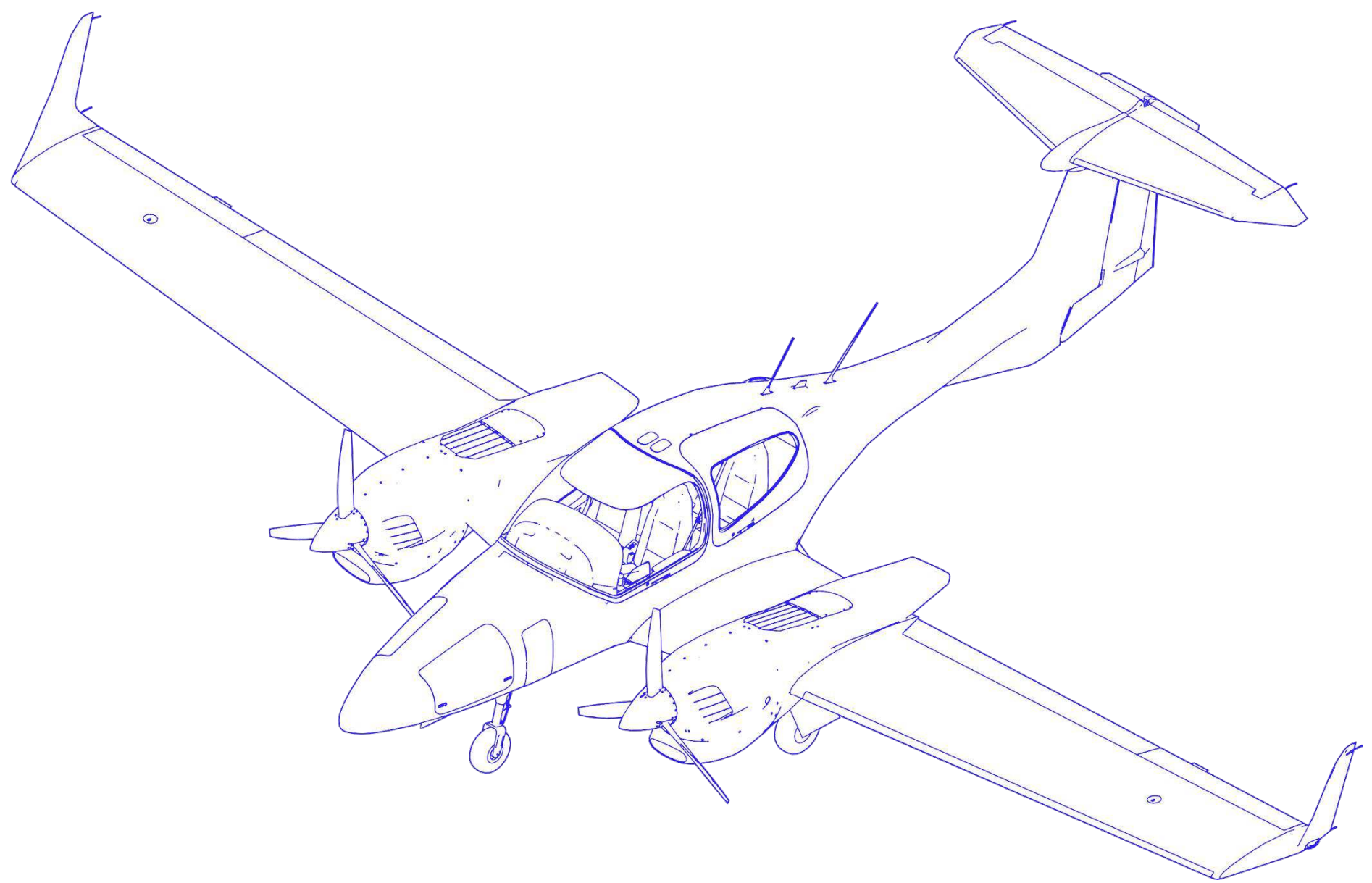


Pilot's Operating Handbook



DA42 Series

COWS	UPDATED: 07/05/2024	
	© 2024. ALL RIGHTS RESERVED.	
	MADE WITH LOVE AND PASSION	
Creator of Worlds - COWS Bespoke Aircraft for Microsoft Flight Simulator & X-Plane From Australia Austria United Kingdom United States	DA42 Series for MSFS Includes DA42-VI & -TDI Version: 1.1.0	YouTube Instagram cows.studio

Introduction

Welcome to the pasture! On behalf of COWS, we'd like to thank you for purchasing our DA42 Series. Your new DA42 has been designed meticulously inside and out to be the most accurate replica of the real DA42. We curated this product around our mission of helping flight students with their multi-engine training.

