

DC-3

Manuel de vol

Flight manual



Fly.Simvol
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&

ROTW

French Developers Team

pour
for **FLY! II**

Douglas DC-3

Introduction

Once more, we use this unique feature, in consumer simulation, created by TRI for Fly !: a complete and "scrollable" instruments panel, a cockpit where everything works whatever the displayed window.

As usually it will be still possible to start in pressing the key "E" which will show you, if you validated the option, all the steps well decomposed. This is practical for learning with the manual. But we shall never repeat it enough; nothing is worth a manual starting up step by step. It is a pleasure to hear every engine puts itself into operation and to see propellers starting as soon as we activate the throttle levers.

The DC-3 is the first "classic" twin-engine aircraft created by Jean Sabatier, one of the ROTW aircraft manufacturers. He had this plane in his portfolios since quite a lot of time and had to delay it to continue the ATR.

We are sure that you will take, with satisfaction, over the controls of this mythical aircraft which was born before the Second World War and which always flies. The piston engines replace the turboprops, it is simple to start and the tone of the engines is very pleasant.

This manual, **usable exclusively for flight simulation**, has for only purpose to allow the "in simulation" DC-3 user to dive into the real manipulations of the check list enumeration before starting up. It also supplies all parameters which will allow a management of simulated flights with a maximum of realism

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Private pilot



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1.

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DESCRIPTION

- Small historical reminder: the Douglas DC-3 (also known as C-47 and Dakota) made its first trial flight on December 10th, 1935 at Clover Field (near Santa Monica, USA). Specifications were both civil (transport of passengers) and military (transport of troops and material). It was also very used for the dropping of parachutists. Nearly 11,000 aircraft were built between 1935 and 1942.
One thousand Dakotas participated in the Normandy landings of June 6th, 1944.
In commercial version, its capacity was of 28 passengers with a range of 2,175 km.
- The model which was used by Jean is a commercial version in service in various Australian airlines since 1938. Its last affectation was at "Ansett Airways" where it flew during some years (until 1971) before being given to an association which continues to make it fly during aviation meetings in Australia. Its "nickname" is "KATANA" and it is equipped with Wright Cyclone engines.
- As often with Jean, there is a supplementary feature in this classic aircraft: it is a very complete and visual management of the icing. The DC-3 is equipped with anti-icing separated devices (left and right). They are naturally functional. The plus is the icing of the windshield: spectacular! The effect is amazing and you should not too much delay putting in service the de-icing if you want to find all the visibility necessary for an effective piloting.

2.

