



Version

3

**FREEWARE PROJECT DORNIER WAL**

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Flight simulation for Microsoft Flight Simulator 2002 ©



# Greenland-Whale

## D-2053

FLIGHTSIMULATION FOR MICROSOFT FLIGHTSIMULATOR 2002 ©

# The Greenland-Whale D-2053

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## Installation

*In version 3 we use only a simple zip archive for distribution*

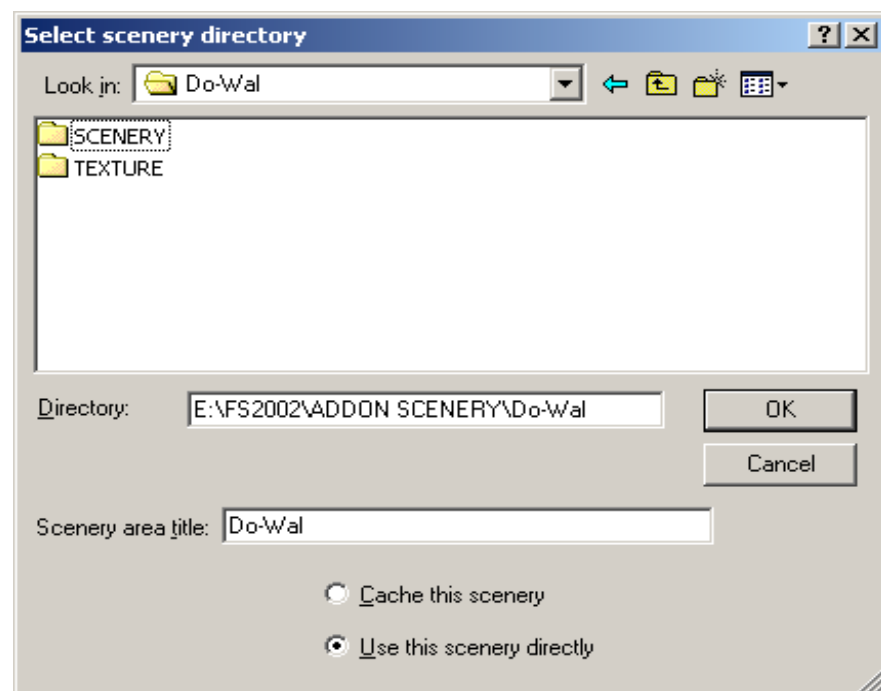
**P**rior start of the installation please check, whether MS Flight Simulator 2002 is installed in the Standard or in the Professional Version. This AddOn will not work in any previous versions.

Extract the files from the zip file

Extract the files into the root of your flight simulator folder with the option of “Use folder names”

Add the Whale-Scenery to the library

Go to the scenery-library from the FS2002 and add the new whale scenery. You find it in the folder “Addon Scenery” under the main folder of FS2002.



## The History

*In this chapter we are dealing with the historical background. We explain the development of the Dornier – Wal, also we highlight the life of Wolfgang von Gronau and his around the world tour.*

The next chapters are statements picked from the books listed in the attachment. Unfortunately this books are no longer available in the shops, a search in special book shops dealing with historical issues may lead to a success.

## The history of the Dornier Wal

*(Taken from the attachment of the book „Pionierflüge mit dem Dornier Wal“)*

### The role of the Wal

The name Dornier-„Wal“ is linked to an important part of the history and development of the flying boats and their use. This name is closely linked with the most important pioneer flights of ocean crossings, either, for daring special flights like ocean crossings, ice sea expeditions and similar or for the first ocean route exploration for the regular airline traffic. The fast development of the seaplanes as a travel vehicle started with the appearance of the Dornier-Wal and was likely made possible by the Wal. The existence of a flying boat with the capabilities of the Wal established the possibilities to make the wide spread practical experience, allowing for further improvement of air travel over seas and gave the influence for this direction. Within one and a half decade the Dornier-Wal was operated on almost all locations of the seas around the world, testing the different climatic conditions and operating limits.

