PA-30 TWIN COMANCHE

USER GUIDE

MILVIZ

This software is an artistic representation of the subject matter.

Any similarities to any commercial product, equipment, vehicle, device or other, present within this artistic representation does not constitute or imply an endorsement (by, or of) the manufacturer(s) and/or trademark holder(s) of that which may be deemed similar.

No replication, reduction, reverse engineering or unauthorized addition to the software, either in whole or in part, is permitted in any form without the express written permission of Military Visualizations Inc.

By installing this software, you are hereby agreeing to the above terms and conditions. Any breach of the above EULA will result in litigation, removal of license and/or forfeiture of continued support.

Any inquiries regarding academic or other professional use of this software should be directed via e-mail to info@milviz.com.

Table of Contents

Introduction

Welcome!

We are very pleased to introduce you to the MilViz PA-30 Twin Comanche!

This User Guide is designed to help you get started with your new PA-30. It contains useful information about your Twin Comanche's equipment, operating procedures, and performance. It also contains instructions for installation and updating. We do recommend that you take some time to read through this guide and to refer to it as needed.

Our interest in your flying pleasure has not ceased with your purchase of the MilViz PA-30. Worldwide, the Military Visualizations staff stands ready to assist and serve. For technical support, please post a request on our PA-30 Twin Comanche support forum. Our dedicated and talented staff is ready to help you.

For forum access please email oisin@milviz.com with your proof of purchase and your preferred or existing forum username.

About the PA-30 Twin Comanche

The first thing you'll notice about the PA-30 is that it's a very attractive looking aircraft! A twin-engined development of the PA-24 Comanche, it retains much of the refined lines and classic styling of its single-engined brethren. The rather purposeful engine cowling on the PA-24 has of course given way on the PA-30 to a gently tapered nose which absolutely suits the rest of the fuselage, complemented by the twin engine nacelles which sweep up from the wing and impart a sense of power and speed.

The PA-30 entered the market in 1963; from then, until production came to a sudden halt in 1972, more than 2,100 Twin Comanches were manufactured through three major variants. Had the factory in Lock Haven, Pennsylvania not flooded during Hurricane Agnes in 1972, destroying tooling, airframes and parts, it's very likely that production and development of the PA-30 may have continued for quite some time.

The beginning of the PA-30 Twin Comanche was as notable as its end, with the work undertaken to convert the popular PA-24 into a twin hired out to Ed Swearingen at Swearingen Aviation. The PA-30 was likely the best known work that Swearingen did for Piper, but the amount of well known aircraft that directly involved his expertise throughout a long career is staggering - everything from the Howard 500 to the Swearingen (later Fairchild) Merlin and Metro series.

One of the primary reasons for the popularity of the Twin Comanche was its ability to extract decent speed from minimum horsepower and fuel consumption. The fuel injected variant of the extremely popular O-320 family, the IO-320-B1A, produced 160 horsepower and enabled the PA-30 to cruise at a comfortable 170 knots while burning just 17 gph. With the Time-Between-Overhaul (TBO) listed at 2000 hours, the O-320 family is highly regarded for both simplicity and durability.

The first version of the PA-30 proved successful, with 931 built, before being upgraded to the PA-30B and later the PA-30C, increasing the seating from four to six and adding a third window to the cabin sides. Additional features also began to be offered, such as Rayjay turbochargers, heated windshield, and wing and propeller ice protection equipment. One of the final changes to the last version resulted in the PA-39 C/R, which was a PA-30C with counter-rotating engines installed.

Our version closely replicates the original PA-30 with normally aspirated IO-320-B1A engines and user-selectable tip tanks. We've upgraded the non-standard instrument layout found in the straight PA-30 to be fully capable of IFR flight, while retaining some of the quirky original instruments such as the backwards-turning, drum-type course selector.

And of course, we're offering our Twin Comanche with a high degree of flexibility in terms of support for 3rd party avionics.

Handling characteristics have been carefully replicated. Not a particularly difficult aircraft to fly, but you do have to treat the laminar flow wing with the same respect you would give any high performance aircraft, as well as ensuring you observe proper procedures if attempting single engine flight.

All in all, we feel our rendition of the PA-30 represents a excellent simulator experience of a very classy aircraft. We hope you enjoy flying it as much as we did creating it!

System Requirements

These requirements apply as a general minimum to successfully install, configure and operate the MilViz PA-30 Twin Comanche.

It's worth remembering that your choice of 3rd party scenery, location, weather, AI traffic, simulator settings, monitor resolution and 3rd party utilities may place additional demands on your computer and may negtively affect your final simulator experience.

Supported Platforms:	• Microsoft Flight Simulator X, Service Pack 2(SP2) (Note: Service Pack 2 is required, aircraft may not function correctly with Service Pack 1 or earlier. The Acceleration expansion pack is fully supported but not required.) • Microsoft Flight Simulator X, Steam Edition • Lockheed Martin Prepar3D, version 2 • Lockheed Martin Prepar3D, version 3 • Lockheed Martin Prepar3D, version 4 (Note: Our product is tested with and designed to operate in the most recent version of Prepar3D available at the date of release. For compatibility with any future updates, please register for and visit our product forums.)
Supported Operating Systems:	• Windows Vista, Windows 7, Windows 10
Processor (CPU):	• 2.4 GHz single core processor required (3.0 GHz, multiple core processor or better recommended).
Video Card (GPU):	• DirectX 11 compliant video card with a minimum of 1024 MB video ram.
System Memory (RAM):	• 4 GB RAM (minimum).
Hard Drive:	• 2.5 GB or greater free hard drive space.
Gaming Controller:	• Joystick, yoke, or other gaming controller (a means of controlling the aircraft rudder, either with twist joystick function or dedicated pedals, is additionally recommended). (Note: All MilViz products require a minimum of one functioning gaming device such as a joystick for proper operation and control.)

Installation Instructions

1

Beginning Installation

As with other flight simulator add-ons, pre-installation precautions should involve closing any open applications, as well as temporarily disabling any active antivirus software.

Failure to temporarily disable antivirus software when installing may result in a non-functioning product and/or simulator!!!

After purchase, you will have been given a link or an option to download a compressed (.zip) file. This compressed file contains an executable (.exe) file, which is the installer for the MilViz PA-30 Twin Comanche.

Using the Windows File Explorer or file compression utility of your choice, unzip this file to a location of your choosing.

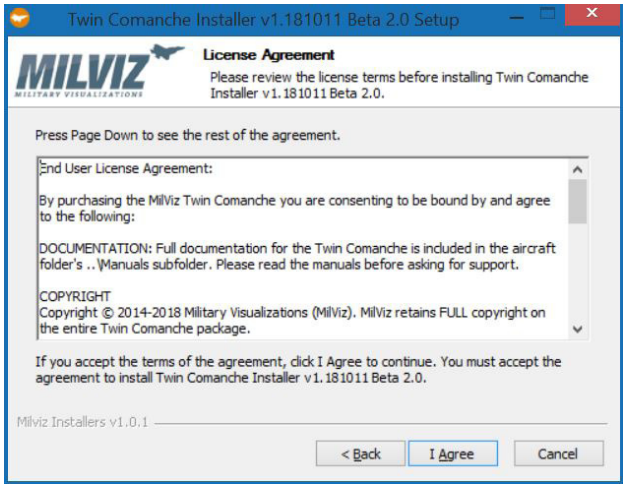
Once unzipped, you may begin installation by right clicking on the executable (.exe) file, then selecting "Run as administrator". The installer will run, showing an initial welcome screen. Left click on the "Next" button to continue.

Note: *Version numbers shown in any of the following installation images may differ from the downloaded product.*

2

Licence Agreement

The screen will allow you to view the end user license agreement. Please take the time to carefully review the license agreement text. Clicking "I Agree" at this screen will confirm your acceptance of the license agreement, and will allow you to proceed to the next step of the installation.

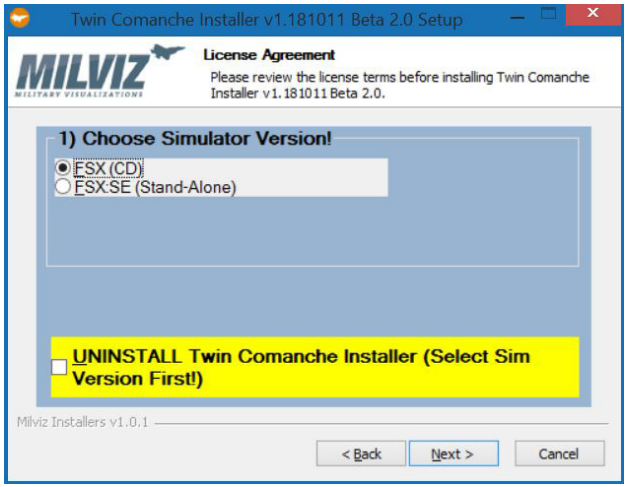


3

Choose Simulator Version

The installer should automatically find all compatible simulator platforms on your system. Only compatible simulators will be displayed as options. (For example, the computer in the below image has two versions of installed: FSX, from the CD and the version of FSX available from the Steam platform.)

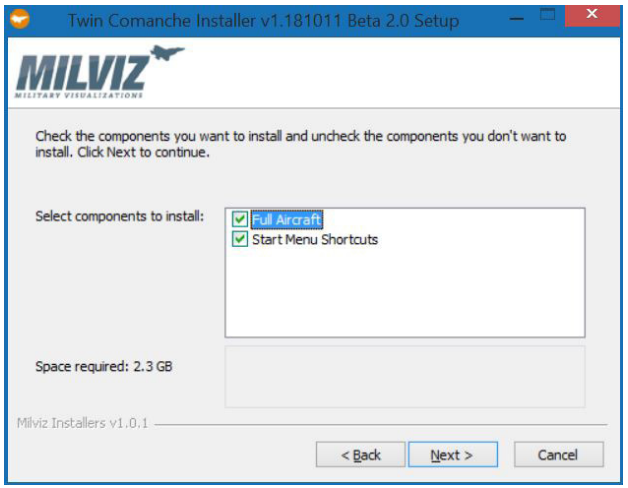
Please note that you are unable to select multiple simulators at once; to install into multiple simulators, re-run the installer for each platform you wish to install to.



4

Component Selection

The various components that make up the installation may selected or deselected at this screen, though we really don't recommend deselecting any preselected components.

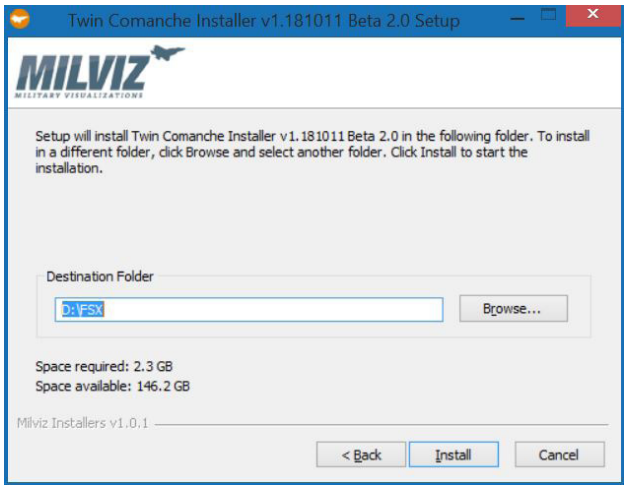


5

Install Location

The next screen shown will display the location where the MilViz PA-30 Twin Comanche will be installed. This should be pre-filled out with the folder location of the simulator chosen in Step 2. If you wish to change the location where the Twin Comanche is to be installed, you may do so by left clicking the "Browse" button and selecting a different folder.

Clicking the 'Install' button will start the process of copying files to the correct locations.



6

Post Installation & Product Support

Please be sure to revert your antivirus program settings back to their previous state. Also please ensure to make your FSX or P3D directory off-limits to any automatic antivirus scanning. Failure to do this may result in a non-functioning simulator!

It may be worthwhile to back-up or save a copy of your downloaded installer. Please be aware that as new updates are released over time, we do not continue to offer older versions for download due to support issues. Please also note that support is intended for the latest releases of our products only.

If you have not done so by this point, we would also encourage you to register for support forum access. Support forum access is available to legitimate product owners only and is granted on a per product basis only, meaning that you have to actively register for each individual product.

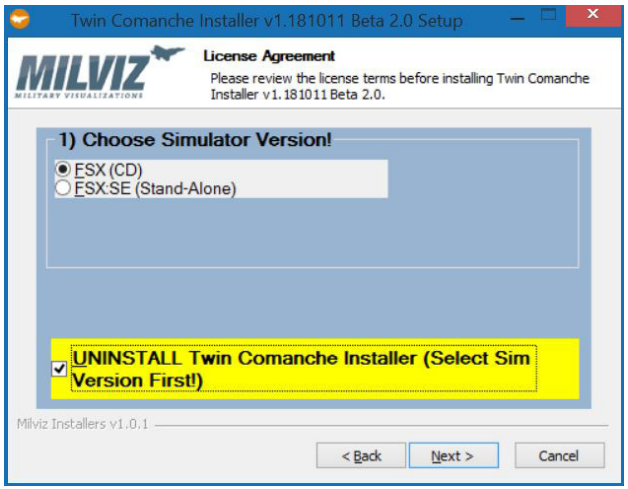
To register, please email **oisin@milviz.com** with your proof of purchase and your preferred (or existing, if you have already registered for other products) username and we'll get you set right up!

Uninstalling the PA-30

The MilViz PA-30 Twin Comanche may be uninstalled from a single simulator at a time by re-running the installer.

Once the installer opens, you may select the simulator you wish to uninstall from, then select the checkbox which is highlighted in a nice subdued yellow color and reads “UNINSTALL”. Left click on the “Next” button to proceed with uninstalling the aircraft.

Note: *Prior to uninstalling the aircraft, please be sure to back up any customized files or custom liveries you have installed if you wish to keep them.*



Updating your product

The MilViz PA-30 Twin Comanche is updated by one of two methods, with minor update notifications delivered through the MVAMS application, and major update notification being provided by your vendor.

To check for a minor update, open the MVAMS application via the MVAMS icon which has been placed on your desktop. If you do not see it, the MVAMS application is installed to ‘C:\Users\(username)\AppData\Local\MVAMS’.

If a minor update for the Twin Comanche is available, a notification will appear here. Click yes to begin the update process, which largely mirrors the install process.

Major updates are beyond the scope of the MVAMS application, however, and require a new version of the aircraft to be downloaded and installed. Be sure to uninstall the previous version first, backing up any custom files or liveries prior to doing so.

MVAMS Overview & Operation

MVAMS stands for MilViz Addon Management System. It is a standalone application used by many of our product releases which represents our user-friendly solution to the growing complexity of options and choices available within our aircraft. It provides a central location to manage your aircraft, as well as providing incremental update capabilities.

The MilViz PA-30 Twin Comanche installs (if not already present) and fully integrates with the MVAMS application, allowing the user to choose between differing avionics options and start-up state.

Starting MVAMS

If this is your first MilViz product that includes the MVAMS application, running the aircraft installer will place a shortcut icon on your desktop. If this is not your first MVAMS equipped MilViz product, the shortcut icon may already exist on your desktop. This icon will open the MVAMS application. In addition, the application will open automatically after installation is complete.

Selecting Your Aircraft

When you open the MVAMS application, you are presented with the instruction to select an addon from the Quick Access menu. Clicking on the top left icon will bring up visual icons of any your installed MilViz addons which are integrated with the MVAMS application. Your newly installed PA-30 Twin Comanche will now be one of the available selections.

Configuring Avionics

The MilViz PA-30 Twin Comanche offers support for a wide range of third party avionics from Flight1, RealityXP, Navstax, and REX/MilViz, with multiple configurations available. To change between panel configurations, simply select the desired choice from the dropdown selection box.

A product-locked version of the REX/MilViz WX Advantage Weather Radar is included with the PA-30 Twin Comanche. All other third party gauges referenced are not included with the PA-30 Twin Comanche and must be purchased separately from their respective publishers.

It's also important to note that we provide support only to the extent that we've provided a mechanism for third party products to be used within the PA-30; we do not provide product support for those individual products.

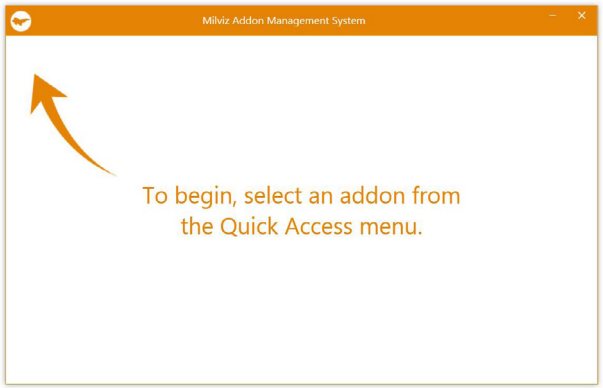
Cold & Dark / Tip Tanks

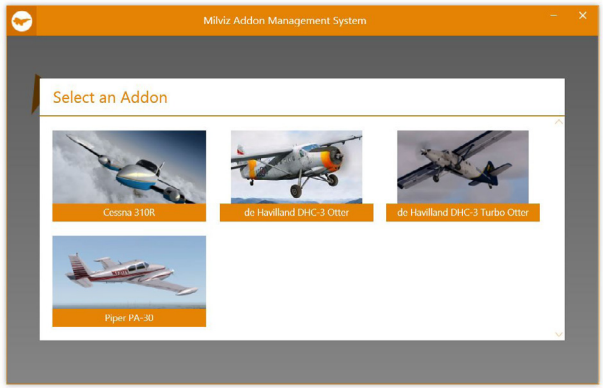
To have the Twin Comanche load in the simulator forced to a 'cold n' dark' state, select the checkbox titled with this option.

