

Robin Flying Group

DR400 Operating Notes

These notes are intended as a general guide and to highlight differences in operating procedures and flying characteristics for pilots new to the Robin DR400 series. They are not intended to replace or modify the official flight manual, which is the definitive (and legal) reference. Note that for UK registered aircraft it is a requirement that the flight manual be carried in the aircraft for all flights.

The DR400 range comprises a number of models, the principal difference between them being their engines, though there is some variety in equipment and minor details. All share what is effectively the same airframe and are straightforward to fly, with safe, positive and vice-free handling plus rugged durability, reliability and ease of operation.

PREFLIGHT

Legal requirements for every flight – These apply to all aircraft not just DR400s but transitioning to a new type might be a good time to review them!

Weight and Balance – The 180hp versions are four-seaters capable of carrying 4 adults of modest average weight and even the 160hp versions can carry three such adults. However, there are some limitations to be aware of, for example 120hp Dauphin 2+2 s are limited to 130Kg in the rear seats, and maximum baggage area loads vary according to model.

Note: *Our Robin Flying Group DR400s are insured as follows: DR400/100 1 passenger seat, DR400/120 2 passenger seats, DR400/160 and DR400/180 3 passenger seats – all max 110kg per seat.*

EXTERNAL

Fuel – Fuel should be sampled for water or other contamination before the first flight of each day and after uploading fuel where there is any doubt about its quality or cleanliness.

Ideally, fuel should be sampled before the aircraft is moved or disturbed in any way, so that any contamination has settled to the drain area and is not mixed in the fuel. If the aircraft has been moved or refuelled, allow a few minutes for this settling to take place. **NOTE: Always sample all the tank drains before the gascolator, starting at the back and working forwards. Sampling the gascolator first could draw any water in the fuel tank into the fuel line where it cannot be drained from the tank drains.**

All DR400s have a 110l tank in the fuselage. Most have a flat bottom so are provided with drains on both sides at the rear. On a level surface both drains must be sampled. Later models have a single drain in the centre. Since there is a right-angle bend in the filler pipe, it is not possible to check contents visually or with a conventional dipstick. However, the electric fuel gauges are normally accurate and a “Low fuel” warning light is provided.

DR400/180 Regent and DR400/160 Major models have two small (40l) additional tanks in the wing roots. Each has its own drain and the contents are easily inspected visually. They are however susceptible to two potential problems: They are dependent on good cap seals to keep water out and we have found the gauges less reliably accurate than main tank ones. Careful sampling and visual contents checks are therefore important.

A further type of tank is available as an option, fitted in the aft fuselage and holding 50l, with the filler on the starboard side. This is mounted above the level of the main tank and can be made to drain into the main tank by pulling out a knob on the instrument panel – simple gravity. It should be obvious that the main tank must have at least 50l space in it before pulling the knob or the main tank will overflow with fuel draining out through the breather! Similarly it is vital that the knob is pushed back in before refuelling.

Oil – The max oil level for the small-engined (DR400/100/120) models is 6 US quarts and 8 US quarts for all the larger-engined ones. A US quart approximates to a litre. Around 1 quart below max is an ideal

operating area so a quart (or litre) should be added when the level is found to have fallen to two quarts below max. Topping right up to max results in oil being wasted out of the breather and ending up on the underside of the aircraft. **NOTE: Tighten the dipstick only gently.** Its mounting tube may come unscrewed with it if it has been over-tightened!

Spats – Check spats for mud, particularly if operating on grass. Mud filled spats can severely increase drag during the take off run. Robins can be flown without spats fitted but with reduced performance – see flight manual before doing so.

Flaps – It is customary to leave DR400 flaps fully down in the landing position at all times when the aircraft is parked (opposite from PA28), because they **must not be trodden on** when getting in or out of the aircraft. They should be up for taxiing to avoid stone damage.

Electrics – When testing lights/stall warner etc, switch on the master switch for as short a time as possible. Aircraft batteries have limited capacity and a significant current is drained as soon as the master is switched on (Turn co-ordinator, gauges, warning lights etc). Nav lights and strobe lights should only be switched on for a max of 30secs or so (strobe may not flash anyway if battery is low).

Landing/Taxi lights take a much higher current and should not be switched on for more than 5 secs or so – one at a time. **NOTE: Never allow both Landing and Taxi lights to be switched on at the same time either on the ground or in flight.**

Manhandling – Before attempting to move the aircraft or turn the propeller:

ALWAYS confirm magnetos off/key out, throttle closed, mixture in cut-off position

To move Robins on the ground use the towbar that fits into the nose wheel, first making sure the prop is horizontal. Ensure that the towbar is pushed fully home into the axle tube. Anyone assisting can push **on the wing walk only** when moving forwards or on the wing leading edge going aft. When pushing on the leading edge, position hands **outboard of wing tanks (if fitted)** in line with the wing ribs so that the palms follow the shape of the leading edge, spreading the load.