## The Beginning

The Dornier-Wal already resembled the said above at its very first appearance based on practical tests and long term research and development. The result was a „flying boat“, in which construction and perfect flight performance was joined to lead to a never before seen sea worthiness. The all metal construction, developed by Dornier as first, the stability on water due to the wing pontoons aside of the boat hull and central tandem style located engines as well introduced by Dornier to the aircraft design are marks, which ensured the dominance. Due to the tandem location of the engines the centre of gravity of the engines was coincident with the CoG of the aircraft in vertical, which allowed for a change of engine types ranging from 260 to 850 Hp without impact on the CoG. Thus adapting the increased engine power due to new developments was possible without changes on the rest of the aircraft. On August 1st 1919, the first Wal-Flyingboat (former named Gs-I) equipped with 2 x 260 Hp Maybach engines performed his maiden flight. After completion of test flights it was handed over to the Swiss Aerocompany (Schweizerischen Luftverkehrsgesellschaft) „Ad Astra“ (Zürich) in autumn 1919. There it performed several passenger and demonstration flights on the Swiss lakes, gathering experience and further knowledge. On December 10th 1919, the flying boat was returned to its home base, after being moored for months without any hangar. Proofing the evidence of the rugged resistance against weather impact, supported by the all metal construction.

On February 3rd 1920 the Gs-I performed a flight from Friedrichshafen (Lake Constance) to Potsdam(near Berlin) within only 5 hours. The first time a seaplane has passed a route of more than 600 km over land, with no chance to touch down on water for a stop over. The following demonstration flights in Holland have been continued in the scandinavian countries, however the political circumstances of that time period caused the sinking of the flying boat near Holtenau in spring 1920. Immediately all the experience was used to prepare the next generation drawings, completed by end of 1920. The Gs-II, later named Dornier-Wal was developed.

## The Manufacturers

Caused by the political situation and the restriction of aircraft manufacturing in Germany, a funding of a manufacturing plant in Italy (the company Costruzioni Meccaniche Aeronautiche S.A. in Marina di Pisa) was initialized, thus finally in the year 1922 the first Wal was produced.

Italy,	since 1922 by Costruzioni Meccaniche Aeronautiche Marina di Pisa.
Japan,	since 1924 by Kawasaki Dockyard Ltd. In Kobe.
Spain,	since 1927 by Construcciones Aeronautica S.A. in Madrid and Cadiz.
Holland,	since 1927 by Aviolanda, Maatschappij voor Vliegtuigbouw, Papendrecht.
Switzerland,	since 1927 by A.-G. für Dornier-Flugzeuge in Altenrhein.
USA,	since 1929 by Dornier-Company of America.

By all this companies more than 200 Wal-Flyingboats were built, which have seen service in Navy and civil aviation all around the world.

## The Flying Boat

The Dornier-Wal was a rigid wing two engine flying boat, built up as „one and a half strut“, where the small lower wing served as part of the boat too. This patented lower wing provided the required roll stability in the water and was organically smoothed to the boat hull, therefore the strutted pontoons usually mounted could be left away and improved the seaworthiness. The flying boat was like all Dornier aircraft an all metal construction, however some areas of the wing and stabilizer were covered with fabric. The first Wal-Flying boats did have a flat and almost circular bow, later on with experience gained a sharpened bulkhead shape was introduced to build up a keel which towards the rear was transformed into a flat bottom. The centre part of the boats bottom was formed to a longitudinal step, reducing the bumps during takeoff run in heavy sea. A lateral step with moderate height was running all across the boat hull. Behind this main step the hull bottom was formed strongly upwards and ended in a tall tail fuselage, which was extending behind the vertical stabilizer providing protection. For stability of water manoeuvring and a more smooth touchdown a sharply formed keel was mounted behind the main step.

The lateral backbone of the boat was formed by 25 bulkheads, mostly of a thin frame type, some which had to transfer high loads were constructed as a framework. The both main bulkheads were aligned with the planes of the wing spars and extended towards the spars of the wing floats. Six bulkheads were built to serve as watertight seals, splitting the boat hull into seven compartments. The position of this cross bulkheads was selected in a order to allow floating of two individual rooms without the danger of drowning or loss of stability. Similar to the boat hull the wing floats did have bulkheads too.

The wings had a parallel leading and trailing edge over the almost entire wingspan, ending in elliptical formed wingtips. The wings were connected to the central wing which also carried the engines block. The wing assembly was built up by two spars made from steel framework and cross linked by ribs. The rectangular fields were crossed out by pre-stressed steel wires.

# Wolfgang von Gronau

*(Excerpt from the annex of the book „Pionierflüge mit dem Dornier Wal“)*

## Before the Wal

Wolfgang von Gronau was born on 25th February 1893 in Berlin. He spent his youth Thorn, where his father, a General of the Artillerie von Gronau, acted as Gouverneur. He graduated the high school (in German, Abitur) and entered the naval service of the Kaiserliche Marine as a cadet in 1911.

