

Introduction

Fly ! is one of the first simulators to offer a complete panel, a realistic cockpit and the possibility to start a plane as in reality.

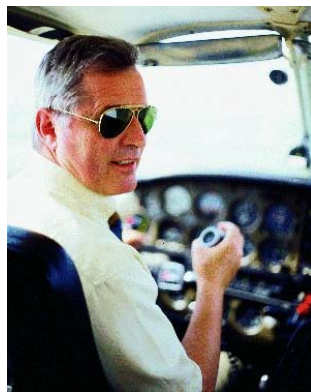
Of course, like in all major flight simulators, a key (in this case the "E" key) allows you to bypass this stage and start your flight with the engine(s) on and only the radios to tune.. That is a pity for the starting up of the engines is a very interesting stage of the pre-flight check-list.

The strictness of the procedures will allow one to be sure of the airworthiness of the plane.

The more sophisticated the plane (multi-engined, turbo-props, jets) the longer and complex this step will be. Even for a single-engined piston driven aircraft, the check-list must be carefully followed. Skipping a part or trusting only one's memory or habits are the cause of major accidents.

This manual, **only meant for flight simulators**, will allow the TBM700 user to become familiar with the real-world procedures of starting the plane. The TBM700 is a modern plane with state of the art avionics (EFIS), starting it up is a real pleasure

René Birot
Simvol/Fly Webmaster
ROTW coordinateur
Pilote privé



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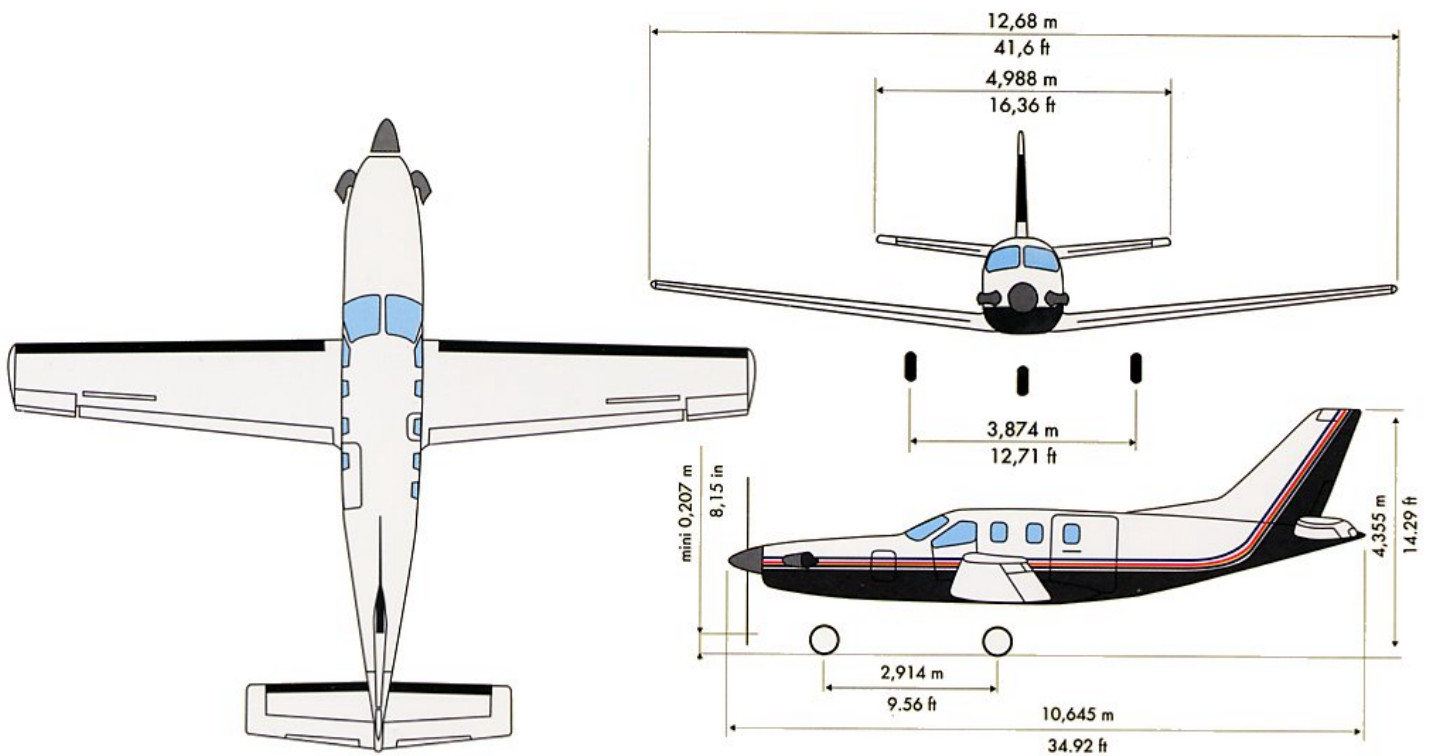
- 1- Guided tour of the TBM700 for Fly**
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Comments :

- a. All the screenshots were all taken in Fly ! II except :
 - the picture of the plane on page 1
 - the picture of the panel on page 5
 - the picture of the turbine on page 6
- b. The procedures described in this manual are all from the real TBM700

1- Guided tour of the TBM700 for FLY! II

1-1 External view



1-2 The panel

The cockpit of the TBM 700 is composed of state-of-the-art avionics.

