Pilot Handling Guide

Duo Discus XL VH-GRL

These notes are a conversion guide only and not a substitute for the Manufacturer's Flight Manual.

General notes on conversions

1. Your conversion to a new type must be authorized by an instructor who has flown the aircraft type.
2. He/she must outline the important features of the aircraft.
3. You should not do your first conversion in crosswind or gusty conditions.
4. Spend some time getting comfortable with the cockpit layout.
5. Get someone to lift the tail to show the takeoff and landing nose attitudes.

Basic Overview

The Duo is a 20m two-seat sailplane for advanced training and cross-country flying, constructed of fibreglass and carbon fibre, and manufactured by Schempp-Hirth. The aircraft is forgiving and gentle to fly with no bad tendencies. The aircraft has retractable undercarriage, water ballast in the wings and a tail ballast tank. Minimum hours to fly the Duo is 75 hours total with 20 hours single seater experience.

External Features

Airbrakes	Double panel Schempp-Hirth airbrakes on the upper surface connected to trailing edge flaps
Flaps	Trailing edge landing flaps
Wings	20m, main panels with tip extensions with winglets
Undercarriage	Retractable with alarm
Wheel brake	Hydraulic disc brake
Tailplane	T-tail

Limitations

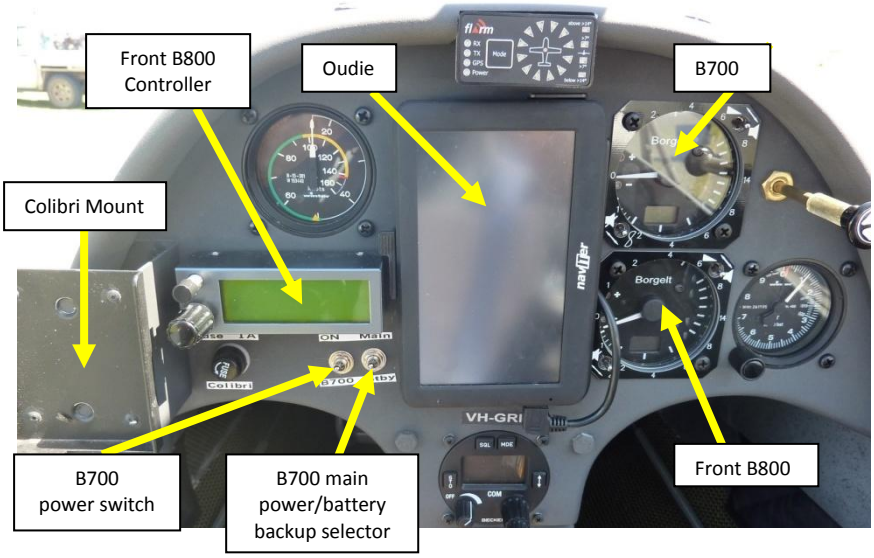
V_{ne}	Max permitted speed	142 knots
V_a	Max manoeuvring speed	97 knots
V_{ra}	Max rough air	97 knots
V_t	Max aerotow speed	97 knots
V_w	Max winch / autotow speed	81 knots
V_L	Max landing gear operation speed	97 knots
Max airbrake operation speed, with care!!		142 knots
Max All Up Weight (MAUW) with water ballast		750 kg
Max All Up Weight (MAUW) without water ballast		660 kg
Min cockpit weight, including parachute, each seat		70 kg
Max cockpit weight, including parachute, each seat		110 kg
Wing Ballast Capacity		198 kg
Tail Tank Capacity		11 kg