Begin of 1915 already a Navy Lieutenant he was commanded to II. Naval Flightcorps (Seefliegerabteilung), Seeflugstation Norderney, however kept this a secret against his family, because his older brother was killed in action as pilot short before. Towards his parents he stated in a letter to serve in a Navy Airship corps, which at that time was considered much more safe than aircraft with the unreliable engines. First he became an „undercover“ pilot. But already on May 1<sup>st</sup> 1915 he was known to be the first of his group to be awarded with the Seefliegerabzeichen, afterwards he served as reconnaissance pilot in the North Sea stationed on the island of Borkum, in November 1915 he was station leader on an early aircraft carrying ship the „Answald“ in the Kurland. In December he was shot down near Riga by a Russian warship, he could escape to the shores of Kurland, held by German cavalry.

In February 1916 he was ordered to a special command located at Warnemünde, where the first torpedo bombers, designed by Heinkel (working for Hansa-Brandenburg aircraft factory at that time), underwent test flights. He was working as a test and certification pilot for this seaplane test centre in Warnemünde. At this time he already tested a gyro horizon for the use in torpedo bombers, made by Anschütz. This can be considered the first and tiny application of instrument flight, which nowadays is, is the standard in military and civil aviation.

Further highlights of his career:

1917 1st Adjutant of the North Sea Flightcorps (Nordseefliegerabteilung). 1918 officer of the admiralty at the air force commander of the sea forces.

During a stay at the coast of Flanders he had his first imagination, a flight to America after the end of the war. Due to the fact that Germany lost the world war 1 and the destruction of all aviation in Germany this plan had to be delayed for a long time.

1919 border patrol East in Oberschlesien. Then he decided to become a farmer and started the education in 1919. In 1921 he leased a large farm „Rittergut Schönwäldchen“ located near Osterode, Eastern Prussia (Ostpreußen), and performed with all heart and fun the farmers job.

However, in the year 1925 after the competition of the first German flight days „Deutschlandflug“ and after the elimination of the strong regulations of the „Versailles Verdict“ for the German aviators, at that time mainly performing glider flying in the Rhön and developing gliders, again powered flights were possible. He cancelled the farmer job and left his farm to enter the aviation again. He was assigned at the Navy command in Berlin for education and training staff in 1925.

In 1926 he could catch a big success, winning the 1<sup>st</sup> German Seaplane contest (Deutscher Seeflugwettbewerb) with a Heinkel He-5 Seaplane. Therefore he was assigned as a member of CEO in the newly founded seaplane aviator school, responsible for education.

## Von Gronau and the Dornier-Wal

In 1926 the Spanish pilot Franco performed a successful flight with a „Dornier-Wal“ crossing the South Atlantic. On the spot his idea of a flight to America was alive again. In 1927 the German Civil Aviation School „Deutsche Verkehrsfliegerschule“ bought from Norway an old „Dornier-Wal“, the one which was used by Amundsen to reach the North Pole. With this aircraft a flight to Iceland was performed in 1929. In reality this was already an approach to fly to the USA, however had to be cancelled due to adverse conditions.

In the year 1930 the success was due, with the same aircraft, via Greenland, Labrador flying to New York. The most difficulty to pass by was during preparation, because this flight was against the will of the government transport ministry and hence had to be performed in most secret manner. In 1931, von Gronau completed a flight with the new type of Dornier Wal, crossing the Greenland Ice-cap, all in the order of the ministry „Reichsverkehrsministerium“ and the Deutsche Lufthansa. Greenland was crossed from Scoresby Sund located at the Eastcoast towards Godthab located at the Westcoast. During this flight, a new large mountain chain was detected in the centre ice fields, which later on was named „Gronau-Nunataker“ – which means „Gronau-Mountains totally enclosed by ice“ – on the order of the Danish government. The further flight route was following the Hudson Bay up to Chicago. This flight was a test to check a flight route on the Great Circle, which is the shortest distance between two points in navigational expression. This path was known as the „Gronau-Route“ at that time, and 25 years later the airline SAS started to fly this route for its regular air traffic; other airlines followed soon.

His third and largest flight adventure was succeeded by von Gronau in the year 1932 finally, when he started on 22<sup>nd</sup> July until 9<sup>th</sup> November a round the world trip lasting over 44,000 kilometres. Flying with the „Grönland-Wal“ from List via Iceland, Greenland, Canada, the USA, Alaska, the Aleutes, Japan, Hongkong, Indonesia, Rangoon, Ceylon, Karachi, Bagdad, Athens, Rome to Friedrichshafen and from there to List again.