The TBM project manager at ROTW wanted the plane to be as realistic as possible and some instruments were especially designed for this plane.

Moreover, it is one of the only planes, if not the only, to have a nominal view position which respects the sight of the pilot. The axis of the stick is in the middle of the screen which gives a stronger feeling of reality, without occulting the essential instruments (see following screenshot)

[SOCATA EADS](#) , the builder of the TBM 700, has especially released data for the ROTW so that the plane is as close as possible to its real-world counterpart : a "première" for a freeware plane for Fly!

Two French Army TBM700 pilots of the “Aviation Légère de l’Armée de Terre” (EAAT based in Rennes) took part in all the tests. Realism was pushed as far as the simulator would allow it.

The next pages will give you an idea of how to operate a TBM 700

Nominal view advised by the ROTW



1-3 Working instruments in Fly !2

1-3-1 The left part of the main panel



- 1 – Airspeed indicator
- 2 – Altimeter
- 3 – Vertical speed indicator
- 4 – Electronic ADI (EFIS)
- 5 – Electronic HSI (EFIS)
- 6 – VOR / ILS 2
- 7 – RMI
- 8 – Radar altimeter
- 9 – Torque meter
- 10 – Prop speed
- 11 – ITT (Turbine temperature)
- 12 – NG
- 13 – Oil temperature
- 14 – Oil pressure
- 15 – Fuel flow (see details on next page)
- 16 – Vacuum indicator
- 17 – Gyro setting
- 18 – Artificial horizon
- 19 – Digital clock
- 20 – Outside temperature
- 21 – Icing lights test

- 22 – Wings de-ice
- 23 – Ice light (light on the left wing) (not functional in Fly ! II)
- 24 – Prop de-ice
- 25 – Left windshield de-ice
- 26 – Right windshield de-ice
- 27 – Pitot 1 de-ice
- 28 – Pitot 2 de-ice and stall warning
- 29 – Inertial separator
- 30 – Parking brake
- 31 – Landing gear
- 32 – Master warning indicator
- 33 – Master caution indicator
- 34 – Altitude – vertical speed pre-select
- 35 – Upper EFIS brightness knob
- 36 – Altitude and decision height selector (Efis)
- 37 – Simple needle selector
- 38 – Double needle selector
- 39 – Navigation radial selector
- 40 – Heading selector
- 41 – ARC mode selector
- 42 – Lower EFIS brightness knob
- 43 – ITT test knob

Detail of fuel flow indicator (# 15 on the left main panel)



- 1 – Used fuel (in pounds)
- 2 – Remaining flight time
- 3 – Brightness knob
- 4 – Display test

1-3-2 Left main panel



- 1 – Fuel tank levels
- 2 – Fuel pressure
- 3 – Automatic/manual fuel tank selector switch
- 4 – Fuel tank selector (for the automatic mode)
- 5 – Auxiliary pumps
- 6 – Weather radar
- 7 – Transponder
- 8 – Cabin pressure altitude
- 9 – Cabin pressure climbing rate selector
- 10 – Differential and cabin pressure indicator
- 11 – Bleed valve
- 12 – HI/LO bleed valve
- 13 – Air conditioning switch
- 14 – Ventilation
- 15 – Pressure dump
- 16 – Cabin temperature
- 17 – Windshield de-fog
- 18 – Airspeed indicator
- 19 – Artificial horizon
- 20 – Altimeter
- 21 – BFG indicator (not operational in Fly !2)
- 22 – Co-pilot HSI
- 23 – Vertical speed indicator
- 24 – DME
- 25 – Hobbs meter

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1-3-3 Central main panel



- 1 – Auto-Pilot
- 2 – Advisory panel
- 3 – Advisory panel brightness knob
- 4 – Advisory panel lamps test
- 5 – Audio panel
- 6 – GPS
- 7 – Com and Nav 1
- 8 – Com and Nav 2
- 9 – ADF 1
- 10 – ADF 2
- 11 – Trims and autopilot master switch
- 12 – EFIS master switch
- 13 – Radio master switch
- 16 – Cabin reading lights
- 17 – Cabin flood lights

1-3-4 Overhead panel



- 1 – Left wing light
- 2 – Taxi lights
- 3 – right wing light
- 4 – Light indicator test
- 5 – Nav lights
- 6 – Strobes
- 7 – Not used
- 8 – Gyro switch
- 9 – Pilot RMI switch
- 10 – Not used (no ADI 2)
- 11 – HSI 2 switch (co-pilot)
- 13 – Main generator reset (not functional)
- 14 – Backup generator reset (not functional)
- 15 – Emergency lever (not functional)
- 16 – Electric source selector (The GPU is not functional)
- 17 – Main or backup generator selector
- 18 – Starter switch
- 19 – Ignition switch
- 20 – Voltmeter
- 21 – Amp-meter