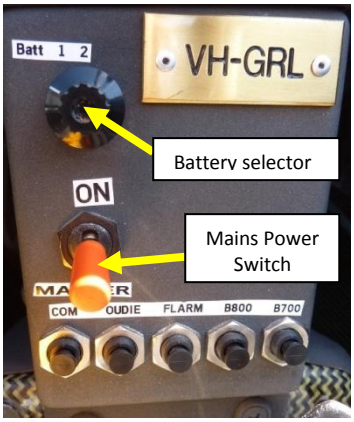
Cockpit Features

Canopy and Jettison	Side hinging with a lever on the left side. Pull the red lever 90 deg. to open. Open canopy normally to jettison, it will break away. At no stage must the canopy or clear view side window be held to lift or close canopy. Only hold levers or frame when opening or closing canopy. Always close and lock canopy when leaving or ground handling glider.	
Trim Ballast	In nose of glider under the front instrument panel.	
Instruments	Radio Vario Flarm Navigation Logger	Becker One Borgelt B700 and Two B800's Mini OZflarm Oudie/B800 Colibri/Flarm/Oudie
Seat Adjustment	Front seat seat-back base can be adjusted forward or back. Backrest angle can be adjusted by moving knob on right side of cockpit forward or back. Back seat is not adjustable. Use the Duo cushions for additional adjustment and comfort.	
Control Column	Standard	
Ventilation	Black knob on top right of front instrument panel. To open pull back. There are outlets on the right canopy rail of each cockpit, turn to adjust.	
Trim	Green knob on left side of the cockpit, move toward the centre of the glider, then forward or back.	
Wheel Brake	On control column only. The glider can therefore be landed with full brake and flap. When operating the wheel brake, if there is sufficient clear runway in front, ease off the wheel brake before the glider stops so that it doesn't nose over onto the nose wheel.	
Tow Rope Release	Nose and belly hook. Conventional yellow handle.	