That means you can feel, hear, and see our differences while practicing critical procedure flows and manoeuvres. We desire that you will find flying it, either for training or leisure, a pleasant and valuable experience.

This COWS manual has been prepared as a guide to help you get the most out of your airplane. It contains instructions, features, and tips on operating the airplane within the simulator. This manual will reference and link Diamond's Official DA42 Operating Manuals to ensure proper procedures.

If you have any questions, requests, or suggestions, please reach out to us via our most active discussion platform: <https://discord.gg/GRRmWfjqr2>

Table of Contents

I	Enabling & Disabling Features	
II	Clickspots & Accessibility	
III	Important Speeds and Operating Limitation	
IV	Flight Planning Tips	
V	Useful Links & Product Information	

Section I

Enabling & Disabling Features

This section contains information on the operation of failures, aircraft state-saving, and engine-damage features of the DA42.

Failures

The COWS DA42 has over 190 custom failures that can also be state-saved. These failures, however, cannot be individually nor categorically controlled (e.g powerplant, electrical, hydraulic). There are 4 modes for controlling failures:

- Off
- Normal (5% Chance of an item failing per hour)
- High (100% Chance of an item failing per hour)
- Chaos (1 failure per 30 seconds)

To enable and select failure settings:

1. Navigate to the Engine Indicating System page (EIS)
2. Click on the “Menu” button on the right side of the MFD
3. Use the outer FMS knob on the bottom right corner of the MFD to scroll and select “Failures Mode”
4. Press the “Ent” button to enable failure mode
5. When done correctly, the menu should disappear and the system will cycle through the failure modes from Off -> Normal -> High -> Chaos
6. Repeat steps 2-4 until the desired mode is indicated on the menu page

To mitigate failures, we recommend familiarizing the abnormal and emergency procedures in sections 3 & 4 of the DA42 Airplane Flight Manual.

If the failure is absent from the flight manual, use aeronautical decision-making (DECIDE model) to mitigate the situation. (https://www.faa.gov/sites/faa.gov/files/04_phak_ch2.pdf)

State-Saving

The COWS DA42 has custom state-saving capabilities to restore the airplane to its prior configuration. The aircraft should restore all switch and button positions from the prior flight except:

- Canopy & Door positions
- Throttle Lever positions

*It’s also important to remember, Do NOT leave the fuel lever on cutoff after a flight. This is a real-world procedure to prevent the damage of fuel pumps running dry.

To enable and disable State-Saving:

1. Navigate to the Engine Indicating System page (EIS)
2. Click on the “Menu” button on the right side of the MFD
3. Use the outer FMS knob on the bottom right corner of the MFD to scroll and select “State Saving”
4. Press the “Ent” button to toggle modes
5. When done correctly, the menu should disappear and the system will toggle State-Saving

Engine Damage

The COWS DA42 has a custom engine damage model that will progressively deprecate engine performance when the user operates the powerplant wth improper procedures.

To enable Engine Damage:

