C	-13		85.2	634	197	.480	296	30.9	38.8	42.8	46.7	50.6	54.6	62.5
		-15	(2)	81.7	570	181	.44	273	30.4	39.1	43.5	47.9	52.3	56.7	65.5
		-19	(1)	91.7	844	235	.57	345	29.0	35.0	37.9	40.9	43.9	46.8	52.8
		-21		88.9	756	222	.540	326	29.9	36.5	39.8	43.1	46.4	49.8	56.4
ISA-10°C -45°C	-22		86.3	682	209	.510	308	30.5	37.9	41.5	45.2	48.9	52.5	59.9	
	-23		83.5	618	197	.480	290	30.8	38.9	42.9	47.0	51.0	55.1	63.2	
	-25	(2)	80.0	553	180	.44	267	30.2	39.2	43.7	48.2	52.8	57.3	66.3	
	-28	(1)	93.2	925	250	.60	357	27.8	33.2	35.9	38.6	41.3	44.0	49.4	
	-30		88.9	789	231	.560	331	29.3	35.6	38.8	42.0	45.1	48.3	54.6	
	-32		85.5	686	214	.520	308	30.3	37.5	41.2	44.8	48.5	52.1	59.4	
-34		81.9	601	197	.480	284	30.6	39.0	43.1	47.3	51.4	55.6	63.9		
-35	(2)	78.8	544	182	.44	264	30.1	39.3	43.9	48.5	53.1	57.7	66.9		

(1) MAXIMUM CRUISE THRUST

(2) THRUST FOR MAXIMUM RANGE (APPROXIMATE)

ANTI-ICE SYSTEMS ON		
MAX FAN % RPM		
-25°C	-35°C	-45°C
89.9	90.7	93.0
INCREASE FUEL FLOWS AND DECREASE SPECIFIC RANGES BY 4%		

