ROBIN DR400

OPERATIONS MANUAL

Just Flight™

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Just Flight™

ROBIN DR400

Operations Manual

Please note that X-Plane 12 must be correctly installed on your
PC prior to the installation and use of this Robin DR400 simulation.

CONTENTS

INTRODUCTION

The DR400 is a wooden monoplane, first flown in 1972 and still in production in France as the latest DR401. This four-seat, piston-engine aircraft is equipped with fixed tricycle landing gear, a 180 HP four-cylinder engine and a large forward-sliding canopy.

The aircraft's distinctive cranked wing design and sliding canopy give it a unique appearance among GA aircraft and enable excellent cruise performance. It is fitted with an auxiliary fuel tank for a total capacity of 240 litres, providing great range.

The DR400's excellent visibility, payload capabilities and 130-knot cruise speed make it an ideal aircraft for touring and flight training.

This Just Flight simulation is based on G-BEUP, a DR400/180 based at Goodwood Aerodrome with SportAir.

Aircraft specifications

Dimensions

Length	7.1 m (23' 4")
Wingspan	8.7 m (28' 7")
Height (to top of tail)	2.2 m (7' 4")
Wing area	14.2 m2 (153 ft^2)

Engine

Type	Lycoming O-360 four-cylinder, horizontally opposed, air-cooled piston
Power	180 HP at 2,700 RPM
Propeller	Two-blade, fixed-pitch

Weights

Empty weight	1,367 lb (620 kg)
Maximum take-off weight	2,425 lb (1,100 kg)
Maximum landing weight	2,304 lb (1,045 kg)
Maximum baggage weight	132 lb (60 kg)
Maximum useful load	1,058 lb (479 kg)

Fuel and oil

Fuel capacity	63 US gallons (240 litres) with auxiliary tank full
Oil capacity	8 US quarts

Performance

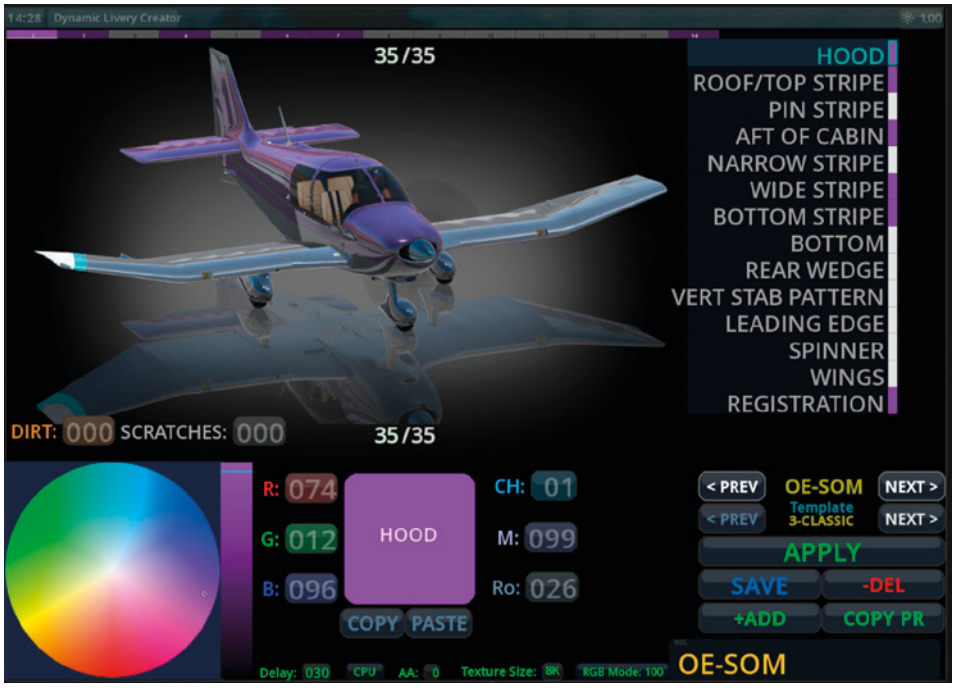
VNE (never exceed speed)	166 KIAS
VNO (max. cruising speed)	140 KIAS
VA (manoeuvring speed)	116 KIAS
VFE (max. flap speeds)	92 KIAS
VSO (stall speed)	51 KIAS (landing configuration)
Service ceiling	15,500 ft
Range (max. payload)	685 nautical miles

Paint schemes

The DR400 is supplied in the following six paint schemes:

- D-EDHG (Germany)
- EC-KFG (Spain)
- F-GUXR (France)
- G-BTRU (UK)
- HB-KHV (Switzerland)
- ZK-TZB (New Zealand)

The DR400 also comes with Thranda's innovative Dynamic Livery system, allowing you to create and save your own custom liveries from the EFB.



INSTALLATION, UPDATES AND SUPPORT

You can install this DR400 software as often as you like on the same computer system:

1. Log in to your Account on the Just Flight website.
2. Select the 'Your Orders' button.
3. A list of your purchases will appear and you can then download the software you require.

Installing the aircraft

To install the aircraft in X-Plane 12:

1. Download the Robin DR400 from your Just Flight Account.
2. Unzip the downloaded .zip file. The resulting folder will be named 'JF12_Robin_DR400'.
3. Copy the 'JF12_Robin_DR400' folder into the 'X-Plane 12/Aircraft' folder.

Accessing the aircraft

To access the aircraft in X-Plane 12:

1. From the Main Menu, click 'New Flight' or go to the Flight Configuration window.
2. Click on the 'Robin_DR400' in the aircraft selection screen.
3. Click 'Customize' and choose a livery from the drop-down menu in the top right.
4. Click 'Start Flight'.

Uninstalling

To uninstall this software from your system:

1. Go to your X-Plane 12 folder.
2. Open the 'Aircraft' folder.
3. Delete the 'JF_Robin_DR400' folder.

Recommended X-Plane settings

Joystick/yoke

For maximum enjoyment of this aircraft in X-Plane we recommend setting your joystick 'Stability Augmentation' sliders to 0. This will help prevent control issues, such as running out of pitch trim, and results in more realistic flight behaviour.

To turn off Stability Augmentation, follow these steps:

1. Launch X-Plane and go to the ‘Settings’ window.
2. Go to the ‘Joystick’ tab.
3. Click on the ‘Control Sensitivity’ button along the bottom of the window.
4. Set all three of the ‘Stability Augmentation’ sliders to 0% to disable them.
5. The Control Response sliders can be set as desired.
6. Press ‘Done’.

Updates and Technical Support

For technical support (in English) please visit the Support pages on the Just Flight website.

As a Just Flight customer, you can get free technical support for any Just Flight product.

If an update becomes available for this aircraft, we will post details on the Support page and we will also send a notification email about the update to all buyers who are currently subscribed to our Newsletter and emails.

Regular News

To get all the latest news about Just Flight products, special offers and projects in development, subscribe to our regular emails.

We can assure you that none of your details will ever be sold or passed on to any third party and you can, of course, unsubscribe from this service at any time.

You can also keep up to date with Just Flight via Facebook and X.

SYSTEMS GUIDE

Airframe

The DR400 is a low-wing, single-engine aircraft with fixed landing gear, built using a semi-monocoque wood and fabric design. It has seating for four occupants, a 132 lb luggage compartment and a 180 HP engine. It is fitted with a sliding canopy.

The distinctive cranked wing is constructed from three parts with a 14-degree dihedral on the outer section leading to a five-degree washout on the wing tips. The design provides the DR400 with excellent cruise capability and low-speed performance.

The three-position metal wing flaps are mechanically controlled by a handle located between the front seats.

Each wing contains one fuel tank.

The tail features a large rudder surface and stabilator with metal-covered anti-balance tabs which provide pitch trim control.

Fuel system

This DR400 is fitted with four fuel tanks: LEFT, RIGHT, MAIN (rear) and RESERVE (supplementary/auxiliary).

The MAIN tank is the largest (110 litres) and the LEFT and RIGHT wing tanks each have a capacity of 40 litres. The RESERVE tank (with a capacity of 50 litres) feeds in to refill the MAIN tank whenever the RESERVE FUEL PULL knob on the centre console is pulled out.

The fuel tank selector is located on the centre console and a fuel quantity gauge for each fuel tank is located on the right instrument panel. All quantities are given in litres.

An auxiliary electric fuel pump is provided in case the engine-driven pump fails. The electric pump should be ON for all take-offs and landings and when switching tanks. The fuel pump switch-breaker is located on the right lower instrument panel.

Electrical system

The electrical system includes a 14-volt, 60-ampere alternator, voltage regulator, over-voltage relay, battery contactor and a 12-volt, 25-ampere-hour battery.

Electrical switches are located on the lower part of the instrument panel. They use the ‘switch-breaker’ design, consisting of a red button and circuit breaker for each circuit. The circuit breaker has to be pushed IN to switch on the associated system and the red button is used to pop OUT the breaker, switching off the associated system.

Standard circuit breakers of the push-to-reset type are located on the right instrument panel and are marked according to their function and amperage.

The master switch and alternator controls are on the left lower instrument panel.

Electrical accessories include a starter, electric fuel pump, audible stall warning, fuel gauges, ammeter, low voltage warning light, heated pitot head and communication and navigation equipment.

The ammeter is mounted on the right instrument panel.

Vacuum system

The vacuum system is designed to operate the air-driven gyro instruments, including the directional and attitude gyros. The system consists of an engine-driven vacuum pump, regulator and filter.

A vacuum gauge mounted on the left instrument panel provides a pilot check for the system during operation. A decrease in pressure, or zero pressure, over an extended period may indicate a problem with the vacuum system.