## His life after the round the world trip

In 1933 the Italian Marshal Balbo called von Gronau to act as an expert consultant for his formation flight to North America. He was a member of the German Council for development of trans-ocean aircraft.

In 1934 von Gronau was assigned for the leading vice president of the Aero-Club of Germany and about a half year later on he became the president of this club. The year after he was elected for the vice president of the Federation Aeronautic International (FAI).

In 1938 he participated together with his wife Hertha von Gronau the Oasis-Challenge in Cairo flying a Messerschmitt „Taifun“. Continuing the flight towards Capetown and backwards over Middle East.

In 1939 he entered to the German Luftwaffe, then he was commanded on 1<sup>st</sup> of April 1939 as aviation attaché (Luftattaché) of the German embassy to Tokyo in Japan. From the planned three years stay finally eight years stay in Japan resulted. In his assignment of aviation attaché all the Japanese war theatres in the Mandchurie, North-, Central- and Southchina were visited frequently. After the entry of Japan into war – meanwhile assigned to a General Major – the entire East-Asian area ranging from Carolinas, Marianas, New-Guinea up to Burma was visited in several flights. After the capitulation of Japan he was interned, but with a chance of carrying out farming business. (Since this time a „chicken soup“ prepared with raven was a speciality on his home menu plan).

By the end of 1947 he was sailing homewards with a large American troop ship and kept arrested in a camp near Ludwigsburg in Germany.

After being free he lived in Stuttgart, later on in Munich. Here he met his wife Hertha again, she was interned in Laurencos Marques (Portug. Kolonie), when she tried to reach Germany right before the WW2. He worked for an aviation insurance. Then later he was the German representative of Lockheed Aircraft Corporation, (Burbank).

After WW2, Wolfgang von Gronau was again active with the re-establishment of the German aviation and improved the international relations of the young German Aero Club and the air tourism.

He is not only a pioneer, which had years ago discovered the important air routes, but also improved the human contacts with foreign countries.

Since 1958 Wolfgang von Gronau, world aviator and gentleman, lived on his single farm above Frasdorf close by the Chiemsee (Lake in Bavaria), until he passed away on March 17<sup>th</sup> 1977. After the funeral ceremony in Munich, his body was transferred to List on the island Sylt and buried there. Von Gronau was a honoured citizen of this village, where he once started for his around the world flights.

## Instruments and Equipment of the Grönland-Wal

*(Picked up from the report, issued by Wolfgang von Gronau due to the around the world flight.)*

The instruments of the Wal have been selected based on the experience made with the aircraft D-1422 (Amundsen Wal) in 1930. The main task was to provide a full set of instruments for each of the two pilots. This allowed for a comfortable and independent check of the instruments for each pilot and improved the safety.

Compasses (Kompass):

The aircraft was equipped with a pneumatic remote compass built by Askania. The master compass was mounted in the rear end of the fuselage and connected to two heading indicators in the cockpit. A flying towards the required heading with this instrument was comfortable and resulted in less crew fatigue, this was proven again.

An additional remote compass, the „Pioneer Erdinduktor“ was included. Also for this instrument, especially in turbulent weather conditions, the reading was acceptable.

For the 2<sup>nd</sup> pilot a leading fluid compass, the „Ludolph F.K. 6“ was built in. This instrument worked perfect. Even in the close relation to the magnetic North Pole, the positioning force of the needle was so strong to allow for a perfect heading hold. The mounting location of this compass was very good, therefore almost no deviation was observed.

In the centre between the two pilots seats, another compass for top view reading, the Askania „Franz“ was mounted.

Due to the very improper mounting location the magnetic force was almost vanished caused by heavy compensation, thus the needle was swinging for some 30 to 40 degrees close to the magnetic North Pole, a correct heading flight was impossible.

The primary navigation compass was the „Ludolph-Orter-Kompass“, which was mounted to the floor of the navigations room, and showed as well almost no deviation. This compass performed perfectly damped and very reliable. This instrument was used for heading definition and all the navigation was based on it too.

Additionally a „Goerz-Sonnenkompass“ (Sun compass) was provided, which allowed very good navigation. However this compass does not appear suitable for aircraft, due to the heavy weight and large dimensions.

## IFR Instruments (Blindfluggeräte):

For flying under IFR conditions the Askania-Wendezeiger (Turn coordinator) was used, as in the year before. This instrument was mounted above the heading indicator of the Askania-Fernkompass (Remote compass) in front of each pilot. The operation of the turn coordinator was driven by a venturi tube or a motor. The turn coordinators stayed on during almost the entire flight and showed perfect performance.