## CRUISE 31000 FEET

ANTI-ICE SYSTEMS OFF

TWO ENGINES

WT LBS	TEMP	RAT °C	FAN PERCENT RPM	FUEL FLOW LBS/HR	KIAS	IND MACH	KTAS	NAUTICAL MILES / 100 LBS FUEL							
								HEAD WIND			ZERO WIND	TAIL WIND			
								100 KT	50 KT	25 KT		25 KT	50 KT	100 KT	
8645	ISA+20°C	-15	(1)	89.1	577	174	.48	298	34.3	42.9	47.3	51.6	55.9	60.3	68.9
	ISA+10°C -36°C	-22	(1)	91.3	652	195	.54	325	34.6	42.2	46.1	49.9	53.7	57.6	65.2
		-23		90.5	633	191	.530	319	34.6	42.5	46.4	50.4	54.3	58.3	66.2
		-24		89.8	616	187	.520	313	34.6	42.7	46.8	50.8	54.9	58.9	67.1
		-24		89.1	600	184	.510	307	34.5	42.9	47.0	51.2	55.4	59.5	67.9
		-25	(2)	88.3	582	179	.50	300	34.4	43.0	47.3	51.6	55.9	60.2	68.8
	ISA+0°C -46°C	-32	(1)	91.7	687	206	.57	335	34.2	41.4	45.1	48.7	52.4	56.0	63.3
		-33		90.2	651	199	.550	324	34.4	42.1	45.9	49.7	53.6	57.4	65.1
		-34		88.7	616	191	.530	312	34.5	42.6	46.7	50.7	54.8	58.8	67.0
		-35		87.3	583	184	.510	301	34.4	43.0	47.3	51.5	55.8	60.1	68.7
		-35	(2)	86.6	567	180	.50	294	34.3	43.1	47.5	51.9	56.3	60.7	69.5
	ISA-10°C -56°C	-40	(1)	95.2	798	225	.62	356	32.1	38.4	41.5	44.6	47.8	50.9	57.2
-41			91.7	716	214	.590	340	33.5	40.5	44.0	47.5	50.9	54.4	61.4	
-43			89.2	651	202	.560	322	34.2	41.8	45.7	49.5	53.4	57.2	64.9	
-44			86.9	598	191	.530	305	34.3	42.7	46.9	51.1	55.2	59.4	67.8	
-46		(2)	84.8	551	180	.50	288	34.1	43.2	47.7	52.2	56.8	61.3	70.4	
8000		ISA+20°C	-14	(1)	89.0	577	178	.50	304	35.5	44.1	48.5	52.8	57.1	61.5
	ISA+10°C -26°C	-14	(2)	88.7	571	177	.49	302	35.4	44.2	48.5	52.9	57.3	61.7	70.4
		-22	(1)	91.2	654	198	.55	330	35.2	42.8	46.7	50.5	54.3	58.1	65.8
	ISA+0°C -36°C	-23		89.8	619	191	.530	319	35.4	43.4	47.5	51.5	55.6	59.6	67.7
		-24		89.0	602	187	.520	313	35.4	43.7	47.9	52.0	56.2	60.3	68.6
		-24		88.3	585	184	.510	307	35.4	44.0	48.2	52.5	56.8	61.1	69.6
		-25	(2)	87.0	556	177	.49	296	35.3	44.3	48.8	53.3	57.8	62.3	71.3
		ISA-10°C -46°C	-31	(1)	91.7	688	208	.57	338	34.6	41.9	45.5	49.2	52.8	56.5
	-33			89.6	639	199	.550	324	35.1	42.9	46.8	50.7	54.6	58.5	66.4
	-34			88.0	602	191	.530	312	35.2	43.5	47.7	51.9	56.0	60.2	68.5
	-35			86.6	569	184	.510	301	35.3	44.1	48.5	52.9	57.3	61.7	70.4
	-35		(2)	85.3	541	177	.49	290	35.1	44.3	49.0	53.6	58.2	62.8	72.1
ISA-10°C -56°C	-39	(1)	95.1	797	226	.62	359	32.4	38.7	41.8	45.0	48.1	51.2	57.5	
	-41		91.1	703	214	.590	340	34.1	41.2	44.7	48.3	51.9	55.4	62.5	
	-43		88.6	639	202	.560	322	34.8	42.6	46.5	50.4	54.3	58.3	66.1	
	-44		86.2	585	191	.530	305	35.1	43.6	47.9	52.2	56.5	60.7	69.3	
	-46	(2)	83.5	526	177	.49	284	34.9	44.4	49.2	53.9	58.7	63.4	72.9	