1-3-5 The lower part



- 1 – Power lever
- 2 – Prop lever
- 3 – Engine power conditioner
- 4 – Tank selector
- 5 – Flaps lever
- 6 – Elevator trim indicator
- 7 – Aileron trim indicator
- 8 – Rudder trim indicator
- 9 – Flap position indicator
- 10 – Aileron trim (not functional in Fly ! II)
- 11 – Elevator trim

2- Characteristics

2-1 Engine :

1 Pratt & Whitney turbo-prop (Canada), type PT6A-64
Free turbine, reverse flow and 2 turbine sections

2-2 Propeller :

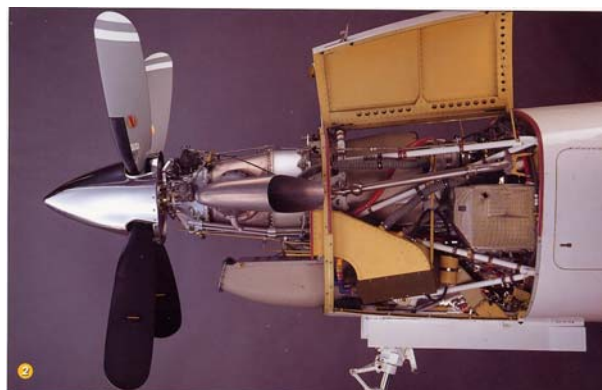
One 4 blades HC-E4N-3/E908S (K) Hartzell propeller (diameter = 2.3 m)

2-3 Sizes :

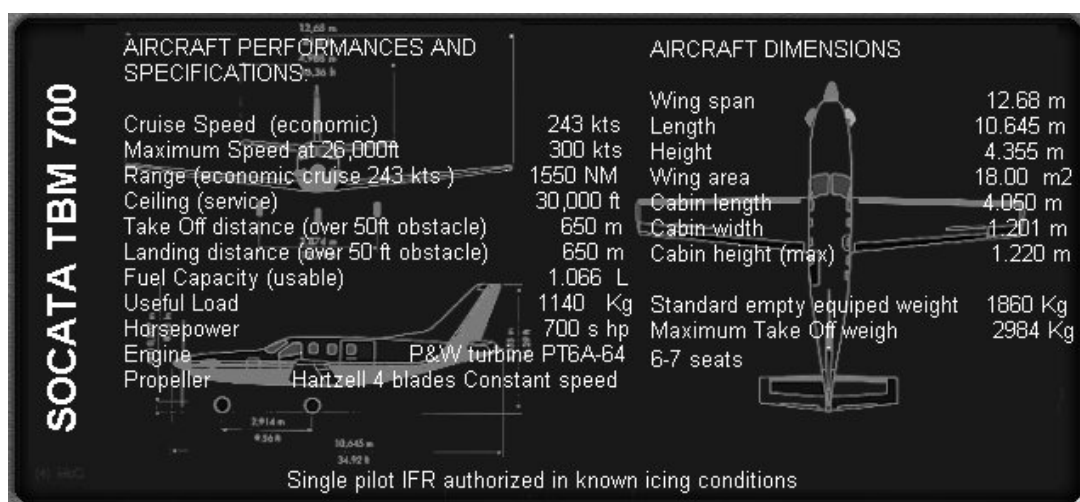
Length = 10.645 m
Wingspan = 12.680 m
Height = 4.355 m
Wheelbase = 3.874 m

2-4 Standard weights for the TBM700-A :

Standard empty weight = 4050 lbs (1837 kg)
Maximum useful load = 2564 lbs (1163 kg)