For completion of the IFR instruments a Sperry Horizon was chosen for this years flights. The improvement of this instrument was lower weight compared to the „Gyrorektor“, used in the year before, and not only indicated the bank angle but the pitch/angle of attack of the plane as well. The reason for low reliability of this instrument is possibly blamed on the too long hose routed from the venturi tube to the instrument. However, it has to be said, flying with use of this instrument is regarded very simple and comfortable.

## Altimeters (Höhenmesser):

The two altimeters used for this flight, provided by the company Lufft and Goerz showed acceptable operation. It was a disadvantage to find the barometric adjustment of the Lufft altimeter in poor calibration, this preventing the barometric correction read from radio messages.

## Tachometer (Drehzahlmesser):

For a precision control of the engine RPM 2 tachometers per engine were installed. One of each engine an electrical remote tachometer by the company Novis was mounted in the pilots panel and one of each engine by Westendarf & Pieper was equipped with a short flex shaft tachometer underneath the engine compartment, which could only be read by the mechanic.

## Coolant temperature gauge (Thermometer):

As with the tachometers the thermometers were built in with 2 per engine, with the use of an electrical resistance thermometer by Hartmann & Braun the liquid coolant at the exit could be measured and underneath the engine compartment, for the mechanic visible only, the entrance temperature could be read on a steam pressure thermometer by Steink und Hartung.

The oil temperature was measured by electrical gauges mounted into the pilots panel. The reading was acceptable.

## Pressure Gauges (Druckanzeiger)

The oil- and fuel pressure gauges showed perfect function as well.

## Fuel Status Gauges (Brennstofführen)

The reading of this gauges was absolutely poor. The fuel status was shown incorrect for more than 200 to 300 Litres. This was partly caused by the imperfect function of the floater guidance inside the tanks.

## Navigational Instruments (Navigationsgeräte):

The navigation was handled on this flight mainly by terrestrial means. Every half an hour the measurement of drift was performed and correlated by the found values. Drift angle and speed tables were used to support navigation. – For astronomic navigation, which was rarely used for this flight, a so called „Plath'scher Libellensexant“ was carried on board. The position lines were calculated by use of a

„Slide Rule“. Other supporting aids were a nautical datasheet and a yearbook. It was learned, by application of precise drift control, ground view mandatory, a flight of 6 hours duration could avoid astronomic navigation.

A very good navigational support was found in the radio direction finder, which in contradiction to the flight of the year before with plane D-1422 worked perfect.

Polar Special Equipment (Polarausrüstung):

Great care was required to select the equipment, aiming for low weight and proper function, to be prepared for an emergency landing even on the Greenland ice cap.

From the company Schuster – Munich we ordered the following:

- 1 ASMÜ Alpine touring tent
- 4 waterproof sleeping bags
- 4 pairs of snowshoes
- 1 snow shovel
- 2 Preuss ice picks
- 4 “Gletscherschleier“
- 1 Pair of ASMÜ ice grips

For the snow sunglasses each crew member had to care on its own.

From D.V.S.-Stock we could grab two „Hängematten“, and fixed them inside the aircraft.

For transports a foldable sled from Aluminium was build in the D.V.S.-wharf. This could also be used to close leaks caused by collision with drift ice.

As provisions was packed in addition to fresh food and water:

- 40 kg. canned food
- 2 kg. Pumpernickel
- 2 bottles of Cognac
- 8 bottles of Mineral water “Selterswasser”
- 30 bars of chocolate
- 10 boxes of weather proof matches
- 10 boxes of standard matches
- 100 pieces of chewing gum

- 150 cigarettes
- 4 boxes of coffin pills „Kola Dalmann-Tabletten“

A small cooking oven fired with alcohol „Spiritus-Primuskoher“ completed the equipment.

Hunting Equipment (Jagdausrüstung):

For the case of a long tracking, a complete hunting equipment, with a three barrel rifle and ammunition, as well as a bowie knife was available.

Sea/nautical equipment (Seeausrüstung):

The nautical equipment consisted of the standard belonging to the flying boat:

- 1 Anchor (15 kg.)
- 1 30 m Anchor rope (Grasleine)
- 2 20 m small ropes
- 1 15 m towing rope (Hanf)
- 1 ship hook
- 8 Life jackets
- 1 large floating anchor
- 1 small floating anchor
- 1 inflatable dingi with 2 paddles and air pump.