A vacuum regulator is provided in the system to protect the gyros. The valve is set so the normal vacuum reads 4.8-5.2 inches of mercury, a setting which provides sufficient vacuum to operate all the gyros at their rated RPM.

Pitot-static system

The pitot-static system supplies pressure to operate the airspeed indicator, the altimeter and the vertical speed indicator. Pitot pressure is picked up by a pitot head on the bottom of the left wing and static pressure is picked up by the pads on both sides of the aft fuselage.

A heated pitot head alleviates problems with icing and heavy rain. The switch-breaker for the heated pitot head is located on the right lower instrument panel.

Lighting system

Lights fitted to the aircraft include navigation, rotating beacon, landing and instrument panel lights.

The control switches for the navigation and rotating beacon lights are on the lower left instrument panel and the switches for the left and right landing lights are on the lower right instrument panel.

There is a DAY/NIGHT lighting selector and instrument lighting switch on the left instrument panel. The instrument lighting switch is spring-loaded and controls the intensity of the cockpit night lighting.

Instrument markings

Airspeed indicator markings

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
White arc	51-92	Full flap operating range. Lower limit is maximum weight VSO in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green arc	56-140	Normal operating range. Lower limit is maximum weight VS1 with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow arc	140-166	Operations must be conducted with caution and only in smooth air.
Red line	166	Maximum speed for all operations.

Engine indicator markings

INSTRUMENT	Red line or arc Minimum limit	Yellow arc Caution range	Green arc Normal operating	Red line Maximum limit
Tachometer	2,150-2,350 RPM	—	2,350-2,700 RPM	2,700 RPM
Oil temperature	—	—	140-245°F	245°F
Fuel pressure	—	—	1.1-5 PSI	—
Oil pressure	1.7 bar	1.7-3.8 bar	3.8-6.5 bar	7.9 bar

Limits

Weight limits

Maximum weight: 2,425 lb (1,100 kg)

Maximum weight in baggage compartment: 132 lb (60 kg)

Manoeuvre limits

This aircraft is certified in the Normal and Utility categories:

- Normal category – all aerobatic manoeuvres including spins prohibited
- Utility category – approved manoeuvres for Utility category only

Within the limits of these categories, the following manoeuvres are authorised:

- Steep turns, lazy eights, chandelles in which the angle of bank is more than 60°
- Stalls (except whip stalls)

These manoeuvres must be carried out within these conditions:

- Rear seats must be unoccupied
- Entry and exit speeds must be within the normal operating range
- Recommended entry speed: 116kt

Flight load factor limits

Positive load factor (maximum) +3.8 G

Negative load factor (maximum) -1.9 G

Types of operation

The aircraft is approved for the following operations:

- Day VFR
- Night VFR
- Day IFR
- Night IFR
- Non-icing

Fuel limitations

Total capacity	63.4 US gallons (240 litres) with auxiliary tank full
Unusable fuel	0.3 US gallons (1 litre)
Usable fuel	63.1 US gallons (239 litres)

Landing gear

The DR400 is equipped with fixed landing gear fitted with fairings.

The nose gear is steerable through a 30-degree arc each side of centre by use of the rudder pedals and toe brakes.

The brake system includes toe brakes on the left and right set of rudder pedals and a parking brake lever on the centre console. The parking brake is engaged by pulling the lever out. To release the parking brake, push the lever back in.

Canopy and baggage door

The aircraft is fitted with a sliding canopy and a separate door on the port side for accessing the baggage compartment.

The canopy can be operated from within the virtual cockpit by left-clicking on the overhead canopy handle.

The canopy and baggage door can also both be operated by clicking on their icons in the Side Menu.

Flight controls

Dual flight controls are standard equipment on the DR400. The flight controls actuate the primary control surfaces through a cable system and the controls are balanced for light operating forces.

The horizontal surface of the tail is a stabiliser with anti-balance tabs. A trim control wheel on the centre console operates the longitudinal trim function of the elevator. Rotation of the wheel forward gives nose-down trim and rotation aft gives nose-up trim. A trim position indicator is mounted forward of the trim control wheel.

The rudder is conventional in design and operation.

The wing flaps are manually operated by the flap control lever between the seats. The flaps can be set in three positions: fully retracted, take-off (15˚) and landing (60˚).

When the flap setting is changed, there is an associated pitch change in the aircraft. This pitch change can be corrected either by elevator trim or by increased control stick force.

Engine

The DR400 is powered by a four-cylinder, horizontally opposed Lycoming O-360 engine rated at 180 HP at 2,700 RPM. It is equipped with a starter, 60-ampere 14-volt alternator, two magnetos, vacuum pump drive and fuel pump. The aircraft is equipped with a fixed-pitch propeller.

Engine controls

The engine controls consist of dual throttle controls and a mixture control lever. There is one throttle control lever on each side of the instrument panel and the mixture control lever is located on the centre console, where it is accessible to both pilots.

The throttle lever is used to adjust the engine RPM. The mixture control lever is used to adjust the air-to-fuel ratio. The engine is shut down by placing the mixture control lever in the fully lean (out) position.

The carburettor heat control lever is in the centre of the lower instrument panel.

Engine instruments

Indicators enable the pilot to check oil pressure, oil temperature and RPM. The engine instruments are located on the right instrument panel.

Ignition and starter system

Engine ignition is provided by a dual magneto on two spark plugs per cylinder. The magneto selector and starter button are located on the left lower instrument panel. A caution light (STR ENG) indicates when the starter is engaged.

Stall warning system

An approaching stall is indicated by an audible alarm located behind the instrument panel. The indicator activates at between 5-10 knots above stall speed.

PANEL GUIDE

The instrument panel is designed to accommodate instruments and avionics equipment for VFR and IFR flight.

Radio equipment is mounted in the centre instrument panel and the flight instruments are mounted on the left. Engine instruments and fuel quantity indicators are clustered on the right instrument panel, including a tachometer, ammeter, oil temperature gauge and an oil pressure gauge. An aircraft hour meter is built into the tachometer.

Warning and caution lights as well as switch and circuit breakers are located on the lower instrument panel along with the heater controls. There are fresh air vents in the left and right corners of the instrument panel.

Instruments include a compass, airspeed indicator, primary and standby altimeters and ADF and VOR indicators. The magnetic compass is mounted on the top of the glareshield and the outside air temperature gauge is mounted to the sliding canopy.

A suction gauge is mounted on the left instrument panel and an attitude gyro, directional gyro, vertical speed indicator and turn coordinator in the flight instrument group. The gyros are vacuum-operated through the vacuum system and the turn coordinator is electric.

A baggage area behind the rear seats is accessible from the cabin as well as via a dedicated door. When baggage is loaded, it is the pilot's responsibility to ensure that the aircraft's centre of gravity falls within the allowable CG range.

EFB 2D pop-out

The EFB 2D pop-out arrow appears in the top left corner of the screen every time you load the DR400.

Left-click on this arrow to open the 2D EFB pop-out.

This icon can easily be faded out and hidden completely by hovering your mouse over it and moving the scroll wheel. It will re-appear for the next flight.

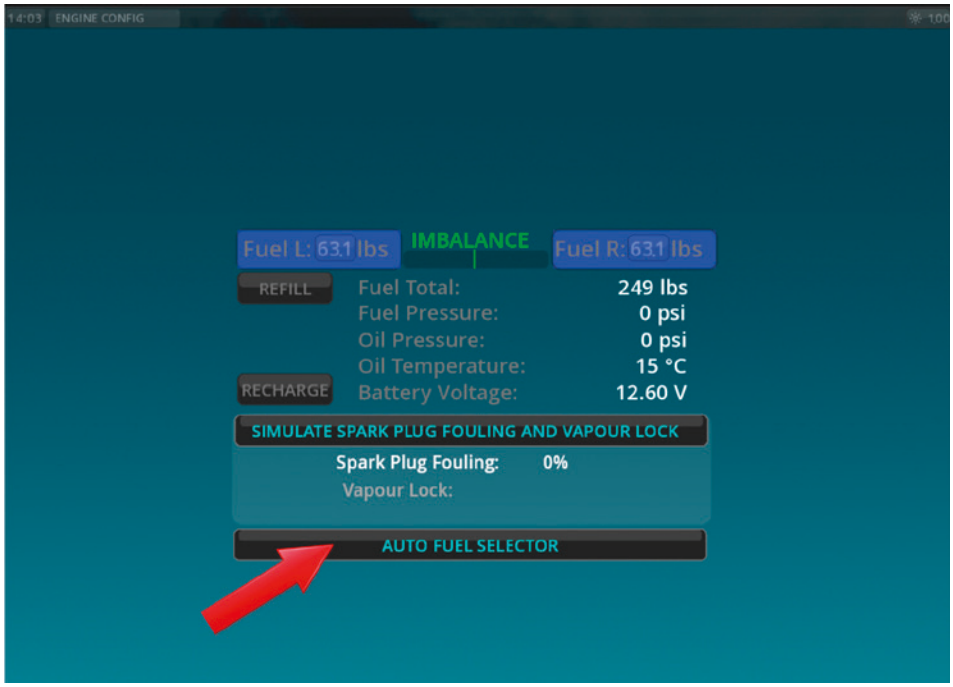
Please see the dedicated EFB manual for further details of EFB operation.

Automatic fuel selector

The DR400 is capable of flying for several hours so we have included an automatic fuel selector switcher, allowing you to leave your PC for prolonged periods without risking a fuel imbalance.

This system will only function when either the left or right wing tank is selected and will automatically swap to the other wing tank every 20 minutes. The automatic fuel selector does not take effect when the centre main tank is selected.

The automatic fuel selector can be enabled/disabled using the AUTO FUEL SELECTOR option in the EFB's Engine Config app (see the dedicated EFB manual).