The real turbo-prop engine

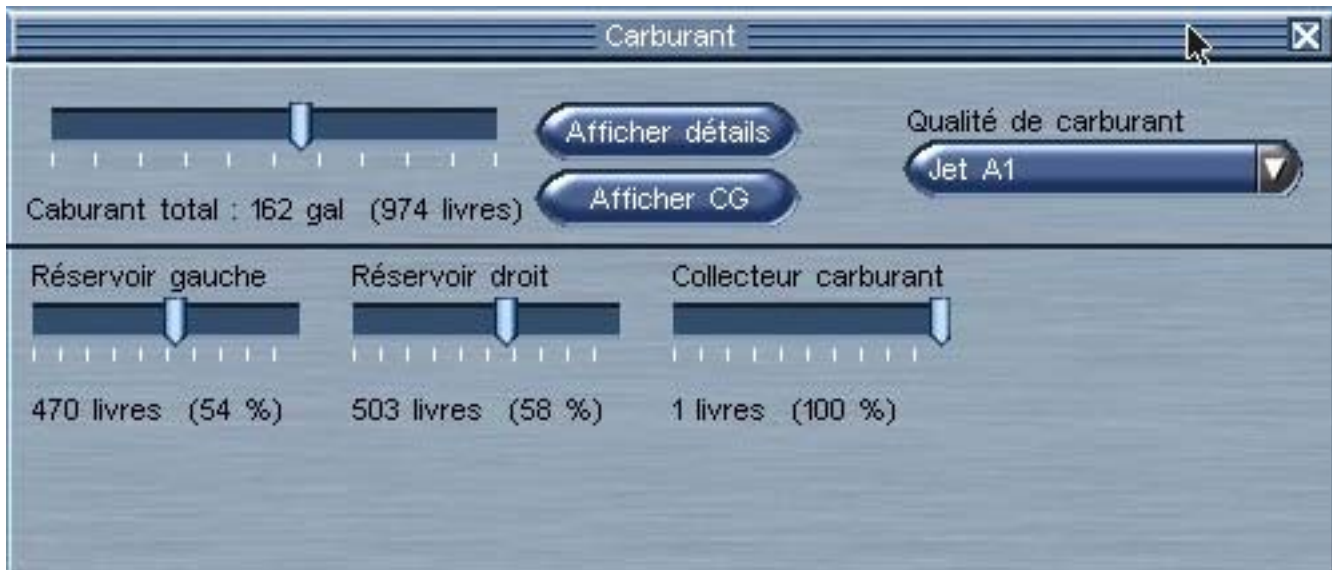


3- Starting the engine

3.1 External pre-flight check

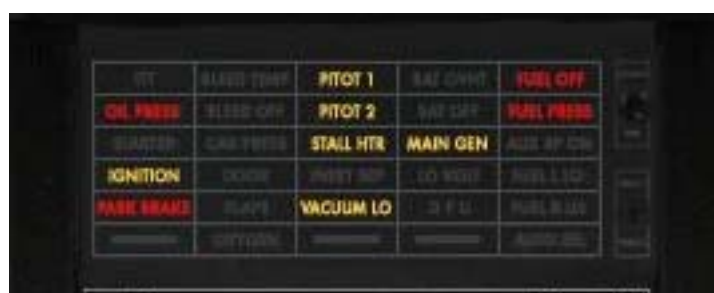
Make sure that the plane, the tires, the moving parts, the lighting are in good condition.
Check the oil levels and quality

Check the fuel warning, TRI has inverted left and right fuel tanks



fuel level gauge on the main panel.
The two tanks are on the same gauge (2 needles)

Notice : at each phase of the starting-up, the indicators on the panel have to be checked. They have to be tested before the start procedure. Don't forget to set the parking-brake.



3-2 Starting the plane

3-2-1 Battery (SOURCE) switched to ON (upper panel)



3-2-2 IGNITION set to AUTO (upper panel)



3-2-3 Fuel tank selector set to LEFT or RIGHT (lower panel)



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- 3-2-4 Set the switch of the automatic tank selector to AUTO (right upper part of the main panel). You will notice that the fuel selector on the lower panel will automatically rotate from left to right every 15 seconds while on the ground and every 10 minutes during the flight.



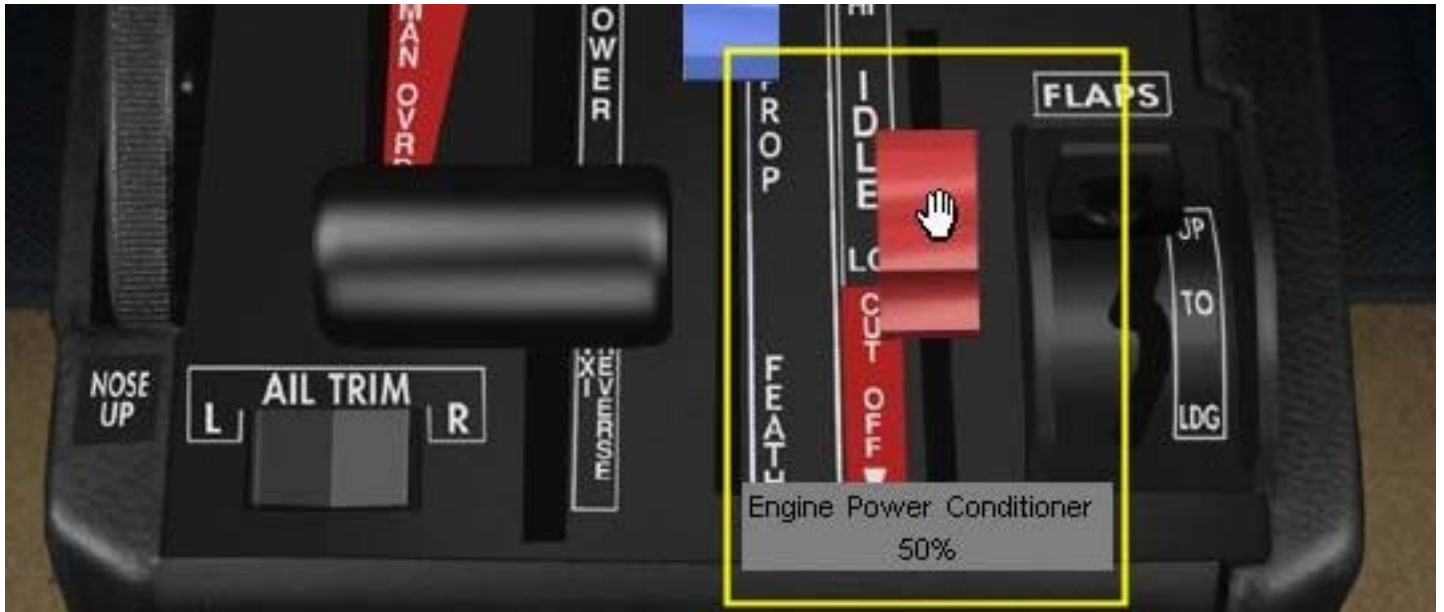
- 3-2-5 Electric fuel pump (AUX BP) set to ON