Photographic Equipment (Photografische Ausrüstung):

The photo equipment was build by one movie camera “Askania-Normal-Filmapparatur” with a tripod. The movie camera was powered by a small electric motor; showed easy use and allowed, despite poor experience of the operator, to take acceptable footage.

Besides of this equipment a small and handy camera was available, an AGFA – amateur movie camera and one Zeiss Ikonta. The weight of the Photo-equipment was about 50 kg including the films.

Spare Parts (Ersatzteile).

The selection of spare parts was performed with great care to keep the weight within limits.

Aside from valve rockers, rocker rollers, valve springs etc. only 1 cylinder and 2 pistons have been taken along. To list all spare Parts would exceed here. In total about 25 kg of spare parts were available.

## Technical Data of the Grönland-Wal

### **Dimensions / Abmessungen:**

Wingspan / Spannweite:	23,2 m (76,44 ft)
Length / Länge:	18,3 m (60,04 ft)
Hight / Höhe:	5,5 m (18,04 ft)
Wing area / Flügelfläche:	96 m <sup>2</sup> (1033,16 sqft)

### **Weight / Gewicht:**

Empty / Leergewicht:	5050 kg (11148 lbs)
MTOW / Max. Startgewicht:	8000 kg (17660 lbs)
Payload / Nutzlast:	2950 kg (6512 lbs)
Fuel capacity / Treibstoff:	3640 Liter (964 USGal) =5784 lbs =2620 kg

### **Performance / Leistungen:**

Cruise speed / Reisegeschwindigkeit:	200 km/h (108 kts)
Optional cruise / Opt. Reisegeschw.:	180 km/h (98 kts) for less fuel burn
Maximum speed / Höchstgeschwindigkeit:	230 km/h (124,2 kts)
Approach speed / Landegeschwindigkeit:	120 km/h (70 kts) , Stall speed < 58 kts
Climb rate / Steigleistung:	3,0 m/s (590 ft/min)
Duration to climb / Steigzeit:	35 Minutes to 3000 m
Maximum Range / Max. Reichweite:	> 1800 km ( > 1000 NM)
Ceiling altitude / Dienstgipfelhöhe:	3000 m ( 9840 ft)

### **Engines / Antrieb:**

Engines / Motoren:	2x V12-inline engine BMW VII
	Liquid cooled, gravity fed carburettor
Max power / Motorleistung max:	750 PS (551 kW) per engine
Cruise power / Motorleistung nom:	690 PS (507 kW) per engine
Cruise RPM / Drehzahl Reise:	1450 RPM +- 50 RPM
Maximum RPM / Drehzahl max:	1680 RPM
Total cylinder displacement / Hubraum:	46,95 Liters (12x233,1 cuin = 2797.2 cuin)
Compression ratio / Verdichtung:	6,0 to 7,3
Props / Propeller:	3 bladed Metal, fixed pitch, Diam. 3,53 m (11,58 ft)

## The use in Flightsimulator

*We give a description of the components of the Grönland-Wal and of its heritage, as well as some hints for operation (Checklists).*

### The Model

The gmax-Model of the Dornier-Wal is built by Michael Garbers. A main guide was the **HUMA plastic model: Domier – Do JII „Wal“ Aufklärungsflugboot** and diverse photos taken from books and the internet.

As moving /animatet parts you shall find:

- Antennaring direction finder (Funkpeilrahmen): Operate with the prop pitch levers
- Anchor (Anker): Set parking brake
- Engine covers (Motorabdeckungen): Operate the 2 exits
- Rotating props and generator prop.
- Animatet control surfaces
- Animated Waterruder
- Wire cable antenna (Wurfantenne): Operate spoilers
- Telescopic antenna mast (Stabantenne): Deploy and retract with gauge of Concorde-Visors.

With progress of a virtual cockpits, some more moving parts will be added.

A Crash-Model is not planned presently , we think about for future.

A fx\_waterland effect , original by Bob Tremblay, modified by Wolfram Beckert .

Additional effects are related to the smoke (original by Peter M. Ridge) and engine fire – both changed by Michael Garbers.

## The Textures

The textures were all drawn by Rolf-Uwe Hochmuth, they are based on the same sources as used for the model.

Existing textures for the model:

- Fuselage and wing textures including light effects
- Propeller texture

For the Panel, original photos from Grönlandwal and other Whale types have been used as templates.

