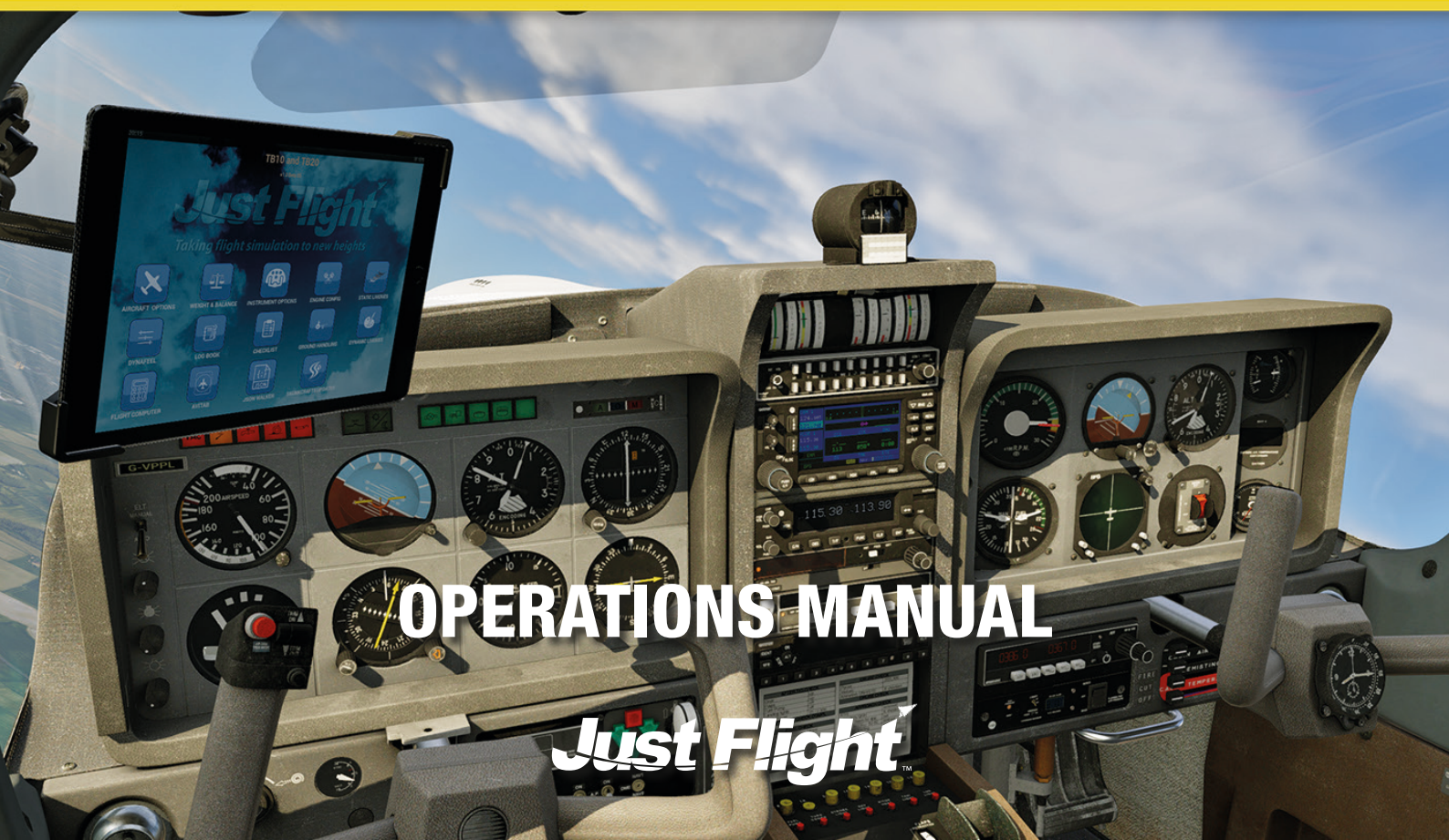


TB-10 Tobago & TB-20 Trinidad



OPERATIONS MANUAL

Just Flight™

More Just Flight aircraft for X-Plane 12

















Just Flight™

TB-10 Tobago & TB-20 Trinidad

Operations Manual

Please note that X-Plane 12 must be correctly installed on your PC prior to the installation and use of this TB-10 and TB-20 simulation.

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INTRODUCTION

The Socata TB-10 Tobago and TB-20 Trinidad are General Aviation aircraft with spacious and comfortable cabins providing seating for up to five people and have proved popular for touring and instrument training. The TB-10 and TB-20 are all-metal, cantilever low wing, single-engine aircraft with two ‘gull wing’ doors and access to the baggage compartment is through a door on the left-hand side of the fuselage.

The TB-10 is powered by a 180 horsepower (134 kW) Lycoming O-360 piston engine and is equipped with fixed tricycle landing gear. The TB-20’s power plant is a 250 horsepower (186 kW) Lycoming IO-540 piston engine and the aircraft is equipped with retractable tricycle landing gear. Both aircraft are fitted with a two-blade constant-speed propeller.



Fuel is carried in two integral wing tanks. The TB-10 carries a maximum of 55 US gallons (210 litres) of fuel, providing a range of 700 nautical miles, and the TB-20 carries a maximum of 89 US gallons (336 litres) of fuel, giving the aircraft a range of 1,100 nautical miles.

The vertical stabiliser consists of a fin, a rudder and a controlled tab. The horizontal stabiliser is of a stabilator type with an automatic anti-tab which can also be controlled through the pitch trim.

The aircraft is equipped with a conventional three-axis surface system consisting of aileron, stabilator and rudder surfaces. Both front positions are equipped with a yoke which actuates the ailerons and stabilator through rods and bellcranks.

Manually operated pitch and rudder trims are provided and can be operated using controls located on the centre pedestal.

Aircraft specifications – TB-10

Dimensions

Length	7.63 m
Wingspan	9.76 m
Height (to top of tail)	3.20 m
Wing area	11.90 m^2

Engine

Type	Lycoming O-360 four cylinder, horizontally opposed piston
Power	180 brake horsepower (134 kW)
Propeller	Two-blade, constant-speed, hydraulically actuated

Weights

Empty weight	700 kg (1,543 lb)
Maximum useful load	450 kg (99 lb)
Maximum take-off/landing weight	1,150 kg (2,535 lb)
Maximum baggage weight	65 kg (143 lb)

Performance

VNE (never exceed speed)	165 kt
VNO (max. cruising speed)	128 kt
VFE (max. flap speeds)	95 kt
VSO (stall speed)	53 kt (landing configuration)
Service ceiling	13,000 ft
Range (max. payload)	697 nautical miles

Aircraft specifications – TB-20

Dimensions

Length	7.75 m
Wingspan	9.85 m
Height (to top of tail)	2.85 m
Wing area	11.89 m^2

Engine

Type	Lycoming IO-540 six cylinder, horizontally opposed piston
Power	250 brake horsepower (186 kW)
Propeller	Two-blade, constant-speed, hydraulically actuated

Weights

Empty weight	800 kg (1,764 lb)
Maximum useful load	600 kg (1,323 lb)
Maximum take-off/landing weight	1,400 kg (3,086 lb)
Maximum baggage weight	65 kg (143 lb)

Performance

VNE (never exceed speed)	187 kt
VNO (max. cruising speed)	150 kt
VFE (max. flap speeds)	129 kt (take-off flap), 103 kt (landing flap)
VLE (max. gear speed)	139 kt
VSO (stall speed)	59 kt (landing configuration)
Service ceiling	20,000 ft
Range (max. payload)	1,100 nautical miles

Paint schemes

The TB-10 is supplied in the following seven paint schemes:

- D-EABM (Germany)
- D-EAKL (Germany)
- F-GTQF (France)
- G-CBHA (UK)
- G-IANL (UK)
- N5548C (USA)
- VH-TBA (Australia)

The TB-20 is supplied in the following six paint schemes:

- CS-DDK (Portugal)
- CS-DEP (Portugal)
- D-EPIM (Germany)
- G-VPPL (UK)
- SP-FYV (Poland)
- SX-ATK (Greece)

INSTALLATION, UPDATES AND SUPPORT

You can install this TB-10 and TB-20 software as often as you like on the same computer system:

1. Log in to your 'Account' on the Just Flight website.
2. Select the 'Your Orders' button.
3. list of your purchases will appear and you can then download the software you require.

