

Dornier Do J „Wal“



Flight Manual



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General information about the Do J

The Do J Wal was created from the basic variant Do GS I and II, from which the Do Wal 22, the widespread Do J Wal, and the 8.5t and 10t Wale emerged. The latter were only produced in small numbers and used as mail flying boats.

The first production version of the Do Wal was built in Marina di Pisa, Italy ("Whale 22" or also called "Pisa Whale", with the number "22" standing for 1922). In 1926, all machines still in flight were retrospectively unified into the "Do J Wal" series.

The Do J Wal is an all-metal monoplane flying boat with engines mounted on the fuselage in twin configuration. The attachment of the engines above, between the wings, which could be dismantled for transport purposes, enabled the greatest possible operational reliability, so that the flying boat could be safely controlled even with only one engine running. Thanks to this engine arrangement, the flying boat behaved like a single-engine landplane.

Initially the engines were air-cooled, but were replaced by less vulnerable water-cooled engines with radiators located between the two engines.

The fuel system held 1450 - 2000 liters of fuel, which was supplied to the two engines by means of a vane pump. To start the engines, the fuel was pumped in by hand. Then the vane pump was driven by the motors.

The Do J Wal could climb up to 4,500 meters, but was mostly flown well below this altitude due to weather conditions.

Thanks to the patented side fins on the fuselage, the flying boat had a high lateral stability.

The hull was keeled more at the back than at the front, which not only made take-off and landing easier, but also made it possible to do without wing flaps.

The tailplane was used for elevator and rudder control, which was carried out by the pilot using foot and hand wheel controls.

In addition to the pilot, there was also the co-pilot, who was mainly responsible for calculating the course, and an on-board mechanic.

The standard equipment of the machine included:

- a speedometer (airspeed indicator)
- two tachometers (rpm indicator)
- an altimeter
- a compass
- a fuel gauge
- a clock

The flying boat did not have batteries.

There was no illumination of the instruments, some of the instruments had a coat of paint that glowed independently in the dark. Lighting (passenger cabin, instruments) could be retrofitted.

The flying boat was mostly offered with double controls, but some also with single controls and, if desired, a radio system could be retrofitted.

Differences between Real and Simulation:

In real the engines were started hand propped by the mechanist. Therefore the mechanist stood by the side of the engine. Each engine, front and back, had a separate start module. Clutch. A crank was inserted into it and then the engine was turned on by hand. In order for the engine to ignite, the ignition switch in the driver's cab had to be turned on.

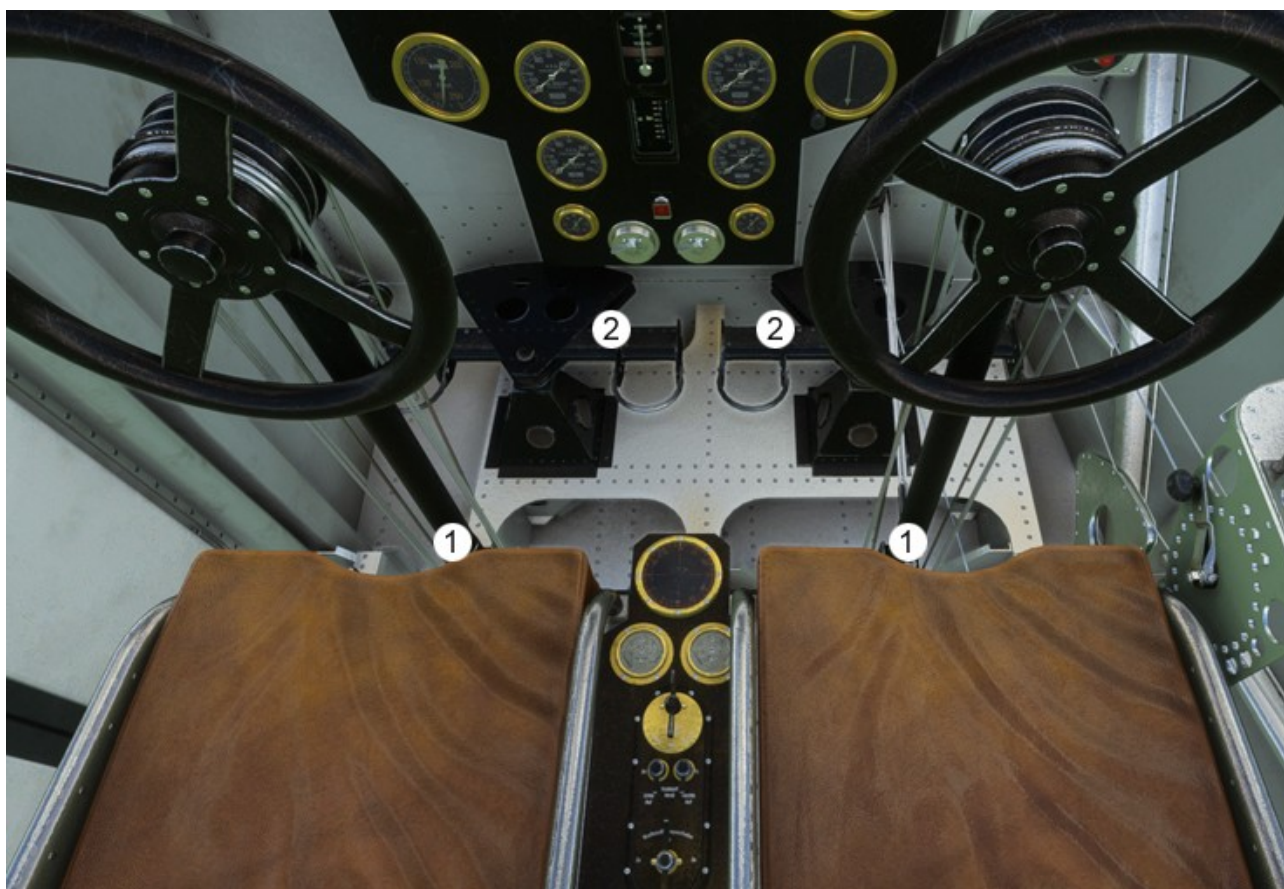
In the simulator we have made that a little more comfortable so we perform these two steps at once by turning the magneto.



