

LAGO

Twin Otter



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Please note down your serial number, name used for registration and the date. You need those for ANY update and when you want to re-install. We will send out codes that are lost, but those requests have a very low priority.

Date :

Code:

Introduction

Although de Havilland Canada originally saw the Twin version of the dependable Otter aircraft as a bush aircraft things turned out to be a bit different. Although very successful with many backwater operators, the Twin Otter, as the aircraft is well known throughout the world, became a successful commuter aircraft as well. Many small "spoke cities" received their first scheduled airline service by the vulnerable Twin-Otter, not to mention the small airstrips and outposts in such regions as Surinam, Indonesia, Alaska, the Arctic and Antarctic areas that could never have been developed in this way if it wasn't for the Twotter bringing in people, goods and mail.

The DHC-6 Twin Otter turned out to be one of the most successful regional aircraft ever. With 844 sales it was actually the most successful Canadian commercial aircraft product until the Canadair regional jet took over this position.

All aspects of Twotter operations are reproduced in this product, from detailed aircraft exteriors to fully working cockpits. The aircraft in this product are painted in the colors of many very different operators to give you an impression of the diversity of Twin Otter operations.

On behalf of Igor Suprunov and all the others who worked on this project, I wish you a lot of flying pleasure. Avoid the major airports and have fun flying into the small and more difficult airports. That's where the Twin Otter feels most at home.

Mathijs Kok
LAGO

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We do take copyrights very seriously and we hope you do too.

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Credits

Project Manager	Marco Blauwhof
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Gauges programming	Igor Suprunov SCDS
Flight dynamics.....	Igor Suprunov SCDS
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Sounds	MeatWater
Installation.....	Mathijs Kok
Manual	Marco Blauwhof, Mathijs Kok, Otto Horsch
Installer Image	Rui Cristina
Test Pilot Lead	Richard Pink

System requirements

- Pentium III 750
- 128 Mb RAM
- 35 Mb of free available space on the hard disk
- Sound card
- Microsoft Flight Simulator 2002 (Standard or Professional edition)
- Microsoft Windows 98 (SE), Windows ME, Windows 2000, or Windows XP operating system (Windows 95 'might' work but we do not support it any more as MS also stopped supporting it).
- Adobe Acrobat® Reader 5 to read and print the manual ⁽¹⁾
- A 3D video board with at least 32Mb RAM, 256 Mb RAM internal memory and a faster processor are highly recommended.

(1) Available for free, download at:

<http://www.adobe.com/prodindex/acrobat/readstep.html>

Conventions used in this manual

- All references to file names, extensions and directories are shown as follows:
- FILENAME.EXT, .EXT, \DIRECTORY
- The FS2002 main folder (that is standard C:\PROGRAM FILES\MICROSOFT GAMES\FS2002 but can be different on your installation) is given as [fsmaindir] in the manual.
- If you have to type some text with the keyboard, the text is shown in Courier:
`text typed by you`
- If you have to press a key, that key will be represented within square brackets.
For example:
- [B] means that you must press the B key on the keyboard.
- [ALT]+[F4] means you should press [F4] key while holding down the [ALT] key at the same time.
- All references to menu (and submenu) items are shown as follow: "Option | Preferences..."
- Buttons are shown as follows: <Cancel>
- When percentages are used 0% is always bad, 100% is always okay.

Installation

Depending on the method you used to get the TWIN_100_ENG.zip file – most probably by downloading it from the Internet – you should now have it unzipped to a location on your hard disk.

BE SURE TO CLOSE ANY OTHER APPLICATION BEFORE PROCEEDING!

Double click on SETUP.EXE file icon.
Follow on-line instructions.

NOTE: If you need to reinstall the product be sure to uninstall it first.
The installation file name reflects the version number of the product. For example TWIN_100_ENG.zip is the initial release of the product (version 1.00). The [ENG] part in the file name represents the language.

De-installation

DO NOT MANUALLY REMOVE THIS PRODUCT !!!

To uninstall Twin Otter for FS2002:

1. Exit FS2002.
2. Open the "Control Panel".
3. Double-click on <Install applications> and select "LAGO Twin Otter".
4. Click on <Add/Remove...>.
You will be asked to confirm the operation: click on <Yes>.

At the end of the uninstall procedure, you may be told that one or more files/directories cannot be removed, these are all files you have created by yourself in the original Twin Otter directories. We feel that it is better if you manually remove these files/directories after the uninstall procedure is complete to avoid removing your own data!

If you do not have ANY other LAGO product and would like to remove the LAGO dropdown menu, simply remove the ViMaCore.DLL from the [fsmaindir]\Modules folder.

How to contact technical support

Before contacting technical support, be sure to visit **both** the FAQ and Download pages; you will find a link to both pages at:

WWW.LAGOONLINE.COM

There you will find the latest version and/or patch for this product. Moreover, in the FAQ (Frequently Asked Questions) page, you will find a list of general problems and solutions. The FAQ pages may already include the answer that you are looking for!

For person-to-person help visit the "Sky Expert" section of our website or use the support forum on www.lagoonline.com. Describe your problem in as much detail as you can. Our Support Officers must be able to follow your instructions step-by-step in order to recreate the same problem on their PCs!

NOTE: Technical support is available in English only!

We hope you will join us in the forums to discuss future enhancements to this product. As always LAGO believes in working with the customer to perfect a product as soon as it is released. As soon as you own a copy you own the right to tell us what to do with it!

Frame rate issues

There is no denying this aircraft (or more precise the panel) will put a major strain on your system. The main reason for this is the fact the panel files are so large because we wanted to have them detailed in any view. The most advanced optimisation routines are used for the 3DS Max files but that will not help if we are moving such large files around in your system memory and over the graphics subsystem.

