ACCU-SIM

COMANCHE 250

For *Microsoft Flight Simulator*

A2A simulations

Accu-Sim Comanche 250

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Risks & Side Effects

Ergonomic Advice

- Always maintain a distance of at least 45cm to the screen to avoid straining your eyes.
- Sit upright and adjust the height of your chair so that your legs are at a right angle. The angle between your upper and forearm should be larger than 90º.
- The top edge of your screen should be at eye level or below, and the monitor should be tilted slightly backwards, to prevent strains to your cervical spine.
- Reduce your screen's brightness to lower the contrast and use a flicker-free, low-radiation monitor.
- Make sure the room you play in is well lit.
- Avoid playing when tired or worn out and take a break (every hour), even if it's hard...

Epilepsy Warning

Some people experience epileptic seizures when viewing flashing lights or patterns in our daily environment. Consult your doctor before playing computer games if you, or someone of your family, have an epileptic condition.

Immediately stop the game, should you experience any of the following symptoms during play: dizziness, altered vision, eye or muscle twitching, mental confusion, loss of awareness of your surroundings, involuntary movements and/or convulsions.

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COMANCHE 250

For *Microsoft Flight Simulator*


N6229P

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A2A
Simulations
"Passion for Flight"

DEVELOPER NOTES

Well, I can finally show you why we have been so quiet for three years. We've been steadily working on an all new way to create airplanes called "Accu-Sim 2.0". Our long time customers know Accu-Sim well as it's been powering our airplanes for over a decade. During that time we've learned a lot.

While this new technology carries the same Accu-Sim name, this latest version was built brand new from a clean slate. Research and development is risky, by nature. There are no guarantees. It was difficult on our team to be in the caves, so to speak, away from our community. We couldn't readily share what we were working on as we didn't know which things would ultimately work as planned.

There were many discussions about "let's just get an airplane out" or "is this really possible?" It was also difficult on our loyal community thinking A2A went away and had forgotten about them.

Now we are so very happy to say, we have succeeded in everything we set out to do. We didn't cut any corners and this brand new Accu-Sim technology represents everything we dreamed of. Perhaps the biggest dream and challenge was to create a new aerodynamics system that allowed us to model how an airplane flies through the air. It's the kind of simulation we knew was possible but wasn't yet realized. Nobody has done anything like this before. This represents a quantum leap for us, and it's the beginning of a whole new way of developing airplanes for flight simulation.

I decided early on the first airplane we had to simulate with Accu-Sim 2.0 would be the Comanche 250, as this is an airplane I have owned and operated for over 10 years. It feels like a nice pair of shoes that are perfectly broken in yet still look good. During development I was continuously asking questions without acceptable answers, and our Comanche gave us every answer we asked. Owning the airplane offers tremendous advantages as you don't need to ask permission or explain why you need to perform some odd sounding test. None of our testing was dangerous but much of it involved things nobody, including me had ever done before.

There is a reason I have owned and operated a Comanche 250, N6229P for over a decade, and now through Accu-Sim 2.0, you can better understand why. It's fast, docile, can carry a load, is roomy, reliable, rugged and beautiful. Perhaps however, most importantly, it just "feels" right. The first time I saw a Comanche I thought what a beautiful airplane it was. After knowing it for over 10 years now, it looks and feels better than ever. This speaks to the old adage, "beauty isn't skin deep" and in the case of the Comanche, it's both. Today, "Two Niner Papa" is family.

So now I present to you, the longest and most meaningful project A2A has ever embarked on. We are committed to not just this airplane, but you our customer. We won't stop pushing the boundaries and asking those questions never asked before. Thank you for being an A2A customer. None of this would be possible without your support.

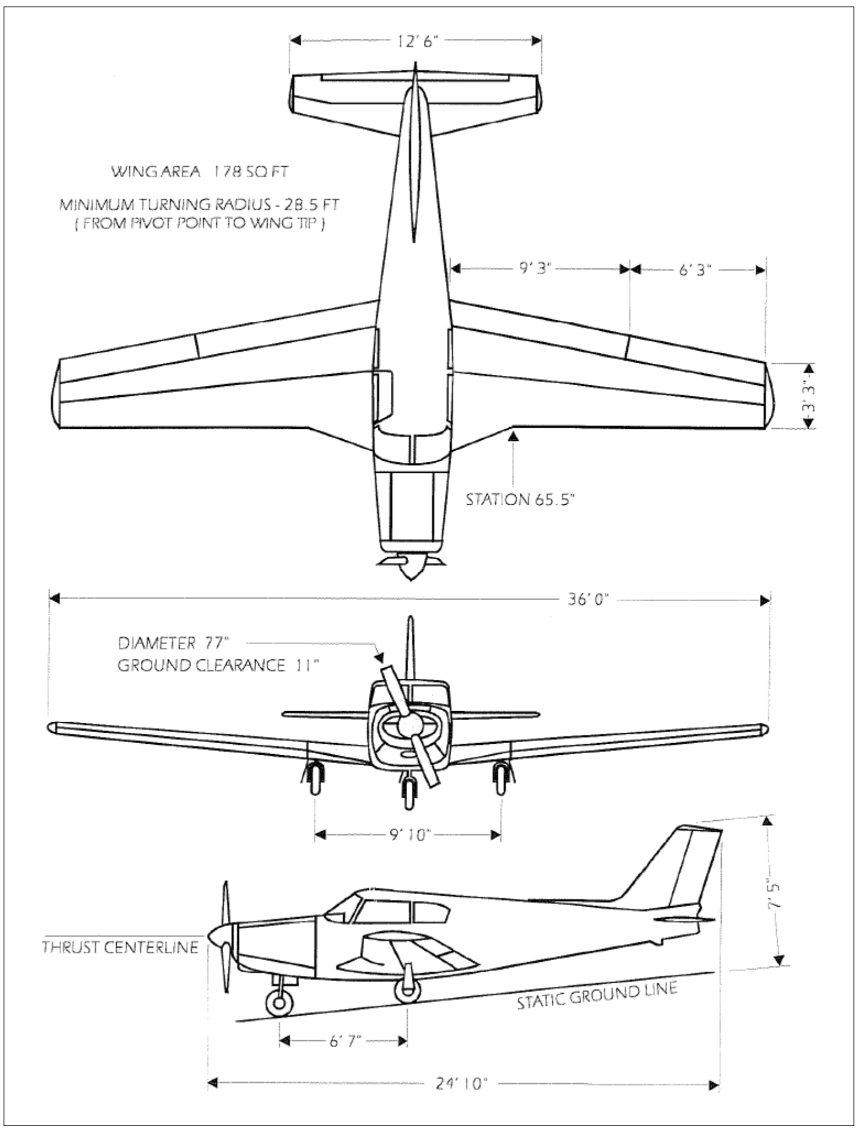
Scott Gentile
President
A2A Simulations Inc.

FEATURES

- A brand new external aerodynamics engine built with Accu-Sim 2.0 'Merlin' technology.
- Remarkable performance accuracy based on operating A2A's own Comanche 250, N6229P, over many years.
- Unparalleled aircraft feel, handling characteristics and trim behaviour based on extensive flight testing.
- A complete physics-based per-cylinder simulation of the Lycoming O-540-A internal combustion engine.
- Dynamic ground physics featuring true weight on wheels simulation, tyre side-loading and response to different surface types.
- Advanced turbulence system and subtle wing flex simulation which responds based on turbulence strength, ground bumps and fuel load.
- Sophisticated airframe vibration physics with unique ground roll and engine vibration-based effects.
- Authentic fuel system simulates fuel lines, primer, strainers and fuel contamination.

- Custom oil system with dynamic viscosity and contaminants that degrade and change the color of the oil.
- Advanced engine starter simulation that physically turns the engine through its compression cycle.
- Physics-driven sound environment featuring well over a thousand dynamic sound effects.
- Beautifully-rendered external and internal modelling and texturing with subtle wear effects, dynamic aircraft registration decals and advanced animations.
- Detailed JPI EDM 830 engine monitor with authentic displays and leaning procedures.
- Custom-coded Narco avionics stack with NCS812 COM/NAV/DME unit, Mark12E COM/NAV, AT150 transponder, CP 136 audio panel and 841 ADF receiver.
- Customisable integration of MSFS default/Working Title GNS 430W and 530W GPS units and support for PMS GTN 750 and TDS GTN 750Xi if installed.
- Century NSD-360A HSI with custom needle-smoothing physics.
- Advanced simulation of the S-TEC System 30 two axis autopilot .
- Beautiful night lighting implementation featuring multi-purpose dimmable and directable Type C-4A cockpit light, dimmable emissive indicator lamps and white and red lighting options.
- Pilot's tablet for intuitive interaction with, and management of your airplane .
- Interactive walkaround with many moving parts that can be grabbed, manipulated and inspected.
- Customisable persistent airplane with failure and wear simulation which can be adjusted and deactivated if desired.
- Graphical tablet engine analyzer provides a detailed insight into the piston engine operation.
- Real time load manager with dynamic weight and balance indicator.
- Electrical system analyzer and circuit breaker functionality.
- Two naturally animated rear seat passengers and support for native MSFS avatars in the front seats.
- Fluid in-sim performance comparable with default aircraft of the same class.

GENERAL



ENGINES

Number of Engines 1
Engine Manufacturer Lycoming
Engine Model Number O-540-A
Rated Horsepower 250
Rated Speed (rpm) 2575
Bore (inches) 5.125
Stroke (inches) 4.375
Displacement (cubic inches) 541.5
Compression Ratio 8.5:1
Engine Type 6 Cylinder, Horizontally Opposed, Direct Drive, Air Cooled

PROPELLERS

Number of Propellers 1
Propeller Manufacturer McCauley
Model B3D32C412-C
Number of Blades 3
Propeller Diameter (inches) 77
Propeller Type Constant speed

Number of Propellers 1
Propeller Manufacturer MT Propeller
Model MTV-9-B/188-50
Number of Blades 3
Propeller Diameter (inches) 74
Propeller Type Constant speed

FUEL

Main Fuel Capacity (U.S. gal.) 60
Usable Fuel 56
Tip Tank Capacity (U.S. gal.) 30
Usable Fuel 30
Usable Fuel Total 86
Fuel Grade, Aviation
Minimum Octane 91/96
Specified Octane 100LL

OIL

Oil Capacity (U.S. Quarts) 12
Oil Specification 15W-50 OR 20W-50
Oil Viscosity per Average Ambient Temp. for Starting

MAXIMUM WEIGHTS

Maximum Takeoff Weight (lbs) (with tip tanks) 3000
Maximum Weight (lbs) in Baggage Compartment 200

STANDARD AIRPLANE WEIGHTS

Standard Empty Weight (lbs): 1690
Weight of a standard airplane including unusable fuel, full operating fluids and full oil
Maximum Useful Load (lbs): 1310
The difference between the Maximum Takeoff Weight and the Standard Empty Weight

SPECIFIC LOADINGS

Wing Loading (lbs per sq ft) 15.7
Power Loading (lbs per hp) 12

LIMITATIONS

This section provides the "FAA Approved" operating limitations, instrument markings, color coding and basic placards necessary for the operation of the airplane and its systems.

This airplane must be operated as a normal of utility category airplane in compliance with the operating limitations stated in the form of placards and markings and those given in this section and this complete handbook.

AIRSPEED LIMITATIONS

Never Exceed Speed (V_{NE}) 203* IAS (mph)
Do not exceed this speed in any operation.
(* 229mph with stabilator tips installed)

Maximum Structural Cruising Speed (V_{NO}) 180 IAS (mph)
Do not exceed this speed except in smooth air and then only with caution

Design Maneuvering Speed (V_A)
Do not make full or abrupt control movements above this speed
At 2800 LBS. 144 IAS (mph)
At 1900 LBS. 120 IAS (mph)

CAUTION: Maneuvering speed decreases at lighter weight as the effects of aerodynamic forces become more pronounced. Linear interpolation may be used for intermediate gross weights. Maneuvering speed should not be exceeded while operating in rough air.

Maximum Flaps Extended Speed (V_{FE}) 125 IAS (mph)
Landing Gear Operation Speed (V_{LO}) 125 IAS (mph)
Maximum Landing Gear Extended Speed (V_{LE}) 150 IAS (mph)

AIRSPEED INDICATOR MARKINGS

Red Radial Line (Never Exceed) 203 IAS (mph) *
(* 229mph with stabilator tips installed)

Yellow Arc: 180 to 227 IAS (mph)
(Caution Range - Smooth Air Only)

Greed Arc: 71 to 180 IAS (mph)
(Normal Operating Range)

White Arc: 64 to 125 IAS (mph)
(Flap Down)

ENGINE OPERATING LIMITS

Maximum Horsepower 250
Maximum Rotation Speed (RPM) 2575
Maximum Oil Temperature 245 deg F

OIL PRESSURE

Minimum (red line) 25 PSI
Maximum (red line) 100 PSI

FUEL PRESSURE

Minimum (red line 0.5 PSI
Maximum (red line) 5 PSI
Fuel Grade (AVGAS ONLY) (minimum octane) 90/96 (blue)

CHT LIMITS AND VACUUM LIMITS

Max CHT 500
Vacuum Limits 4.8 - 5.1 inHg.

TYPES OF OPERATION

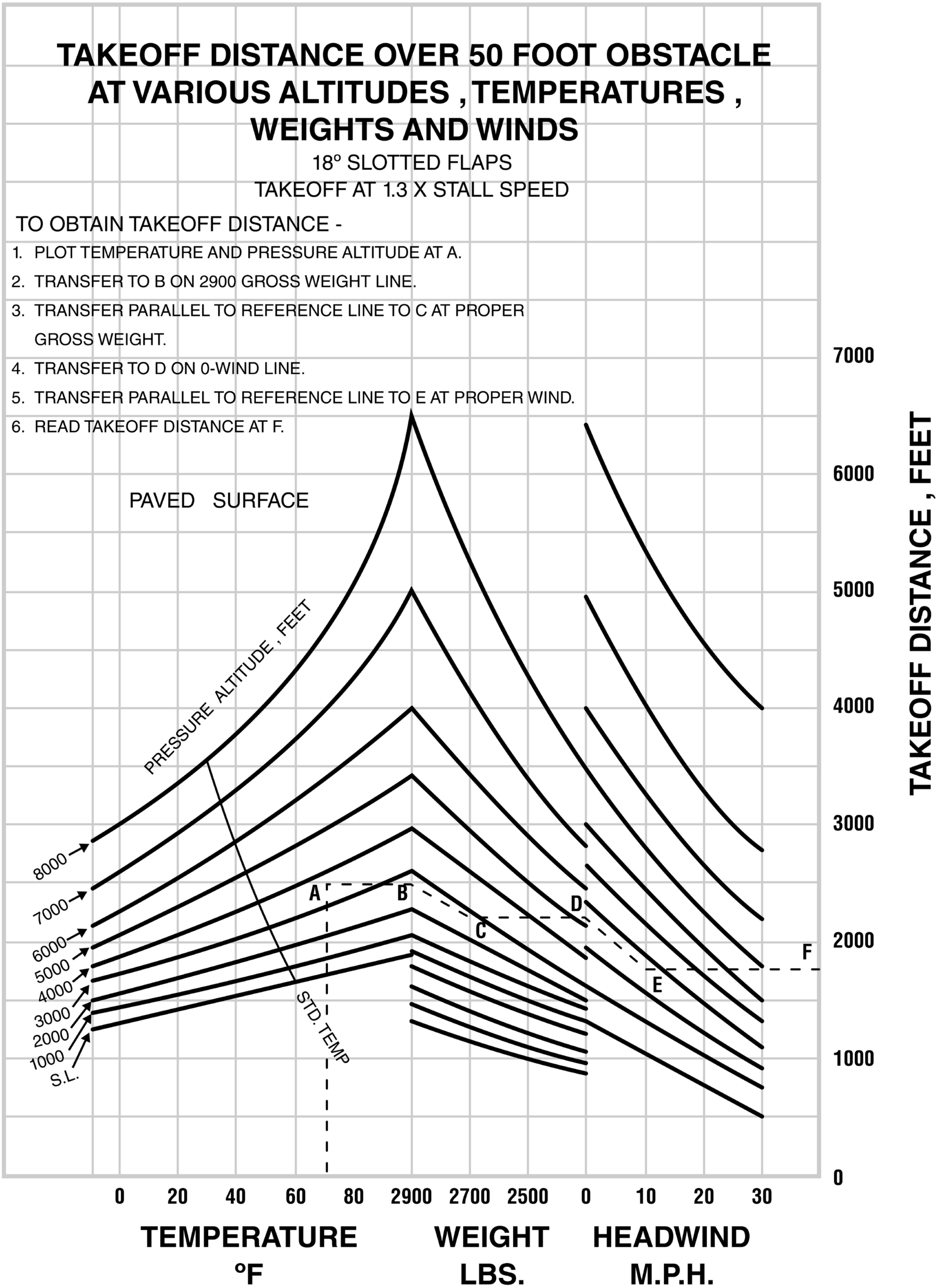
The airplane is approved for the following operations when equipped in accordance with FAR 91 or FAR 135:

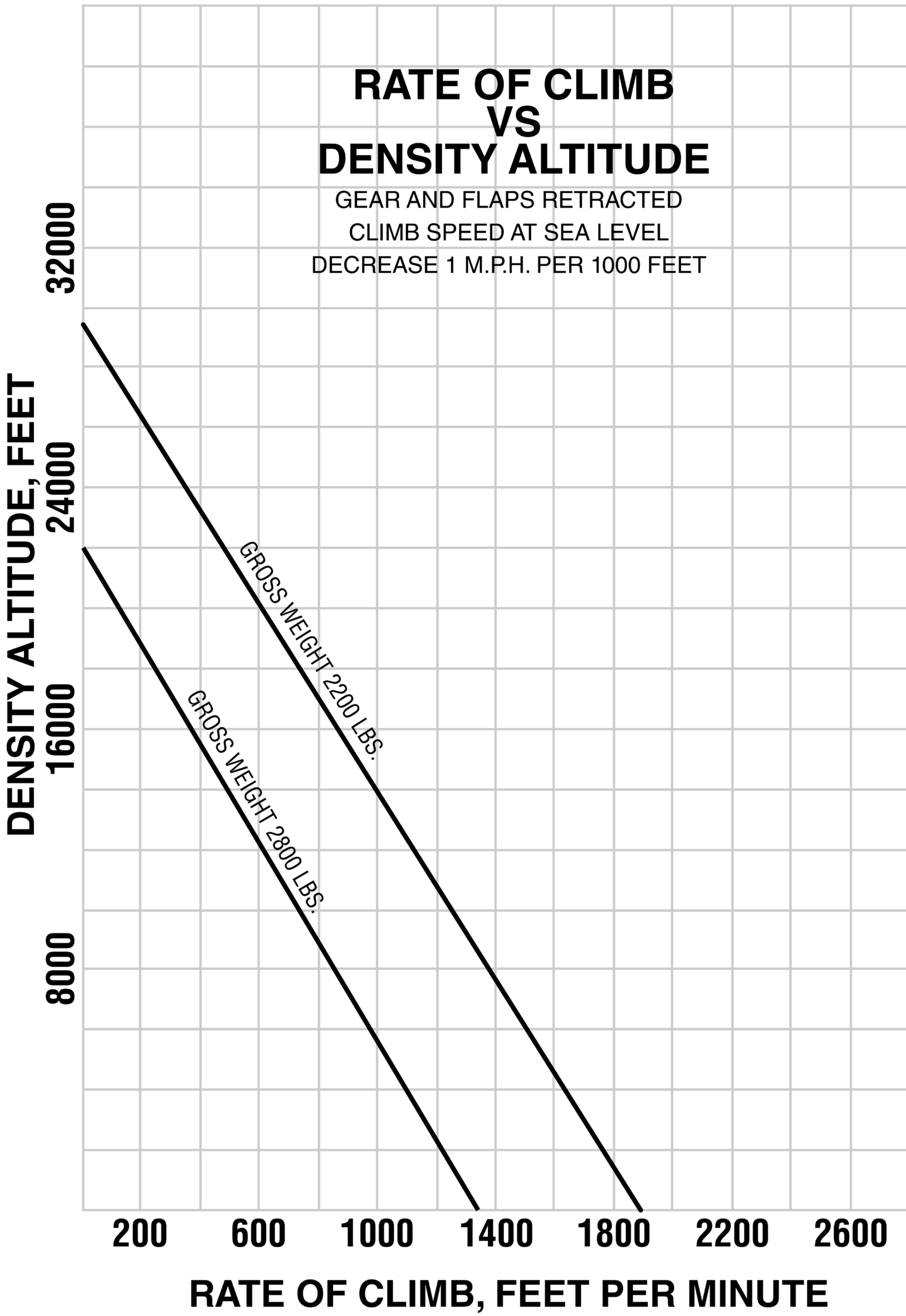
Day V.F.R.	Night V.F.R.	Non Icing
Day I.F.R.	Night I.F.R.	

PERFORMANCE

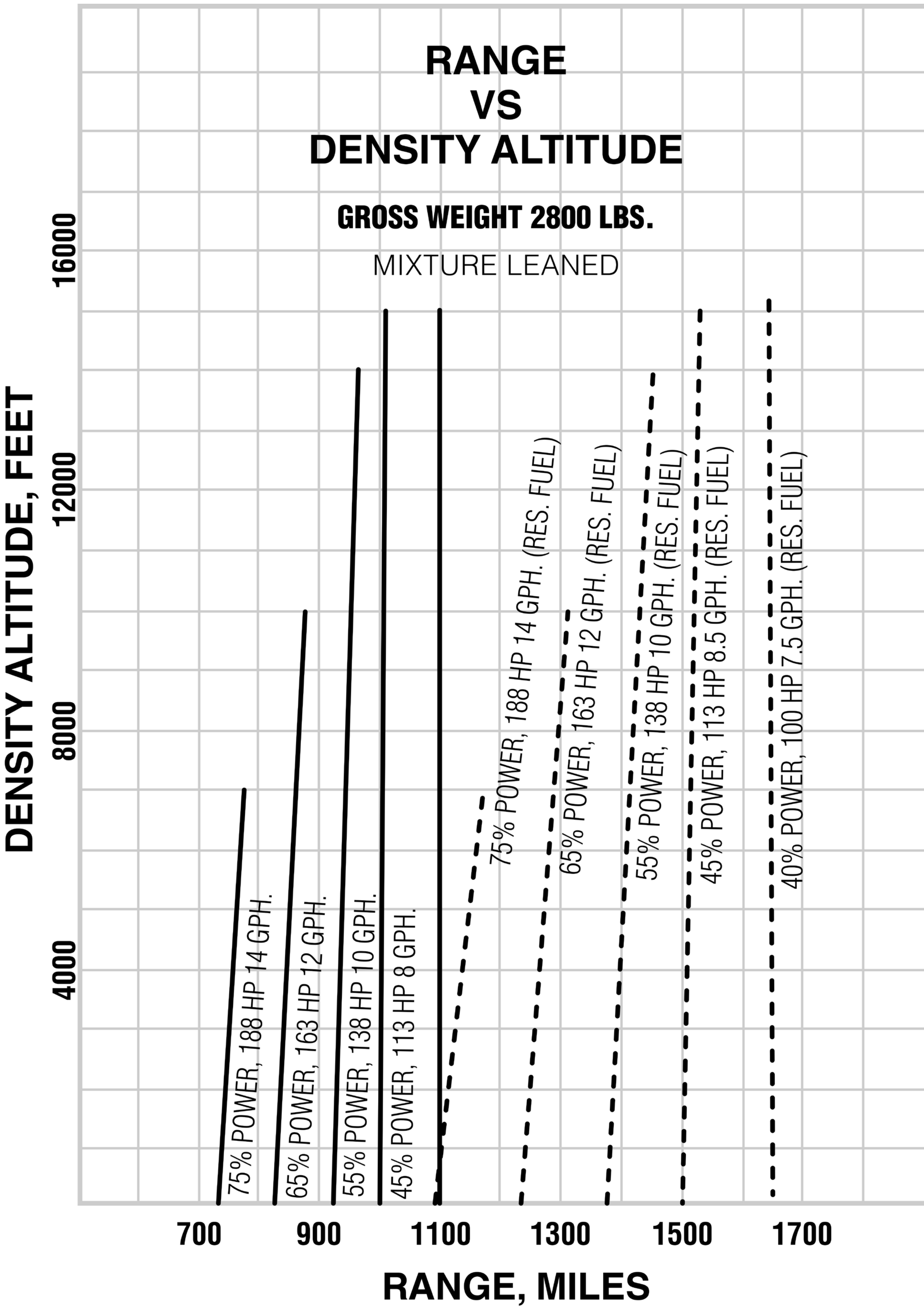
The performance information presented in this section is based on measured Flight Test Data corrected to ICAO standard day conditions and analytically expanded for the various parameters of weights, altitude, temperature, etc. The performance charts are unfactored and do not make any allowance for varying degree of pilot proficiency or mechanical deterioration of the aircraft. The performance however can be duplicated by following the stated procedures in a properly maintained airplane.

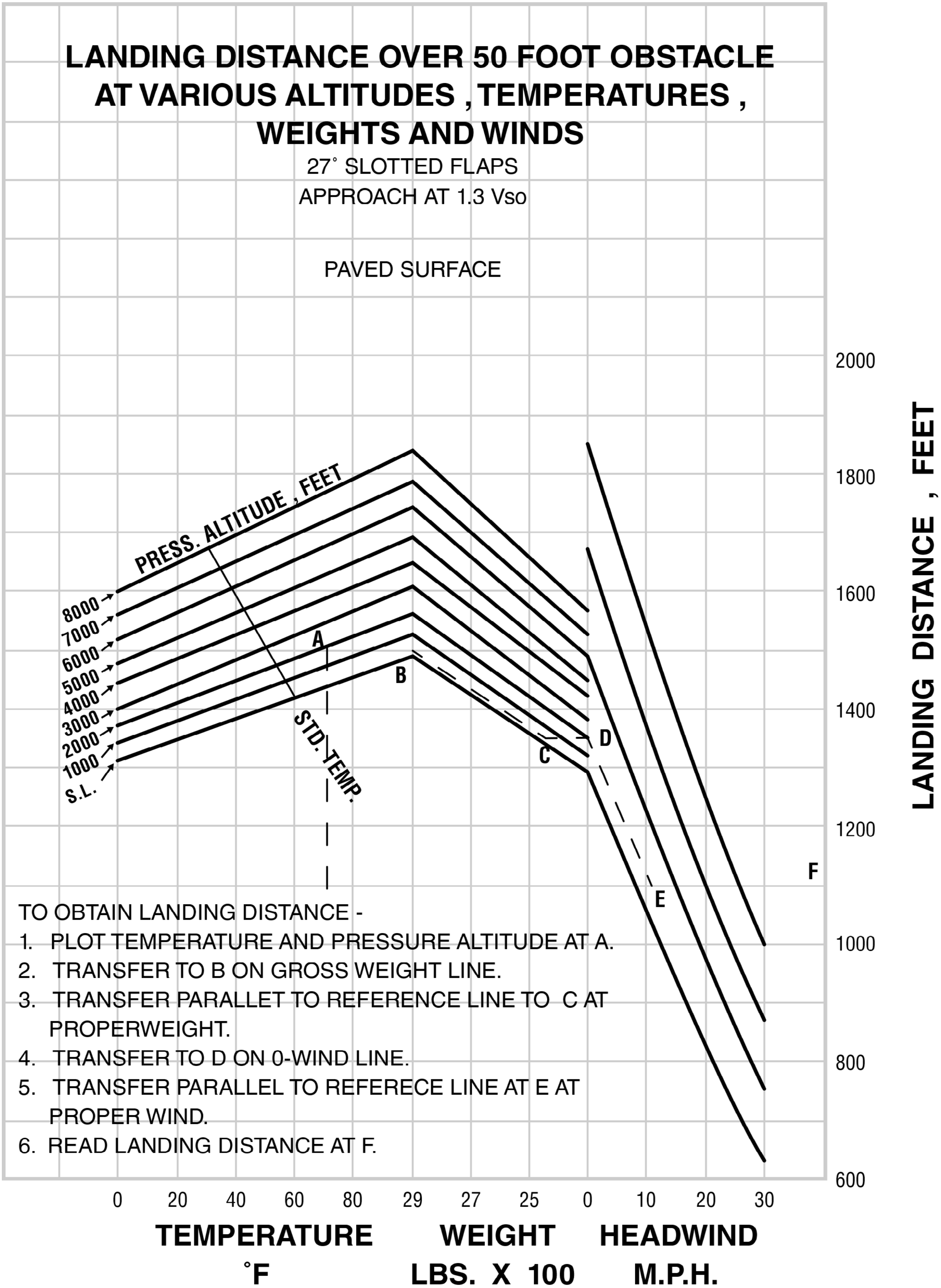
Effects of conditions not considered on the charts must be evaluated by the pilot, such as the effect of soft or grass runway surface on takeoff and landing performance, or the effect of winds aloft on cruise and range performance. Endurance can be greatly affected by improper leaning procedures, and in-flight fuel flow and quantity checks are recommended.


TAKEOFF DISTANCE OVER 50 FOOT OBSTACLE
AT VARIOUS ALTITUDES , TEMPERATURES ,
WEIGHTS AND WINDS
18° SLOTTED FLAPS
TAKEOFF AT 1.3 X STALL SPEED
TO OBTAIN TAKEOFF DISTANCE -
1. PLOT TEMPERATURE AND PRESSURE ALTITUDE AT A.
2. TRANSFER TO B ON 2900 GROSS WEIGHT LINE.
3. TRANSFER PARALLEL TO REFERENCE LINE TO C AT PROPER GROSS WEIGHT.
4. TRANSFER TO D ON 0-WIND LINE.
5. TRANSFER PARALLEL TO REFERENCE LINE TO E AT PROPER WIND.
6. READ TAKEOFF DISTANCE AT F.
PAVED SURFACE
PRESSURE ALTITUDE , FEET
8000
7000
6000
5000
4000
3000
2000
1000
S.L.
STD. TEMP
A
B
C
D
E
F
0
20
40
60
80
2900
2700
2500
0
10
20
30
TEMPERATURE
°F
WEIGHT
LBS.
HEADWIND
M.P.H.
7000
6000
5000
4000
3000
2000
1000
0
TAKEOFF DISTANCE , FEET


RATE OF CLIMB
VS
DENSITY ALTITUDE
GEAR AND FLAPS RETRACTED
CLIMB SPEED AT SEA LEVEL
DECREASE 1 M.P.H. PER 1000 FEET
DENSITY ALTITUDE, FEET
32000
24000
16000
8000
GROSS WEIGHT 2200 LBS.
GROSS WEIGHT 2800 LBS.
200
600
1000
1400
1800
2200
2600
RATE OF CLIMB, FEET PER MINUTE


TRUE AIR SPEED AND RPM
VS
DENSITY ALTITUDE
GROSS WEIGHT 2800 LBS
DENSITY ALTITUDE, FEET
16000
12000
8000
4000
2400 RPM
FULL
THROTTLE
2575 RPM. FULL THROTTLE
40% POWER, 100 HP.
45% POWER, 113 HP.
55% POWER, 138 HP.
65% POWER, 163 HP.
75% POWER, 188 HP.
130
140
150
160
170
180
190
200
TRUE AIR SPEED, M.P.H.


RANGE
VS
DENSITY ALTITUDE
GROSS WEIGHT 2800 LBS.
MIXTURE LEANED
DENSITY ALTITUDE, FEET
4000
8000
12000
16000
75% POWER, 188 HP 14 GPH.
65% POWER, 163 HP 12 GPH.
55% POWER, 138 HP 10 GPH.
45% POWER, 113 HP 8 GPH.
75% POWER, 188 HP 14 GPH. (RES. FUEL)
65% POWER, 163 HP 12 GPH. (RES. FUEL)
55% POWER, 138 HP 10 GPH. (RES. FUEL)
45% POWER, 113 HP 8.5 GPH. (RES. FUEL)
40% POWER, 100 HP 7.5 GPH. (RES. FUEL)
700
900
1100
1300
1500
1700
RANGE, MILES


LANDING DISTANCE OVER 50 FOOT OBSTACLE
AT VARIOUS ALTITUDES , TEMPERATURES ,
WEIGHTS AND WINDS
27° SLOTTED FLAPS
APPROACH AT 1.3 Vso
PAVED SURFACE
PRESS. ALTITUDE , FEET
8000
7000
6000
5000
4000
3000
2000
1000
S.L.
STD. TEMP.
A
B
C
D
E
F
TO OBTAIN LANDING DISTANCE -
1. PLOT TEMPERATURE AND PRESSURE ALTITUDE AT A.
2. TRANSFER TO B ON GROSS WEIGHT LINE.
3. TRANSFER PARALLET TO REFERENCE LINE TO C AT PROPERWEIGHT.
4. TRANSFER TO D ON 0-WIND LINE.
5. TRANSFER PARALLEL TO REFERECE LINE AT E AT PROPER WIND.
6. READ LANDING DISTANCE AT F.
0
20
40
60
80
29
27
25
0
10
20
30
600
800
1000
1200
1400
1600
1800
2000
LANDING DISTANCE , FEET
TEMPERATURE
°F
WEIGHT
LBS. X 100
HEADWIND
M.P.H.