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1. Common Systems

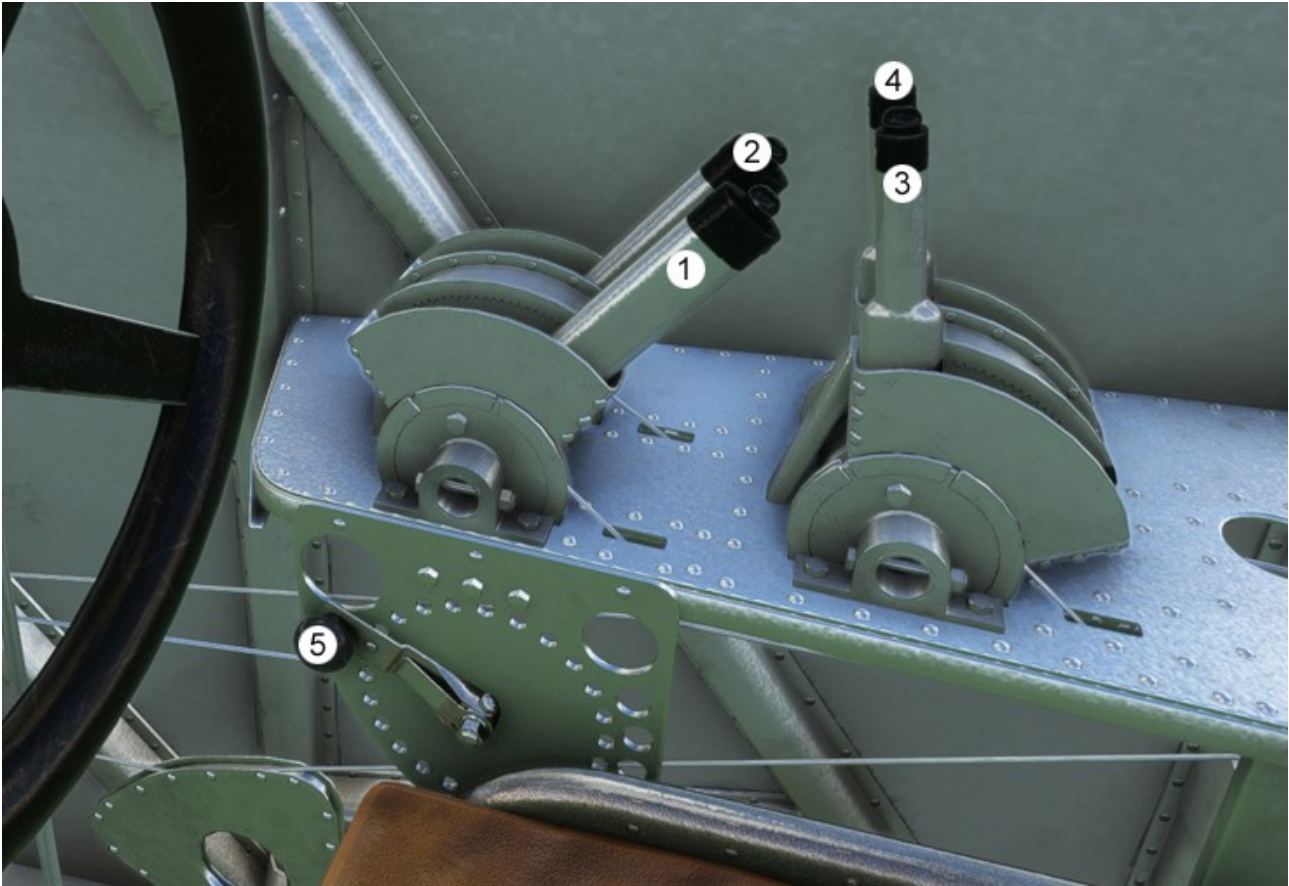
Yokes and Pedals



1	Yoke Hide Area	
2	Pedals	

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Levers



1	Throttle Lever Engine 1 (front engine)	
2	Throttle Lever Engine 2 (rear engine)	
3	Mixture Lever Engine 1	
4	Mixture Lever Engine 2	
5	Trim Lever	

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Fuel Control



1	Fuel Quantity Indicator (Left Tank)	
2	Fuel Quantity Indicator (Right Tank)	
3	Fuel Selector Lever	
4	Fuel Valve left (front Engine)	
5	Fuel Valve right (rear Engine)	
6	Fuel Shut-off Valve	
7	Magnetic Compass	

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Instrument and Cockpit Lighting

The “Cabina” has a batterie dependent instrument and passenenger cabin lighting.
The “N25” and “Plus Ultra” has on there instruments self lighting color, the are fluorescent.