Left main panel

1. Airspeed indicator (ASI)
2. Attitude indicator (AI) – a pitch reference knob allows the position of the pitch bars (aircraft symbol) to be adjusted nose-up or nose-down.
3. Altimeter – a barometric pressure scale is provided for hPa/mb. The unit of measurement can be changed between hPa/mb and inHg via the Side Menu.
4. VOR 1 indicator – driven by GNS 430.
5. GPS caution lights – GPS WPT will illuminate when the ETE to the next GPS waypoint is less than 60 seconds and GPS MSG will illuminate when there is a new message to read on the GNS 430.
6. Vacuum gauge
7. Turn and bank indicator – the two knobs would have been used to control the ‘stabilisator’, a basic autopilot system. That system is inoperative in this simulation and is replaced by the more capable S-TEC 55 autopilot.
8. Direction indicator – caging knob (bottom left) controls rotation of the compass card. HDG knob (bottom right) controls the heading bug.
9. Vertical speed indicator (VSI)
10. NAV-122 VOR 2 indicator – a self-contained VOR/LOC/GS indicator and NAV 2 radio. The FREQ knob is used to select a NAV 2 frequency. The indicator is also fitted with three marker lights.
11. Throttle levers
12. Instrument lighting switch
13. ADF indicator
14. KR85 ADF receiver

Left lower panel

1. Navigation lights switch-breaker
2. Rotating beacon switch-breaker
3. Caution and warning lights
4. Day/night lighting selector switch
5. Magneto selector
6. Engine starter button
7. Engine starter warning light – illuminates whenever the engine starter is engaged.
8. Master switch
9. Alternator switch-breaker
10. Mixture lever
11. Heating controls

Centre panel

1. GMA 340 audio selector
2. GNS 430 GPS / COM 1 / NAV 1 radio (or RealityXP GTN if installed)
3. KY 97 COM 2 radio
4. KN 64 DME receiver
5. GTX 330 transponder
6. S-TEC 55 autopilot

Centre panel with GTN 750

The DR400 offers compatibility with the TDS GTNXi and Reality XP GTN 750; these units will be swapped out for the GTN 750 touchscreen when either plugin is enabled.

1. GTN750 touchscreen

Right main panel

1. Tachometer (RPM)
2. Standby altimeter
3. Engine instruments – ammeter, oil temperature, oil pressure and fuel quantity indicators.
4. Push-to-talk button – opens ATC menu.

Right lower panel

1. Carburettor heat control lever
2. Electric fuel pump switch
3. Stabilisator switch-breaker – controls power to the S-TEC 55 autopilot.
4. Pitot heat switch-breaker
5. Landing light switch-breakers
6. Circuit breakers

Centre console

1. Elevator trim position indicator
2. Low voltage warning light
3. Reserve fuel tank lever – pull lever to transfer fuel from reserve to main/rear tank.
4. Parking brake lever
5. Fuel tank selector
6. Elevator trim wheel – rotating the wheel forward gives nose-down trim and rotation aft gives nose-up trim.
7. Flap lever

Upper cockpit

1. Canopy latch
2. Outside air temperature gauge
3. Whiskey compass

GMA 340 – audio selector

1. Left knob
   - Large – in the real aircraft this knob is used to control the squelch level. As this functionality is not possible within X-Plane, this knob is non-functional.
   - Small – this knob is used to switch on/off power to the GMA 340 unit.
2. AOM lights – these marker beacon lights will illuminate when the aircraft passes over Airway/Inner, Outer or Middle marker beacons.
3. MKR MUTE – this button is used to toggle the mute function for the marker beacon audio. If a valid marker beacon signal is being received by the unit but you wish to mute the audio, press this button and confirm that the green LED illuminates. Press the button once more to un-mute the sound.
4. SENS – this button is used to select either high or low marker beacon sensitivity. The HI and LO LEDs above the SENS button indicate which sensitivity level has been selected. Low sensitivity is used on ILS approaches and high sensitivity used when operating over airway markers.
5. COM 1/2/3 – these buttons are used to select COM 1, 2 and 3 transceiver audio sources. LEDs on the buttons indicate which sources are selected.
6. COM 1/2/3 MIC – these buttons are used to select COM 1, 2 or 3 MIC, allowing you to transmit on the selected COM frequencies. LEDs on the buttons indicate which are selected. The corresponding transceiver audio will be automatically selected when COM 1, 2 or 3 MIC are selected.

   Note: *The X-Plane ATC system does not provide for the facility of a COM 3 radio, so although the COM 3 controls are functional they will not have any impact on ATC operations.*
7. NAV 1 / NAV 2 – these buttons are used to toggle the NAV 1 and NAV 2 audio sources. LEDs on the buttons indicate which sources are selected.
8. DME – this button is used to toggle the DME audio source. DME audio is selected if the LED is illuminated.
9. ADF – this button is used to toggle the ADF audio source. ADF audio is selected if the LED is illuminated.
10. COM 1/2 – this button is used to toggle the Split Com function, which when enabled will automatically select the COM 1 MIC and COM 2 MIC. Pressing the button a second time will disable the function. Split Com is enabled if the LED is illuminated.
11. SPKR / PA / PILOT / CREW – these buttons are used to toggle cabin audio functions. LED lights will illuminate on each switch when they are selected.
12. TEST – pressing this button with the unit switched on will activate the test mode. All LEDs and the AOM lights on the unit should illuminate for several seconds before extinguishing.
13. Right knob – this knob is used to control the volume and squelch levels for the co-pilot.

The GMA 340 is an audio control system which provides control over transceiver and receiver outputs through the use of selector switches. The simulator doesn't allow for separate speaker and headphone outputs so both buttons perform the same function.

The COM 1 and COM 2 buttons are used to toggle the COM 1 and COM 2 transceiver audio, allowing you to select COM 1 and/or COM 2 as the audio source(s) to monitor.

The NAV, DME, MKR and ADF buttons are used to toggle the associated audio sources.

The microphone selector buttons connect the microphone to the selected output.

GNS 430 – COM 1 / NAV 1 / GPS

1. Power and COM volume knob
2. VLOC volume knob
3. Left outer and inner knobs
4. COM frequency transfer button
5. VLOC frequency transfer button
6. CDI button
7. OBS button
8. MSG button
9. Flight plan (FPL) button
10. Procedures (PROC) button
11. Range buttons
12. Direct-to button
13. Menu button
14. Clear button
15. Enter button
16. Right outer and inner knobs

Rotate the power knob to switch on the GNS 430 unit.

Rotate the left outer knob to change the frequency in 1MHz increments and rotate the left inner knob to change the values in 25kHz increments. Toggle between changing the COM and VLOC (NAV) standby frequency by pressing the centre of the left inner knob.

Swap the COM active and standby frequencies by pressing the COM frequency transfer button. Swap the VLOC (NAV) active and standby frequencies by pressing the VLOC frequency transfer button.

Detailed instructions can be found in your ‘X-Plane 12/Instructions/X-Plane G430 Manual.pdf’.

KY 97 – COM 2 radio

The KY 97 is a basic COM 2 radio. The standby COM 2 frequency can be altered using the right knob. The active COM 2 frequency is shown on the left of the display and the standby COM 2 frequency is shown on the right.

1. Flip-flop – this button is used to transfer the COM 2 standby frequency into the COM 2 active frequency slot.
2. CHAN – non-functional
3. Power knob – controls power to the radio.
4. Right knob – the right knob can be used to alter the standby COM 2 frequency. The outer knob increases/decreases the whole numbers and the inner knob increases/decreases the fractions.

KN 64 – DME

1. Three-position function switch – determines the information that is displayed and the channelling source.

   On the Frequency (FREQ) setting, the unit can be channelled internally.

   On the Groundspeed/Time-to-Station (GS/T) setting, the unit holds the internally selected frequency and also displays distance, groundspeed and time-to-station information.

   On the Remote (RMT) setting, the DME is channelled when you select your NAV frequency on the NAV 1 receiver (GNS 430) and displays distance, groundspeed and time-to-station.

2. ON/OFF switch – controls power to the unit.

   The KN 64 should be powered on only after engine start-up and should be turned off prior to engine shutdown.

3. Frequency selector knobs – used to alter the internally selected frequency.

   With the inner knob pushed in, it changes the 0.1MHz digit (0.0, 0.1, 0.2 etc.). With the inner knob pulled out, it adds 0.05MHz to the frequency and tunes the frequency in 0.1MHz steps (0.05, 0.15, 0.25 etc.). Turning the outer knob changes the larger digits (1MHz, 10MHz etc.).

The KN 64 is a Distance Measuring Equipment (DME) system. It can be channelled remotely through the NAV 1 receiver (GNS 430) or tuned directly with its own frequency selection knobs. This dual channelling compatibility makes two DME frequencies available to you at all times, allowing for DME holds.

Frequency mode

In this mode the DME displays distance and the internally selected frequency. You can alter the frequency using the frequency knobs.

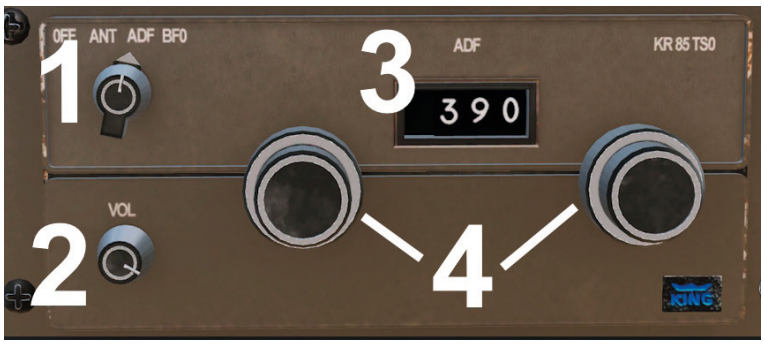
Groundspeed/Time-to-Station mode

In this position the DME holds the internally selected frequency while displaying distance, groundspeed and time-to-station. A ‘frequency hold’ feature prevents you from accidentally altering the frequency when it isn’t displayed.

