TB-30
EPSILON

FLIGHT MANUAL

AZURPOLY

TABLE OF CONTENTS

1\ INTRODUCTION

1.1\ History

The TB-30 Epsilon is a two-seat, low-wing, single-engine military basic training aircraft by French aviation producer Socata. It took its first flight in October of 1980 and entered service in September of 1984.

Socata produced 174 Epsilons during its manufacturing run from 1983 and 1989, and the aircraft remains in service with the militaries of a number of countries, including Portugal and Senegal, as well as in the hands of private and commercial owners, like Apache Aviation.

The Epsilon features a tandem cockpit, a retractable nosewheel undercarriage, and a standard tail. It is a highly refined trainer that is balanced to be both forgiving for the first-timer but is also nimble and speedy enough to satisfy aviators with more aggressive ambitions. Not only is the Epsilon a performer, it is a great touring machine, with a canopy that affords broad vistas of the world around it. Pilots of all skill levels who have flown the TB-30 have at least a few reasons why they love it.

1.2\ Developer notes

This development has been very special for us. For the first time, we had the chance to visit and fly on the real aircraft, to really feel how it behaves. We had the possibility to study it in details, record any sound we needed to reproduce it on the simulator. The pilots we met have been essential to reproduce an airplane with this level of details. For all that, we thank Vertical Flight Experience very much.

The journey is still underway, and we are glad you are now part of it. As for our other products, we will propose updates each time we consider it as relevant, to bring new functionalities or fix discovered bugs.

Do not hesitate to contact us at contact@azurpolygroup.com or on www.azurpolygroup.com.

2\ GENERAL DESCRIPTION

2.1\ Specifications

Weights	
Empty weight	870 kg
Maximum takeoff weight	1250 kg
Dimensions	
Wingspan	7,92 m
Length	7,59 m
Height	2,66 m
Wing area	9 m²
Engine	
Peak power	300 HP
Maximum engine speed	2700 RPM
Cubic capacity	8,87 L
Compression ratio	8.7
Propeller diameter	1,98 m

Fuel capacity	210 L
Limits	
G-Force	+ 5.5 G / − 2.75 G
Maximum altitude	12000 ft
Maximum crosswind	25 kt

2.2\ Detailed views

Front station

1	Compass	**34**	Fuel pump switch
2	Clock	**35**	Taxi and landing lights switch
3	Accelerometer (G-force)	**36**	Flaps switch
4	Anemometer (knots)	**37**	Throttle lever
5	G5 PFD (slip ball above)	**38**	Propeller lever
6	Altimeter (feet)	**39**	Mixture lever
7	Manifold pressure (mbar) & fuel flow (litres per hour)	**40**	Rudder trim
8	General failure light	**41**	Pitch trim
9	Outside air temperature (°Celsius)	**42**	Roll trim
10	Oil pressure (bars)	**43**	Alternate static handle
11	Oil temperature & cylinder head temperature (°Celsius)	**44**	Parking brake
12	Tachymeter (RPM)	**45**	Rudder pedals setting
13	Exhaust gas temperature (°Celsius)	**46**	Engine hot air lever
14	Fuel level (litres)	**47**	Cabin air conditioning levers
15	Vertical speed indicator (ft/min)	**48**	Battery switch
16	G5 HSI	**49**	Starter button
17	Attitude indicator	**50**	Alternator switch

18	Flaps and landing gear position monitoring panel	**51**	Fuel cut-off handle
19	Map light knob	**52**	Strobes switch
20	GNC 255 radio (COM 2/NAV 2)	**53**	Gyroscope switch
21	GMA 340 audio panel	**54**	Navigation lights switch
22	KR87 ADF receiver	**55**	Avionics switch
23	Emergency gear lever	**56**	Pitot heat switch
24	VOR Gauge	**57**	Pitot heat light
25	GPS unit	**58**	Fuel tank selector
26	Landing gear lever	**59**	Engine monitoring gauges circuit breakers
27	Landing gear warning light	**60**	UV lights knob
28	NAV source (VOR gauge)	**61**	Red lights knob
29	GTX 335 transponder	**62**	Radio lights knob
30	Smoke switch	**63**	Console lights knob
31	Voltmeter (volts)	**64**	Alarms lighting intensity switch
32	Magneto selector	**65**	Canopy locking handle
33	Alarms panel	**66**	Canopy opening handle

Rear station

1	Clock	**21**	Voltmeter (volts)
2	Accelerometer (G-force)	**22**	Alarms panel
3	Anemometer (knots)	**23**	Flaps switch
4	G5 PFD (slip ball above)	**24**	Throttle lever
5	Altimeter (feet)	**25**	Propeller lever
6	Manifold pressure (mbar) & fuel flow (litres per hour)	**26**	Mixture lever
7	General failure light	**27**	Rudder trim
8	Outside air temperature (°Celsius)	**28**	Pitch trim
9	Oil pressure (bars)	**29**	Roll trim

10	Oil temperature & cylinder head temperature (°Celsius)	**30**	Alternator switch
11	Tachymeter (RPM)	**31**	Starter button
12	Exhaust gas temperature (°Celsius)	**32**	Gyroscope switch
13	Fuel level (litres)	**33**	Fuel cut-off handle
14	Vertical speed indicator (ft/min)	**34**	UV lights knob
15	G5 HSI	**35**	Red lights knob
16	Attitude indicator	**36**	Radio lights knob
17	Flaps and landing gear position monitoring panel	**37**	Console lights knob
18	Map light knob	**38**	Alarms lighting intensity switch
19	Landing gear warning light	**39**	Canopy locking handle
20	Landing gear lever	**40**	Canopy opening handle

3\ AIRCRAFT SYSTEMS

3.1\ Flight controls

Roll and pitch axis are all directly driven from the yoke, mechanically and without any hydraulic assistance.

Side movement of the stick handgrip through the control linkage of roll ensures a deflection of the ailerons by 13 degrees downwards and 18 degrees upwards. Ailerons are statically overbalanced (110 %) by integrated balance weights.

Longitudinal movement of the stick ensures a deflection of the elevator between 20 degrees (nose up) and 1° degrees (nose down). Static balance (100%) is performed with weights located in the horn of each tip and in the leading edge. Return to neutral position is performed thanks to a spring bellcrank.

The aircraft can be compensated on three axes thanks to the trim wheels located on the left panel:

- + 4° / − 2° on pitch axis.
- + 2.5° / − 1° on yaw axis.
- + 2.5° / − 2.5 ° on roll axis.

Even if not fitted with an autopilot, those trims allow to reach a very good stability during cruise flight, in non-turbulent conditions.

Rudder control is actuated through a pressure on left and right pedals, and braking is ensured through a pressure on upper part of each pedal. Nose wheel is of free castor type (free wheel not linked to rudder pedals). Unfortunately, MSFS does not currently allows faithfully replication of free castoring wheels, so you will see the nose wheel move depending on rudder input.

3.2\ Canopy

Front and rear canopies are made of plexiglass convex panels mounted in a metallic frame. The assembly moves on two rails thanks to four rollers for the front canopy and six rollers for the rear canopy.