POWER SETTING TABLE

LYCOMING MODEL O-540-A, 250 HP NORMALLY ASPIRATED ENGINE

PRESSURE ALTITUDE	STD AIR TEMP		138 HP - 55% RATED 1. APPROX 10.3 GPH 2. APPROX 12.0 GPH RPM AND MAN PRESS				163 HP - 65% RATED APPROX 12.3 GPH APPROX 14.0 GPH RPM AND MAN PRESS				188 HP - 75% RATED APPROX 14.0 GPH APPROX 16.0 GPH RPM AND MAN PRESS		
	F.	C.	2100	2200	2300	2400	2100	2200	2300	2400	2200	2300	2400
SEA LEV	59	15	21.6	20.8	20.2	19.6	24.2	23.3	22.6	22.0	25.8	25.1	24.3
1,000	55	13	21.4	20.6	20.0	19.3	23.9	23.0	22.4	21.8	25.5	24.8	24.1
2,000	52	11	21.1	20.4	19.7	19.1	23.7	22.8	22.2	21.5	25.3	24.6	23.8
3,000	48	09	20.9	20.1	19.5	18.9	23.4	22.5	21.9	21.3	25.0	24.3	23.6
4,000	45	07	20.6	19.9	19.3	18.7	23.1	22.3	21.7	21.0	24.8	24.1	23.3
5,000	41	05	20.4	19.7	19.1	18.5	22.9	22.0	21.4	20.8		23.8	23.0
6,000	38	03	20.1	19.5	18.9	18.3	22.6	21.8	21.2	20.6			22.8
7,000	34	01	19.9	19.2	18.6	18.0	22.3	21.5	21.0	20.4			
8,000	31	-01	19.6	19.0	18.4	17.8		21.3	20.7	20.1			
9,000	27	-03	19.4	18.8	18.2	17.6			20.5	19.9			
10,000	23	-05	19.1	18.6	18.0	17.4				19.6			
11,000	19	-07	18.9	18.3	17.8	17.2							
12,000	16	-09	18.6	18.1	17.5	17.0							
13,000	12	-11		17.9	17.3	16.8							
14,000	09	-13			17.1	16.5							
15,000	05	-15				16.3							

1.) BEST ECONOMY CRUISE - PEAK EGT (FOR LEANEST CYLINDER)
2.) BEST POWER CRUISE - 100 DEGREES FAHRENHEIT RICH OF PEAK EGT (FOR LEANEST CYLINDER)

**** NOTE ****

TO MAINTAIN CONSTANT POWER, CORRECT MANIFOLD PRESSURE APPROXIMATELY 0.17 INCH Hg. FOR EACH 10 DEGREE FAHRENHEIT VARIATION IN CARBURETOR AIR TEMPERATURE FROM STANDARD ALTITUDE TEMPERATURE. ADD MANIFOLD PRESSURE FOR TEMPERATURES ABOVE STANDARD; SUBTRACT FOR TEMPERATURES BELOW STANDARD.

WEIGHT AND BALANCE

In order to achieve the performance and flying characteristics which are designed into the airplane, it must be flown with the weight and center of gravity (C.G.) positioned within the approved operating range (envelope). Although the airplane offers flexibility of loading, it cannot be flown with the maximum number of adult passengers, full fuel tanks, and maximum baggage. With the flexibility comes responsibility. The pilot must ensure that the airplane is loaded within the loading envelope before he makes a takeoff.

Misloading carries consequences for any aircraft. An overloaded airplane will not take off, climb, or cruise as well as a properly loaded one. The heavier the airplane is loaded, the less climb performance it will have.

Center of gravity is a determining factor in flight characteristics. If the C.G. is too far forward in any airplane, it may be difficult to rotate for takeoff or landing. If the C.G. is too far aft, the airplane may rotate prematurely on takeoff or tend to pitch up during climb. Longitudinal stability will be reduced. This can lead to inadvertent stalls and even spins, and spin recovery becomes more difficult as the center of gravity moves aft of the approved limit.

Weight and Balance Loading Form

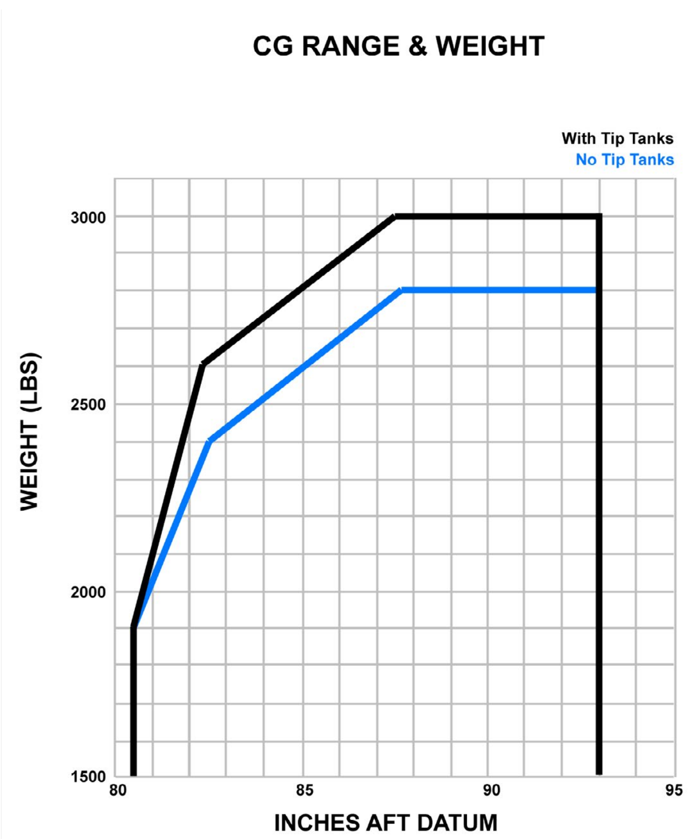
For use with Tip Tanks and MT propeller.
(example using two 170 lbs passengers, full fuel, and 50lbs of baggage)

	Weight (lbs.) Arm Aft	Datum (in.)	Moment (in-lbs.)
Basic Empty Weight	1709	83.9	143,385
Front Seats	340	84.8	28,832
Rear Seats*	0	118.5	0
Main Fuel (max 60gal)	360	90.0	32,400
Tip Tanks (max 30gal)	180	91.5	16,470
Baggage*	50	142	7,100
Total	2,639		222,187

NOTE: Typically, empty weight includes unusable fuel, but in A2A's "29p" pilot's operating manual, it does not.

How to Calculate the Center of Gravity:

Total Moment ÷ Total Weight = C.G. (center of gravity)
222,187 ÷ 2,639 = 84.19
C.G. = 84.19



AIRPLANE & SYSTEM DESCRIPTIONS

The PA-24-250 Comanche is a single-engine, low-wing, retractable landing gear monoplane of all metal construction. It has four place seating, two hundred pound baggage capacity, and a 250 horsepower engine.

Engine and Propeller

The Comanche PA-24-250 is powered by a Lycoming O-540-A engine (direct drive, wet sump, horizontally opposed), developing 250 HP at 2575 RPM. The compression ratio of 8.5 to 1 and the minimum required use of 91/96 Aviation fuel.

The engine is furnished with a geared starter, alternator, vacuum pump drive, and carburetor air box and filter.

Exhaust gases from the engine are carried overboard through an exhaust manifold. The manifold incorporates a stainless steel muffler fitted with a heater shroud which provides heat for both the cabin interior and the carburetor heat system.

Engine cooling is accomplished without the usual cowl flaps, exhaust augmenters, or drag producing fixed cowl flanges.

There are two different models of propellers used for the A2A Accu-Sim simulator:

- McCauley constant speed 77” diameter 3-blade
- MT Propeller constant speed 74” diameter 3-blade

Both propellers are controlled by a governor mounted on the engine which supplies oil to the propeller through the engine shaft. The governor in turn is controlled by the propeller control in the cockpit.

Structures

Structures are of sheet aluminum construction, and are designed to ultimate load factors well in excess of normal requirements. All components are completely zinc chromate primed, exterior surfaces are coated with acrylic lacquer.

The main spars of the wings are jointed with high strength butt fittings in the center of the fuselage, making in effect a continuous main spar. The spars are attached to the fuselage at the side of the fuselage and in the center of the structure; wings are also attached at the rear spar and at an auxiliary front spar.

The wing airfoil section is a laminar flow type, NACA-642A215, with maximum thickness about 40% aft of the landing edge. This permits the main spar, located at the point of maximum thickness, to pass through the cabin under the rear seat, providing unobstructed cabin floor space ahead of the rear seat.

Landing Gear

The nose gear is steerable with the rudder pedals through a 40 degree arc. During retraction of the gear the steering mechanism is disconnected automatically to reduce rudder pedal loads in flight. The nose gear is equipped with a hydraulic shimmy dampener.

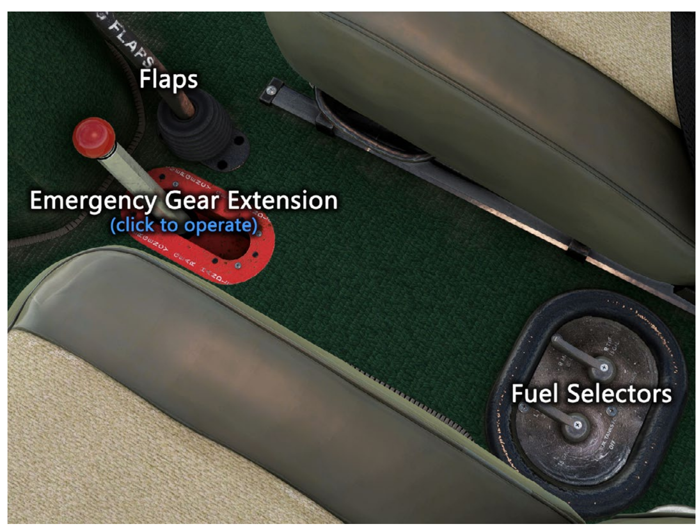
Retraction of the landing gear is accomplished through the use of an electric motor and gear train located under the floorboards, actuating push- pull cables to each of the gears. The landing gear motor is activated by a selector switch located on the instrument panel.

As an added safety feature, the warning horn is connected to the gear selector switch. The horn will then operate if the selector is moved

to the “UP” position with the master switch on and the weight of the airplane is on the landing gear. As a final safety factor to prevent gear retraction on the ground, an anti-retraction switch is installed on the left main gear. This prevents the electric circuit to the landing gear motor from being completed until the gear strut is fully extended. A green light on the instrument panel below the landing gear switch is the indication that all gears are down and locked. The warning horn will also sound if the power is reduced below approximately 12” of manifold pressure and the gear has not been lowered.

The telescoping emergency gear handle should not be used as the primary indication that the gear is down and locked. An amber light above the switch indicates gears up. The indication lights are automatically dimmed when the navigation lights are turned on.

The brakes on the Comanche are actuated by toe brake pedals mounted on the left set of rudder pedals or by a hand lever protruding from under the instrument panel. Hydraulic brake cylinders are located above the left rudder pedals and are accessible in the cockpit for servicing. Parking brake valves are incorporated in each cylinder. Two cables extending from the parking brake “T” handle are attached to the



parking brake valves. To prevent inadvertent application of the parking brake in flight, a safety lock is incorporated in the valves thus eliminating the possibility of pulling out the "T" handle until pressure is applied by use of the toe brakes or the hand lever.

Control Systems

The flight controls on the Comanches are the conventional three control type operated by a control column and rudder pedals. The movable stabilator, with an anti-servo tab which also acts as a longitudinal trim tab provides extra stability and controllability with less size drag and weight.

Provision for directional and longitudinal trim is provided by an adjustable trim mechanism for the rudder and stabilator. Dual flight controls are installed in the Comanche as standard equipment.

A hand brake is provided to operate the brakes while occupying the right seat.

The flaps on the Comanche are mechanically operated and can be positioned in the three locations of 9°, 18° , and 27°. Locks on the inboard ends of the flaps hold them in the "UP" position so the right flap can be stepped on for entry or exit. A second lock is incorporated to prevent the flap from going full down in case a step load is applied and the full up lock was not fully engaged.

Comanche Owner's Note: Even though technically the flaps can hold the weight of a person, most if not all Comanche owners we know don't let people use the flaps as a step.

Fuel System

The fuel for the Comanche is carried in two rubber-like fuel cells located in the inboard leading edge sections of the wings. Capacity of these cells, which are classified as the main fuel cells, are 30 gallons each.

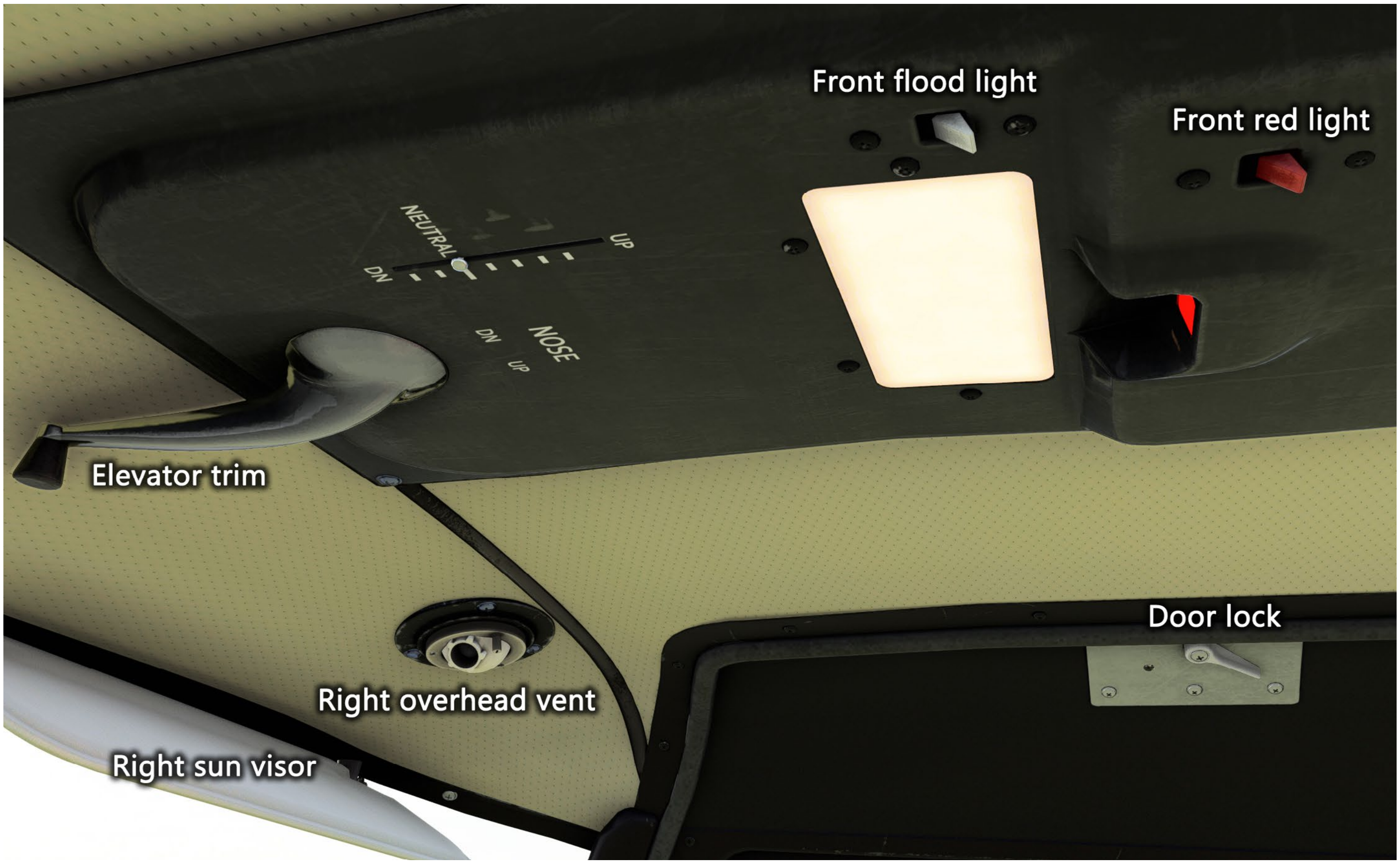
60 gallons is the standard fuel capacity of which 56 gallons is usable; however, if tip tanks are installed the fuel capacity is increased to 90 gallons of which a total of 84 gallons is usable.