Remote mode

With remote mode selected, the DME uses the frequency that is selected on the NAV 1 receiver (GNS 430). Distance, groundspeed and time-to-station is shown. Dashes will be displayed when there is no valid signal.

KR 85 – ADF



1. Power/mode selector knob – selects ADF, ANT or BFO mode.
2. Volume knob
3. Frequency display
4. Frequency select knobs – tune the ADF frequency.

Frequency selection

The ADF frequency is displayed on three counters.

The frequency is selected using the frequency select knobs which are rotated either clockwise or anti-clockwise. The right inner knob tunes the 1s. The right outer knob tunes the 10s. The left knob tunes the 100s and the 1,000s.

Operating modes

ANT mode provides improved audio reception from the station tuned and is usually used for identification. The bearing pointer on the ADF indicator will be deactivated and immediately turn to the 90° relative position and remain there during ANT reception.

ADF mode activates the bearing pointer on the ADF indicator, causing it to point in the direction of the station relative to the aircraft heading.

BFO mode permits the carrier wave and the associated Morse code identifier broadcast on the carrier wave to be heard.

ADF test

Select ANT mode and confirm that the bearing pointer moves directly to the parked 90° position. Make sure that the unit is tuned to a usable frequency and then select ADF mode. Confirm that the needle moves to the station bearing.

GTX 330 – transponder

1. Mode selection buttons
2. Identification (IDENT) button
3. VFR button
4. Function (FUNC) button
5. Start/stop button
6. Cursor (CRSR) button
7. Clear (CLR) button
8. Number buttons

The GTX 330 is a Mode S transponder. It also features several other functions such as an altitude monitor, flight timer and outside air temperature (OAT) display.

The unit is powered on by pressing the ON key.

Mode selection buttons

OFF – powers off the GTX 330. Pressing the STBY, ON or ALT button powers on the transponder, displaying the last active identification code.

STBY – selects the standby mode. The transponder will not reply to any interrogations when it is in standby mode.

ON – selects Mode A. In this mode the transponder replies to interrogations, as indicated by the reply symbol (R).

ALT – selects Mode A and Mode C. In ALT mode the transponder replies to identification and altitude interrogations as indicated by the reply symbol (R).

Code selection

The transponder code is entered using the 0-7 numeric buttons. Pushing these buttons begins the code selection sequence. The new code is not activated until the fourth digit is entered.

Pressing the CLR button moves the cursor back to the previous digit. Pressing the CLR button when the cursor is on the first digit of the code, or pressing the CRSR button during code entry, removes the cursor and cancels data entry, restoring the previous code.

You can press the CLR button up to five seconds after code entry is complete to return the cursor to the fourth digit. The numbers 8 and 9 are not used for code entry, only for entering a Count Down time.

Important codes

1200 – VFR code used in North America

7000 – VFR code used in Europe

7500 – Hijack code

7600 – Loss of communications

7700 – Emergency

Buttons for other GTX 330 functions

IDENT – pressing the IDENT button activates the ‘special position identification’ pulse for 18 seconds, identifying your transponder return to an ATC unit. The word ‘IDENT’ will appear in the upper left corner of the display while the IDENT mode is active.

VFR – sets the transponder code to the VFR code. The default code can be set in the DR400’s manifest via the line ‘defaultVFRCode’.

FUNC – changes the page shown on the right side of the display. Display data includes flight timer, Zulu time, local time (12-hour format) and local time (24-hour format).

START/STOP – starts and stops the flight timer.

CRSR – non-functional.

CLR – resets the timer and cancels the previous button press during code selection.

8 – non-functional.

9 – non-functional.

FLIGHT TIME – timer start and stop can be manually controlled using the START/STOP and CLR keys.

S-TEC 55 – autopilot

The S-TEC 55 is a highly capable two-axis digital autopilot without a flight director.

1. Heading select button – press to engage/disengage heading select mode.
2. Navigation hold button – press to engage/disengage navigation hold mode.
3. Approach hold button – press to engage/disengage approach hold mode.
4. Back course button – press to engage/disengage back course hold mode.
5. Altitude hold button – press to engage/disengage altitude hold mode.
6. Vertical speed button – press to engage/disengage vertical speed hold mode.
7. Vertical speed knob – rotate to select the vertical speed in 100s of feet.
8. Mode annunciators – illuminate to show which autopilot modes are engaged.

Auto-trim

The auto-trim system uses the elevator trim to make pitch changes when a pitch mode is active. When the elevator trim is in motion, ‘TRIM’ and the up or down symbol will annunciate to indicate the trim direction of travel.

Heading select (HDG) mode

In HDG mode the autopilot will capture and hold the heading selected on the direction indicator. The HDG annunciator will illuminate to indicate that heading select mode is engaged.

The heading bug becomes the primary control of the aircraft around the roll axis. When the heading of the aircraft matches the heading bug, the autopilot will maintain the heading. To turn to a new heading, rotate the heading bug to the desired heading and the aircraft will turn to the newly selected heading.

Navigation (NAV) hold mode

In navigation (NAV) hold mode the autopilot intercepts and tracks VOR and GPS courses.

To intercept and track a VOR course:

1. Tune the frequency for the selected VOR station into the GNS 430 (NAV 1).
2. Select the desired course on the HSI.
3. Press the NAV button. The NAV annunciator will illuminate to indicate that navigation hold mode is engaged.

To intercept and track a GPS course:

1. Program a flight plan into the GPS.
2. Press the NAV button twice in quick succession. The NAV and GPS annunciators will illuminate to indicate that GPS navigation hold mode is engaged.

Approach (APR) hold mode

Approach (APR) hold mode allows the autopilot to intercept and track ILS (localiser and glideslope).

To operate in approach hold mode:

1. Tune the frequency for the selected ILS into the GNS 430 (NAV 1).
2. Press the APR button. The APR annunciator will illuminate to indicate that approach hold mode is engaged.
3. The glideslope (GS) annunciator will illuminate to indicate glideslope capture arming; glideslope capture is indicated by the extinguishing of the ALT annunciation.

Back course (REV) hold mode

Back course (BC) hold mode allows the autopilot to intercept and track a reverse course ILS.

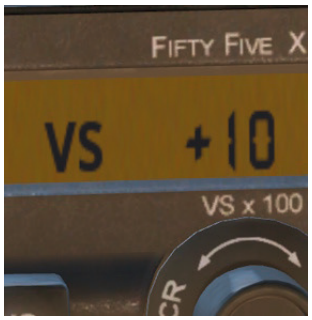
To operate in the back course hold mode:

1. Tune the frequency for the selected ILS back course into the GNS 430 (NAV 1).
2. Press the REV button. The APR and REV annunciators will illuminate to indicate that back course hold mode is engaged.

Altitude (ALT) hold mode

Press the ALT button to engage altitude hold mode. The ALT annunciator will illuminate to indicate that altitude hold mode is engaged. This mode maintains the pressure altitude at the time of the mode selection.

Vertical speed (VS) hold mode



Press the VS button to engage vertical speed hold mode. The VS annunciator will illuminate to indicate that vertical speed hold mode is engaged. The autopilot will synchronise with the aircraft's vertical speed at the time the mode is engaged, and the corresponding vertical speed will be indicated on the display.

The selected vertical speed can be altered in 100ft increments by rotating the VS knob. The positive (+) symbol indicates a climb selection and the negative (-) symbol indicates a descent selection. The maximum selectable VS limits are ±1,600 feet per minute.

GROUND EQUIPMENT

The aircraft can be fitted with chocks and tie-downs whilst on the ground.

The chocks and tie-downs are activated by the toggle buttons in the EFB's Aircraft Options app. They can appear whenever the aircraft is on the ground and stationary, with the engine off and the parking brake applied.

They will disappear when those conditions are no longer met.

FAILURES

In addition to supporting the simulator's own failures system, this DR400 simulation includes a few of the more common failures found on these aircraft:

- **Spark plug fouling** – this can occur if the engine is kept at low RPM for prolonged periods. Symptoms include rough running with a subsequent increase in cockpit vibration. If fouling occurs, increase engine RPM.
- **Vapour lock** – this can occur for up to approximately 30 minutes after the engine has been shut down. After shutdown, fuel vapour can remain in the fuel lines as the result of high temperatures. This vapour disrupts the operation of the fuel system and creates an incompatible mix of air and fuel, so you might need a few attempts at starting the engine before ignition occurs. This problem is more likely to occur when operating in high temperatures.
- **Battery failure** – the battery can be quickly drained, either by leaving electrical systems switched on without the engine (and therefore alternator) running or by repeated attempts to start the engine. The battery can be recharged using the Refill Menu.

These failures are disabled by default and can be enabled/disabled by clicking on 'Simulate Spark Plug Fouling and Vapour Lock' in the EFB's Engine Config app.

If you are unable to start the engine, please check the following items:

Fuel flow – to ensure sufficient fuel flow for ignition, confirm that the fuel pump is switched on and the mixture lever is set to rich (forward). Confirm fuel flow using the flow gauge prior to attempting an engine start. Refer to the NORMAL PROCEDURES section in this manual for more information.

Vapour lock – this can occur for up to approximately 30 minutes after the engine has been shut down. After shutdown, fuel vapour can remain in the fuel lines as the result of high temperatures. This vapour disrupts the operation of the fuel system and creates an incompatible mix of air and fuel, so you might need a few attempts at starting the engine before ignition occurs.