	7500	ISA+20°C	-14	(1)	88.9	576	181	.50	309	36.2	44.9	49.2	53.6	57.9	62.2
ISA+10°C -26°C		-14	(2)	87.7	552	175	.49	299	36.1	45.2	49.7	54.2	58.8	63.3	72.3
		-22	(1)	91.2	655	200	.55	333	35.6	43.2	47.0	50.9	54.7	58.5	66.1
ISA+0°C -36°C		-23		90.1	628	195	.540	325	35.8	43.8	47.8	51.7	55.7	59.7	67.7
		-24		88.5	591	187	.520	313	36.0	44.5	48.7	52.9	57.2	61.4	69.9
		-24		87.0	557	180	.500	301	36.1	45.0	49.5	54.0	58.5	63.0	72.0
		-25	(2)	86.0	537	175	.49	293	36.0	45.3	49.9	54.6	59.2	63.9	73.2
		ISA-10°C -46°C	-31	(1)	91.6	688	210	.58	341	35.0	42.2	45.9	49.5	53.1	56.8
-32				90.0	649	202	.560	330	35.4	43.1	46.9	50.8	54.6	58.5	66.2
-33				88.3	611	195	.540	318	35.7	43.9	48.0	52.1	56.2	60.3	68.5
-34				86.7	575	187	.520	306	35.9	44.6	48.9	53.3	57.6	62.0	70.7
-36			(2)	84.4	523	175	.49	287	35.8	45.3	50.1	54.9	59.7	64.5	74.0
ISA-10°C -56°C	-39	(1)	95.0	797	228	.63	360	32.7	38.9	42.1	45.2	48.3	51.5	57.8	
	-41		90.7	694	214	.590	340	34.5	41.7	45.3	48.9	52.5	56.1	63.3	
	-43		88.1	631	202	.560	322	35.3	43.2	47.2	51.1	55.1	59.0	67.0	
	-44		85.7	576	191	.530	305	35.7	44.4	48.7	53.0	57.4	61.7	70.4	
	-46	(2)	82.6	508	175	.49	281	35.5	45.4	50.3	55.2	60.1	65.1	74.9	
	7000	ISA+20°C	-14	(1)	88.8	576	183	.51	312	36.9	45.5	49.9	54.2	58.6	62.9
ISA+10°C -26°C		-14		88.1	562	180	.500	307	36.9	45.8	50.2	54.7	59.1	63.6	72.5
		-14		87.3	546	176	.490	301	36.9	46.0	50.6	55.2	59.7	64.3	73.5
		-15	(2)	86.6	531	172	.48	295	36.8	46.2	50.9	55.6	60.3	65.0	74.4
ISA+0°C -36°C		-22	(1)	91.2	656	202	.56	336	36.0	43.6	47.4	51.2	55.0	58.8	66.5
		-23		89.6	619	195	.540	325	36.4	44.4	48.5	52.5	56.5	60.6	68.7
		-24		88.0	581	187	.520	313	36.6	45.2	49.5	53.8	58.1	62.4	71.0
		-24		86.5	547	180	.500	301	36.8	45.9	50.5	55.0	59.6	64.2	73.3
		-25	(2)	84.9	517	173	.48	289	36.6	46.3	51.1	55.9	60.8	65.6	75.2
ISA-10°C -46°C		-31	(1)	91.6	690	211	.58	343	35.3	42.5	46.1	49.8	53.4	57.0	64.3
		-32		89.5	641	202	.560	330	35.8	43.6	47.5	51.4	55.3	59.2	67.0
		-34		87.0	583	191	.530	312	36.4	45.0	49.2	53.5	57.8	62.1	70.7
	-35		84.7	532	180	.500	295	36.6	46.0	50.7	55.4	60.1	64.8	74.2	
	-36	(2)	83.2	504	173	.48	283	36.4	46.3	51.3	56.3	61.2	66.2	76.1	
	ISA-10°C -56°C	-39	(1)	94.9	797	229	.63	362	32.9	39.2	42.3	45.4	48.6	51.7	58.0
-41			90.4	686	214	.590	340	34.9	42.2	45.8	49.5	53.1	56.8	64.1	
-43			86.9	603	199	.550	317	35.9	44.2	48.4	52.5	56.6	60.8	69.1	
-45			83.7	533	184	.510	294	36.4	45.7	50.4	55.1	59.8	64.5	73.9	
-46		(2)	81.5	490	173	.48	277	36.2	46.4	51.5	56.6	61.7	66.8	77.0	