Installing the aircraft

To install the aircraft in X-Plane 12:

1. Download the TB-10/TB-20 from your Just Flight Account.
2. Unzip the downloaded .zip file. The resulting folder will be named 'JF12_TB10_TB20'.
3. Copy the 'JF12_TB10_TB20' folder into the 'X-Plane 12/Aircraft' folder.

Accessing the aircraft

To access the aircraft in X-Plane 12:

1. From the Main Menu, click 'New Flight' or go to the Flight Configuration window.
2. Click on 'Tobago + Trinidad' in the aircraft selection screen.
3. Click 'Customize' and choose a livery from the drop-down menu in the top right. TB-10 and TB-20 variants are named accordingly (_TB10 or _TB20).
4. Click 'Start Flight'.



Uninstalling

To uninstall this software from your system:

1. Go to your X-Plane 12 folder.
2. Open the ‘Aircraft’ folder.
3. Delete the ‘JF12_TB10_TB20’ folder.

Recommended X-Plane settings

Joystick/yoke

For maximum enjoyment of this aircraft in X-Plane we recommend setting your joystick ‘Stability Augmentation’ sliders to 0. This will help prevent control issues, such as running out of pitch trim, and results in more realistic flight behaviour.

To turn off Stability Augmentation, follow these steps:

1. Launch X-Plane and go to the ‘Settings’ window.
2. Go to the ‘Joystick’ tab.
3. Click on the ‘Control Sensitivity’ button along the bottom of the window.
4. Set all three of the ‘Stability Augmentation’ sliders to 0% to disable them.
5. The ‘Control Response’ sliders can be set as desired.
6. Press ‘Done’.

Updates and Technical Support

For technical support (in English) please visit the Support pages on the Just Flight website.

As a Just Flight customer you can obtain free technical support for any Just Flight product.

If an update becomes available for this aircraft, we will post details on the Support page and we will also send a notification email about the update to all buyers who are currently subscribed to our Newsletter and emails.

Regular News

To get all the latest news about Just Flight products, special offers and projects in development, subscribe to our regular emails.

We can assure you that none of your details will ever be sold or passed on to any third party and you can, of course, unsubscribe from this service at any time.

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SYSTEMS GUIDE

Fuel system

The fuel system consists of two fuel tanks (one located in each wing), a selector valve, auxiliary fuel pump and engine-driven fuel pump.

On the TB-10, each wing tank can hold a maximum of 27.7 US gallons (105 litres), providing a total fuel capacity of 55.4 US gallons (210 litres).

On the TB-20, each wing tank can hold a maximum of 44.4 US gallons (168 litres), providing a total fuel capacity of 88.8 US gallons (336 litres).

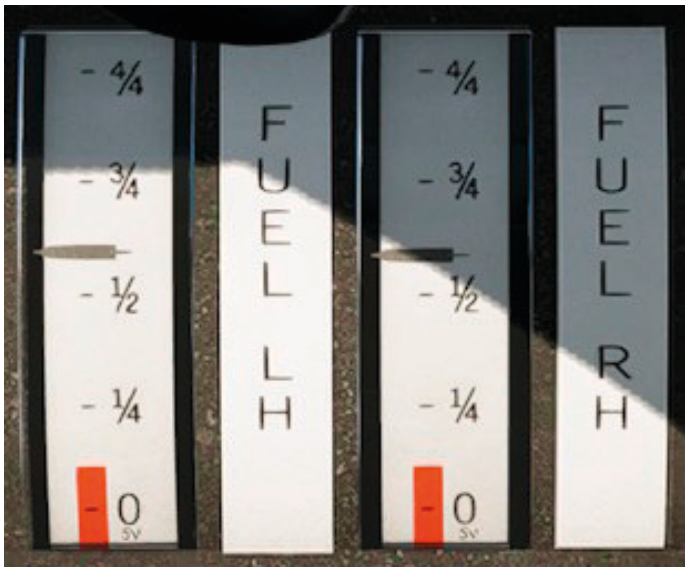
The engine-driven fuel pump draws fuel from the left or right tank through the three-position selector valve. The selector valve is controlled with a knob on the centre pedestal which is labelled FUEL SELECTOR, with CLOSED, LEFT and RIGHT positions.



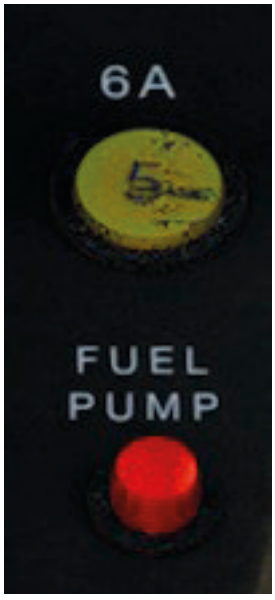
The fuel then passes through the electrically powered auxiliary fuel pump and supplies the engine. The fuel flow and pressure are shown on a dual indicator located on the right panel.



The quantity of fuel remaining in each wing tank is shown on two indicators, one per tank, which are located on the engine monitoring cluster at the top of the centre console. The indicators are graduated in quarters from empty (0) to full (4/4). The indicators are electrically powered and the voltmeter should be checked if both pointers rapidly move to zero.



The auxiliary fuel pump must be switched on whenever a new tank is being selected, to ensure a continuation of fuel flow. The auxiliary fuel pump is controlled by a switch breaker on the front of the centre pedestal, and an indicator light on the advisory panel shows the operation of the pump.



Each fuel tank is equipped with its own ventilation system. Should a vent become blocked, fuel flow from the tank will be reduced and the engine may cut out.

Electrical system

The aircraft is equipped with a 28-volt DC electrical system, a 70-amp alternator installed on the engine and a battery located in a compartment under the baggage compartment floor.

Electrical power is provided to the aircraft systems via three buses:

BUS 1

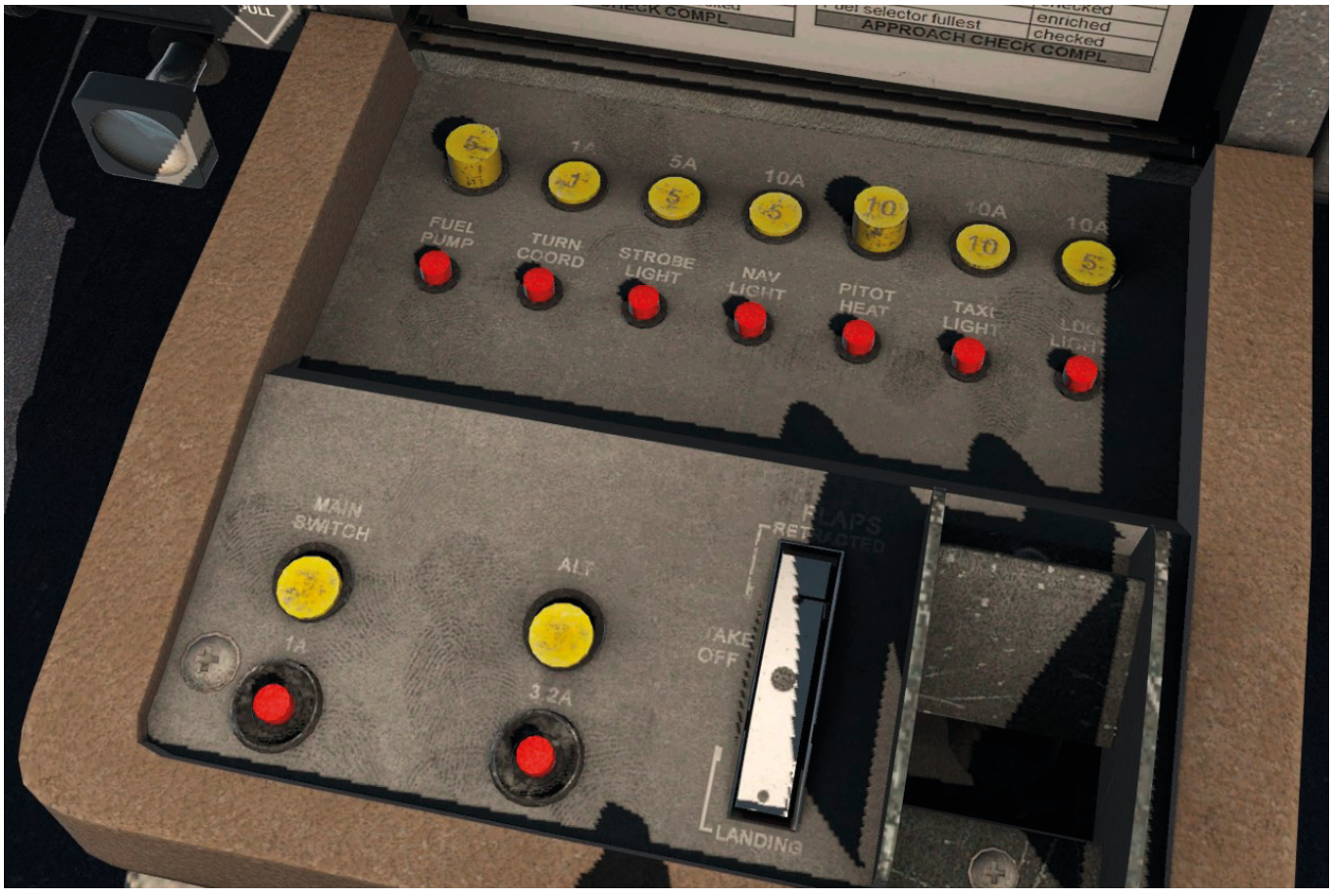
- Flaps + indicator
- OAT
- HSI
- Pitot
- Landing light
- Fuel pump
- Landing gear lights
- Tachometer
- Annunciators
- Flow meter
- GTX 330

BUS 2

- Fin light
- Cockpit lighting
- Cabin blower
- Taxi light
- Turn/bank indicator
- Clock
- TKS
- Chronometer
- Starter
- GNS 430
- KN 62
- KAP 150
- GTX 330
- KR 87

BUS 3

- Landing gear
- AI
- Recognition lights
- Nav lights
- Anti-collision lights
- Landing gear control
- ADF indicator
- Hour meter
- GNC 255



Battery

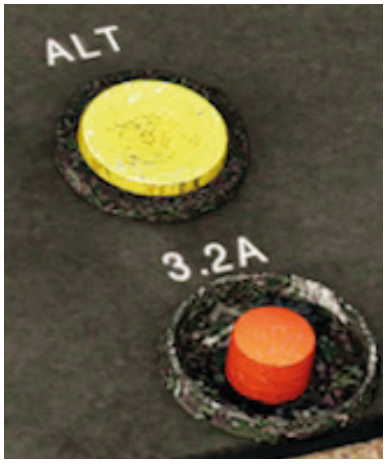
Battery connection to the electrical system is made through the switch breaker labelled ‘MAIN SWITCH’.



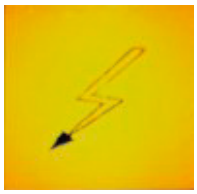
Alternator

A ‘pull-off’ type circuit breaker calibrated at 60 amps limits the alternator electrical load to the battery and electrical system. In the event of over-voltage, the alternator control unit cuts off the alternator field and the amber warning light labelled with a lightning bolt symbol illuminates. The electrical system is then powered only from the battery. The alternator control unit can be reset by disconnecting and closing the switch breaker labelled ‘ALTr FLD’.

The alternator switch breaker (labelled ‘ALT’) located to the right of the main switch controls the operation of the alternator through the regulator.



Any time the electrical system voltage falls below approximately 26 volts, an amber warning light illuminates on the advisory panel to warn the pilot.



Avionics power

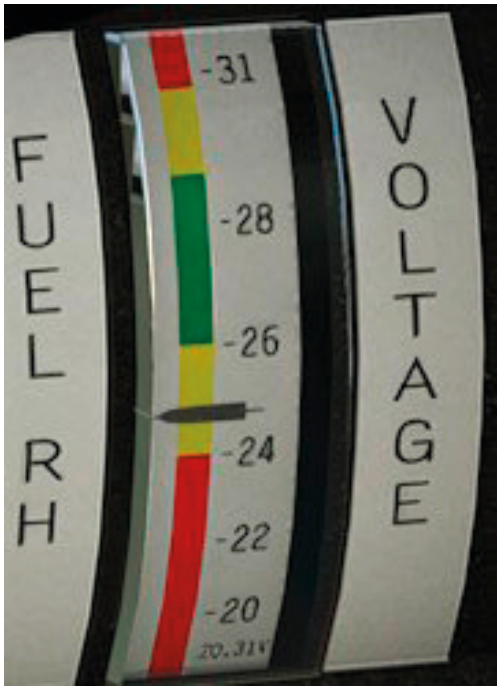
A switch labelled ‘RADIO MASTER’, on the lower right side of the left panel, controls the power supply to the avionics and enables the automatic disconnection of the avionic systems during engine start or manual disconnection during abnormal conditions. When the switch is in the OFF position, no electrical power is available to the avionics equipment. The switch should be placed in this position prior to moving the main switch, in order to prevent damage to the avionics.

Pulling out the ‘R.M SWITCH’ circuit breaker will inhibit the RADIO MASTER switch, allowing power to reach the avionics regardless of the position of the switch.



Voltmeter

A voltmeter is located on the engine monitoring cluster at the top of the centre console, allowing for monitoring of the electrical generation system. When the alternator is operational the indication must stabilise in the green sector. When the alternator is off, the indication may go down to the yellow sector. If the indication is within the lower red sector the battery must be charged. If the indication is within the upper red sector, with the alternator operating, the regulator has to be adjusted.



Circuit breakers and fuses

Most of the electrical circuits are protected by circuit breakers which are located on the left side of the cockpit. An overload will cause the circuit breaker to open, switching off the circuit. The circuit breaker should be allowed to cool for approximately three minutes before it is closed again.

The avionics equipment is protected by circuit breakers grouped in the lower part of the circuit breaker panel:

- 60-amp ALTr – between the alternator and electrical system
- 70-amp BAT – between the battery and electrical system
- 30-amp BUS 1 – bus bar 1 supply
- 30-amp BUS 2 – bus bar 2 supply
- 30-amp BUS 3 – bus bar 3 supply

These five pull-off type circuit breakers are manually operated and can isolate the various sources or bus bars.

A variety of other fuses and breakers protect other circuits, including instruments and controls.



Lighting system

Exterior lighting

The exterior lighting consists of conventional navigation lights located on the wing tips and tail cone, a landing light and a taxi light mounted on the leading edge of the left wing. Anti-collision lights consist of strobe lights on each wing tip and a rotating beacon on the vertical stabiliser.