The begin to light after dark.
No cockpit lights are available, only a flashlight, use “ALT + L” to enable/disable.

Fuel Pump



The Fuel Pumps (1) are driven by the engines.
If no engine is running, the fuel pumps don ´t work.

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2. Dornier Do J „Cabina“ (Passenger Wal)



TECHNICAL DATA

Length	17,25 m	56,59 ft	
Wingspan	22,50 m	73,82 ft	
Height	4,70 m	15,42 ft	
Wing area	97 m ²	1.044 sq ft	
Empty weight	3.500 kg	7.606 lbs	
Max. Take off Weight	5.600 kg	12.436 lbs	
Engine	2 × Rolls-Royce Eagle IX	395 PS	390 hp
Cylinder	12		
Fuel Quantity	1.450 Liter	383 Gallons	
Max. Airspeed	191 km/h	103 kts	119 mph
Cruise Speed	168 km/h	91 kts	104 mph
Max. Altitude	3.100 m	10.170 ft	
Crew	2 - 3		
Passengers	8 - 10		

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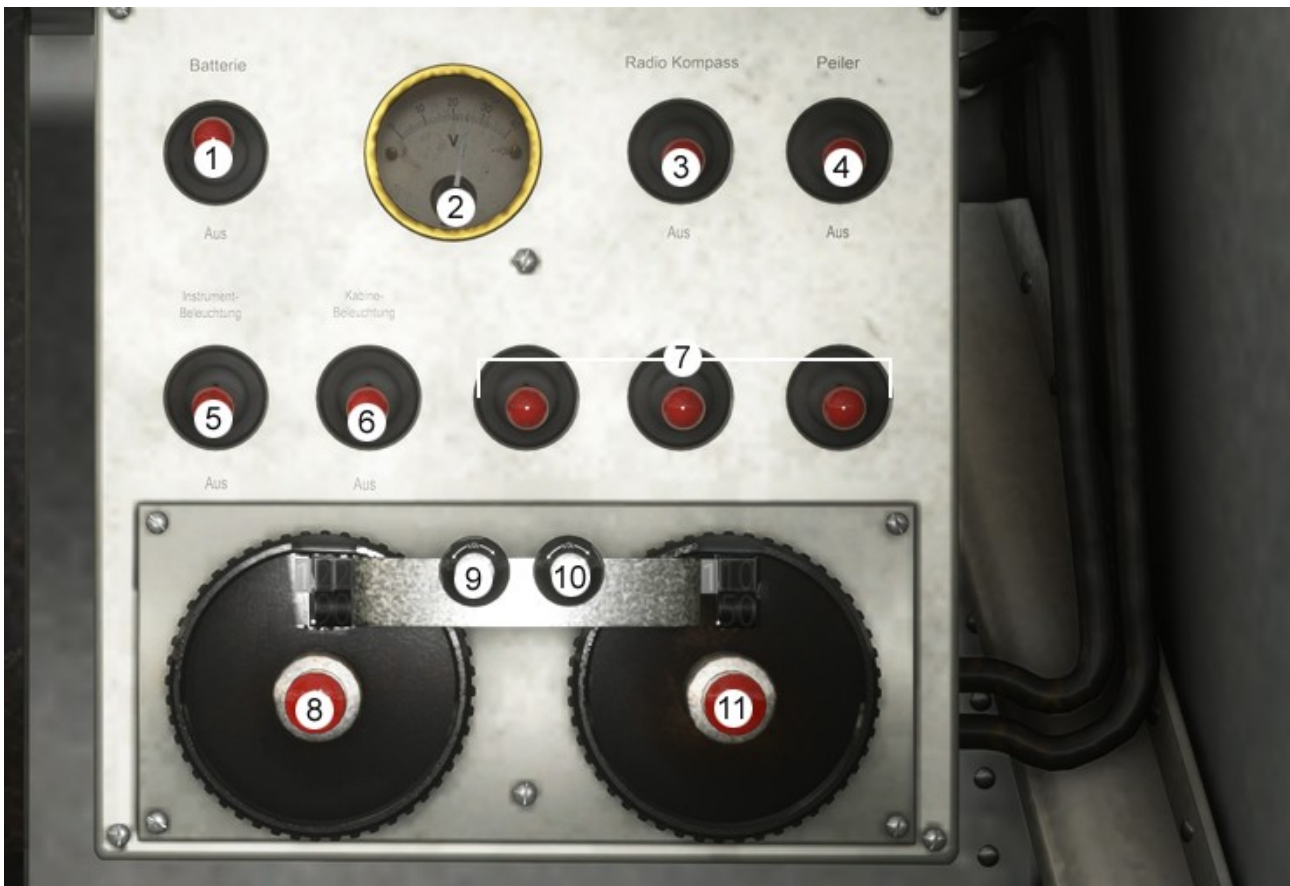
DESCRIPTION MAIN PANEL