- (1) MAXIMUM CRUISE THRUST
- (2) THRUST FOR MAXIMUM RANGE (APPROXIMATE)

ANTI-ICE SYSTEMS ON		
MAX FAN % RPM		
-36°C	-46°C	-56°C
89.9	90.4	93.9
INCREASE FUEL FLOWS AND DECREASE SPECIFIC RANGES BY 4%		



## CRUISE 35000 FEET

ANTI-ICE SYSTEMS OFF

TWO ENGINES

WT LBS	TEMP	RAT °C	FAN PERCENT RPM	FUEL FLOW LBS/HR	KIAS	IND MACH	KTAS	NAUTICAL MILES / 100 LBS FUEL								
								HEADWIND			ZERO	TAILWIND				
								100 KT	50 KT	25 KT	WIND	25 KT	50 KT	100 KT		
8645	ISA+20°C	-24	(1)	89.4	506	.52	281	35.8	45.7	50.6	55.6	60.5	65.4	75.3		
	ISA+10°C	-31	(1)	91.1	560	.53	314	38.2	47.1	51.6	56.0	60.5	65.0	73.9		
	ISA+0°C	-40	(1)	92.3	609	.57	332	38.0	46.3	50.4	54.5	58.6	62.7	70.9		
	-54°C	-41		91.2	586	.560	324	38.2	46.7	51.0	55.3	59.5	63.8	72.3		
		-41		90.6	571	.550	318	38.2	47.0	51.4	55.7	60.1	64.5	73.2		
		-42	(2)	89.6	550	.54	310	38.1	47.2	51.7	56.3	60.8	65.4	74.4		
	ISA-10°C	-48	(1)	95.6	656	.62	350	35.9	43.1	46.7	50.3	53.9	57.5	64.7		
	-64°C	-49		93.2	647	.600	339	36.9	44.7	48.5	52.4	56.3	60.1	67.9		
		-50		91.1	604	.580	328	37.7	46.0	50.1	54.2	58.4	62.5	70.8		
		-51		89.3	569	.560	316	38.0	46.8	51.2	55.6	60.0	64.4	73.2		
		-52	(2)	87.7	535	.54	303	37.9	47.3	52.0	56.6	61.3	66.0	75.3		
	8000	ISA+20°C	-23	(1)	89.1	506	.52	294	38.4	48.3	53.2	58.2	63.1	68.1	78.0	
ISA+10°C		-31	(1)	91.0	563	.54	322	39.4	48.3	52.7	57.1	61.6	66.0	74.9		
ISA+0°C		-40		90.1	544	.530	314	39.3	48.5	53.1	57.7	62.2	66.8	76.0		
-44°C		-31		89.3	529	.52	307	39.1	48.5	53.3	58.0	62.7	67.5	76.9		
ISA+0°C		-39	(1)	92.1	609	.58	337	38.9	47.1	51.2	55.3	59.4	63.5	71.7		
-54°C		-40		91.2	587	.570	330	39.1	47.6	51.9	56.1	60.4	64.6	73.2		
		-41		89.7	556	.550	318	39.3	48.3	52.8	57.3	61.7	66.2	75.2		
		-42		88.2	528	.530	307	39.1	48.6	53.3	58.0	62.8	67.5	77.0		
		-42	(2)	87.5	514	.52	300	38.9	48.7	53.5	58.4	63.2	68.1	77.8		
ISA-10°C		-48	(1)	95.7	700	.63	355	36.4	43.5	47.1	50.7	54.2	57.8	65.0		
-64°C		-49		92.1	629	.600	339	38.4	45.9	49.9	53.9	57.9	61.8	69.8		
		-51		89.2	570	.570	322	39.0	47.7	52.1	56.5	60.9	65.3	74.0		
	-52		87.1	526	.540	305	39.0	48.6	53.3	58.1	62.8	67.6	77.1			
	-53	(2)	85.7	501	.52	294	38.8	48.8	53.8	58.7	63.7	68.7	78.7			
7500	ISA+20°C	-22	(1)	89.0	506	.50	301	39.8	49.7	54.7	59.6	64.6	69.5	79.5		
	ISA+10°C	-30	(1)	91.0	555	.55	327	40.1	49.0	53.4	57.8	62.3	66.7	75.5		
	ISA+0°C	-44°C	-31		90.1	547	.540	320	40.2	49.3	53.9	58.4	63.0	67.6	76.7	
		-31		89.4	533	.530	314	40.1	49.5	54.2	58.9	63.6	68.3	77.7		
		-32		88.7	519	.520	308	40.0	49.7	54.5	59.3	64.1	68.9	78.6		
		-32	(2)	87.8	502	.51	300	39.9	49.8	54.8	59.8	64.8	69.8	79.7		
	ISA+0°C	-39	(1)	92.0	609	.59	340	39.4	47.6	51.7	55.8	59.9	64.0	72.2		
	-54°C	-40		90.6	577	.570	330	39.8	48.5	52.8	57.2	61.5	65.9	74.5		
		-41		89.0	545	.550	318	40.0	49.2	53.8	58.4	62.9	67.5	76.7		