The switch breakers located on the central pedestal control the landing, taxi, navigation and anti-collision lights. The strobe light circuit is also protected by a circuit breaker.



Interior lighting

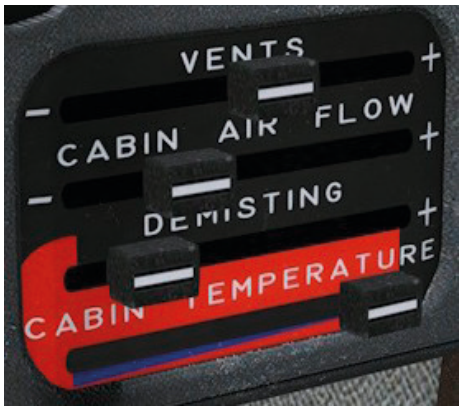
Interior lighting is provided by integral, flood and post lights. Three lighting control knobs grouped together on the left-hand part of the left panel control the interior lighting:

- Normal lighting – instrument panel visor lighting
- Emergency lighting – overhead lights
- Instruments/radio lighting – console visor lighting and instrument panel lighting

Cabin air system

The temperature and air flow to the cabin are regulated by the cabin air regulation system and the air outlets.

The temperature and air flow can be controlled using the panel located below the right control yoke.



Instrument markings

Airspeed indicator markings – TB-10

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
White arc	53-95	Full flap operating range. Lower limit is maximum weight VSO in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green arc	60-128	Normal operating range. Lower limit is maximum weight VS1 with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow arc	128-165	Operations must be conducted with caution and only in smooth air.
Red line	165	Maximum speed for all operations.

Airspeed indicator markings – TB-20

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
White arc	59-103	Full flap operating range. Lower limit is maximum weight VSO in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green arc	70-150	Normal operating range. Lower limit is maximum weight VS1 with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow arc	150-187	Operations must be conducted with caution and only in smooth air.
Red line	187	Maximum speed for all operations.

Engine indicator markings

INSTRUMENT	Red line or arc Minimum limit	Yellow arc Caution range	Green arc Normal operating	Red line Maximum limit
Tachometer	----------	----------	750-2,575 RPM	2,575 RPM
Oil Temperature	----------	Below 104°F (40°C)	104-244°F (40-118°C)	244°F (118°C)
Fuel Pressure Fuel Flow	0.1 PSI 2 gal/hr	----------	0.1-8 PSI 2-25 gal/hr	8 PSI 25 gal/hr
Oil Pressure	25 PSI	25-60 PSI and 90-100 PSI	60-90 PSI	100 PSI
Cylinder Head Temperature	----------	435-500°F (224-260°C)	200-435°F (93-224°C)	500°F (260°C)
Vacuum Gauge	----------	----------	4.4-5.2 inHg	4.4 and 5.2 inHg

Limits

Weight limits – TB-10

Maximum take-off weight: 2,535 lb (1,150 kg)

Maximum landing weight: 2,535 lb (1,150 kg)

Maximum weight in baggage compartment: 143 lb (65 kg)

Weight limits – TB-20

Maximum take-off weight: 3,086 lb (1,400 kg)

Maximum landing weight: 3,086 lb (1,400 kg)

Maximum weight in baggage compartment: 143 lb (65 kg)

Manoeuvre limits

These aircraft are certificated in the normal category. The normal category is applicable to aircraft intended for non-aerobatic operations.

These include any manoeuvres incidental to normal flying, stalls (except whip stalls), lazy eights, chandelles and steep turns in which the angle of bank is no more than 60°.

Aerobatic manoeuvres, including spins, are not approved.

Flight load factor limits

Flaps up: + 3.8 G

Flaps down: + 2.0 G

Ground control

Ground control during taxiing is accomplished through nose-wheel steering by using the rudder pedals which are connected to the nose-wheel through rods. When a rudder pedal is fully pushed, the nose-wheel rotates through an arc of approximately 18 degrees each side of the centre position. By applying either left or right brake, the degree of turn may be increased. The minimum turning radius of the aircraft is obtained by using differential braking and nose gear steering.

Moving the aircraft by hand is most easily accomplished by attaching a towbar (stowed in the baggage compartment) to the nose gear leg. See the Aircraft Options section of the separate EFB manual for more details.

Wing flaps

The wing flaps are of the large span, single-slot type, with three positions:

- UP – 0 degrees
- TAKE-OFF – 10 degrees
- LANDING – 25 degrees (TB-10) or 40 degrees (TB-20)

They are retracted or extended through the use of the flap control lever located on the pedestal. An indicator next to the lever shows the current flap position.

The wing flaps system is protected by a 10-amp circuit breaker, labelled ‘FLAPS’, on the circuit breaker side panel.

Landing gear

Landing gear – TB-10

The TB-10 landing gear system is a stationary (fixed) tricycle type, utilising a conventional steerable nose gear. Nose gear and main gear are provided with oil/air shock absorbers. Each main gear wheel is equipped with a hydraulically actuated, single-disc brake on the inboard side of the wheel.

Landing gear – TB-20

The landing gear system on the TB-20 is a retractable tricycle type, utilising a conventional steerable nose gear and a trailing-beam-type main landing gear. Nose gear and main gear are provided with oil/air shock absorbers. Each main gear wheel is equipped with a hydraulically actuated, single-disc brake on the inboard side of the wheel.

Landing gear extension or retraction is accomplished by actuators powered by an electrically driven hydraulic power pack, the hydraulic generator.

A normal operating pressure is automatically maintained in the landing gear system. This pressure is sufficient to provide a positive up pressure on the landing gear.

A hinge strut provides the mechanical downlock of the nose and main gears. Mechanically actuated wheel well doors connected to the landing gear are provided for the nose and main gears. Hydraulic generator operation is started and stopped by a pressure switch when the landing gear control is placed in the UP position.

Landing gear control

The landing gear lever is located on the lower right of the left panel. The lever has two positions, up and down, which give a mechanical indication of the gear position selected.

Operation of the landing gear system will not begin until the lever has been repositioned. After the lever has been repositioned, it directs hydraulic pressure within the system to actuate the gear to the selected position.

Landing gear position indicator lights

Position indicator lights adjacent to the landing gear lever indicate whether the gear is either down and locked, or unlocked.

Separate green ‘gear down’ indicator lights are provided for each gear and a red single ‘gear unlocked’ light illuminates any time one or more of the gears is not locked down or fully up.

The landing gear system is also equipped with gear safety (squat) microswitches, an emergency extension control and a gear-up warning system.

The ‘gear unlocked’ red light and the green ‘gear down’ lights (one for each gear) are tested using a push-knob labelled ‘TEST’ on the annunciator panel. The green lights are dimmed with the toggle switch labelled ‘D/N’ on the annunciator panel.

Landing gear operation

To retract or extend the landing gear, move the lever to the desired position. During a normal cycle the gear retracts fully or extends and locks, limit microswitches close and green indicator lights illuminate (down cycle only), indicating completion of the cycle.

While the gear is in transit, or whenever any gear is not fully retracted or locked down, the red ‘gear unlocked’ light will illuminate.

The electric pump will continue to run:

- During landing gear extension, until the green indicator lights illuminate and the red indicator light goes out.
- During landing gear retraction, until the green and red indicator lights go out.

If pressure in the system drops, the pressure switch starts operation of the hydraulic generator which increases pressure.

The safety (squat) microswitches, actuated by the main gears, electrically prevent inadvertent retraction whenever the gear shock absorber is compressed by the weight of the aircraft. A pull-off type circuit breaker is also provided in the system as a maintenance safety feature. With the circuit breaker pulled out, landing gear operation by the gear pump is prevented. After maintenance is completed, and prior to flight, the circuit breaker should be pushed back in.