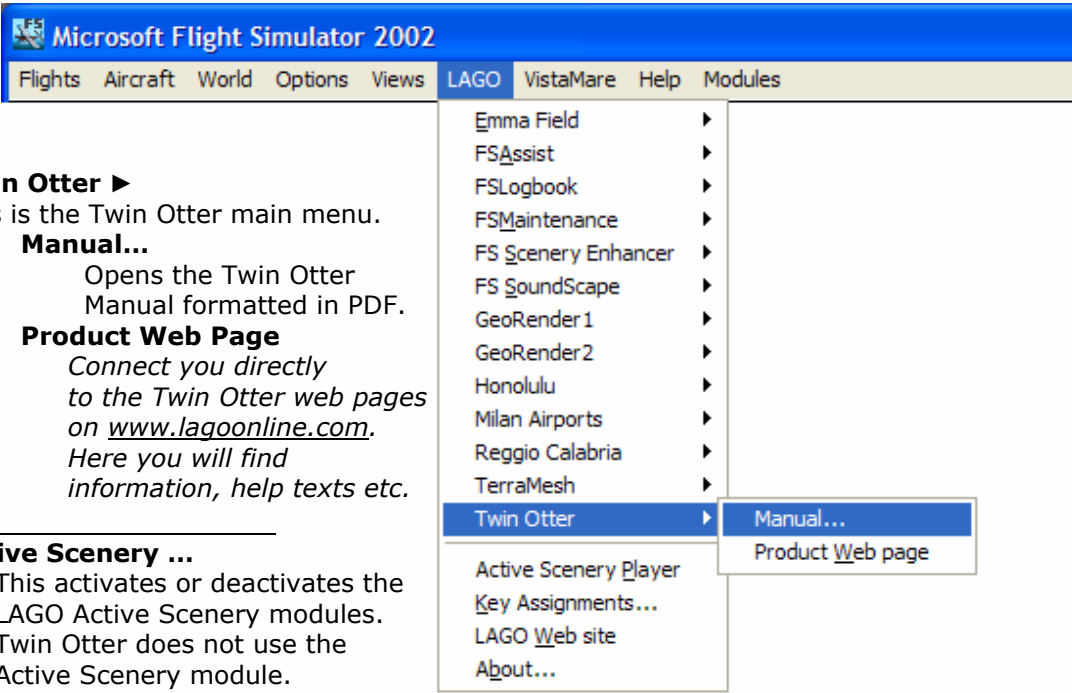
Most obvious, using the Twin Otter you might see some delays in opening windows and/or accessing menu items.

Repaints

Although the resulting textures in your aircraft directory are standard FS2002 textures they are created using vector technology. Prior to exporting to bitmap we used layered vector graphics with "bolts" and other surface details as well as aluminum surface showing up from beneath a livery. These effects will be lost if the textures are just repainted. But the author of the textures is willing to do the repaints, see our website for more information.

The LAGO menu

The first thing you will notice after installing "Twin Otter" and launching Microsoft Flight Simulator 2002 is a new entry called LAGO in the Flight Simulator menu. Under this menu you can access all LAGO programs for FS2002. The LAGO entry will already exist if you installed another LAGO Active Scenery product, like FS Scenery Enhancer, FSMaintenance or Emma Field.



LAGO

Twin Otter ►
This is the Twin Otter main menu.

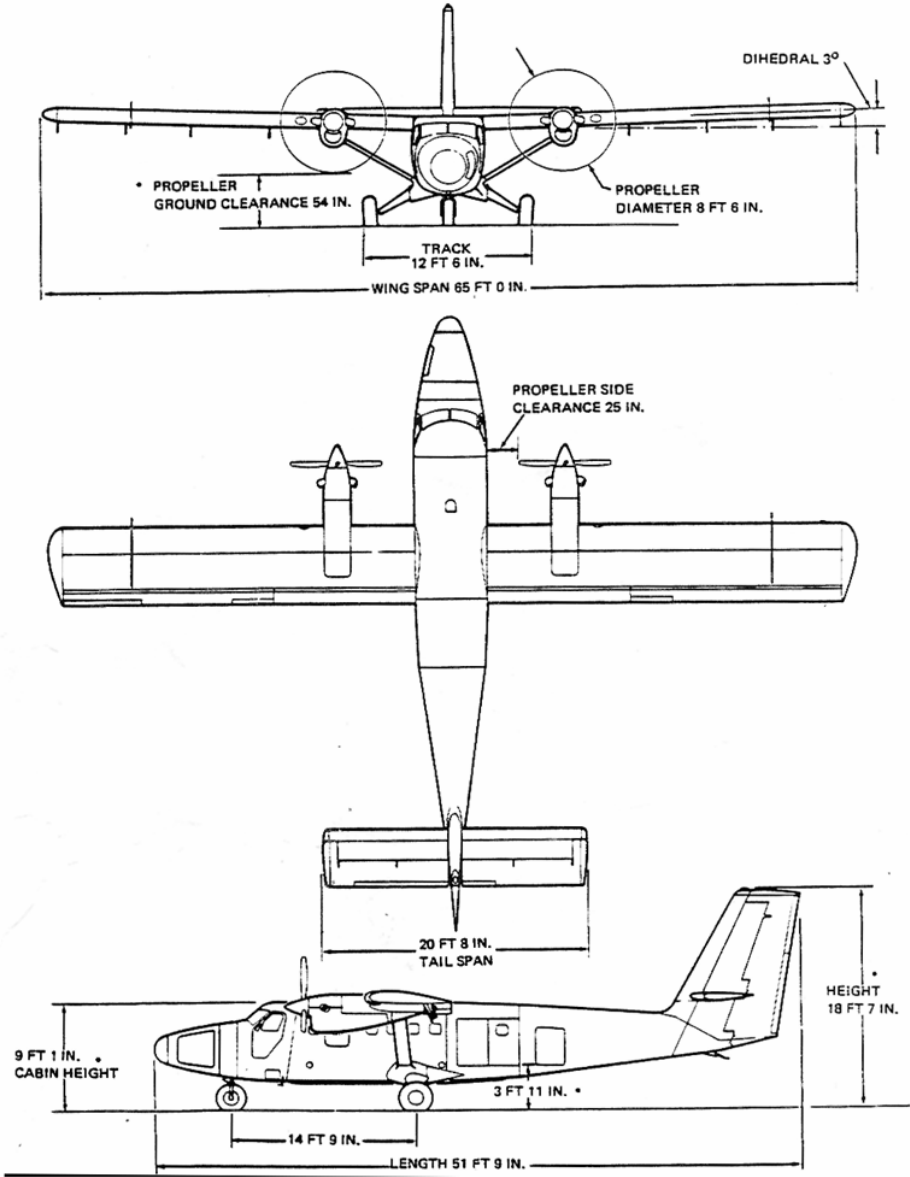
Manual...
Opens the Twin Otter Manual formatted in PDF.