You can also start the engine using the power icon located in the EFB's Aircraft Options app or the 'Ready for take-off' option in the menu bar.

FLYING THE DR400

In this tutorial flight we will be departing from Goodwood Aerodrome, home of the legendary Goodwood racing circuit in West Sussex, England. We will be heading north-west, passing to the west of London Heathrow. The route will then take us north-west past RAF Fairford before arriving at Gloucestershire airport, the UK's busiest for general aviation.

Covering approximately 85 nautical miles, this short flight is the ideal length for learning about the essential systems on board the DR400.

Here are the details for today's flight:

EGHR > CPT (114.35) > GST (331.0) > EGBJ

Estimated time en route: 45 minutes

Route distance: 85 nautical miles

Departure time: 0900 (local time)

Weather: VFR Few Clouds

Now that we are prepared for the flight, we can proceed to the cockpit to begin our pre-flight checks. To load up the DR400 tutorial flight, follow these steps:

1. Start X-Plane 12.
2. From the Main Menu click **New Flight** or go to the Flight Configuration window.
3. In the Weather panel move the slider to select VFR Few Clouds.
4. Click on the Robin DR400 in the Aircraft Selection screen.
5. Click **Customize**, choose the G-BTRU livery from the drop-down menu in the top right and uncheck the box labelled **Start with engines running**.
6. Under the Location box, type **EGHR** and select **Chichester Goodwood**. Click the **Customize** button.
7. Under 'Starts', select **Ramp** and choose a ramp start location. Press **Confirm** when done.
8. Click **Start Flight**.

You should now find yourself sitting in the cockpit at Goodwood Aerodrome. The aircraft is configured in a ‘cold and dark’ state, with all the cockpit systems switched off, as you would find the aircraft prior to the first flight of the day. Beginning in this configuration means we will need to spend some additional time setting up the cockpit, but doing so will allow you to learn a considerable amount about the features and functions on board the DR400.

This tutorial will cover the necessary steps for you to get from point A to point B, but it will not explore each system in depth. Please refer to the rest of this manual for details of each system.

Getting started

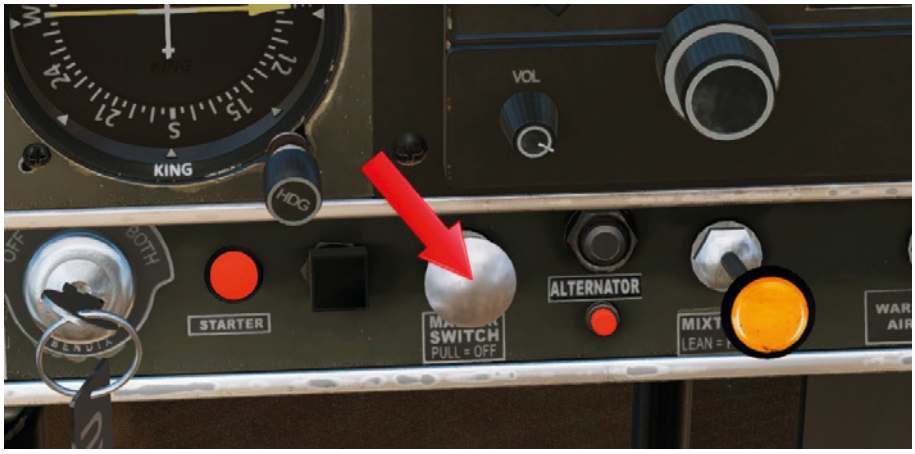
The first step is to open the canopy to allow entry into the cockpit. In the virtual cockpit, click on the canopy latch to rotate it to the **OPEN** position.

We can now start working through the pre-flight inspections.

To enable easier access to the controls, you may want to hide the control sticks by using the clickspot located on the microphone jack socket.

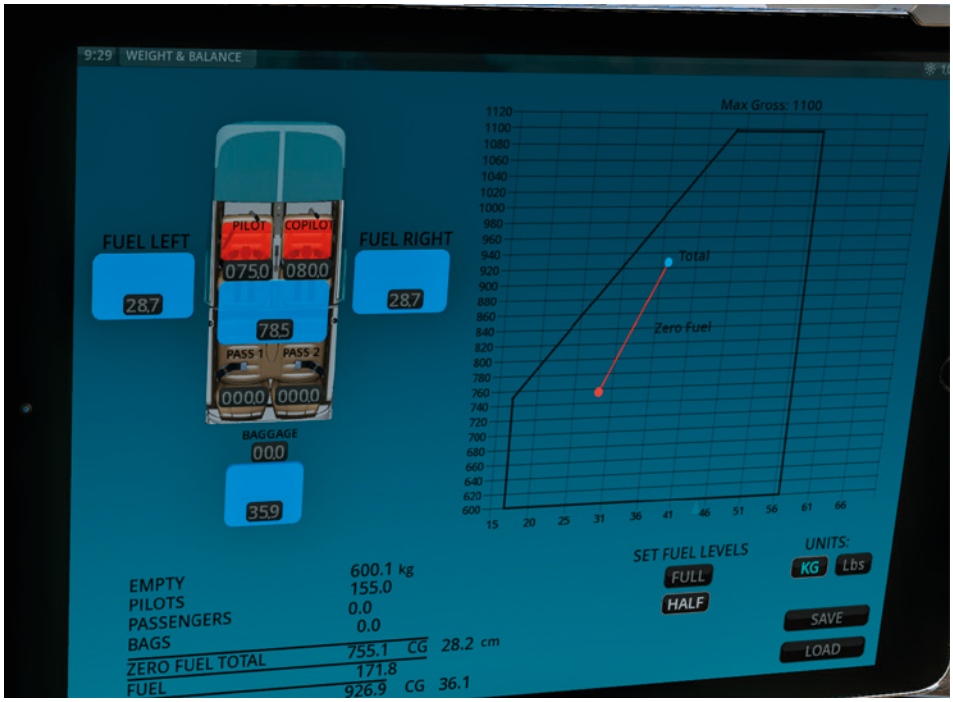
Confirm that the parking brake lever is pulled **ON**.

Check that all avionics are **OFF**, the mixture lever is pulled out to **IDLE CUT-OFF** and the magnetos are set to **OFF**. Then switch **ON** the master switch. Confirm that the alternator warning light is illuminated.



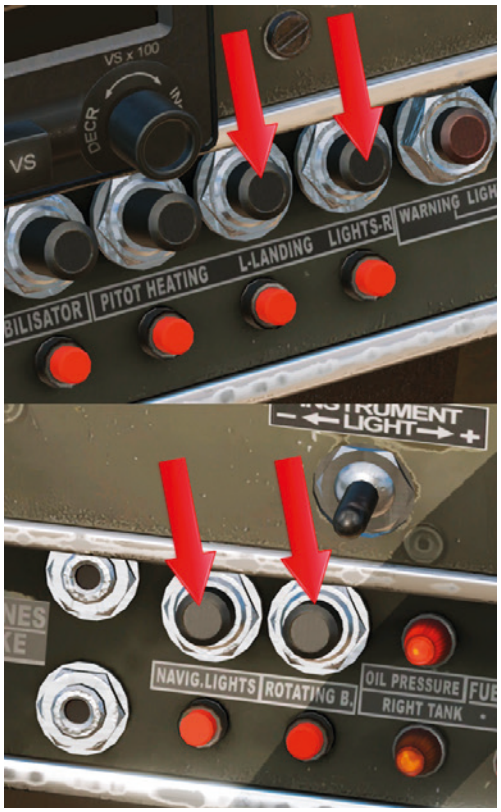
With power to the aircraft and fuel gauges alive, now will be a good time to set up our load. For this flight we will have all tanks full.

Open the Weight and Balance app on the EFB and set fuel to FULL by clicking the FULL icon. Use the mouse wheel while hovering over each rear passenger and baggage location to remove all weight from these areas. This will ensure that we are within the weight and balance limits.



Now check that ALL four fuel gauges indicate full tanks.

Switch **ON** the navigation, rotating beacon and landing lights using the red buttons on the left and right lower panels.



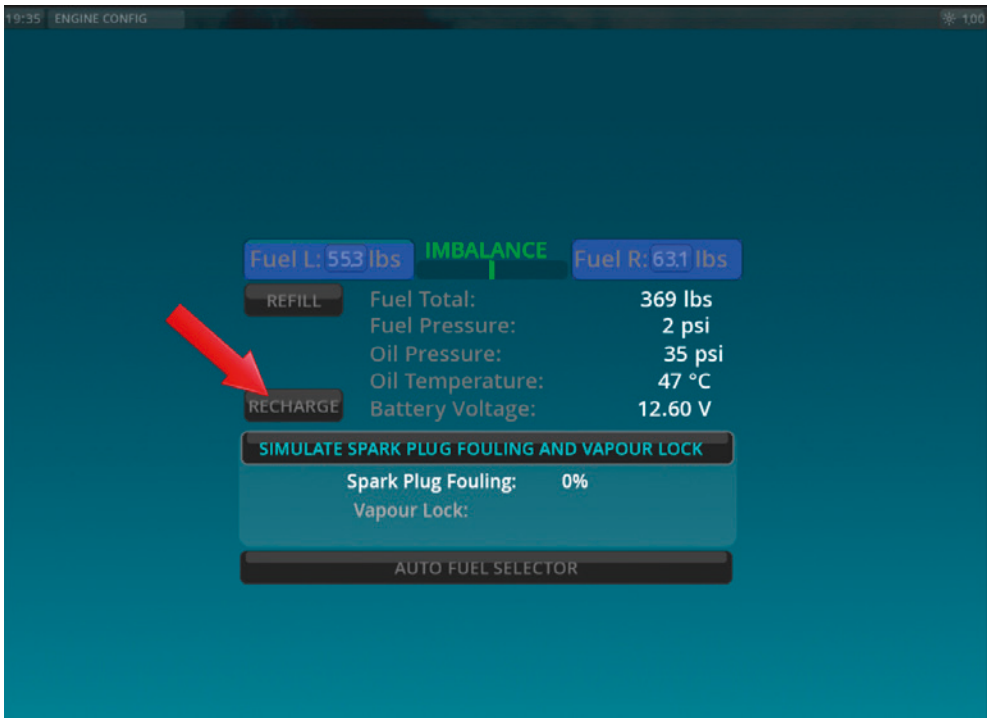
Switch to the exterior (Chase) view and confirm that all of the lights are illuminated before returning to the cockpit and switching them all **OFF**. Switch **OFF** the master switch.