NOTE: Never push on spinner, wing tanks/fairings or landing

light Perspex cover and if pushing/pulling on the propeller itself, do so only close to the spinner taking care that the prop does not rotate and strike the towbar.

The nose undercarriage is designed so that when the aircraft takes off, the nosewheel locks in the central position for optimum aerodynamic alignment. A corollary is that the nosewheel may occasionally lock central on the ground if the tail of the aircraft has been pushed down by load or someone clambering in or out. This is easily rectified by pulling downwards on the prop (*not the spinner!*) or lifting the rear of the fuselage before attempting to turn the aircraft.

NOTE: If the nosewheel feels locked central do not force it with the towbar.

Pitot – Both static vents and the pitot tube can be protected with simple pins. The three are interchangeable but must all be removed before flight!

GETTING ABOARD

The canopy is a glorious feature of Robins, but highly vulnerable to misuse. Before opening the canopy check that the inspection hatch in the top engine cowling is closed and latched. Few DR400s have escaped without a clash between canopy and hatch at some stage in life!



NOTE: Always open the canopy all the way to its forward stops before getting in or out - slide it gently, carefully and squarely and do not apply undue force. If it sticks, slide it back towards where you started then try again. Having the canopy fully open is vital to standing up in the aircraft comfortably.

Step only on the black wing walk area of the wing – never allow any part of your feet to stray outside this area.

Do not touch the sliding part of the canopy when climbing in or out of the cabin - hold on to the fixed part of the cabin roof and the handholds provided in the top of the glareshield.

Lower yourself into the seat putting your outboard hand on the longeron (solid wooden bit) outside the canopy rail – **do not put your weight on the upholstered side rail or the seat back.**

Never under any circumstances put anything at all on the glareshield - as the canopy is easily scratched (or worse) and the compass will be affected by metallic objects. Headsets are absolutely the worst items to put near the compass as they contain magnets and may damage the compass permanently or magnetise the canopy frame adversely affecting compass readings.

Seats – A lever on the inboard side of each seat latches/unlatches the seat. With the lever pushed fully aft the seat can be adjusted fore and aft or pushed fully forward and tilted for access to the rear seats. **Once the seats have been adjusted for flight, check that they are latched properly with the levers returned to the fully forward position. Never tread or kneel on the seats – this can cause permanent damage.**





Emergency release - There are two emergency release levers at the forward ends of the canopy to allow the canopy to be jettisoned altogether in an emergency. They must never be moved except in an emergency and even then, not in flight!

To jettison the canopy after an accident, first release the normal canopy latch, pull BOTH emergency levers upwards and backwards as far as they will go then push off the canopy vertically.

INTERNAL

Master/alternator switches – Modern DR400s have conventional American split master/alternator switches, which are so common that they need no further comment.

When the engine is running, the prudent pilot will soon realise if the alternator is switched off from the “Alternator” and “Low volts” lights, of course....

Annunciator lights – A row of helpful warning lights is provided to alert the pilot to various events/states. On our modern DR400s they are centre top on the edge of the glareshield. The latter is a good attention-grabbing position, but is so “in your face” that it demands a dimming facility for night flying. ***It is easy to leave the switch in the night position, rendering the lights useless in daylight, so always test the lights and ensure that the switch is in the “Day” position before every flight.***

Of the lights themselves:

The “Flaps” indicator is helpful as it is easy accidentally to leave the flaps in the Flaps1 (Takeoff) position, where the lever position is not obviously different from Flaps 0 (up).

The “Fuel low” light is a helpful back-up to the gauges and on three tank versions refers automatically to the tank currently selected. A further good idea on these is that the fuel low light comes on whenever the selector is between tanks or in the off position. We have found that, as with the gauges, secondary tank low warnings are less accurate than main tank ones.

Similarly “Fuel pressure” warning light, like fuel pressure gauges (see below) can be prone to false alarms. It is quite common to see the fuel pressure light flickering under high power settings with the electric fuel pump switched off. Turning on the electric pump will normally stop this, which in most cases may be an overly pessimistic indication anyway.

In reality, with a simple carburettor, the DR 400 needs very little fuel pressure (only 35 millibars quoted minimum). Unlike for fuel-injected engines, the fuel pump simply has to deliver the fuel to the float bowl and the actual value of the pressure is relatively unimportant.

NOTE: In critical situations (close to the ground, takeoff, landing, changing fuel tanks etc) it is a sensible precaution to deploy the electric pump anyway.