Two internal handles are installed on the forward former of each canopy. Two additional handles are installed on the central former of the rear canopy.

Front canopy locking against the windshield is performed by two side catches in which enters the windshield locking pins. The rear canopy locking against the front canopy is identical.

To open any of the two canopies, you first need to unlock it with the lock handle on the right, and then click on one of the two red handles to translate the canopy. You can achieve the same directly from the EFB.

You can visualize any unlocked cabin with “CABINE” indicator light in the alarms panel.

3.3\ Electrical system

The direct-current electrical power is supplied by a lead acid battery (24 V/17 Ah) associated with an engine-driven alternator. This alternator supplies a 28V D.C. voltage, nominal rating 70 A, after rectification.

Circuit breakers

Direct current supply is performed by 6 bus each protected by “Pull-Off” circuit breakers. Bus 4 is used by all avionics and bus 5 – 6 for rear station only.

Each circuit breaker is functional.

Front station circuit breakers

#	DESCRIPTION	#	DESCRIPTION
1	Oil pressure gauge	**29**	Front station failure warning lights
2	Voltmeter gauge	**30**	GNC 255 radio navigation
3	Oil and cylinder temperature gauge	**31**	Front map reader
4	EGT gauge	**32**	Front station radio unit
5	Tachometer gauge	**33**	Front station panel indicator lights
6	Fuel level gauge	**34**	KN 62 DME transceiver
7	Alternator	**35**	Rear station temperature indicator
8	Battery	**36**	Rear station flap indicator
9	BUS 1	**37**	Rear station failure warning lights
10	BUS 3	**38**	GAD ARINC converter
11	Pitot heat	**39**	Front console lighting unit
12	Flap motor	**40**	Front station engine monitoring cluster (oil/cylinder temperature, EGT, tachometer)
13	Front station G5 PFD	**41**	Rear station panel indicator lights
14	Front station G5 HSI	**42**	GTX 335 transponder
15	Battery relay	**43**	Landing gear indicating power supply
16	Alternator excitation	**44**	Front station landing gear indicator lights
17	BUS 2	**45**	GPS unit
18	BUS 4	**46**	Navigation lights
19	Starter relay	**47**	Front station red lights
20	Landing gear	**48**	Front station flap indicator
21	GMA 340 audio panel	**49**	Rear station landing gear indicator lights

22	Attitude indicator gyro	**50**	Active noise reduction power supply
23	Electric fuel pump	**51**	Front station temperature indicator
24	GNS/GTN VHF transceiver	**52**	Warning sounds unit
25	Front and rear altimeter shakers	**53**	Front station engine monitoring cluster (fuel gauge, oil pressure, voltmeter)
26	GNC 255 VHF transceiver	**54**	Taxi light
27	Anti-collision light unit	**55**	Front station UV lights
28	Landing lights	**56**	USB socket power supply

Rear station circuit brakers

#	DESCRIPTION	#	DESCRIPTION
1	BUS 6	**7**	Rear station G5 HSI
2	BUS 5	**8**	Rear station UV lights
3	Turn and bank indicator (not implemented)	**9**	Rear station red lights
4	Rear station G5 PFD	**10**	Rear console lighting unit
5	Radio lighting unit	**11**	GAD ARINC converter
6	Rear map reader	**12**	Engine monitoring cluster system + rear station voltmeter gauge

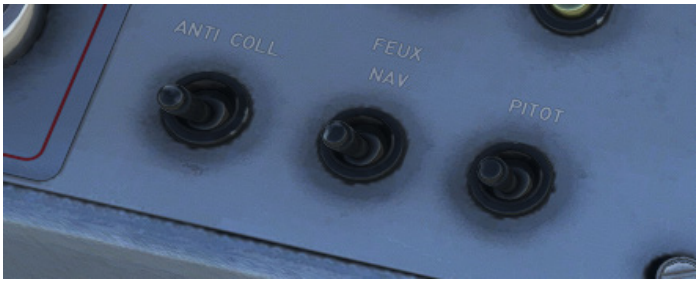
Lights

Exterior lights

The TB-30 is fitted with the following exterior lighting:

- Navigation lights (“FEUX NAV”).
- Strobe lights (“ANTI COLL”).
- Taxi and landing lights.

Strobes and navigation lights switches can be found on right console of front station only:



Taxi and landing lights are managed with a single switch on left console of front station. Taxi light is ON in middle position (“ROUL”) and landing light is ON in top position (“PHARE ATT”).

Interior lights

On each station, you will find five knobs controlling interior lights:

- UV lights (“ECLAIRAGE UV”) on front panel.
- Red lights (“ROUGE”) on front panel.
- Radio lights (“RADIOS”) to set intensity of avionic units (knobs and buttons).
- Console lights (“BANQUETTES”) for left and right consoles lights.
- Map light (“LECT CARTES”) to use map reading light on the left of the panel.

Flaps

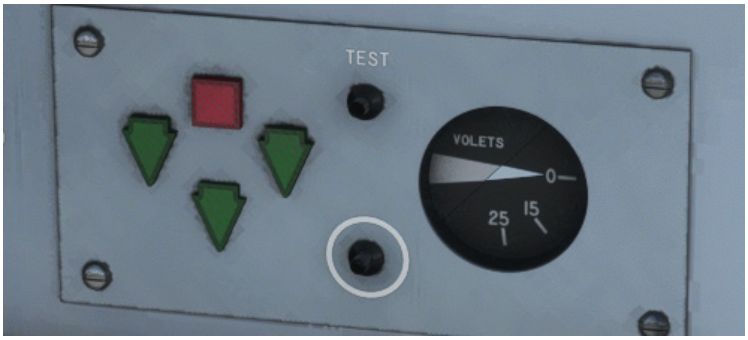
The aircraft has two wing flaps, that can be extended to any angle between 0 and 25 degrees.

The flaps are of single slot type, each of them being carried by arc shaped sliders (two per flap), which ensure a deflection and return effect.

An electrical motor is controlling a screw jack moving inside sliders to ensure flaps deflection.

You can choose to set them from your flight controller, or by using the switch placed on the left of throttle lever.

Current flaps position is reflected on the following gauge (front panel):



3.4\ Fuel system

Fuel is contained in two tanks located in the wings leading edge (one per half-wing), feeding the engine through a feeder tank.

Pilot can switch between either left or right tank using a fuel selector located on front station only.

In the middle position, both tanks direct fuel towards feeder tank. However, this position may lead to transfer incidents and must not be used.

An inverted flight feeder tank which contains 2.5 litres allows a limited time of inverted flight. Rollover valves installed in each tank limit fuel waste through air vents during inverted flying. After approximately two minutes of inverted flying, fuel feeding will stop, resulting in engine shutdown.

A decanting filter is installed in the feeder tank outlet and is provided with a drain valve, easily accessible below the aircraft nose.

Electric fuel pump is installed just after the decanting filter and is controlled by a switch on the front station left console.

A 140 µm filter between electric pump and shut-off valve protects engine pump.

Shut-off valve is located behind firewall and can be operated from both front and rear station.

The mechanical pump is of vane-type, installed on the rear part of the engine and driven by the latter. It supplies fuel necessary to the injection system.