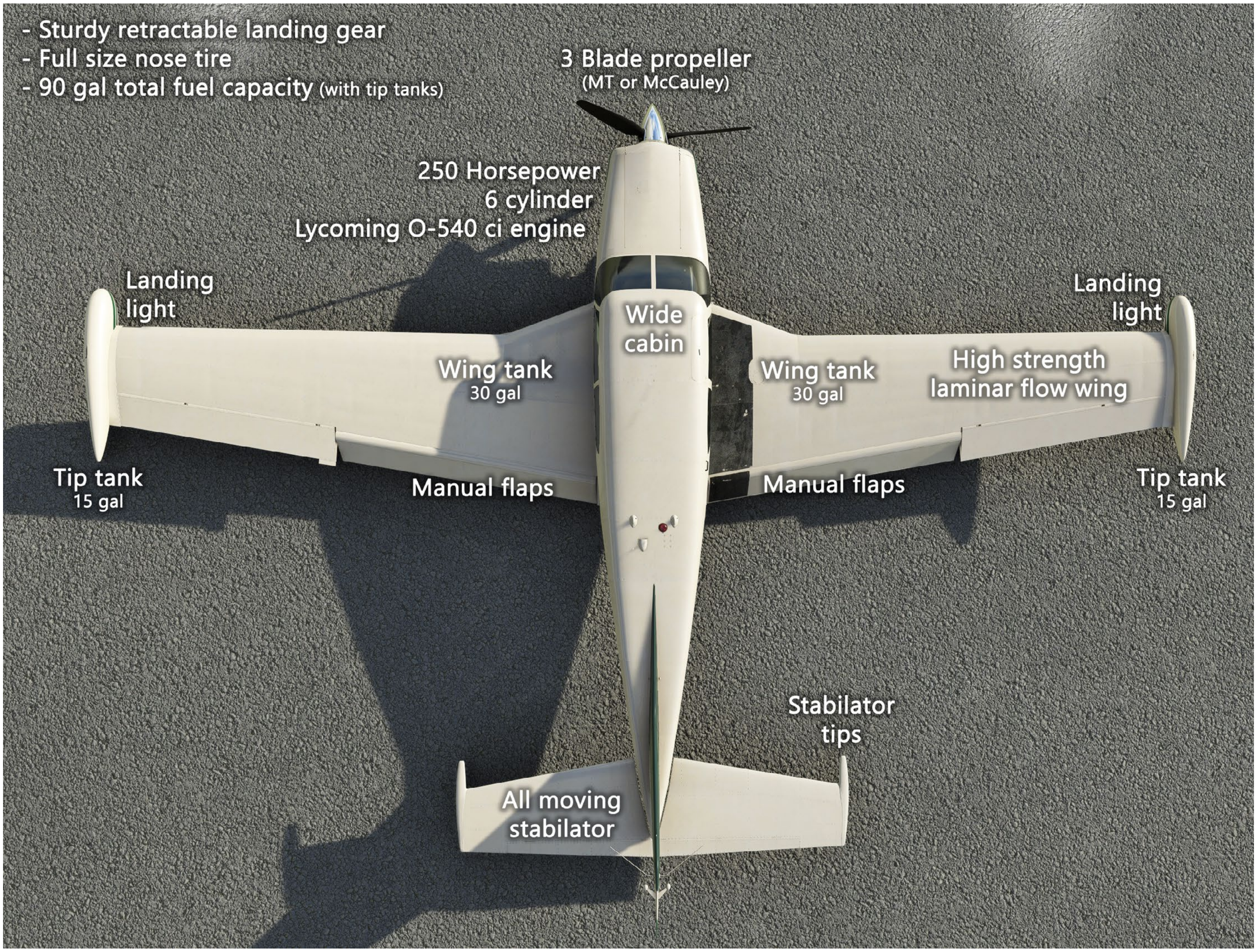
During normal operation the fuel is drawn to the engine from the cell by a mechanically operated fuel pump located on the engine accessory section. In the event the engine driven fuel pump fails, two electric auxiliary fuel pump are provided. The pumps are operated (via a single switch) during starting, take-offs, and landings.

Markers
Radio Panel
NAV-COM 1
(with DME)
NAV-COM 2
Ash Tray
Transponder
Pilot's Side Window
OAT
(Outside Air Temperature)
Autopilot Disconnect
Autopilot Altitude Hold
Vent amount & lock
Yoke
(Click to hide)
Autopilot Master
Avionics Master
Headphones
Vent direction
Battery Master
Fuel Pump
NAV-INST Lights
Landing Lights
Strobe
Beacon
Pitot Heat
Magnetos
Starter
Parking Brake
Tablet
Aileron lock
Headphones Noise Cancelling
Circuit Breakers
(just below panel)

Fuel Flow
ADF
(Automatic Direction Finder)
HOBBS
Airframe time
Co-pilot's Window
Yoke
(Click to hide)
Ash tray
Glove box
Gyro Suction
Vent amount & lock
Vent direction
Circuit Breakers
Primer
Cabin Vent left
Lighter
Cabin Heat
Defroster
Cabin Vent right
Headphones
Door handle
(click to open door)


Rear flood light
C4A multi-purpose Cockpit light
Left rear overhead vent
Right rear overhead vent
Life preservers


Front flood light
Front red light
NEUTRAL
UP
DN
NOSE
DN
UP
Elevator trim
Door lock
Right overhead vent
Right sun visor



The fuel strainer, equipped with a quick drain, is mounted under the right forward section of the fuselage. The strainer should be drained regularly to check for water or dirt accumulations.

Electrical System

Electrical power for the Comanche is supplied by a 12 volt, direct current system. Incorporated in the current system is an alternator, which furnishes electrical power during all normal operation. A 12 volt 33 ampere hour battery is used in the system to provide power for starting and as a reserve power source in case of alternator failure. The battery is located behind the baggage compartment bulkhead in a sealed stainless steel battery box. Refer to the Maintenance Section for servicing of the battery.

Electrical switches and circuit breakers for the different systems are located on the lower left instrument panel. The circuit breakers automatically break the electrical circuit if an overload is applied to the system, thereby preventing damage to the component and wiring.

To reset the circuit breakers simply push in the reset button. Allow approximately two minutes for breakers to cool prior to resetting. Continual popping out of a circuit breaker indicates trouble in that circuit and must be checked prior to operation. It is possible to manually trip the breaker by pulling out on the reset button.

Heating and Ventilating System

There are four individual controls provided for regulating the heating, defrosting, and forward fresh ventilating air. The controls are located on the lower right side of the instrument panel in the console panel.

Heated air for the cabin is provided by a heater shroud attached by the exhaust muffler. Fresh air is picked up at the rear engine baffle and passed through the heater shroud into a control valve for distribution to the cabin.

Warm air for the defroster system is obtained directly from the heater shroud. The amount of air applied to the windshield is regulated with the control in the console. Caution should be used if it is necessary to operate the defroster on the ground as prolonged application of heat to the windshield may cause distortion.

Fresh air for the cabin interior is picked up from two air scoops attached to the lower engine cowling. The air passes through flexible hoses to control valves on the firewall where the flow is regulated to the cabin. Located at each seat are two smaller air vents that may be regulated by the individual.

Located in the aft section of the cabin is an exhaust vent to improve the circulation of air in the cabin interior.

Instrument Panel

The instrument panel in the Comanche is designed to accommodate the customary advanced flight instruments on the left side in front of the pilot and the engine instruments on the right side. Provisions for extra instruments are made in both sections. Instruments are shock mounted and accessible for maintenance by removing a portion of the fuselage cowl over the instruments.

The artificial horizon and the directional gyro in the flight group are vacuum operated through the use of a vacuum pump installed on the engine. The turn coordinator is an electrically operated instrument and serves as a standby for the other gyros in case of vacuum system failure (partial panel).

Radios are installed in the left of the panel. Radio power supplies are mounted aft of the baggage compartment.

The default Narco Avionics radio suite in the Accu-Sim Piper Comanche 250 is so complete that the best source of information is the original manufacturer's manuals.

MK 12 E/NCS812 NAV/COM radios

ADF 841 Receiver

Baggage Compartment

Maximum placarded weight of the baggage area is 200 pounds with 20 cubic feet of area available, accessible through a 20 x 20 inch door. Provision for securing cargo is provided by tie-down belts installed in the compartment. Attached to the top of the baggage compartment are provisions for stowing the tow bar. The key used in the ignition operates the lock on the baggage compartment door.

AUTOPILOT

Overview

The S-TEC System Thirty ALT is an accurate simulation of a real autopilot installed in the A2A Comanche. It's simple and easy to use, but it's also quite different from other autopilots you may encounter in Microsoft Flight Simulator.

The autopilot offers the following lateral modes, which are cycled by depressing the Mode button.

ST – Will maintain turn rate as set using the Mode knob.

HD – Will follow the heading selected using the heading bug on the HSI.

TRK LO/HI – Will follow the CDI needle in the HSI. Normally TRK HI is used; TRK LO is a low sensitivity mode for situations when radio signal is unstable.

The ALT hold mode can be toggled with a dedicated button on the yoke, but only when one of the lateral modes has been engaged.

To turn off the autopilot use the Disconnect button on the yoke or press and hold Mode button for more than three seconds.

For detailed operating procedures, please refer to the S-TEC System 30 Pilot's Operating Handbook linked below.

S-TEC System 30 ALT Pilot's Operating Handbook

Rate-based versus attitude-based autopilots

Unlike most autopilots found in Microsoft Flight Simulator aircraft, the S-TEC System 30 is a rate-based, not an attitude-based autopilot. This means that it doesn't use the aircraft's attitude indicator, or any other attitude sensor, to steer the aircraft. Instead, it relies on the turn rate sensor (gyro) for its lateral modes, and an additional altitude pressure sensor for the altitude hold.

Rate based autopilots are compact, relatively inexpensive, and reliable. In the case of the S-TEC 30, the whole autopilot is conveniently built around the turn rate indicator, which is also its primary sensor. Provided there is electrical power, the autopilot will continue to work, even if both your ADI and HSI fail. However, rate-based autopilots do not offer advanced functions like a flight director or pitch hold, and they are also less stable in turbulence. Because of this, larger and more expensive aircraft typically use attitude-based systems.

Another difference between rate and attitude-based autopilots is that a rate-based autopilot will maintain the same turn rate regardless of aircraft speed. Your bank angle will change depending on the airspeed. An attitude-based autopilot will maintain a constant bank in turns, and the turn rate will decrease as airspeed increases.

Elevator control

Most real autopilots control the altitude by moving the elevator itself, and then use a separate servomotor to adjust the trim and reduce the load on the elevator servo. But in case of a low-cost autopilot like S-TEC System 30, you are the trim servomotor. When the alt hold is engaged, the autopilot will move the elevator as necessary to maintain the altitude. And it will do a pretty good job. But if a control threshold is reached, it will notify you with light and audio signals that a manual trim adjustment is needed, because it's getting close to a point where the servo won't have enough force to push the elevator any further. Such trim adjustments will be necessary during the flight when airspeed changes, weather shifts, and even centre of gravity changes as the flight progresses.

Keyboard Shortcuts

Our autopilot is fully custom coded and does not rely on the default MSFS autopilot. However, for your convenience, we've connected most of the stock MSFS events to our code, so that you can seamlessly control the autopilot buttons with the same shortcuts as used in other aircraft. Take note that some shortcuts will have slightly different functions simply because of the design of this autopilot. For example, the "Autopilot Toggle" shortcut (default 'Z') will change autopilot modes just like pressing the Mode button. To disengage the autopilot, you need to use the "Autopilot Disconnect" key. There are no dedicated heading and nav toggle functions, as these are integrated into the mode button.

You can also use our external Input Configurator app to map the joystick axis to the autopilot turn knob.

GPS flight plans

The S-TEC System 30 autopilot can track a VOR/LOC/GPS course. However, it can't intercept a new course on its own, which means it won't automatically fly the whole route you've programmed into a GPS. With a little practice though, it is possible to switch between GPS route legs efficiently; here's a quick guide on how to do that.

1. When approaching the next GPS waypoint, check your GPS flight plan page and note DTK of the next leg.
2. Set the HDG bug to the DTK of the next leg.
3. When the GPS informs you it's time to turn to the next leg, switch autopilot to the HDG mode.
4. Once established on the new course press the Mode button twice to go back to HI TRK mode. Don't worry if you're not perfectly aligned, the autopilot will sort out small errors.
5. Adjust the course setting on the HSI when convenient. HSI Course setting is not used by the autopilot, it's only for your reference.

JPI EDM 830 ENGINE MONITOR

Overview

The JP Instruments EDM 830 is an advanced simulation of the digital engine monitor fitted in the real A2A Comanche. It constantly checks critical engine parameters and includes a 'LeanFind' mode that will assist you in finding the correct cylinder's peak EGT to set your mixture to.

However, it's not your primary engine instrument and it's normal that it shuts itself down during engine startup. In fact, it is good practice to start the engine with all avionics switched off.

Display

The top left section of the display depicts RPM and Manifold Pressure graphically and digitally, with a digital reading of percent horsepower shown below. Liner gauges occupy the right portion of the screen, and in the A2A Comanche are configured to show Oil Pressure (O-P), Fuel Flow (GPH), Fuel Remaining (REM), Predicted Endurance (H:M) and Battery Voltage (BAT).

Cylinder bar graphs are shown in the central portion of the display, two for each of the 6 cylinders of the O-250-A engine. For each pair of columns, Exhaust Gas Temperature (EGT) appears at left in blue. Cylinder Head Temperature (CHT) is shown at right in white when below the programmed normal operating limit of 380°F and in red if this value is exceeded. You may notice that the CHT redline for the EDM 830 is set much lower than the 500°F redline on the analogue CHT gauge. Running those cylinders above 400°F for any length of time really isn't a good idea, except in an emergency.

The lower section of the display presents dynamic readouts of various engine parameters. Any alarms which are triggered, for instance high EGT, low oil pressure or low fuel quantity, will take priority in this area and flash in red.

Controls

The EDM 830 includes just two front panel operating buttons, a white button at left normally labelled STEP and a black button at right, normally labelled LF (lean find). The function of these will be described in a little more detail below.

Percentage and Normalize View

Pressing the black LF button for 3 seconds will toggle between Percentage View and Normalize View.

In Percentage View the columns indicate percent of EGT redline so hotter cylinders display higher columns than cooler cylinders.

When Normalize View is activated the EGT and CHT columns are set to the same half-height level for trend analysis and any changes will be shown as an increase or decrease in column height. A one-segment change indicates a 10°F difference.

You should use Normalize View in level cruise and run-up, but not when making changes to power settings as this will cause columns to go off scale. When Normalize View is active, the NRM text indicator is visible at bottom center.

Power Up Fuel

On power-up, once the initialization sequence has completed you will be prompted to enter any fuel you might have added to the tanks with FILL? N. If the aircraft hasn't been refuelled, simply click the white button, now labelled EXIT. Otherwise press the black button now labelled REFUEL to select one of the 3 options below.

1. FILL 60 sets remaining fuel to fully filled main wing tanks.

2. FILL 90 sets remaining fuel to the fully filled main wing and tip tanks.

3. FILL + allows you to adjust remaining fuel by pressing or holding the black button.

To return to the fuel programming page at any time press both buttons simultaneously. In the simulator, this can be done with a right click of either button.

Using the buttons on the EDM 830 to enter the fuel total can be a little fiddly, so we've also provided a shortcut on the fuel and payload page of the pilot's tablet to instantly synchronize this parameter from the actual fuel on board.

Manual and Automatic Modes

When you first turn on the power the EDM 830 starts in Manual mode but will enter the Automatic mode after two minutes.

To re-enter Manual Mode, press the STEP button. This stops the automatic display of parameters in the lower screen area, with subsequent presses of STEP cycling through them manually.

To enter automatic mode, Press the LF button, then the STEP button. Each parameter is sequenced automatically and shown in the digital display for a few seconds.

LeanFind Mode

The EDM 830 installation in the A2A Comanche support Rich of Peak (ROP) leaning.

The procedure for leaning using ROP mode is as follows.

1. Establish cruise at 65-75% power and pre-lean the mixture to 50°F rich of peak on any cylinder. Wait for a minute or so for the engine stabilize.

2. Press the LF button and verify that ROP is displayed.

3. Lean the mixture at around 5°F per second continuously until LEANEST flashes and the corresponding EGT column flashes. The EGT for the leanest cylinder will be displayed at bottom left.

4. At the point the display should change to show the difference from peak at bottom left. If it does not, press the LF button again.

5. Slowly enrich the mixture to set the desired setting. In the A2A Comanche, best power will generally be achieved with a difference of 40-50°F ROP.

For a carbureted engine like the Lycoming O-540, the difference in mixture distribution between the cylinders is too large for Lean of Peak (LOP) mode to be useful. That algorithm looks for the last cylinder to peak, and by that time the first cylinder that peaked may already be too lean to work efficiently. To fly LOP, simply use ROP mode, but after finding the leanest cylinder, pull the mixture further 50 degrees LOP. This should give you best economy.

For more information on operating the EDM 830, please refer to the Pilot's Guide linked below.