Product Web Page
Connect you directly to the Twin Otter web pages on www.lagoonline.com. Here you will find information, help texts etc.

Active Scenery ...
This activates or deactivates the LAGO Active Scenery modules. Twin Otter does not use the Active Scenery module.

LAGO Web site
Links to the www.lagoonline.com web site.

About...
Shows the credits and version number of ViMaCore.dll, the file that creates the link between our products and FS2002.



DHC-6 Twin Otter history

Manufacturer

de Havilland Canada

Program

January 1951	Design work on the DHC-3 Otter begins.
December 1951	First flight of the DHC-3 Otter.
November 1952	Otter receives Canadian certification.
Mid 1950's	DHC begins studies on an improved version of the aircraft that would eventually replace the Otter. At the moment no suitable engines were available so work on the "Twin Otter" was postponed.
Early 1960's	The Pratt & Whitney Canada PT-6 engine becomes available, making it possible to design a "Twin Otter" with the same STOLL characteristics as the DHC-3 Otter.
May 1965	First flight of the DHC-6 "Twin Otter". The Twotter was born.
1966	First Twotter deliveries.
1968	Introduction of the series -200. Because of the long nose and a reconfigured interior this version featured much more cabin space.
1969	Introduction of the series -300. This version featured increased engine performance, allowing for a 450kg increase in take-off weight.
1988	Last Twin Otter leaves the production line.
2002...	More Twin Otters flying then a couple of years ago, old derelict aircraft are restored. Not only because they have historical or sentimental value but also because they still are very functional, cheap and easy to operate and loads of fun to fly.

Design features

The de Havilland DHC-6 Twin Otter is an all-metal, high wing monoplane, powered by two wing-mounted, turbo-shaft engines, each driving a three-bladed, reversible pitch, fully feathering propeller.

The aircraft carries a pilot, copilot, and up to 20 passengers, depending upon the seating configuration. Alternatively the Twin Otter can be equipped for cargo transportation, ambulance duties, supply dropping, aerial survey operations and fire fighting.

The aircraft can be adapted for operations on wheel-skis, spring skis, floats (which necessitates the installation of a short nose), and intermediate flotation gear (for "soft field" operation). Optional installations available include wing fuel tanks, anti-icing and deicing systems, crew and passenger oxygen systems, autopilot, propeller synchronizer, air conditioning, and various radio, navigation and communication systems.

De Havilland Canada has a long history with rough terrain aircraft and the Twin Otter is no exemption. It features large tires to distribute the aircraft's weight over a large surface. It has a high wing design to keep the engines clear of stones, dirt and dust. Also its own stairway built into the passenger entrance door, making it independent of ground equipment. Due to its high wings it has a relatively short ground-clearance,

thus making it relatively easy to service the aircraft without the use of any ground equipment.

As you might have noticed the engine controls are positioned on the cockpit ceiling. This is another one of the Twin Otter's ingenious features. By placing the controls on the ceiling it was no longer necessary to let the control cables run from the high mounted engines to the cockpit floor. This in turn makes maintenance easier and the change on malfunctions smaller. The controls for the flaps are positioned in the same way.

A lot of effort has been made to keep the aircraft simple, the only hydraulically operated part in the aircraft is the flap system and this makes it possible to put the flaps in every possible position, ranging from 0-37.5 degrees. Unfortunately this is not possible in FS2002. All other controls are mechanically operated through pulleys and cables.

Power plants

The power plants comprise two United Aircraft of Canada Limited PT6A-27 engines, each housed in a wing nacelle. Each engine has two independent turbines, one driving the engine compressor, fuel pump and accessory gearbox, and the other driving the propeller through a reduction gearing. A starter- generator and a gas generator tachometer are mounted on the accessory gearbox. Retractable intake deflectors for ice and snow protection are installed in the engine air inlet ducts. On some aircraft a spray ring for engine compressor washing is installed inside each engine nacelle.

Short Take-Off and Landing (STOL)

The Twin Otter was designed as a STOL aircraft, meaning that it is capable of operation from very short runways. Its STOL capabilities are boosted by the aircraft's huge wing-area of 39 square meters, this at a maximum take-off weight of 5670Kg, giving it a wing-area to weight ratio of an amazing 1:145. A 747-400 for instance has a wing-area that is 14 times larger; its maximum take-off weight on the other hand is 72 times bigger, resulting in a wing area to weight ratio of 1:763.

To assist in breaking the propellers can be set into a 'Beta' (reverse) range where they give reverse thrust. To activate this system press [F2] when in idle and press [F1] to go back to idle. Although totally unsupported and not standard practice, it is known that pilots have used this system to perform very steep dives where the use beta setting to avoid the speed getting to high.

Float and amphibious operations

The Twin Otter was available in many versions but a very successful one always was the float version. Not as many amphibious aircraft were sold but they are still seen a lot in the USA and Canada. Both the float and amphibious version share one problem. The ground handling is not very good.

The amphibious version has no wheel steering and both versions have no water rudder. You will need to use directional braking, directional engine control and (when you have some speed) the rudder to keep course. With some wind this is a real problem. But that's just about the only disadvantage of this aircraft.

Twin Otter performance

Take off distance (sea level, ISA):

Ground run	700 ft (213m)
Distance over 50 ft	1200 ft (366m)

Landing distance (sea level, ISA):

Ground run	515 ft (157m)
Distance over 50 ft	1050 ft (320 m)

Rate of climb (sea level, ISA):

Two engines	1600 ft/min
One engine	340 ft/min

Service ceiling (ISA):

Two engines	26700 ft (but don't go there in the Twin Otter)
One engine	11600 ft

Maximum cruise speed (ISA):

Sea level	170Kts True Airspeed (TAS)
5000 ft	181Kts (TAS)
10000 ft	182Kts (TAS)

Stall speed:

Flaps retracted	74Kts Indicated Airspeed (IAS)
Flaps Extended	58Kts IAS

Dimensions:

Wingspan	65.00 ft (19.81m)
Wing area	39m ²
Length	51.75 ft (15.77m)
Height	19.50 ft (5.94m)

Weights:

Maximum take off	12.500 lb (5670Kg)
Maximum landing	12.300 lb (5580Kg)
Empty	6878 lb (3120Kg)

Fuel Capacity (Sea level, ISA):

Maximum fuel capacity	2410 lb (1093Kg)
-----------------------	------------------

Power plant:

Maximum take off thrust	460 KW (620 SHP)
-------------------------	------------------

Settings & Speeds

The Twin Otter is not a Boeing 747-400. Not only in size and equipment but also in settings and procedures. It is an aircraft build to take some punishment. All procedures, settings and speeds in this manual should be taken as a guide. But many Twotter pilot will tell you that as long as she doesn't stall all is okay. Do not be afraid to experiment.