Tip tanks may be selected / deselected to hide or show the tip tanks on the aircraft within the simulator.

Saving and Exiting

To save your changes, click the button 'Save Defaults' located at the bottom of the screen (Note: If your aircraft is loaded while you access this menu, you will need to reload your aircraft before you will see any change in the simulator.)



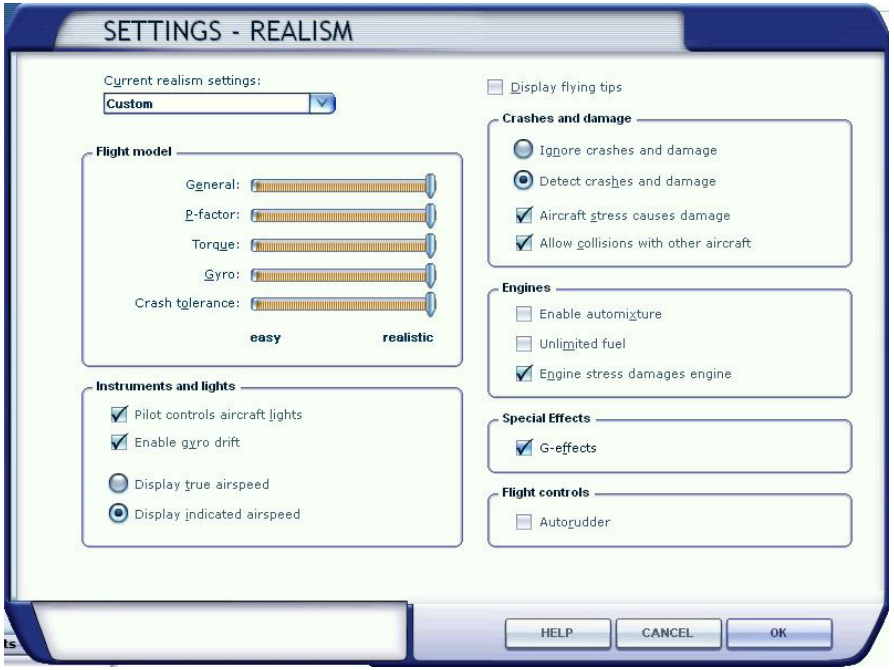


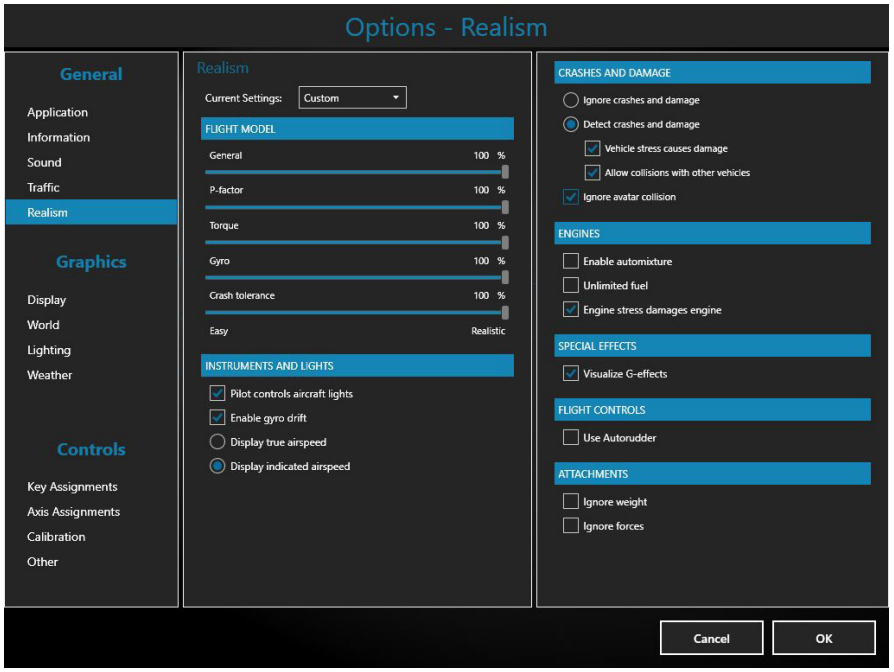
Realism Settings

The MilViz PA-30 Twin Comanche has been designed with the goal of replicating a high level of accuracy in regards to operation and flight response. To this end, development and testing have both been carried out using the highest realism settings available within the simulator.

The realism settings within both Flight Simulator X and Prepar3D exist in order to make simulated flying less of a chore, as well as to remove some of the tasks which are necessary in real life to ensure a safe and proper flight. We do encourage the use of many of these settings, so long as they help increase enjoyment of flight simulation by our pilots.

In consideration of the above, our recommended settings exist not as a strict guideline, but as a means to ensure that the full level of accuracy available within our Twin Comanche may be experienced if desired. Without these recommended settings in place, particularly in regards to the section which controls the flight model, the aircraft may not perform as intended.





Flight Model

For maximum realism, all sliders in the flight model section should be set fully to the right. Any other settings may cause the aircraft to become easier to fly, but at the expense of accuracy in regards to the intended flight model.

Instruments and Lights

The MilViz PA-30 Twin Comanche has a sophisticated lighting system in place, so the "Pilot controls aircraft lights" should be checked. "Enable gyro drift" and "Display indicated airspeed" may be left to user preference.

Crashes and Damage

The choices in this section may be left to user preference.

Engines

"Enable automixture" should not be selected in order to allow for functionality of the mixture lever. "Unlimited fuel" may be left to user preference. "Engine stress damages engine" may be left to user preference as well.

Special Effects

This may be left to user preference.

Flight Controls

"Autorudder" should not be selected, so long as you have means to operate the aircraft rudder via rudder pedals or a twist axis on your joystick.

Cabin Overview

As would be expected from a light twin commonly used for multi-engine flight training, the cabin of the PA-30 Twin Comanche is simple and elegant, lending itself to quick familiarization and easy use.

Equipped with dual flight controls, the Twin Comanche is flyable from either the pilot's or the copilot's position. However, the left hand panel contains the primary flight instruments, and the left hand yoke features an electrical trim switch not present on the right.

The primary flight instruments, located on the left side of the instrument panel, are arranged in a factory standard period typical layout which differs slightly from the traditional 'six-pack'.

Directly below the left hand yoke is the avionics power switch (labeled RADIO PWR), the parking brake handle, and the handle for raising and lowering the landing gear.

At the bottom of the left hand side instrument panel is the electrical switch panel which holds the majority of the electrical and lighting switches in the aircraft.

To the right of the electrical switch panel is the throttle quadrant, containing dual levers for throttle, propeller, and fuel mixture.

The avionics stack is next, found right-of-center, followed to the right by the engine instrumentation: dual tachometers, a dual needle manifold

Simulator Tips: Maintaining control over your PA-30.

The MilViz PA-30 Twin Comanche, like all of our aircraft, is designed to have the primary flight controls operated by a gaming controller such as a joystick or a yoke.

Not only is it one of our stated requirements for the product, but we firmly believe that the investment placed in a good gaming controller will allow a greater level of aircraft control, which will in turn create a better sense of realism as well as provide a richer, more immersive, experience.

All secondary controls, such as switches, buttons, and other levers, are designed to be operated with simulator commands that can be mapped to controller or keyboard buttons, or with a computer mouse.

Most basic **ON/OFF** toggle switches are designed to be toggled using the **LEFT MOUSE BUTTON**, but switches or controls with multiple positions may also use a convention where the control may be incremented or turned **ON** with the **LEFT MOUSE BUTTON** and conversely decremented or turned **OFF** with the **RIGHT MOUSE BUTTON**.

Rotary switches or dials, such as the heading selector for example, may be operated with the mouse wheel. Typically, the convention is to increment a value with **MOUSE WHEEL UP** and decrement a value with **MOUSE WHEEL DOWN**. Levers may be operated by holding down the **LEFT MOUSE BUTTON** and dragging, or by using the mouse wheel as described above.

pressure gauge, a twin dial fuel flow gauge, and smaller rectangular fuel quantity, fuel pressure, oil pressure and oil temperature gauges.

To the right of the throttle quadrant, at the bottom of the right hand instrument panel, are located the handles for the cowl flaps, the alternate air levers, the rudder trim wheel (marked 'NOSE' as per the original placard), the wing flaps switch, and the various heater controls.

Pitch trim (also marked 'NOSE' as per the original placard!) is operated via a rotating handle located in the center of the cabin ceiling.

On the left hand window we have an outside temperature gauge as well as a fully animated storm window; the cabin exit is the door on the right side of the cabin, which when operated, also animates the right hand front seat.

Located on the cabin floor, well hidden, I mean, *nestled* between the seats, are the dual fuel controls for the engines.

Immediately forward of the fuel selectors is a removable floor panel which exposes the manual gear extension lever which would be used in the event that the electrical gear motor is not functioning. This method is not operational, but the panel may be removed by clicking on the rear latch, and replaced by clicking on the panel cover which, when opened, sits on the back seat.

Moving forward a bit more is the hinged circuit breaker panel. This panel may be opened by clicking the latch, which will then expose the circuit breakers. None of the circuit breakers are functional, but clicking on that area will in fact hide or show the tip tanks! The panel may be closed by clicking again on the open panel itself.

Flight & Navigation Instrument Overview

The traditional layout of primary flight instruments commonly known as the 'six pack' is so ubiquitous these days, that it can be surprising to encounter an instance where experimentation by the manufacturer is more obvious.

The Twin Comanche is a good example. It predates any sort of standard coming into common practice about where instruments 'should' be, and so while it features an extensive array of instrumentation, it's worthwhile giving the panel a quick review to become familiar with what is where.

Front and center in the panel is a unique original 'Course Selector'; this instrument functions as a very easy to use heading indicator.

To the right is the Artificial Horizon; to the left is the Airspeed Indicator. Below the Airspeed Indicator is the Altimeter, while the Turn Coordinator and the Vertical Speed Indicator are located under the Artificial Horizon.

At the far left of the panel sits the all important analog clock as well as a indicator for the wing flaps. A trio of navigational instruments is located to the right of the primary flight instruments, while tucked away in a lower position below the VSI is the suction gauge.

An ammeter, the only gauge on the left side not involved in primary flight or navigation duties, rounds out the left hand instrumentation.

Airspeed Indicator

The Twin Comanche features an advanced Airspeed Indicator that includes, in addition to markings in both MPH and Knots, a method for determining True Airspeed (TAS).

The primary markings on the indicator represent the Indicated Airspeed (IAS) of the aircraft. Colored ranges represent the Normal Operating Speed (green arc), the Never Exceed Speed (top of yellow arc, terminated by the red line), and the Flap Extension Speed (white arc).

To calculate the True Airspeed (TAS), rotate the dial to the bottom right of the airspeed indicator with the MOUSEWHEEL so that your current pressure altitude (as determined by the altimeter while set at 29.92 in Hg.) is in line with the current Outside Air Temperature (OAT).

The reading in the lower TAS window is the True Airspeed of the aircraft, in MPH.

Course Selector

The course selector in the Twin Comanche functions as an useful heading selector and indicator. It consists of a rotating compass card, a vertical lubber line, and a horizontal compass dial.

The current aircraft heading is shown on the rotating compass card above the vertical lubber line, while the horizontal compass dial can be turned by the pilot to select a desired heading using the rotary knob below the instrument.

This can be used as a navigation reference to assist the pilot in maintaining a desired heading, or in conjunction with an installed autopilot to operate a heading hold.

The rotary knob may be operated with the MOUSEWHEEL to select a desired heading. It may also be clicked with either the LEFT or RIGHT MOUSE BUTTON respectively to decrement or increment the selected heading. To sync with the current aircraft heading, click the MIDDLE MOUSE BUTTON.

Artificial Horizon

The Artificial Horizon, or Attitude Indicator, informs the pilot of the orientation of the aircraft relative to the horizon. Indicating both pitch (fore and aft tilt) and bank (side to side tilt), it is a primary instrument for flight in instrument meteorological conditions (IMC).

The instrument features a fixed orange waterline which can be adjusted up or down manually by the pilot using the knob located at the bottom of the instrument. The “card” behind the waterline pivots and rotates in concert with the aircraft’s pitch and roll movements. The waterline is set to lie flush with the white horizon line.

To set the waterline on the Artificial Horizon, the knob may be rotated with the MOUSEWHEEL, or clicked with the LEFT or RIGHT MOUSE BUTTON.

This should be done in stable level flight with reference to the actual horizon, under visual meteorological conditions (VMC).

Navigation Instruments

Radio navigation in the MilViz Twin Comanche is accomplished through a combination of installed navigation receivers or GPS units, and a trio of navigation instruments arranged vertically to the right of the flight instruments.

NDB Navigation

It's possible to utilize non-directional radio beacons (NDB) in the Twin Comanche, using the automatic direction finder (ADF) tuner and the relative bearing indicator (RBI).

The RBI is the topmost gauge in the navigation instrument stack, and consists of a fixed compass card and a rotating needle. The compass card is stationary; 0 degrees corresponds to the centreline of the aircraft. Tuning the ADF to a in-range NDB frequency will cause the needle to point directly towards the NDB beacon.

It is important to remember that the compass card does not correlate to the magnetic compass and is not adjustable; instead, the bearing indicated by the needle is relative to the heading of the aircraft. As such, by changing the aircraft heading so that the needle of a tuned NDB will read 0 degrees, the aircraft will be heading directly toward the beacon; by changing the aircraft heading so that the needle is pointing to 180 degrees, the aircraft will be heading directly away from the beacon.

VOR/LOC/GPS Navigation

The MilViz Twin Comanche is equipped with dual VOR indicators, which are the second and third gauges from top.

The topmost VOR indicator is slaved to NAV 1, regardless of what sort of avionics are installed.

The vertical course deviation bar operates with a VOR/LOC navigation receiver to indicate either left or right deviations from the selected course. On an instrument approach, the course bar will also indicate deviation left and right, but will switch to a more sensitive mode of operation, showing twice the amount of deflection for a given course distance error.

The TO/FROM indicator is a triangular-shaped pointer. When this indicator points to the head of the course arrow, it indicates that the course selected, if properly intercepted and flown, will take the aircraft TO the selected facility, and vice versa.

When flying a precision approach with operating glideslope information, the glide slope deviation needle indicates the relationship of the aircraft to the glideslope. When the needle is below the center position, the aircraft is above the glide slope, and an increased rate of descent is required.

The bottom VOR indicator is slaved to NAV 2, and operates in much the same manner as the above. However, the gauge is read from the bottom instead of the top, and this gauge also lacks a glide slope deviation needle.

The compass card on either gauge may be adjusted by rotating the OBS knob found immediately to the bottom left of the respective gauge. The knob may be manipulated by using the MOUSEWHEEL. It may also be clicked with either the LEFT or RIGHT MOUSE BUTTON to decrement or increment the compass card setting by single degrees.

Engine Instruments

The MilViz Twin Comanche features a full set of engine instrumentation allowing the pilot to monitor the aircraft as well as configure the aircraft correctly for certain stages of flight.

The tachometers are located at the top of the right-side instrument panel and represent, respectively, the left and right engines. The normal operating range allowable, represented by the green arc, is from 500 RPM to 2700 RPM. The red marking indicates the maximum continuous RPM of 2700 RPM. The RPM can be adjusted by the pilot using the associated propeller condition levers located on the throttle quadrant. During cruise operations, the pilot should ensure that the RPM is kept in the normal operating range (the green arc) by moving the associated prop condition levers.

The manifold pressure gauge, located on the bottom-right of the engine instrument cluster, features independently operating needles for the left and right engines and displays the amount of air pressure that each engine is sucking through the throttle manifold aft of the venturi. The manifold pressure is affected directly by the movement of the throttle levers on the throttle quadrant, as well as the outside air pressure.

The fuel flow gauge in the Twin Comanche features dual needles representing the left and right engines. The gauge is graduated in U.S. Gallons per hour, and represents the fuel flow entering the engines. Markings are present to assist the pilot in setting fuel flows consistent with certain phases of flight. Available settings include take-off settings for various altitudes, as well as for cruise, 55% power, 65% power, and 75% power.

A set of smaller rectangular monitoring gauges are present on the right side of the right hand instrument panel. These gauges are duplicated for the left and right hand engines.

The oil pressure gauges are graduated in degrees Fahrenheit, and feature a normal operating range of 120 to 245 degrees, with the maximum temperature being indicated by the red line at 245 degrees.

The oil pressure gauges are graduated in PSI, and have an indicated normal operating range of 60 to 90 psi.

The fuel pressure gauges are also graduated in PSI, and feature a normal operating range of 2 to 7 psi.

The fuel quantity gauges correspond to the left and right tanks, and give a relative indication of fuel remaining in the selected tank for that side.

Electrical Systems Operation

The electrical systems in the MilViz Twin Comanche are uncomplicated in nature, represented by a circuit breaker panel (non-functional) located under the floor, a switch panel located at the bottom of the left hand panel, and an ammeter located above the throttle. Other electrically operated systems include the lights, the avionics, the wing flaps, and the landing gear.

The lower switch panel is divided into 3 groups of 5 switches. From the left, we have the Master switch, the Magneto switches for both engines, the Engine Starter switch, the Fuel Pump switches, external lighting switches, the Pitot Heat switch, and the left and right Generator switches. Immediately above the switch panel is the Radio Power switch, which controls power to the avionics.

All switches, with the exception of the Engine Starter switch, are toggled UP for ON, and DOWN for OFF. They may be operated by clicking the switch with the LEFT MOUSE BUTTON.