JP Instruments EDM-830 Pilot's Guide

NORMAL PROCEDURES

BEFORE ENGINE START

1. Preflight . . . . . COMPLETE
2. Passengers . . . . . BRIEFED
3. Seat belts . . . . . SECURE
4. Controls lock . . . . . REMOVED
5. Parking brake . . . . . SET
6. Gear switch . . . . . DOWN
7. Flaps . . . . . UP
8. Radios . . . . . OFF
9. Autopilot master . . . . . OFF
10. Avionics master . . . . . OFF
11. All electrical switches . . . . . OFF
12. Circuit breakers . . . . . IN
13. Rotating beacon . . . . . ON

ENGINE START

1. Fuel selectors . . . . . DESIRED TANK
2. Mixture . . . . . RICH
3. Throttle . . . . . CRACKED
4. Prop . . . . . FULL FORWARD
5. Carb heat . . . . . OFF
6. Master switch . . . . . ON
7. Fuel pump . . . . . ON
8. Fuel pressure . . . . . CHECK
9. Fuel pump . . . . . OFF
10. Primer . . . . . 1–5 STROKES
11. Mags . . . . . BOTH
12. Prop area . . . . . CLEAR
13. Starter . . . . . ENGAGE
14. Oil pressure . . . . . CHECK
15. Mixture . . . . . LEAN AS REQUIRED

TAXI

1. Primer . . . . . LOCKED
2. Avionics master . . . . . ON
3. Ammeter . . . . . CHECK
4. Radios . . . . . ON
5. Transponder . . . . . AS REQUIRED
6. Altimeter . . . . . SET
7. Heading indicator . . . . . SET
8. Landing gear lamp . . . . . GREEN
9. Nav lights . . . . . AS REQUIRED
10. Parking brake . . . . . RELEASE
11. Brakes on initial roll . . . . . TEST

RUN-UP

1. Position . . . . . INTO WIND
2. Brakes . . . . . HOLD
3. Fuel quantity . . . . . CHECK
4. Fuel selectors . . . . . DESIRED TANK
5. Mixture . . . . . AS REQUIRED
6. Throttle . . . . . 2000 RPM
7. Engine instruments . . . . . CHECK
   Oil press, oil temp, fuel press, ammeter, vacuum, CHT, EGT
8. Magnetos . . . . . CHECK
   Max drop: 125 RPM
   Max diff: 50 RPM
9. Prop . . . . . CYCLE x 3
   Then **REDUCE** to 1500 RPM and **CHECK** steady
10. Carb heat . . . . . CHECK

BEFORE TAKEOFF

1. Control .... **FREE & CORRECT**
2. Elevator trim .... **NEUTRAL**
3. Rudder trim .... **AS REQUIRED**
4. Door..................................... **LATCHED**
5. Flaps .... **SET AS DESIRED**
6. Fuel selectors .... **DESIRED TANK**
7. Fuel pump...................................... **ON**
8. Mixture .... **FULL RICH**
9. Prop............................... **FULL FORWARD**
10. Carb heat .... **OFF**
11. Engine gauges.............................. **CHECK**
12. Pitot heat .... **AS REQUIRED**
13. Strobes .... **ON**
14. Landing lights .... **AS REQUIRED**

TAKEOFF

1. Throttle................................ **FULL OPEN**
2. Airspeed indicator .... **ALIVE**
3. Engine gauges.............................. **CHECK**
4. Rotate .... **85 MPH**
5. Positive climb .... **VERIFY**
6. Gear... **UP**
7. Flaps .... **UP**
8. Airspeed .... **Vy 105 MPH**
9. Emerg. landing area......................... **VERIFY**

CLIMB

1. Fuel pump........................ **OFF at 1000 ft AGL**
2. Power .... **Do not reduce until 1000 ft AGL**
   Throttle: As engine temps will tolerate
   Prop: 2400 RPM MAX
3. CHT .... **CHECK**
4. Mixture .... **LEAN AS REQUIRED**

CRUISE

1. Throttle....................................... **SET**
2. Prop... **SET**
3. Mixture .... **LEAN AS REQUIRED**
4. Fuel pump.............................. **VERIFY OFF**
5. Fuel pressure............................... **CHECK**
6. Engine gauges.............................. **CHECK**

APPROACH

1. Autopilot master.............................. **OFF**
2. Fuel pump..................................... **ON**
3. Fuel selectors .... **DESIRED TANK**
4. Fuel levels .... **CHECK**
5. Fuel pressure............................... **CHECK**
6. Mixture .... **RICH**
   Airport > 4,000 ft .... **LEAN AS REQUIRED**
7. Prop.............................. **FULL FORWARD**
8. Carb heat .... **AS REQUIRED**
9. Airspeed .... **120 MPH**
10. Gear.. **DOWN**
11. Flaps .... **AS DESIRED**
12. G.U.M.P. .... **CHECK**

LANDING

1. Gear indicator lamp .... **GREEN**
2. Flaps .... **DOWN**
   If windy flaps **AS REQUIRED** and add 5 MPH
3. Airspeed .... **90 MPH**

AFTER LANDING

1. Flaps .... **UP**
2. Strobes .... **OFF**
3. Fuel pump..................................... **OFF**
4. Mixture .... **LEAN AS REQUIRED**
5. Trim....................................... **NEUTRAL**

SHUTDOWN

1. Parking brake .... **SET**
2. Radios.. **OFF**
3. Transponder................................... **OFF**
4. Avionics master .... **OFF**
5. Master switch .... **OFF**
6. Throttle.................................. **CLOSED**
7. Mixture .... **IDLE CUTOFF**
8. Magnetos .... **OFF**
9. Control wheel .... **SECURE**
10. Doors / windows .... **CLOSED**
11. Tie-downs.................................. **SECURE**

NORMAL PROCEDURES EXPLAINED

This chapter provides more detail on some of the normal procedures contained in the previous section. It's not intended for use as an in-flight reference due to the lengthy explanations. The short form checklists should be used for this purpose and referred to when reading this chapter.

Starting

It is not necessary to turn the electric fuel pump on for starting. However, it is important that before starting, proper operation of the electrical fuel pump is checked as the main engine-driven fuel pump will not be running. Once a fuel pressure indication from the electrical pump has been verified, it should be switched off again. This is so that operation of the engine-driven fuel pump can be checked independently too, without the electrical pump running. Note that the auxiliary electrical pump must be switched back on as part of the before take-off checklist to provide redundancy, should the engine-driven pump fail to provide adequate fuel pressure during take-off.

The requirement to prime the engine will depend on the engine temperature. When the engine is warm (over 40°F), do not prime but turn the magneto switch to the 'both' position and immediately engage the starter. Some priming can be accomplished by pumping the throttle, but care should be taken not to overload the engine this way. When the engine is cold (under 40°F), prime three to five strokes; if extremely cold, further priming may be required. The throttle should be open about one-quarter inch for easiest starting.

As soon as the engine starts, check the oil pressure. If no pressure is indicated within thirty seconds, stop the engine and determine the trouble. In cold weather it will take a few seconds longer to get an oil pressure indication.

Once the engine is firing evenly, adjust the throttle to maintain about 800 RPM. Idling at lower RPM is likely to foul the spark plugs, unless fine wire plugs are fitted.

If the engine fails to start at the first attempt, another attempt should be made without additional priming. If this fails, it is possible that the

engine is over primed. Turn the magneto switch to the 'off' position, open the throttle slowly, and crank the engine through approximately ten revolutions with the starter. Re-prime the engine with one half the amount used in the initial attempt, turn the magneto switch to 'both', and repeat the starting procedure.

Warm-Up and Ground Check

Warm-up the engine at 800 to 1200 RPM for not more than 2 minutes in warm weather, or 4 minutes in cold weather. If electrical power is needed from the generator, the engine can be warmed up at 1200 RPM at which point the generator cuts in. The magnetos should be checked at 2000 RPM, the drop not to exceed 125 RPM with manifold pressure of 15" Hg. The engine is warm enough for take-off when the throttle can be opened without the engine faltering.

Carburetor heat should be checked during the warm-up to make sure the heat control operation is satisfactory and to clear out the carburetor if any ice has formed. The heat source from the exhaust is very plentiful in the Comanche, so a drop of around 125 RPM due to this hotter, less dense air entering the engine can be expected. Carburetor heat should also be applied in flight occasionally when the outside air temperature is between 20°F (-5°C) and 70°F (21°C) to check if icing is occurring in the carburetor. In most cases when an engine loses manifold pressure without apparent cause, the use of carburetor heat will correct the condition. If carburetor icing is present and carb heat is applied, some initial engine roughness due to the ingestion of partially melted ice can be expected.

Note that when carburetor heat is applied, cold air entering the induction system is taken from a rear baffle to an exhaust pipe shroud, then to the carburetor; it is not filtered. For this reason, carburetor heat should not be used on the ground in dusty conditions except momentarily during the run-up. Dust taken into the intake system can damage the engine severely, and caution must always be exercised during ground operation to prevent dust from entering the engine.

The propeller control should be moved through its normal range during the warm-up to check for proper operation, then left in the full high RPM position. During cold weather operation the propeller should be cycled a minimum of three times to ensure that warm engine oil has circulated throughout the system.

During the propeller check, as during other ground operations, care must be taken not to run-up the engine when the propeller is over loose stones, cinders or other objects which can be picked up and cause extensive damage to the propeller blades.

Take-Off

In a smooth, steady motion of the throttle, apply full power allowing the aircraft to accelerate in a three-point attitude until the control surfaces become effective. Then begin applying slight back pressure on the control column to lift the nose wheel. At max take-off weight and without flaps, the aircraft should be rotated to leave the runway at around 85 MPH. However, Comanche pilots must be aware that at lighter take-off weights and/or when using flaps, the aircraft will become light on its main landing gear at a slower airspeed, typically closer to 65 MPH. When this happens, it's important for the pilot to continue applying sufficient back pressure on the control column to prevent the aircraft from 'wheelbarrowing' on the nose wheel. Therefore, a take-off considerably earlier than 85 MPH should be expected and planned for under these conditions.

After the take-off has proceeded to the point at which a landing on the runway can no longer be made with the wheels down in the event of loss of power, the gear should be retracted. As soon as the gear is up and sufficient altitude has been gained, typically 1000 feet above ground level, reduce power to the climb setting.

For a minimum take-off run in the Comanche 250, the flaps should be lowered to the recommended 18° (2/3) position. With the flaps in this position the take-off run will be reduced by approximately 20 per cent.

Normally flaps are not used during crosswind take-offs. It is desirable to hold the nose wheel on the runway until a higher-than-normal take-off speed is obtained, then apply a definite but not abrupt back pressure to the control column to lift the aircraft from the runway. Once airborne, set up the required crab angle, retract the gear, and continue the climb.

Climb

The best rate of climb is obtained at 105 MPH. This speed should be decreased by about 1 MPH per thousand feet of altitude so that at 10,000 feet the best airspeed for maximum rate of climb is 95 MPH. A good rate of climb is obtained at lower altitudes at 110 to 120 MPH" while forward speed is increased. Reducing the climbing airspeed below 95 MPH at low altitudes has the added disadvantages of cutting down forward visibility over the nose and reducing the cooling airflow to the engine. Extended climbs at speeds below that figure are not recommended.

Stalls

The gross weight stalling speed with flaps and gear down is 64 MPH. The stall speed will increase by about 6 MPH with flaps up. All controls are effective at speeds down to the stalling speed. Stalls are gentle and the airplane is easily controlled if back pressure is released from the yoke.

Cruising

The cruising speed of various Comanche models is determined by many factors including power setting, altitude, temperature, load and equipment installed on the airplane. The Comanche 250 has a maximum recommended cruising speed of 181 MPH at 75% power at 7000 feet, 2400 RPM and 22.6" MP. Fuel consumption at this speed is approximately 14 gallons per hour. This gives a cruising range with standard fuel of 4.3 hours or 740 miles, and with tip tanks installed a range of 6.4 hours or 1100 miles.

To keep engine wear, fuel consumption, and noise at reasonable levels, cruising RPMs from 2000 to 2400 are recommended with appropriate Manifold Pressures to obtain power settings of 65% to 75% power at low and intermediate altitudes.

For minimum fuel consumption and maximum efficiency, the best power settings during cruising flight are with minimum RPM and the necessary Manifold Pressures to obtain a given percent of power, consistent with the above limitations. Engine smoothness and noise level should be major factors in determining the best RPM.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes. The mixture should always be leaned during cruising operation over 5000 feet altitude, and normally also at lower altitudes at the pilot's discretion.

The continuous use of carburetor heat during cruising flight reduces power and performance. Unless icing conditions in the carburetor are severe, do not cruise with the heat on. Apply heat slowly and only for a few seconds at intervals determined by icing severity.

In order to keep the airplane in best lateral trim during cruise, the fuel should be used alternately from each tank. If tip tanks are installed, it is suggested to use the fuel in the tip tanks first.

Approach and Landing

Although it is permissible to extend the landing gear at speeds up to 150 MPH, the loads on the landing gear extension motor and on the gear doors are much lower if slower speeds are used. For this reason, it is recommended that unless there is good reason to lower the gear at a higher speed, it should normally be extended at speeds below 125 MPH. If required, the flaps can be lowered at 125 MPH, although it's recommended to be below 100 MPH for flap extension. For final approach, trim the aircraft to approximately 90 MPH with full flaps, or approximately 95 MPH with no flaps. The propeller should be set full forward for high RPM to facilitate a go-around if required. Carburetor heat generally is not applied during landing unless icing conditions are suspected. If a landing is aborted move the carburetor heat to the off position immediately if full power is desired.

The amount of flap used during landings and the speed of the aircraft at contact should be varied according to the wind, the landing surface, and other factors. It is always best to contact the ground at the minimum practicable speed consistent with landing conditions.

Normally, the best technique for short and slow landings is to use full flap and a small amount of power, holding the nose up as long as possible before and after ground contact. In high wind conditions, particularly in strong crosswinds, it may be desirable to approach the ground at higher-than-normal speeds with partial or no flap.

Maximum braking effect during short field landings can be obtained by holding full back on the control wheel with flaps up while applying brakes. This forces the tail down and puts more load on the main wheels, resulting in better traction. Fully depressing the brake pedals too quickly may cause the brakes to lock.

Airspeeds for Normal Operation

The following airspeeds are those which are significant to the safe operation of the airplane. These figures are for standard airplanes flown at gross weight under standard conditions at sea level.

Performance for a specific airplane may vary from published figures depending upon the equipment installed, the condition of the engine, airplane and equipment, atmospheric conditions and piloting technique.

V_X	Best Angle of Climb Speed	84 mph
V_Y	Best Rate of Climb Speed	105 mph
V_{BG}	Best Glide Speed: Range	105 mph
	Best Glide Speed: Endurance	95 mph
V_S	Stall Speed, normal configuration	71 mph
V_{S0}	Stall Speed, landing configuration	64 mph
	Recommended Flap Extension Speed	100 mph
V_{FE}	Maximum Flap Extension Speed	125 mph
V_{LO}	Recommended Maximum Landing Gear Operation Speed	125 mph
V_{LE}	Maximum Landing Gear Extended Speed	150 mph
V_A	Maneuvering Speed (at gross weight)	144 mph
V_{NO}	Maximum Structural Cruising Speed	180 mph
V_{NE}	Never Exceed Speed	203 mph
	(With Stabilator Tips Installed)	229 mph
	Normal Climb Out	110 mph
	Final Approach, Flaps Up	95 mph
	Final Landing Approach, Flaps 27°	90 mph
	Maximum Demonstrated Crosswind Velocity	17 kts

EMERGENCY PROCEDURES

POWER LOSS IN FLIGHT

1. Airspeed .... 105 MPH
2. Fuel selector .... FULLEST TANK
3. Fuel pump...................................... ON
4. Mixture .... FULL RICH
5. Carb heat .... ON
6. Primer................................ IN & LOCKED
7. Magnetos .... CHECK
8. Engine gauges.............................. CHECK

If no fuel pressure indicated:

9. Fuel selector .... ALTERNATE TANK

If power restored:

10. Carb heat .... OFF
11. Fuel pump.................................... OFF

If power not restored, trim for 97mph and prepare for emergency landing

POWER OFF APPROACH

1. Airspeed .... 97 MPH
2. Prop.................................... FULL AFT
3. Landing site............................... LOCATE
4. Transponder................................. 7700
5. Radio............................. 121.5 / MAYDAY
6. Seatbelts .... TIGHT

When landing site can be easily reached:

7. Gear....................................... DOWN
8. Flaps .... DOWN

POWER OFF LANDING

Emergency landings should normally be made at lowest possible airspeed with full flaps

1. Landing gear .... DOWN
   GEAR UP if landing on water
2. Flaps .... DOWN
3. Throttle.................................. CLOSED
4. Mixture .... IDLE CUTOFF
5. Magnetos .... OFF
6. Master switch .... OFF
7. Fuel selector .... OFF
8. Seat belt.................................... TIGHT
9. Door...................................... UNLATCH

ENGINE FIRE

1. Throttle.................................. CLOSED
2. Mixture .... IDLE CUTOFF
3. Fuel selector .... OFF
4. Fuel pump.................................... OFF
5. Heater / defroster............................ OFF

Proceed to power off approach checklist.

ELECTRICAL FIRE

1. Master switch .... OFF
2. Generator circuit breaker .... PULL
3. Vents....................................... OPEN
4. Door......................... OPEN / AS REQUIRED
5. Cabin heat .... OFF
6. Fire extinguisher...................... ACTIVATE

Proceed to manual gear extension checklist and land as soon as possible.

CARBURETOR ICING

1. Carb Heat .... ON
2. Throttle................................ FULL OPEN
3. Mixture .... ADJUST for smoothness

Expect initial engine roughness due to ice ingestion when using carb heat.

ENGINE ROUGHNESS

1. Carb heat .... ON
2. Throttle................................ FULL OPEN

If roughness continues after 1 minute:

3. Carb heat .... OFF
4. Mixture .... ADJUST for smoothness
5. Fuel pump....................................... ON
6. Fuel selector .... ALTERNATE TANK
7. Engine gauges.............................. CHECK
8. Magnetos .... L then R then BOTH

If operation is satisfactory on either one, continue on that magneto at reduced power and full RICH mixture to nearest airport. Prepare for power off landing.