		-42		87.5	517	.530	307	40.0	49.6	54.5	59.3	64.1	69.0	78.6		
		-43	(2)	86.0	488	.51	294	39.7	49.9	55.0	60.1	65.3	70.4	80.6		
	ISA-10°C	-48	(1)	95.4	696	.63	356	36.8	44.0	47.6	51.2	54.8	58.4	65.6		
-64°C	-49		91.4	617	.600	339	38.7	46.9	50.9	55.0	59.0	63.1	71.2			
	-51		88.7	560	.570	322	39.7	48.6	53.1	57.6	62.0	66.5	75.4			
	-52		86.4	515	.540	305	39.8	49.5	54.4	59.2	64.1	68.9	78.6			
	-53	(2)	84.2	474	.51	287	39.4	50.0	55.3	60.5	65.8	71.1	81.6			
7000	ISA+20°C	-22	(1)	88.8	504	.51	307	41.0	50.9	55.9	60.8	65.8	70.8	80.7		
	ISA+10°C	-34°C	-22		88.3	.494	302	40.9	51.0	56.1	61.2	66.2	71.3	81.4		
	ISA+0°C	-44°C	-30	(1)	91.0	567	.56	331	40.8	49.6	54.0	58.4	62.8	67.2	76.1	
		-31		89.4	536	.540	320	40.9	50.3	54.9	59.6	64.2	68.9	78.2		
		-32		88.0	508	.520	308	40.9	50.8	55.7	60.6	65.6	70.5	80.3		
		-33	(2)	86.5	480	.50	295	40.7	51.1	56.4	61.6	66.8	72.0	82.4		
	ISA+0°C	-39	(1)	91.9	609	.59	343	39.9	48.1	52.2	56.3	60.4	64.5	72.7		
	-54°C	-40		90.0	567	.570	330	40.5	49.3	53.7	58.2	62.6	67.0	75.8		
		-41		88.4	536	.550	318	40.7	50.1	54.7	59.4	64.1	68.7	78.1		
		-42		86.9	507	.530	307	40.8	50.7	55.6	60.5	65.5	70.4	80.3		
		-43	(2)	84.7	467	.50	289	40.5	51.2	56.6	61.9	67.3	72.7	83.4		
	ISA-10°C	-48	(1)	94.8	684	.63	356	37.5	44.8	48.4	52.1	55.7	59.4	66.7		
-64°C	-49		90.8	606	.600	339	39.4	47.7	51.8	55.9	60.1	64.2	72.5			
	-51		88.1	550	.570	322	40.4	49.5	54.0	58.5	63.1	67.6	76.7			
	-52		85.7	506	.540	305	40.6	50.5	55.4	60.4	65.3	70.3	80.2			
	-54	(2)	82.9	453	.50	282	40.2	51.3	56.8	62.3	67.8	73.4	84.4			
6500	ISA+20°C	-22	(1)	88.6	503	.51	311	42.0	51.9	56.9	61.9	66.8	71.8	81.7		
	ISA+10°C	-34°C	-22		87.6	.483	302	41.9	52.3	57.5	62.6	67.8	73.0	83.4		
	ISA+0°C	-44°C	-23	(2)	87.0	473	.49	298	41.8	52.4	57.7	63.0	68.2	73.5	84.1	
		-30	(1)	91.0	568	.57	335	41.3	50.1	54.5	58.9	63.3	67.7	76.5		
		-30		89.6	542	.550	325	41.6	50.8	55.4	60.0	64.6	69.2	78.5		
		-31		88.0	511	.530	314	41.8	51.6	56.4	61.3	66.2	71.1	80.9		
		-32		86.6	483	.510	302	41.8	52.2	57.4	62.5	67.7	72.9	83.2		
		-33	(2)	85.3	460	.49	292	41.6	52.5	57.9	63.4	68.8	74.2	85.1		
	ISA+0°C	-39	(1)	91.9	609	.60	346	40.3	48.5	52.6	56.8	60.9	65.0	73.2		
	-54°C	-40		89.5	558	.570	330	41.1	50.1	54.6	59.1	63.5	68.0	77.0		
		-41		87.0	512	.540	312	41.5	51.3	56.2	61.1	66.0	70.9	80.6		
		-43		84.8	469	.510	295	41.6	52.3	57.6	62.9	68.2	73.6	84.2		
	-44	(2)	83.6	447	.49	285	41.4	52.6	58.2	63.7	69.3	74.9	86.1			
ISA-10°C	-48	(1)	94.1	674	.63	356	38.1	45.5	49.2	52.9	56.6	60.3	67.8			
-64°C	-49		90.2	596	.600	339	40.1	48.5	52.7	56.9	61.0	65.2	73.6			
	-51		87.6	542	.570	322	41.0	50.2	54.8	59.5	64.1	68.7	77.9			
	-52		85.1	496	.540	305	41.3	51.4	56.5	61.5	66.5	71.6	81.6			
	-54	(2)	81.8	435	.49	279	41.1	52.6	58.4	64.1	69.9	75.6	87.1			