The Engine Starter switch is a three position momentary switch which normally rests in the center position. When starting the engines, it is temporarily held in the left position by clicking and holding the LEFT MOUSE BUTTON, and in the right position by clicking and holding the RIGHT MOUSE BUTTON.

Rotary switches are present to control the intensity of lighting for the instruments and the avionics.

The wing flaps switch is located over on the bottom of the right side instrument panel. It is also a three position momentary switch, normally resting in the center position. It operates in a similar manner as the starter switch. To raise the flaps one notch, click the switch with the LEFT MOUSE BUTTON, and lower the flaps one notch by clicking the switch with the RIGHT MOUSE BUTTON.

The landing gear is operated by handle below and to the right of the pilot's yoke and is guarded to prevent accidental lowering of the landing gear. To lower the guard, click on the guard with the LEFT MOUSE BUTTON. To raise the landing gear, click on the gear handle with the RIGHT MOUSE BUTTON. To lower the landing gear, first lower the guard, then click on the gear handle with the LEFT MOUSE BUTTON.

The provided ammeter, located above the throttle quadrant, allows for indication of the amperage draw of the combined electrical system.

Throttle Quadrant

The top of the pedestal houses the throttle quadrant, with twin levers for the throttle, propeller, and mixture. In addition to being able to assign these functions to hardware controllers, they may also be operated with the mouse, or by keyboard commands. For ease of use in operating with a mouse, each lever may be manipulated in a few different ways, as well as in tandem.

To operate a single lever, hover the mouse directly over the individual knob (restricted to the upper half of the propeller knobs, more on that in a bit), and rotate the MOUSE WHEEL, or alternatively, click and hold the LEFT MOUSE BUTTON to drag the lever forward or backwards.

To operate a pair of levers in tandem, position the mouse anywhere between the knobs on the levers, and then rotate the MOUSE WHEEL, or alternatively, click and hold the LEFT MOUSE BUTTON to drag the pair of levers forward or backwards.

Propeller Feathering

Feathering (rotating the blades parallel to the airflow) the propeller on a dead engine is absolutely vital. If this is not done, the airflow will cause the propeller to continue to rotate.

A propeller blade is similar in airfoil section to a low-drag wing. When rotated by the engine, it produces thrust in addition to a small amount of induced drag as the propeller slices through the air. If the engine loses power, no thrust is produced, but all of the induced drag from the now windmilling propeller remains.

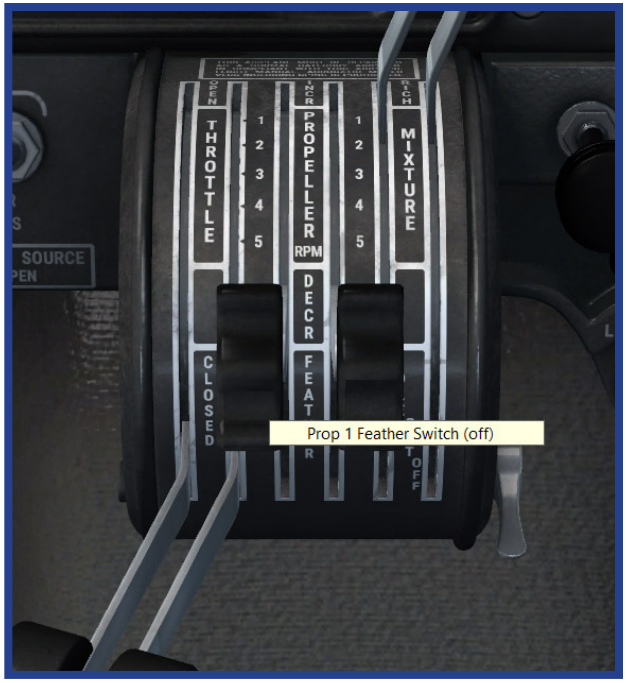
This is undesirable when operating with reduced, asymmetrical power or under no power at all, as it can rob the aircraft of the power required to maintain altitude, exacerbate negative control effects resulting from asymmetrical thrust, and shorten glide distances in total power loss situations.

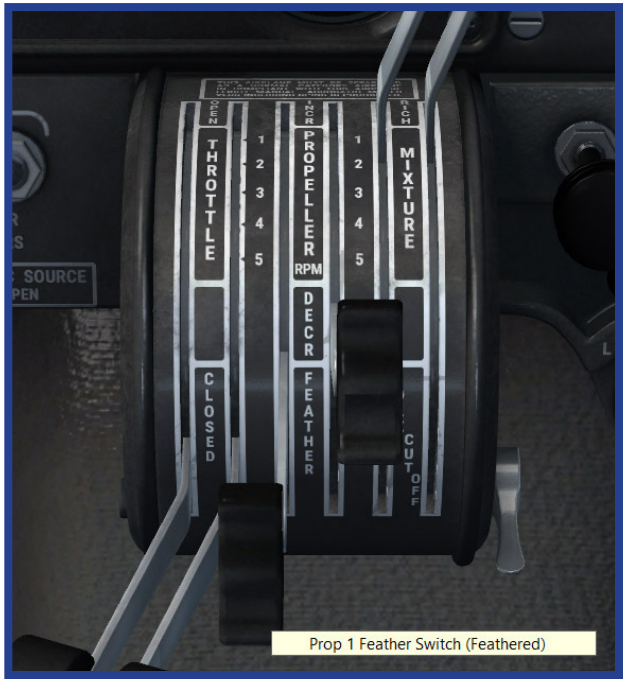
The solution is to eliminate as much induced drag as possible by stopping the propeller rotation. To accomplish this, the propeller is feathered by pulling the propeller condition levers full aft, causing the propeller blades to rotate to a fully coarse setting parallel to the airflow. This reduces the aerodynamic force of the passing air so that the propeller no longer windmills.

Unfortunately, due to limitations within the simulator, there is no way to directly portray propeller feathering merely using the levers in the virtual cockpit. By default, the levers stop at the minimum (non-feathered) propeller pitch position in order to prevent unintentional feathering by the pilot. This 'feature' exists when accessing prop levers within the virtual cockpit with the mouse, or when using an external throttle quadrant.

To solve this issue, our Twin Comanche features a method which allows for full propeller feathering using the propeller levers in the virtual cockpit.

To move the propeller levers to the fully feathered position, first hover the mouse over the lower portion of the propeller knob for the propeller you wish to feather and click the RIGHT MOUSE BUTTON. This will cause the lever to move fully aft, fully feathering the propeller. To quickly unfeather the propeller, click the RIGHT MOUSE BUTTON over the same lower portion while the propeller lever is in the feathered position.





Fuel Controls

The fuel controls for the Twin Comanche are located between the front seats, meant to be within easy reach of the pilot. The Twin Comanche carries its fuel in four integral fuel cells in the leading edge of the wings. The two main fuel cells carry 30 gallons (27 usable), the auxiliary fuel cells carry 15 gallons (all usable).

Wing tip tanks are available as optional equipment, but do not carry additional fuel in the MilViz PA-30.

Auxiliary fuel is to be used in level flight only.

During normal operation, the engine driven fuel pump is used to draw fuel from the cell adjacent to that engine. However, through the use of either the electric auxiliary fuel pump or the engine driven fuel pump, fuel can be drawn from any cell to both engines.

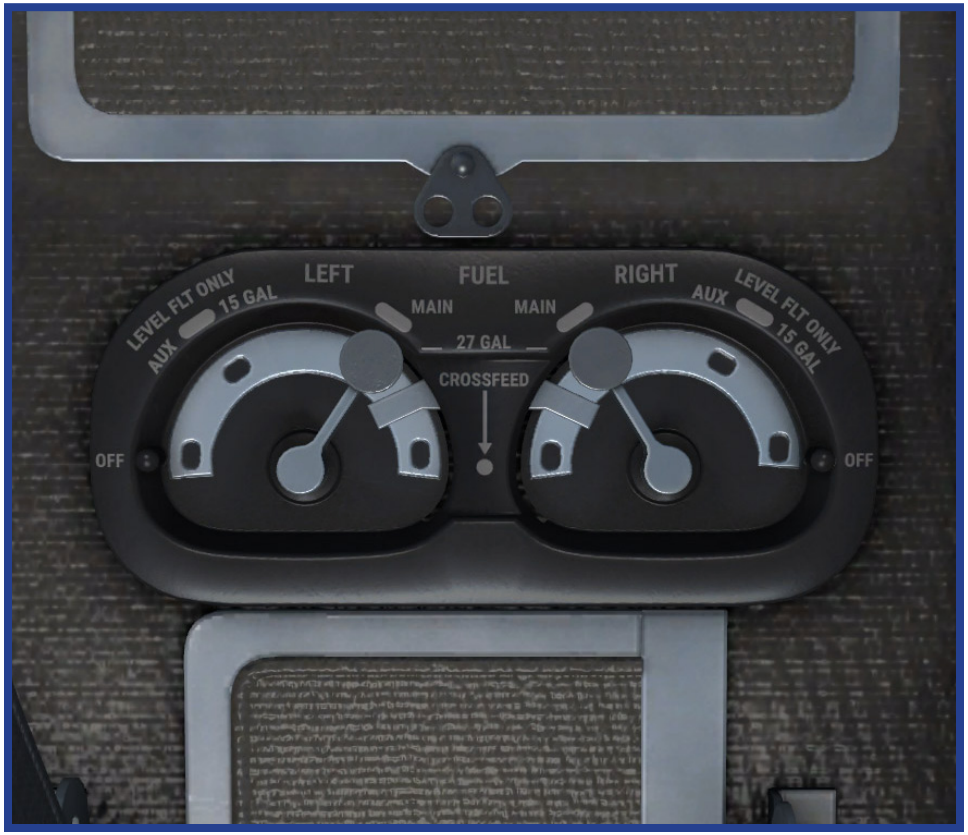
Crossfeed is available for emergency single engine operations to extend the range. When fuel is being used from the tanks on the same side as the operating engine, the fuel selector will remain in the same position as it would for normal operation, with the auxiliary fuel pump off.

To use fuel from the cells on the opposite side of the operating engine, first move the fuel selector for the inoperative engine to the main or auxiliary position, then move the fuel selector for the operating engine to the crossfeed position.

For a single engine landing, the main cell on the same side as the operating engine must be used. Never put both fuel selectors in the crossfeed position at the same time.

To operate the fuel selectors, it's important to note that mouse interaction with the levers is designed to provide a predictable movement, but one that must be studied briefly.

Both levers respond with identical rotational movement with the same mouse interaction. A click on either lever with the LEFT MOUSE BUTTON will move that lever one position **counter-clockwise**. A click on either lever with the RIGHT MOUSE BUTTON will move that lever one position **clockwise**.



However, due to the fact that the positions are mirrored from each other, it is important to make note of which way you want the lever to move prior to clicking the mouse button.

For example, if you wished to move both levers from the MAIN position to the AUX position, you would need to move the left lever counter-clockwise, and the right lever clockwise. Therefore, you would click the left lever with the LEFT MOUSE BUTTON to move the left lever counter-clockwise; you would similarly click the right lever with the RIGHT MOUSE BUTTON so as to move that lever clockwise.

Hiding the Yokes

A common issue when flying within the simulator from a fixed head position is that it's very common for the aircraft yoke(s) to obscure the switches and controls needed to start or operate the aircraft.

To help alleviate that issue, both of the yokes in the MilViz Twin Comanche may be hidden and shown at will.

To hide the yokes, click the LEFT MOUSE BUTTON where either yoke shaft meets the panel. To show the yoke again, simply click the LEFT MOUSE BUTTON again in the same location.

Doors and Windows

The MilViz Twin Comanche is equipped with an operable main cabin door, as well as an animated baggage door and an animated storm window.

The main cabin door may be operated from inside the virtual cockpit by clicking on the door handle on the left side of the cabin with the LEFT MOUSE BUTTON; the door may be closed by clicking on the handle again.

To operate the main cabin door from the outside, or open or close the baggage door, use the keyboard combination SHIFT+E, followed in quick succession by the numbers 1 or 2.

The storm window found on the side window to the left of the pilot may be opened or closed by clicking anywhere on the frame of the storm window with the LEFT MOUSE BUTTON.

Avionics Choices

The MilViz Twin Comanche PA-30 includes support for an incredibly wide variety of 3rd party avionics.

Panel layouts, selectable through our MVAMS utility, are available for the following configurations:

- Default GNS 530 & GNS 430
- Flight1 GNS 430 (x2)
- Flight1 GNS 530 & GNS 430
- Flight1 GTN 650 (x2)
- Flight1 GTN 750 & GTN 650
- Flight1 GTN 750 & default-based GNS 430
- RealityXP GNS 430 (x2)
- RealityXP GNS 530 & GNS 430
- NavStax Radio Navigation Stack
- Free Radio (blank panel for implementing your own 2D gauges)

In addition, each one of the above is also selectable as a separate choice outfitted with the REX/MilViz WX Advantage Weather Radar. A special version of this software, usable only with the Twin Comanche, is included with your purchase.

Important: All options except for the first (Default-based GNS 530 + GNS 430) and the last (Free Radio) require ownership of the corresponding 3rd party gauges, which are not included in the MilViz PA-30 Twin Comanche.

Special Features

(**Important:** These features are compatible with **Prepar3D 4.x** only.)

We are pleased to offer the **TrueGlass** and **RealLight** technologies in the MilViz PA-30 Twin Comanche.

Licensed from TFDi Design, these stunning technologies allow for a more immersive experience in Prepar3D 4.x.

TrueGlass allows advanced rain, ice, and condensation effects to appear on the cockpit windows, while RealLight provides beautiful and adjustable night lighting to the aircraft.

Normal Flight Procedures

The normal flight procedures on the following pages are intended to be useful for all users, regardless of experience or ability. Although the full range of procedures are shown, from the initial walk around to post flight parking, we've attempted to categorize the individual steps so as to display their importance within the simulator. These are shown in the right-most column.

The categories that we've used are as follows:

(INTERACTION NOT SIMULATED)
These items are those that do not have an associated action to be performed within the simulator. This can be due to limitations within the simulator, or areas where which we've made the decision not to simulate.

(OPTIONAL TO COMPLETE)
These items do have an associated action that can be performed within the simulator, however this importance of that action is largely up to the preference of the user. There are no in-game consequences for ignoring these steps. This includes engine instrumentation monitoring tasks.

(RECOMMENDED)
These are items that are not only able to performed within the simulator, but also have the added benefit of providing a relatively realistic and complete flight experience. While there are no serious consequences for ignoring these steps, we do highly recommend that they are followed.

(REQUIRED)
These items are those of importance for the operation of this aircraft. Ignoring these steps will likely cause issues if the intent of each section is desired. (For example, not following the required steps in the 'Starting Engines' section will prevent the engines from being started. Who would of guessed!)

It should be noted that the MilViz PA-30 Twin Comanche is designed to be accessible for all pilots, regardless of skill level, and as such there are no custom failure routines programmed into this aircraft, nor is there any sort of wear accumulation arising from misuse of the engines or airframe.

Preflight Check

1) Cabin		
Control Wheel	RELEASE RESTRAINT	*(INTERACTION NOT SIMULATED)*
Avionics Master	OFF	*(OPTIONAL TO COMPLETE)*
Ignition	OFF	*(OPTIONAL TO COMPLETE)*
Landing Gear Selector	DOWN	*(OPTIONAL TO COMPLETE)*
Master Switch	ON	*(OPTIONAL TO COMPLETE)*
Fuel Quantity Gauge	CHECK EACH TANK	*(OPTIONAL TO COMPLETE)*
Wing Flaps	LOWER	*(OPTIONAL TO COMPLETE)*
Master Switch	OFF	*(OPTIONAL TO COMPLETE)*

Walk-around Inspection

Exterior	CHECK FOR DAMAGE OR LEAKS	*(INTERACTION NOT SIMULATED)*
2) Right Wing		
Control Surfaces	CHECK FOR INTERFERENCE	*(INTERACTION NOT SIMULATED)*
Wing Tip and Navigation Light	CHECK	*(INTERACTION NOT SIMULATED)*
Fuel Tanks	CHECK SUPPLY VISUALLY	*(INTERACTION NOT SIMULATED)*
Fuel Tank Vents and Overflow Drains	OPEN	*(INTERACTION NOT SIMULATED)*
Tie Downs and Wheel Chocks	REMOVE	*(REQUIRED - PERFORMED VIA MENU)*
Main Gear Strut	PROPER INFLATION - 2-3/4”	*(INTERACTION NOT SIMULATED)*

Walk-around Inspection (continued)

2) Right Wing (continued)		
Tire	CHECK FOR WEAR AND PROPER INFLATION	*(INTERACTION NOT SIMULATED)*
Oil	CHECK LEVEL	*(INTERACTION NOT SIMULATED)*
Dip Stick and Oil Inspection Cover	SECURE	*(INTERACTION NOT SIMULATED)*
Air Inlets	CLEAR	*(INTERACTION NOT SIMULATED)*
Propeller	CHECK FOR NICKS	*(INTERACTION NOT SIMULATED)*
Area Surrounding Propeller	CLEAR OF DEBRIS	*(INTERACTION NOT SIMULATED)*
Cowling	SECURE	*(INTERACTION NOT SIMULATED)*
3) Nose Section		
Windshield	CLEAN	*(INTERACTION NOT SIMULATED)*
Heater and Ventilating Air Inlet	CLEAR	*(INTERACTION NOT SIMULATED)*
Nose Gear Strut	PROPER INFLATION - 2-3/4”	*(INTERACTION NOT SIMULATED)*
Tire	CHECK FOR WEAR AND PROPER INFLATION	*(INTERACTION NOT SIMULATED)*
4) Left Wing		
Oil	CHECK LEVEL	*(INTERACTION NOT SIMULATED)*
Dip Stick and Oil Inspection Cover	SECURE	*(INTERACTION NOT SIMULATED)*
Air Inlets	CLEAR	*(INTERACTION NOT SIMULATED)*
Propeller	CHECK FOR NICKS	*(INTERACTION NOT SIMULATED)*
Area Surrounding Propeller	CLEAR OF DEBRIS	*(INTERACTION NOT SIMULATED)*
Cowling	SECURE	*(INTERACTION NOT SIMULATED)*
Fuel Tanks	CHECK SUPPLY VISUALLY	*(INTERACTION NOT SIMULATED)*
Fuel Tank Vents and Overflow Drains	OPEN	*(INTERACTION NOT SIMULATED)*