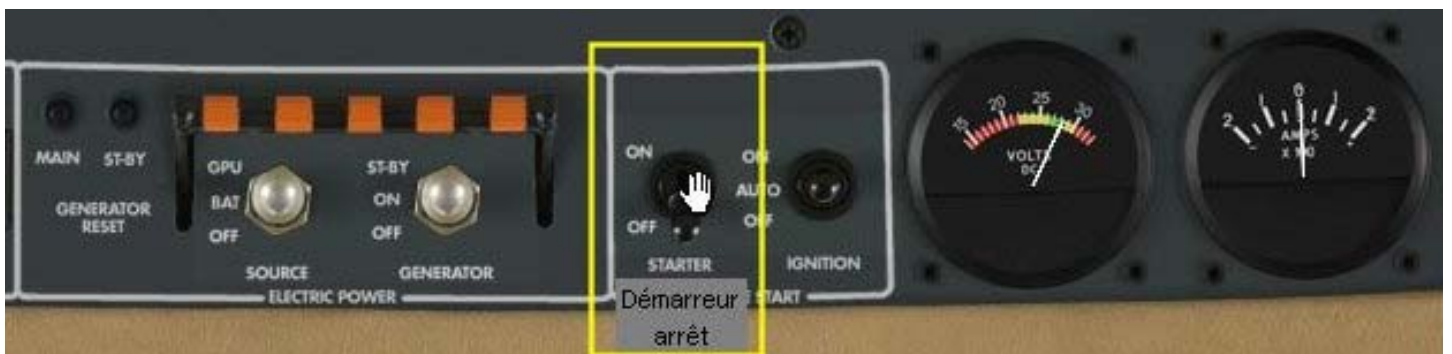
- 3-2-6 STARTER set to ON : engine starts ! Wait until you hear propeller rotating.



3-2-7 Move the conditioner lever from CUT OFF to IDLE (>50%)



3-2-8 – Starter on OFF (52% of NG) In Fly ! , it is easy to hear when the engine starts. One can also switch the starter to OFF as soon as the oil pressure light goes off. You will notice that the Main Gen light will go off, that the voltmeter will move from 25 to 28 volts and that the amp-meter will positive or on 0.



- IGNITION remains on AUTO



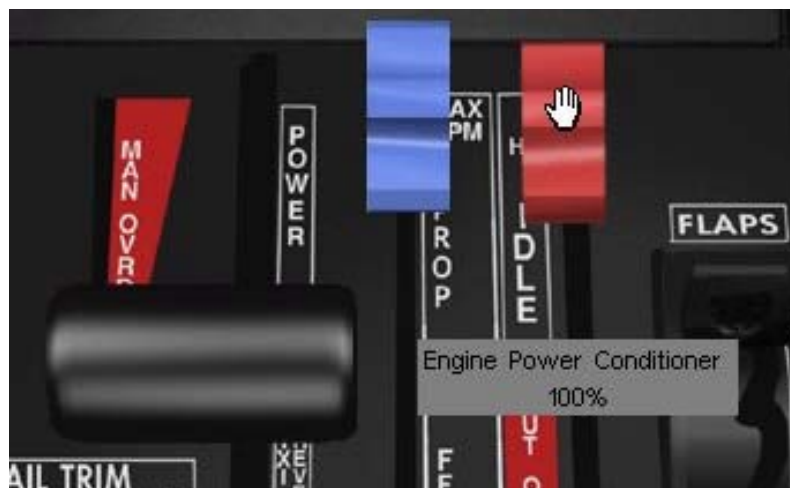
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- Electric pumps (AUX BP) on OFF, the fuel pump gauge should not go below 10 PSI



3-2-9 After starting

- Move the lever to HIGH - IDLE (100%)



The engine is now running. Lets now switch on the avionics

The normal procedure is to ask the tower for clearance to switch the engine on. This can be done **without setting the battery switch to on** by switching on the VHF1 (green light GND CLR on) and to ask for clearance to the tower.



3-3 Switching on the avionics

3-3-1 Radios, GPS, VOR, ADF, Transponder, Weather radar, auto pilot



switch to ON the three knobs surrounded by a yellow box to to have all the navigation instruments operational.

3-3-2 Switching on of the gyroscopes:



This is done by moving the 4 switches on the overhead panel

3-3-3 Interior lighting : Panel, instruments, intensity for EFIS-1 and EFIS-2 (bordered in yellow)



4. Some features of ROTW's TBM700

Fuel management

The TBM is equipped with an automatic tank selector. The switch is left of the fuel tank levels gauge. The right and left tanks are selected one after the other, every minute fifteen seconds when the plane is on the ground and every ten minutes in flight. You can watch the change of tank by looking at the selector on the lower console which passes automatically from one tank to the other. In reality, this selector is driven by an electric motor.