Emergency landing gear extension

In the event that the landing gear fails to extend normally, slowing the aircraft below 97 kt (180 km/h) and placing the landing gear lever in the down position should allow the landing gear to ‘free fall’ to the down and locked position, as evidenced by the green ‘gear down’ lights illuminating.

Following this procedure, should the gear lights indicate that the gear is still not down and locked, utilise the emergency landing gear control under the left panel to extend the gear. For the complete procedures, refer to the EMERGENCY PROCEDURES section of this manual. The emergency landing gear control cannot be used to retract the gear, but it is necessary to push back this control to retract the landing gear in a normal way.

Landing gear warning system

The aircraft is equipped with a landing gear warning system designed to help prevent the pilot inadvertently making a wheels-up landing. The system consists of a throttle-actuated microswitch which is electrically connected to an aural warning unit.

In the ‘gear up’ configuration, when the throttle is retarded to approximately 1/2 inch (12 mm) of the aft stop (with the battery switch-breaker ON), the throttle linkage will actuate on a microswitch which is electrically connected to the gear aural warning unit.

If the landing gear is retracted (or not down and locked), a continuous tone will be heard on the alarm loudspeaker. In addition, a microswitch connected to the wing flap system also sounds a tone when the flaps are extended beyond 10° with the landing gear retracted.

An ‘LDG PUMP’ amber warning light on the advisory panel illuminates to indicate operation of the hydraulic generator.

Doors and exits

The aircraft is fitted with two passenger doors and a baggage door.

Each passenger door can be opened from within the virtual cockpit by clicking on the door handle to rotate it to the OPEN position and then clicking on the door frame to push it open. It can be closed by clicking on the door frame to pull it closed and then clicking on the door handle to rotate it to the CLOSED position.

The baggage door and both pilot doors can be opened from the Aircraft Options section of the EFB app.

Controls lock

A controls lock can be fitted to the yoke on the left panel. The lock consists of a locking pin which prevents movement of the flying controls and a safety device that prevents the magneto/start selector key from being used.

The lock is fitted by clicking on the area into which the blocking pin is inserted on the control wheel tube.



Engine

The TB-10 is powered by a four-cylinder, horizontally opposed, direct drive Lycoming O–360–A1AD engine rated at 180 BHP.

The TB-20 is powered by a six-cylinder, horizontally opposed, direct drive Lycoming IO–540–C4–D5D engine rated at 250 BHP.

Both engines are provided with a starter, a 24-volt/70-amp alternator, an all-weather shielded ignition harness, a dual magneto, a vacuum pump drive, a fuel pump and a manifold air filter.

The engine cowl is a laminate cantilever structure, fixed on the firewall and made of two elements. The upper cowl is fitted with an inspection door to check oil level and an access door to the propeller de-icing fluid tank. The lower cowl is fitted with incorporated air intakes. The engine mount is made of steel tube, rigidly attached on the firewall.

Engine and accessories cooling is provided by a downwards airflow. Air penetrates through holes on each side of the propeller cone, where it is guided around the engine by airproof deflectors, and is then conducted to two air outlets located on the lower cowl. Engine inlet air penetrates through an air intake at the front of the lower cowl and goes directly through a filter, before being admitted in the air duct under the carburettor on the TB-10, and under the injection unit on the TB-20.

The air duct can also be air-fed by an alternative air supply source which is mechanically actuated by the carburettor lever on the TB-10, or by pushing the control lever on the lower right of the left panel on the TB-20. This air source provides the carburettor or injection unit with heated air when the aircraft involuntarily enters icing conditions.

The stainless steel exhaust system is comprised of a silencer with a heat exchanger in order to provide hot air supply to the cabin.

Engine controls

Engine manifold pressure is controlled by the black/yellow throttle control on the pedestal. In the forward position the throttle is open (full power) and in the aft position it is closed (engine idling). At approximately 1/2 inch (12 mm) from its rear stop, the throttle actuates on the landing gear alarm microswitch.

The propeller governor is controlled by the blue propeller control on the pedestal. In the forward position, the propeller moves to its low pitch position (high RPM) and in the aft position it moves to high pitch position (low RPM).

The mixture is controlled by the red mixture control on the pedestal. In the forward position the mixture is open (full rich) and in the aft position the mixture is closed (idle cut-off).

On the TB-10, the carburettor air temperature is controlled by the carburettor heating control (grey round knob) located on the pedestal. If the control lever is in the forward position, the outside temperature air is carried through the air filter to the carburettor. If it is in the aft position, air heated in the exchanger, mixed with outside temperature air, is directly carried to the carburettor.

Engine instruments

Indicators enable the pilot to check oil pressure, oil temperature, tachometer, manifold pressure, fuel flow, EGT and CHT. The engine instruments are located on the cluster at the top of the centre console and on the right panel.

Ignition and starter system

Engine ignition is provided by a dual magneto on two spark plugs per cylinder. Ignition is controlled by a key-operated rotating selector on the lower left portion of the left panel. The selector operates clockwise, with left, right, left/right and starter positions.

Engine lubrication system

The engine is lubricated by an oil system which is powered by a pump on the engine rear accessory housing. A sump at the bottom of the engine allowing oil recovery, a throw-away cartridge-type filter on the engine rear accessory housing and a strainer-type filter in the sump complete the system.

A pressure probe and a temperature probe transmitting the values to two indicators on the upper edge of the console enable the pilot to check the oil system.

An inspection door located on the engine upper cowl provides access to the oil system filling port. A dipstick enables the oil level to be checked.

Air induction system

The engine is supplied with an air intake located under the propeller cone. This air intake is fitted with a filter which removes dust and other foreign matter from the induction air so that they do not penetrate into the air duct. In the event of the air filter becoming blocked, however, place the carburettor heating control in the ON position on the TB-10 or pull on the 'Alternate Air' knob on the TB-20 to open an alternate air door and allow air to enter the engine.

Propeller

The aircraft is fitted with an all-metal, two-blade, constant-speed, governor-regulated propeller. The propeller control actuates on the governor. According to the control position, the governor determines propeller rotation speed and thus the engine speed to be maintained. The governor controls the flow of engine oil, boosted to high pressure by the governing pump, onto a piston located in the propeller hub. Oil pressure twists the blades toward high pitch (low RPM). When oil pressure to the piston is relieved, the blades twist to low pitch (high RPM).



PERFORMANCE

Take-off performance – TB-10

CONDITIONS:

IAS – lift off: 59 KIAS / 68 MPH

IAS – clear 50 ft: 65 KIAS / 75 MPH

Weight: 2,535 lb / 1,150 kg

Flaps: Take-off position (10°)

Power: Full low pitch – 2,575 RPM – full throttle

Runway: Dry

Temperature	Distance	Pressure altitude (ft)				
		0	2000	4000	6000	8000
ISA -20°C	Roll (ft)	837	1001	1214	1460	1755
	Clear 50ft (ft)	1296	1558	1886	2329	2920
ISA	Roll (ft)	968	1165	1394	1690	2051
	Clear 50ft (ft)	1476	1804	2198	2739	3478
ISA +15°C	Roll (ft)	1066	1280	1542	1870	2297
	Clear 50ft (ft)	1657	2001	2461	3084	4035

CONDITIONS:

IAS – lift off: 63 KIAS / 73 MPH

IAS – clear 50 ft: 69 KIAS / 79 MPH

Weight: 2,535 lb / 1,150 kg

Flaps: Take-off position (10°)