Water Ballast Lever	Black lever on right side in the front cockpit. Forward is closed, back is open.	
Undercarriage Lever	Grey handle on right side, front and rear. The undercarriage can be operated from either seat, but the detents are in the front only and care is needed to ensure that it is locked in position.	
Airbrake Lever	Single blue lever on left side operates both brakes and landing flaps.	
Rudder Pedal Adjustment	Front seat, conventional adjustment handle on right side of control column, can be adjusted in flight. Rear seat, adjustable on the floor pan, not adjustable in flight.	
Battery	On the floor in front of the rear seat. There are two dedicated and labelled GRL batteries.	

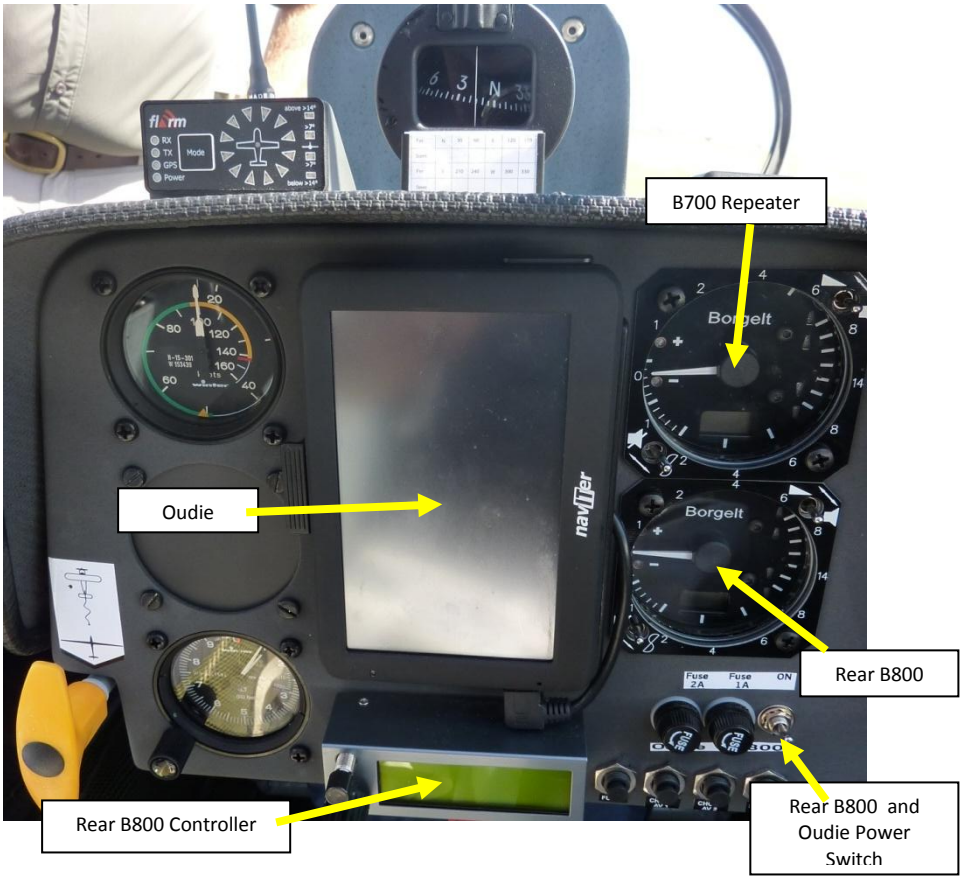
VH:GRL is fitted with a Borgelt B700 standard TE vario with battery backup incase of power loss and a repeater dial for the back seat. There are also two completely independent Borgelt B800 varios in the front and back seats. These give speed to fly commands as well as basic navigation using the B800 controller. For first flights or simple operation it is recommended to turn both B800 vario volumes down and fly off the B700 vario alone. Pilots flying solo can also turn off the rear B800 by using the power switch on the rear instrument panel. To use the B800 vario read the manual and use the volume of the B800 in use (e.g. if using the rear B800, have the volume on that one turned up and the front B800 turned down).