Circuit breakers - Three types: Most are conventional (push in to set, pull out to turn off). The push-only type are potentially a bit fiddly to reset, so worth rehearsing before the real need arises. In the “On” position the button stays in, virtually flush with the mounting nut. To turn off, press the button in further and release. It will pop out, just as it would in an overload situation. To reset/turn on push the button in very gently until it can just be felt to latch in the virtually flush position and let go. Pushing too hard/too far results in the button popping out again, easily frustrating the unwary!

The third type are invisible, being incorporated in the on/off switch to which they relate. The rocker switches along the top of the glareshield are this type. An overload situation should simply turn the switch off. To reset, switch it on again - ***but if it trips again leave it off, as you would any other circuit-breaker.***

Instruments – Robin instruments are generally of good quality and reliable. Main fuel tank gauges have proved particularly reassuring. However, secondary tank gauges seem less so and fuel pressure gauges distinctly unreliable.

The Robin parts catalogue is littered with iterations and supersessions of the fuel pressure gauge and its sender, presumably in the pursuit of a more reliable arrangement. Some DR400s, are not fitted with one anyway - this may be the most reliable arrangement!

Fresh air vents – These are very simple with a flap that is opened and closed by pressing on it.

STARTING

Priming – The engine is primed by pumping the throttle prior to starting. This pumps a jet of fuel upwards from the carburettor into the intake manifold.

For the first start of the day switch on the electric fuel pump briefly to ensure that there is fuel in the carburettor, check that the fuel pressure warning light goes out then turn the pump off again.

NOTE: The act of priming must be left until the very last seconds before pressing the starter button, otherwise fuel can trickle back down the manifold, through the carburettor and onto the lower engine cowling where it could catch fire if the engine misfires on start-up. Do not prime until you are ready to start instantly.

When starting from cold, 3 brisk pumps is usually sufficient, four pumps if ambient temperatures are particularly low. Do not use more than four pumps before pressing the starter. If the engine does not then start immediately add more pumps (never more than 4) and press the starter again. **Note: Always start the engine with the throttle closed or only fractionally open (no more than 1cm).**

If the engine is hot ½ or 1 pump should be sufficient. If flooding is suspected then start with the mixture fully lean, moving to full rich as soon as the engine fires.

NOTE: If the engine coughs or backfires when starting, do not release the starter button until it is running properly. This ensures that any excess fuel is sucked into the engine avoiding a fire risk.

Mixture – Full rich at all times when the engine is running unless over 5000ft amsl.

Magnetos – What seems at first sight like an unusual procedure here: **Always start on the LEFT magneto, switching to BOTH as soon as the engine starts.** The reason for this is that the left magneto is fitted with an impulse coupling, which both enhances the spark and retards it for starting. The right magneto has no retard facility so may fire the engine before the pistons reach “Top dead centre” causing a kick-back - which usually breaks the starter!

Starting on Left is particularly important if hand swinging the engine in the event of a flat battery.

NOTE: Hand swinging, though effective on Robins, should not be undertaken without prior briefing!

TAXI

Steering - Robins are easy to taxi with light but precise nosewheel steering, excellent visibility and decent suspension.

Brakes – Modern DR400s have “conventional” toe brakes. **NOTE: Care must be taken not to “ride” the brakes or apply brake against power while taxiing. The throttle should always be closed fully before applying brake to slow down or stop.**

Flaps – Although left down for parking, the flaps should be raised fully for all engine running and taxiing to avoid damage from debris thrown up by the prop-wash.

Flaps 1 is the standard takeoff setting. **Flaps 0** is acceptable for long tarmac runways but requires a stronger pull to rotate.

Power checks - Standard, running up at approx 1800RPM (while holding the stick fully aft of course).

The brakes should be held depressed without using the parking brake. This is because the parking brake works by isolating the wheel brake circuit from the pedals, trapping in what pressure is present when it is applied.

A corollary of this is that the toe brakes are effectively disabled while the parking brake is applied, so if the aircraft starts to move forward they may not be much use! ***So use the parking brake only for its purpose – short-term parking.***

Ensure the canopy is latched before running the engine up, otherwise it can be drawn forward. The canopy must not be opened in flight. It is acceptable to open it while static on the ground to demist the canopy or cool the occupants, ***but always check that it is fully closed and latched every time you line up for take-off.***

TAKE-OFF

Steering - The steering is sensitive, so a gentle touch is required to keep straight down the runway, particularly on tarmac.

Rotation - When flying speed is reached (100-110kmh depending on model, weight and flap setting) a positive rotation is required to get a DR400 airborne cleanly. Do not rotate prematurely, particularly in the lower powered variants. This can have the effect of simply increasing drag and reducing acceleration.