There is one thing you need to keep thinking about. It's a turboprop and one of the few disadvantages of that type of power plant is that it will NOT spool up very fast. If the torque gets low it will take a few seconds before power is build up again. Get low, slow and at low torque settings and you do not have much options. When you are approaching a difficult runway it is better to loose speed by using a lot of flaps then to lower the torque.

Cruise Torque settings

Cruise Torque settings (%) (at 1900 rpm prop)							
IAS (Kts)	100	110	120	130	140	150	160
Alt (Ft)							
5000	35	41	47	58	72	84	100
6000	36	42	49	60	74	87	103
7000	36	42	49	60	74	87	103
8000	37	43	49	61	76	88	
9000	37	44	50	62	77	90	
10000	38	45	51	63	78	91	
11000	38	45	51	63	78	91	
12000	38	45	51	63	78	91	
13000	39	45	52	64	79	93	
14000	38	45	51	63	78	91	
15000	39	45	52	64	79	93	
16000	40	47	54	67	83	97	
17000	41	48	55	68	84	98	
18000	42	49	56	69	86	100	
19000	43	50	58	71	88	103	
20000	43	51	58	72	89		
21000	45	52	60	74	92		
22000	45	53	61	75	93		
23000	46	54	62	76	94		
25000	46	54	62	76	94		

Optimal cruise speed and cruise altitude

The Twin Otter is most at ease cruising at 14.000 feet and 130 knots indicated airspeed. Any higher and your passengers will feel uncomfortable because of the lack of a pressure cabin. Any lower and you will burn more fuel than needed.

Approach speeds

Flaps 10	100 KIAS
Flaps 20	90 KIAS
Flaps 40	80 KIAS
Touch down speed expect	70 KIAS

The models in this product

After the end of the installation process, in your system you will find the Twin Otter in 4 versions and 13 liveries. The liveries are chosen to represent a wide range of Twin Otter operators, both from the present and in the past.

Liveries available are:

Float version:

- Maldivian Air Taxi

Ski version:

- British Antarctic Survey

Amphibious version:

- Private

Wheel version:

- Aeropelican
- Air Seychelles
- Aeropelican
- Air Aid
- Air Hokkaido
- Aloha Island Air
- British Airways
- Executive Airlines
- Sunstate
- Warsteiner

To select the Twin Otter of your choice just do the following.

1. Go to the "Aircraft | Select Aircraft ..."
2. Under the "Aircraft manufacturer" select "De Havilland Canada",
3. In the "Aircraft model" dropdown select a Float, Wheel, Amphibious or Ski version of the Twin Otter.
4. Finally you can select your favorite operator in the "Variation" dropdown.

You are now ready to fly the Twin Otter!

Main instrument panel

Main Panel overview



1. Primary Flight Instruments

- Turn Co-ordinator
- Airspeed Indicator
- Radio Magnetic Indicator (RMI)
- Artificial Horizon
- NAV1 & Glideslope Indicator
- Clock
- Altimeter
- Vertical Speed Indicator
- Marker Beacon indicators

2. Engine Instruments

- Torque indicators
- Propeller tachometers
- Turbine Temperature indicators
- Gas Generator tachometers
- Fuel Flow indicators
- Oil Pressure Indicators
- Oil Temperature indicators
- Fire Panel

3. Radio Panel

- Battery voltage indicator.
- Direct Current (DC) load indicator
- Indication select switch
- Radios

Main Panel Details Primary Flight Instruments



- 1. Turn Co-ordinator**
Needle displays bank angle, the ball displays rate of turn.
- 2. Airspeed Indicator**
Needle displays airspeed in knots. Green and red marks are provided to indicate safe and danger operating zones.
- 3. Radio Magnetic Indicator**
Single needle displays direction to selected Non-Directional Beacon (NDB)
Double needle displays direction to selected Nav2 station
Red bug can be set to a "reference" course; the knob on the right bottom of the instrument can adjust position of the bug.
- 4. Artificial Horizon**
Displays bank & pitch attitude.
- 5. Nav1 & Glide-slope indicator**
Displays course and cross-track to selected Nav1 station. Also displays glide-slope deviation if an ILS frequency is tuned.
- 6. Clock**
Displays local time
- 7. Altimeter**
Hands show altitude in respectively: Feet, 1000xfeet and 10000xfeet.
- 8. Vertical Speed Indicator**
Displays vertical speed in feet per minute.
- 9. Marker Beacon Indicator**
Blue light displays outer marker signal
Yellow light displays middle marker signal
White light displays inner / airways marker signal

Main Panel Details Engine Instruments



- 1. Torque indicators**
 Displays percentage of maximum torque delivered by the engine. Information is received from pressure transmitters on the relevant gearbox.
- 2. Propeller tachometers**
 Displays propeller rpm in rpm.
- 3. Turbine temperature indicators**
 Indicates temperature of the area downstream of the compressor turbine in degrees Celsius (°C).
- 4. Gas generator tachometers**
 Displays gas generator (turbine) rpm in percentage of maximum rpm.
- 5. Fuel Flow indicators**
 Displays fuel flow in pounds per hour (PPH).
- 6. Oil pressure indicators**
 Displays oil pressure in pounds per square inch (PSI).
- 7. Oil temperature indicators**
 Displays oil temperature in degrees Celsius (°C).
- 8. Fire panel**
 Features the fire extinguishing handles, this is not functional in Fs2002.