1	Clock	
2	RPM Indicator Engine 1	
3	RPM Indicator Engine 2	
4	Altimeter with calibration knob	
5	Airspeed Indicator	
6	Radiator Engine 1	
7	Bank Indicator	
8	Radiator Engine 2	
9	Radio Compass	
10	Oil Temperature Engine 1	
11	Pitch Indicator	
12	Oil Temperature Engine 2	
13	Netzausschalter (Emergency Cut Off switch)	
14	Oil Pressure Engine 1	
15	Oil Pressure Engine 2	
16	Starter Engine 1 (Front Engine)	
17	Starter Engine 2 (Rear Engine)	

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DESCRIPTION CONTOL BOX



1	Battery Master Switch	
2	Battery Volt Indicator	
3	Radio Master Switch	
4	Radio Direction Finder Switch	
5	Instrument Lighting Switch	
6	Passenger Cabin Lighting Switch	
7	INOP	
8	Com 1 Setting Knobs	
9	Com 1 Volume Knobs	
10	NAV 1 Volume Knobs	
11	NAV 1 Setting Knobs	

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DESCRIPTION RADIO COMPASS

Note: This function is only available in the Dornier DoJ “Cabina”.



The Radio Compass has two operating modes: “Manual” or “Radio Dependent”.

Manual:

In order to set a course manually, it does not require any power supply from the battery. The radio main switch does not have to be switched on. The RADIO STATUS SWITCH (3) must be set to “MAN”. After a course has been calculated, it can be set using the COURSE SETTING KNOB (5). If the flying boat drifts off the set course due to wind conditions, the pilot sees this on the basis of the course needle (4) and can correct the flight attitude.