Confirm that the elevator trim is in the centre/neutral position, using the indicator on the centre console.

Check that you have full and free movement of the flying controls and that the mechanically controlled flaps extend and retract fully.

Switch to the external (Chase) view and carry out a visual inspection of the aircraft. The wheel chocks and tie-downs should be visible.

Use the EFB Engine Config app to recharge the battery in case it has discharged while you've been finding your way around the cockpit.



Starting the engine

We will start the engine before configuring the avionics for our departure.

Close the canopy by clicking on the latch to rotate it to the **CLOSED** position.

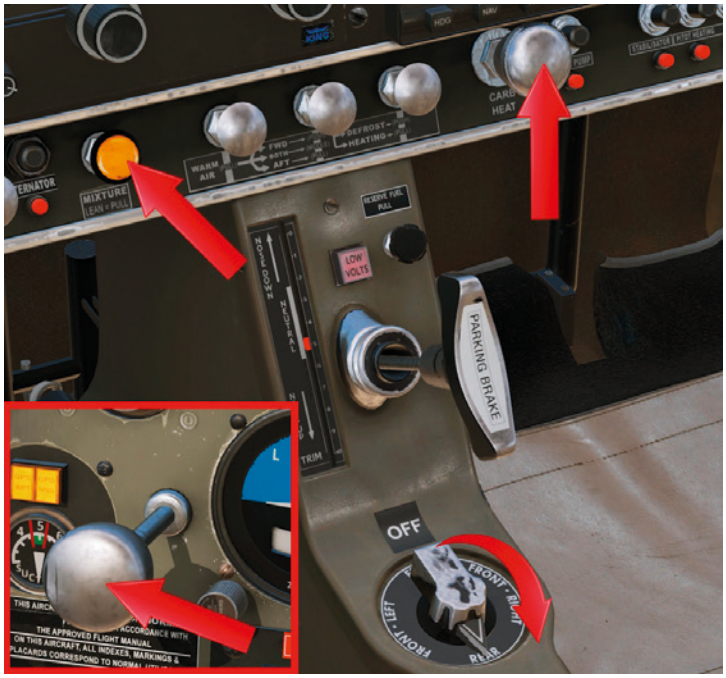
To give us more visibility move the EFB to the right hand side by using the dark click spot on the windshield. The EFB can be rotated using the top bezel.

Check that all of the circuit breakers highlighted in the image below are pushed in.

On the control quadrant, right-click on the fuel selector to rotate it to the **REAR** (main tank) position.

Push in the mixture lever to the **FULL RICH** (in) position and advance the throttle lever to approximately **1/4 open**.

Confirm that the carburettor heat lever is set to **OFF** (in) and that all avionics are still **OFF**.



Switch **ON** the master switch to provide electrical power to the aircraft.

Turn **ON** the navigation and rotating beacon lights, warning anyone in the area that we are about to start the engine.

Switch **ON** the fuel pump and confirm that the fuel pressure warning light has extinguished.

Rotate the magneto selector to the **BOTH** position.

Check that the area surrounding the aircraft is clear of obstructions and then press and release the STARTER button to start the engine.

Check that the oil pressure and temperature are rising.

Push **IN** the alternator switch breaker.

Confirm that the alternator, starter engager and oil pressure warning lights have extinguished.

Adjust the throttle to maintain approximately **1,200 RPM** and check that the vacuum gauge shows suction within the given limits.

With the engine running and the alternator charging the battery, we can now switch on the avionics. Starting at the top of the centre panel and working down, switch on the GMA 340, GNS 430, KY 97, KN 64, GTX 330 and KR 85 units.

Finally, rotate the fuel selector switch to the **FRONT RIGHT** and then the **FRONT LEFT** positions, checking that the engine operates correctly on both tanks before selecting the **REAR** tank.

Configuring the avionics

We now need to configure the avionics for our departure.

Using the knob on the direction indicator, rotate the compass card to ensure that it matches the heading shown on the whiskey compass. Alternatively, use the ‘vacuum DG sync to magnetic north’ keyboard assignment.

Once we are settled into our climb we will make a turn to fly towards our first waypoint on the route, Compton VOR (**CPT – 114.35**). The VOR is one of those used by aircraft departing London Heathrow. In preparation, tune the VOR into NAV 1 (GNS 430) and make sure it is set to VLOC mode. You may need to accept the database and self-test by pressing the ENT button twice first.

1. Use the PUSH C/V button to move the cursor onto the VLOC1 box.
2. Use the knobs to set 114.35 into the standby frequency box.
3. Use the V button to switch the frequency to active.
4. Press the CDI button so that VLOC is displayed above.

Rotate the course knob on the VOR 1 indicator to select **336 degrees**. This is the course inbound to the Compton VOR from Goodwood.

Tune the second waypoint on our route, Gloucestershire NDB (**331.0**), into the KR 85 ADF unit.

Check that the function switch on the KN 64 is set to the **RMT** (remote) position. Selecting the remote function allows the KN 64 to display DME information from NAV 1 (the GNS 430) rather than from its own internal NAV receiver.

You can also use this time to enter our waypoints into the GNS 430's flight plan, but for this flight we will stick to conventional navigation techniques.

Taxi

We can now taxi to the runway. Check that the area around the aircraft is clear of obstacles and then release the parking brake. Apply power slowly to get the aircraft rolling and then start the short taxi to the threshold of runway 32.

Steering the aircraft with the rudder pedals only is generally sufficient. Combined use of the rudder pedals and the brakes permits, if necessary, tight turns.

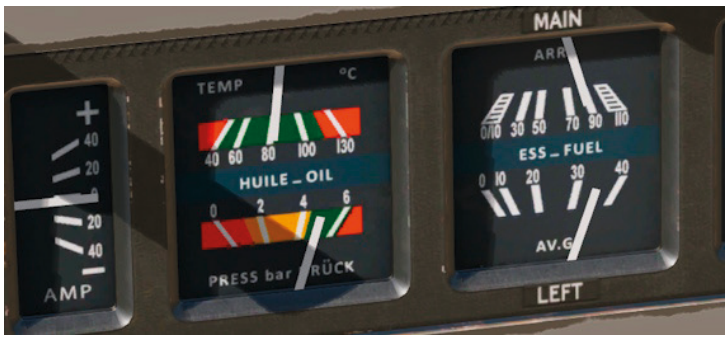
Check the operation of gyroscopic instruments (horizontal attitude, heading and turn and bank indicators) by means of alternate turns.

Stop at the holding point just short of runway 32. We can carry out the power (ground) checks here.

Set the parking brake and advance the throttle lever to obtain **2,000 RPM**.

To carry out a magneto check, rotate the magneto selector to the LEFT position, note the RPM drop and then rotate it back to the BOTH position. Repeat the process for the right magneto.

Check that the vacuum, oil temperature and pressure readings are within limits and that no warning lights are illuminated.



Make sure that the mixture lever is set to **FULL RICH** (in) and that the fuel selector is set to the fullest tank (REAR).

To carry out a carburettor heat check, pull the carburettor heat lever to **ON** (out) and check for a small drop in RPM, then push the lever back to **OFF** (in). If the RPM increases to significantly more than the original 2,000 RPM, it is likely that icing conditions are present. With clear skies and moderate temperatures for our flight, however, that shouldn't be an issue.

Finally, reduce the throttle to idle and check for rough running.

Check the operation of the fuel system by switching the fuel pump **OFF** and confirming that the fuel pressure warning light illuminates.

Adjust the throttle again to maintain approximately **1,200 RPM**. We can now run through the before take-off checks.

Confirm that the master switch is set to **ON**.

Switch the fuel pump back **ON**.

Check that the carburettor heat lever is set to **OFF** and that the mixture lever is in the **FULL RICH** (in) position.

Confirm that the magneto selector is set to **BOTH** and then switch **ON** the landing lights. Note that there are separate controls for the left and right landing lights.

Rotate the pitch trim wheel until the indicator sits in the neutral/centre position.

Set the flaps to the **take-off** position (first notch).

Finally, switch **ON** the PITOT HEATING switch.

With the before take-off checks complete, have a look left and right, verify that nothing is on approach and that the runway is clear, and then taxi onto the runway.

Take-off

Line up with the runway centre line and then come to a stop. Smoothly apply full power and, as the aircraft starts to gather speed, keep it running down the centre line with rudder inputs. As you approach **54 KIAS**, start to raise the nose of the aircraft.

Raise the flaps as you pass through **300ft AGL**.

Make elevator inputs as required to maintain an initial climb speed of approximately **80 knots**, holding the runway heading (320 degrees).

Climb

Switch **OFF** the fuel pump and landing lights on reaching 1,000 feet. Lower the nose to maintain a cruise climb speed of **90 KIAS**.