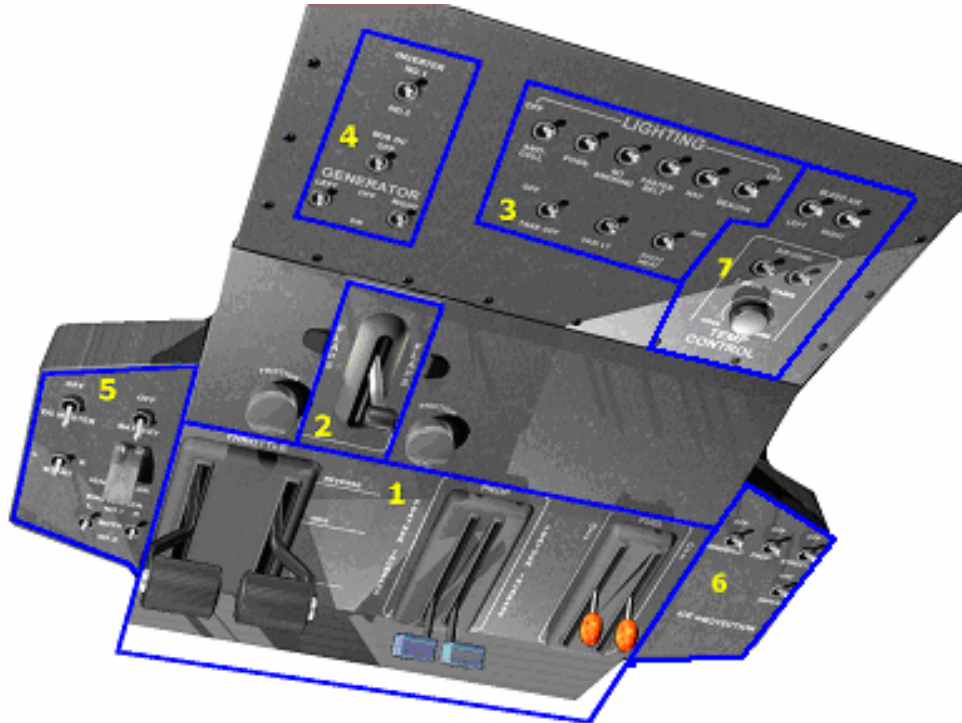
Main Panel Radio Panel / Battery Indicator



- 1. Battery current (DC) voltage indicator**
Indicates voltage on the left DC bus.
- 2. Direct current (DC) load indicator**
Indicates load on the source selected by the indication select switch.
- 3. Indication select switch**
Selects display source for the DC load indicator. Left engine generator, right engine generator or Battery.
- 4. Radios**
Used to select Nav & Com radio frequencies and Transponder codes.
Note: The little white TEST button on the COM1 serves as the FS2002 command to toggle the ATC window [`], the button on COM2 will send the freq set in COM2 to COM1.

Overhead panel

Overview



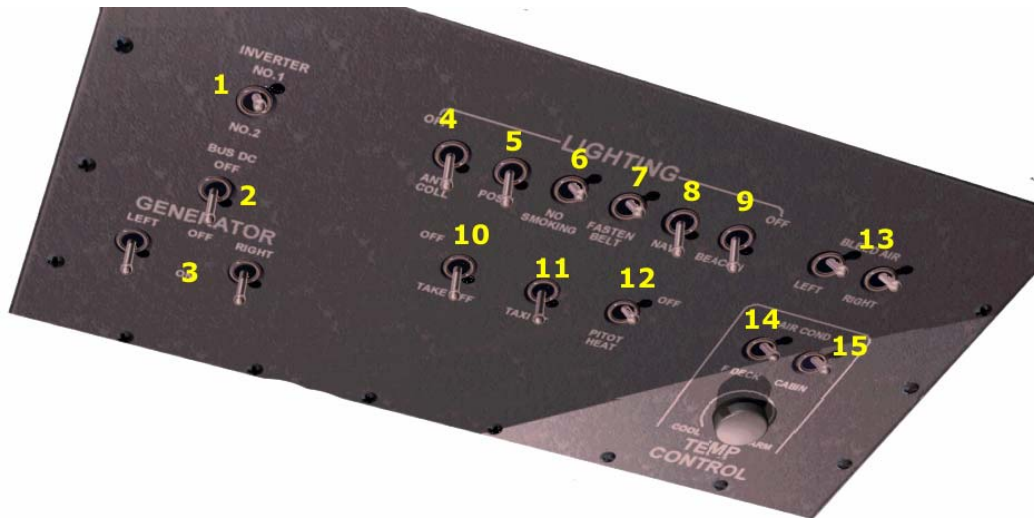
- 1. Engine controls**
 - Power levers
 - Propeller levers
 - Mixture levers
- 2. Flap handle**
 - Flap lever
- 3. Lighting panel**
 - Light switches
 - Pitot heat switch
- 4. Electrical panel**
 - Inverter switch
 - Bus DC switch
 - Generator Switches
- 5. Start panel**
 - Battery switch
 - DC master switch
 - Starter select switch
 - Ignition select switch
 - Engine ignition switch
- 6. Ice Protection panel**
 - Windshield deice
 - Prop deice
 - Struct (wings) deice
 - Wiper
- 7. Bleed air / Air conditioning)**
 - Air conditioning
 - Bleed Air

Overhead Details Engine controls



- 1. Power levers**
Control propeller pitch. Full rear is reverse pitch, full forward is maximum pitch.
- 2. Propeller levers**
Control propeller rpm, full forward is used for startup, full backwards feathers the prop.
- 3. Mixture levers**
Control engine mixture (mixture is hardly used in these aircraft, most of the time these levels are only used to cut the fuel flow to the engines to stop them. Full back will cut the fuel to the engines.
- 4. Flap handle**
Controls flap position, the real Twin Otter does not use 'steps' but can be set at any angle. This is not possible in FS2002.