Fuel level is monitored on its dedicated gauge (front station). Measurement is achieved with two electrically transmitting gaging dipsticks for each tank.

3.5\ Powerplant & Propeller

Engine

The aircraft is equipped with a six cylinders piston engine (Avco Lycoming type AEI0-540 L1B5D), rated 300 HP (224 kW) at 2700 rpm. Combustion is ensured by an injection system.

Engine	
Pistons	6
Cooling	Air-cooled
Configuration	Flat, opposed cylinders
Power (Max continuous)	300 HP
Cubic capacity	8.87 L
Compression ratio	8.7

Air intake

Air intake in ensured by a box equipped with a flap, which may close cool air inlet to let in hot air from the engine, in order to avoid icing risk of injection unit. This hot air is not filtered. The flap is controlled by the “AIR SECOURS MOTEUR” lever.

Mixture

An Automatic Mixture Controller (AMC) sets mixture permanently depending on ambient conditions to get the best power mixture (EGT peak − 70°C).

A fuel metering lever allow to adjust manually the mixture, when operation with a mixture near best power one is not wanted.

Ignition

Ignition is performed through a dual magneto, which provides spark plugs with a high-voltage double ignition (two spark plugs per cylinder). Ignition order is 1-4-5-2-3-6.

A selector, located only at front station on instrument panel strip right hand side, allows magneto operation and selection.

Engine monitoring

Monitoring instruments are arranged on right hand instrument panel of each station. These instruments are:

- A manifold pressure (mbar) and fuel flow (L/h) dual indicator.
- An electrical tachymeter (tr/min).
- An EGT indicator (°C).
- An oil temperature and cylinder temperature dual indicator (°C).
- An oil pressure indicator (bars).

Propeller

The “Hartzell” metallic propeller is of pitch-regulated constant-speed type. It is a direct drive propeller and turns clockwise.

Propeller speed is dependent upon the balance between two actions:

- Action of counterweights, tending to position the propeller in high pitch by propeller rotation.
- Action of the governor, engine-driven and fed by lubrication system, tending to position the propeller in low pitch. Pilot acts on governor spring with the propeller control lever.

In case of regulation failure, pressure drop results in automatic transition to high pitch.

3.6\ Landing gear

The retractable tricycle landing gear consists of a nose gear and two main gears. Each landing gear is of shock-compensating rocker-beam type and is equipped with an oil/air shock absorber and a single wheel provided with a low-pressure tire.

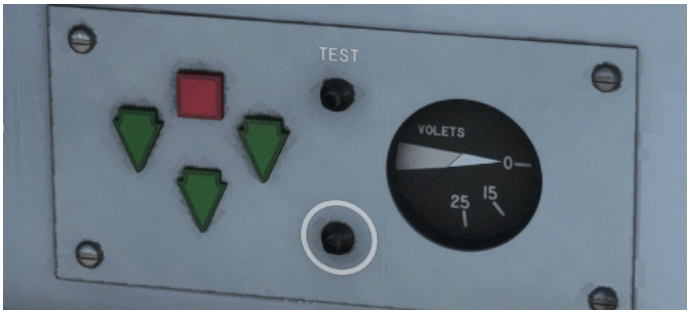
The landing gear wells are partially closed by doors the travel of which is mechanically linked to the landing gear maneuver. The landing gear is activated by hydraulic pressure provided by a dual direction gear electric pump and its tank.

Landing gear control lever is located on the left-hand side of the instrument panel at each pilot station, and has two positions. Interconnection between front and rear station is ensured by flexible controls. While aircraft is on ground, control lever is locked down by an electromagnetic lock. Control can be pushed up again only if:

- Landing gear shock absorbers are extended.
- Nose landing gear is in the centerline.

INDICATIONS

Current landing gear state is indicated on the following panel:



- Red light is on when landing gear is not fully locked.
- Green lights (one per gear) are on when landing gear is down and locked.

One button allows to test correct functioning of the lights. The other button will emit a radio signal (“BIP”) when pressed if landing gear is locked down.

To avoid any unvoluntary belly landing:

- A red light on left hand side of main panel will blink when throttle is on idle position and landing gear is not extended.
- An aural warning can be heard when flaps are extended to more than 20° and landing gear is not extended. It will not stop until flaps deflection is reduced or landing gear is put down.

3.7\ Alarms

On each station you will find a panel dedicated to alarms on the bottom right part.

A button allows to test correct lighting of each alarm.

Depending on severity, different color lights are used:

- Red for failures and important information.
- Orange for simple indications.

A day/night switch allows to change light intensity used for all alarms.

Each red alarm can be clicked to disable its lighting up.

If at least one red alarm is active, the general red light on top of the panel will light up:

You will find same alarms on front and rear panel, with the following rules:

- “PRESS CARBT” (fuel pressure): fuel pressure lower than 0.84 bar.
- “BAS NIVEAU” (low fuel level): currently selected tank contains only 10 liters or below.
- “ALTERNATEUR” (alternator): main bus voltage lower than 26 V.
- “CABINE” (cabin): unlocked canopy.
- “PRESS HUILE” (oil pressure): oil pressure lower than 1.75 bar.
- “POMPE CARBT” (fuel pump): fuel pressure greater than 1.7 bar.
- “ALIM DEM” (starter supply): starting knob being pushed, or stuck starter relay.

4\ AVIONICS

Our TB-30 is based on civilian-converted models, retrofitted from military models used in French Air Force and retired from service. Differences are very minor, and avionics is the most noticeable difference you will find.

Military radios have been removed to be replaced by conventional civil communication and navigation units, described in this section.

4.1\ VOR/ILS

Beside the numerous screens present on the aircraft, you will find a simple VOR/ILS indicator, that you can use as a course deviation indicator with glideslope indicator.

Course can be set from the knob on bottom left.

NAV source to use can be changed from the switch just below:

NAV 1 frequency is set from the GPS and NAV 2 frequency from the secondary radio unit.

4.2\ G5 PFD & HSI

The two main screens you will find on front panel consist of:

- A PFD (Primary Flight Display), displaying attitude information and principal flight parameters:
  - Airspeed.
  - Altitude, including a reference bug and current barometric reference.
  - Vertical speed.
  - Horizontal situation.
  - Slip and turn rate indicator.
  - Current heading, including a reference bug.
  - Ground speed.
  - Course deviation indication and glide slope pointer when there is an active radio station providing that information.

- A secondary display with HSI (Horizontal Situation Indicator) displaying:
  - Current heading, including a reference bug.
  - Course deviation to active navigation source (coming from GPS or from radio station).
  - Distance to station.
  - Ground speed.

Each of them can be switched ON or OFF with the left button.

A knob allows to set barometric reference (unit can be changed from the menu), and can be clicked to navigate through the menus (left plus right click).

You can switch between VLOC and GPS mode from the GPS unit. In VLOC mode, NAV 1 source will be used.

Course selection is done from the GPS unit (OBS) in GPS mode. In VLOC mode, you can select course from the HSI menu.

You will not find 100% of functionalities compared to a real G5, however you already have essential ones. We plan to enrich our custom G5 in future updates.