Power: Full low pitch – 2,575 RPM – full throttle

Runway: Dry

Temperature	Distance	Pressure altitude (ft)				
		0	2000	4000	6000	8000
ISA -20°C	Roll (ft)	954	1141	1384	1664	2000
	Clear 50ft (ft)	1413	1698	2056	2533	3166
ISA	Roll (ft)	1103	1328	1589	1927	2338
	Clear 50ft (ft)	1612	1967	2393	2976	3765
ISA +15°C	Roll (ft)	1215	1459	1758	2132	2618
	Clear 50ft (ft)	1806	2180	2677	3346	4357

Take-off performance – TB-20

CONDITIONS:

IAS – lift off: 63 KIAS / 73 MPH

IAS – clear 50 ft: 69 KIAS / 79 MPH

Weight: 2,370 lb / 1,075 kg

Flaps: Take-off position (10°)

Power: Full low pitch – 2,575 RPM – full throttle

Runway: Dry

Temperature	Distance	Pressure altitude (ft)					
		0	2000	4000	6000	8000	10000
ISA -20°C	Roll (ft)	647	757	886	1042	1230	1448
	Clear 50ft (ft)	1008	1170	1365	1605	1906	2282
ISA	Roll (ft)	771	905	1063	1254	1487	1758
	Clear 50ft (ft)	1197	1399	1642	1948	2341	2851
ISA +20°C	Roll (ft)	909	1070	1261	1492	1775	2106
	Clear 50ft (ft)	1409	1655	1959	2346	2859	3564

CONDITIONS:

IAS – lift off: 71 KIAS / 82 MPH

IAS – clear 50ft: 78 KIAS / 90 MPH

Weight: 3,086 lb / 1,400 kg

Flaps: Take-off position (10°)

Power: Full low pitch – 2,575 RPM – full throttle

Runway: Dry

Temperature	Distance	Pressure altitude (ft)					
		0	2000	4000	6000	8000	10000
ISA -20°C	Roll (ft)	1115	1305	1527	1795	2119	2496
	Clear 50ft (ft)	1735	2036	2409	2889	3537	4457
ISA	Roll (ft)	1329	1560	1833	2162	2562	3029
	Clear 50ft (ft)	2083	2469	2959	3618	4578	6190
ISA +20°C	Roll (ft)	1566	1845	2173	2572	3059	3630
	Clear 50ft (ft)	2483	2976	3626	4562	6116	9854

Climb performance – TB-10

CONDITIONS:

Landing gear: UP

IAS: 73 KIAS / 84 MPH

Weight: 2,535 lb / 1,150 kg

Mixture: FULL RICH

Flaps: Retracted

Power: 2,575 RPM – full throttle

Pressure altitude (ft)	Climb speed					
	ISA -20°C		ISA		ISA +15°C	
	m/s	ft/min	m/s	ft/min	m/s	ft/min
0	4.11	810	3.76	740	3.51	690
2000	3.56	700	3.23	635	2.97	585
4000	3.00	590	2.67	525	2.44	480
6000	2.44	480	2.13	420	1.90	375
8000	1.91	375	1.61	317	1.39	274

CONDITIONS:

Landing gear: UP

IAS: 78 KIAS / 90 MPH

Weight: 2,535 lb / 1,150 kg

Mixture: FULL RICH

Flaps: Retracted

Power: 2,575 RPM – full throttle

Pressure altitude (ft)	Climb speed					
	ISA -20°C		ISA		ISA +15°C	
	m/s	ft/min	m/s	ft/min	m/s	ft/min
0	4.68	921	4.29	844	4.00	787
2000	4.06	799	3.68	724	3.40	669
4000	3.41	671	3.04	598	2.78	547
6000	2.78	547	2.43	478	2.17	427
8000	2.17	427	1.84	362	1.59	313

Climb performance – TB-20

CONDITIONS:

Landing gear: UP

IAS: 86 KIAS / 99 MPH

Weight: 2,370 lb / 1,075 kg

Mixture: FULL RICH

Flaps: Retracted

Power: 2,575 RPM – full throttle

Pressure altitude (ft)	Climb speed					
	ISA -20°C		ISA		ISA +20°C	
	m/s	ft/min	m/s	ft/min	m/s	ft/min
500	8.94	1760	8.01	1576	7.22	1422
2500	8.13	1601	7.24	1425	6.48	1276
4500	7.33	1443	6.47	1273	5.74	1130
6500	6.54	1287	5.70	1122	4.99	982
8500	5.74	1129	4.93	970	4.25	836
10500	4.95	973	4.16	818	3.49	688
12500	4.15	817	3.39	667	2.74	549

CONDITIONS:

Landing gear: UP

IAS: 95 KIAS / 109 MPH

Weight: 3,086 lb / 1,400 kg

Mixture: FULL RICH

Flaps: Retracted

Power: 2,575 RPM – full throttle

Pressure altitude (ft)	Climb speed					
	ISA -20°C		ISA		ISA +20°C	
	m/s	ft/min	m/s	ft/min	m/s	ft/min
500	6.32	1244	5.59	1100	4.96	977
2500	5.65	1112	4.94	972	4.34	853
4500	4.98	979	4.29	844	3.70	729
6500	4.31	848	3.64	716	3.07	604
8500	3.64	716	2.99	588	2.43	479
10500	2.97	585	2.34	460	1.80	353
12500	2.31	455	1.69	332	1.16	228

CONDITIONS:

Landing gear: UP

IAS: 86 KIAS / 99 MPH

Weight: 2,370 lb / 1,075 kg

Mixture: FULL RICH

Flaps: Retracted

Power: 2,575 RPM – full throttle

Pressure altitude (ft)	Climb from sea level								
	ISA -20°C			ISA			ISA +20°C		
	Time (mins)	Fuel (US gal)	Dist (NM)	Time (mins)	Fuel (US gal)	Dist (NM)	Time (mins)	Fuel (US gal)	Dist (NM)
500	0’17”	0.1	0.4	0’19”	0.1	0.5	0’21”	0.1	0.5
2500	1’29”	0.6	2.1	1’39”	0.6	2.4	1’49”	0.6	2.8
4500	2’48”	1.0	4.0	3’8”	1.1	4.7	3’28”	1.1	5.3
6500	4’17”	1.5	6.3	4’48”	1.6	7.3	5’20”	1.6	8.4
8500	5’58”	2.0	8.9	6’43”	2.1	10.4	7’31”	2.2	12.0
10500	7’53”	2.5	11.9	8’57”	2.7	14.1	10’6”	2.8	16.4
12500	10’9”	3.1	15.7	11’39”	3.3	18.7	13’18”	3.5	22.1

CONDITIONS:

Landing gear: UP

IAS: 95 KIAS / 109 MPH

Weight: 3,086 lb / 1,400 kg

Mixture: FULL RICH

Flaps: Retracted

Power: 2,575 RPM – full throttle

Pressure altitude (ft)	Climb from sea level								
	ISA -20°C			ISA			ISA +20°C		
	Time (mins)	Fuel (US gal)	Dist (NM)	Time (mins)	Fuel (US gal)	Dist (NM)	Time (mins)	Fuel (US gal)	Dist (NM)
500	0’24”	0.2	0.6	0’27”	0.2	0.7	0’30”	0.2	0.8
2500	2’6”	0.8	3.3	2’23”	0.9	3.8	2’41”	0.9	4.5
4500	4’2”	1.5	6.4	4’35”	1.6	7.5	5’10”	1.7	8.8
6500	6’15”	2.2	10.0	7’9”	2.3	11.9	8’8”	2.5	14.0
8500	8’51”	3.0	14.5	10’13”	3.2	17.3	11’46”	3.4	20.7
10500	11’58”	3.8	20.0	14’2”	4.2	24.3	16’28”	4.5	29.6
12500	15’53”	4.8	27.1	19’5”	5.3	33.8	23’9”	6.0	42.7

Maximum performance altitude

Maximum performance altitude in standard temperature conditions (ISA), corresponding to a vertical speed of 100 ft/min, is 13,000 ft for the TB-10 and 18,000 ft for the TB-20, at maximum take-off weight.