Overhead Details Lights, Air Condition & Generator



- 1. Inverter**
selects what inverter is used to create 115V 400Hz (AC) electrical power for the main aircraft bus.
- 2. Bus DC switch**
connects the left and right Direct Current (DC) bus.
- 3. Generators**
activates left and rights generators
- 4. Anti Collision lights**
switches the red tail light and the white wingtip lights
- 5. Position Lights**
switches the green/red wingtip lights and the white tail light
- 6. No Smoking lights**
switches the cabin 'no smoking' lights
- 7. Fasten Seat Belts light**
switches the cabin 'fasten seatbelts' lights
- 8. Navigation lights**
Identical to position lights (don't ask, that what the de Havilland manual states) so we are not using this switch, perhaps it can be used for some other use later
- 9. Beacon lights**
switches the red rotating light on the fuselage.
- 10. Landing lights**
switches the bright landing lights on the wings
- 11. Taxi light**
switches the bright light on the nose gear strut, rotates with rudder
- 12. Pitot Heat**
switches on the heating for the Pitot tube
- 13. Bleed Air**
activates the bleed air system that provides pressurized air to the air conditioning system
- 14. Air conditioning Flight Deck**
activates the air conditioning for the cockpit
- 15. Air conditioning Cabin**
activates the air conditioning for the cabin.

Overhead Details Start panel



- 1. DC master switch**
connects the battery to the aircraft electrical busses.
- 2. Battery switch**
connects the battery to the system (but before the DC master)
- 3. Starter select switch**
selects which engine is to be started.
- 4. Engine ignition switch**
selects the ignition system, open the cover first.
- 5. Ignition select switch**
selects which ignition system is used. Use alternatively to avoid using one system more then the other (many airlines use 1 for outbound flights and 2 for inbound flights).

Autopilot panel



- 1. Mode annunciators**
displays the AutoPilot modes that are active
- 2. YAW ENG switch**
toggles the yaw damper on/off
- 3. AP ENG switch**
toggles the Auto Pilot control on/off
- 4. Heading select**
Not implemented as the real function is not simulated in FS2002. AP heading is set with the Heading Select knob under the RMI.
- 5. AP PWR switch**
toggles the AP power on/off
- 6. Vertical speed select**
selects the vertical speed
- 7. Autopilot setting display**
displays the settings used by the AP
- 8. HDG**
toggles the Heading Select mode on/off (aircraft will follow heading bug)
- 9. NAV**
toggles the Nav mode on/off (aircraft will track radial tuned on Nav1)
- 10. APP**
toggles the Approach mode on/off (aircraft will track ILS heading and glideslope)
- 11. BC**
toggles Localizer Back Course mode on/off (aircraft will track ILS back course, without Glideslope)
- 12. CLIMB**
toggles Climb mode on/off (aircraft pitch will be maintained)
- 13. ALT**
toggles Altitude Select mode on/off (aircraft will climb/descend to preselected altitude)
- 14. ALT SEL** (not functional in this refurbished AutoPilot system)
- 15. VS** (not functional in this refurbished AutoPilot system)
- 16. IAS** (not functional in this refurbished AutoPilot system)
- 17. DCS** (not functional in this refurbished AutoPilot system)



Panel Management

This aircraft is one of the first that is made to be flown using the Virtual Cockpit. As we all know some of the most problematic parts of flying with the VC are that a lot of the controls normally used with the mouse can no longer be used. We decided to solve this by having ALL parts of the panel as separate windows.

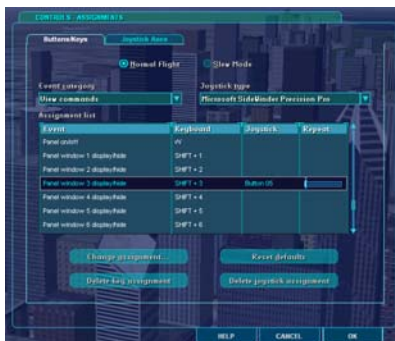
So when you fly and need to tune the radio you can press [SHFT]-[8] and a 2D clickable window will open where you mouse can be used. Press [SHFT]-[8] again and the window is gone, on the VC panel the new setting is seen.



This way of flying will give you a whole new and much more immersive experience while flying the Twin Otter. As you fly low and rather slow in this aircraft and often have to dodge in and out of valleys or try to find a runway hidden in a jungle, the freedom to move your view smoothly around the cockpit will make your flights safer and more fun.



If you have multiple monitors as so many simmers have these days you can make your flights even easier by moving the undocked panels to the second monitor.



The checklist has all key settings for the windowed instruments, btw.

The overhead panel is hard to put on a separate window as it will probably use all the space that is available. While testing we found the assigning a joystick button to this panel was by far the best option. In Fs2002 you will find the assign options in the "Options | Controls | Assignments ..." menu You can assign more panels to buttons but the overhead seems best suited.

Active Camera

While we were working on the Twin Otter our Belgium friends Serge Baye, Guillaume Darier and Andy Newman, release a new version of Active Camera. This module that enhances the viewing options of FS2002 seems to be made for this product and so we asked them if we could use the small module for this product. And to our great pleasure we got the permission. That is why it is installed with this product (it will not overwrite newer version of course).

It has to be clear that LAGO does not have any copyrights on this module, nor is there any commercial agreement made for the use of this module. Active Camera Pro in the current version is 100% freeware created by the creative minds of Anticyclone (www.anticyclone.be). Active Camera Pro is NOT a part of the product that we sell.

Listed below is a (very much) condensed version of the readme/manual for this module, it is not the complete file; you can find that in the ActiveCameraDocuments folder in the main FS2002 folder. There are much more options and possibilities with this amazing module and we strongly advise you to read the full documentation.

By far the most important for flying with the Twin Otter is the second option. Using the mouse wheel to zoom in and out and the mouse to pan around the VC makes this a whole new experience.

ACTIVE CAMERA PRO 1.3 FOR FS 2002

DESCRIPTION OF THE MODULE

With this module you can enable supplementary views in Microsoft FS 2002.

1. FLY BY

In the FS2002 Options - ActiveCameraPro menu select the "Activate Flyby".

The standard outside view will now be replaced with a 'flyby' mode where the view point will be fixed and always looking towards the aircraft.

2. VIRTUAL COCKPIT AND PILOT VIEWS

In the FS2002 Options - ActiveCameraPro menu select the "Internal Pilot view".

When in the virtual cockpit you can move anywhere in the aircraft. Simply PUSH and HOLD the wheel (or the center button) and while moving the mouse you can have a look left, right, up and down. With the wheel you can zoom in and out. You can even move left, right, back or forward (Num keypad 4, 6, 2, 8).