4.3\ GPS

On the center bottom of the main panel, you will find a GPS unit, using Working Title GNS 430 by default.

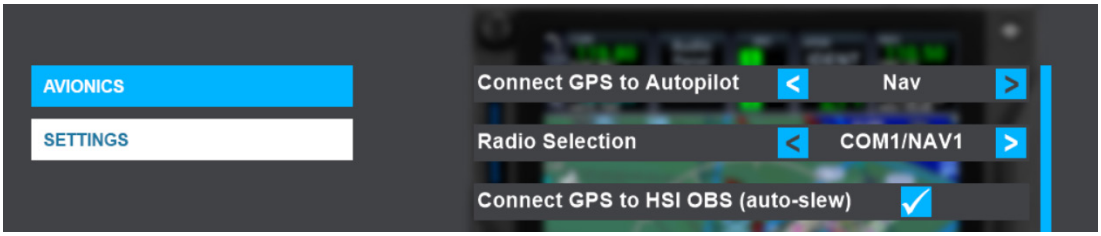
This unit is managing COM 1 and NAV 1 frequencies.

PMS50 and TDS GTN integration

If you own PMS50 GTN or TDS GTNXi add-ons, you can easily use them on our aircraft instead of the default unit.

You only need to select GTN unit in the electronic flight bag (tablet) main page depending on which of both products is installed on your PC.

If you are using TDS implementation, please check in TDS GTNXi Flight Sim Interface that GTN650Xi Unit 1 is connected on COM1/NAV1:



4.4\ GNC 255 Radio

While GPS unit manages main frequencies, an additional radio unit is used to set COM 2 and NAV 2 frequencies.

This GNC 255 radio is partially customized as the default one provided in the simulator only manages COM frequencies.

This unit provides following features:

- Two knobs on the left:
  - Power On/Off, used for COM volume and Squelch On/Off.
  - NAV volume and NAV Ident On/Off.
- Buttons:
  - “MON” to monitor active and standby frequencies.
  - “C/N” to switch between COM and NAV menus.
  - “OBS” to display deviation related to radio station (inoperative for now).
  - “T/F” to switch between To/From selection (inoperative for now).
  - “FUNC” to enter functions menu.
  - “CLR” to clear current selection.
  - “ENT” to enter selection.
  - Frequency swap key.
- Double knob to adjust standby frequency.

We plan to implement the few missing functionalities in future updates.

4.5\ GMA 340 Audio Panel

Audio panel is fully functional and is used to manage various audio channels.

It features two double knobs to set pilot/copilot intercom volume and squelch level, and the following buttons:

- “MKR” to mute or enable marker beacon sounds.
- “SENS” to switch between HIGH and LOW marker beacon sensitivities.
- Three buttons – “COM1”, “COM2”, “COM3” – to enable COM reception. Please note that there is no COM 3 channel of the aircraft.
- Three buttons – “COM1 MIC”, “COM2 MIC”, “COM3 MIC” – to choose COM channel to use for transmission.
- Four buttons – “NAV1”, “NAV2”, “DME”, “ADF” – for radio audio listening.
- “COM 1/2" to split pilot and copilot communication on two channels.
- “SPKR” for speaker function.
- “PA” to broadcast pilot and copilot mic audio over the cabin speaker.
- “PILOT” and “CREW” to manage crew or pilot audio isolation.
- “TEST” to test all lights of the unit.

4.6\ KR87 DME

A distance measuring equipment (DME) unit is placed below the audio panel.

As radio magnetic indicator (RMI) has been replaced by G5 display units in the civilian TB-30 we based our work on, it is not possible to retrieve distance and bearing to selected NDB, as the G5 only displays GPS, VOR and VLOC data.

DME unit is still useful and has been kept for its chronometer function.

A RMI gauge could be added in a future update to fully use the DME.

4.7\ GTX 355 Transponder

Transponder is placed on bottom center of the panel.

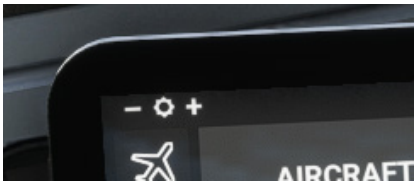
It is the exact same model you will find in plenty other aircraft in the simulator.

5\ ELECTRONIC FLIGHT BAG

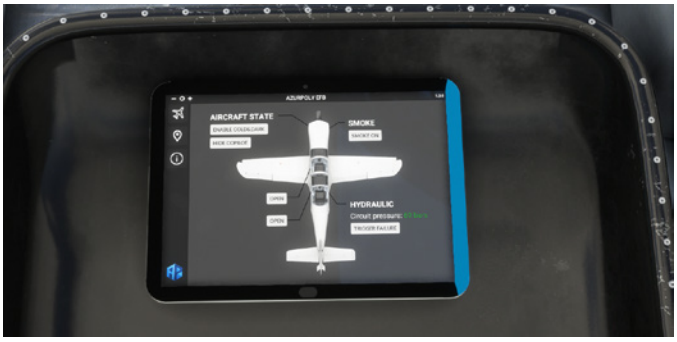
To help managing all actions related to the aircraft, an EFB has been implemented, similarly to all our other aircrafts.

It can be opened and closed thanks to a cockpit button.

When opened, screen brightness can be set from the top bar.



EFB can be closed with a click on its left border. It can be moved on the seat with a click on its right border.



5.1\ Aircraft menu

You can put here the aircraft in “cold and dark” mode. Engine will be turned off, systems will be off and ground protections will be put in the aircraft exterior. You can manage wheel chocks and pitot covers independently.

You can also open and close pilot and copilot canopy from here.

Copilot can be hidden in exterior view.

You can trigger hydraulic failure, as this type of failure is not natively supported by MSFS. You will see main hydraulic pressure drops, which will let you practice emergency procedures in case of hydraulic failure, to maneuver landing gear.

You can turn on or off the smoke system (which can also be done with the switch on the main panel).

As explained in GPS section, you can switch between regular GNS 430 and PMS50 or TDS GTN 650 (if you have them installed).

5.2\ Map menu

This menu consists of a map showing current aircraft position.

Different controls on the right part allow to interact with the map:

- Zoom buttons.
- Button to stop auto centering to aircraft position.
- Trajectory button to show or hide aircraft path.

5.3\ Autopilot

The TB-30 is not equipped with an autopilot. However, you will find an autopilot menu in the EFB, allowing you to hold altitude and/or heading as you wish.

When turning autopilot on, current aircraft vertical speed (VS) will be held by default. You can change its value to follow a specific climb or descent path.

Below “ALT” button, you may select a target altitude using “+” and “−“ buttons. When aircraft is reaching this altitude, ALT mode will be enabled automatically and altitude will be maintained.

Please note that ALT mode does not allow to change altitude, but only to capture a specific altitude. To change your altitude using the autopilot:

1. Select the altitude you want to reach (below ALT button).
2. Select the vertical speed you want to maintain and enable vertical speed mode (VS button).
3. Autopilot will automatically capture and keep selected altitude.

With HDG button, you can follow a target heading selected with “+” and “−“ buttons below.