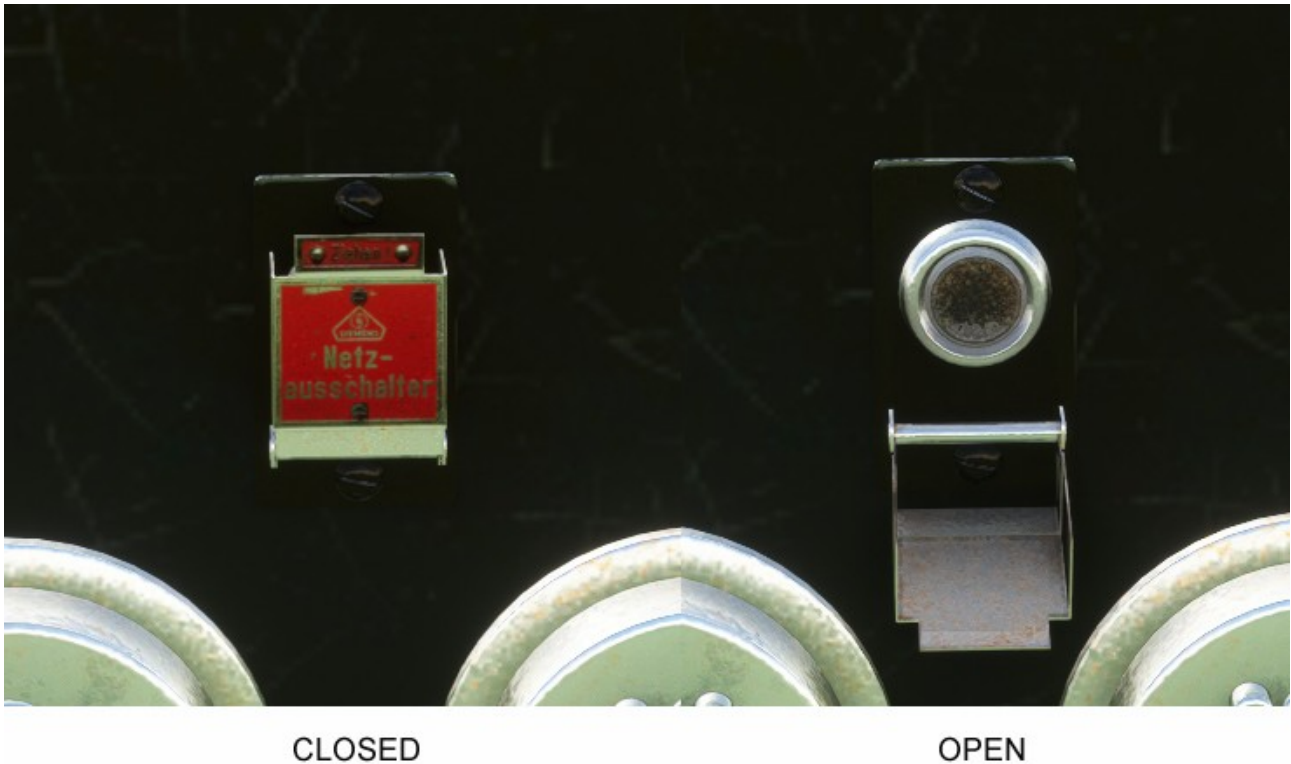
Radio dependent:

The BATTERY (1) and the RADIO MAIN SWITCH (1) must be switched on for this. The RADIO STATUS SWITCH (3) must be set to “VOR”. If a current course signal is set in the NAV radio and this is received, this is automatically transmitted to the radio compass (4) and the pilot can orientate himself using the position of the course needle.

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DESCRIPTION NETZAUSSCHALTER (Emergency cut off switch)

Note: Do not use in normal flight condition.



The “NETZAUSSCHALTER” interrupts all flight relevant systems. The button must be pushed in (“On”, this is standard if the cover is closed), otherwise the fuel supply to the engines is stopped and all power is cut off.

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CABINA HATCHES

The Cabina Wal has two hatches that can be opened/closed with the mouse.

Note: To do this you must sit inside the cockpit.



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3. Dornier Do J „Plus Ultra“



TECHNICAL DATA

Length	17,25 m	56,59 ft	
Wingspan	22,50 m	73,82 ft	
Height	4,70 m	15,42 ft	
Wing area	97 m ²	1.044 sq ft	
Empty weight	3.450 kg	7.606 lbs	
Max. Take off Weight	5.450 kg / 7.000 kg	12.015 lbs	15.432 lbs
Engine	2 × Napier „Lion V“	450 PS	444 hp
Cylinder	12		
Fuel Quantity	2.000 Liter	528 Gallons	
	4.000 Liter	1056 Gallons	
Max. Airspeed	200 km/h	108 kts	124 mph
Cruise Speed	170 km/h	92 kts	106 mph
Max. Altitude	4.500 m	14.764 ft	
Crew	3 - 4		
Passengers	0		

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Background information about the Do J “Plus Ultra”

The Plus Ultra, which means “always further” in Latin, was built in Pisa, Italy, in 1925. Its origin was the military Do J variant, it was given the serial number 40 and was transferred from Pisa to Barcelona with the identification "M-MWAL".

In the Spanish Air Force it received the service number “W12”. It was later renamed “Plus Ultra” by Franco.

To increase the range, the tank capacity of the Plus Ultra has been expanded to 4,000 liters.

On January 22, 1926, Ramón Franco, his co-pilot Julio Ruiz de Alda Miqueleiz, naval lieutenant Juan Manuel Duran and mechanic Pablo Rada took off from Palos de la Frontera, in Huelva, Spain on the first transatlantic flight, who would later make history.