3. EXTERNAL VIEWS

In the FS2002 Options - ActiveCameraPro menu select the "External Pilot view".

It is mandatory that the Internal Pilot View is activated. You are now outside the aircraft. Move to the left or right, forward or backward and walk (even run) around the airplane (using both num keypad and mouse).

Test flight

Brussels National to London City

To get you fully acquainted with the Twin-Otter we have chosen a test flight in which you will learn all the Twin-Otter's functions, habits and performance.

The flight will depart from Brussels international airport, runway 7R and via a sharp right turn it will take you westbound. Climbing to a cruising altitude of 12000ft you will reach the North Sea coast over the Belgium coastal city of Kokzijde, home of the Belgian air Force Search and Rescue (SAR) helicopters.

Once over the North Sea you will proceed to the city of Dover, well known for its spectacular cliffs (be sure to use LAGO TerraMesh for maximum detail here). Once at Dover it will be just a short hop to London City where you will land on runway 10, making a spectacular turn over the London area followed by a LCY 5.5° glide-path approach.

Getting started

To start the test flight we have to open a flight first. Go to the "Flights | Select a flight ..." menu. Then select "LAGO flight files | Twin Otter Test Flight".

Cockpit Preparation

The first thing to do is make sure that the aircraft has power and that the avionics are working so that radio's can be tuned and engines can be started.

Check the following items:

- **Battery switch** **ON**
- **DC master switch** **ON**
- **Battery Voltage** **At least 20V**
- **Bus DC switch** **ON**
- **Generator switches** **OFF**
- **Radio power switches** **ON**

Now that we have electrical power and working avionics tune your COM radio to 132.475 MHz to receive the current weather via the Automated Terminal Information System (ATIS). A shortcut is to press the test button on the COM2 radio. It will tell you the following information:

Wind:	71° / 8Kts
Clouds:	2500 ft scattered
Visibility	20 miles
Temperature	15°C
Dew point	15°C
Altimeter	29.92 inch / 1013mB
Runway in use	07L

Using the "Flights | Flight Planner | Load.." menu you can now load the flight plan "Twin Otter Test Flight" in our (non standard) GPS system. The GPS window can NOT be loaded with a short cut key because FS2002 only allows 10 windows to be loaded with that. It can however always be loaded using the "Views | Instruments.." menu.

Engine Start

No change to our plans following this ATIS. It's time to start the engines and line up runway 07R. To change to the overhead panel press [SHFT]-[3] or press on the "OVERHEAD SWITCHES" text on the lower left part of the main panel.

We are now ready to start the engines so look left and right to see if no one is standing between the prop blades. Check and perform the following items:

- | | | |
|---------------------------------|------------------------|--------------------|
| • Propeller levers | FULL | [CTRL]-[F4] |
| • Mixture levers | RICH | [SHFT]-[CTRL]-[F4] |
| • Throttle levers | IDLE | Joystick or [F1] |
| • Beacon | ON | |
| • Ignition select switch | BOTH | |
| • Starter select switch | LEFT | |
| • Engine ignition switch | IGNITION MANUAL | |
| • Left Generator | ON | |
| • Ignition switch | CLOSE COVER | |

Repeat for Right engine

If everything went well the engines are running. Now check if they are stabilized. If all indications are in the green and stable do the after start actions. Check and perform then the following items:

- | | |
|---------------------------------|-------------------------|
| • Starter select switch | Neutral position |
| • Engine ignition switch | Cover closed |
| • Generator switches | ON |
| • Anti collision lights | ON |
| • Position lights | ON |
| • Taxi lights | ON |
| • Trim | Neutral |
| • Bleed Air Switches | ON |
| • Air Conditioning | ON |

Departure

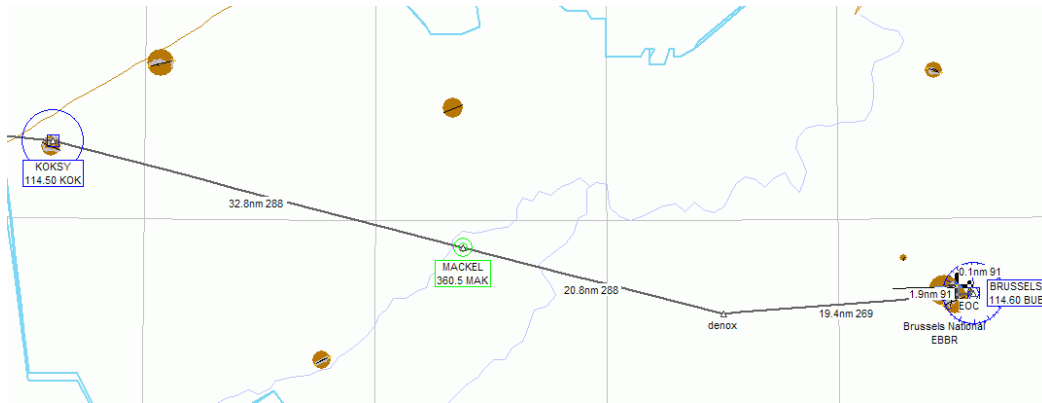
Now slowly taxi to the runway. Departure will be from rwy 07R. At 500ft Above Ground Level (AGL) a right turn will be made to the "OZ" Non Directional Beacon (NDB). Once overhead "OZ" proceed at 275° to intercept the 288° inbound radial to the "KOK" VOR, this will take you directly over the "MAK" NDB.

Overhead the "KOK" VOR turn left to intercept the 279° outbound track, which is also the 279° inbound to the "DVR" VOR. Cruise altitude will be 12000ft.

Radio frequencies:

Check and perform the following items:

- | | |
|----------------|---|
| • NAV1: | Kokzijde "KOK" VOR / 114.50Mhz / 288°. |
| • NAV2: | Brussels "BUB" VOR / 114.60Mhz |
| • ADF: | Oscar Zulu "OZ" NDB / 314Khz. |



We have just been cleared to line up rwy 07R so move the (blue) Propeller levers fully forward to get normal RPM ([CTRL]-[F4]) and an slightly advance the power levers to get the aircraft moving. Once on the runway, select flaps 10 and check all engine indications are in the green. You are now ready for take-off.