HIGH OIL / CHT TEMPERATURE

1. Throttle.................................... REDUCE
2. Mixture .... ENRICH
3. Airspeed........................... ABOVE 120 MPH

Prepare for power off landing, land at nearest airport and investigate.

LOSS OF FUEL PRESSURE

1. Fuel pump....................................... ON
2. Fuel selector .... FULLEST TANK

If fuel pressure does not increase:

3. Fuel selector .... ALTERNATE TANK

Land as soon as possible. Low fuel pressure may indicate a fuel leak.

CAUTION: if normal engine operation and fuel flow is not immediately re-established, the electric fuel pump should be turned off. The lack of a fuel flow indication while in the ON position could indicate a leak in the fuel system, or fuel exhaustion.

LOSS OF OIL PRESSURE

If a safe landing area is found, prepare for power off landing and land as soon as possible.

If a safe landing area cannot be found, glide the maximum distance and then use engine sparingly to reach a safe landing spot.

Be aware running an engine with no oil pressure increases the risk of an engine fire.

PROPELLER OVERSPEED

1. Throttle.................................... RETARD
2. Oil pressure .... CHECK
3. Prop..................................... FULL AFT
   SET prop if any control available
4. 4. Airspeed................................ REDUCE
5. 5. Throttle............................ AS REQUIRED
   REMAIN BELOW 2575 RPM

Land as soon as possible.

ALTERNATOR FAILURE

1. Ammeter......................... VERIFY DISCHARGE
2. Electrical load .... REDUCE
3. Generator circuit breaker .... RESET

If power is not restored

4. Master switch .... OFF 6 SECS THEN ON

If no output, minimise electrical load and land as soon as practical planning for emergency gear extension procedure.

SPIN RECOVERY

1. Throttle...................................... IDLE
2. Ailerons .... NEUTRAL
3. Spin direction .... IDENTIFY
4. Rudder .... FULL OPPOSITE
5. Control wheel .... FORWARD

When rotation stops:

6. Rudder .... NEUTRAL
7. Control wheel .... SMOOTH PULL

EMERG. LANDING GEAR EXTENSION

1. Master switch .... ON
2. Circuit breakers............................. CHECK
3. Navigation lights................................ OFF
4. Gear indicator bulbs......................... CHECK

If gear not down and locked:

5. Airspeed.......................... 100 MPH or below
6. Gear selector................................. DOWN

Click on the red knob on the emergency landing gear extension handle to extend gear.


N84VK

EMERGENCY PROCEDURES EXPLAINED

The following paragraphs are presented to supply additional information for the purpose of providing the pilot with a more complete understanding of the recommended course of action and probable cause of an emergency situation.

Engine Power Loss During Takeoff

The proper action to be taken if loss of power occurs during takeoff will depend on the circumstances of the particular situation.

If sufficient runway remains to complete a normal landing, keep the landing gear down and locked, and land straight ahead.

If insufficient runway remains, maintain a safe airspeed and make only a shallow turn if necessary to avoid obstructions. Use of flaps depends on the circumstances. Normally, flaps should be fully extended for touchdown.

If sufficient altitude has been gained to attempt a restart, maintain a safe airspeed and switch the fuel selector to another tank containing fuel. Check the electric fuel pump to ensure that it is "ON" and that the mixture is "RICH." The carburetor heat should be "ON" and the primer checked to ensure that it is locked.

If engine failure was caused by fuel exhaustion, power will not be regained after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds.

If power is not regained, proceed with the Power Off Landing procedure.

Engine Power Loss In Flight

Complete engine power loss is usually caused by fuel flow interruption and power will be restored shortly after fuel flow is restored. If power loss occurs at a low altitude, the first step is to prepare for an emergency landing. An airspeed of at least 90 MPH (for best endurance, 105 MPH for best distance) should be maintained.

If altitude permits, switch the fuel selector to another tank containing fuel and turn the electric fuel pump "ON." Move the mixture control to "RICH" and the carburetor heat to "ON." Check the engine gauges for an indication of the cause of the power loss. Check to ensure the primer is locked. If no fuel pressure is indicated, check the tank selector position to be sure it is on a tank containing fuel.

When power is restored move the carburetor heat to the "OFF" position and turn "OFF" the electric fuel pump. If the preceding steps do not restore power, prepare for an emergency landing.

If time permits, turn the ignition switch to "L" then to "R" then back to "BOTH." Move the throttle and mixture control levers to different settings. This may restore power if the problem is too rich or too lean a mixture or if there is a partial fuel system restriction. Try other fuel tanks. Water in the fuel could take some time to be used up, and allowing the engine to windmill may restore power. If power is due to water, fuel pressure indications will be normal.

If engine failure was caused by fuel exhaustion power will not be restored after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds. If power is not regained, proceed with the Power Off Landing procedure.

Power Off Landing

If loss of power occurs at altitude, trim the aircraft for best gliding angle 105 MPH (if equipped, Air Cond. Off) and look for a suitable field. If measures taken to restore power are not effective, and if time permits, check your charts for airports in the immediate vicinity: it may be possible to land at one if you have sufficient altitude. The glide ratio is reduced dramatically when the landing gear is lowered.

Real world tip: If possible, notify the FAA by radio of your difficulty and intentions. If another pilot or passenger is aboard, let him help.

When you have located a suitable field, establish a spiral pattern around this field. Try to be at 1,000 feet above the field at the downwind position, to make a normal landing approach. When the field can easily be reached, slow to 85mph with flaps down for the shortest landing. Excess altitude may be lost by widening your pattern, using flaps or slipping, or a combination of these.

Touchdown should normally be made at the lowest possible airspeed. When committed to a landing, close the throttle control and shut "OFF" the master and ignition switches. Flaps may be used as desired.

Turn the fuel selector valve to "OFF" and move the mixture to idle cut-off. The seat belts and shoulder harness (if installed) should be tightened. Touchdown should be normally made at the lowest possible airspeed.

Fire In Flight

The presence of fire is noted through smoke, smell, and heat in the cabin. It is essential that the source of the fire be promptly identified through instrument readings, character of the smoke, or other indications since the action to be taken differs somewhat in each case. Check for the source of the fire first.

If an electrical fire is indicated (smoke in the cabin), the master switch should be turned "OFF." The cabin vents should be opened and the cabin heat turned "OFF." A landing should be made as soon as possible.

If an engine fire is present, switch the fuel selector to "OFF" and close the throttle. The mixture should be at idle cut-off. Turn the electric fuel pump "OFF." In all cases, the heater and defroster should be "OFF." If radio communication is not required, select master switch "OFF." Proceed with power off landing procedure.

NOTE: The possibility of an engine fire in flight is extremely remote. The procedure given is general and pilot judgment should be the determining factor for action in such an emergency.

Loss of Oil Pressure

Loss of oil pressure may be either partial or complete. A partial loss of oil pressure usually indicates a malfunction in the oil pressure regulating system, and a landing should be made as soon as possible to investigate the cause and prevent engine damage.

A complete loss of oil pressure indication may signify oil exhaustion or may be the result of a faulty gauge. In either case, proceed toward the nearest airport, and be prepared for a forced landing. If the problem is not a pressure gauge malfunction, the engine may stop suddenly. Maintain altitude until such time as a dead stick landing can be accomplished. Don't change power settings unnecessarily, as this may hasten complete power loss. Depending on the circumstances, it may be advisable to make an off airport landing while power is still available, particularly if other indications of actual oil pressure loss, such as sudden increases in temperatures, or oil smoke, are apparent, and an airport is not close.

If engine stoppage occurs, proceed with Power Off Landing.

Loss of Fuel Pressure

If loss of fuel pressure occurs, turn "ON" the electric fuel pump and check that the fuel selector is on a full tank. If the problem is not an empty tank, land as soon as practical and have the engine-driven fuel pump and fuel system checked.

High Oil Temperature

An abnormally high oil temperature indication may be caused by a low oil level, an obstruction in the oil cooler, damaged or improper baffle seals, a defective gauge, or other causes. Land as soon as practical at an appropriate airport and have the cause investigated.

A steady, rapid rise in oil temperature is a sign of trouble. Land at the nearest airport and let a mechanic investigate the problem. Watch the oil pressure gauge for an accompanying loss of pressure.

Alternator Failure

Loss of alternator output is detected through zero reading on the ammeter. Before executing the following procedure, ensure that the reading is zero and not merely low by actuating an electrically powered device, such as the landing light. If no increase in the ammeter reading is noted, alternator failure can be assumed. The electrical load should be reduced as much as possible. The "GEN" circuit breaker should then be reset.

The next step is to attempt to reset the overvoltage relay. This is accomplished by moving the "MASTER SWITCH" to "OFF" for 6 seconds and then to "ON." If the trouble was caused by a momentary overvoltage condition (16.5 volts and up) this procedure should return the ammeter to a normal reading. If the ammeter continues to indicate 0 output, or if the "GEN" breaker will not remain reset, trip the "GEN" breaker, maintain minimum electrical load and land as soon as practical. All electrical load is being supplied by the battery.

Spin Recovery

Intentional spins are prohibited in this airplane. If a spin is inadvertently entered, immediately move the throttle to idle and the ailerons to neutral.

Full rudder should then be applied opposite to the direction of rotation followed by control wheel full forward. When the rotation stops, neutralize the rudder and ease back on the control wheel as required to smoothly regain a level flight attitude.

Carburetor Icing

Under certain moist atmospheric conditions at temperatures of -5 to 20 degrees C, it is possible for ice to form in the induction system, even in summer weather. This is due to the high air velocity through the carburetor venture and the absorption of heat from this air by vaporization of the fuel.

To avoid this, carburetor preheat is provided to replace the heat lost by vaporization. Carburetor heat should be full on when carburetor ice is encountered. Adjust mixture for maximum smoothness.

Engine Roughness

Engine roughness is usually due to carburetor icing which is indicated by a drop in manifold pressure,, and may be accompanied by a slight loss of airspeed or altitude. If too much ice is allowed to accumulate, restoration of full power may not be possible; therefore, prompt action is required.

Turn carburetor heat on. Manifold pressure will decrease slightly and roughness will increase. Wait for a decrease in engine roughness and an increase in manifold pressure, indicating ice removal. If no change in approximately one minute, return the carburetor heat to "OFF."

If the engine is still rough, adjust the mixture for maximum smoothness. The engine will run rough if too rich or too lean. The electric fuel pump should be switched to "ON" and the fuel selector switched to the other tank to see if fuel contamination is the problem. Check the engine gauges for abnormal readings. If any gauge readings are abnormal, proceed accordingly. Move the magneto switch to "L" then to "R," then back the "BOTH." If operation is satisfactory on either magneto, proceed on that magneto at reduced power, with mixture full "RICH," to a landing at the first available airport. If roughness persists, prepare for a precautionary landing at pilot's discretion.

NOTE: Partial carburetor heat may be worse than no heat at all, since it may melt part of the ice, which will refreeze in the intake system. When using carburetor heat, therefore, always use full heat, and when ice is removed return the control to the full cold position.

AIRCRAFT SERVICING AND CONFIGURATION

The Accu-Sim Pilot's Tablet

Located in the pocket down by your left knee is the Accu-Sim Tablet. This is your means to fuel, load, maintain and configure your Comanche. It also gives you an insight into the current environmental conditions and shows in detail how the Lycoming O-540-A up front is performing. It's probably best to think of it as a somewhat magical way to connect with the aircraft rather than a typical 'electronic flight bag'.

Simply click the tablet's exposed bezel to take it out of the pocket. Once it's out, you can 'grab' the bezel with your mouse to move it around and you can adjust its distance from you using your mouse scroll wheel. When you done with the tablet, click the power button to restow it in the pocket. You can also toggle the tablet via a shortcut in the input configurator.

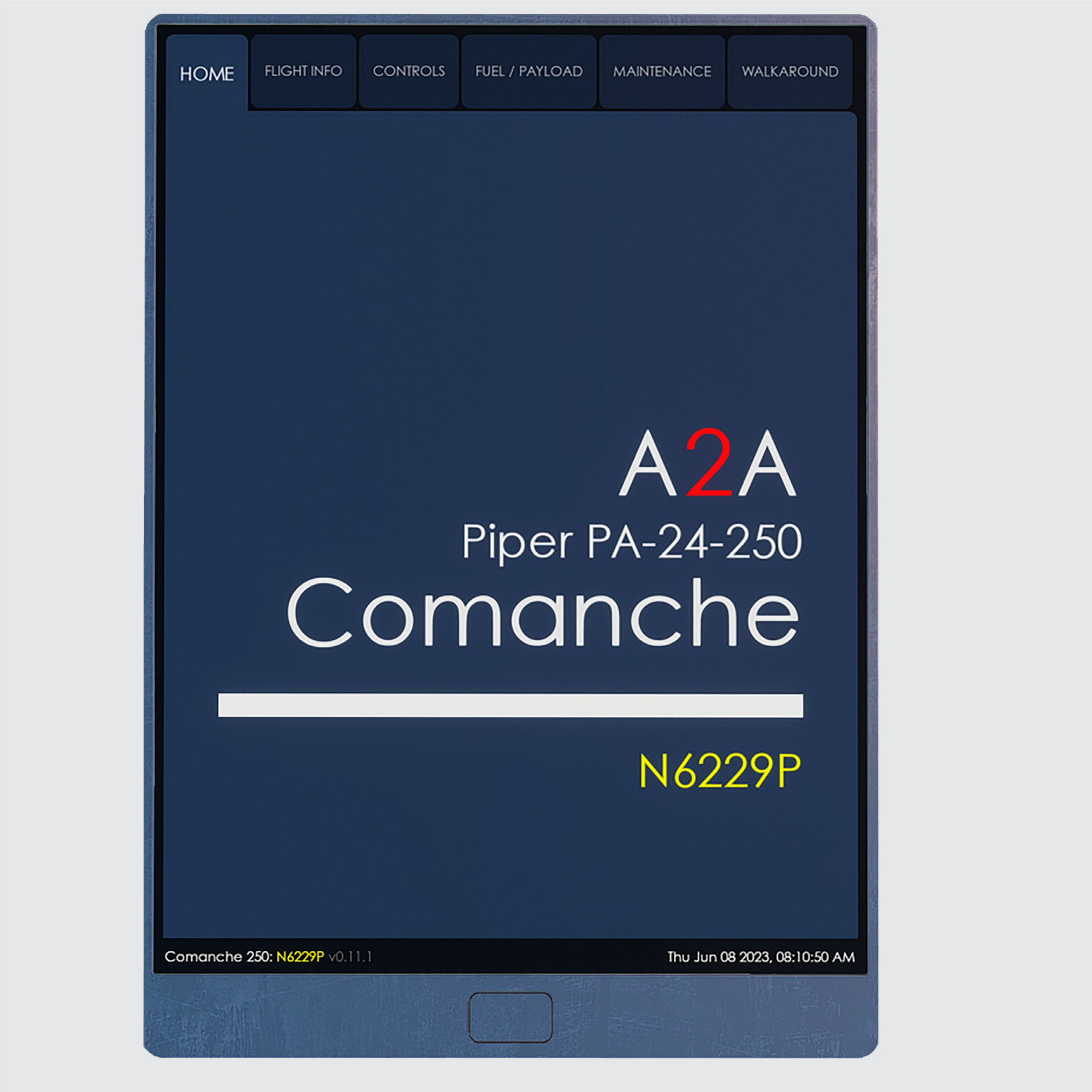
Because it's a bit of a chore, we've also saved you the bother of having to charge it.

HOME PAGE

The tablet will initialise to the home page where you'll see a notification if product updates are available for download. If technical issues are detected, they will be shown here too.

FLIGHT INFO

The *Flight Info* page provides some helpful information about the environmental condition, your flight, and your aircraft.