## The Flightdynamics

The flight- and float behaviour was modified from original FS2002 template by Wolfram Beckert.. He was provided with many information from the experienced Herrn Dr. Ing. Elmar Wilzcek, an un exhausting source of information if regarded to Floatplanes of any kind and related issues.

The flight operation with the Wal is simply and does not require very special experience.

A few „Operating instructions“ shall be given despite:

The water operations / taxiing on water:

To get movement the first time you will have to apply quite much power, in contradiction to the original no taxiing is possible with one engine running only. You may not be punished with a bad issue of this flying boat the so called „Tauchstampfen“ (English expression not known) in FS2002, the Simulator is very forgiving for water planes.

Once a few knots of speed is built up, reduce power to avoid a float up of the hull (in germen „Auf Stufe“ zu kommen), at higher speed.

The Takeoff:

Apply full power and accelerate, around.157 km/h (85 kts) apply smooth up elevator and get airborne.. The hull should float on step around 65km/h (35 kts), this may be visible by a different water spray effect.

You should immediately reduce power (rpm) to protect your engine from overload, start your initial climb with some. 1550 RPM.

## Climbout:

Initially climb with 3 to 4 m/s (500 to 700 ft/min) (The model will accept more, but it is considered unrealistic). After you reached a safety altitude of about 300 m further power reduction is advised. Engine RPM shall stay below 1500 RPM for long endurance (cruise) power.

## Cruise:

A common cruise speed was about 180 km/h or 97 kts with an engine setting of about 1450 RPM. Cruise altitude was usually low, pending on weather and terrain, ranging from 300 m to 1500 m AGL, as mentioned in the old reports. If you are patient the Do-Wal will climb above 3000 m or 10,000 feet. For a more economic fuel burn a slower cruise speed may be chosen. The reports quite often state an average speed of the flown legs ranging from 160 to 175 km/h (potentially also affected by headwinds). With all tanks filled up you should be able to make it through all described legs.

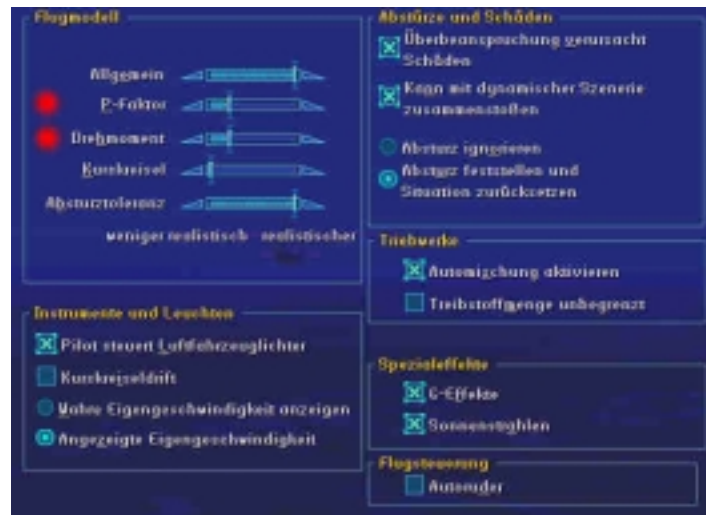
## The touchdown or the approach to water:

The Do-Wal did not have any kind of flaps or spoilers, therefore reduce your altitude with a moderate sink rate. Close to your desired touchdown area you should be already low and keep the approach with engine power. You may reduce the speed down below 120 km/h (65 kts), stalling is below 105km/h (58 kts) with full loaded aircraft. Once in contact with the water the speed will bleed off quickly if throttles are cut, or just keep some power to hold taxi speed.

The Wal is able to touchdown on any surface without serious damage, however, a takeoff is possible from water or surfaces defined as „Ice“ in FS only. You could do a touchdown in the Greenland icecap.

## Known Problems:

In case your settings of FS2002 for reality, strong P-Factor, torque etc. are to the max, you have to expect a course correction very frequently. The flightdynamics model is set to compensate this effects if normal cruise power is set (the engines are assigned asymmetrically ). This, however, may lead to a course drift pending on your settings in reality menu..



The Autopilot works somehow a little sluggish, however you will note about in heavy direction changes only. Manually flown the Wal operates very smooth. You have to prepare for a lot of elevator trim caused by the engines high above CoG. This will result in a significant momentum about the lateral axis when changing the power setting.

To set some dynamics effects a heavy „hacking“ of the .AIR file and the aircraft.cfg was made, so be warned if you will give yourself a try as „hobby Aerodynamic engineer“. You will screw up the settings very fast, as Wolfram did many times.