Take-off

Once cleared for take-off, perform the final checks. Check and perform the following items:

- | | | |
|-----------------------------|---------------------|-------------|
| • Landing lights | ON | |
| • Propeller levers | Full forward | [CTRL]-[F4] |
| • Flaps | 10 degrees | |
| • Take-off clearance | Received | |
| • Landing lights | ON | |

Keep increasing the power levers until the engines are stabilized at almost 100 pct Torque. Rolling down the runway rotate the aircraft to a 10° nose up attitude when you've reached 80Kts. Once airborne, climb to 500ft at 100 knots and then turn right almost 180° to proceed straight to the "OZ" NDB. The course to the any NDB can be seen in the RMI single needle. After the turn start you flap retraction. Climb speed without flaps up should be 110kts at a rate of climb of 1500ft / min.

Overhead the "OZ" NDB turn right to 269° to intercept the 288° radial to the "KOK" VOR. The radial can be set using the selector knobs on either the NAV1 & Glideslope indicator or the autopilot panel. Change the ADF frequency to the "MAK" NDB (360.5Khz)

Cruise

You should have reached 12000ft well before the "KOK" VOR. Reduce the torque to 90% (with the throttle) and prop rpm to 1900rpm to achieve a comfortable cruise speed.

Overhead the "KOK" VOR change the NAV1 frequency to the "DVR" VOR (114.95Mhz / 179°). Put Kokzijde in NAV2 to check NAV1 readings.

Overhead "DVR" change the NAV1 frequency to the Detling "DET" VOR (117.30Mhz) and put Dover in NAV2 to make sure your course is correct. Inbound course to "DET" should be 291°.

Descent

Overhead "DET" it is already time to descent. Let's start with a descent briefing.

Expected landing runway is 10, thankfully wind and clouds are as favorable as in Brussels so a nice approach can be expected. Runway 10 has a 5.5° glide path and approach will be at 20 degrees flaps / 85 Kts. Full flaps will be selected at 500ft AGL.

Radio frequencies: Check and perform the following items:

- **NAV1:** **London City ILS DME "LST" / 111.15Mhz /097°.**
- **NAV2:** **Detling "DET" VOR / 117.30Mhz**
- **ADF:** **London City "LCY" NDB / 322Khz.**

Overhead "DET" continue at 291° and retard the power levers to achieve a torque reading of 40 % and descent to 2000ft. When the small needle on the RMI is at 235° turn right to Intercept the 235° inbound course to the "LCY" NDB (fly direct to the NDB) to get at the airport.

At 2000' keep the torque low to let the speed reduce to 100Kts overhead the "LCY" NDB. At 100Kts select flaps 20.

Overhead "LCY" turn left to 290°. After 3 minutes start a left turn to 115° to intercept the localizer for rwy. 10. Once stabilized on the localizer reduce the speed to 85Kts and select full flaps. Now capture the glide-slope and start a descent. You are now ready for the landing.

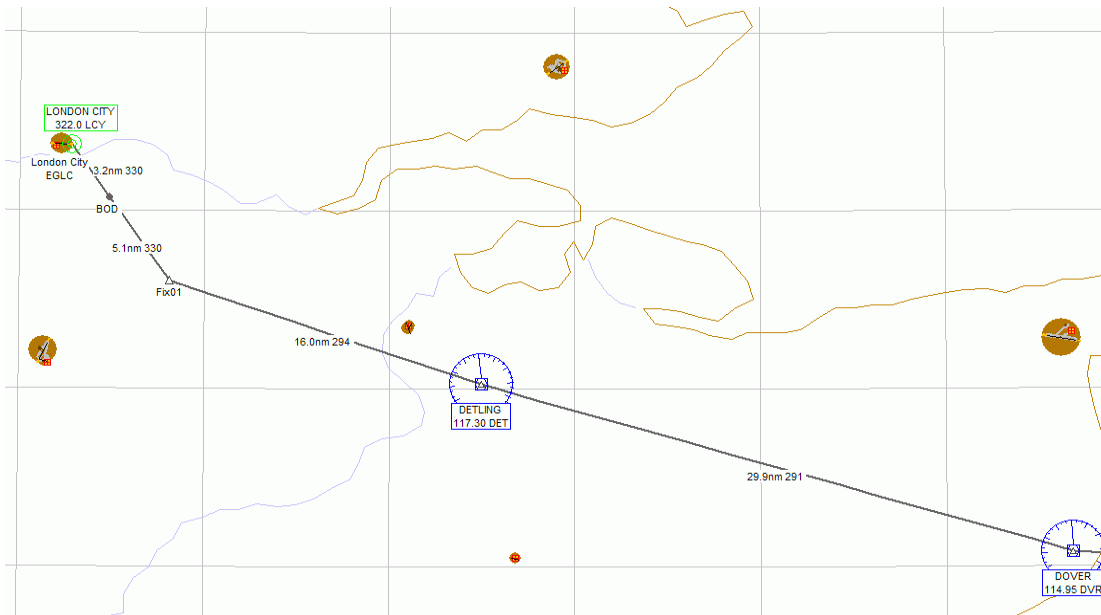
Landing

Check and perform the following items:

- | | |
|----------------------------|---------------------|
| • Propeller levers | Full forward |
| • Flaps | 40 degrees |
| • Landing lights | ON |
| • Landing clearance | Received |

Now touch down and use the brakes to slow the aircraft down. Turn off the runway, taxi to the parking and move your mixture levers fully back to the "cut-off" position. After your passengers have disembarked switch the aircraft off.

Check and perform the following items:



- **Mixture levers** **CUTOFF**
- **Propeller levers** **FEATHER**
- **Power levers** **IDLE**
- **Air Conditioning** **OFF**
- **Bleed Air** **OFF**
- **Generator switches** **OFF**
- **Bus DC switch** **OFF**
- **Generator switches** **OFF**
- **Radio power switches** **OFF**
- **Igniters** **1 or 2**
- **DC master switch** **OFF**
- **Battery switch** **OFF**
- **Inverter switch** **Opposite**
- **Autopilot power** **OFF**

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CITY
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