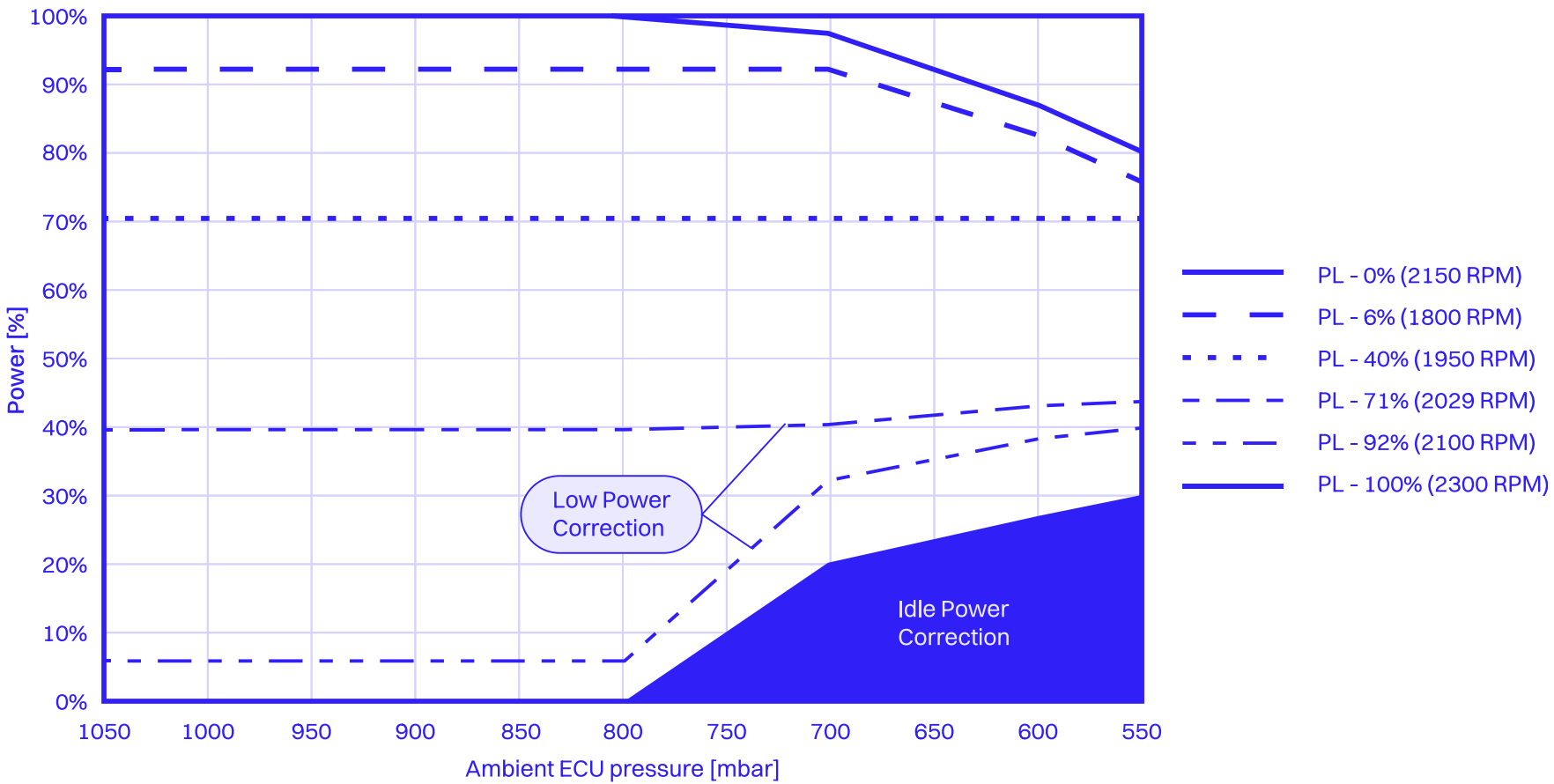
1. Navigate to the Engine Indicating System page (EIS)
2. Click on the “Menu” button on the right side of the MFD
3. Use the outer FMS knob on the bottom right corner of the MFD to scroll and select “Engine Damage”
4. Press the “Ent” button to toggle modes
5. When done correctly, the menu should disappear and the system will toggle Engine Damage

Common errors of inducing engine damage include but not limited to:

- Using 100% Load on climb-out/cruise (Use 90-92% after takeoff)
- Moving the engine throttle lever too fast
- Operating the engine in abnormal temperatures and conditions

Note: At high-altitude airports, the DA42 will run at a higher idle setting than usual due to the Low Power Correction Technique. This behavior is normal and reflects real-world engine behaviors.

Engine Performance depending on Ambient ECU Pressure and Power Level (PL) Position



Section II

Clickspots & Accessibility

This section contains information on the operation of clickspots, tips, and operable features of the COWS DA42.

ECUs

During the routine ECU test, pilots usually use both their fingers to hold the ECU buttons together. The click spot for the shortcut is located between the two ECU test buttons on the left-most panel.

To test the routine operation of ECUs:

1. Ensure gearbox temperature is in the green range (If absent, run the engine idle for at least 2 minutes for the engine to warm up as per real-world checklist)
2. Ensure both ECU switches are in “AUTO” position
3. Hold the mouse in between the two black ECU push switches until “ECU FAIL” annunciations disappear on the PFD.
4. The engine should cycle through a rise in RPM followed by a drop in RPM 2 times throughout the ECU test

Note: ECU will not cycle until temperature and conditions are met.

Windows & Doors

The COWS DA42 has various operable doors throughout the model:

- The left front red handle within the cockpit operates the front canopy
- The left rear red handle within the cockpit operates the rear door
- The left & right storm window notch operate their respective window

The COWS DA42 has the following inoperable doors:

- The FWD baggage doors
- The gearbox oil access panel
- The fuel cap

Headset Simulation

The COWS DA42 has implemented and referenced real sound recordings from the Bose A20 to mimic its ANC (Active Noise Cancellation) feature.

To enable headset simulation, locate the GA plug jacks found on the rearward side of the middle console. The click spot is the jack itself.