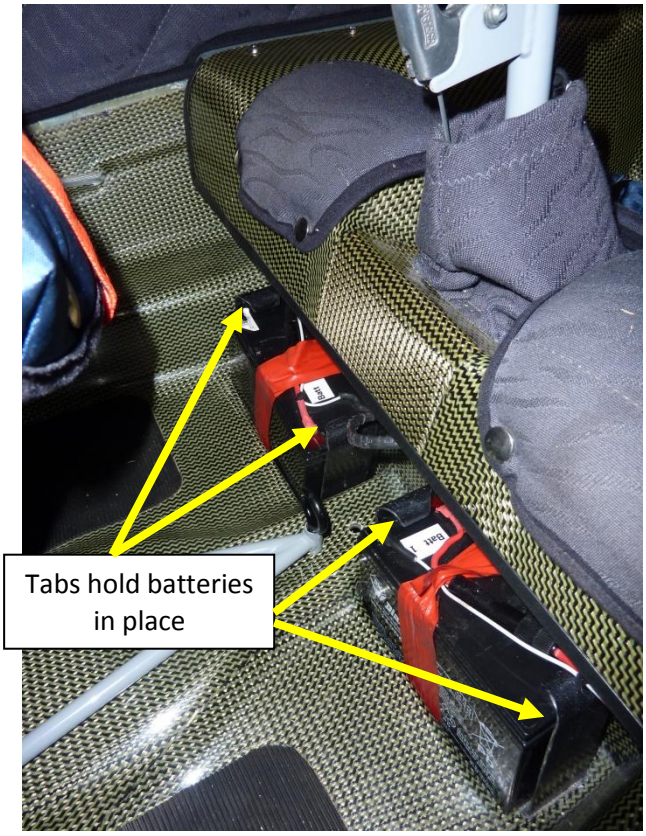
Front Instrument Panel





Rear Instrument Panel

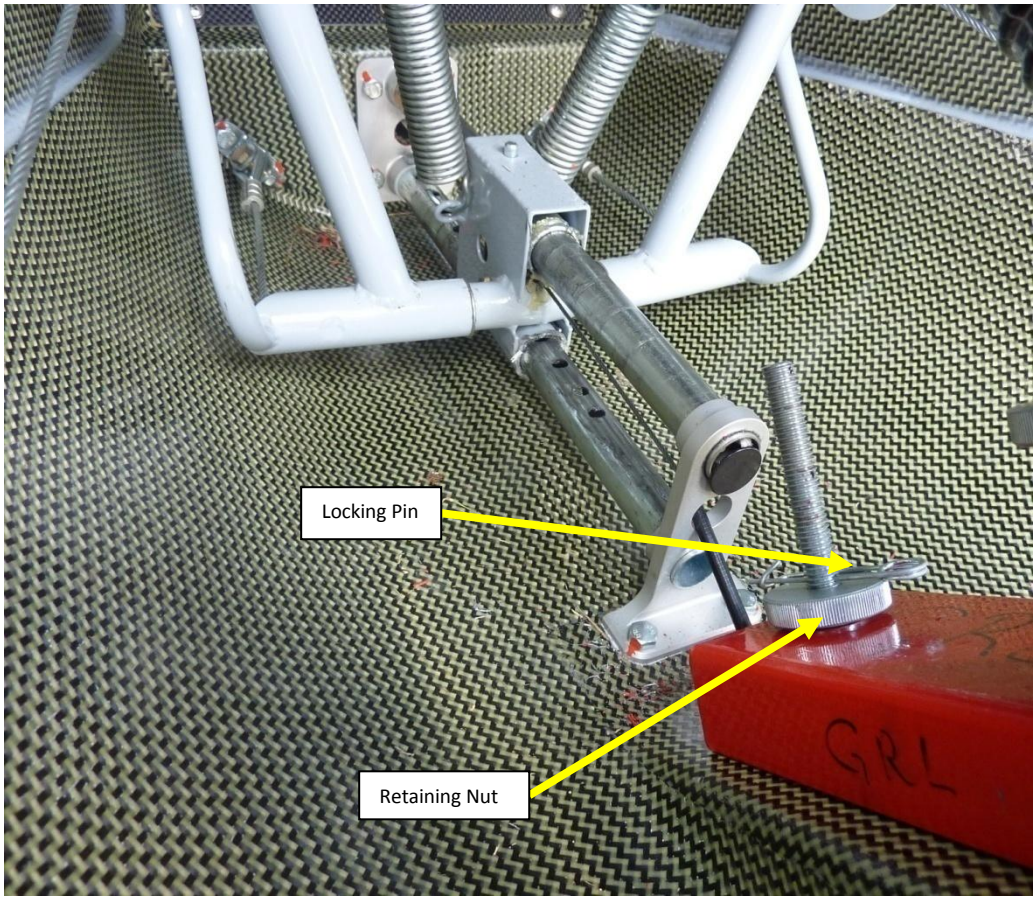




Trim Ballast

The trim ballast mount below the front instrument panel holds up to 3 lead plates which weigh 3.7kg each. The plates are to be fitted here only. Make sure BOTH retaining nuts are done up tightly and BOTH locking pins are locked correctly.