In the event of an imbalance between the tanks in automatic management (Auto Sel), you can change tanks manually either by pressing on the button marked "Shift" on the left of the gauge, or by operating the selector on lower the console. At every pressure on the button, the Auto-Sel counter resets. Do not forget to select the fullest tank before the landing

Engine management

The turboprop engine which equips the TBM must not be operated like a piston engine. The main instrument to monitor is the torque-meter. This gauge measures the torque (force of torsion) on the propeller shaft. Like on helicopters, the needle on this gauge should never enter the red zone. Fortunately, the builder provided the plane with an automatic torque limiter. In reality, one never exceeds the value of 100%! (Approximately 80% of throttle on the ground) So no more take-offs with full throttle !

You will also notice that if you do not move this lever, the more you climb, the more the value indicated on the torque-meter will decrease. Normal because the density of air decreases with altitude so there is less pressure (so less torque) on the propeller. You can then push the black lever to increase the torque to 100%. At an altitude of about 24000 feet and higher (according to weather conditions), you will not be able to maintain a torque setting of 100% even if you will still be able to climb, which will allow you to increase your ground-speed and be more fuel-efficient.

Another thing to watch out for is the turbine temperature on the ITT gauge which should not exceed 800° Adjust the power-lever accordingly if you want to keep the engine alive!.

The inertial separator (Inert Sep switch on the panel)

The inertial separator is a device which expels heavier particles entering the engine. The device is activated by the pilot (a warning light goes on on the advisory panel). It is highly recommended to switch it on on taxiways and by heavy rain, and, of course, in icing conditions. The device considerably reduces the engine power (by about 15% on the torque-meter).

The inertial separator should not be activated above 200kts. It should be activated before accelerating for a descent..

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4-1 : Cabin lighting : an innovation brought by TBM is the possibility to switch on the passenger cabin lighting :



You can see the results in the following sequence :



daylight



by night



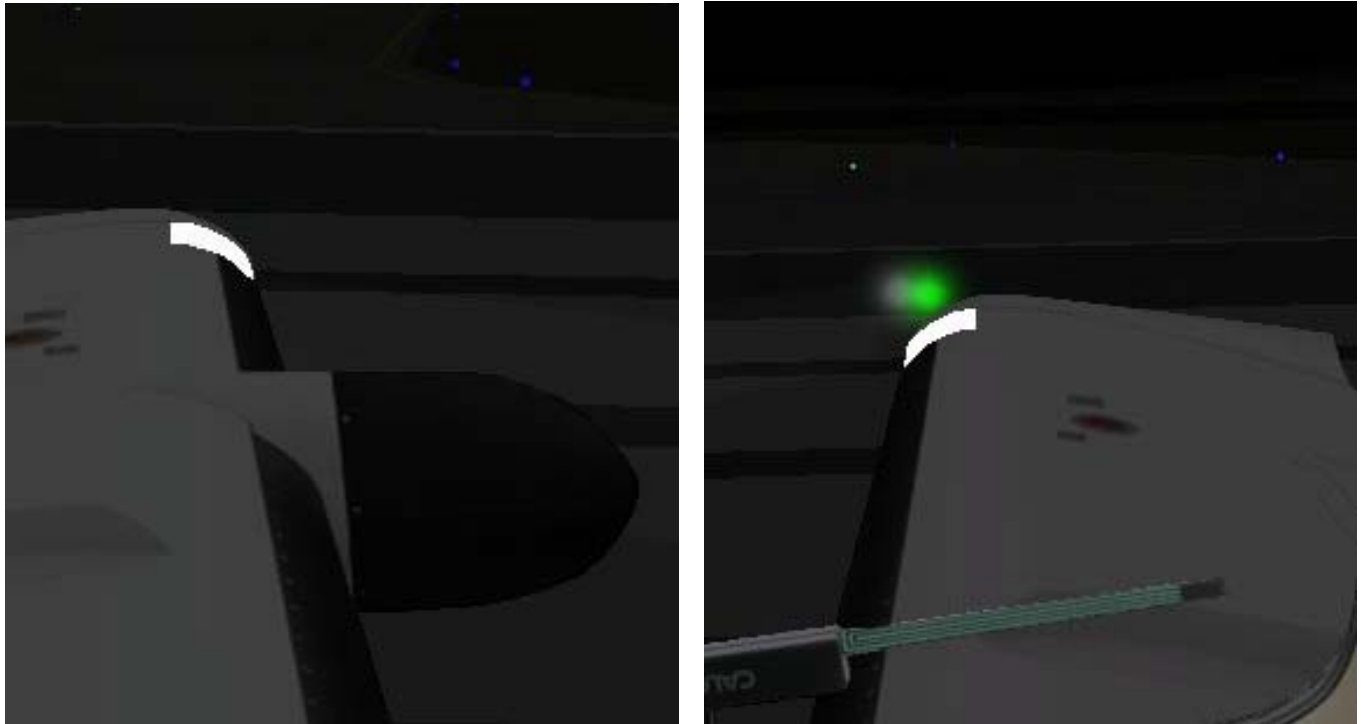
by night with the passenger cabin lights switched on

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4-2 : most instruments and switches are operational when you select the two 3/4 front views.