On the first leg to Las Palmas, Canary Islands, they also took photographer Leopoldo Alonso with them to film the start of the trip. The journey takes eight hours. On January 26, 1926, the Plus Ultra set off towards Porto Praia (Cape Verde Islands), the end of the second stage, which lasted nine hours and fifty minutes.

On February 9, 1926, after a total of 10,270 km, the Plus Ultra landed in Buenos Aires after 59 hours and 39 minutes.

The plane did not return to Spain with the successful fliers. King Alfonso XIII. donated it to the Argentine Navy, who used it as a mail plane.

It later came back to Spain where it was restored and is now on display at the Enrique Udaondo Provincial Museum in the city of Luján, Argentina.



The individual flight stages of the Plus Ultra transatlantic crossing.

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DESCRIPTION MAIN PANEL



1	Fuel Pressure Engine 1	
2	RPM Indicator Engine 1	
3	RPM Indicator Engine 2	
4	Fuel Pressure Engine 2	
5	Pitch Indicator	
6	Radiator Engine 1	
7	Airspeed Indicator	
8	Bank Indicator	
9	Attitude Indicator	
10	Radiator Engine 2	
11	Oil Temperature Engine 1	
12	Oil Pressure Engine 1	
13	Oil Pressure Engine 2	
14	Oil Temperature Engine 2	
15	Starter Engine 1 (Front Engine)	
16	Altimeter with calibration knob	
17	Clock	
18	Starter Engine 2 (Rear Engine)	

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4. Dornier Do-J N25 “Amundsen Wal”



TECHNICAL DATA

Length	17,25 m	56,59 ft	
Wingspan	22,50 m	73,82 ft	
Height	4,70 m	15,42 ft	
Wing area	97 m ²	1.044 sq ft	
Empty weight	3.430 kg	7.562 lbs	
Max. Take off Weight	5.430 kg	12.971 lbs	
Engine	2 × Rolls-Royce Eagle IX	360 PS	355 hp
Cylinder	12		
Fuel Quantity	2.000 Liter	528 Gallons	
Max. Airspeed	185 km/h	100 kts	115 mph
Cruise Speed	155 km/h	84 kts	96 mph
Max. Altitude	3.700 m	12.139 ft	
Crew	3 - 4		
Passengers	0		

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Roald Amundsen starts with the N25 on the first flight expedition to the North Pole

Norwegian polar explorer Roald Amundsen used two Dornier seaplanes in his attempt to reach the North Pole on May 21, 1925. The N-24 and N-25 converted to Amundsen's imagination for this purpose. In addition to the normal instrumentation, they received a sextant and an anemometer.

Accompanying Amundsen were Lincoln Ellsworth, pilot Hjalmar Riiser-Larsen and German Dornier engineer Karl Feucht, as well as two other team members.

Both aircraft had three men on board and despite the 500 kg overload on both machines, the take-off went smoothly.

After around 8 hours of flight, an engine failure in the N-25 brought the expedition to an abrupt end. During the emergency landing, the two planes landed several miles apart without radio contact, but the crews were able to reunite. However, the N-24 was damaged beyond repair upon landing in the ice, leaving only the N-25.

For over three weeks, Amundsen and his crew worked to prepare a runway for takeoff from the ice. They shoveled away around 500 tons of ice and snow using only a pound of the daily food ration. In the end, six crew members were packed into the N-25. Riiser-Larsen took off and they were able to return.

His two planes landed at the northernmost latitude, 87° 44' north, that an airplane had ever reached up to that point.

DESCRIPTION MAIN PANEL



1	Starter Engine 1 (Front Engine)	
2	Starter Engine 2 (Rear Engine)	
3	Oil Pressure Engine 1	
4	Fuel Pressure Engine 1	
5	Fuel Pressure Engine 2	
6	Oil Pressure Engine 2	
7	Oil Temperature Engine 1	
8	RPM Indicator Engine 1	
9	Pitch Indicator	
10	RPM Indicator Engine 2	
11	Oil Temperature Engine 2	
12	Radiator Engine 1	
13	Bank Indicator	
14	Radiator Engine 2	
15	Airspeed Indicator	
16	Clock	
17	Altimeter with calibration knob	

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DESCRIPTION ANEMOMETER



For measuring the wind speed.

N25 HATCHES

The N25 Wal has two hatches that can be opened/closed with the mouse.



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5. TUTORIAL FLIGHT

1. Flight from Friedrichshafen (EDNY) to the Geneva (LSZG)

Flight model:	Dornier Do J Cabina
Departure:	Lake Constance
Destination:	Geneva Lake
Flight time:	2 hours
Distance:	~200 nm
Fuel used:	168,96 Gallones (32%)

Since we cannot load our flight directly on the water of Lake Constance, we start 1500 ft (457 m) above the water.