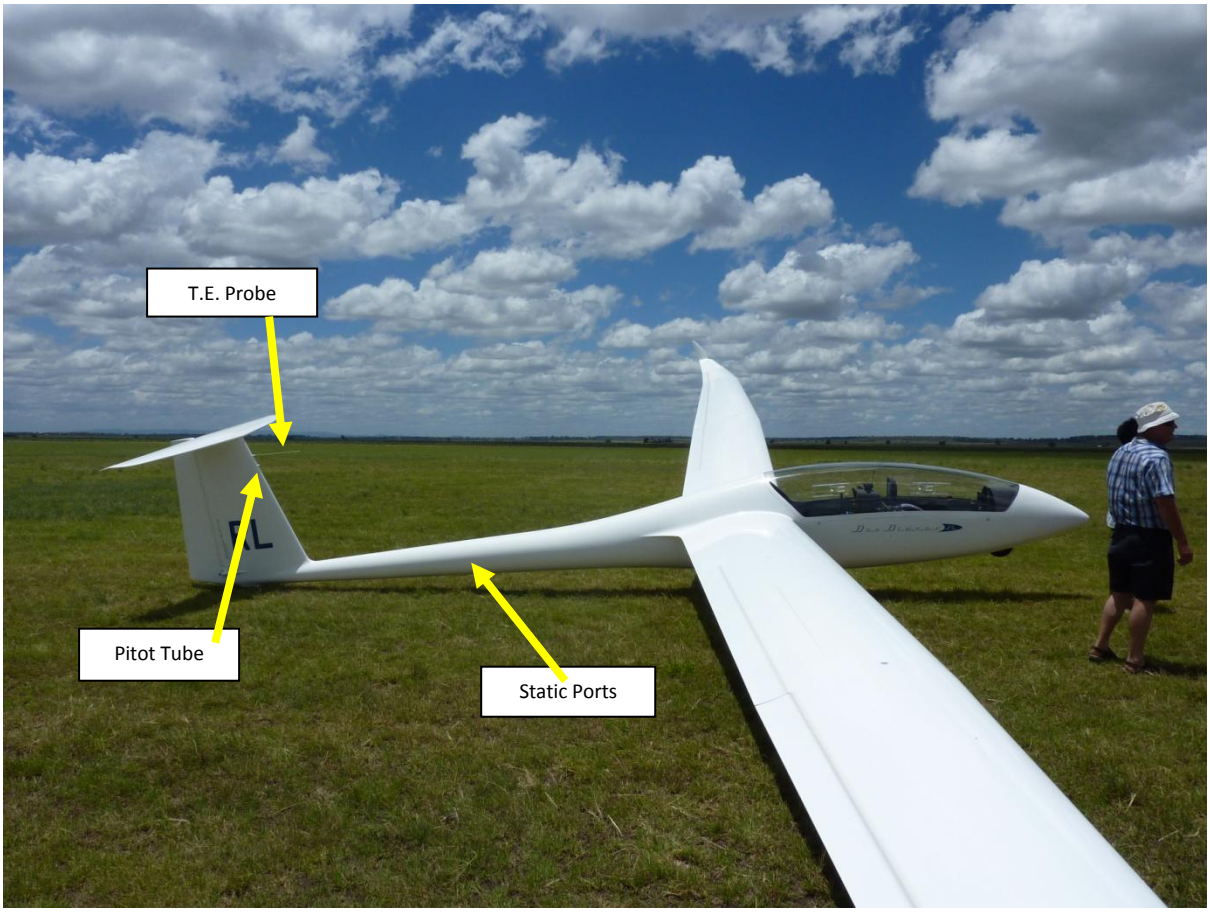
1 lead plate reduces the front seat minimum weight by 5 Kg.
2 lead plates reduce the front seat minimum weight by 10 Kg.
3 lead plates reduce the front seat minimum weight by 15 Kg.



Daily Inspection notes

In addition to the normal daily inspection routine:

- Tyre Pressures: Main Wheel: 57 psi
  Tail Wheel: 43 psi
  Nose Wheel: 43 psi
- Main Pin: One Pin with spring loaded lock.
- Check ballast compartment under the front instrument panel.
- Always check TE probe, Pitot tube and Static Ports for blockages from wasp nests.
- Ensure tailplane is locked in at the front and the elevator has full deflection up and down.
- Evidence of heavy landings or improper rigging can show up as cracks in the skin of the wing root. Check for cracks in the paint where the spar stub exits the wing.
- Check wingtips are correctly locked, the top of the locking pin should be 2 mm below the wing surface. Use the Rigging tool to push the pin up from underneath. The tool can be found in the rear seat pocket and MUST ALWAYS be put back after use.
- Check the operation of the trailing edge flaps.



Glider Accessories and Storage

Accessories

Duo Discus GRL has a canopy cover. The cover must be used when the glider is not in use and make sure the canopy is CLEAN first. Make sure to attach the straps underneath the fuselage. When the glider is being flown, store the cover in the baggage compartment in the glider. Care must be taken to ensure the cover is kept clean as any dirt will scratch the canopy. Also ensure the canopy is clean before using the cover for the same above reason. If the canopy is dusty, it is better to leave the canopy cover off until it is cleaned.