Walk-around Inspection (continued)

4) Left Wing (continued)		
Tie Down and Wheel Chocks	REMOVE	*(REQUIRED - PERFORMED VIA MENU)*
Main Gear Strut	PROPER INFLATION - 2-3/4”	*(INTERACTION NOT SIMULATED)*
Tire	CHECK FOR WEAR AND PROPER INFLATION	*(INTERACTION NOT SIMULATED)*
Stall Warning Transmitter Switch	FREE	*(INTERACTION NOT SIMULATED)*
Pitot Head Cover	REMOVE	*(REQUIRED - PERFORMED VIA MENU)*
Pitot Head	HOLE CLEAR	*(INTERACTION NOT SIMULATED)*
Wing Tip and Navigation Light	CHECK	*(INTERACTION NOT SIMULATED)*
Control Surfaces	CHECK FOR INTERFERENCE	*(INTERACTION NOT SIMULATED)*
5) Fuselage & Empennage		
Static Vents	HOLES CLEAR	*(INTERACTION NOT SIMULATED)*
Control Surfaces	CHECK FOR INTERFERENCE	*(INTERACTION NOT SIMULATED)*
Navigation Lights	CHECK	*(INTERACTION NOT SIMULATED)*
Antennas	CHECK	*(INTERACTION NOT SIMULATED)*
Dorsal Fin Ventilating Air Inlet	CLEAR	*(INTERACTION NOT SIMULATED)*
Tie Down	REMOVE	*(INTERACTION NOT SIMULATED)*
Baggage Door	SECURE	*(CLOSE IF OPEN, NO OTHER INTERACTION)*

Before Starting Engines

Seats	ERECT	*(INTERACTION NOT SIMULATED)*
Belts and Harness	FASTENED AND ADJUSTED	*(INTERACTION NOT SIMULATED)*
Brakes	SET	*(RECOMMENDED)*
Fuel Selectors	INBOARD MAIN TANKS	*(RECOMMENDED)*
Circuit Breakers	CHECK IN	*(INTERACTION NOT SIMULATED)*
Avionics Master	OFF	*(RECOMMENDED)*
Air Vents, Heater and Defroster	AS DESIRED	*(OPTIONAL TO COMPLETE)*
Alternate Static Source	CLOSED	*(RECOMMENDED)*
Controls	FREE AND CORRECT	*(RECOMMENDED)*
Door	LATCHED	*(CLOSE IF OPEN, NO OTHER INTERACTION)*
Cowl Flaps	OPEN	*(RECOMMENDED)*
Master Switch	ON	*(REQUIRED)*

Starting Engines

Throttle	1/2 INCH OPEN	*(REQUIRED)*
Propeller Control	FULL FORWARD - INCREASE RPM	*(RECOMMENDED)*
Electric Fuel Pump	ON	*(RECOMMENDED)*
Mixture	FULL RICH	*(REQUIRED)*
Propeller	CLEAR	*(INTERACTION NOT SIMULATED)*
Magneto Switches	ON	*(REQUIRED)*
Starter	ENGAGE	*(REQUIRED)*
Throttle	ADJUST	*(RECOMMENDED)*
Oil Pressure	CHECK, CONFIRM INCREASE	*(OPTIONAL TO COMPLETE)*

(Repeat Procedure For Opposite Engine)

Before Taxiing

Rotating Beacon Light	ON	*(RECOMMENDED)*
Electric Fuel Pump	OFF	*(RECOMMENDED)*
Wing Flaps	FULLY RETRACT	*(REQUIRED)*
Wing Flap Selector	OFF POSITION (CENTER)	*(OPTIONAL TO COMPLETE)*
Landing Gear Indicator Light	CHECK GREEN	*(OPTIONAL TO COMPLETE)*
Avionics Master Switch	ON	*(REQUIRED)*
Radio Switches	AS REQUIRED	*(RECOMMENDED)*
Artificial Horizon	CHECK ERECT AND SET	*(RECOMMENDED)*
Rate-of-Climb Indicator	VERIFY ZERO	*(OPTIONAL TO COMPLETE)*
Altimeter	ADJUST TO LOCAL BAROMETRIC SETTING	*(RECOMMENDED)*
Pitot Heat Switch	ON, CHECK AMMETER DISCHARGE, OFF	*(OPTIONAL TO COMPLETE)*

Taxiing

Taxi Area	CLEAR	*(RECOMMENDED)*
Throttle	APPLY SLOWLY	*(RECOMMENDED)*
Brakes	CHECK	*(OPTIONAL TO COMPLETE)*
Steering	CHECK	*(OPTIONAL TO COMPLETE)*

Engine Run Up

Brakes	SET	*(OPTIONAL TO COMPLETE)*
Warm Up	2 TO 4 MINUTES AT 800 TO 1200 RPM	*(OPTIONAL TO COMPLETE)*
Mixture Controls	CHECK FULL RICH	*(OPTIONAL TO COMPLETE)*
(Above 5000 ft density altitude, mixture should be leaned for takeoff until any engine roughness is eliminated.)		
Propeller Controls	CHECK FULL FORWARD - INCREASE RPM	*(OPTIONAL TO COMPLETE)*
Manifold Pressure	15 IN HG	*(OPTIONAL TO COMPLETE)*
Magnetos	CHECK LEFT / RIGHT (MAXIMUM DROP 175 RPM)	*(OPTIONAL TO COMPLETE)*
Vacuum	5.0 IN HG	*(OPTIONAL TO COMPLETE)*
Vaccum L and R Indicators	CHECK	*(OPTIONAL TO COMPLETE)*
Ammeter	CHECK CHARGING	*(OPTIONAL TO COMPLETE)*
Oil Temperature	CHECK	*(OPTIONAL TO COMPLETE)*
Oil Pressure	CHECK GREEN	*(OPTIONAL TO COMPLETE)*
Throttle	REDUCE	*(OPTIONAL TO COMPLETE)*
(Repeat Procedure For Opposite Engine)		

Before Takeoff

Fuel Selectors	INBOARD MAIN TANKS	*(RECOMMENDED)*
Electric Fuel Pumps	ON	*(RECOMMENDED)*
Wing Flaps	SET FOR TAKEOFF - ZERO TO 15 DEGREES	*(REQUIRED)*
Trim Tab	SET FOR TAKEOFF - NEUTRAL OR AS REQUIRED	*(REQUIRED)*
Directional Gyro / HSI	SET HEADING	*(RECOMMENDED)*
Engine Gauges	CHECK NORMAL	*(OPTIONAL TO COMPLETE)*
Strobe Lights	ON	*(RECOMMENDED)*

Takeoff

Throttles	OPEN USING SLOW AND STEADY MOVEMENT	*(REQUIRED)*
Accelerate to V_R	90 MPH (78 KT)	*(REQUIRED)*
Control Wheel	BACK PRESSURE TO ROTATE TO CLIMB ATTITUDE	*(REQUIRED)*
Positive Rate of Climb	ESTABLISH	*(REQUIRED)*
Brakes	TAP	*(OPTIONAL TO COMPLETE)*
Landing Gear	RETRACT	*(REQUIRED)*
Landing Gear Indicator	AMBER	*(OPTIONAL TO COMPLETE)*
Climb Out at V_Y	112 MPH (97 KT)	*(RECOMMENDED)*

Short Field Takeoff and Obstacle Clearance

Wing Flaps	15 DEGREES	*(REQUIRED)*
Trim Tab	SET FOR TAKEOFF	*(REQUIRED)*
Brakes	APPLY PARTIAL POWER BEFORE RELEASE	*(REQUIRED)*
Throttles	OPEN USING SLOW AND STEADY MOVEMENT	*(REQUIRED)*
Accelerate	70 TO 80 MPH (61 TO 70 KT)	*(REQUIRED)*
Control Wheel	BACK PRESSURE TO ROTATE TO CLIMB ATTITUDE	*(REQUIRED)*
Positive Rate of Climb	ESTABLISH	*(REQUIRED)*
Accelerate to V_X	90 MPH (78 KT)	*(REQUIRED)*
Climb Past Obstacle		
Accelerate to V_Y	112 MPH (97 KT)	*(RECOMMENDED)*
Landing Gear	RETRACT	*(REQUIRED)*
Wing Flaps	RETRACT	*(REQUIRED)*
Power	AS REQUIRED ABOVE 1000 FT AGL	*(RECOMMENDED)*

Climb

Best Angle-of-Climb Speed (V_X)	90 MPH (78 KT)	*(RECOMMENDED)*
Best Rate-of-Climb Speed (V_Y)	112 MPH (97 KT)	*(RECOMMENDED)*
Best En Route Rate-of-Climb Speed	130 MPH (113 KT)	*(RECOMMENDED)*
Cylinder Head Temperature	MAINTAIN IN GREEN	*(RECOMMENDED)*
Mixture Controls	ADJUST WITH ASCENT	*(RECOMMENDED)*
Electric Fuel Pumps	OFF AT DESIRED ALTITUDE	*(RECOMMENDED)*
Cowl Flaps	CLOSED AT DESIRED ALTITUDE	*(RECOMMENDED)*

Cruise

Power	SET PER POWER TABLE	*(RECOMMENDED)*
Normal Maximum Cruise Power	75 %	*(RECOMMENDED)*
Mixture Controls	ADJUST AS PER EGT GAUGE	*(RECOMMENDED)*
Auxiliary / Tip Tanks	USE ONLY IN LEVEL CRUISE FLIGHT	*(OPTIONAL TO COMPLETE)*
Propellers	SYNCHRONIZE	*(OPTIONAL TO COMPLETE)*
Engine Gauges	MONITOR	*(RECOMMENDED)*

Descent

Propeller Controls	CRUISE RPM	*(RECOMMENDED)*
Manifold Pressure Gauges	15 TO 17 IN HG	*(RECOMMENDED)*
Airspeed	CYLINDER HEAD TEMPERATURES IN GREEN	*(RECOMMENDED)*
Mixture Controls	ENRICH WITH DESCENT	*(RECOMMENDED)*

Approach and Landing

Seats	ERECT	*(INTERACTION NOT SIMULATED)*
Belts and Harness	FASTEN AND ADJUST	*(INTERACTION NOT SIMULATED)*
Electric Fuel Pumps	ON	*(RECOMMENDED)*
Fuel Selectors	INBOARD MAIN TANKS	*(RECOMMENDED)*
Landing Gear Selector	DOWN UNDER 125 MPH (108 KT)	*(RECOMMENDED)*
Landing Gear Indicator	GREEN	*(RECOMMENDED)*
Wing Flaps	AS REQUIRED UNDER 100 MPH (87 KT)	*(RECOMMENDED)*
Cowl Flaps	OPEN	*(RECOMMENDED)*
Trim Tab	SET FOR LANDING	*(RECOMMENDED)*
Propeller Controls	2400 RPM	*(RECOMMENDED)*
Mixture Controls	ENRICH AS REQUIRED	*(RECOMMENDED)*
V_{APP}	95 MPH (83 KT)	*(RECOMMENDED)*

Short Field Landing

Airspeed on Final	90 MPH (78 KT)	*(RECOMMENDED)*
Throttles	CARRY POWER UNTIL FLARE	*(RECOMMENDED)*
Wing Flaps	RETRACT IMMEDIATELY UPON TOUCHDOWN	*(RECOMMENDED)*
Control Wheel	FULL BACK PRESSURE	*(RECOMMENDED)*
Brakes	APPLY FULLY	*(RECOMMENDED)*

Go Around

Propeller Controls	FULL FORWARD - INCREASE RPM	*(RECOMMENDED)*
Throttles	FULL FORWARD - OPEN	*(RECOMMENDED)*
Control Wheel	ROTATE TO CLIMB ATTITUDE	*(RECOMMENDED)*
Positive Rate of Climb	ESTABLISH	*(RECOMMENDED)*
Landing Gear	RETRACT	*(RECOMMENDED)*
Climb Out at V_Y	112 MPH (97 KT)	*(RECOMMENDED)*
Wing Flaps	RETRACT	*(RECOMMENDED)*
Power	AS REQUIRED ABOVE 1000 FT AGL	*(RECOMMENDED)*

After Landing (Clear of Runway)

Wing Flaps	RETRACT	*(OPTIONAL TO COMPLETE)*
Wing Flap Selector	CENTER OFF POSITION	*(OPTIONAL TO COMPLETE)*
Strobe Lights	OFF	*(OPTIONAL TO COMPLETE)*

Engine Shutdown

Idle	UNTIL NOTED DECREASE IN CHT	*(OPTIONAL TO COMPLETE)*
Electric Fuel Pumps	OFF	*(RECOMMENDED)*
Cabin Heater	OFF	*(RECOMMENDED)*
Rotating Beacon	OFF	*(RECOMMENDED)*
Avionics Master	OFF	*(RECOMMENDED)*
Throttles	1800 RPM	*(OPTIONAL TO COMPLETE)*
Clear Plugs	15 TO 20 SECONDS	*(OPTIONAL TO COMPLETE)*
Throttles	REDUCE TO 1200 RPM	*(OPTIONAL TO COMPLETE)*
Mixture Controls	IDLE CUT-OFF	*(REQUIRED)*

Engine Shutdown (continued)

Magnetos	OFF	*(RECOMMENDED)*
Master Switch	OFF	*(RECOMMENDED)*

Parking and Mooring

Control Wheel	SECURE RESTRAINT	*(INTERACTION NOT SIMULATED)*
Wheel Chocks	IN PLACE	*(OPTIONAL - PERFORMED VIA MENU)*
Tie Downs	SECURE	*(INTERACTION NOT SIMULATED)*
Pitot Head	COVER	*(OPTIONAL - PERFORMED VIA MENU)*
Cabin Fresh Air Inlets	CLOSED	*(OPTIONAL TO COMPLETE)*
Storm Window	SECURE	*(OPTIONAL TO COMPLETE)*
Doors	LOCKED	*(INTERACTION NOT SIMULATED)*

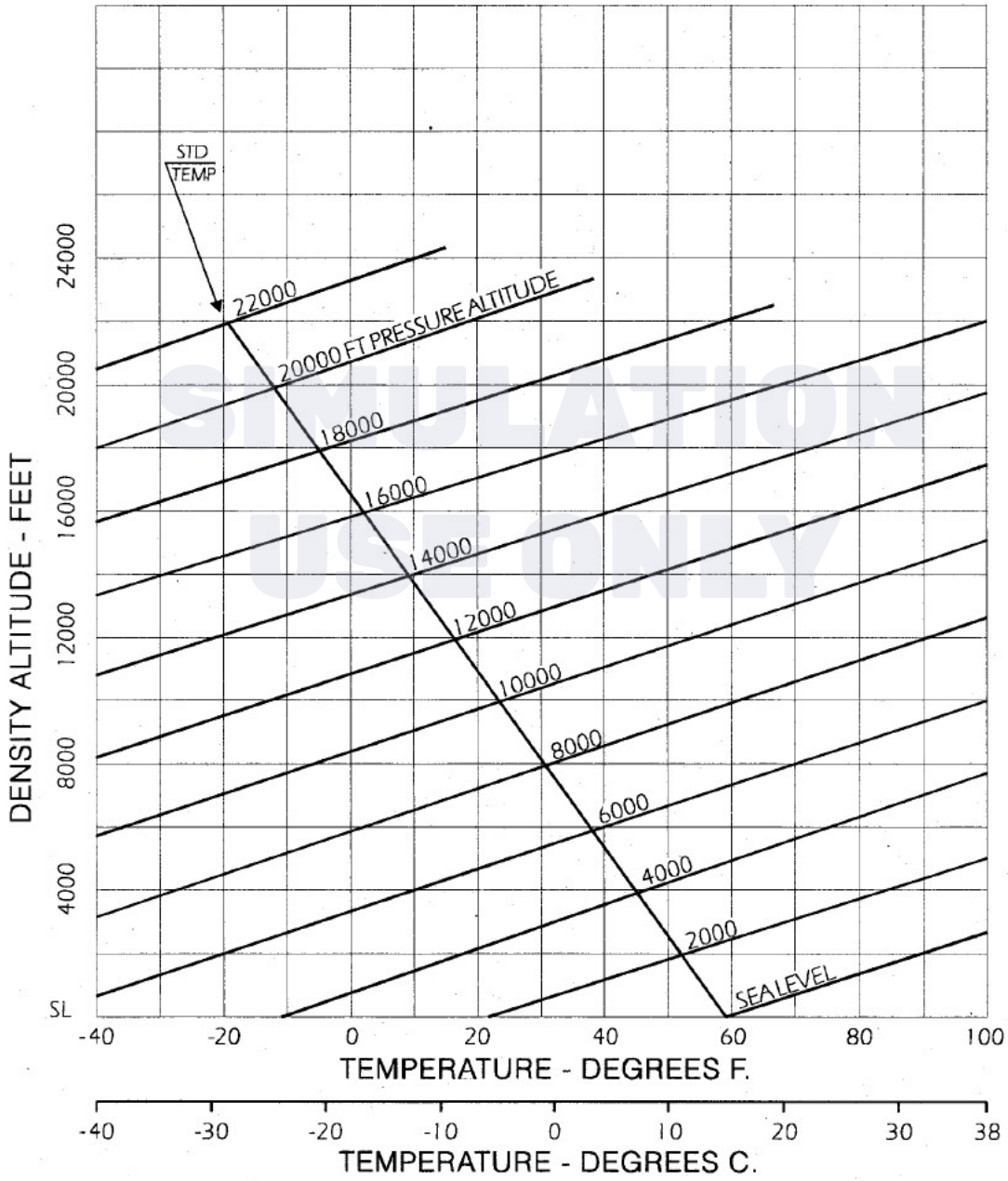
Performance Charts

Altitude Conversion Chart

Note:

This chart can be used to determine density altitude from existing temperature and pressure altitude conditions.