Douglas DC-3

CHARACTERISTICS

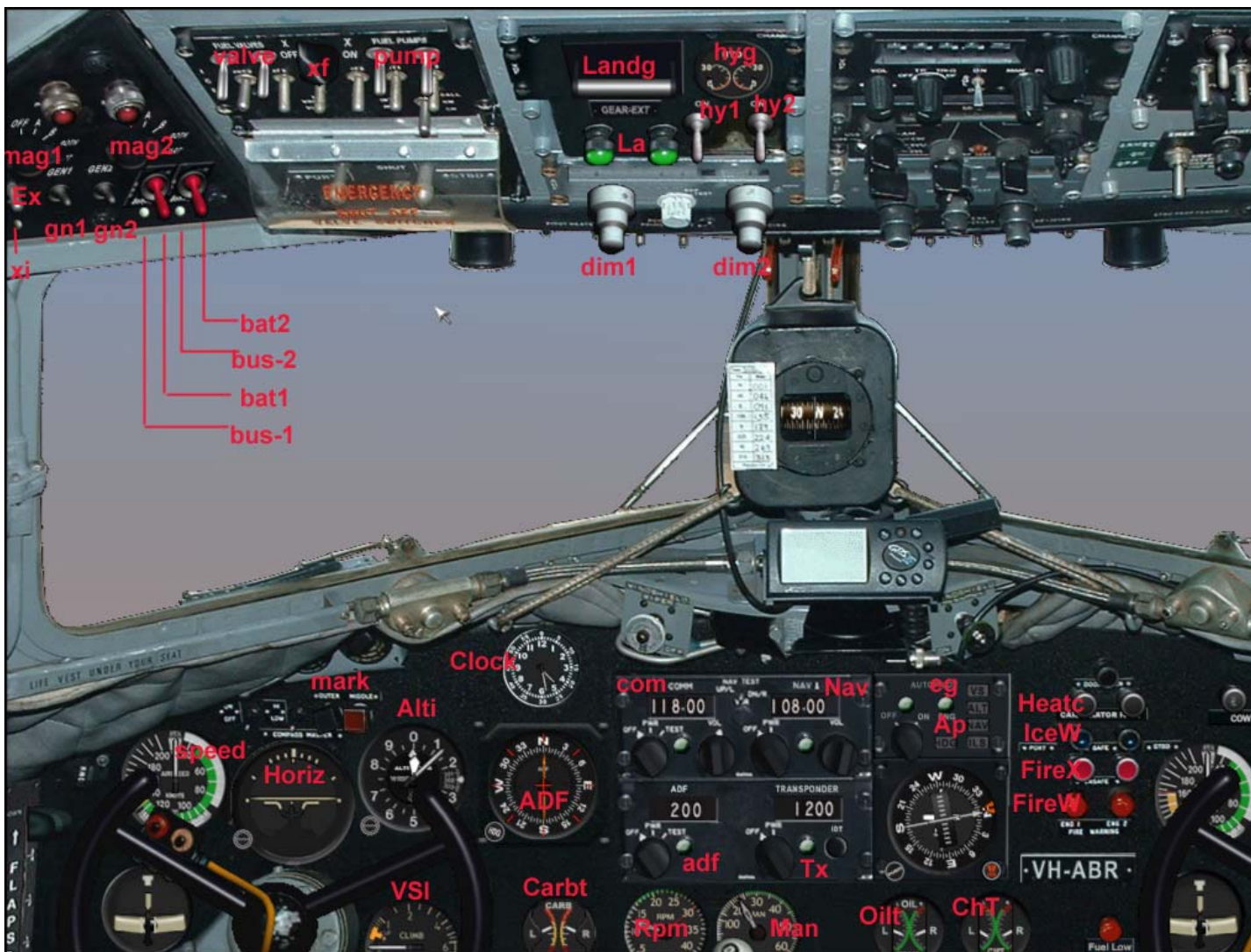
External dimensions	
Wing span	95 ft (28,96 m)
Length overall	64 ft 5 in (19,63 m)
Height overall	16 ft 11 in (5,16 m)
Surface alaire	987 ft² (91.70 m²)
Powered	
Original engine	2 × Pratt & Whitney Twin Wasp S1C3G 14-cylinder radials with 1,200 hp (895 kW) each
Original propeller	7149-A, Hamilton Standard - 3 blades
Weights	
Empty	18,300 lb (8,300 kg)
Maximum Take-off weight	28,000 lb (12,700 kg)
Performance	
Maximum speed	237 mph (381 km/h)
Cruising speed	170 mph (274 km/h)
Rate of climb	1,130 ft/min (344 m/min)

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INTRUMENTS PANELS

A. Upper and main panels (left)



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Reference	Type	Description
CIRCUIT ELECTRIQUE		
Bat1	Switch	Battery N° 1
Bat2	Switch	Batterie N° 2
Bus-1	Ann	Lighted when Bus-1 is fed.
Bus-2	Ann	Lighted when Bus-2 is fed
Mag1	Rot	Magneto N° 1-Engine 1 starter
Mag2	Rot	Magneto N° 2-Engine 2 starter
Gen1	Switch	Generator N° 1
Gen2	Switch	Generator N° 2
Ex	Switch	Electrical cross-feed between Bus-1 and Bus-2
Xi	Ann	Lighted when cross-feed is effective
Dim1	Rot	Panel dimmer
Dim2	Rot	Instrument dimmer
FUEL CONTROL		
Valve	Switch	Fuel control valves (left-right)
Pump	Switch	Fuel pumps (left-right)
Xf	Rot	Fuel cross-feed
HYDRAULIC		
Hy1	Switch	Hydraulic pump 1
Hy2	Switch	Hydraulic pump 2
Hyg	Gauge	Hydraulic pressure
LANDING		
LandG	Handle	Manette du train d'atterrissage
La	Light	Green: locked down Flashing: unlocked Off: gears locked up
AVIONICS Green light when "ON" Click on numbers to tune		
Com	Rot	Com radio switch.
Nav	Rot	Navigation radio
Adf	Rot	ADF radio.