Tow out gear under construction.

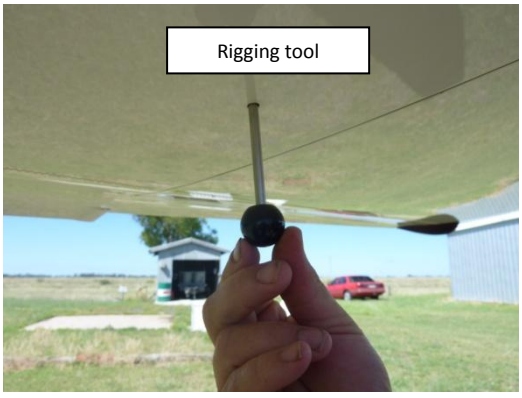
Storage

GRL is in the main hangar at the western end, facing the tug hangar. It is at the front and needs the tips fitted and removed every day. This brings some new requirements. There are no skids on the main wing panel so the wing tip CANNOT be put on the ground until the tips are on.

To put the tips on, clean and grease the pins, on both the main wing and the wingtip, then attach the wingtip. The looking pin doesn't spring up easily, it should be about 2 mm below the surface of the wing when it is correctly locked in.

It needs some gentle persuasion with the rigging tool from underneath. Hitting the tool with your hand is enough force to move it to the correct position. Applying a reasonable amount of upward pressure on the wing tip makes it a lot easier. The locking pins will wear in and get easier over time.

Then clean off the old tape residue with a rag and cleaner and re-tape the winglet. Have someone else check the rigging and that the locking pin is correct and sign out in the DI book. TAKE CARE WITH THE WING TIPS, THEY SCRATCH EASILY!



Flight Characteristics

Controls:
All controls are light to the feel and are responsive. Airbrakes are affective and have little pitch change on the glider.

Aerotow:
Set trim one third of the way back. Raise tail and balance on main wheel when airspeed is gained ready for takeoff. The tail lifts quickly

Thermalling:
50 knots is a good guide. Slower in smooth thermals, faster at maximum all up weight. Steep angles of bank can be maintained without significantly increasing airspeed.

Cruising:
The Duo will allow a high cruising speed even without water. Up to 85 knots is possible before the sink rate becomes excessive, 95 knots if fully loaded. The Duo has a 46:1 glide ratio with best LD at about 54 knots.

Stalling:
The glider stalls in the conventional manner. Recovery is progressive forward movement of the stick until flying speed is returned. Stall speed is 29-39 knots depending on weight.

Spinning:
The Duo has typical spin characteristics and recovers easily with the standard spin recovery technique. Loss of height can be up to 600 ft.

Water Ballast:
Although the Duo can be landed with water ballast still on board, it is recommended to dump before landing. Water ballast must be dumped before temperature reaches 0 deg C. Dump time for full water is approx. 4 minutes. The glider has a tail tank to compensate for centre of gravity changes from the wing ballast. Follow placard limits.

Circuit and Landing:
- Use approach speed of 49 knots *(no wind)* minimum weight
  57 knots *(no wind)* maximum weight
- Setup finals approach for half airbrake
- Roll control is adequate for ground roll
- On ground roll when below stall speed, hold tail wheel on the ground by applying back stick. This will help with directional control and help to prevent the glider nosing over. Apply full back stick and take care when applying the wheel brake as the Duo has a tendency to “nose over” onto the nose wheel. If this stats to happen, ease off the wheel brake so the tail stays down, unless you are running out of runway.

Pilot responsibilities

- Understand how to DI the glider
- Understand how to operate the glider (including limitations)
- Understand how to fill and fly with water ballast (including limitations)
- Understand how to Rig / De-Rig the glider, including removing and fitting the wing tips
- Make yourself familiar with the Duo trailer

Enjoy your flight in the Duo