4-3 Landing lights are visible in the side-views



4-4 Spoilers increase the effect of the left and right ailerons



5- Limitations

5.1 Airspeed limitations

	SPEED	KCAS	KIAS	REMARKS
V_{MO}	Maximum operating speed	270	266	Do not intentionally exceed this speed in normal flight category
V_A	Maneuvering speed	160	158	Do not make abrupt or full control movements above this speed
V_{FE}	Maximum flaps extended speed : landing configuration takeoff configuration	120 180	122 178	Do not exceed these speeds depending on flaps position
V_{LO}	Maximum landing gear operating speed : extension retraction	180 130	178 128	Do not extend or retract landing gear above this speed
V_{LE}	Maximum landing gear extended speed	180	178	Do not exceed this speed with landing gear extended
	Maximum inertial separator operating speed	203	200	No limitation when inertial separator is in fixed position

5.2 2 Indications on the airspeed indicator

MARKING	KIAS (Value or range)	SIGNIFICANCE
White arc	60 – 122	Full Flap Operating Range Lower limit is maximum weight V_{SO} in landing configuration.
Wide	60 – 75	Transition point between wide and narrow arcs is stall speed with flaps UP
Narrow	75 – 122	Upper limit is maximum speed permissible with flaps LDG
Red line	266	Maximum speed for all operations

Source of the data found in this chapter:



The complete flight manual (670 pages in English) can be downloaded from **Socata** : <http://www.socata.com>

5.5 Essential tips

Starting the engine :

Respect the right sequence of the starting procedure as described in 3-2 to 3-3-2. Do not forget to set the CUT OFF lever to 50% after having moved the starter switch to ON.

Do not start taxiing before all the warning lights are off
Always fly with the torque set at 100%.

Flight level

The normal flight level for this plane is usually between FL 150 and FL 300
Set the cabin pressure accordingly (between 0 and 8900 feet)

Have a great flight on bord of the Socata TBM700 !



5-6 Check-list :

To help you with flying this plane, the ROTW beta-team have especially prepared a complete check-list designed for our TBM.

CHECK-LIST ROTW DU TBM700

BEFORE STARTING THE ENGINE

Set power lever to idle
Propeller governor lever on Max rpm
Conditioner lever on Cut OFF
All switches on OFF

Before switching on power, check
- Ignition switch on Auto or OFF
- Starter switch on OFF
- Gear lever on Dn

Ground Control switch on ON
Request start-up clearance
Ground Control switch on OFF
Radar switch to OFF

STARTING THE ENGINE

Set Source switch to Bat
Check that voltage is > 25 volts
Check fuel levels
Select right or left fuel tank
Fuel Sel switch on Auto or Man
Test the ITT
Strobes on On
If dark, Navlights switch on ON
Aux BP switch to ON (the Aux Bp light goes on and the Fuel press light goes off)
Check that fuel pressure is in the green zone
Ignition switch on Auto
Starter to ON (the Starter led goes on)
At NG \pm 13%, Power lever to Lo Idle
Oil Press light should go off
At NG \pm 50%, Starter switch to OFF (the Starter and Ignition lights go off)
Power lever to Hi Idle
Check NG \pm 69%
Check that oil pressure, oil temperature and ITT are in the green zone
Aux BP switch on Auto (the Aux BP ON light goes off)
Main Gen light goes off
Check the load on the Amp meter
Check Voltmeter (U \pm 28 Volts)

AFTER THE ENGINE HAS STARTED

on the Gyro Inst panel, all switches set to ON
Check that the gyroscopic depression is in the green and that the Vacuum Lo indicator is off
Gyro Slaving selector on Slave
Prop De Ice switch on ON and check that the green light goes on
Prop De Ice switch to OFF
L. Windshield switch to ON et and check that the corresponding green light goes on
R. Windshield switch to ON et and check that the corresponding green light goes on
Both Windshield switches to Off
Airframe De Ice switch to ON and check that both green lights go on (the de-ice cycle takes 67 sec.)
Airframe De Ice switch to OFF
Inert Sep switch to ON and check that the Inert Sep indicator is on (The Inert Sep should be on during taxiing to avoid particles to enter the engine)
Generator switch set to Main
Flaps Up
Bleed Valve switch to ON

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Cabin Fan switch as required
Adjust Cabin Temp
DEFOG / NORMAL" distributor as required
Cabin altitude selector Airfield altitude - 500 feet
Radio Master switch to ON (the radios should go on)
Radar switch on Sby
Efis Master on ON
Press on the Pre-flight test button of the auto-pilot
Tune radios and navs
Pitch trim UP / DN, then ADJUSTED
Yaw trim L / R, then ADJUSTED
Roll trim L / R, then ADJUSTED

TAXIING

Taxi lights ON
Inert Sep on checked
Release parking brake (indicator should go off)
Power lever on request (the conditioner lever should be on Hi Idle so that the prop RPM remains out of the yellow warning zone on the prop tachometer°
Check flight instruments
Check advisory panel