We can now begin a small right turn towards the first waypoint, Compton (CPT) VOR. With the VOR now in range, the CDI needle on the VOR 1 indicator will indicate our deviation from the selected course. Use the needle deflection to judge a suitable heading for intercepting the course towards the VOR – approximately **350 degrees** in this case.

As the needle returns to the centre position, turn right onto **336 degrees** to intercept the course (there is zero wind, so no heading correction is required).

We will now reduce our workload by utilising the autopilot for the remainder of the climb and cruise. Power on the autopilot by pushing **IN** the STABILISATOR breaker on the lower right panel. The autopilot unit will run through its self-test procedure and then display the ready (RDY) annunciation.

Press the **NAV** button on the autopilot unit once to engage navigation hold mode. The NAV annunciator will appear and the autopilot will steer the aircraft to maintain the selected course towards the Compton VOR.

Press the **VS** button to engage vertical speed hold mode. The autopilot will control the pitch of the aircraft to maintain your current vertical speed (in hundreds of feet per minute). It is important to note that this mode offers no speed or stall protection, so you will need to use the VS knob to increase/decrease the selected vertical speed to maintain our climb speed – **90 KIAS**.

Cruise

As you approach **4,000ft**, use the VS knob to reduce your vertical speed and, once the altitude is reached, press the ALT button on the autopilot to engage altitude hold mode. The autopilot will capture and hold the current altitude.

Bring the throttle back to approximately **65%** to set cruise power – approximately 2,400 RPM.

With the aircraft stabilised in cruise, you can sit back and take in the views across the South Downs National Park. You should be able to see Gatwick Airport on the horizon to the east of the aircraft and Southampton to the west.

The leg to the VOR should take approximately 15-20 minutes. This is the ideal opportunity to explore some of the features of the aircraft.

Cockpit tour

The DR400 has some very useful IFR-capable avionics so we'll take a quick look at some of their features. Make sure you keep an eye on the distance remaining to the Compton VOR, as we'll need to return to navigating the aircraft once we are five miles from it. You can always return to this section of the manual on the second half of the route.

Sliding over to the KN 64 unit, move the function switch to the **FREQ** (frequency) position. With this function selected we can tune the KN 64's internal receiver (NAV 3).

Rotate the frequency selector knobs to tune in **113.60**, the frequency for the London (LON) VOR/DME which is located at London Heathrow. The DME distance (in nautical miles) to the VOR will be shown on the left of the display. Move the function switch to the **GS/T** (groundspeed/time) position to show the DME distance (nautical miles), groundspeed (knots) and time-to-station (minutes) to the VOR. Note that the display is identical to that shown with RMT (remote) selected, but this display shows the information for the internally tuned frequency rather than the remote frequency (GNS 430).

Return the function switch to the **RMT** (remote) position so we can continue to monitor the distance to the Compton VOR.

A more unusual feature of the avionics is the NAV 2 radio. Rather than tuning the NAV 2 frequency into the KY 97 unit (which acts as COM 2), the frequency is selected on the VOR 2 indicator itself. The selected frequency is shown at the lower centre of the NAV 122 unit. It is also equipped with marker lights and both localiser and glideslope deviation indicators.

Another useful feature for navigation is the Flight Computer panel, which can be opened from the EFB. The Flight Computer shows a variety of real-time information related to everything from speed to fuel burn/flow and range/ endurance.

Before long you should see a cluster of airfields and airports ahead: Popham, Lasham, RAF Odiham and Farnborough. Out to the north-east you might also be able to see Heathrow Airport. Any departures or arrivals should pass below our aircraft.

As we pass over CPT VOR, rotate the OBS knob to read 304°. This radial will guide us until the Gloucestershire NDB comes into range.

Now that we have used some of the fuel from the rear tank (as indicated by the corresponding quantity indicator) we can start transferring fuel into it from the reserve tank. To do this, pull **OUT** the reserve fuel lever on the centre console.

You can monitor the fuel transfer using the reserve and main tank quantity indicators.

As the name suggests, the reserve tank is only needed for longer flights when the extended range is required. The majority of local or training flights can be flown with the reserve tank empty for improved performance.

It is important to remember that the engine is only being fed with fuel from a single tank at any given time, so the fuel quantity in each tank should be carefully monitored. It is recommended that you change fuel tanks every half hour and do not exceed a fuel imbalance of 20 litres or five US gallons when using the wing tanks.

If you want to avoid worrying about switching fuel tanks, enable the automatic fuel selector from the Engine Config app on the EFB.

During the remaining time in the cruise, take the opportunity to explore the cockpit, using the PANEL GUIDE for reference.

It is also a good idea to periodically run through the 'FREDA' checks whilst in the cruise:

F – check the **F**uel gauges to ensure that there is enough fuel for the remainder of the flight.

R – check that the correct **R**adio frequency is selected and that the transponder is set as required.

E – check the **E**ngine instruments (oil temperature and pressure).

D – check that the **D**irection indicator is correctly aligned with the whiskey compass reading and that you are on the correct heading (towards the Wolverhampton NDB in this case).

A – check that the barometric pressure setting is correctly set on the **A**ltimeter.

Halfway along our leg at approximately 22 NM from CPT VOR we will pass between RAF Fairford to our west, home to the annual Royal International Air Tattoo, and RAF Brize Norton to our east, home to the strategic and tactical air transport and air-to-air refuelling aircraft of the RAF.

Descent

The direction to the Wolverhampton NDB will be indicated by the yellow needle on the ADF indicator when it is within range of the aircraft. The ADF indicator's compass card is not controlled by a directional gyro, so it won't rotate automatically as the aircraft changes heading. Instead, rotate the compass card using the heading knob until your current magnetic heading is at the top of the gauge and then check the needle to get the relative bearing to the NDB.

The NDB is located directly at our destination airfield, so it will serve as a useful navigation aid on our descent and approach.

We will begin our descent at a DME distance of 30 NM from CPT VOR.

Reduce the throttle to obtain **2,000 RPM** and once the airspeed has reduced to 100 knots, start the descent by engaging vertical speed (VS) hold mode and then selecting a descent rate of **-500ft/min**.

As the aircraft stabilises in its descent, adjust the throttle to maintain approximately **90 knots**.

Pull the carburettor heat **ON**.

Approach and landing

We will carry out an approach onto runway 06. Our routing will bring us onto an extended base leg, and we will make use of the ILS using NAV 1.

Rotate the HDG bug on the DI to 350° and engage HDG mode on the S-TEC autopilot. This will set us up to intercept the extended centreline of runway 27 and the localiser.

Tune the NAV 1 frequency on the GNS430 to 109.95 AND rotate the CDI compass card to 263°, our final approach course.

As you descend, switch **ON** the fuel pump and landing lights. Confirm that the mixture is set to the **FULL RICH** (in) position and the parking brake is **OFF**. Rotate the fuel selector to select the fullest tank.

We can now engage APR mode on the S-TEC autopilot by pressing the APR button. Since we have already tuned the ILS, the autopilot will automatically intercept the localiser and glideslope.

As the aircraft approaches 2,500 ft, reduce the vertical speed, engage ALT mode on the S-TEC autopilot and increase power back to 2,400 RPM to maintain airspeed.

Monitoring the CDI, the aircraft will begin a left-hand turn to intercept the localiser. As the aircraft rolls out, reduce your airspeed to 80 knots and extend the flaps to the **take-off** position (first notch).

Again monitoring the CDI, the glideslope indicator will begin to move and the aircraft will begin to descend. Adjust the throttle to maintain 80 knots. Our distance to the runway can be monitored on the KN64.

At 3 NM DME on the KN64, extend the flaps to the **landing** (fully extended) position and reduce to a final approach speed of **68 KIAS**.

Disengage the autopilot by popping out the STABILISATOR breaker.

As the aircraft arrives over the runway, start to bring the aircraft into a flare, gently raising and then keeping the nose just above the horizon. Reduce the throttle to idle and the aircraft should touch down smoothly.

Apply gentle braking and, once the aircraft has slowed to a fast walking pace, turn left off the runway at the first available taxiway. When you are safely off the runway, raise the flaps and push the carburettor heat to OFF.

You can also switch OFF the landing lights, pitot heat and fuel pump.

Shutdown

Begin your taxi to the nearest available parking spot.

Once you have come to a stop at your chosen parking spot, engage the parking brake and switch **OFF** the avionics.

Bring the throttle lever back to **IDLE** and then bring the mixture lever back to **IDLE CUT-OFF** to shut down the engine.

Once the engine has come to a stop, set the magneto selector to the **OFF** position, switch **OFF** the navigation and rotating beacon lights and then switch **OFF** the master and alternator switches to disconnect the electrical power.

Rotate the fuel selector to the **OFF** position and and open the canopy.

Congratulations – you have completed the DR400 tutorial flight!