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Reference	Type	Description
AVIONICS (continued)		
Green light when "ON" Click on numbers to tune		
Tx	Rot	Transponder radio
Ap	Rot	Auto pilot
Eg	Light	Green when AP engaged. To engage, use the A (or Q) key
PILOT GAUGES		
Mark	Light	Middle and outer markers
Speed	Gauge	Airspeed gauge
Horiz	Gauge	Horizon gauge
Alti	Gauge	Altimeter
VSI	Gauge	Vertical speed gauge and knob
ADF	Gauge	Auto finder
CarbT	Gauge	Temperature for both carburetors
RPM	Gauge	RPM gauge for both engines
Man	Gauge	Manifold pressure for both engines
OilT	Gauge	Oil Temperature for both engines
Cht	Indicateur	Cylinder Head temperature for both engines
HeatC	Knob	Carburetor Heaters
IceW	Light	Ice formation warning
FireX	Knob	Engine Fire extinguishers
FireW	Light	Engine fire warning

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B. Upper and main panels (right)



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Reference	Type	Description
HSI	Gauge	HSI instrument coupled to auto pilot
Cowl	Knob	Cowl flaps
ELT	Switch	ELT system
P1-P2	Switch	Pitot heaters (left-right)
LL	Switch	Landing lights (left-right)
Nav	Switch	Navigation lights
Rec	Switch	Recognition lights
Dice	Switch	Pneumatic de-icers (left-right)
Wind	Rot	Windshield heaters (left-right)

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C. Main panel



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Reference	Type	Description
Comp	Gauge	Compas magnétique
Flap	Lever	Flap control
Dme	Gauge	DME instrument
Temp	Gauge	Outside temperature
TankLeft	Knob	Tri states left tank selector: Inboard-Closed-Outboard
TankRight	Knob	Tri states right tank selector: Inboard-Closed-Outboard
Prop	Lever	Propeller control (Left-right)
Power	Lever	Power control (left-right)
Mix	Lever	Mixture control (left-right)
Carbair	Lever	RAM air for carburetors (left-right)
OverHeat	Light	Engine overheat warning
FuelQTY	Gauge	Fuel quantity
FuelSel	Rot	Tank Selector for fuel qty
FuelLow	Light	Fuel low for the selected tank

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PROCEDURE

A. Starting

- Parking brake ON
- Throttles to idle
- Prop to high
- Mixture full rich

(1) Engine n° 1

- Battery n° 1 ON
- Left Tank selector to outboard
- Open tank valve
- Open fuel pump n° 1
- Magneto n°1 from OFF to START
- Wait for engine
- Open generator n° 1
- Close Battery n° 1
- Close fuel pump n° 1

(2) Engine n° 2

- Battery n° 2 ON
- Right Tank selector to outboard
- Open tank valve
- Open fuel pump n° 2
- Magneto n° 2 from OFF to START
- Wait for engine
- Open generator n° 2

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- Close battery n° 2
- Close fuel pump n° 2

ATTENTION: **BATTERIES WILL CHARGE ONLY WHEN GENERATORS ARE ON AND THE BATTERY IS OFF. OTHERWISE BATTERIES ARE DISCHARGING AND THE LIFE IS ABOUT 1H.**

NOTE: Electrical cross-feed is effective only when one BUS is active and the other is inactive (after an engine shutdown for instance). The cross-feed may be used to feed the inactive BUS.

(3) Hydraulic

- Activate both hydraulic pumps and wait for pressure to build up.
- The flaps and the landing gears need hydraulic pressure to operate.

(4) Avionic

- Switch on all the radios:

COM
NAV
ADF
TRANSPONDER
AUTO PILOT

NOTE: Auto pilot will engage only with the A key (Q for French keyboard). This is because auto pilot switches are on the moving stick, and this cannot be simulated with FLY!.