Climb-out – Pilots new to the DR400 tend to climb too steeply as they are not used to the excellent forward view. Remember to retract flaps before accelerating past 150kmh and to turn off the fuel pump at an appropriate height. Suitable climb speeds range from 130-170kmh, with the higher end of this range giving better forward view and engine cooling.

Performance - Whilst all DR400 models can be safely operated out of grass strips, attention must be paid to performance calculations. Always factor in surface conditions (wet/long grass, mud, high temperatures, upslopes etc) when calculating the takeoff distance required, and add a suitable margin for safety. It is all too easy to be lulled into a false sense of security operating from long smooth tarmac runway.

CRUISE

Carb icing - Carb icing is an ever-present possibility and can occur in almost any conditions, summer or winter. Apply carb heat regularly for at least 10 seconds and consider leaving on when at low power (<2000RPM). If no ice is present, the rpm will drop slightly (c.100 rpm) stay at this level while the carb heat is on and return to the original rpm when it is returned to cold.

If there is a little icing, the rpm will drop with carb heat on then go up slightly before it is returned to cold, when the rpm will now be significantly higher than before applying carb heat.

If the engine coughs/splutters as soon as carb heat is applied ***do not immediately return it to cold*** but give it time to melt all the ice as this is usually an indication of severe icing.

Fuel management – To get absolute maximum range out of three tank models it may be necessary to be prepared to allow the 40 litre wing tanks to run close to dry. This is not as alarming as it sounds, but final emptying of each tank should only be carried out in safe conditions – plenty of height, no distractions etc..

Once the low fuel level warning light is illuminated full-time, be prepared to select another appropriate tank and do so as soon as the fuel pressure warning light comes on or flashes. It is sensible practice to switch on the electric fuel pump while changing tanks.

If you fail to spot the warning and the engine starts to lose power, it should pick up promptly once an alternative tank with fuel is selected and the electric pump switched on.

Mixture – The mixture should only be leaned when operating over 5000ft at a power setting of 75% or less. ***Before descending or applying more power to climb always return the mixture to fully rich.***

Stall – DR400 stall characteristics are benign. The stall warner sounds 5-10 knots above the stall, but it is not the loudest. If wearing good noise cancelling headsets it can be hard to hear.

RPM – DR400/180s have a red or yellow ‘avoid band’, marked on the RPM gauge. When fitted with a Sensenich (metal) propeller the engine should not be operated continuously within this RPM range.

APPROACH AND LANDING

Carb heat - If descending at low power, ensure carb heat is applied, and regularly warm the engine.

Flaps – *Ensure flaps are not deployed above 170kmh for Flaps 1 (white arc on ASI) and 150kmh for Flaps 2 (full flap).* This can require a bit of forward planning, particularly in the faster models.

On approach there is little point in using Flaps 1 at all – it is simply the flap position for take-off and has little useful to contribute at this stage. It is preferable to get below 150kmh and go straight to Flaps 2 which gives better speed control and view.

NOTE: *Airspeed must never be allowed to exceed 170kmh with Flaps 1 deployed or 150kmh with Flaps 2.*

Approach Speed - If airspeed is allowed to decay a high descent rate can develop requiring considerable power to recover speed and height. Slow short field approaches should be avoided until experience is gained. Typical minimum approach speeds are 120-130kmh, refer to the flight manual for detailed figures for each model.

Sideslips – DR400s sideslip well if an increased rate of descent is required. Sideslipping with any flap setting is permissible.

Control stick - If either of the front seats are towards their front limits the stick may meet the chair cushion well before its rear stop - be ready to ‘pull against the cushion’ in the final stages of the flare.

Crosswinds – DR400s must be amongst the easiest aircraft to land in a crosswind and have a high published crosswind limit of 22 knots. The powerful rudder and ailerons make for easy last minute corrections, using either “crab” or “wing down” methods or a combination of both.

SHUTDOWN

Flaps – Flaps *should be retracted for taxiing* then lowered fully and left down when parked.

Engine – Idle should be set to 1000-1200rpm before moving the mixture control to fully lean to stop the engine. The throttle should be closed fully once the engine has stopped. **NOTE: It should not be closed fully before the engine has stopped as this may cause “running on” which can damage the engine. The magnetos should be switched off only when the propeller has stopped completely.**

The mixture control must be left in the fully lean position with the throttle fully closed and the key out of the ignition switch when the aircraft is parked.

IN CONCLUSION

Few, if any, aircraft can be as pilot-friendly as the Robin DR400 and the delightful handling plus wonderful view out soon wins over even the most sceptical!