NORMAL PROCEDURES

Airspeed (IAS) for safe operations

Best rate of climb (flaps take-off)	**81 KIAS**
Best rate of climb (flaps up)	**92 KIAS**
Best angle of climb (flaps take-off)	**70 KIAS**
Best angle of climb (flaps up)	**76 KIAS**
Operating speed in turbulent air	**140 KIAS**
Maximum flap speed (flaps landing)	**92 KIAS**
Final approach speed (flaps landing)	**68 KIAS**

Pre-flight

Cockpit

Parking brake	**SET**
Avionics	**OFF**
Mixture	**IDLE CUT-OFF**
Magnetos	**OFF**
Master switch	**ON**
Fuel quantity gauges	**CHECK**
Alternator warning light	**CHECK**
Master switch	**OFF**
Flight controls	**CHECK OPERATION**
Flaps	**CHECK OPERATION THEN RETRACT**

Left/right wing

Flap and aileron	**CHECK**
Wing tip and lights	**UNDAMAGED**
Tie-down	**REMOVED**

Nose section

Chocks	**REMOVED**
Towbar	**REMOVED (NOSE GEAR)**
Oil	**CHECK LEVEL**
Propeller	**GOOD CONDITION**
Air inlets	**CLEAR**

Tail section

Rudder	**CHECK CONTROLS**
Stabiliser	**CHECK CONTROLS**

Before starting engine

Canopy	**CLOSED**
Brakes	**SET**
Circuit breakers	**IN**
Carburettor heat	**OFF**
Avionics	**OFF**
Fuel selector	**DESIRED TANK**

Engine starting

Caution: *If a positive oil pressure is not indicated within 30 seconds after an engine start, stop the engine and determine the cause of the trouble. In cold weather it will take a few seconds longer to get a positive oil pressure indication.*

Throttle	**¼ INCH OPEN**
Master switch	**ON**
Magnetos	**L**
Electric fuel pump	**ON**
Mixture	**FULL RICH**
Propeller	**CLEAR**
Starter	**ENGAGE**

If engine does not start within 10 seconds, prime and repeat the starting procedure.

When the engine starts:

Magnetos	**BOTH**
Throttle	**ADJUST**
Oil pressure	**CHECK**
Throttle	**1,200 RPM**
Electric fuel pump	**OFF**
Alternator switch	**ON**

Taxiing

Avionics	**ON**
Taxi area	**CLEAR**
Parking brake	**RELEASE**
Throttle	**APPLY SLOWLY**

Brakes	**CHECK**
Steering	**CHECK**

Steering the aircraft with the rudder pedals only is generally sufficient. The combined use of rudder pedals and brakes permits, if necessary, tight turns.

Check the operation of gyroscopic instruments (horizontal attitude, heading and turn and bank indicators) by means of alternate turns.

Ground check

Parking brake	**SET**
Throttle	**2,000 RPM**
Magnetos	**CHECK (max. drop 175 RPM)**
Vacuum	**4.8-5.2 inHg**
Oil temperature	**CHECK**
Oil pressure	**CHECK**
Ammeter	**CHECK**
Carburettor heat	**CHECK**
Electric fuel pump	**OFF**
Throttle	**IDLE (600-650 RPM)**

Before take-off

Throttle	**1,200 RPM**
Master switch	**ON**
Magnetos	**BOTH**
Flight instruments	**CHECK**
Fuel selector	**AS REQUIRED**
Mixture	**SET**
Electric fuel pump	**ON**
Carburettor heat	**OFF**
Engine gauges	**CHECK**
Flaps	**TAKE-OFF**
Trim	**SET**
Controls	**FREE**

Take-off

Lined up on runway	**CHECK COMPASS**

Normal technique

Minimum RPM	**2,200 RPM**
Take-off speed	**54 KIAS**
Initial climb speed	**70 KIAS**

After obstacle clearance:

Climb speed	**81 KIAS**
Electric fuel pump	**OFF**
Flaps	**UP**

Short field/obstacle clearance technique

Flaps	**TAKE-OFF**

Apply full power with brakes applied, check for minimum 2,200 RPM then release.

Take-off speed	**54 KIAS**
Best angle of climb speed	**70 KIAS**

Climb

Normal climb (flaps up)	**92 KIAS**
Best angle (flaps up)	**76 KIAS**
Electric fuel pump	**OFF**

Cruise

Refer to the OPERATING DATA MANUAL for cruise power settings.

The normal maximum cruising power is 75% of the rated horsepower of the engine.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes. The mixture should be leaned during cruising operation when 75% power or less is being used. If any doubt exists as to the amount of power being used, the mixture should be in the FULL RICH position for all operations.

To lean the engine during cruise, slowly pull the mixture lever out until a slight drop is observed in the RPM. Then enrich the mixture again just enough to regain the RPM.

You should monitor weather conditions while flying and should be alert to conditions which might lead to icing. If icing is expected, place the carburettor heat control in the **ON** position.

To keep the aircraft in best lateral trim during cruise flight, fuel should be used alternately from each tank at 15-minute intervals. Always remember that the electric fuel pump should be set to **ON** before switching tanks and should be left on for a short period thereafter.

Approach and landing

Fuel selector	**SET TO FULLEST TANK**
Electric fuel pump	**ON**
Carburettor heat	**AS REQUIRED**
Mixture	**FULL RICH**
Flaps	**SET (92 KIAS max.)**
Trim	**Trim for 81 KIAS**
Final approach speed	**68 KIAS**
Carburettor heat	**OFF**

Shutdown

Flaps	**RETRACT**
Electric fuel pump	**OFF**
Avionics	**OFF**
Throttle	**CLOSED**
Mixture	**IDLE CUT-OFF**
Magnetos	**OFF**
Master switch	**OFF**
Alternator switch	**OFF**
Parking brake	**SET**

Stalls

An approaching stall is indicated by a stall warning horn which is activated between 5-10 knots above stall speed. Mild airframe buffeting and gentle pitching may also precede the stall.

Weight: 1,100 kg (2,425 lb), engine idle	**KIAS**		
Bank angle	**0°**	**30°**	**60°**
Flaps up	57	61	78
Flaps take-off	53	57	76
Flaps landing	51	55	72

Note: *The stall warning system is inoperative with the battery master switch OFF.*

EMERGENCY PROCEDURES

Airspeed (IAS) for safe operations

Stall speed (flaps up)	**56 KIAS**
Stall speed (full flap)	**51 KIAS**
Maximum manoeuvring speed	**116 KIAS**
Never exceed speed	**166 KIAS**
Power off glide speed (flaps up)	**78 KIAS**

Engine failures

Engine failure during take-off (not airborne)

Sufficient runway remaining:

Throttle	**IDLE**
Brakes	**APPLY**

Insufficient runway remaining:

Throttle	**IDLE**
Brakes	**APPLY**
Mixture	**IDLE CUT-OFF**
Fuel selector	**OFF**
Master switch	**OFF**
Magnetos	**OFF**

Engine failure during take-off (airborne)

If sufficient runway remains for a normal landing, land straight ahead.

Insufficient runway remaining:

Airspeed	**78 KIAS**
Mixture	**IDLE CUT-OFF**
Fuel selector	**OFF**
Master switch	**OFF**
Magnetos	**OFF**

If sufficient altitude has been gained to attempt a restart:

Airspeed	**ABOVE STALL**
Fuel selector	**Switch to other tank**

Electric fuel pump	**ON**
Mixture	**RICH**
Carburettor heat	**ON**

If power is not regained, proceed with power-off landing.

Engine failure in flight

Airspeed	**Maximum glide speed (81 KIAS)**
Fuel selector	**Switch to other tank**
Electric fuel pump	**ON**
Mixture	**RICH**
Carburettor heat	**ON**
Engine gauges	**Check for indication of cause of power loss**

If power has not been restored:

Magnetos	**L then R then back to BOTH**
Throttle and mixture	**Try different settings**

When power is restored:

Carburettor heat	**OFF**
Electric fuel pump	**OFF**

If power cannot be restored:

If power is not restored, prepare for power-off landing.

Power-off landing

Trim for best glide speed (81 KIAS). Locate a suitable field and establish spiral pattern 1,000ft above field at downwind position for normal landing approach.

Electric fuel pump	**OFF**
Mixture	**IDLE CUT-OFF**
Throttle	**IDLE**
Magnetos	**OFF**
Fuel selector	**OFF**
Alternator switch	**OFF**

When the field can be easily reached, slow to 67 KIAS for shortest landing.

When committed to landing:

Flaps	**OFF**
Master switch	**OFF**
Canopy	**UNLOCK**

Fires

Engine fire during starting

Starter	**CRANK**
Mixture	**IDLE CUT-OFF**
Throttle	**OPEN**
Electric fuel pump	**OFF**
Fuel selector	**OFF**

Engine fire in flight

Fuel selector	**OFF**
Throttle	**CLOSED**
Mixture	**IDLE CUT-OFF**
Electric fuel pump	**OFF**
Cabin heat	**OFF**

Proceed with power-off landing procedure.

Electrical fire

Master switch	**OFF**
Cabin heat	**OFF**
Alternator switch	**OFF**

Land as soon as possible.

Low oil pressure

Throttle	**REDUCE AS FAR AS POSSIBLE**
Oil temperature	**CHECKED**
If oil temperature is high	**REDUCE THROTTLE**

Prepare for a forced landing and land as soon as possible.

Alternator failure

Reduce electrical loads to minimum.

Alternator circuit breaker	**Check and reset as required**
Alternator switch	**OFF then ON**

If power is not restored:

Alternator switch	**OFF**

If alternator output cannot be restored, reduce electrical loads and land as soon as it is practical. The battery is the only remaining source of electrical power.

Icing

IMPORTANT! *Flight into known icing conditions is prohibited.*

Carburettor heat	**ON**
Cabin heat	**FULL HOT**
Pitot heat	**ON**
Engine	**MAX. POWER/RPM**

Adjust course and/or altitude to obtain the best outside air conditions. Divert to nearest airport.

Spin recovery

Rudder	**HOLD OPPOSITE DIRECTION OF ROTATION**
Stick	**FULL FORWARD, AILERONS NEUTRAL**
Throttle	**IDLE**
Flaps	**RETRACT**

When spinning stops, centralise rudder, level the wings and ease out of the dive.

Airspeed indicating system failure

In case of erroneous indications in flight:

Pitot heat	**ON**

If erroneous indications persist, carry out a precautionary approach, maintaining an adequate airspeed margin above stall warning activation speed.

CREDITS

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