FLIGHT MANUAL

GotFriends

DISCUS-2C GLIDER

Version: 2.0.6. (Flightsim.to & Official Marketplace)

NOTICE

The Discus-2c has a standard "Freeware" version and a premium "Payware" version. This manual has been written to include information pertaining to both versions. There is no difference between the freeware and payware versions except for that the payware version includes a Front Electric Sustainer (FES) Variant of the Discus-2c.

DISCLAIMER

Our Experimental Multiplayer Towplane feature utilizes WASM coding. We cannot guarantee that it will work on Xbox until after Asobo adds WASM support to the Xbox version.

History

The Discus-2c is a single-seat, high-performance sailplane by German glider manufacturer Schempp-Hirth. The Discus-2c is an evolution and replacement of their renowned Discus design. The Discus-2c took its first flight in 1997, and is today available in two sizes: 15-meter (49 feet, 2.5 inch) wingspan and 18-meter (59 feet) wingspan. The sailplane also comes in an electric motor assist version (FES), and one with internal combustion powered assist (2cT).The Discus-2c features composite construction, advanced flight control surfaces for precise control, and a state-of-the-art wing design that maximizes glide performance and aerodynamic efficiency. The 15-meter variant has a wing aspect ratio of 22.2 and the 18-meter version has a 28.5 aspect ratio. Each has a top speed of 174 miles per hour. One of the most advanced soaring craft ever developed, the incredible Discus-2c allows aviators to master the heights in the purest form of flight. Stay aloft in the mountains by riding ridge lift, circle into a cloud base on thermals, or just glide along silently on laminar air at dawn while you become one with the sky.

Specifications:

Max Permitted All-Up Weight	1,246 lb / 565 kg
Empty Weight	749 lb / 340 kg
CG Limits	32% - 48%
Pax	1 Pilot
Left Ballast Tank	220 lbs / 100 liter (50% Max Limit w/ FES)
Right Ballast Tank	220 lbs / 100 liter (50% Max Limit w/ FES)
Fin Ballast Tank	18 lbs / 8 liter (50% Max Limit w/ FES)
Wingspan	59.06 feet / 18 meter
Wing area	122.28 sq ft / 11.36 sqm
Length	22.24 feet / 6.78 meter
G-Force limits	+5.3G, Plus 50% Safety Margin
Trim Available	Pitch

Performance:

Max Permitted Speed	151 knots / 280 kph
Service Ceiling	26,500 feet / 8,077 meter
Max Range	Not-Limited

Max Permitted Speeds (IAS):

Max Permitted Speed	151 knots / 280 kph
Speed in Rough Air	103 knots / 190 kph
Maneuvering Speed	103 knots / 190 kph
Speed on Aerotow	97 knots / 180 kph
Speed on Winch Launch	81 knots / 150 kph

Dashboard:

A. FLARM (Standard) | FLARM and Compass (FES)
B. Ventilation Lever
C. Pitot Heat Switch
D. Glareshield Lighting Switch
E. Master Battery Circuit Breaker
F. Visibility Circuit Breakers
G. Cable Release Lever
H. Master Battery Switch (Standard) | Master Battery and FES Power Switch (FES)
I. Air Brake Lever
J. Elevator Trim Lever
K. Landing Gear Lever
L. Variometer
M. Airspeed Indicator
N. Digital Variometer
O. Compass (Standard) | FES Control Unit (FES)
P. Nav/Com Radio
Q. Navigation Display
R. Altimeter
S. Thermometer
T. Transponder

Yaw String:

The yaw string, also known as a slip string, is a simple device for indicating a slip or skid in an aircraft in flight. It performs the same function as the slip-skid indicator ball, but is more sensitive, and does not require the pilot to look down at the instrument panel. Technically, it measures sideslip angle, not yaw angle, but this indicates how the aircraft must be yawed to return the sideslip angle to zero.

If you slip in a right turn:
- The top of the string will move to the left.
- The corrective action called for is more right rudder.

String to the left causes the bottom of the string to point to your right foot. The string is a pointer, pointing to the rudder pedal that needs more pressure. It is this difference that makes it difficult for some pilots accustomed to using a slip/skid ball to use the yaw string. But with practice, the yaw string is by far the better instrument, and it weighs nothing.