8104-00-01

- (1) MAXIMUM CRUISE THRUST
- (2) THRUST FOR MAXIMUM RANGE (APPROXIMATE)

ANTI-ICE SYSTEMS ON		
MAX FAN % RPM		
-44°C	-54°C	-64°C
89.6	90.8	94.1
INCREASE FUEL FLOWS AND DECREASE SPECIFIC RANGES BY 4%		



## CRUISE 41000 FEET

ANTI-ICE SYSTEMS OFF

TWO ENGINES

WT LBS	TEMP	RAT °C	FAN PERCENT RPM	FUEL FLOW LBS/HR	KIAS	IND MACH	KTAS	NAUTICAL MILES / 100 LBS FUEL								
								HEAD WIND			ZERO WIND	TAIL WIND				
								100 KT	50 KT	25 KT		25 KT	50 KT	100 KT		
8400	ISA+0°C	-45	(1)	92.2	461	144	.51	291	41.5	52.3	57.7	63.2	68.6	74.0	84.9	
	ISA-10°C	-53	(1)	94.0	502	161	.56	316	43.1	53.1	58.1	63.0	68.0	73.0	83.0	
	-66°C	-54	(2)	93.7	497	160	.56	314	43.1	53.1	58.2	63.2	68.2	73.3	83.3	
8200	ISA+0°C	-45	(1)	92.1	463	148	.52	299	43.0	53.8	59.2	64.6	70.0	75.4	86.2	
	ISA-10°C	-53	(1)	94.1	505	164	.57	321	43.8	53.7	58.7	63.6	68.6	73.5	83.4	
	-66°C	-54	(2)	93.0	487	160	.56	314	43.8	54.1	59.2	64.4	69.5	74.6	84.9	
8000	ISA+0°C	-44	(1)	92.1	466	151	.53	305	44.2	55.0	60.4	65.7	71.1	76.5	87.3	
	ISA-10°C	-53	(1)	94.2	508	166	.58	326	44.4	54.3	59.2	64.1	69.0	73.9	83.8	
	-66°C	-53	(2)	93.4	495	163	.570	320	44.5	54.6	59.7	64.7	69.8	74.8	84.9	
7500	ISA+10°C	-38	(1)	90.6	428	136	.48	283	42.8	54.5	60.3	66.2	72.0	77.9	89.6	
	ISA+0°C	-43	(1)	91.9	468	157	.55	317	46.4	57.1	62.4	67.8	73.1	78.5	89.2	
	ISA-10°C	-52	(1)	94.4	514	171	.60	336	45.6	55.3	60.2	65.0	69.9	74.8	84.5	
	-66°C	-52	(2)	93.8	506	169	.590	332	45.8	55.7	60.6	65.6	70.5	75.4	85.3	
		-52			92.7	491	166	.580	326	46.1	56.3	61.4	66.5	71.5	76.6	86.8
		-53			91.7	477	163	.570	320	46.2	56.7	62.0	67.2	72.4	77.7	88.2
		-54	(2)		90.5	460	159	.56	313	46.2	57.1	62.5	67.9	73.4	78.8	89.7
7000	ISA+10°C	-35	(1)	90.1	427	143	.50	296	45.8	57.5	63.4	69.2	75.1	80.9	92.6	
	ISA+0°C	-43	(1)	91.8	470	162	.57	326	48.0	58.6	63.9	69.2	74.6	79.9	90.5	
	-56°C	-43	(2)	91.6	466	161	.56	324	48.0	58.7	64.1	69.4	74.8	80.2	90.9	
	ISA-10°C	-51	(1)	94.5	520	175	.61	342	46.5	56.1	60.9	65.8	70.6	75.4	85.0	
	-66°C	-52			93.6	505	172	.600	337	46.9	56.8	61.8	66.7	71.6	76.6	86.5
		-52			92.4	489	169	.590	332	47.3	57.6	62.7	67.8	72.9	78.0	88.2
		-52			91.3	475	166	.580	326	47.6	58.1	63.4	68.7	73.9	79.2	89.7
6500	ISA+20°C	-28	(1)	87.8	382	119	.42	253	40.2	53.3	59.9	66.4	73.0	79.5	92.6	
	ISA+10°C	-34	(1)	89.7	426	147	.52	304	47.9	59.7	65.5	71.4	77.3	83.1	94.8	
	ISA+0°C	-42	(1)	91.8	473	166	.58	333	49.2	59.8	65.1	70.4	75.7	80.9	91.5	
	-56°C	-42	(2)	91.2	463	163	.570	328	49.3	60.1	65.5	70.9	76.3	81.7	92.5	
		-43	(2)	90.6	453	161	.56	323	49.2	60.2	65.8	71.3	76.8	82.3	93.3	
	ISA-10°C	-51	(1)	94.3	518	177	.62	346	47.4	57.1	61.9	66.7	71.5	76.4	86.0	
	-66°C	-52			92.3	491	172	.600	337	48.3	58.5	63.6	68.7	73.8	78.9	89.1
	-52			91.1	475	169	.590	332	48.7	59.2	64.5	69.7	75.0	80.3	90.8	
	-52			90.1	462	166	.580	326	49.0	59.8	65.2	70.6	76.1	81.5	92.3	
	-53	(2)		88.6	439	160	.56	315	49.0	60.4	66.1	71.8	77.5	83.2	94.6	

51CM-00-01

- (1) MAXIMUM CRUISE THRUST
- (2) THRUST FOR MAXIMUM RANGE (APPROXIMATE)

ANTI-ICE SYSTEMS ON		
MAX FAN % RPM		
-46°C	-56°C	-66°C
88.5	89.7	92.8
INCREASE FUEL FLOWS AND DECREASE SPECIFIC RANGES BY 4%		