You can also manage altitude and heading target values from the G5.

5.4\ Version menu

This menu indicates version of the aircraft currently installed on your machine.

A message will be displayed if an update is available.

You can also see how much time you spent within the aircraft!

6\ NORMAL PROCEDURES

6.1\ Reference speeds

General	
Stall speed (full flaps)	**60** kts
Stall speed (no flaps)	**72** kts
Rotation speed	**70** kts
Initial climb speed	**110** kts
Approach speed	**90** kts
Best glide speed (no flaps)	**110** kts
Maximum speed in turbulent air (VNO)	**250** kts
Maximum gear or flaps extended	**130** kts
Never exceed speed (VNE)	**281** kts
Maneuvering speed (VA)	**190** kts

6.2\ Checklists

In addition to this manual, you can find in-game interactive checklists, with dynamic validation and cameras management to help you complete each step.

STARTING ENGINE

Master Battery	**ON**
Fuel Valve	**OPENED**
Alarms	**TESTED**
Emergency Static	**CLOSED**
Engine Anti Ice	**OFF**
Parking Brake	**ON**
Propeller	**FORWARD**
Canopy	**CLOSED & LOCKED**
Throttle	**1 CM**
Mixture	**FULL RICH**
Magneto	**BOTH**
Starter	**ON**
Starter Alarm	**OFF**
Engine RPM	**1200**
Oil Pressure Alarm	**OFF**
Oil Pressure	**GREEN**

BEFORE TAXI

Alternator	**ON**
Voltage	**GREEN**
Avionics	**ON**
Gyro	**ON**
Strobes	**ON**
Navigation Lights	**ON**
Pitot Heat	**ON**
Transponder	**STBY**
Oil Temperature	**MIN 40 CELSIUS**
Taxi Light	**ON**

Parking Brake	**OFF**
Brakes	**TESTED**

BEFORE TAKEOFF

Parking Brake	**ON**
Taxi Light	**OFF**
Oil Temperature	**MIN 50 CELSIUS**
Cylinder Head Temperature	**MIN 100 CELSIUS**
Fuel Pump	**OFF**
Engine RPM	**2000**
Oil Pressure	**GREEN**
Magneto	**LEFT**
RPM Loss	**BELOW 175**
Magneto	**BOTH**
Magneto	**RIGHT**
RPM Loss	**BELOW 175**
Magneto	**BOTH**
Throttle	**IDLE**
RPM	**MIN 700**
RPM	**1200**
Voltage	**GREEN**
Oil Temperature	**GREEN**
Cylinder Head Temperature	**GREEN**
Oil Pressure	**GREEN**
Propeller	**FORWARD**
Mixture	**MAXIMUM**
Flaps	**15 DEGREES**
Trim	**AS REQUIRED**
Fuel Pump	**ON**
Landing Light	**ON**
Parking Brake	**OFF**

TAKEOFF

Rotation	**75 KT**
Landing Gear	**UP**
Flaps	**UP**
Fuel Pump	**OFF**
Landing Light	**OFF**

BEFORE LANDING

Fuel Pump	**ON**
Landing Light	**ON**
Mixture	**MAXIMUM**
Propeller	**FORWARD**
Landing Gear	**DOWN**
Flaps	**25 DEGREES**
Speed	**90 KT**

AFTER LANDING

Taxi Light	**ON**

Fuel Pump	**OFF**
Flaps	**UP**

SHUTDOWN

RPM	**1200**
Gyro	**OFF**
Strobes	**OFF**
Navigation Lights	**OFF**
Taxi Light	**OFF**
Pitot Heat	**OFF**
Avionics	**OFF**
Alternator	**OFF**
Mixture	**MINIMUM**
Magneto	**OFF**
Master Battery	**OFF**

7\ EMERGENCY PROCEDURES

7.1\ Hydraulic failure

In case of hydraulic failure (electric pump), you will lose all control on the landing gear movement.

To use the emergency release, put first landing gear lever down.

Then, you need to pull emergency gear lever to let the landing gear going down.

Once emergency handle is pulled, landing gear cannot be manipulated anymore until hydraulic pressure is available again.

8\ PERFORMANCE

8.1\ Takeoff

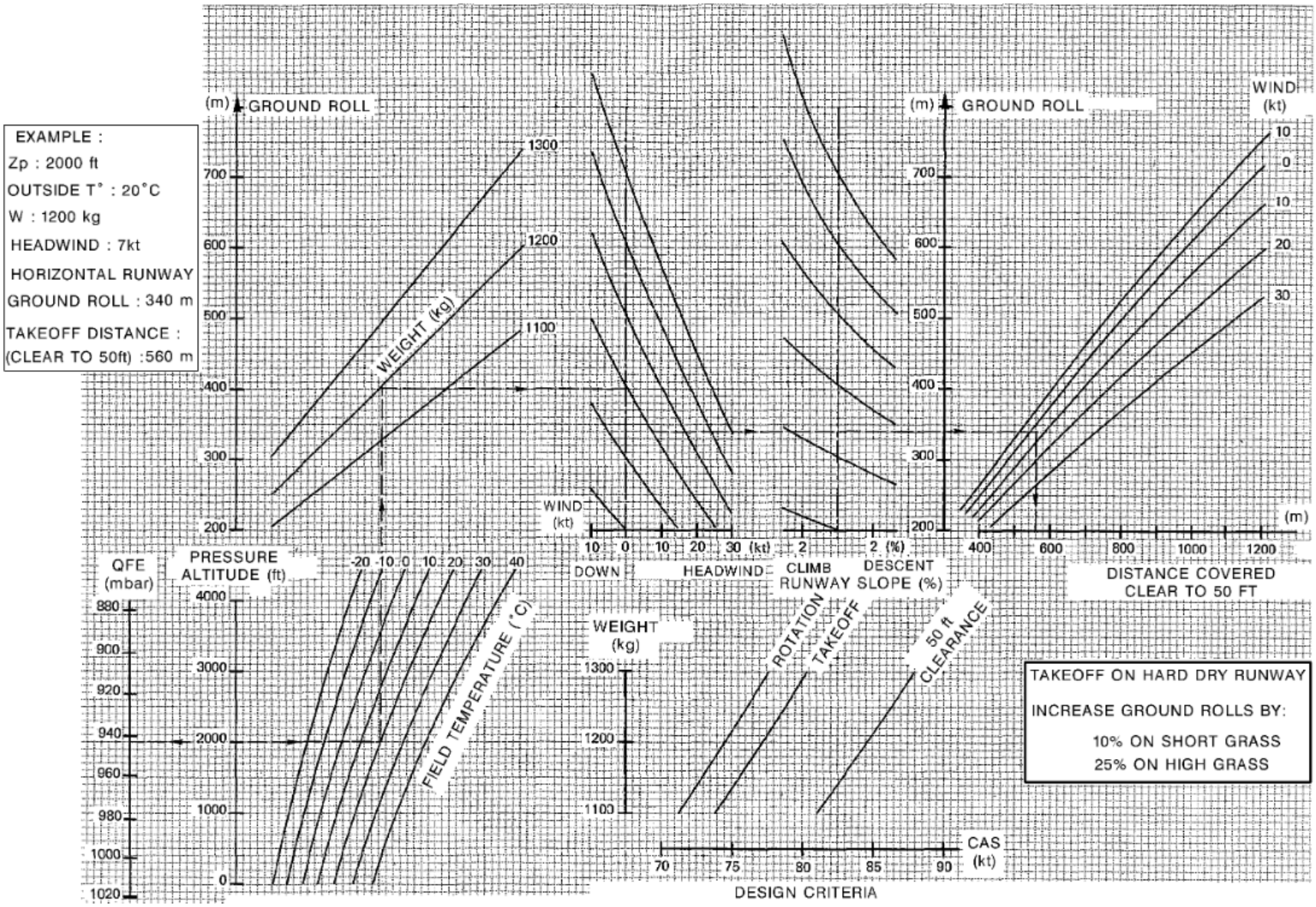
Takeoff is performed full throttle, full low pitch, full rich, in flaps configuration 15°.