Flight configuration:

The screenshot shows the 'WEIGHT AND BALANCE' configuration screen for a Dornier Do J Cabina aircraft. The interface is divided into several sections:

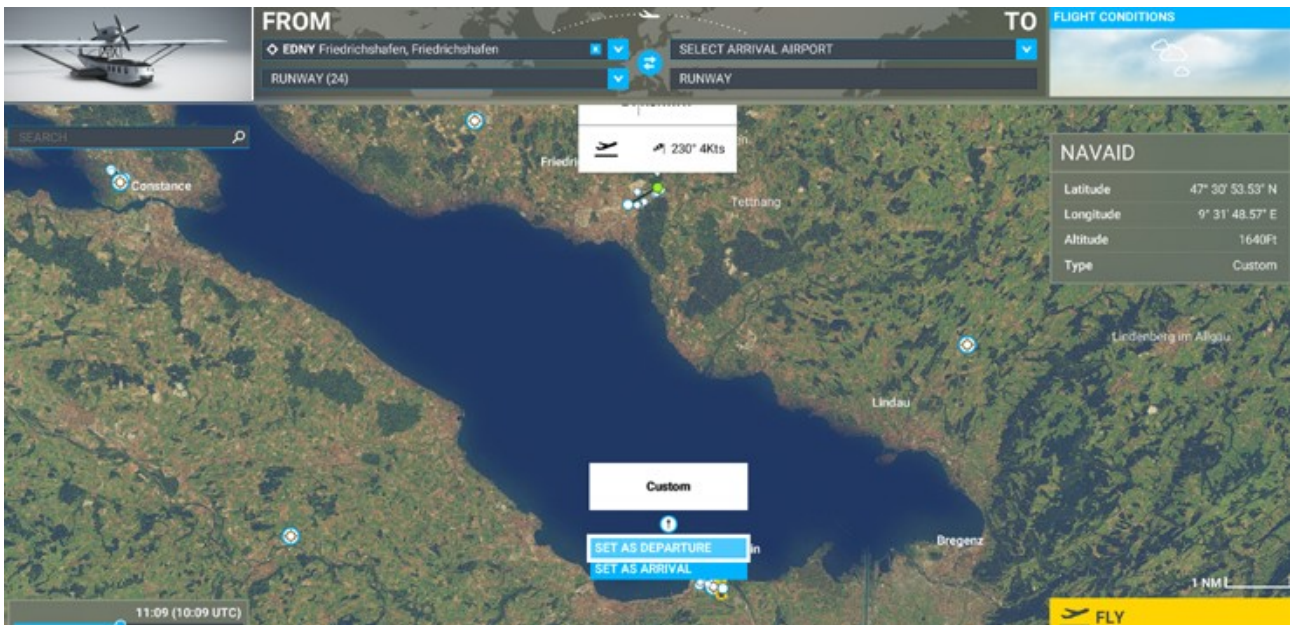
- FROM / TO:** Select departure and arrival airports and runways.
- FLIGHT CONDITIONS:** A button to access flight condition settings.
- WEIGHT AND BALANCE (Active):**
 - DISPLAY FUEL AS:** A toggle switch set to 'GAL'.
 - FUEL:** Sliders for 'LEFT MAIN' and 'RIGHT MAIN' are both set to 50.00%, resulting in 132 gal each.
 - PAYLOAD:** A slider is set to 13.50%.
 - PILOT:** 170 lb
 - CO-PILOT:** 170 lb
 - PASSENGER 3:** 0 lb
 - PASSENGER 4:** 0 lb
 - BAGGAGE:** 40 lb
- EMPTY CG POSITION %MAC:** A slider is set to 27.90%.
- Center of gravity limits:**
 - Center of gravity: 25.79% MAC
 - CG forward limit: 7.50% MAC
 - CG aft limit: 31.00% MAC
- Diagram:** A top-down view of the aircraft showing the center of gravity (CG) position relative to the Mean Aerodynamic Chord (MAC) limits: LEMAC FWD LIMIT, AFT LIMIT, and TEMAC.
- Summary Table:**

Empty Weight / -	7 LB / -
Fuel / Max Allowable Fuel	1 LB / 3 LB
Payload / Max Payload	380 LB / 2 LB
Total / Max Takeoff Weight	9 LB / 12 LB

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Set Departure Airport: EDNY

Now enlarge the map and set a custom departure near to LSZR, Altenrhein. This give us enough time to fly an approach to the bay of Friedrichshafen.