## NORMAL DESCENT

2000 FEET PER MINUTE RATE OF DESCENT  
ANTI-ICE SYSTEMS OFF

SPEED BRAKES RETRACTED

GEAR AND FLAPS UP

PRESSURE ALTITUDE FEET	KIAS	WEIGHT AT START OF DESCENT - LBS								
		8000			7000			6000		
		TIME MIN	DIST NM	FUEL LBS	TIME MIN	DIST NM	FUEL LBS	TIME MIN	DIST NM	FUEL LBS
41,000	172	20.6	108	148	20.5	108	158	20.5	108	167
39,000	181	19.5	102	144	19.5	102	153	19.5	102	163
37,000	190	18.5	96	139	18.5	96	149	18.5	96	158
35,000	200	17.5	90	134	17.5	90	143	17.5	90	153
33,000	209	16.5	84	128	16.5	84	137	16.5	84	146
31,000	220	15.5	78	122	15.5	78	130	15.5	78	139
29,000	230	14.5	73	114	14.5	73	122	14.5	73	131
27,000	240	13.5	66	105	13.5	66	113	13.5	66	121
25,000	240	12.5	61	97	12.5	61	105	12.5	61	113
23,000	240	11.5	55	89	11.5	55	96	11.5	55	104
21,000	240	10.5	49	81	10.5	49	88	10.5	49	95
19,000	240	9.5	44	74	9.5	44	80	9.5	44	86
17,000	240	8.5	39	66	8.5	39	72	8.5	39	77
15,000	240	7.5	34	58	7.5	34	63	7.5	34	68
10,000	240	5.0	22	40	5.0	22	43	5.0	22	46
5,000	240	2.5	10	20	2.5	10	22	2.5	10	24

## NORMAL DESCENT

2000 FEET PER MINUTE RATE OF DESCENT  
ANTI-ICE SYSTEMS ON

SPEED BRAKES RETRACTED

GEAR AND FLAPS UP

PRESSURE ALTITUDE FEET	KIAS	WEIGHT AT START OF DESCENT - LBS								
		8000			7000			6000		
		TIME MIN	DIST NM	FUEL LBS	TIME MIN	DIST NM	FUEL LBS	TIME MIN	DIST NM	FUEL LBS
41,000	172	20.8	109	155	20.7	109	164	20.6	108	173
39,000	181	19.6	102	149	19.5	102	158	19.5	102	168
37,000	190	18.5	96	144	18.5	96	153	18.5	96	163
35,000	200	17.5	90	138	17.5	90	147	17.5	90	157
33,000	209	16.5	84	132	16.5	84	141	16.5	84	150
31,000	220	15.5	78	125	15.5	78	134	15.5	78	143
29,000	230	14.5	73	117	14.5	73	126	14.5	73	134
27,000	240	13.5	66	109	13.5	66	117	13.5	66	125
25,000	240	12.5	61	100	12.5	61	108	12.5	61	116
23,000	240	11.5	55	92	11.5	55	99	11.5	55	107
21,000	240	10.5	49	84	10.5	49	91	10.5	49	98
19,000	240	9.5	44	76	9.5	44	82	9.5	44	89
17,000	240	8.5	39	68	8.5	39	74	8.5	39	80
15,000	240	7.5	34	60	7.5	34	65	7.5	34	71
10,000	240	5.0	22	41	5.0	22	44	5.0	22	48
5,000	240	2.5	10	21	2.5	10	22	2.5	10	24

WIND EFFECT ON DESCENT DISTANCE - NM  
(SUBTRACT FOR HEADWIND, ADD FOR TAILWIND)

TIME (MIN)	WIND		
	25KTS	50KTS	100KTS
5	2	4	8
10	4	8	16
15	6	12	25
20	8	16	33
25	10	20	41
30	12	25	50

## HIGH-SPEED DESCENT

3000 FEET PER MINUTE RATE OF DESCENT  
ANTI-ICE SYSTEMS OFF

SPEED BRAKES RETRACTED

GEAR AND FLAPS UP

PRESSURE ALTITUDE FEET	KIAS	WEIGHT AT START OF DESCENT - LBS								
		8000			7000			6000		
		TIME MIN	DIST NM	FUEL LBS	TIME MIN	DIST NM	FUEL LBS	TIME MIN	DIST NM	FUEL LBS
41,000	172	14.8	78	68	14.6	77	77	14.3	75	88
39,000	181	13.8	72	64	13.5	71	73	13.3	70	83
37,000	190	12.7	66	60	12.6	65	69	12.4	64	80
35,000	200	11.8	61	55	11.7	60	65	11.7	60	76
33,000	209	11.1	56	52	11.0	56	62	11.0	56	73
31,000	220	10.4	52	49	10.3	52	58	10.3	52	69
29,000	230	9.7	48	45	9.7	48	54	9.7	48	64
27,000	240	9.1	44	41	9.0	44	49	9.0	44	59
25,000	240	8.4	40	37	8.3	40	45	8.3	40	55
23,000	240	7.7	37	33	7.7	36	41	7.7	36	50
21,000	240	7.1	33	30	7.0	33	37	7.0	33	45
19,000	240	6.4	29	27	6.3	29	33	6.3	29	41
17,000	240	5.7	26	24	5.7	26	30	5.7	26	37
15,000	240	5.1	23	21	5.0	22	26	5.0	22	32
10,000	240	3.4	15	14	3.3	14	17	3.3	14	22
5,000	240	1.7	7	7	1.7	7	9	1.7	7	11