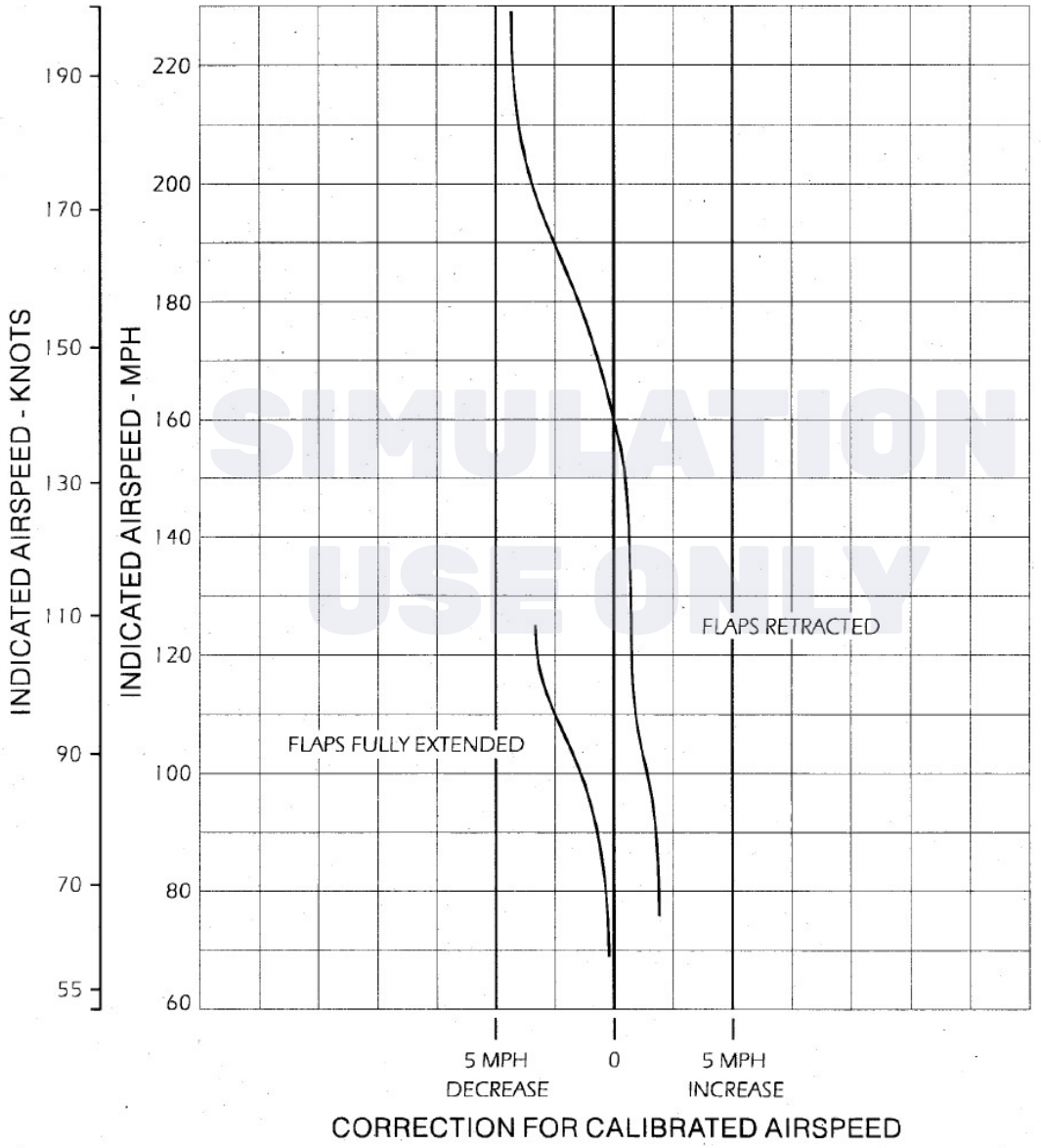
Refer to this chart when interpreting the accompanying performance charts.



Airspeed Calibration

Primary Pitot - Static System

Standard Pitot - Static Head



Part Throttle Fuel Consumption

IO-320-B Series Engine

8.5 to 1 Compression Ratio

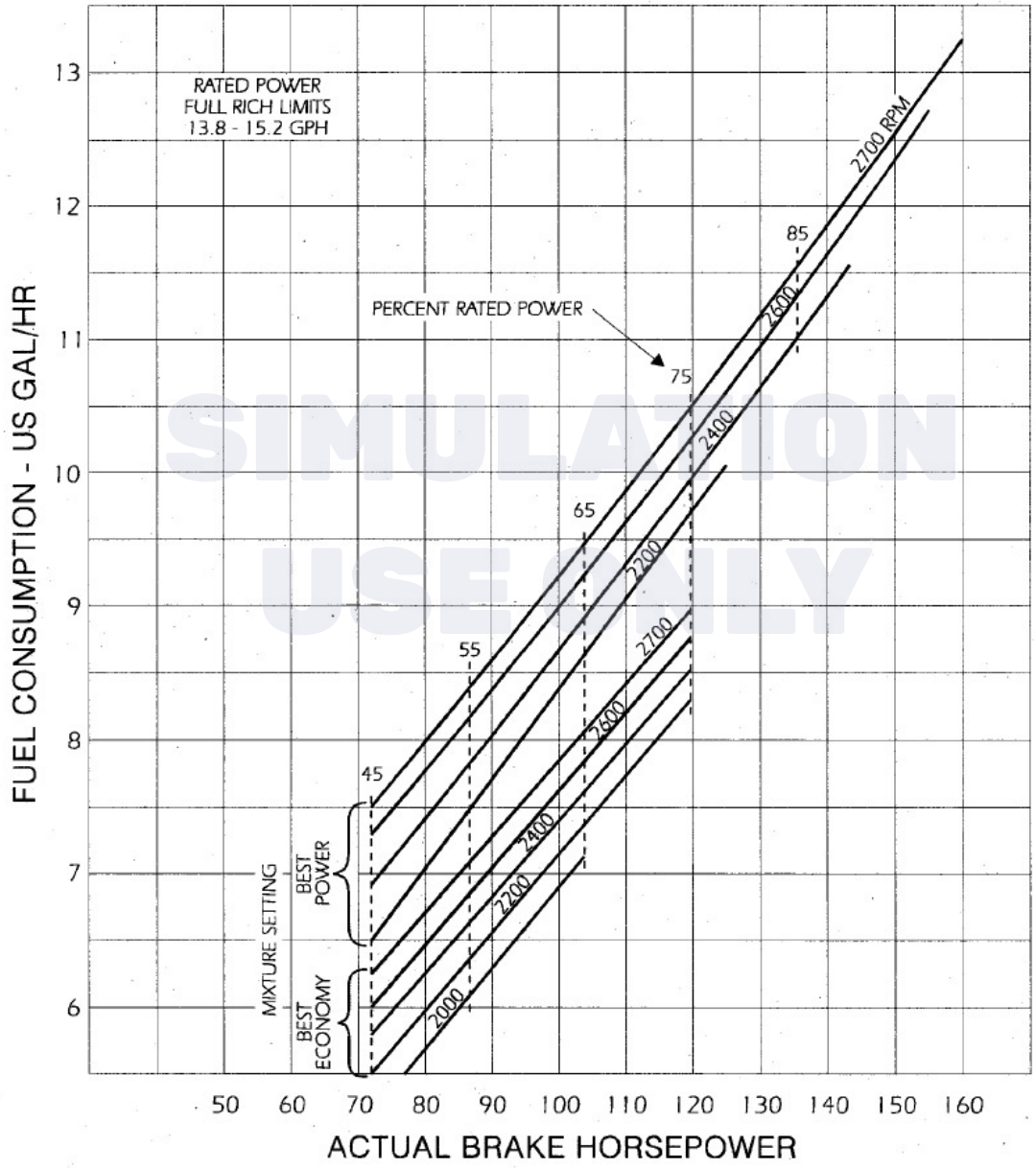
RSA-5AD1 Fuel Injector

Standard Sea Level Conditions

Mixture As Noted

Note:

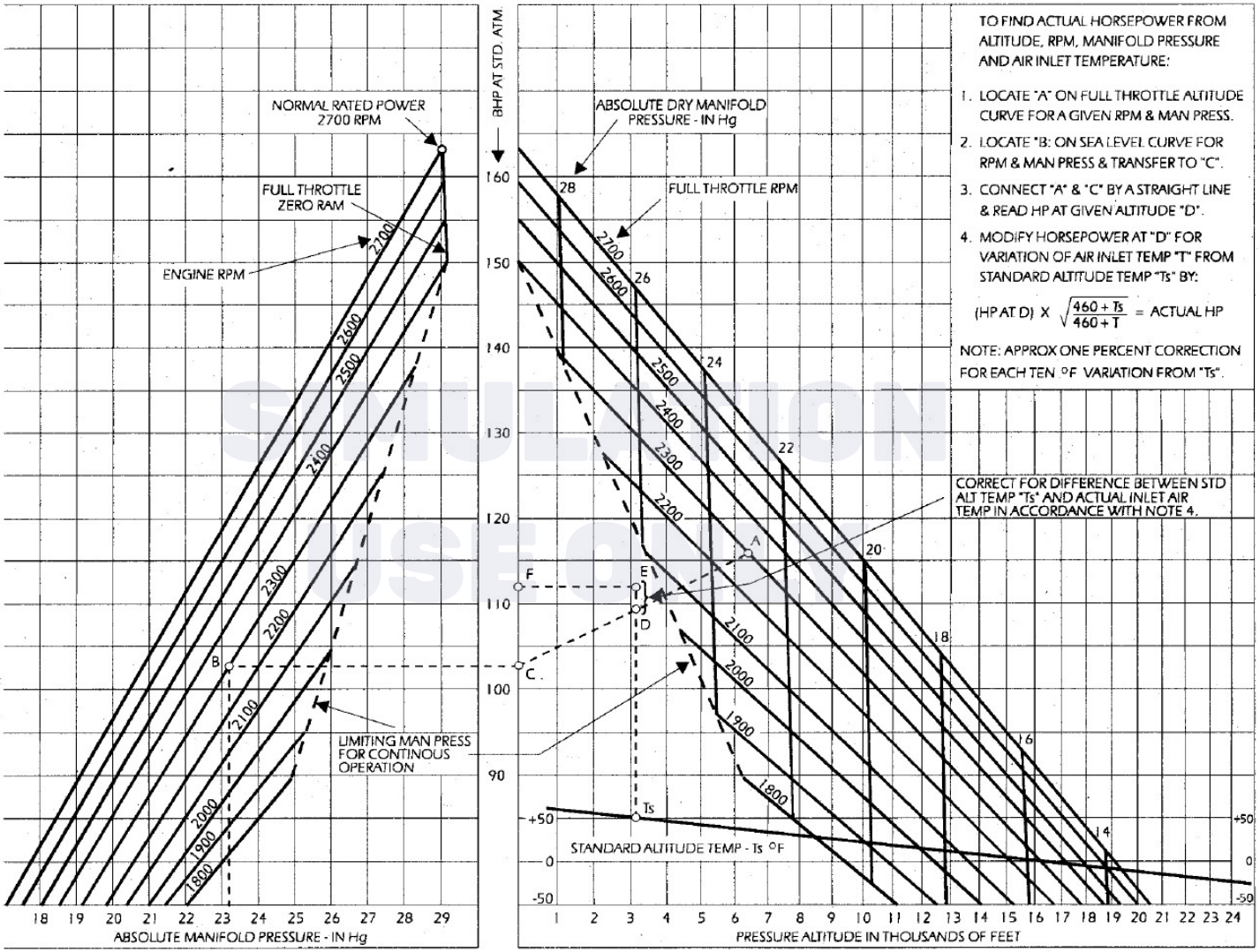
To obtain fuel consumption at altitude, refer to accompanying altitude performance curve.



Altitude Performance Curve

IO-320-B Series Engine
8.5 to 1 Compression Ratio
RSA-5AD1 Fuel Injector

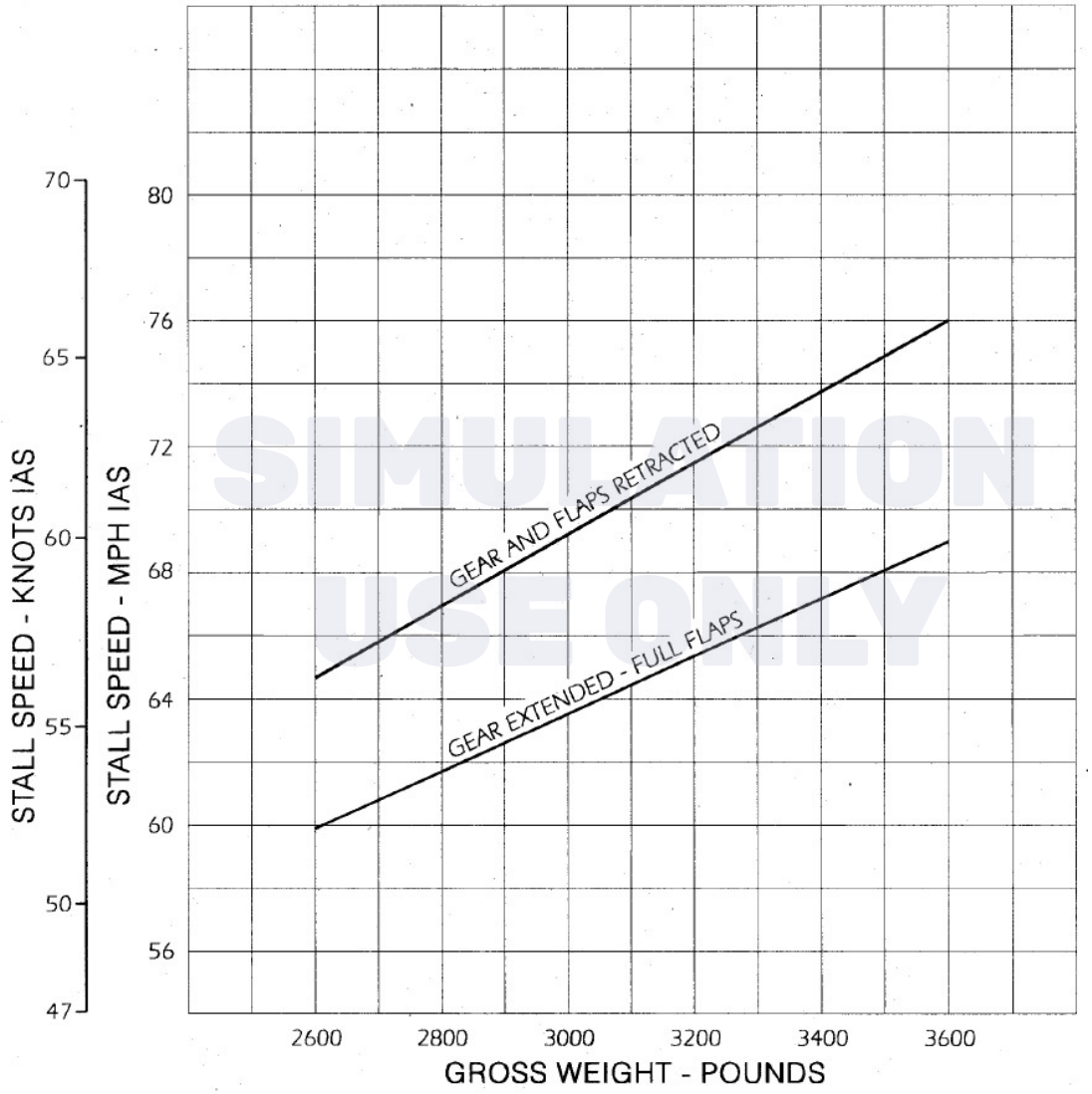
Standard Atmosphere
Mixture: Best Power



Stall Speed vs. Gross Weight (without tip tanks)