Corrective Action:
Apply Right Rudder

FLARM:

The FLARM (Flight & Alarm) obtains its position and altitude readings from an internal GPS and a barometric sensor and then broadcasts this together with forecast data about the future 3D flight track. At the same time, its receiver listens for other FLARM devices within range and processes the information received. Advanced motion prediction algorithms predict potential conflicts for up to 50 other aircraft and alert the pilot using visual and aural warnings. FLARM has an integrated obstacle collision warning system together with an obstacle database. The database includes both point and segmented obstacles, such as split power lines and cableways.

If FLARM determines you are at risk of colliding with another aircraft or an obstacle:
- The unit warns you of the greatest danger at that moment.
- The warning is given by a whistle sound (beep) and bright light emitting diodes (LED).
- The display also gives indication of the threat level (flash speed)
- The horizontal bearing to the threat.
- The vertical bearing to the threat.

Visibility Circuit Breakers:

There are 4 Visibility Circuit Breakers on the Lower Console that provide additional Cockpit Customization Options. You will find the following:

- Display/Hide Pilot Model
- Display/Hide Compass (FES Only)
- Display/Hide FLARM
- Display/Hide GoPro

Variometer (Netto):

The Variometer is designed to directly measure the static pressure of the atmosphere using a pressure sensor that detects changes in altitude directly from the change in air pressure. Netto Variometers adjust for the intrinsic sink rate of the glider at a given speed (the polar curve). The needle will always read zero in still air. This provides the pilot with the accurate measurement of air mass vertical movement critical for final glides.

MacCready Ring:

The MacCready ring is an indispensable aid in cross country flying. The ring is rotatable and is marked with speeds and a white triangle. The chief use of the MacCready ring is to achieve the highest possible cruising speed (average cross-country flying speed) on thermal cross-country flights. This involves setting the white arrow to the anticipated rate of climb for the next upcurrent. Optimum flight performance is assured when the airspeed indicated by the airspeed indicator corresponds to the pre-selected flying speed to which the MacCready ring has been set.

Airspeed Indicator (6 FMS):

The 6 FMS instrument shows airspeed on a 510° spiral scale. The instrument works by measurement of the pitot pressure, by means of an open diaphragm cell, as the difference between total pressure and static pressure.

Digital Variometer (Netto or Total Energy):

Digital Variometers generate a sound pitch and rhythm depending on the instrument reading. The audio tone increases in frequency as the variometer shows a higher rate of climb and decreases in frequency towards a deep groan as the variometer shows a faster rate of descent. When the variometer is showing a climb, the tone is chopped and the rate of chopping may be increased as the climb rate increases, while during a descent the tone is not chopped. This audio signal allows the pilot to concentrate on the external view instead of having to watch the instruments, thus improving safety and also giving the pilot more opportunity to search for promising looking clouds and other signs of lift.

Netto Mode adjusts for the intrinsic sink rate of the glider at a given speed (the polar curve). The needle will always read zero in still air. This provides the pilot with the accurate measurement of air mass vertical movement critical for final glides.

Total-Energy is electronically compensated. The membrane compensator is an elastic membrane, which flexes according to the total pressure (pitot plus static) from airspeed. Thus, airspeed effects cancel out an increase in sink, due to acceleration, or a decrease in sink, due to deceleration. The venturi compensator supplies a speed-dependent negative pressure, so that the pressure reduces as speed increases, compensating for the increased static pressure due to sink.

Needles
- **Orange:** Average Vario (Netto or Total Energy)
- **Red:** Instantaneous Vario
- **Blue:** MacCready Needle
- **Yellow Bar:** Projected Gains/Loss

Black Arrow: Wind Indicator
- N,S,E,W positional
- Wind Strength (Number Display)

Top Knob: Variotone Volume
Bottom Knob: Netto or Total Energy Mode

NOTICE:

If you experience variotone audio issues during flight, please TURN OFF your Master Battery and then TURN ON your Master Battery to reset your digital variometer. This is a known bug that will occur during random server sessions. We are aware of this issue and are working on

Compass:

A magnetic compass aboard an aircraft displays the current magnetic heading of the aircraft, i.e., the aircraft's directional orientation relative to the Earth's geomagnetic field, which has a roughly north-south orientation. The compass can be used in turns to verify the aircraft is traveling in the desired direction at the conclusion of a turn.