Level flight performance

Level flight performance is given for a weight of 2,535 lb (1,150 kg) for the TB-10 and 2,943 lb (1,335 kg) for the TB-20, and for either the 'Best Power' or 'Best Economy' power setting obtained by EGT. Various parameters such as mixture setting and the atmospheric conditions (wind, temperature etc.) may noticeably vary the endurance and range.

Power settings:

- Best economy mixture – from full rich, lean the mixture until peak EGT
- Best power mixture – from peak EGT, enrich mixture until EGT temperature decreases by 75°F (3 divisions)

Level flight performance – TB-10

CONDITIONS:

Pressure altitude: 2,000 ft

ISA: 52°F (11°C)

Mixture: Best Power

Weight: 2,535 lb (1,150 kg)

N (RPM)	2700		2600		2500		2400		2300	
inHg	22.1 20.7 19.2		23.6 22.1 20.7 19.2		23.6 22.1 20.7 19.2		25 23.6 22.1 20.7		25 23.6 22.1 20.7	
% BHP	73 67 60		78 72 65 58		76 70 63 58		81 74 68 62		78 72 66 60	
TAS	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**
	119 114 108	137 132 124	122 118 113 106	141 136 130 122	121 117 112 104	140 135 129 119	124 120 115 110	143 138 133 127	122 118 113 108	141 136 130 124
US Gal/hr	11.4 10.4 9.4		11.7 10.6 9.6 8.8		11 10 9.1 8.4		11.5 10.5 9.6 8.7		11.1 10.1 9.2 8.4	
Distance (without reserves)	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**
	4.42 5.12 5.43	646 687 711	4.37 5.05 5.36 6.06	649 690 727 743	4.53 5.22 5.54 6.25	684 724 758 764	4.40 5.07 5.38 6.10	665 708 749 783	4.41 5.20 5.51 6.23	662 727 764 792
Distance (with reserves)	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**
	4.07 4.32 5.00	562 597 618	4.02 4.26 4.53 5.19	565 600 631 646	4.17 4.42 5.06 5.35	593 631 657 665	4.11 4.29 4.49 5.23	593 615 649 677	4.14 4.39 5.06 5.34	593 531 662 690

CONDITIONS:

Pressure altitude: 4,000 ft

ISA: 45°F (7°C)

Mixture: Best Power

Weight: 2,535 lb (1,150 kg)

N (RPM)	2700		2600		2500		2400		2300	
inHg	22.1 20.7 19.2		23.6 22.1 20.7 19.2		23.6 22.1 20.7 19.2		23.6 22.1 20.7 19.2		23.6 22.1 20.7	
% BHP	76 69 62		80 74 67 60		79 72 66 59		77 70 64 58		74 68 62	
TAS	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**
	123 118 112	142 136 129	126 122 117 110	145 140 135 126	125 120 115 107	144 139 132 123	124 119 113 105	142 137 130 121	122 117 111	140 135 128
US Gal/hr	11.8 10.7 9.7		12.1 11 9.9 9.1		11.4 10.3 9.7 8.5		10.9 9.9 9 8.3		10.4 9.6 8.7	
Distance (without reserves)	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**
	4.32 5.02 5.34	640 684 715	4.27 4.55 5.25 5.57	646 690 730 749	4.43 5.13 5.32 6.19	677 721 733 777	4.57 5.27 6.00 6.30	702 746 783 786	5.09 5.40 6.12	724 764 792
Distance (with reserves)	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**
	3.58 4.28 4.49	550 587 612	3.53 4.17 4.42 5.08	553 590 624 640	4.07 4.32 4.48 5.26	581 618 624 665	4.19 4.44 5.11 5.35	603 637 668 671	4.29 4.54 5.23	618 652 677

CONDITIONS:

Pressure altitude: 6,000 ft

ISA: 37°F (3°C)

Mixture: Best Power

Weight: 2,535 lb (1,150 kg)

N (RPM)	2700		2600		2500		2400		2300	
inHg	22.1 20.7 19.2		22.1 20.7 19.2		22.1 20.7 19.2		22.1 20.7 19.2		22.1 20.7 19.2	
% BHP	78 71 64		76 69 63		74 68 61		73 66 60		70 64 58	
TAS	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**
	127 122 115	146 140 132	125 120 113	144 139 130	125 119 111	144 137 128	123 119 111	144 137 128	121 115 105	139 132 121
US Gal/hr	12.2 11.1 9.9		11.3 10.3 9.3		10.7 9.7 8.9		10.2 9.3 8.5		9.9 8.9 8.2	
Distance (without reserves)	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**
	4.25 4.52 5.25	643 684 718	4.46 5.14 5.48	687 724 755	5.02 5.33 6.06	721 761 783	5.16 5.48 6.21	746 783 795	5.28 6.00 6.32	761 792 789
Distance (with reserves)	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**
	3.53 4.15 4.42	550 581 612	4.10 4.33 5.00	587 618 640	4.23 4.49 5.16	615 646 665	4.35 5.01 5.28	634 665 671	4.44 5.11 5.37	646 671 668

CONDITIONS:

Pressure altitude: 8,000 ft

ISA: 30°F (-1°C)

Mixture: Best Power

Weight: 2,535 lb (1,150 kg)

N (RPM)	2700		2600		2500		2400		2300	
inHg	20.7 19.2 17.7		20.7 19.2 17.7		20.7 19.2		20.7 19.2		20.7 19.2	
% BHP	74 66 59		72 65 58		70 63		68 62		66 60	
TAS	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**
	125 119 107	144 137 123	124 117 103	143 134 118	122 115	141 132	121 112	139 129	119 109	137 126
US Gal/hr	11.4 10.2 9.3		10.6 9.6 8.7		10 9.1		9.6 8.7		9.2 8.5	
Distance (without reserves)	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**
	4.42 5.15 5.48	677 718 715	5.05 5.37 6.09	727 752 727	5.22 5.55	758 783	5.37 6.10	780 798	5.49 6.22	798 798
Distance (with reserves)	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**
	4.09 4.35 5.02	575 606 603	4.27 4.52 5.18	612 634 615	4.41 5.07	637 659	4.52 5.19	656 671	5.02 5.28	668 671

CONDITIONS:

Pressure altitude: 10,000 ft

ISA: 23°F (-5°C)

Mixture: Best Power

Weight: 2,535 lb (1,150 kg)

N (RPM)	2700		2600		2500		2400		2300	
inHg	19.2 17.7		19.2		19.2		19.2		19.2	
% BHP	68 61		67		65		64		62	
TAS	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**	**KTAS**	**MPH**
	122 110	141 127	120	139	119	137	116	134	113	130
US Gal/hr	10.6 9.5		9.9		9.4		9		8.7	
Distance (without reserves)	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**
	5.06 5.40	718 718	5.28	758	5.45	786	6.00	802	6.10	802
Distance (with reserves)	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**	**H.MIN**	**SM**
	4.30 4.56	603 603	4.47	634	5.01	656	5.11	668	5.20	668

Level flight performance – TB-20

CONDITIONS:

Pressure altitude: 500 ft

ISA: 57.2°F (14°C)