Ignition Key

The COWS DA42 has implemented a large area ignition key rotation click spot for ease of use.

At times, the key may be hard to turn in one direction or the other. To ease rotation, move the camera towards the desired side of rotation and click-hold the key.

Flood Light

The COWS DA42 has implemented an easier click spot for the FWD cabin flood light.

The click spot is located on the standby airspeed indicator needle. Clicking it requires the battery to be on. The alternative method of enabling flood light is on the floodlight panel itself, on the roof between the pilot seats.

Control Sensitivities

The COWS DA42 flight model reacts appropriately across various control sensitivity settings. However, it is recommended that the user has flight control peripherals tuned to the right sensitivity options in the simulator

We recommend only adjusting one setting, REACTIVITY:

- Less than or equal to 30% across all control surfaces

Section III

Important Speeds and Operating Limitations

This section contains information on critical airspeeds and limits of the DA42.

VSPEEDS

DA42-VI

It's important to note specific airspeeds for takeoff, landing, cruise, and stall conditions.

DA42-VI (Section 2 & Section 5 of AFM):

- Vr - Takeoff Rotation Speed:

76 KIAS
- Vyse - Single Engine Climb Speed:

85 KIAS
- Vy - Best Rate of Climb:

92 KIAS
- Vref - Approach Speed:

84 KIAS
- Vo - Maneuvering Speed:

112-122 KIAS

	Airspeed		KIAS	Remarks
VO	Operating manoeuvring speed	Above 1800 kg (3968 lb)	122 KIAS	Do not make full or abrupt control surface movement above this speed.
		Above 1700 kg (3748 lb) to 1800 kg (3968 lb)	119 KIAS	
		Up to 1700 kg (3748 lb)	112 KIAS	
VFE	Max. flaps extended speed	LDG	113 KIAS	Do not exceed these speeds with the given flap setting.
		APP	133 KIAS	
VLO	Max. landing gear operating speed	Extension VLOE	188 KIAS	Do not operate the landing gear above this speed.
		Retraction VLOR	152 KIAS	
VLE	Max. landing gear extended speed		188 KIAS	Do not exceed this speed with the landing gear extended.
VMCA	Minimum control speed airborne	APP	68 KIAS	With one engine inoperative, keep airspeed above this limit.
		UP	71 KIAS	
VNO	Max. structural cruising speed		151 KIAS	Do not exceed this speed except in smooth air, and then only with caution.
VNE	Never exceed speed in smooth air		188 KIAS	Do not exceed this speed in any operation.

VSPEEDS

DA42-TDI

It's important to note specific airspeeds for takeoff, landing, cruise, and stall conditions.

DA42-TDI (Section 2 & Section 5 of AFM):

- Vr - Takeoff Rotation Speed:

72 KIAS
- Vyse - Single Engine Climb Speed:

82 KIAS
- Vy - Best Rate of Climb:

86 KIAS
- Vref - Approach Speed:

78 KIAS
- Vo - Maneuvering Speed:

120-126 KIAS

	Airspeed		KIAS	Remarks
VA	Manoeuvring speed if MAM 42-088 or OAM 42-054 or both incorporated	Above 1542 kg (3400 lb)	126 KIAS	Do not make full or abrupt control surface movement above this speed.
		Up to 1542 kg (3400 lb)	120 KIAS	
	Neither MAM 42-088 or OAM 42-054 incorporated	Above 1468 kg (3236 lb)	124 KIAS	
		Up to 1700 kg (3748 lb)	121 KIAS	
VFE	Max. flaps extended speed	LDG	111 KIAS	Do not exceed these speeds with the given flap setting.
		APP	137 KIAS	
VLO	Max. landing gear operating speed	Extension VLOE	194 KIAS	Do not operate the landing gear above this speed.
		Retraction VLOR	156 KIAS	
VLE	Max. landing gear extended speed		194 KIAS	Do not exceed this speed with the landing gear extended.
VMA	Minimum control speed airborne		68 KIAS	With one engine inoperative, keep airspeed above this limit.

Section IV

Flight Planning Tips

This section outlines tips and tricks to make a flight plan and calculate critical distances, time, and speeds for a general aviation flight. Below are techniques derived from real-world flying.

For a more detailed outline, take a look at Mitchell’s flight instructor lesson plan here:

https://docs.google.com/document/d/1CDCsDJOtias8b9_JyCJv7D92BZfXhUOdG7PNUJpS0ug/edit?usp=share_link

Planning a Flight

To plan a cross-country flight, using tools such as Skyvector, Foreflight, or Garmin Pilot will help aid your flight planning process. Begin by first plotting the departure and arrival airport. Then find waypoints in between, whether VFR or IFR, use visual waypoints on the map, or use VORs and NAVAIDs. Waypoints should be within 20nm to ensure navigational signal integrity and basic pilotage.