Altimeter:

On an altimeter, the sea-level reference pressure can be adjusted with a setting knob. The reference pressure, in inches of mercury in Canada and the United States, and hectopascals (previously millibars) elsewhere, is displayed in the small Kollsman window, on the back-face of the aircraft altimeter. This is necessary, since sea level reference atmospheric pressure at a given location varies over time with temperature and the movement of pressure systems in the atmosphere.

Thermometer:

A thermometer is a device that measures a temperature gradient. The thermometer does not change units with the unit of measurement toggle. Instead, the pilot must click on the thermometer gauge to swap between Farenheit and Celsius. This is because some regions in the world fly with Metric Measurements and Farenheit.

Oxygen System & GoPro Vision:

Behind your seat, you will find two interactive items: The Oxygen Tank and a GoPro. You can open the Oxygen Valve in-flight in order to drain your oxygen as simulated. Once on-ground, your glider will automatically begin servicing the oxygen tank for your next flight. If you click on the GoPro, your camera will shift to a GoPro Cinematic View that may be desired for a unique experience.
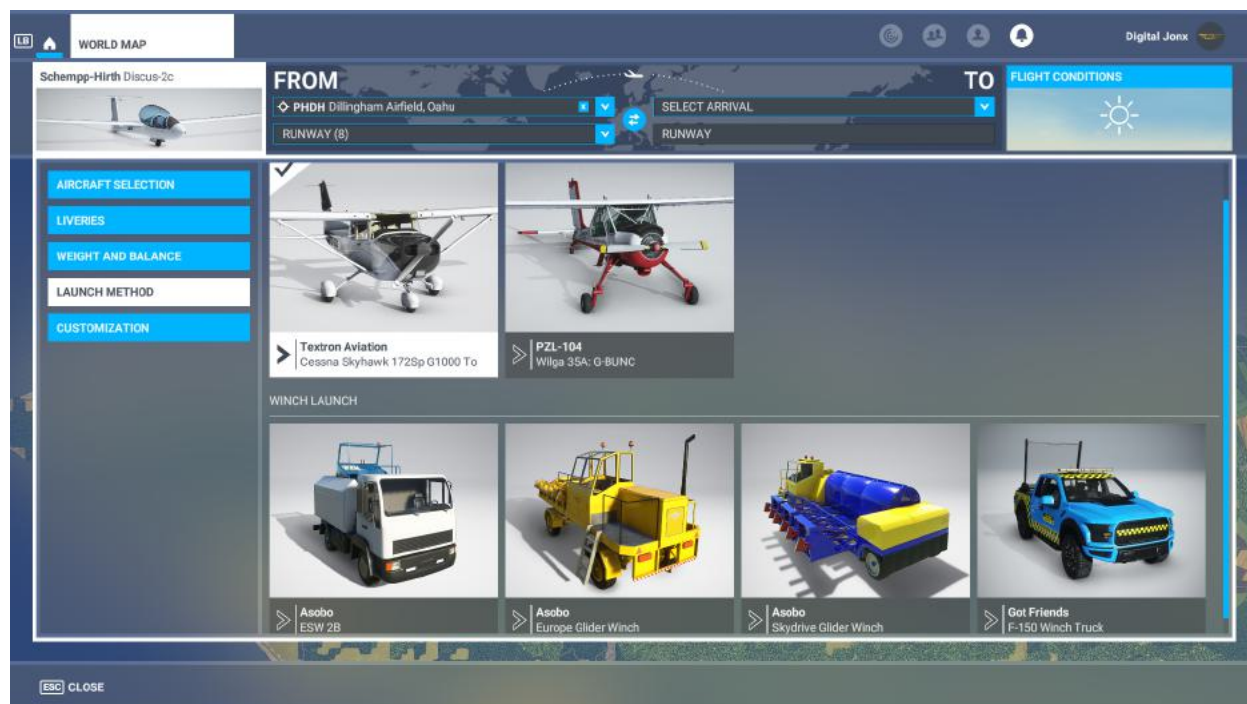
Launch Options:

Native Launch:
- Available from the "Launch Method" selection menu during aircraft selection.
- The Tow Plane option will allow you to start with an AI Tow Plane on the runway.
- The Winch Launch option will allow you to start with an AI Winch Vehicle on the runway.
- The F-150 Winch Truck is included with the Freeware and Payware Versions.
- The Wilga 35A is sold separately by Got Friends: [Click Here to View More Info](#)
-

New Launch Menu:

Our New Launch Menu includes Two Additional Options:
- **Multiplayer Connection:** This allows you to connect to an aircraft in front of your glider. This works with any aircraft/vehicle that uses a "Pilot Model". So you can connect to either AI Aircraft or Multiplayer Aircraft. When you hit (Click to Connect), the system will scan 100m left and right, scan 200m forward, and will connect you to the nearest aircraft with a pilot model.
- **Quick Winch Connection:** This experimental feature allows you to spawn a native AI Winch Vehicle. If you are in range of an airfield, it will spawn the Winch Vehicle at the end of the runway. If you are not in range of any airfield, it will spawn a Winch Vehicle 3000 feet in front of your glider. This option was many implemented for re-launches, out field landings, emergency landings, and other quick launch needs.

Old Launch Menu:
The Discus-2c was the first glider in Microsoft Flight Simulator to have a fully capable in-game Winch Launch. We coded a physically accurate winch cable simulation. Although not perfect, this was the only method of launching your glider until Asobo introduced native launch methods in the 40th Anniversary Update. Although outdated, many users prefer to launch using our system due to the customizable speed, length and visual display options. We have decided to leave this launch option in-game. You can access the Old Launch Menu by clicking on the Navigation Display SD CARD to load/unload the menu.

Prior to Launch:
- The Winch Launch Module should be displayed by default on Runway Spawn.
- Hit Connect to connect the cable to the Discus-2c.
- You should now see a visible cable and winch vehicle up to 500m in front of your glider.
- Select your desired cable length. (Take airfield length into consideration)
- Select your desired launch speed.
- When ready, click on launch.

- Your winch vehicle and cable will now adjust to that selected length.
- Your In-Launch Phase will begin.

In-Launch:
- The glider will automatically level the wings. (Simulates real-world crew conditions)
- You will have a 3-Second countdown timer displayed to prepare for launch.
- Reaching launch speed takes an average of 3.5 seconds.
- While in launch, maintain a low percentage of cable deviation.
  - Use the 2D deviation tracker to maintain glider track while in launch.
- If you exceed 70 degrees deviation from the cable, you will automatically disconnect.
- To manually release cable, click on release **OR** click on the yellow release handle.
- Otherwise, if you reach the end of the cable length, you will automatically disconnect.

Navigation Display (LX-NAV & GPS):

The Discus-2c comes equipped with an LX navigation display and a GPS navigation display. The LX navigational module includes World View, Mouse Drag, Zoom In, Zoom Out, Checkpoint Display, Checkpoint Browsing, Checkpoint Data, Task Timer, Wind Indicator, Sink/Gain Rate Tracker and Re-Center functionalities. The GPS navigation module includes Checkpoint Display, Checkpoint Positional Indicators, Current Altitude, and Checkpoint Distance. The navigational unit as a whole allows you to select one or two divided views. At the top of the unit, you can select between GPS-NAV and LX-NAV navigation. At the bottom of the unit, you can select a digital Attitude Gauge or the Settings Screen. The attitude gauge and settings screen may be divided into the navigational display for quick viewing or selected as solo viewing by clicking on either the attitude or settings buttons **and then** clicking on the GPS-NAV or LX-NAV buttons.

In the Settings Tab located on the Navigation Display, you will find 4 customizable settings. By selecting the "Units" button, you can swap the measurement of units in all your gauges between Imperial and Metric. By selecting the "Canopy Tint" button, you can install or remove additional sun-tinting on your canopy. By selecting the "Oxygen" button, you can install or remove the additional oxygen tank behind the pilot. By selecting the "Cover" button, you can place or remove the canopy cover. The canopy cover requires the canopy to be closed and the glider to be parked in order to place the cover.