Environment

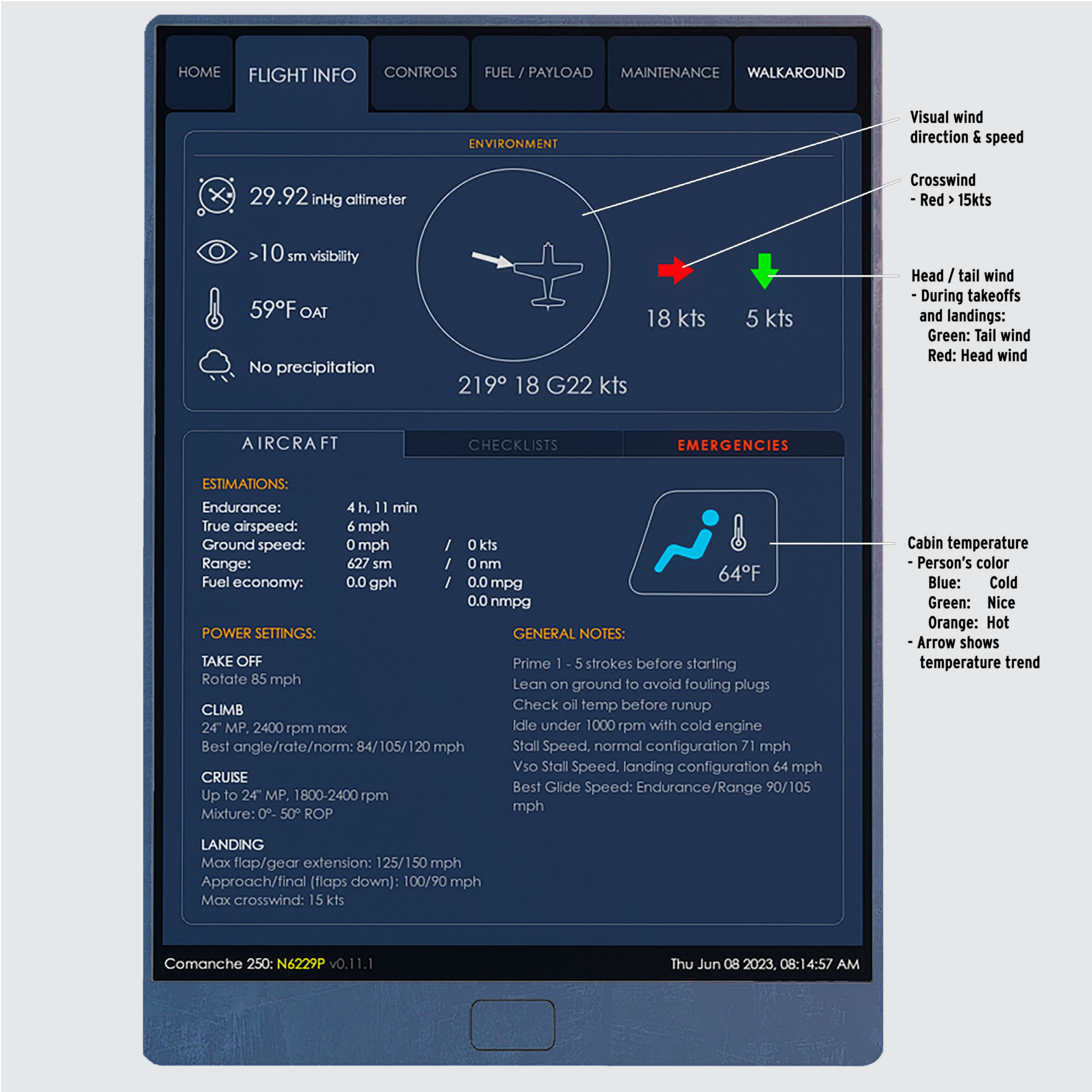
The upper section of the *Flight Info* page always displays the current environmental conditions outside the airplane. Text parameters are shown at left, and the units displayed will depend on your MSFS 'units of measure' setting.

At centre is a dynamic wind gauge which shows the wind strength, direction, and gustiness relative to the aircraft.

The crosswind and head/tailwind components are shown at right. If the airplane is in a landing or take-off configuration, they will be displayed in red if the max demonstrated crosswind component (17 kts) is exceeded, or if there's a tailwind. A headwind will be shown in green.

Aircraft

The lower section of the *Flight Info* page contains selectable tabs, the first of which is the *Aircraft* tab which displays some performance estimations, power settings and general notes. This tab also allows you to monitor the cabin temperature via the graphical display at top right. The color of the pilot figure shows the current cabin temperature, and the trend arrow shows how fast it's warming or cooling.



Checklists

Normal checklist can be selected in this section.

Emergencies

Emergency checklists are presented in the red-colored tab.

CONTROLS

Various aircraft controls and settings can be accessed from this page. Most are self-explanatory and some controls will be disabled when the aircraft is in flight.

GPS options are displayed at the top of this page, including the ability to fit a Garmin GNS 430, GNS 530 or one of each. If you prefer to use the Garmin GTN 750 or GTN 750Xi and have them installed, these options will be available too. Alternatively, you can select the no GPS option and rely solely on ground-based navigation aids.

Place *jacks* under your wings and tail and jack up or down your aircraft. Useful if you want to test the landing gear.

The Towbar (the "T" in the middle) moves you to the nose of the airplane and attaches a towbar. The airplane can then be towed using

your flight stick or yoke. Make sure you remove the parking brake beforehand.

An *Engine Heater* plugs in an electric oil pan heater and takes around 2 hours to heat the oil to about 75°F. If left plugged in, it will continue heating your oil even once your computer is off. A common use would be to plug this in when you are parking your aircraft overnight, so the engine is warm for the next flight.

Autostart sets all necessary systems on and starts the engine for you.

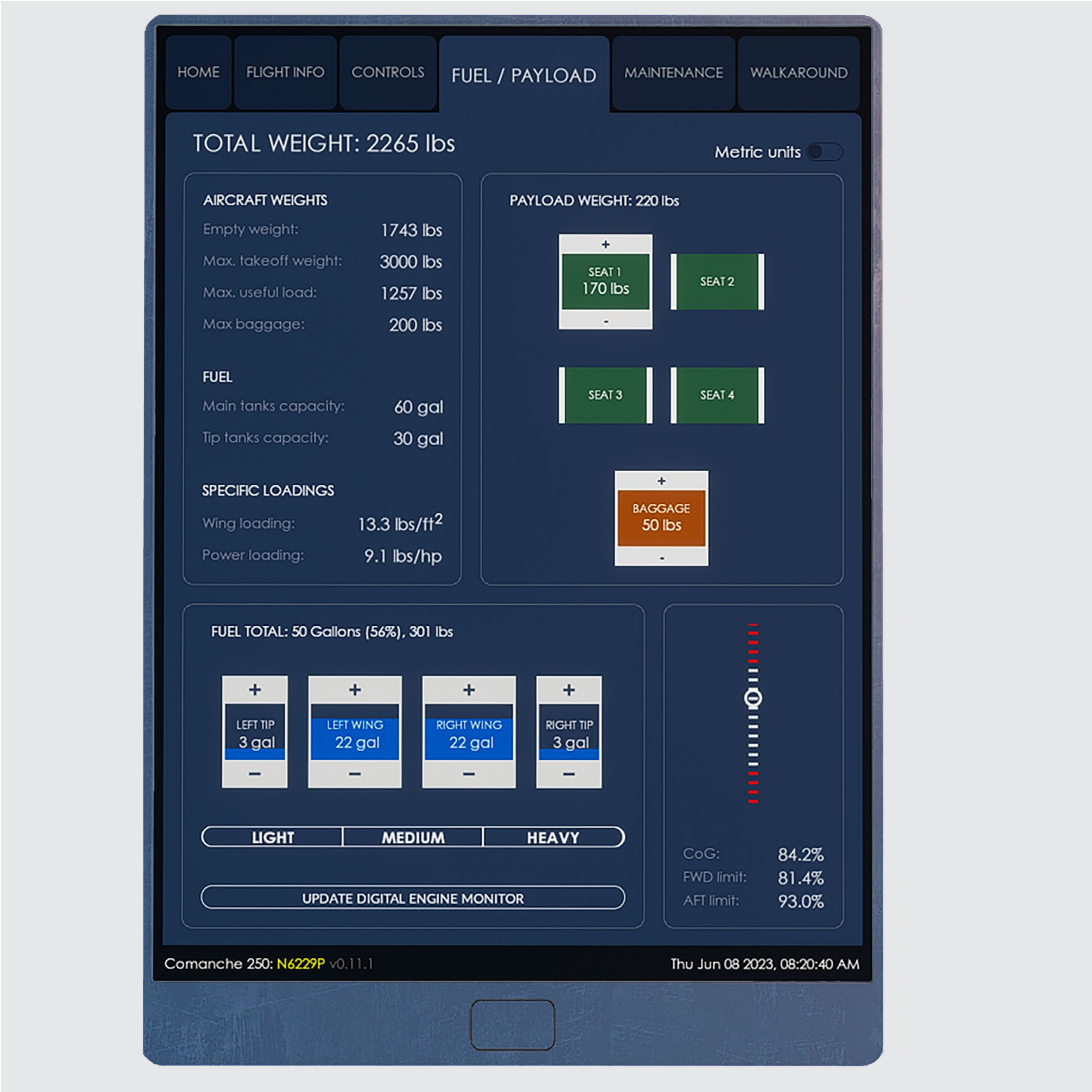
Cold & Dark turns all systems off, locks the ailerons, and chocks and ties the aircraft down.

Options

Gyro drift enables a realistic heading gyro that drifts over time and because of maneuvering, requiring periodic adjustments every 15 minutes or so when in flight.

Cockpit persistence strictly maintains all switch and lever positions. The next time you load the airplane, switches and systems will be exactly as it was left with only two exceptions. If starting on the ground the gear will be down. If starting in the air, the engine will be running and gear up.

Persistence by livery makes each paint scheme an independent and persistent aircraft over time.



Gyro sound is the high frequency whirring sound the aircraft gyros make as soon as you turn on the electric power. This frequency can be irritating to people with sensitive ears, so we allow this to be disabled if desired.

Realistic parking brake accurately simulates the Comanche parking brake, for which you must depress the brake pedals while pulling the parking brake handle for it to work. When off, the default click on/click off MSFS parking brake behavior is used.

Tablet volume controls the click sounds when clicking various buttons on the tablet.

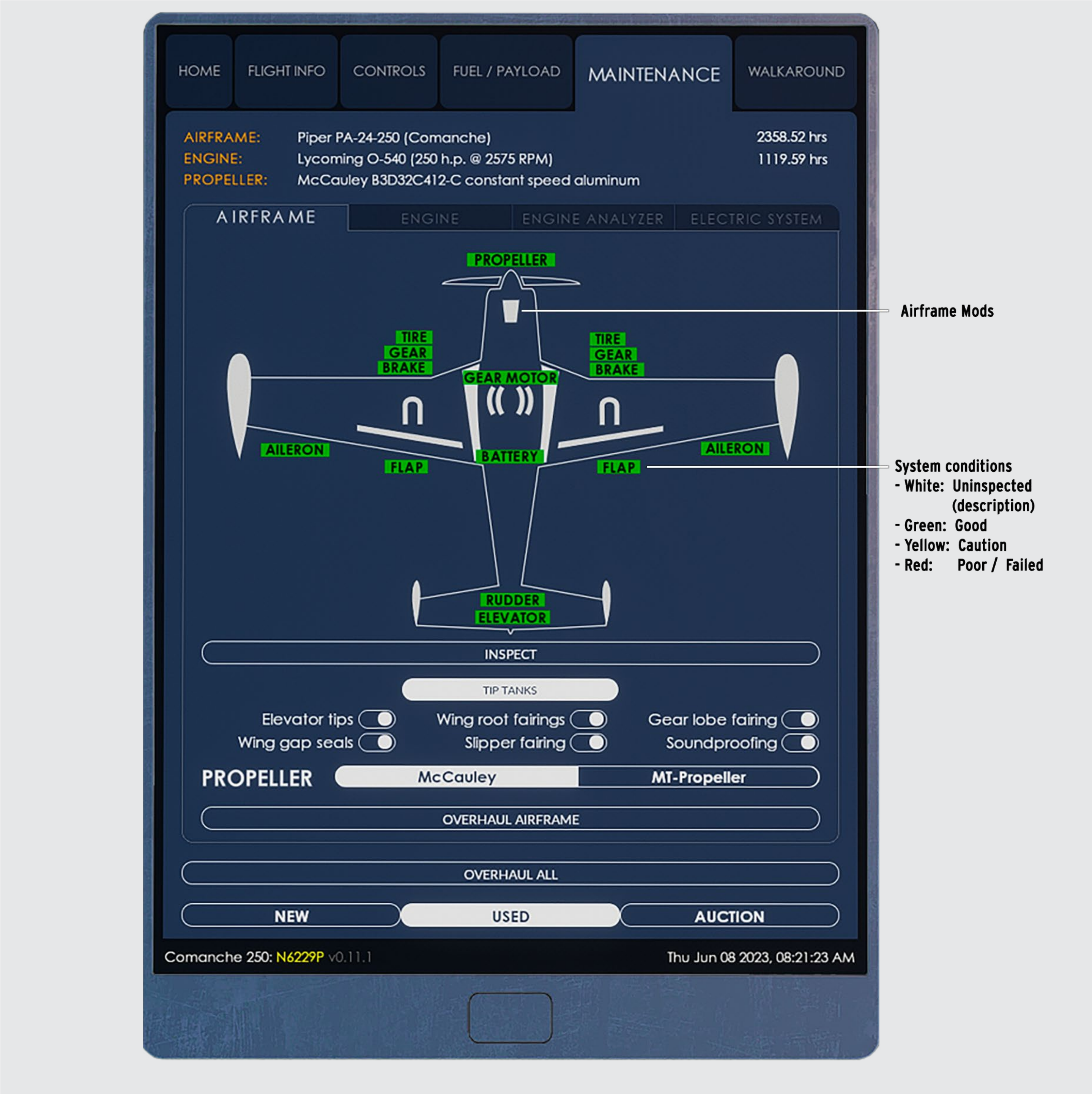
Warnings volume is for the autopilot altitude hold trim warning sound.

Master Volume sets the level of all Accu-Sim audio effects.

All volume sliders default to 50%.

Advanced Options

8.33 kHz COM radios supports reduced VHF channel spacing to overcome frequency congestion and is required in European airspace. Not a strictly realistic option for the venerable Narco radios, but one which may be useful.



3-way gear switch supports hardware with either 2 or 3 position gear switches.

Original prop lever swaps between the distinctive factory-fitted Comanche prop lever and a newer, smaller industry standard blue prop lever.

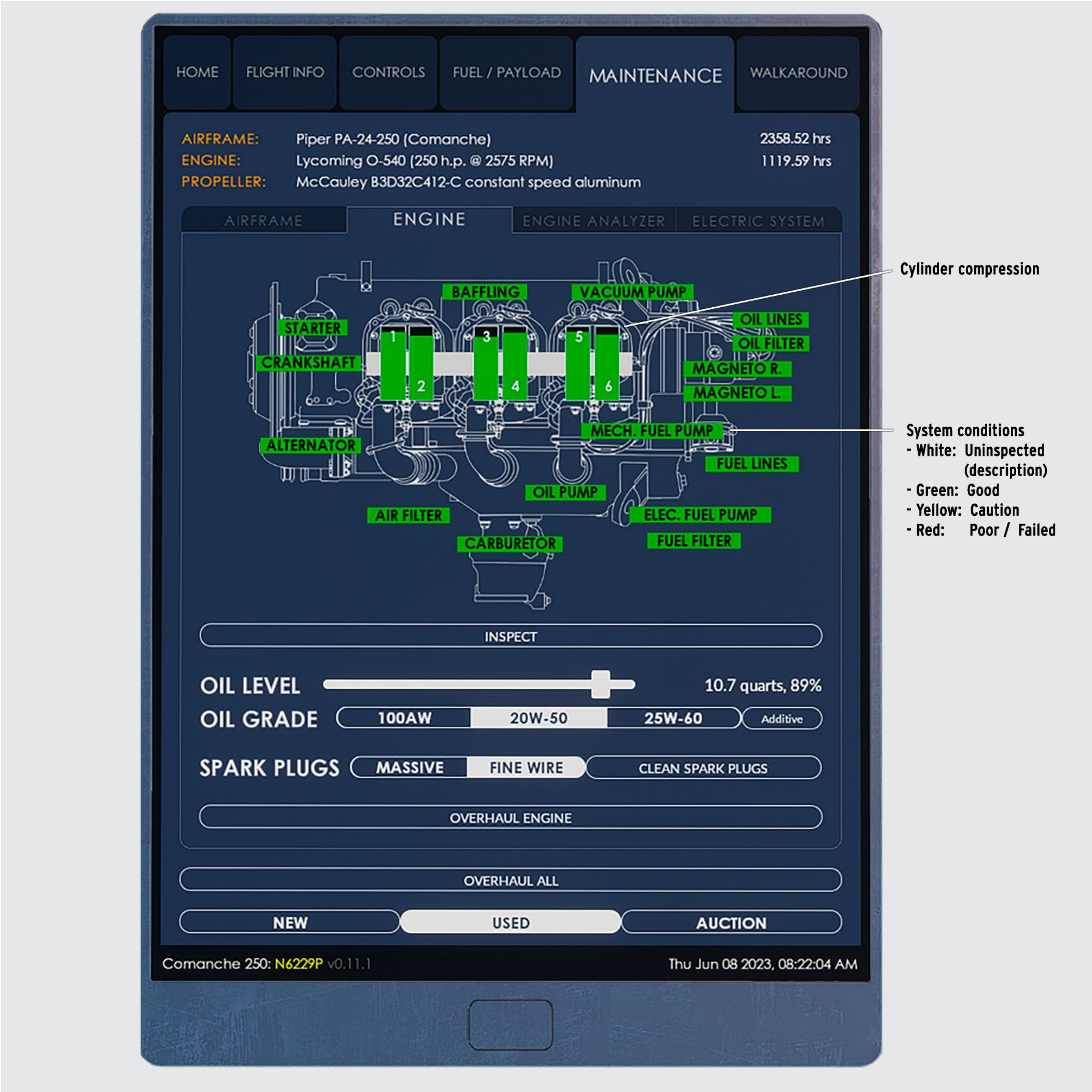
Elevator force simulates increasing elevator control forces with higher speed and allows you to reduce pitch sensitivity in cruise. When set to left this is disabled, so elevator control will be rather sensitive at higher airspeeds. This control defaults to about 25%.