Following illustration gives:

- Rolling distance;
- Takeoff distance to 15m obstacle clearance.

The used procedure is the following:

- Full throttle, brakes applied;
- Rotation and obstacle clearance to speeds indicated on graph shown on the same figure, depending on weights;
- Starting of landing gear retraction as soon as the vertical speed indicator gives a clearly positive value.

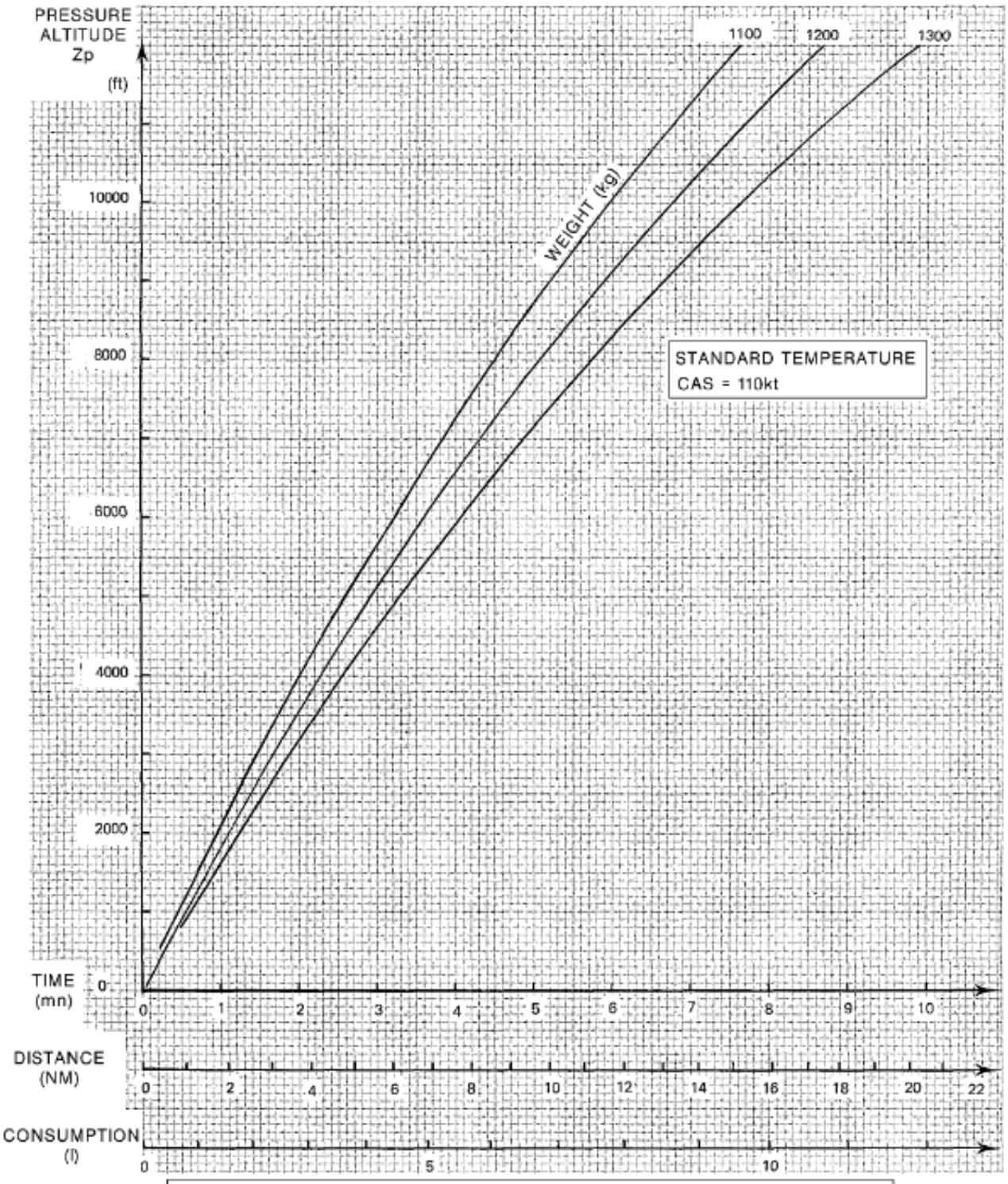

EXAMPLE :
Zp : 2000 ft
OUTSIDE T° : 20°C
W : 1200 kg
HEADWIND : 7kt
HORIZONTAL RUNWAY
GROUND ROLL : 340 m
TAKEOFF DISTANCE :
(CLEAR TO 50ft) :560 m
(m) GROUND ROLL
WEIGHT (kg)
1300
1200
1100
700
600
500
400
300
200
WIND (kt)
10 0 10 20 30 (kt)
2 2 (%)
DOWN HEADWIND CLIMB DESCENT
RUNWAY SLOPE (%)
(m) GROUND ROLL
WIND (kt)
10
0
10
20
30
400 600 800 1000 1200 (m)
DISTANCE COVERED
CLEAR TO 50 FT
QFE (mbar)
880
900
920
940
960
980
1000
1020
PRESSURE ALTITUDE (ft)
4000
3000
2000
1000
0
-20 -10 0 10 20 30 40
FIELD TEMPERATURE (°C)
WEIGHT (kg)
1300
1200
1100
ROTATION
TAKEOFF
50 ft CLEARANCE
70 75 80 85 90
CAS (kt)
DESIGN CRITERIA
TAKEOFF ON HARD DRY RUNWAY
INCREASE GROUND ROLLS BY:
10% ON SHORT GRASS
25% ON HIGH GRASS

8.2\ Climb

Climbs are performed full throttle, full low pitch, with nil slope and side-slip, for CAS = 110 kts and in clean configuration.

Following illustration gives:

- Time, distance and consumption in standard atmosphere;
- The possibility to correct these results depending on deviation from standard air temperature.



INITIAL CONDITIONS: Zp = 0 CAS = 110kt
ADD 40s FOR TAKEOFF AND ACCELERATE TO 110kt
ADD 15l FOR TAXI, RUN-UP AND TAKEOFF
TEMPERATURE CORRECTIONS / FOR ±10°C: ± 3 % ON CLIMB TIME
± 5 % ON DISTANCE COVERED
±15 % ON CONSUMPTION

8.3\ Cruise

Cruise performance (speed, consumption, distance, time) are given for two associated settings of power and mixture:

- Power 75% “normal cruise” (2450 tr/min, adapted Pa), mixture best power (EGT peak – 70 °C) as done by automatic mixture control already.