After establishing waypoints, pick an altitude of over 2000ft AGL over the highest terrain or obstacle en route, then add 500ft if VFR. This will be your cruising altitude.

Top of Climb

To calculate top of climb, refer to the operating manual cruise climb performance chart to calculate rate-of-climb at your given weight. Then average that climb rate with the departure altitude and the cruising altitude. Then, divide the altitude difference (cruise altitude - departure field altitude) by the climb-rate. This will give you the resulting minutes it takes to reach top of climb.

To calculate the distance, you will need to multiply your ground speed by the time it takes to reach top of climb (in hours). To calculate groundspeed, take indicated airspeed, convert it to calibrated airspeed in AFM, then use local winds aloft to add or subtract from the calibrated airspeed.

Finally, divide the resulting calculated minutes above by 60 to convert it to hours, and multiply that by the groundspeed to determine how far out your TOC will be in NM.

Top of Descent

To calculate the top of descent, multiply the altitude difference (Cruise altitude - arrival field altitude) by 3. Move the decimal 3 places to the left and this will be the NM out that you will need to start your descent.

To calculate how fast you should descend, take your groundspeed and divide it by two, add a 0 to the end and the result is your standard FPM descent rate on a 3-degree standard glideslope

Section V

Useful Links & Product Information

This section provides users with links to useful documentation from official Diamond training checklists, to the paint kit for the aircraft if you want to get creative.

Product

Systems

- Accurate electrical system with circuit breakers and custom alternator voltage simulation
- Custom standby flight instrumentation
- Deice system with weight and functional stall heat
- Custom gear hydraulic system simulation with state saving and gravity emergency extension
- Custom lighting that warms up and responds to system voltage
- Custom Yaw damper and multiple fixes to native Asobo systems
- Engine damage, state saving, and random failures (to come later)

Sounds

- Developed from the creator of sounds for FBW A32NX, FlightFX vision jet and other projects.
- Sound simulation follows systems, e.g. hydraulic actuator
- Dynamic engine, wind, and ground roll sounds

Engine sounds differ depending of prop pitch, fuel flow, and speed

- Dynamic wind sounds, howling sounds in slips and drag noises with gear and flaps
- Sounds sourced from first-party sources, local DA42
- Headset simulation

Visual Model

- Light-baked photorealistic reflections and ray-traced shadows & lighting textures
- Faithful exterior model matched with hundreds of pictures at various angles
- Intricate Interior model featuring moderate and heavy wear
- Interior features two options of black panel/standard grey furnishings
- Subtle and photorealistic photo-overlays for incredible lifelike textures
- All placards sourced and positioned from Diamond maintenance manuals
- Exterior features realistic moderate to heavy dirt/wear, matching reference DA42
- Fibreglass scratching
- TKS leaks

Flight Model

- Accurate Performance and handling with over 1500hrs of testing from DA42 pilots, students, and instructors
- Custom flight control animations showing respective trim forces and variable elevator backstop
- Tiny bump when dropping the gear and deceleration on touchdown
- Airframe shake during ground power runs

PowerPlant

- Engine map
- Dual ECUs
- ECU test procedure
- ECU error detection and switching
- ECU runtime saving and High altitude flameout prevention
- Custom Manifold pressure, fuel injection and turbo simulation with alternate air and filter icing
- Custom water cooling with water pump and thermostat (affected by rain)
- Custom oil cooling with oil-water heat exchanger
- Custom oil pressure simulation with oil bypass valve
- Gearbox temperature simulation
- Fuel temperature simulation
- Oil and fuel starvation when flying inverted
- Custom fuel pressure simulation
- Fuel slosh and starvation when slipping with low fuel
- Reaction to engine failures and failure modes
- Propeller feathering, windmilling and piston compression physics
- De-feathering accumulator
- Glow plug controller

Other

- Slight differences of the engine parameters (temps, pressures, rpms)
- Slow and delayed engine indications
- props come off the start lock when master is turned on
- Feathering and windmilling

Paintkit

Get creative by turning your DA42 into a virtual canvas with creating custom liveries and paints through our official paint kit for the COWS DA42:

[DOWNLOAD](#)

Normal & Emergency Checklists:

The official Diamond training checklists is recommended to be used with the COWS DA42:

[DOWNLOAD](#)

END OF DOCUMENT