After our flight is loaded, we advance the throttle levers until we reach about 1500 RPM and trim our flying boat to get a stable flight attitude.

Now open the VFR card and begin with the approach to the bay of Friedrichshafen.

Reduce RPM to ~1200 and sink with 300 – 500 ft/min (91 m/min – 152 m/min). Hold the airspeed under 90 knots (167 km/h).



For final approach, reduce speed to 60 knots (111 km/h). Before touching down, set the throttles to idle and pull the flying boat up slightly.

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Fuel Valve Left	Closed
Fuel Valve Right	Closed
Mixture Lever left and right	Closed
Fuel Shut-off Valve	Closed
Radio Master Switch	Off
Battery Master Switch	Off

Now we are ready for the tutorial flight.

Check fuel Quantity, should be not less than 50%. Otherwise refuel.

Starting Engines	
First we start the rear engine:	
Fuel Shut-off Valve	Open
Fuel Valve right	Open
Mixture Lever right	Full open
Starter Engine 2	Rotate and hold
After starting Engine 2:	
Check Water Temperature	< 50°C
Check Oil Temperature	< 50°C
Check Oil Pressure	> 35 psi
Now we start the front engine:	
Fuel Valve left	Open
Mixture Lever left	Full open
Starter Engine 1	Rotate and hold
After starting Engine 1:	
Check Water Temperature	< 50°C
Check Oil Temperature	< 50°C
Check Oil Pressure	> 35 psi

Roll them to a good take-off position with direction to the West.

Battery Master Switch	As required
Radio Master Switch	As required
Instrument Lighting	As required
Altimeter	Checked and set

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Take-off	
	Apply full throttle to launch and pull the yoke toward you when exceeding 80 knots (148 km/h).
	Note that a flying boat can get stuck on the water if you don't catch a good wave. Move the yoke back and forth to take off. The heavier you are, the more noticeable this effect is.
Climb	
RPM	~ 1500 - 1600
Airspeed	90 - 95 kts (167 – 176 km/h)
Vertical Speed	300 – 500 ft/min (91 m/min – 152 m/min)
Check Water Temperature	< 97°
Check Oil Temperature	< 105°
Check Oil Pressure	< 50 psi

Climb to 3500 ft (1067 m) and fly west to the island of Mainau.
 Turn left, course 260°, and fly down over the Untersee to the mouth of the Rhine.
 Here we leave the lake of constance and follow the Rhine in the direction of the Rhine Falls, which we will reach after about 35 minutes.

Cruise	
RPM	~ 1500
Airspeed	91 kts (169 km/h)
Check Water Temperature	< 97°
Check Oil Temperature	< 105°
Check Oil Pressure	< 50 psi

Now we also want to use our direction finding during the flight.

Note: Direction finding is only available if we get a signal from a radio station.
 In order to be able to use radio direction finding, we need power from the battery.

Battery Master Switch	On
Radio Master Switch	On
Radio Direction Finder Switch	VOR
NAV 1 Frequency	set 114.20 for VOR TRA (Trasadingen)

However, we continue to follow the course of the Rhine and use radio direction finding only for rough orientation.

As long as the weather is kind to us and we have a view of the river, we fly by sight.

After a flight time of 40 minutes we come to the city of Koblenz, here we meet the river Aare.

Which we now follow in a southeasterly direction (about 188°).

After we have also left the VOR TRA behind us, we set NAV 1 to VOR WIL (Willisau) 116.90.

We fly further down the Aare, after a flight time about 50 minutes we pass the city of Aarau and have VOR WIL on our left. Our course should be about 240°.

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Should cloud fields unexpectedly appear during the flight, we will sink under them if possible so that we can continue to follow the river.

After a flight time of 1 hour and 15 minutes we see Lake Biel in front of us, and shortly afterwards Lake Neuchâtel.

We fly over Lake Neuchâtel on a course of 229°. For support we use the direction finder again, we set the VOR SPR (St. Prex) 113.90.

At the southern end of the lake we turn to 217° and fly over land again. Lake Geneva can already be seen in the distance.

We reduce RPM and descend to 2500 ft (762 m) at about 300 ft/min (91 m/min).

After 1 hour and 50 minutes we are above Lake Geneva and begin the landing approach.

Descent		
RPM		~ 1200
Vertical Speed		300 – 500 ft/min (91 m/min – 152 m/min)
Airspeed		~ 80 kts (148 km/h)
Check Water Temperature		< 97°
Check Oil Temperature		< 105°
Check Oil Pressure		< 50 psi
Altimeter		Checked and set

Approach and Landing		
Airspeed		reduce speed to 60 kts (111 km/h)
Before touching down, set the throttles to idle and pull the flying boat up slightly.		