- Power 60% “economic cruise” (2350 tr/min, adapted Pa), mixture manually set to EGT peak.

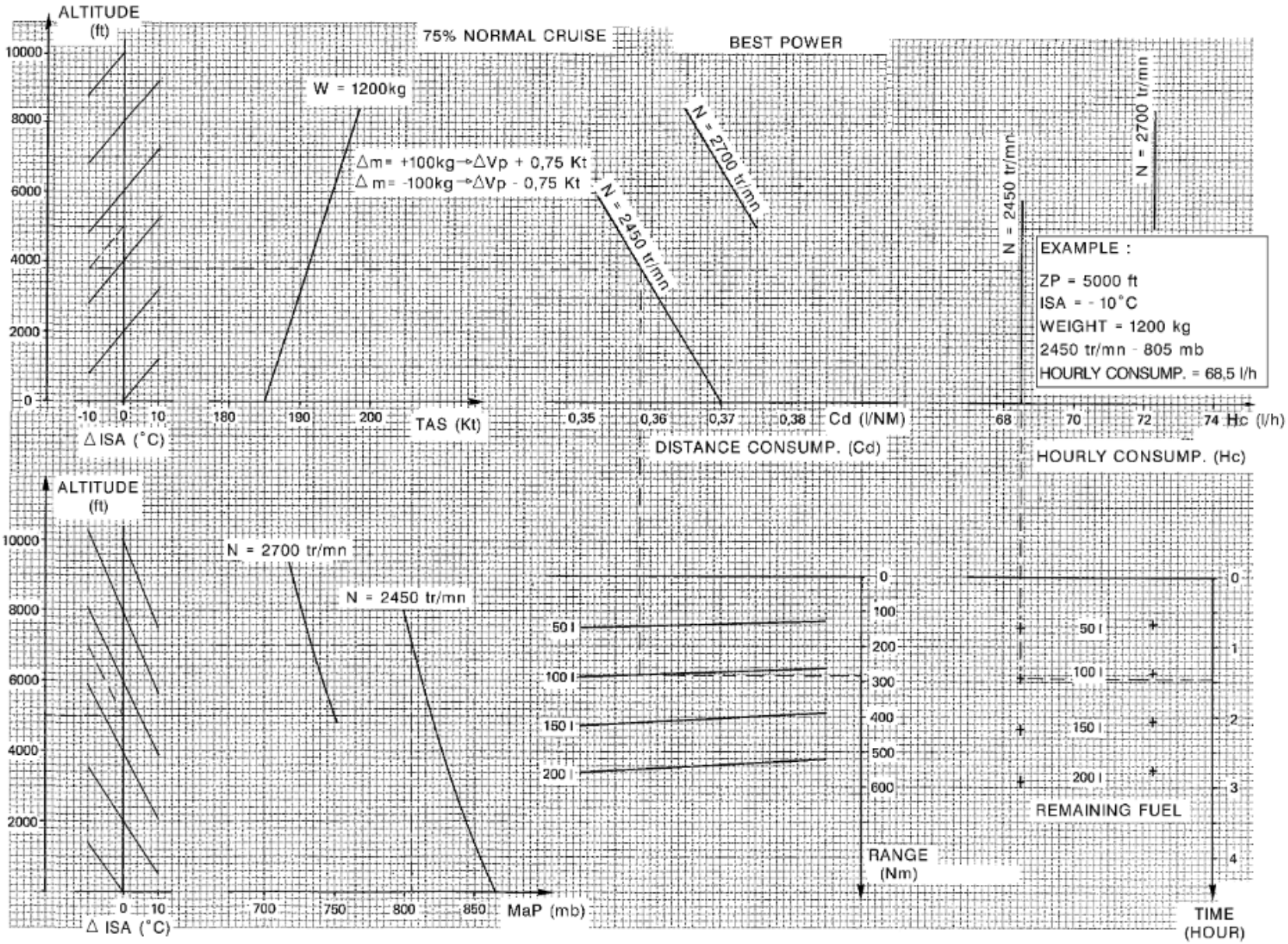
In cruise, the pilot may set the mixture to improve his aircraft distance/consumption if the following conditions are met:

- Displayed power < 75%.
- Cruise stabilized and constant altitude.

With constant RPM and manifold pressure, the pilot weakens the mixture with mixture lever. EGT indicator gives an exhaust gas temperature directly related to inlet mixture. Please note that there is a great inertia between the lever movement and the EGT temperature modification.