Standard Atmosphere

Power Off

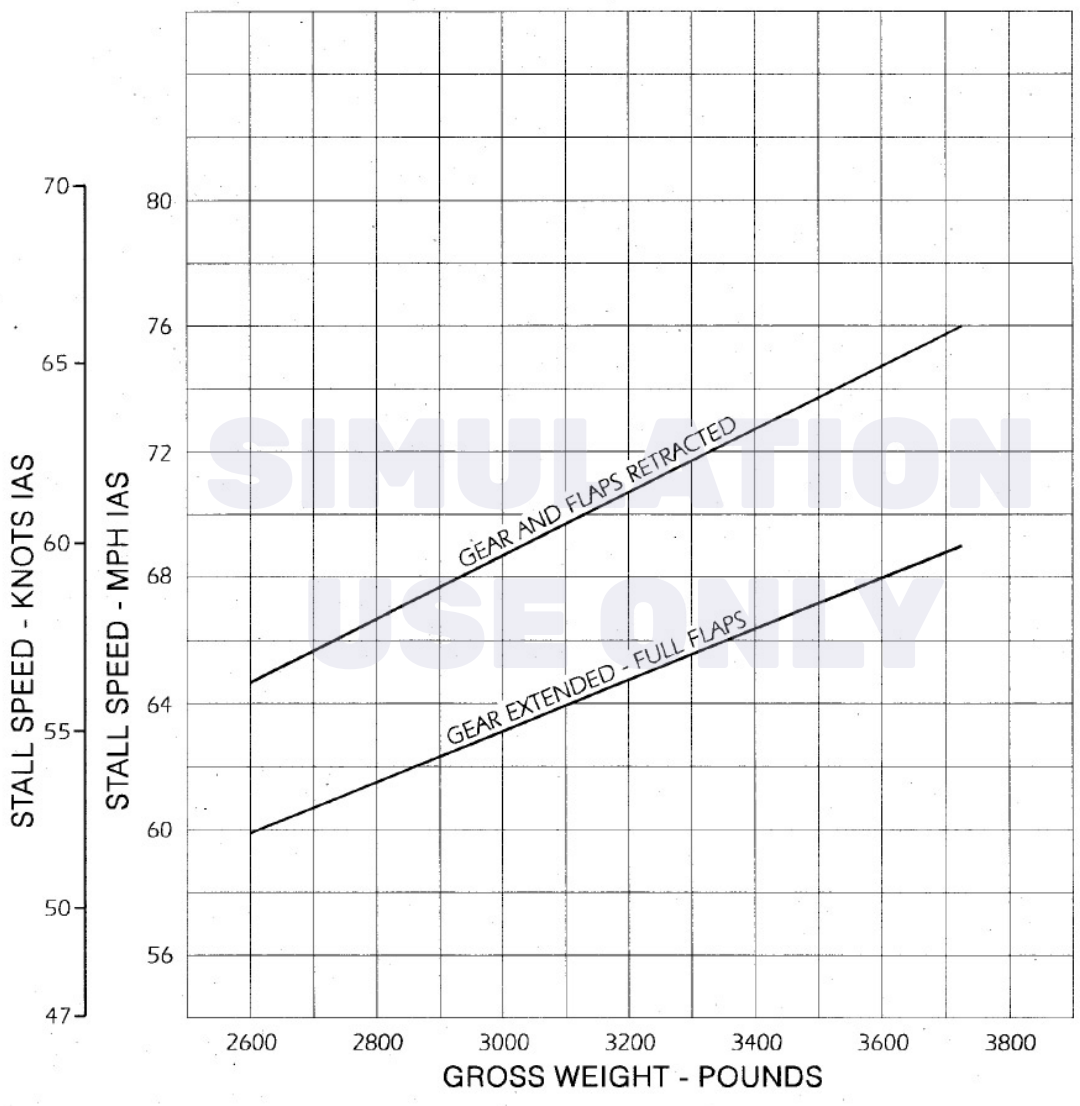


Stall Speed vs. Gross Weight (with tip tanks)

3725 lbs Gross Weight

Standard Atmosphere

Power Off



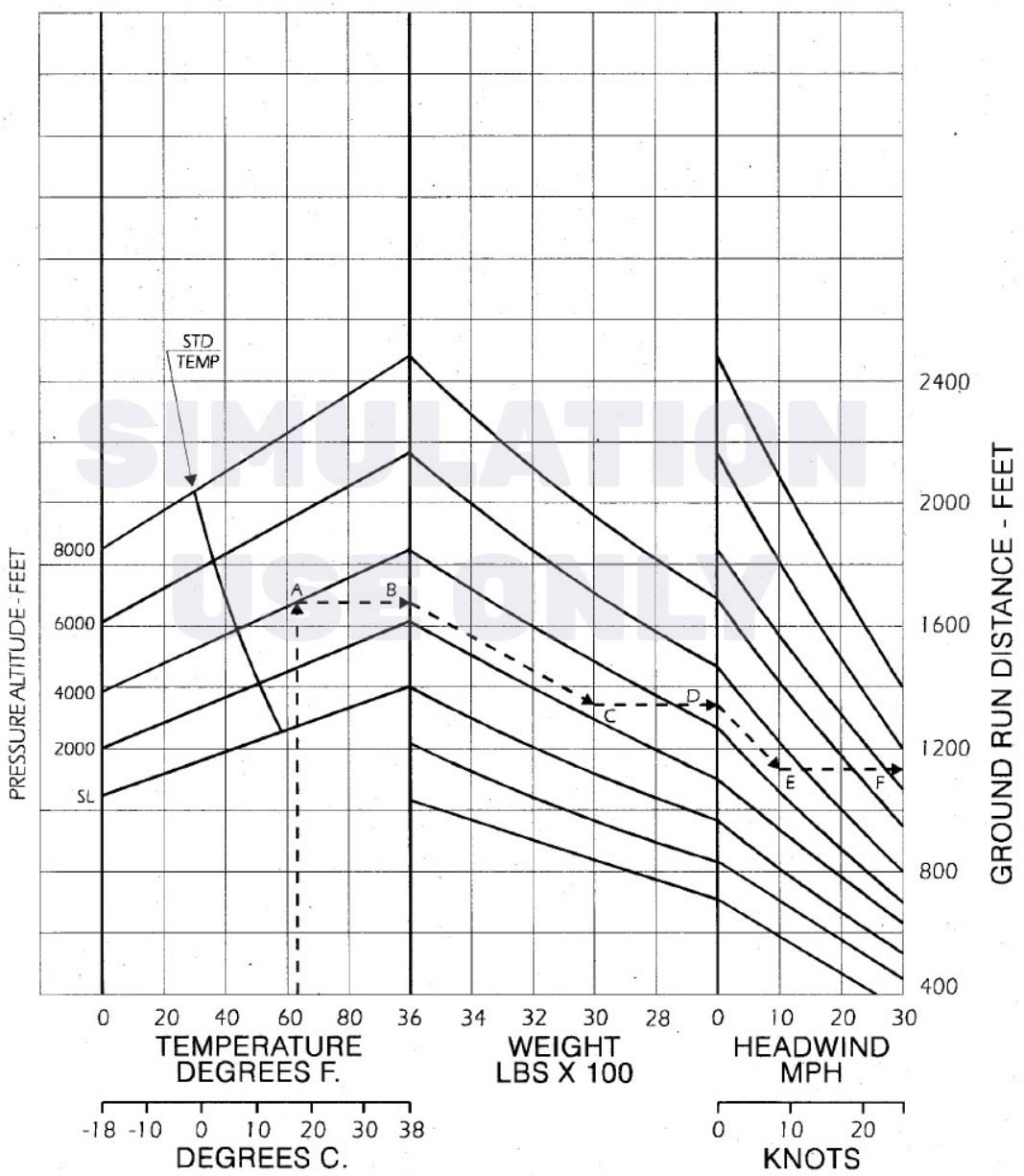
Takeoff Ground Run Distance (without tip tanks)

Wing Flaps set at 15 degrees

Runway Surface Paved, Level, Dry

Full Throttle & Maximum RPM

Takeoff Speed = 80 MPH IAS



Takeoff Ground Run Distance (with tip tanks)

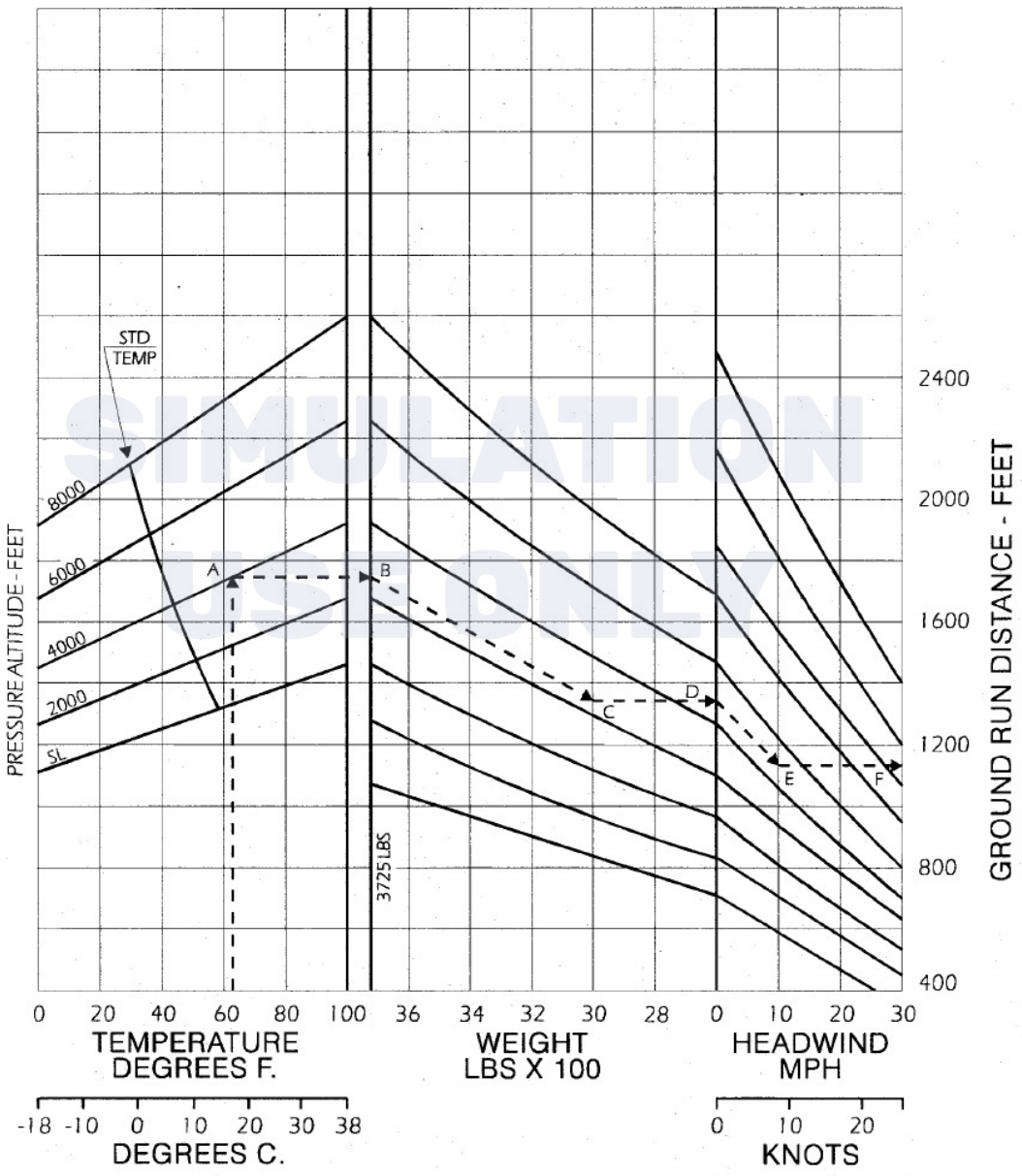
3725 lbs Gross Weight

Wing Flaps set at 15 degrees

Runway Surface Paved, Level, Dry

Full Throttle & Maximum RPM

Takeoff Speed = 80 MPH IAS



Accelerate-Stop Distance (without tip tanks)

Wing Flaps Retracted

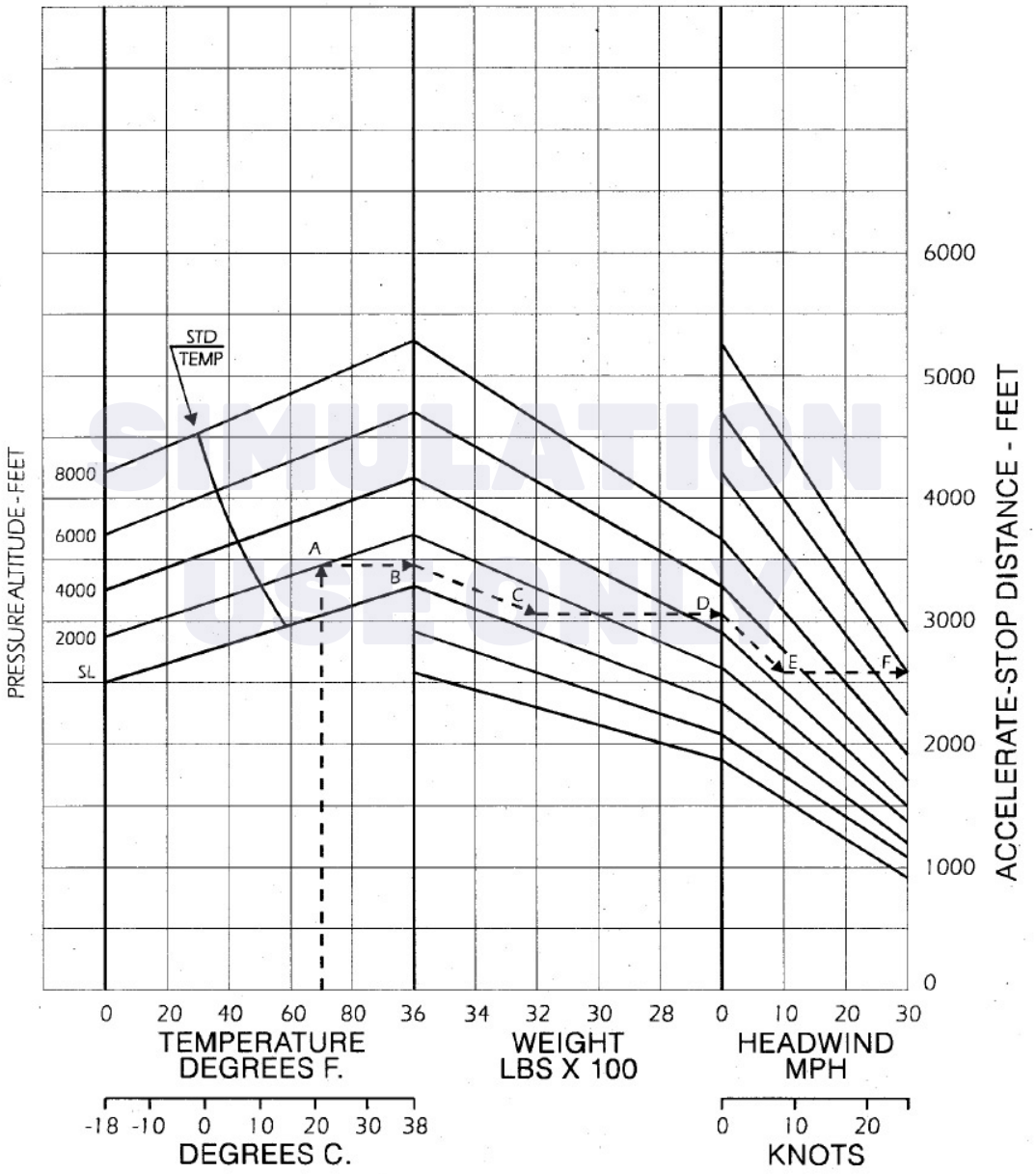
Runway Surface Paved, Level, Dry

Full Throttle & Maximum RPM

Accelerate To 90 MPH IAS

Throttles Closed At Decision Speed

Maximum Braking Effort



Accelerate-Stop Distance (with tip tanks)

3725 lbs Gross Weight

Wing Flaps Retracted

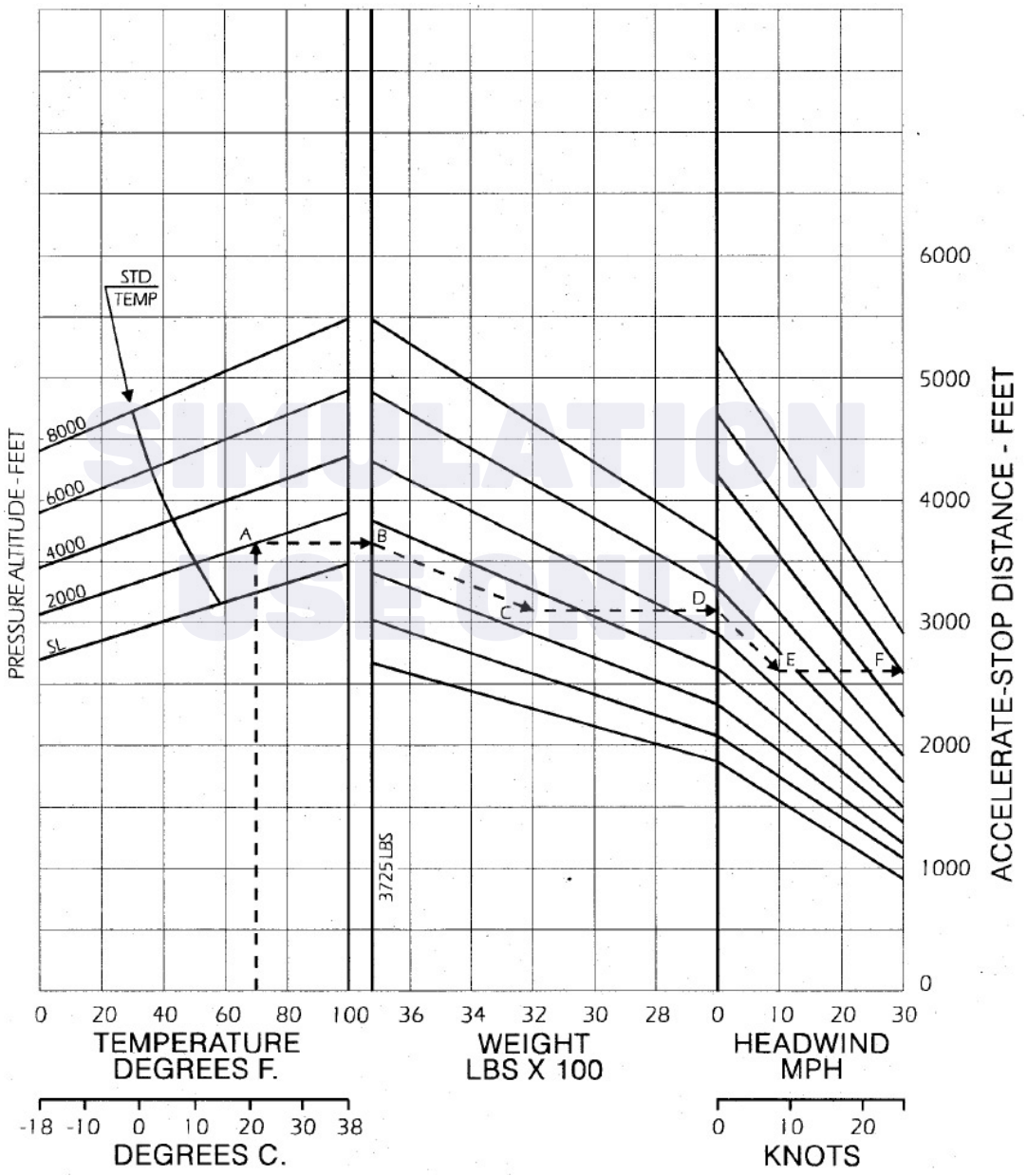
Runway Surface Paved, Level, Dry

Full Throttle & Maximum RPM

Accelerate To 90 MPH IAS

Throttles Closed At Decision Speed

Maximum Braking Effort



Multi-Engine Rate Of Climb vs. Density Altitude & Weight (without tip tanks)