Turbulence can be tailored to a flat screen or to a VR headset.

Turbulence strength allows you to reduce or increase the intensity of the Accu-Sim turbulence. Turbulence is based on current MSFS turbulence levels, so turbulent air must be present in MSFS for this effect to be visible. The default position is in the center.

Wear Rate directly controls the rate of component wear so that you can see parts degrade faster if you desire. Wear can also be completely disabled via this setting.

Failure Rate allows you to adjust the chance of an unexpected failure. Setting this at x100 can make for interesting and unpredictable flights, or in-flight failures can be disabled entirely should you prefer.



FUEL AND PAYLOAD

When loading and fuelling the Accu-Sim Comanche, please use this page of the tablet. Because external code is used, the default MSFS weight and balance menu is not supported.

The page includes information on standard airplane operating weights and a real time graphical indication of whether the centre of gravity is within limits as you adjust the fuel level, passenger weight and baggage.

Three preset fuel loads are also provided for convenience along with a one click update of your JPI EDM 830 engine monitor fuel state.

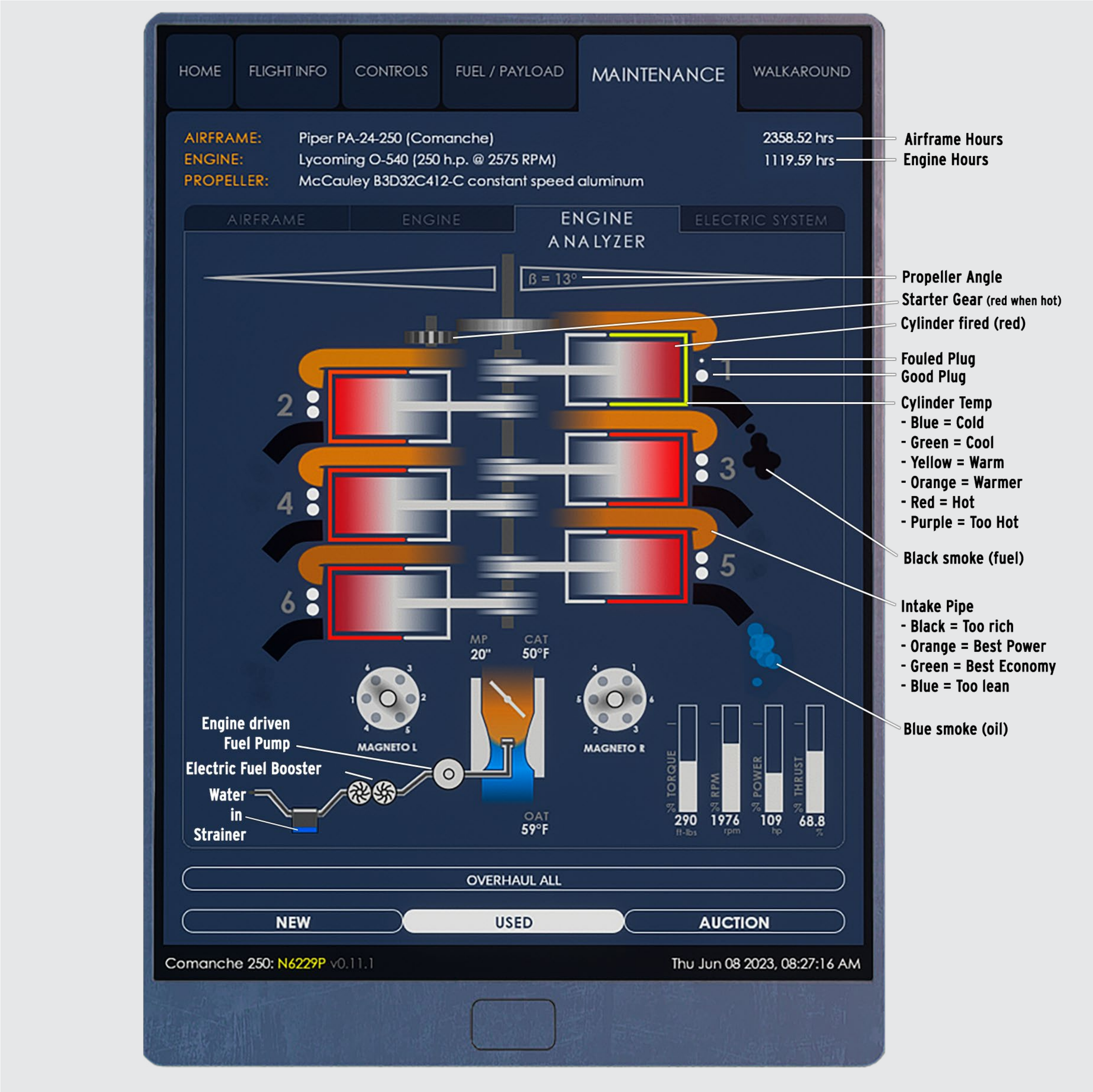
MAINTENANCE

General information is presented at top including airframe and engine hours. At the bottom you can overhaul the entire aircraft (airframe and engine).

New sets the aircraft to brand new condition as if it just rolled out of the factory.

Used sets it to a condition typical of an airplane on the used market that is in used, but flyable shape.

Auction sets it to a condition you may find at an auction, meaning anything from very nice to a total wreck. This one can be rather interesting to inspect and fly!



Airframe

The aircraft diagram shows any airframe mods installed and the condition of systems after the aircraft has been inspected. Clicking 'inspect' tells your mechanic to examine the aircraft and the results will show on the diagram. Green is good, yellow is questionable and red is bad.

Stabilator tips install on the stabilator and increase the allowable top speed (V_{NE}).

Wing gap seals cover gaps between the underside of the wing and the flaps and ailerons. This helps a bit with speed and lift at slow speeds.

Wing root fairings clean up the area where the wings meet the fuselage and help to reduce drag and increase lift.

Slipper fairing installs just behind the engine cooling exit beneath the engine and helps to increase the flow of air through the engine, helping it to run cooler and lowering airframe drag.

Gear lobe fairings cleans up the area behind the main wheels underneath this wing and give the most drag reduction of all the mods.

Soundproofing installs fire resistant light weight sound proofing material throughout the airplane, lowering cabin noise in flight.

Propeller allows you to switch between a conventional McCauley metal propeller and a more modern composite, scimitar-bladed

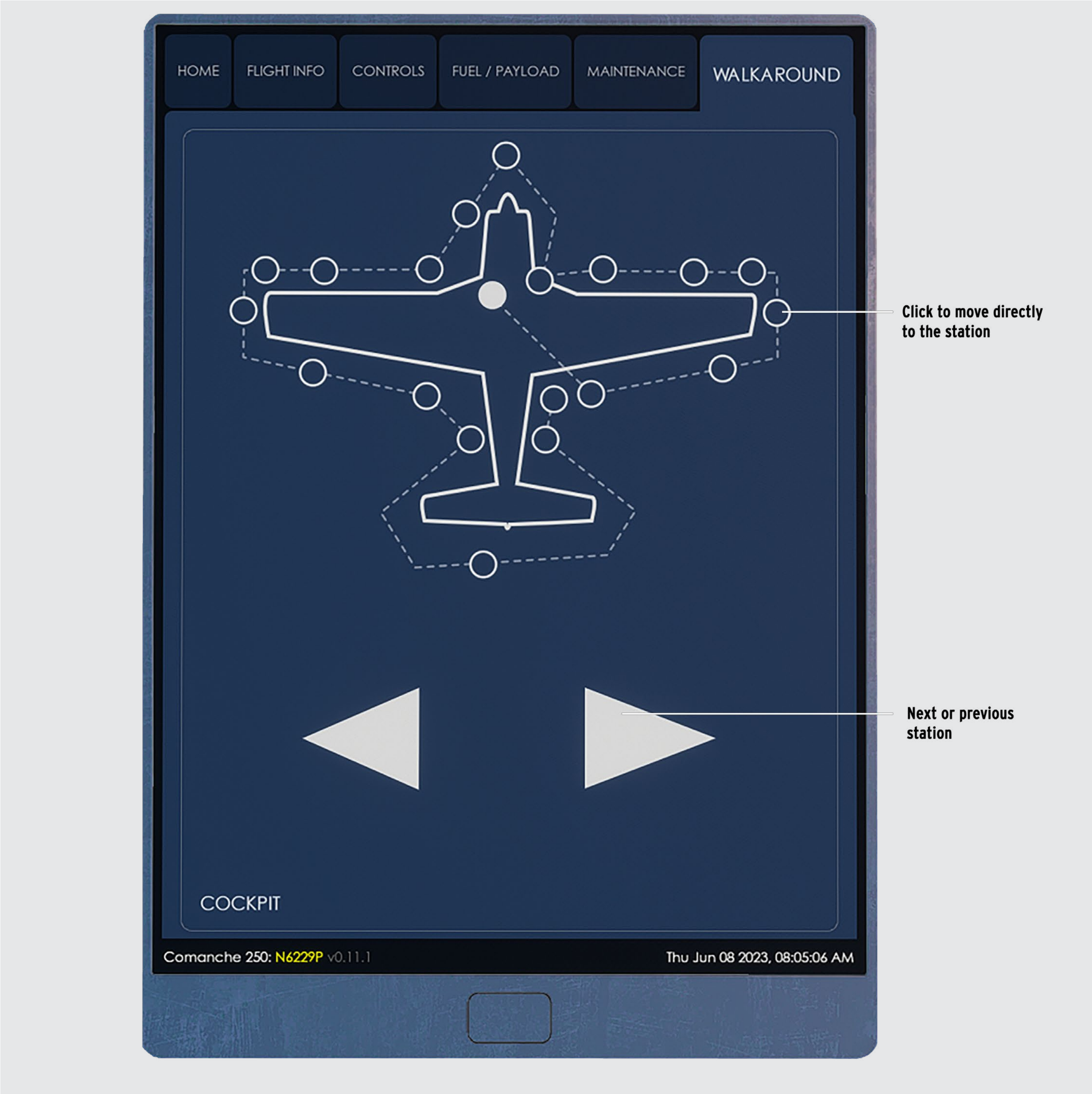
MT-Propeller. The McCauley prop is slightly larger but can achieve a flatter pitch allowing it to obtain slightly higher RPM at full power static on the ground. The MT propeller has a wood core instead of being made of metal like the McCauley and absorbs about half of the vibration from the engine, significantly reducing cabin vibration.

Engine

All engine components are listed with white labels. Clicking on each label brings up a description of the component. If you click inspect, your mechanic will examine the engine, run a compression test and report on any issues. Green items are good, yellow questionable and red are bad. Clicking on any items displays more detailed information and allows you to carry out a repair if needed.

Oil level allows you to add or remove oil. 9 quarts is the recommended max oil level.

Oil grade changes the viscosity of your oil and how it reacts to the cold and heat. 100AW is a straight weight oil and only recommended in consistently hot conditions. 20W-50 is an all-weather multi viscosity oil good for all weather, but best for cold weather. 25W-60 is an all-weather multi viscosity oil good for all weather, but best for warmer to hot weather. The oil additive helps



to prevent damage to the engine if the aircraft sits for long periods of time.

Spark plugs can be traditional massive electrode variety or fine wire plugs. "Massives" are prone to foul if you idle for too long or idle at a too low RPM and "fine wires" are very resistant to fouling and more reliable. If your spark plugs are fouled (running rough especially on one magneto), you can clean them via this page.

Engine Analyzer

The engine analyzer provides a live visual representation, under the hood, inside the Accu-Sim Lycoming O-540-A engine.

Electric System

This is a live visual representation of the electrical system.

WALKAROUND

This page allows you to navigate around your airplane, inspecting various areas. You can click on the circle to go directly to that area or use the arrows to go to the next or previous station.

FREQUENTLY ASKED QUESTIONS

Why's there no sound at startup?

When you load the Comanche, various elements of Accu-Sim are initialised in sequence. The sounds will fade in towards the end of this process, after around ten seconds.

Why can't I change the fuel quantity in the default weight and balance menu?

Accu-Sim includes an external simulation of the Lycoming O-540 engine and its fuel system, including removable tip tanks. For the reason, the default fuel system isn't supported, and you must use the fuel/payload page of the tablet to add or remove fuel, passengers, and baggage.

Why aren't my cockpit control positions remembered?

By default, the "cockpit persistence" option on the controls page of the tablet is switched off. With this option disabled, the plane will always be configured for take-off if you load on the runway, and it will be cold and dark if you load at a parking spot. If you prefer all system and cockpit controls to remain exactly as you left them, please enable the "cockpit persistence" option.

Why isn't the engine running when I load on the runway?

See the question above. If you've switched on "cockpit persistence" the engine's state will be as you left it during your previous sim session. The engine may also stop after loading if your mixture control is set to idle cutoff or if the spark plugs are heavily fouled. Or if it's damaged, in which case you can fix it via the tablet.

The parking brake doesn't seem to work.

If the "realistic parking brake" option is enabled on the controls page of the tablet, you'll have to depress the toe brakes before you can pull the parking brake "T" handle. (In the real aircraft, a safety lock is incorporated into the system to physically prevent you from pulling out this handle until pressure is applied by use of the toe brakes.)

Where are the checklists?

For a more realistic and immersive experience, we've presented the checklists in the virtual cockpit on the flight info page of the tablet.

I can't start the engine.

You will need to make sure the throttle is opened slightly before engaging the starter. Depending on conditions, instead of using the primer, you can pump the throttle when starting. More guidance on engine starting is provided in the pilot's operating handbook.

Help, I'm gradually losing power in flight!

If you experience a gradual loss of power in flight, the first thing to do is to apply full carb heat and leave it there for a while. Remember that carb icing isn't like structural icing: warm air will drop in temperature as fuel evaporates into the carburettor, and if this air contains moisture, this can freeze inside the venturi, and start choking the engine. The engine analyser in the tablet will show you the carburettor air temperature (CAT) and if ice is present.

Something in the cockpit isn't working.

The Comanche includes functional circuit breakers (CBs) which are located on the underside of the instrument panel, along with a couple next to the primer. If any of the electrical systems in the cockpit aren't working as expected when battery power is applied, check the associated CB. Because they're a little hard to see in the virtual cockpit we also show the status of the CBs on the electrical page of the tablet.

The individual radios have their own power switches, so don't forget to check those too.

I can't press the IDENT button on the transponder.

The left click-and-grab action here is reserved to rotate this button to dim the light; a right click presses it to ident.

Why don't the GTN 750 or GTN 750Xi GPS units power up?

These options are to support the third-party PMS GTN 750 and TDS GTN 750Xi simulations which must be installed in MSFS before you can use them in the Comanche.

The gear indicator lamps don't seem to be working.

One design 'feature' of the Comanche is that the gear indicator lamps are dimmed greatly when the nav lights are switched on. This is because the 1950s assumption was that you'd only want the nav lights on at night, so dimming the indicator lamps would prevent distracting glare in the darkened cockpit. Trouble is, it makes them hard to see if you use the nav lights in daytime.

What's the "A2A Accusim Service" which runs when the Comanche is loaded?

Accu-Sim uses a completely external sound engine, and this small application will run in the background to enable these sound effects. Normally you won't have to do anything with this app, but you can use it to manually change the Accu-Sim playback device if desired. Please don't close it though, or the Accu-Sim sounds will stop playing.

Why doesn't the MSFS headphone simulation work?

Because of the external sound engine mentioned above, the default MSFS headphone simulation isn't supported. However, don't worry as Accu-Sim includes its own active noise reduction headphone simulation which can be enabled via click the headphone jack in the cockpit. Active noise cancelling mode is toggled by clicking the button on the headphone cable.

How do I control the spotlight on the ceiling?

The Type C-4A cockpit light has quite a few functions. Bulb dimming is adjusted with the rotating bezel at the rear of the lamp body which is a bit tricky to 'grab' in the simulator. Therefore, we've created an additional click spot for this action using the lamp bracket.

The left click-and-drag action on the lamp body controls its direction and a right click switches between white and red filter modes (again, the small switch on the far side of the lamp is tricky to reach directly in the sim). The front rotating bezel adjust the light beam angle from narrow to wide.

Alternatively, you can use the controls page of the pilot's tablet to adjust these functions.

How do I remove the pilot from the plane?

Open the cabin door and click the black non-slip walkway on the wing.

But I can't open the door!

It's a two-part process: first unlock the latch at the top of the door by rotating it forward, and then use the handle below the window. Bear in mind that if the engine is running, the prop wash will push the door closed.

Help, there's a red message on the tablet "Initialisation Failure" and nothing works!

This message usually indicates the SimConnect connection to Accu-Sim was lost on loading. This should happen very rarely but reloading the aircraft many times may be one cause. If you do see this message, please try reloading the flight. If this doesn't work, please exit and relaunch Microsoft Flight Simulator itself.

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MICROSOFT & ASOBO STUDIO
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AND FINALLY, "29P"
A2A test bed and the true star of the show

Piper Comanche "29P" (oil on board) by Michał Puto

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