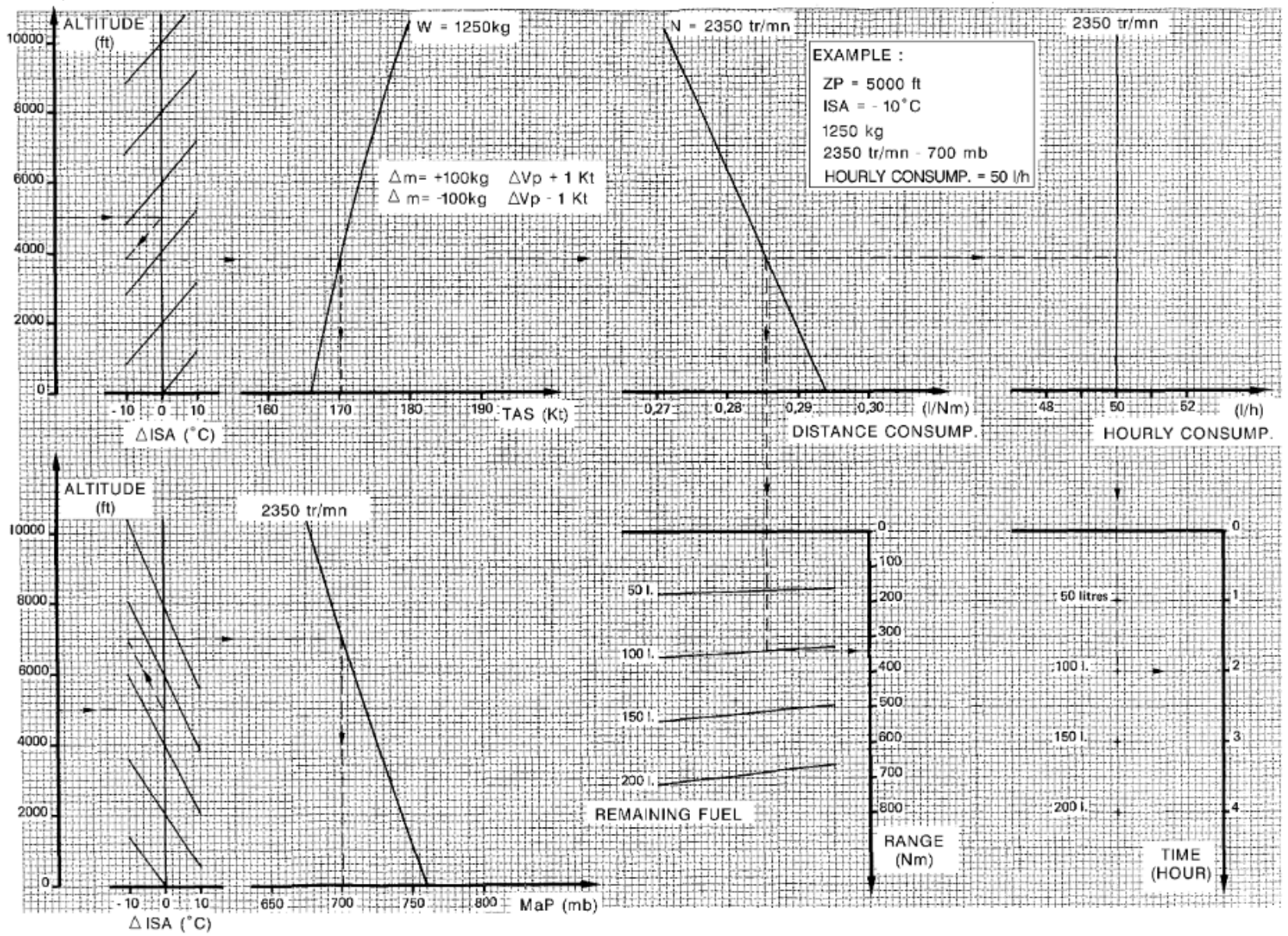
75 % NORMAL CRUISE PERFORMANCE

"These curves are calculated for a mixture corresponding to EGT peak – 70°C"



60 % ECONOMIC CRUISE PERFORMANCE

"These curves are calculated for a mixture corresponding to EGT peak "

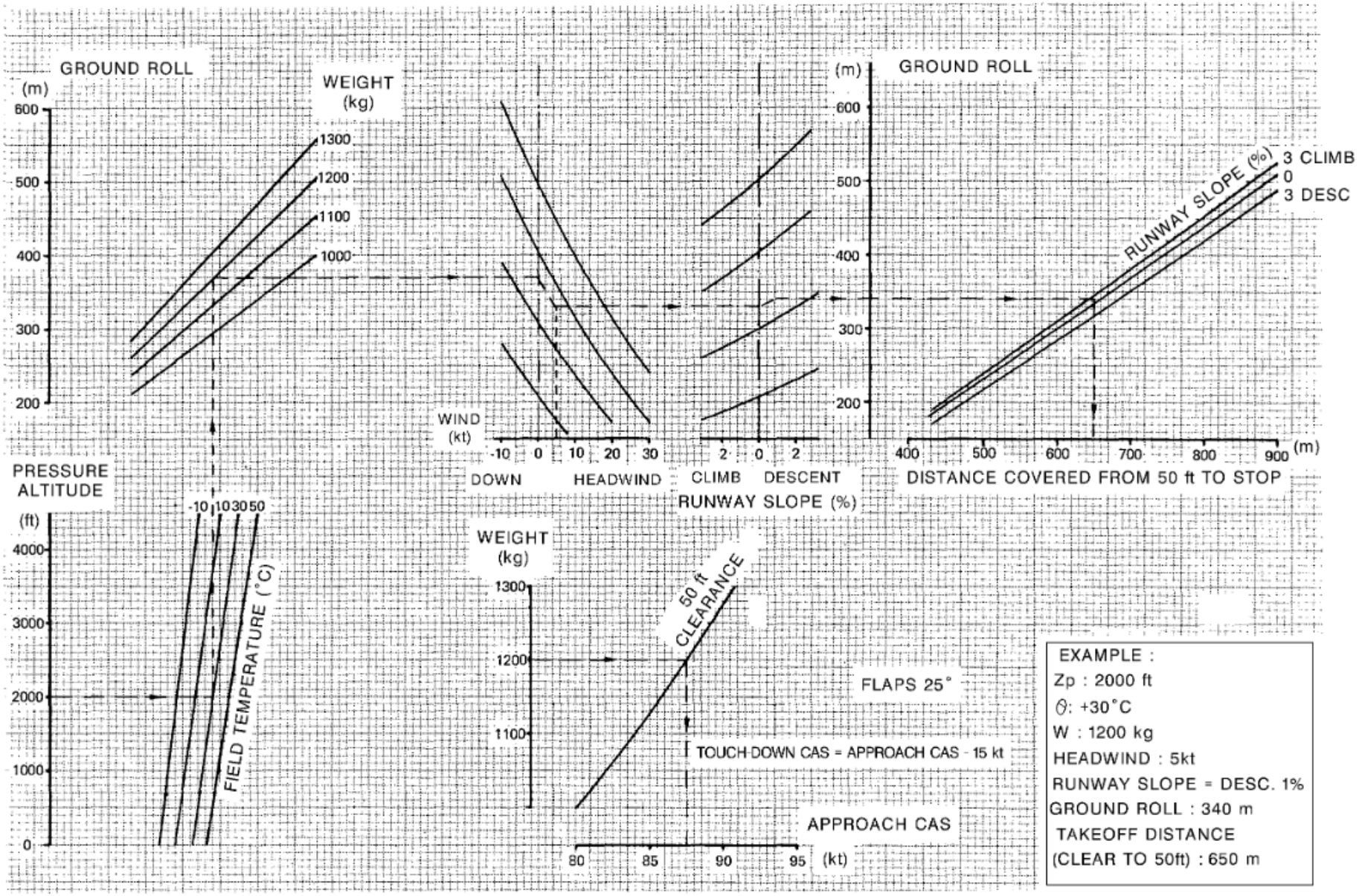


8.4\ Landing

Following illustration gives:

- Rolling distance;
- Landing distance from 15m obstacle clearance to aircraft stop.

These performances are established on dry, hard surface runway, with approach and touch-down impact speeds, depending on aircraft weight, given by the graph on this same figure.


GROUND ROLL
(m)
600
500
400
300
200
WEIGHT
(kg)
1300
1200
1100
1000
PRESSURE
ALTITUDE
(ft)
4000
3000
2000
1000
0
-10
10
30
50
FIELD TEMPERATURE (°C)
WIND
(kt)
-10
0
10
20
30
DOWN
HEADWIND
(m)
600
500
400
300
200
2
0
2
CLIMB
DESCENT
RUNWAY SLOPE (%)
GROUND ROLL
RUNWAY SLOPE (%)
3 CLIMB
0
3 DESC
400
500
600
700
800
900
(m)
DISTANCE COVERED FROM 50 ft TO STOP
WEIGHT
(kg)
1300
1200
1100
50 ft
CLEARANCE
FLAPS 25°
TOUCH-DOWN CAS = APPROACH CAS - 15 kt
APPROACH CAS
80
85
90
95
(kt)
EXAMPLE :
Zp : 2000 ft
θ: +30°C
W : 1200 kg
HEADWIND : 5kt
RUNWAY SLOPE = DESC. 1%
GROUND ROLL : 340 m
TAKEOFF DISTANCE
(CLEAR TO 50ft) : 650 m