Cowl Flaps Open

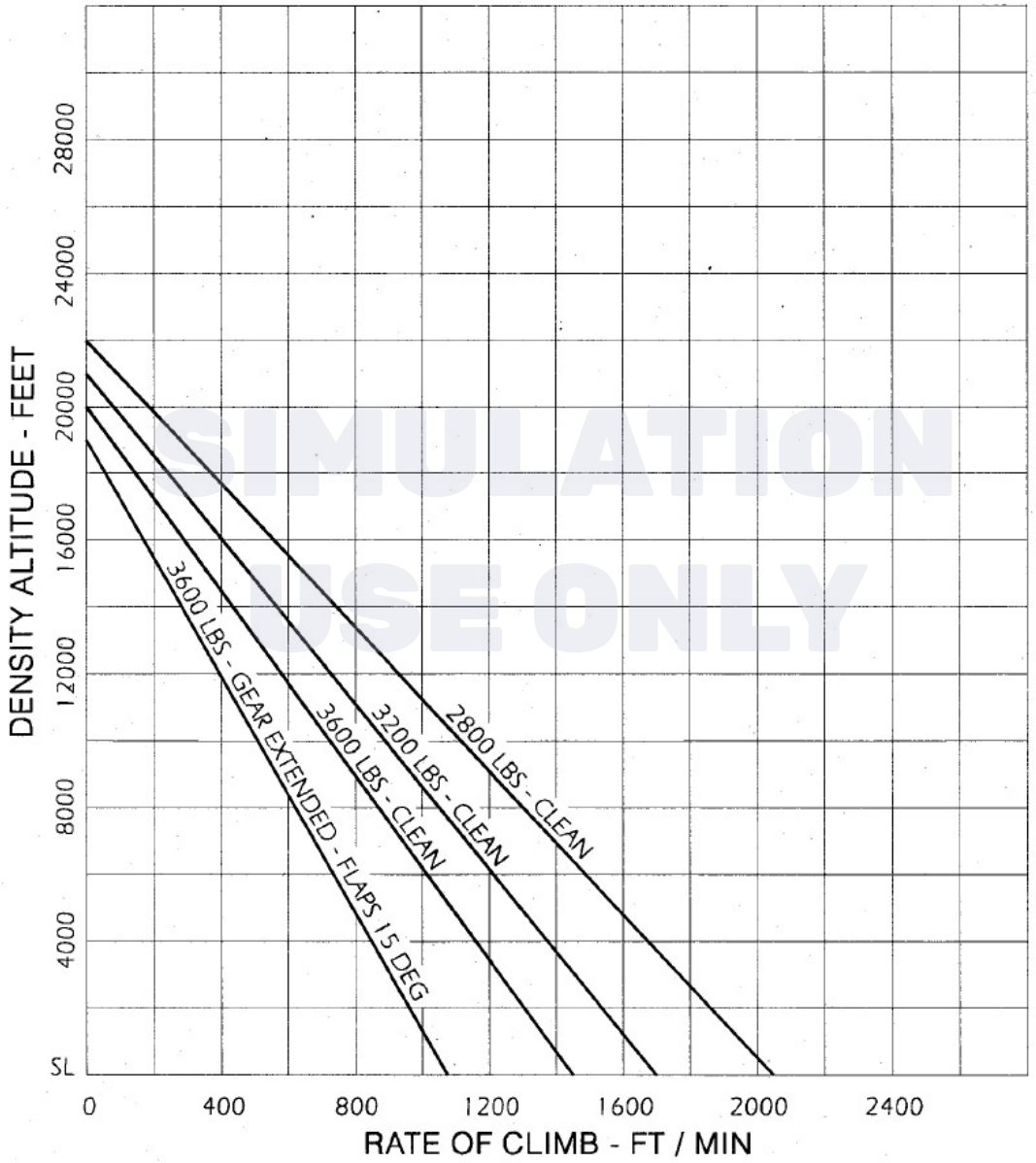
Adjust Mixture For Smooth Operation

Full Throttle & Maximum RPM

Optimum Airspeed

Landing Gear As Indicated

Wing Flaps As Indicated



Multi-Engine Rate Of Climb vs. Density Altitude & Weight (with tip tanks)

3725 lbs Gross Weight

Cowl Flaps Open

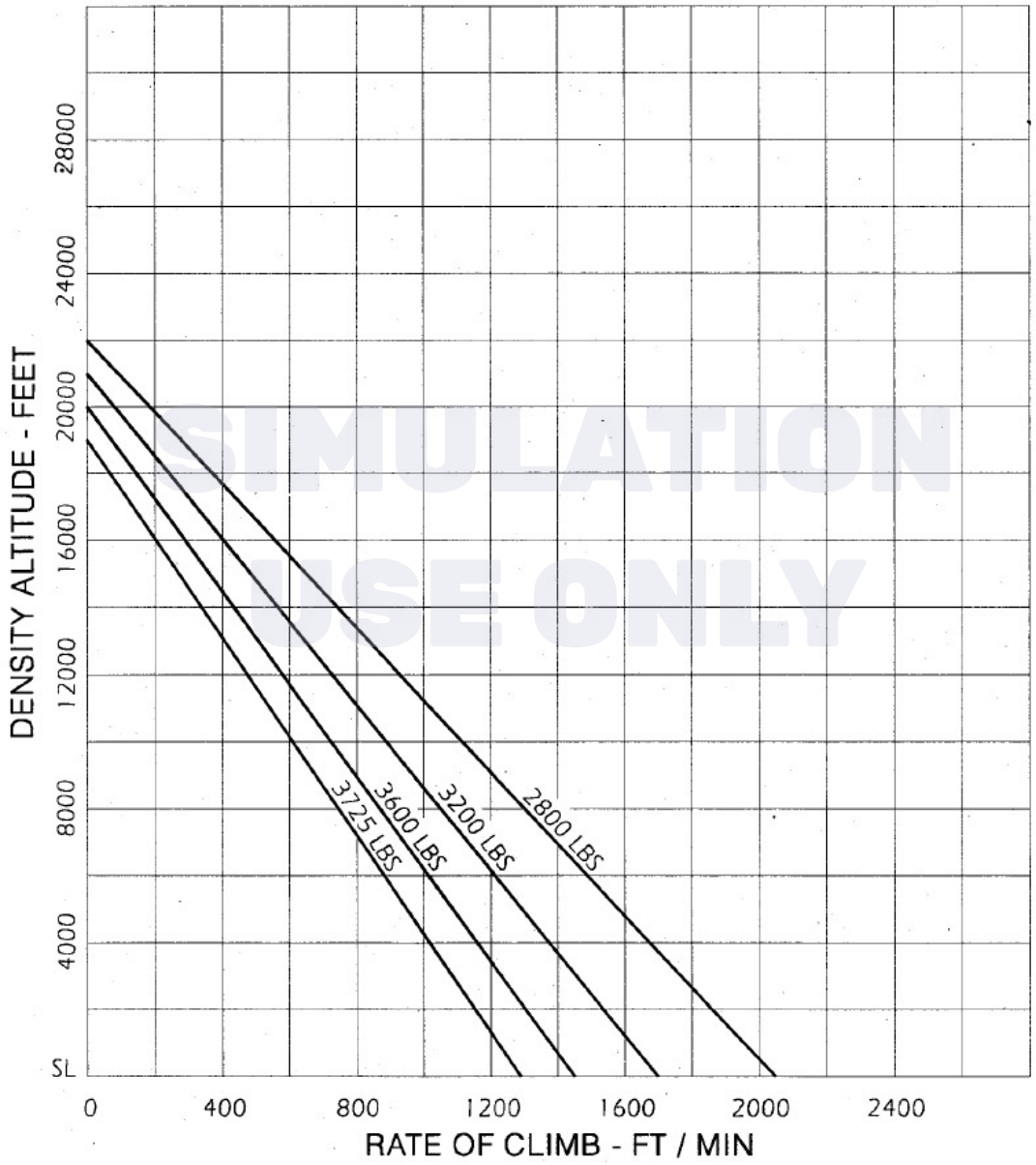
Adjust Mixture For Smooth Operation

Full Throttle & Maximum RPM

Optimum Airspeed

Landing Gear As Indicated

Wing Flaps As Indicated



Single-Engine Rate Of Climb vs. Density Altitude & Weight (without tip tanks)

Left Engine Inoperative

Left Propeller Feathered

Right Engine Full Throttle

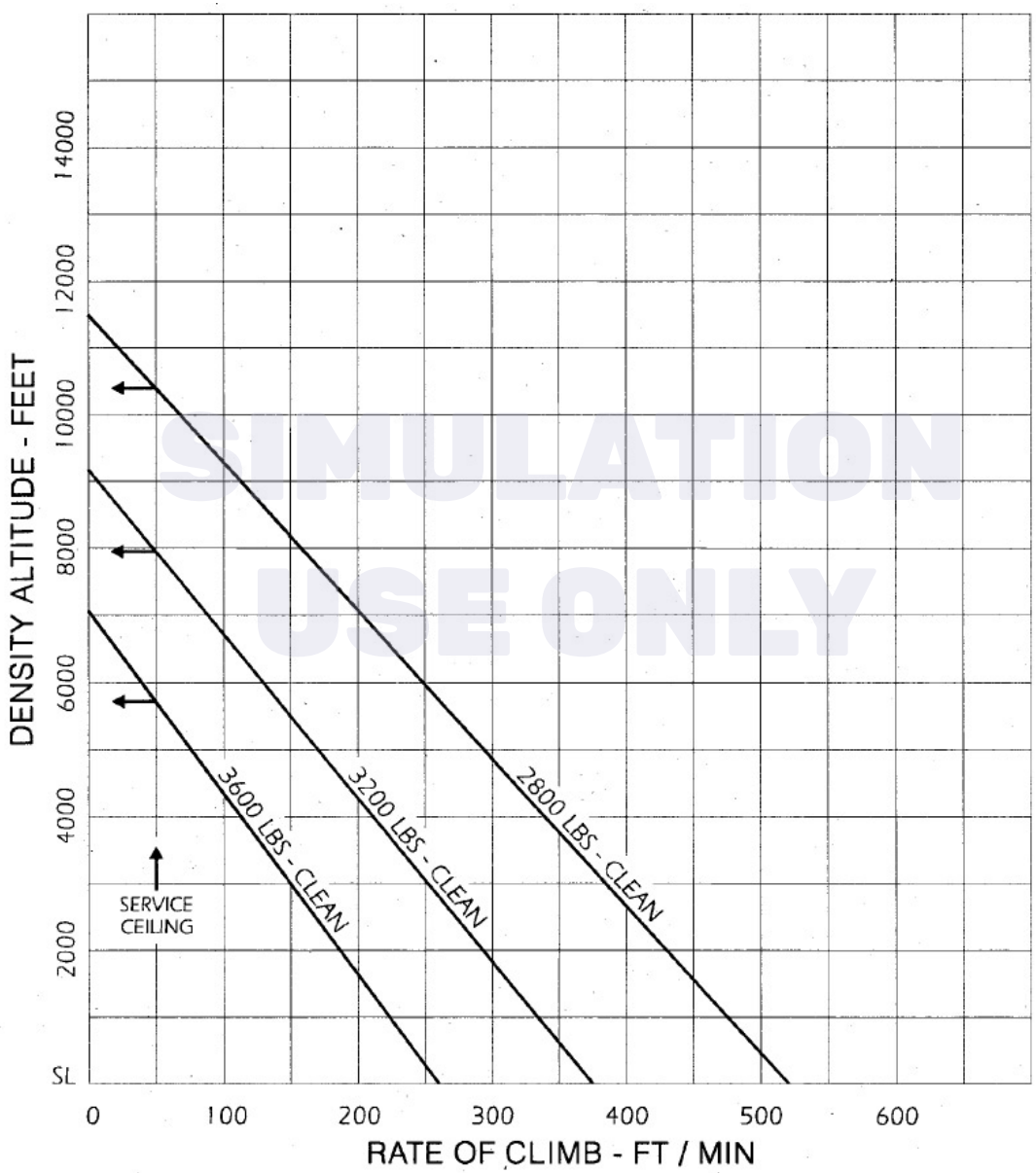
Right Propeller Maximum RPM

Cowl Flaps Open

Adjust Mixture For Smooth Operation

Optimum Airspeed

Landing Gear & Flaps Retracted



Single-Engine Rate Of Climb vs. Density Altitude & Weight (with tip tanks)

3725 lbs Gross Weight

Left Engine Inoperative

Left Propeller Feathered

Right Engine Full Throttle

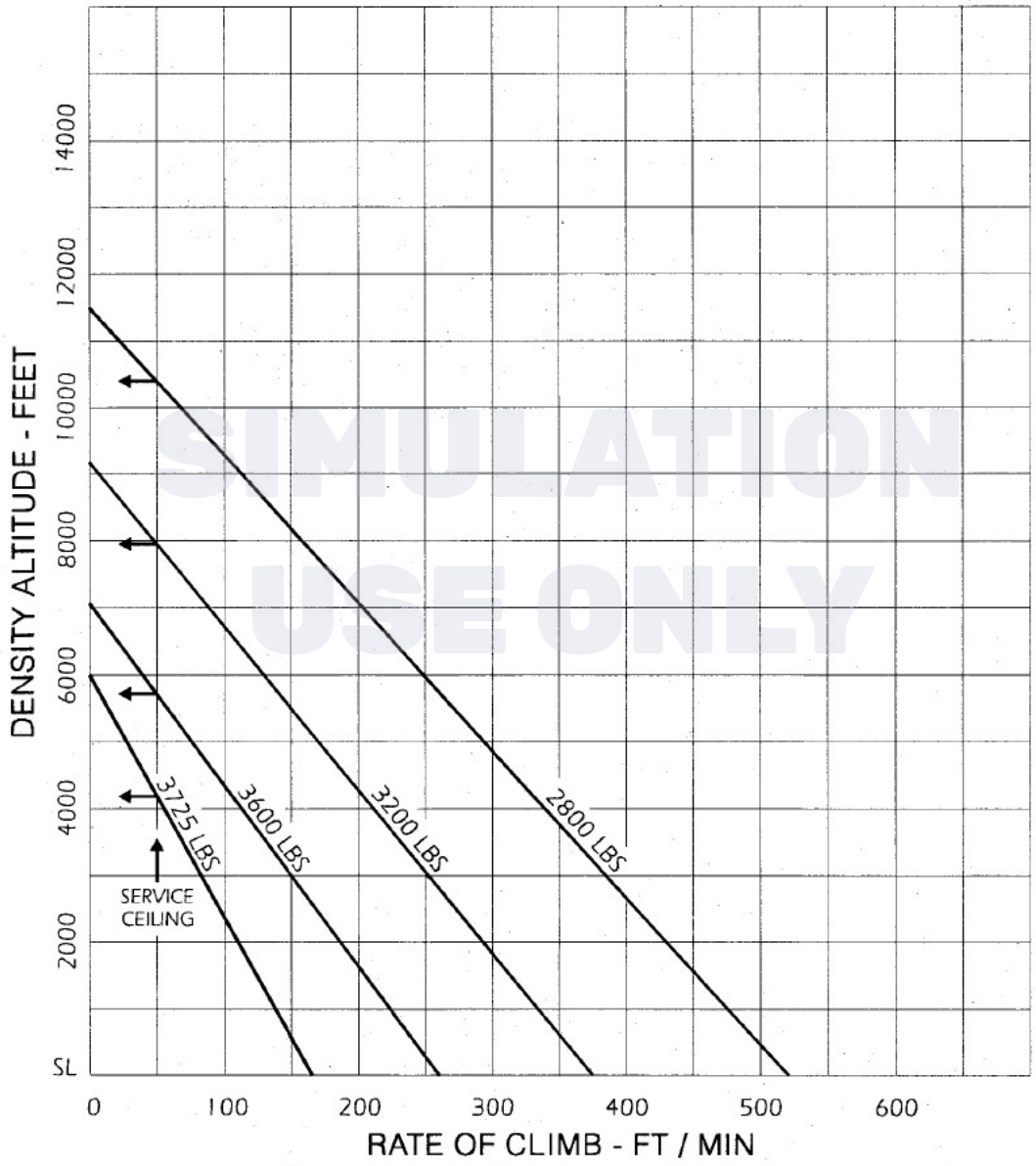
Right Propeller Maximum RPM

Cowl Flaps Open

Adjust Mixture For Smooth Operation

Optimum Airspeed

Landing Gear & Flaps Retracted



Landing Ground Roll Distance (without tip tanks)