BEFORE TAKEOFF

Parking brake set
Conditioner lever to HI Idle ($N_g \pm 68\%$)
Check fuel tank levels and symmetry
Fuel Sel on Auto checked
Aux Bp switch checked on Auto
Flaps on TO
Airframe De Ice according to weather
Prop De Ice according to weather
Inert Sep switch to OFF if runway in good condition and no freezing (keep Inert Sep on ON if runway very wet or dirty)
L. Windshield to ON if needed
R. Windshield to ON if needed
Pitot 1 switch to ON (the indicator goes off)
Pitot 1 switch and Stall HTR to ON (the indicator goes off)
Check on the Advisory Panel that all is off except Park Brake and Inert Sep if used
Check flight instruments and radar (the radar should be on Sby to avoid radiation hazard on people close to the plane)
Check engine parameters (all indicators should be in the green)
Check trim settings
Release parking brakes
Strobe switch checked on ON

TAKEOFF (LINED-UP)

Check Caps, HSI and stand-by compass
Check horizon
L.LDG/Taxi/R.LDG lights ON
Check engine instruments (ITT in green sector)
Advisory Panel check all warning lights off (except Inert Sep if used except IGNITION if used)
Radar switch as required
Increase power until propeller RPM reaches 1900 RPM
Release brakes
Power lever TRQ = 100%
Rotation according to plane weight
Vertical speed indicator positive
Gear up before 128kt
At sequence end, check : All warning lights OFF
Lights : TAXI" OFF ,L.LDG / R.LDG" AS REQUIRED
Initial climb speed 110 KIAS
Flaps UP

CLIMB

Climb speed as required
Cabin altitude selector Cruise altitude + 1000 feet
Cabin rate selector adjust to 500 ft /min
Check pressurization
Check fuel tank gauges
De-Ice system as required

DESCENT

Altimeter settings complete
Cabin altitude selector Airfield altitude + 500 feet
De-Ice as required
Cabin rate selector Adjusted
De-Ice As required
IF HEAVY PRECIPITATION, TURN IGNITION AND INERT SEP ON
Windshield misting protection system As required
Fuel gauges check quantity and symmetry

BEFORE LANDING

Altimeters check
Fuel gauges check quantity and symmetry
Propeller lever at Max RPM
Landing gear control (IAS < 178 KIAS) DN Green warning lights ON
Flaps on To (IAS < 178 knt)
Landing and taxi lights ON
Auto pilot off before reaching 200 ft
Radar on sby
IAS < 122 set flaps on LDG
Approach speed of 80 KIAS
"YAW DAMPER" push-button OFF

LANDING

Power lever on Idle
Reverse as required (avoid on dirty or snow-covered runways)
Brakes as required

AFTER LANDING (runway cleared, plane stopped)

on De Ice System panel;
AIRFRAME DE ICE" switch OFF
PROP DE ICE" switch OFF
INERT SEP" switch CHECKED ON
"L.WINDSHIELD" switch As required
"R.WINDSHIELD" switch (if installed) As required
"PITOT 1 HTR" switch OFF
"PITOT 2 & STALL HTR" switch OFF
Radar switch (if installed) CHECKED SBY
Transponder SBY
Flaps UP
"L.LDG / R.LDG" lights OFF
"TAXI" lights OFF
"STROBE" OFF

ENGINE SHUT-DOWN

Parking brake SET - The warning light will go on

"TAXI" light OFF

"INERT SEP" switch OFF

Pressurization :BLEED VALVE" switch OFF

Power lever IDLE

Condition lever CUT OFF

Propeller governor lever FEATHER

"AUX BP" switch OFF

"FUEL SEL" switch MAN,

Tank selector to OFF

"AP / TRIMS MASTER" switch OFF

"RADIO MASTER" switch OFF

Radar switch OFF

EFIS MASTER" switch OFF .

GYRO INST panel : all switches OFF

"GENERATOR" selector MAIN

"SOURCE" selector OFF



6- Les crédits

1- The Socata TBM700 is a plane built in France by :

« [Socata of the EADS group \(http://www.socata.com\)](http://www.socata.com) » (among which the Aérospatiale : Caravelle, Airbus, Concorde...)

2- Development for Fly! 2 : « Rest Of The World » (ROTW)

- | | |
|---|--|
| a. Project manager: | TJ |
| b. Digitized pictures of the real plane: | Socata |
| c. Internal land external 3d model | Jean Sabatier |
| d. Internal views | TJ |
| e. Panel design and programming | TJ |
| f. Flight model Laurent Claudet | Laurent Claudet |
| g. Gauge creation and programming | TJ |
| h. File "podding" | Laurent Claudet |
| i. Flight preparation screens | René Birot |
| j. Real and virtual test flights | Nicolas Boltoukhine, Bruno Tresarrieu (French Army TBM 700 pilots) |
| k. Flight manual (F) | René Birot |
| l. English translation of the flight manual | Jean-Paul Mes |
| m. Cover page artwork | Jean-Paul Mes |

Special thanks to Peter Sidoli et Rob Young from Real Air Simulation (<http://www.realairsimulations.com>)



This plane can not be modified in any way without the written consent of its designers.