## HIGH-SPEED DESCENT

3000 FEET PER MINUTE RATE OF DESCENT  
ANTI-ICE SYSTEMS ON

SPEED BRAKES RETRACTED

GEAR AND FLAPS UP

PRESSURE ALTITUDE FEET	KIAS	WEIGHT AT START OF DESCENT - LBS								
		8000			7000			6000		
		TIME MIN	DIST NM	FUEL LBS	TIME MIN	DIST NM	FUEL LBS	TIME MIN	DIST NM	FUEL LBS
41,000	172	16.0	84	89	15.1	80	89	14.6	77	94
39,000	181	14.8	77	84	14.0	73	83	13.5	71	89
37,000	190	13.7	71	78	13.0	67	78	12.5	65	84
35,000	200	12.8	65	74	12.1	62	74	11.7	60	80
33,000	209	11.9	60	69	11.3	57	70	11.0	56	76
31,000	220	11.2	56	66	10.6	53	66	10.3	52	72
29,000	230	10.6	52	62	9.9	49	62	9.7	48	67
27,000	240	9.9	48	57	9.3	45	57	9.0	44	62
25,000	240	9.2	44	54	8.6	41	53	8.3	40	57
23,000	240	8.6	40	50	8.0	38	49	7.7	36	53
21,000	240	7.9	37	47	7.3	34	45	7.0	33	48
19,000	240	7.2	33	43	6.6	30	41	6.3	29	43
17,000	240	6.6	30	40	6.0	27	37	5.7	26	39
15,000	240	5.9	26	36	5.3	24	33	5.0	22	34
10,000	240	4.0	17	26	3.6	16	24	3.3	14	23
5,000	240	2.1	9	14	1.9	8	13	1.7	7	12

WIND EFFECT ON DESCENT DISTANCE - NM  
(SUBTRACT FOR HEADWIND, ADD FOR TAILWIND)

TIME (MIN)	WIND		
	25KTS	50KTS	100KTS
5	2	4	8
10	4	8	16
15	6	12	25
20	8	16	33
25	10	20	41
30	12	25	50



## VREF - KIAS (Anti-Ice OFF)

	WEIGHT - POUNDS					
	6000	6500	7000	7500	8000	*8645
V <sub>REF</sub> LAND 30°	82	85	88	91	94	98
V <sub>APP</sub> 15°	87	91	95	98	101	105

\* Use in an emergency which requires landing at weights in excess of 8,000 pounds.

## VREF - KIAS (Anti-Ice ON)

	WEIGHT - POUNDS					
	6000	6500	7000	7500	8000	*8645
V <sub>REF</sub> 15°	98	102	105	109	112	117
V <sub>APP</sub> 15°	98	102	105	109	112	117

\* Use in an emergency which requires landing at weights in excess of 8,000 pounds.

## LANDING DISTANCE - FEET ACTUAL DISTANCE

## FLAPS - LAND ANTI-ICE OFF

PA	SEA LEVEL					
	TEMP °C	LANDING WEIGHT - POUNDS				
		6000	6500	7000	7500	8000
50	2070	2190	2330	2460	--	--
45	2050	2170	2300	2430	2580	--
40	2020	2140	2270	2400	2540	2730
35	2000	2120	2240	2370	2510	2690
30	1980	2090	2210	2340	2470	2660
25	1960	2070	2190	2310	2440	2620
20	1940	2050	2160	2280	2410	2580
15	1910	2020	2130	2250	2380	2550
10	1890	2000	2110	2220	2350	2510
5	1870	1980	2080	2190	2320	2480
0	1850	1960	2060	2170	2290	2440
-5	1830	1940	2030	2140	2250	2410
-10	1810	1910	2010	2110	2220	2380
-15	1790	1890	1990	2090	2190	2340
-20	1770	1870	1970	2060	2170	2310
-25	1750	1850	1940	2030	2140	2280

**Note:** All landing distances predicated on zero wind and zero runway gradient.

\* Use in an emergency which requires landing at weights in excess of 8,000 pounds.



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Version 2.0