Wing Flaps set at 27 degrees

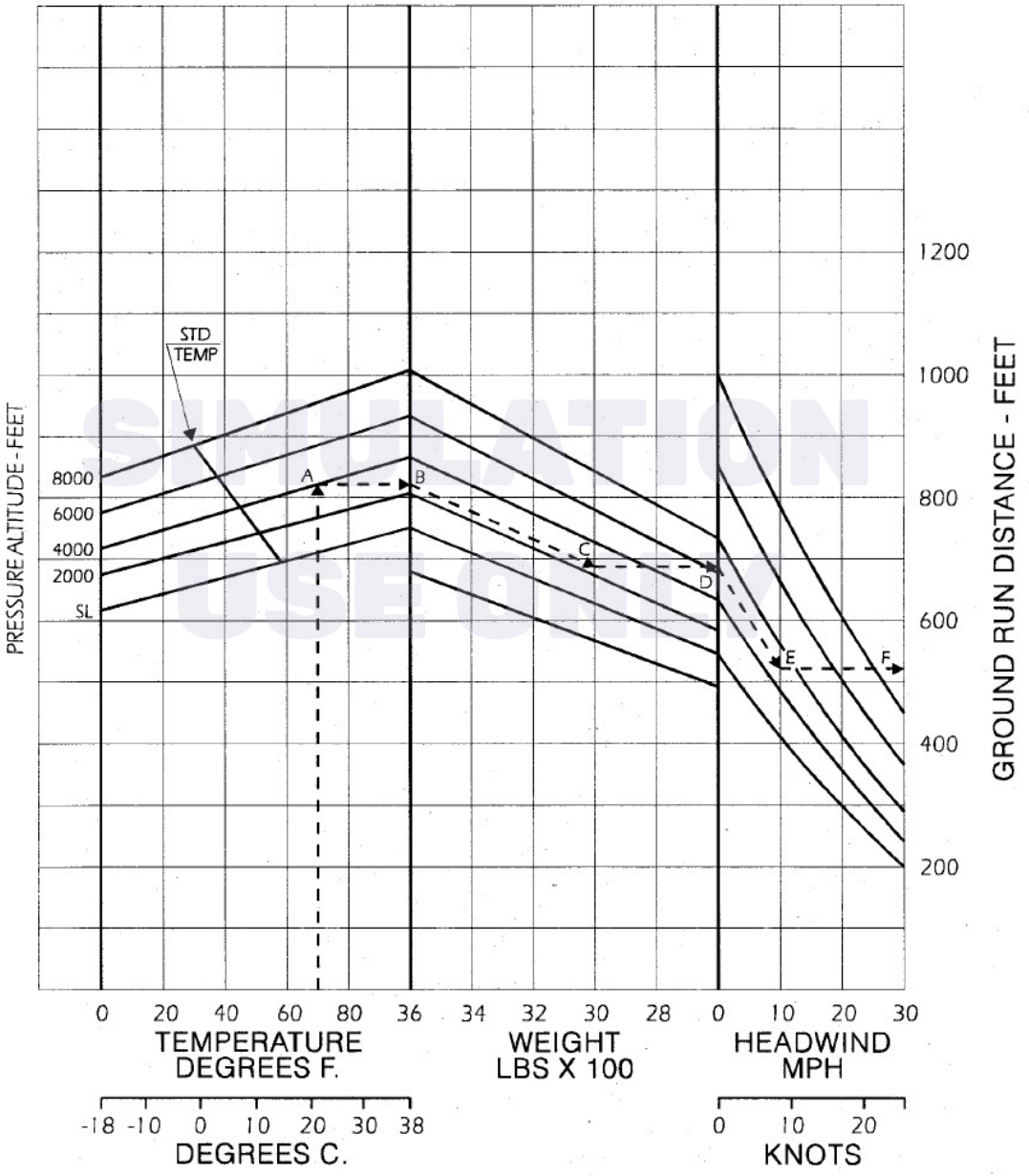
Runway Surface Paved, Level, Dry

Maximum Braking Effort

Throttles Closed

Approach Speed = 90 MPH IAS

Touchdown Speed = 70 MPH IAS



Landing Ground Roll Distance (with tip tanks)

3725 lbs Gross Weight

Wing Flaps set at 27 degrees

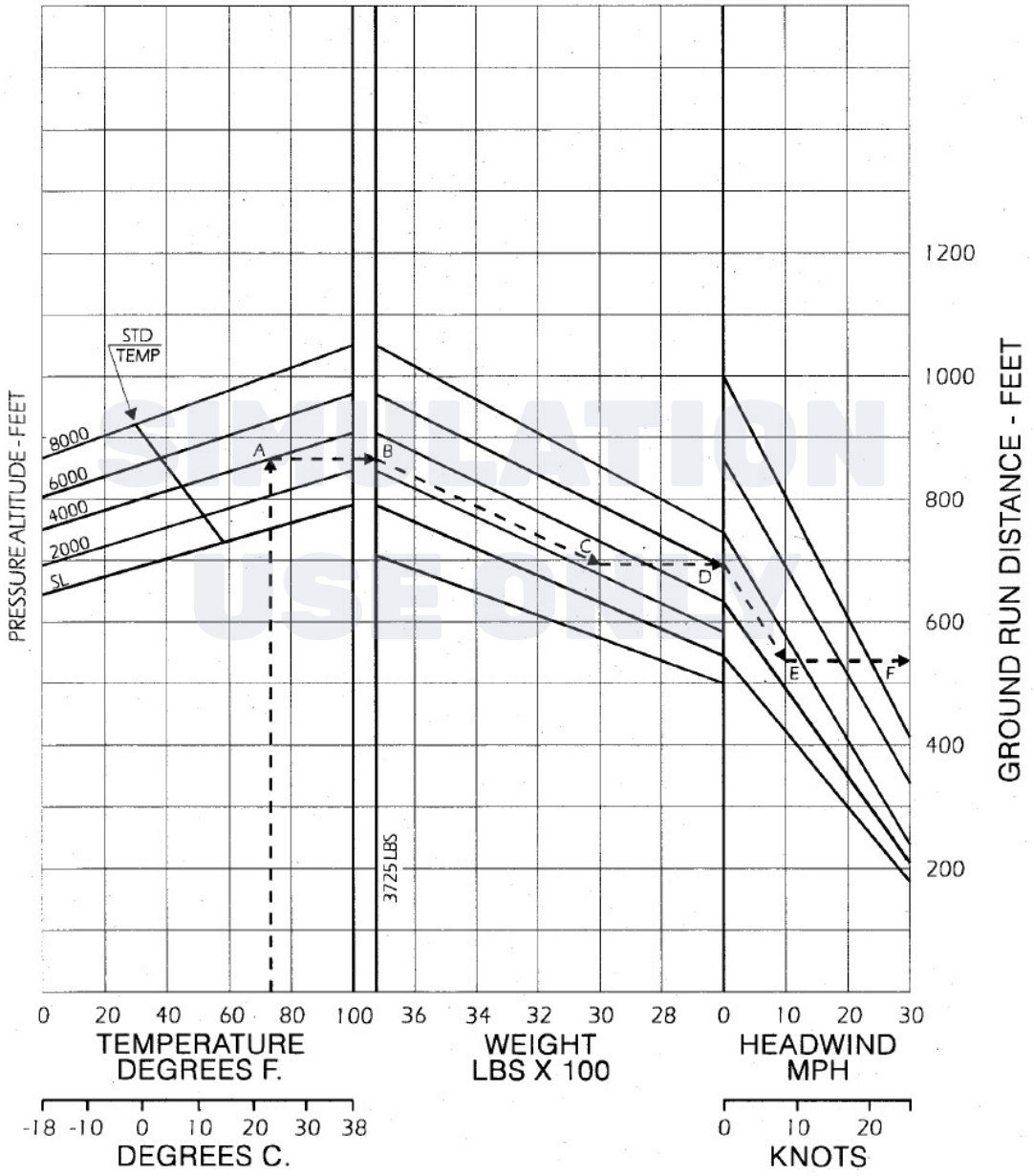
Runway Surface Paved, Level, Dry

Maximum Braking Effort

Throttles Closed

Approach Speed = 90 MPH IAS

Touchdown Speed = 70 MPH IAS



Power Setting Table

Model IO-320-B, 160 HP, Normally Aspirated Engine

Disclaimer: *This chart is for simulator use only. Values shown below are for operational interest only and may vary from values presented within the simulator.*

Pressure Altitude	Standard Air Temperature		88 HP = 55% Engine Rating 1) Approximately 13.4 GPH Fuel Flow 2) Approximately 16.0 GPH Fuel Flow RPM & Manifold Pressure				104 HP = 65% Engine Rating 1) Approximately 15.2 GPH Fuel Flow 2) Approximately 17.7 GPH Fuel Flow RPM & Manifold Pressure				120 HP = 75% Engine Rating 1) Approximately 17.2 GPH Fuel Flow 2) Approximately 20.0 GPH Fuel Flow RPM & Manifold Pressure		
	F	**C**	**2100**	**2200**	**2300**	**2400**	**2100**	**2200**	**2300**	**2400**	**2200**	**2300**	**2400**
Sea Level	59	15	22.4	21.7	21.0	20.4	25.0	24.2	23.3	22.7	26.5	25.6	24.9
1,000	55	13	22.1	21.5	20.7	20.2	24.7	23.9	23.0	22.4	26.2	25.3	24.6
2,000	52	11	21.8	21.2	20.5	19.9	24.4	23.6	22.8	22.2	25.9	25.0	24.3
3,000	48	09	21.6	20.9	20.2	19.7	24.1	23.3	22.5	21.9	25.6	24.7	24.0
4,000	45	07	21.3	20.6	19.9	19.4	23.8	23.0	22.2	21.6	25.3	24.3	23.7
5,000	41	05	21.0	20.4	19.7	19.2	23.5	22.7	21.9	21.3		24.0	23.4
6,000	38	03	20.8	20.1	19.4	18.9	23.2	22.4	21.6	21.1			23.1
7,000	34	01	20.5	19.8	19.1	18.7		22.1	21.3	20.8			
8,000	31	-01	20.2	19.5	18.9	18.4		21.8	21.0	20.5			
9,000	27	-03	19.9	19.2	18.6	18.2			20.7	20.3			
10,000	23	-05	19.7	19.0	18.3	17.9				20.0			
11,000	19	-07	19.4	18.7	18.1	17.7							
12,000	16	-09		18.4	17.8	17.4							
13,000	12	-11			17.5	17.2							
14,000	09	-13				16.9							
15,000	05	-15											

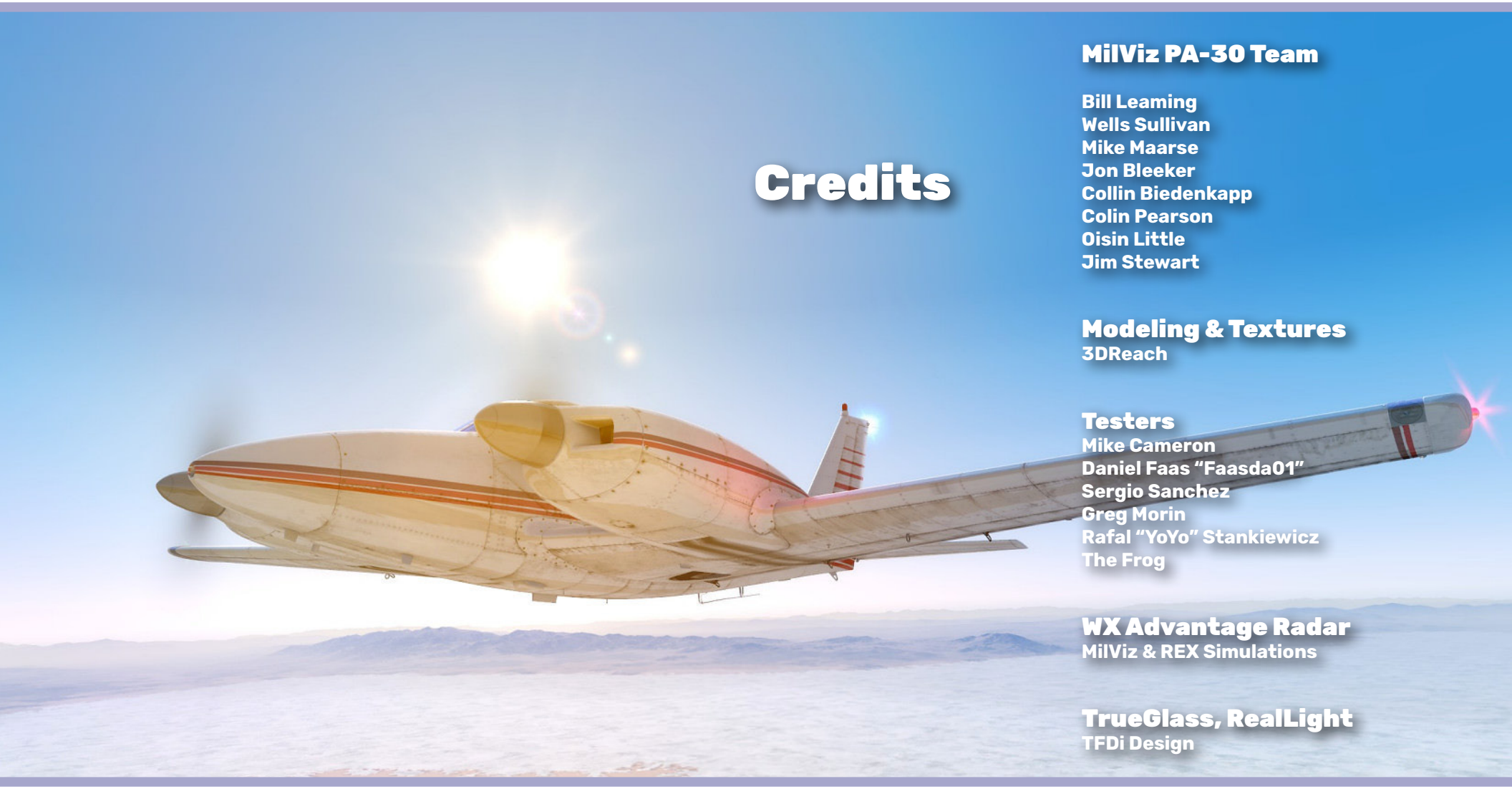
1) BEST ECONOMY CRUISE = PEAK EGT
2) BEST POWER CRUISE = 100 DEGREE F RICH OF PEAK EGT

Aircraft Specifications & Limitations

Type Designation:	Twin Comanche PA-30
Number of Engines:	2
Engine Model Number:	IO-320-B
Engine Type:	fuel injected, air-cooled, horizontally opposed, four cylinder, 320 cubic-inch displacement.
Horsepower:	160 rated horsepower at 2700 RPM
Propellers:	2, 2-blade, 6' diameter, constant speed, full feathering, hydraulically actuated.
Seats:	4
Baggage Capacity:	200 lbs
Basic Fuel Capacity:	60 US gal (54 Usable)
Internal Reserve Fuel Capacity:	30 US gal (30 Usable)

Maximum Takeoff Weight:	3600 lbs
Maximum Landing Weight:	3600 lbs
Standard Empty Weight:	2207 lbs
Maximum Useful Load:	1393 lbs
- with basic fuel & oil (60 US gal)	1033 lbs
- with reserve fuel (30 US gal)	853 lbs
Wing Aspect Ratio:	7.3
Total Wing Area:	178 square feet
Wing Loading:	20.2 lbs per square foot
Power Loading:	11.3 lbs per horsepower
Maximum Speed (knots):	178 KIAS
Multi-Engine Rate of Climb (3600 lbs gross weight):	1460 ft/min

Operational Limitations		
Maneuvering Speed V_A (knots) (3600 lbs gross weight)	141 KIAS	Do not make abrupt or sudden control movements above this speed.
Maneuvering Speed V_A (knots) (2450 lbs gross weight)	116 KIAS	
Maximum Flap Extended Speed V_{FE} (knots)	107 KIAS	Do not exceed this speed at this flap setting.
Maximum Gear Operating Speed V_{LO} (knots)	129 KIAS	Do not operate the landing gear above this speed.
Maximum Gear Extended Speed V_{LE} (knots)	129 KIAS	Do not extend the landing gear above this speed.
Minimum Single Engine Controllable Airspeed VMCA (Knots)	76 KIAS	Minimum airspeed for directional controllability after sudden loss of a single engine.
Never Exceed Speed V_{NE} (knots)	203 KIAS	Do not exceed this speed in any type of operation
Maximum Cruising Speed V_{NO} (knots)	171 KIAS	Do not exceed this speed except in smooth air and with caution
Stall Speed - Power Off, Full Flaps, Gear Extended V_{S0} (knots)	60 KIAS	
Stall Speed - Power Off, Clean V_{S1} (knots)	64 KIAS	



Credits

MilViz PA-30 Team

Bill Leaming
Wells Sullivan
Mike Maarse
Jon Bleeker
Collin Biedenkapp
Colin Pearson
Oisin Little
Jim Stewart

Modeling & Textures

3DReach

Testers

Mike Cameron
Daniel Faas "Faasda01"
Sergio Sanchez
Greg Morin
Rafal "YoYo" Stankiewicz
The Frog

WX Advantage Radar

MilViz & REX Simulations

TrueGlass, RealLight

TFDi Design

MILVIZ