Advanced LXN-Navigation by JackBilbo:

In partnership with JackBilbo, we have worked hard to ensure compatibility with his LXN-Navigation Replacement Mod. This **PC ONLY** alternative navigation option is for glider enthusiasts who want advanced customization options and task tracking. You can drag-n-drop this additional addon into your community folder next to your freeware or payware Discus-2c folder. We will continue to support this add-on with future updates and fully support JackBilbo, Ian Lewis (B21), Touching Cloud, and other individuals who have put countless hours into this add-on.

Download Link: Discus 2c - LXN Nav Replacement » Microsoft Flight Simulator

FES FCU:

The FES Control Unit (FCU) displays the electric-motor running data and live-system status. The FCU requires the FCU On/Off Switch to be in the On position in order to use the unit. The FES Motor requires the Motor Switch to be in the On position in order to apply electrical torque and power to the 2-bladed propeller system. You can find the FES Power Switch on the lower console to the left of the Master Battery Switch. If you turn Off the Fes Motor Switch or FCU Power Switch during motorized flight, the motor will shut off and properly stow the FES system. If you lower your power to 0% on the FES Control Unit, the motor will shut off and properly stow the FES system. The FES System is custom built to realistically simulate an electric-driven motor within Microsoft Flight Simulator. This includes a complex power system and thermal dynamic protection system. You may see periodic errors displayed on your FCU if you are running the motor too hot. Please follow the on-screen prompts for corrective actions. This may include cooling down the electric motor by pulling the Ventilation Lever above the digital variometer to add more airflow.
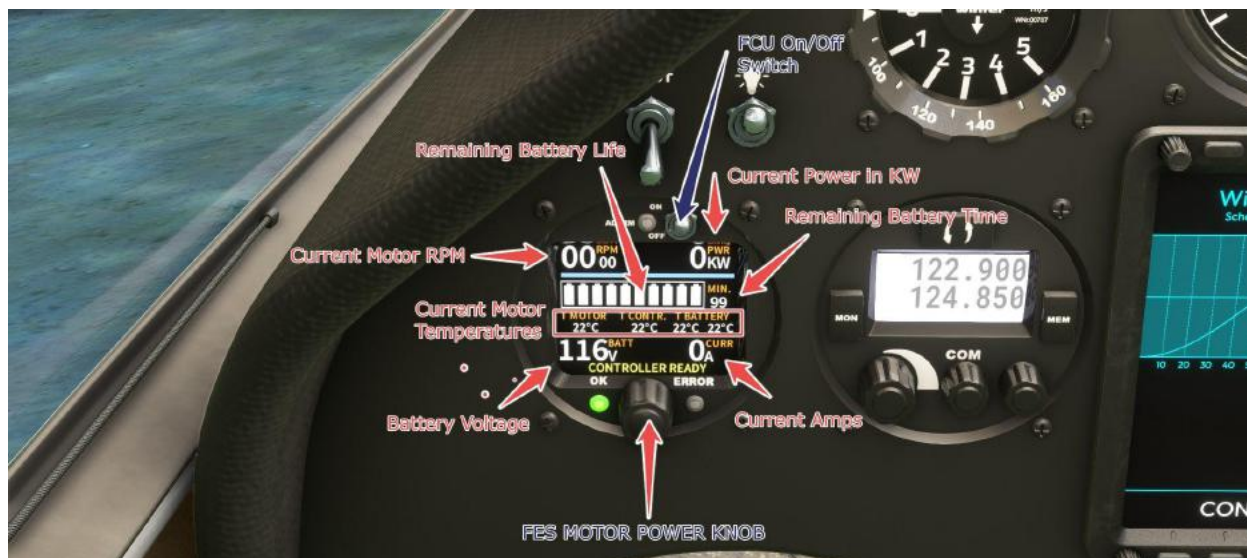
Left Side of Cockpit:

The left side of the cockpit has a Sliding Glass Door (Small & Large), Canopy Handle, Air Brake Lever, and Elevator Trim Adjustment Lever (Spring).

Right Side of Cockpit:

The right side of the cockpit has the Landing Gear Lever, Air Conditioning Vent, and a Ballast Valve Lever.