We are going on to work on the flightdynamics.

## The Panel

The difficult part of the panel design was carried out by Rolf-Uwe Hochmuth, he was forced to build a panel without real information up to now. Meanwhile he can work on a basis of pictures of Wal cockpits that have been kindly provided by Mrs. Ludewig from the Lufthansa pictures archive.

The gauges in use are a collection of various sources presently. The planning is to replace each gauge by a more representative one and add/develop new ones.

## The Sound

With thanks to Mike Hambly and his Freeware Warbird sound.

## The Sceneries

We would like to provide a small (symbolic) scenery at every place visited by the Wal.

Presently an example exists for Manzell, the former Dornier manufacturing plant (near Friedrichshafen, Lake Constance), Ivigtut and Kakumabetsu, built by Wolfram Beckert.

List /Sylt, built by Markus Senkbeil

## The Flights

In order to fly yourself the historic route around the world, a package of readily prepared flight situations is provided by Michael Garbers .

A precise description, weather and maps shall be added on the basis of the original reports issued by W. von Gronau. We are glad to have a copy in hands, kindly provided by the Dornier historical archive.

Current status: The first three flights are complete, the others some stuff is missing.

## The Checklist

Actual version see the FS2002 aircraft folder of the Dornier Wal

## The Radio Signals

A special feature, idea and programming by Michael Garbers.

As there was no radio communication as we know today, all messages had to be transmitted by Morse code. The impression shall be given by the radio simulation showing a clear text in the moving band on top of your FS screen and the audio signals of a Morse code transmission. This may not work on all PC system as we have learned, possibly pending on the sound card and system performance.

### **Operation:**

After installing the DornierWalFT.exe Morse Add-On this functionality is available. (More in the readme file of the add-on.)

After firing up your FS2002 and selecting the associated flight situation from the Dornier Wal Weltenflug you also have to start the small program DornierWalFT.exe, located in a folder under FS2002\Morse. This will enable to receive the radio messages. Presently you can not send manually a message from the aircraft.

## List of Sources

*Find here a list of the sources used or made reference to (as far as known)*

### Books

Pionierflüge mit dem Dornier „Wal“

**Wolfgang von Gronau**

3. Auflage 1977 - Luftfahrtverlag Walter Zuerl – Steinebach-Wörthsee (Obb.)

Weltflieger – Erinnerungen 1926 - 1947

**Wolfgang von Gronau**

Auflage 1955 – Deutsche Verlags-Anstalt – Stuttgart

*Eines der 150 Sonderexemplare in Leder gebunden mit original Autogram von Wolfgang von Gronau*

Im Grönland-Wal - Dreimal über den Atlantik und einmal um die Welt

**Wolfgang von Gronau**

5. Auflage 1933 – Verlag Reimar Hobbing - Berlin

Flugzeuge die Geschichte machten – Dornier Wal

**Heinz J. Nowarra**

1. Auflage 1993 – Motorbuch Verlag - Stuttgart

Die Jagd nach dem Nordpol – Mit dem Flugzeug zum 88. Breitengrad

**Roald Amundsen**

? – Verlag Ullstein - Berlin

Flugboote über dem Atlantik – Die abenteuerlichen Expeditionen der Lufthansa 1934 - 1939

**Jürgen Rosenstock**

1. Auflage 2001 – GeraMond Verlag - München

Cockpits deutscher Flugzeuge – Historische Instrumentierungen von 1911-1970

**Peter W. Cohausz**

## Dornier Archive

A great thanks to the Dornier historic archive and Mrs. Piroth. From this place we made it to copy the old flight reports issued by Wolfgang von Gronau. Important technical information as well as weather and other status could be drawn from this papers.

## Websites

Certainly the Internet was considered as a primary source to gather information. Unfortunately we learned again, there was not too much of information that could support our work. With respect to von Gronau or the Do-Wal the search was not very successful and quality information was rare to get. Pictures – regarded to external photos – however can be found.

Newest information related to this project can be found at:

<http://www.dornier-wal.info>

## Gauges and Effects

Many thanks to the authors of the Freeware Gauges and Effects or who allows us to use their gauges.

By name without order:

Bob Tremblay, Peter M. Ridge, Jean-Robert Turcot, Hauke Keitel, Dragonflight Design, Arne Bartels, Melville Consulting, Gritsevsky, Alex Backfire, Wade C. Chafe, Tom Corson, Roy Chaffin.