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B. Take-off

- Taxi to runway
- Set parking brake
- Set flap to the first step (13°)
- Engage AUTO PILOT and set desired vertical altitude speed on the VSI
- Disengage the AP
- Set a 5° nose up in the elevator trim
- Set Cowl flaps for take off to prevent engine overheating
- Slowly set the full throttles
- Release parking brake
- Let the aircraft roll
- Take off at about 90 KTS
-

NOTE: The Auto Pilot is normally engaged from the stick, but for the simulation you will have to use the Keyboard key 'A' ("Q" for European keyboard).

The aircraft will nose up at about 40Kts when everything is normal

C. Climbing

- Climb steadily up
- At 300 feet, retract the gears
- At 500 feet retract the flaps
- Climb up to your cruise level

You may reduce propeller pitch and mixture when cruising at high altitude.

The DC3 will operate up to 20,000 feet.

Watch fuel quantity during long travel and switch tanks in route accordingly.

D. Landing

- Approach at no more than 100KTS at 20 miles from the airport
- Set full prop
- Set full mixture
- Reduce speed to 85KTS before descent
- Set flaps at first notch
- Descent at no more than 85 KTS

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- Touch down at 82-85 KTS
- Flare-up and touch down
- Cut Throttle to idle
- Start braking until speed bleed off
- Taxi to airport
- Parking brakes
- Shut down everything in reverse order

You are at home!

E. Managing the aircraft

(1) Carburetor

The carburettor will function normally when $-5^{\circ} < \text{carbTemp} < 35^{\circ}$.

Watch the gauge.

When carburettors are freezing, applies the following procedure:

- Close RAM AIR (Otherwise, the heaters are not enough effective)
- Open Carburettor Heaters

When carburettor temperature is too hot:

- Ensure Carburettor Heaters are closed.
- Open RAM-AIR. (For the left RAM-AIR, click well above the knob as the room is pretty cluttered around).

WARNING: IF ENGINES ARE OPERATED TOO LONG OUTSIDE NORMAL RANGE, THE ENGINES WILL CHOKED DOWN AFTER A WHILE.

(2) Pitot

When outside temperature is reaching -4°C , PITOTS tend to freeze. The following instruments will give erroneous results:

- Airspeed
- Altimeter

Open PITOT heaters when outside temp is below -4°C .

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(3) Engine fire

Engines may overheat when full throttles are applied too long when outside temperature is too hot. The yellow overheat warning lights will blink when engines are overheating.

Open cowl flaps too cool down engines

WARNING: OPERATING THE ENGINES TOO LONG IN OVERHEAT CONDITION MAY LEAD TO ENGINE FIRE

(4) Icing conditions

Above 13,000 feet, you may encounter freezing weather. Ice has random adverse effect on surface or on windshield.

When ice is forming on the windshield, open the windshield heaters.

When ice is forming on the plane surfaces, engine ice-warning lights are blinking.

Ensure cowl flaps are closed (Otherwise, de-icer will not operate)

Vérifiez que les volets de capot moteur sont fermés; sinon, le dégivrage ne fonctionnera pas.

Open De-icers to prevent ice formation.

NOTE: De-icers will close automatically to conserve energy when freezing conditions are no longer effective.

Windshield heaters closed when ice formation is no more detected.

WARNING: OPERATING TOO LONG WHEN ICE IS ACCUMULATING ON THE PLANE SURFACES WILL SLOW DOWN THE AIRCRAFT UNTIL IT LOOSE SPEED AND ALTITUDE.

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Credits

Project initiator	Jean Sabatier (ROTW)
3D model	Jean Sabatier
Panel and instruments	Jean Sabatier
Internal views	Jean Sabatier
Flight model	Jean Sabatier
Electrical circuit	Jean Sabatier
External paintwork	Jean Sabatier
Flight tests	Azzurro, Gilles Guesnel, Frédéric Mouflin, René Birot (all ROTW members)
Flight manual	Jean Sabatier, Jean-Marie Reuter, René Birot (all ROTW members)
Manual cover	Ema Trésarrieu