Got Friends Glider Club:

Included in the Freeware and Premium Packages is the Got Friends Glider Club. You will find this to be a wonderful spot to begin your soaring journey. Special thanks to the Flying Hedgehog (TwoCats) for providing us such a wonderful airfield. There is Kinetic Assistant compatible thermals and flight plans located in your documentation folder if you wish to use them.

ICAO: GTFD

Standard Operating Checklist:

You can find the Standard Operating Checklist in the In-Game Checklist Menu (Top-Bar).

<u>NOTE</u>

The Checklist has been tailored for Microsoft Flight Simulator and should not be a replacement for Real-Life Discus-2c Operating Procedures.

Frequently Asked Questions/Bugs:

QUESTION: I am getting a bad navigation display with crazy numbers and nothing on the main display is working.
ANSWER: Please update your GTN-750 Addon or remove it completely from your Community Folder. PMS50 is aware of the compatibility issue and we are working together to ensure this gets addressed in the future.

QUESTION: What happens if I press **"L"** on my Keyboard?
ANSWER: The Discus-2c is using complex multiplayer variables that need to be assigned to various in-game lights in order to work with multiplayer. Pressing "L" in-flight might make your flight, features, and experience broken and unflyable.

QUESTION: My glider is just sitting on the runway. How do I launch?
ANSWER: If you are using a Native Launch Method, you must fully move your rudder left and right a couple times in order to signal your wing-walker that you are ready for launch. Your wing-walker will then wave his arm at the launch vehicle/towplane in order to start the launch process.

ASSOCIATED HOTKEYS:

Spoiler Axis: Recommend Assigning this to your Throttle for Variable Speed Brake Control.
- Do Not Use the Spoiler Axis (0-100%) Setting only Spoiler Axis Setting

Throttle Axis: Recommend Assigning this to a Slider or Knob for Realistic FES Control.
Strobe Light: Ballast Valves (Open/Close)
Glareshield Light: Glareshield Light (On/Off)
Panel Light: FES FCU (On/Off)
Pedestal Light: Canopy (Open/Close)
Cabin Light: Ventilation Lever (Open/Close)
Taxi Light: FLARM (On/Off)
Logo Light: Multiplayer Towplane Connection Switch (Connect/Disconnect)
Pitot Heat: Pitot Heat (On/Off)
Navigation Light: Skip/Next Waypoint
Recognition Light: Quick Winch Disconnect
Water Rudder: Kinetic Assistant (Functions/Connections)

Support and Community:

Support is provided at the **Got Gravel Discord Server:** https://discord.gg/4f3j4YgNm4

Credits:

Finally, and most importantly, a big thank you from **Got Gravel, Jonx**, **270 Inc, and Mykrode** for your support and for downloading the standard package of the Discus-2c Glider. We hope this aircraft is a great addition to your MSFS hangar and is all you expected her to be and perhaps, a bit more!

This project would also not have been accomplished without the tireless work of these individuals:

Jonx: XML Coding, Navigation HTML Modifications, Sound, & Weather Presets
Got Gravel: Flight Model, Winch Launch HTML, FCU HTML, and V8 Variometer HTML.
twoseventyinc: Liveries, Launch Vehicle Textures, and Material Effects
Mykrode: Full 3D Modeling (Standard Discus-2c, Discus-2c FES, and Launch Vehicle)
GurtTractor: Custom Sound Design and Professionally Recorded Elements
Touching Cloud: WInch Launch Visual Elements, FLARM System, and Towplane System
Ian Lewis (B21): Supporting HTML, Feedback and XML Coding Support
JackBilbo: Navigation Modifications (NavMod)
Flying Hedgehog: Got Friends Gider Club Scenery (Airfield)
Asobo/Microsoft: General Assets & SDK

Additional Downloads (Optional):

Community Liveries:
Discus-2c Aircraft Liveries for Microsoft Flight Simulator | Flightsim.to
LXN-Navigation Mod:
Discus 2c - LXN Nav Replacement » Microsoft Flight Simulator
Official Paint Kit:
Discus 2c Glider (Paint Kit) » Microsoft Flight Simulator
Kinetic Assistant (Additional Gliding Features):
Kinetic Assistant - Touching Cloud [OFFICIAL MOD PAGE]