Mixture: Best Power

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
75%	2500 2400 2300 2200	23.6 24.3 25.1 26.0	173	150	174	151	61.3 60.4 59.4 58.5	16.2 15.9 15.7 15.4	40.6 40.0 39.3 38.7	10.7 10.6 10.4 10.2
70%	2500 2400 2300 2200	22.4 23.1 23.8 24.7	168	146	169	147	58.4 57.4 56.5 55.5	15.4 15.2 14.9 14.7	39.7 39.1 38.4 37.8	10.5 10.3 10.1 10.0
65%	2500 2400 2300 2200	21.2 21.9 22.6 23.4	163	142	165	143	55.5 54.5 53.6 52.6	14.7 14.4 14.2 13.9	38.8 38.1 37.5 36.8	10.2 10.1 9.9 9.7
60%	2500 2400 2300 2200	20.1 20.7 21.3 22.1	158	137	159	138	52.5 51.6 50.6 49.7	13.9 13.6 13.4 13.1	38.0 37.3 36.6 35.9	10.0 9.9 9.7 9.5
55%	2500 2400 2300 2200	18.9 19.5 20.1 20.8	152	132	153	133	49.6 48.6 47.7 46.7	13.1 12.8 12.6 12.3	37.2 36.5 35.8 35.0	9.8 9.6 9.5 9.2
50%	2500 2400 2300 2200	17.7 18.3 18.8 19.5	146	127	147	128	46.7 45.7 44.8 43.8	12.3 12.1 11.8 11.6	36.5 35.8 35.0 34.3	9.6 9.5 9.2 9.1

CONDITIONS:

Pressure altitude: 2,500 ft

ISA: 50°F (10°C)

Mixture: Best Power

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
75%	2500 2400 2300 2200	23.0 23.8 24.5 25.4	171	148	177	154	61.3 60.4 59.4 58.5	16.2 15.9 15.7 15.4	39.9 39.2 38.6 38.0	10.5 10.4 10.2 10.0
70%	2500 2400 2300 2200	21.9 22.6 23.3 24.2	166	144	172	150	58.4 57.4 56.5 55.5	15.4 15.2 14.9 14.7	39.0 38.4 37.7 37.1	10.3 10.1 10.0 9.8
65%	2500 2400 2300 2200	20.7 21.4 22.1 22.9	161	140	167	145	55.4 54.5 53.6 52.6	14.6 14.4 14.2 13.9	38.1 37.5 36.8 36.2	10.1 9.9 9.7 9.6
60%	2500 2400 2300 2200	19.6 20.2 20.9 21.6	156	136	162	141	52.5 51.6 50.6 49.7	13.9 13.6 13.4 13.1	37.3 36.6 36.0 35.3	9.9 9.7 9.5 9.3
55%	2500 2400 2300 2200	18.5 19.0 19.6 20.3	150	131	156	136	49.6 48.6 47.7 46.7	13.1 12.8 12.6 12.4	36.6 35.9 35.2 34.5	9.7 9.5 9.3 9.1
50%	2500 2400 2300 2200	17.3 17.8 18.4 19.0	144	125	150	130	46.7 45.7 44.8 43.8	12.3 12.1 11.8 11.6	35.9 35.2 34.4 33.7	9.5 9.3 9.1 8.9

CONDITIONS:

Pressure altitude: 4,500 ft

ISA: 42.8°F (6°C)

Mixture: Best Power

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
75%	2500 2400 2300	22.5 23.2 24.0	168	147	180	157	61.3 60.4 59.4	16.2 16.0 15.7	39.1 38.5 37.9	10.3 10.2 10.0
70%	2500 2400 2300 2200	21.4 22.1 22.8 23.6	164	143	176	153	58.4 57.4 56.5 55.5	15.4 15.2 14.9 14.7	38.3 37.7 37.0 36.4	10.1 10.0 9.8 9.6
65%	2500 2400 2300 2200	20.3 20.9 21.6 22.4	160	139	170	148	55.5 54.5 53.6 52.6	14.7 14.4 14.1 13.9	37.4 36.8 36.2 35.5	9.9 9.7 9.6 9.4
60%	2500 2400 2300 2200	19.2 19.8 20.4 21.1	154	134	165	143	52.5 51.6 50.6 49.7	13.9 13.6 13.4 13.1	36.6 36.0 35.3 34.7	9.7 9.5 9.3 9.2
55%	2500 2400 2300 2200	18.0 18.6 19.2 19.9	149	129	158	138	49.6 48.6 47.7 46.7	13.1 12.9 12.6 12.4	36.0 35.3 34.6 33.9	9.5 9.3 9.1 9.0
50%	2500 2400 2300 2200	16.9 17.4 18.0 18.6	141	123	151	131	46.7 45.7 44.8 43.8	12.3 12.1 11.8 11.6	35.5 34.8 34.1 33.4	9.4 9.2 9.0 8.8

CONDITIONS:

Pressure altitude: 6,500 ft

ISA: 35.6°F (2°C)

Mixture: Best Power

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
75%	2500	22.1	167	145	184	160	61.3	16.2	38.4	10.1
70%	2500 2400 2300	21.0 21.6 22.3	162	141	178	155	58.4 57.4 56.5	15.4 15.2 14.9	37.6 37.0 36.3	9.9 9.8 9.6
65%	2500 2400 2300 2200	19.8 20.5 21.1 21.9	157	137	173	151	55.4 54.5 53.6 52.6	14.6 14.4 14.1 13.9	36.8 36.1 35.5 34.9	9.7 9.5 9.4 9.2
60%	2500 2400 2300 2200	18.7 19.3 19.9 20.6	152	132	168	146	52.5 51.6 50.6 49.7	13.9 13.6 13.4 13.1	36.0 35.4 34.7 34.1	9.5 9.4 9.2 9.0
55%	2500 2400 2300 2200	17.6 18.2 18.8 19.4	146	127	161	140	49.6 48.6 47.7 46.7	13.1 12.9 12.6 12.3	35.4 34.7 34.0 33.3	9.4 9.2 9.0 8.8
50%	2500 2400 2300 2200	16.5 17.0 17.6 18.2	138	120	152	132	46.7 45.7 44.8 43.8	12.3 12.1 11.8 11.6	35.2 34.5 33.8 33.1	9.3 9.1 8.9 8.7

CONDITIONS:

Pressure altitude: 8,500 ft

ISA: 28.4°F (-2°C)

Mixture: Best Power

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
70%	2500	20.5	160	139	182	158	58.4	15.4	36.9	9.7
65%	2500 2400 2300	19.4 20.0 20.7	155	135	176	154	55.5 54.5 53.6	14.7 14.4 14.2	36.1 35.5 34.9	9.5 9.4 9.2
60%	2500 2400 2300 2200	18.3 18.9 19.5 20.2	150	130	170	148	52.5 51.6 50.6 49.7	13.9 13.6 13.4 13.1	35.4 34.8 34.1 33.5	9.4 9.2 9.0 8.8
55%	2500 2400 2300 2200	17.2 17.8 18.3 19.0	144	125	164	143	49.6 48.6 47.7 46.7	13.1 12.9 12.6 12.4	34.8 34.1 33.4 32.8	9.2 9.0 8.8 8.7

CONDITIONS:

Pressure altitude: 10,500 ft

ISA: 21.2°F (-6°C)

Mixture: Best Power

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	Kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
65%	2500	19.0	153	133	180	156	55.5	14.7	35.5	9.4
60%	2500 2400 2300	17.9 18.5 19.1	148	129	173	151	52.5 51.6 50.6	13.9 13.6 13.4	34.8 34.2 33.6	9.2 9.0 8.9
55%	2500 2400 2300 2200	16.8 17.4 17.9 18.6	142	123	166	144	49.6 48.6 47.7 46.7	13.1 12.8 12.6 12.3	34.4 33.7 33.1 32.4	9.1 8.9 8.7 8.6

CONDITIONS:

Pressure altitude: 12,500 ft

ISA: 14.6°F (-10°C)

Mixture: Best Power

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	Kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
60%	2500 2400	17.5 18.1	146	127	176	154	52.5 51.6	13.9 13.6	34.2 33.6	9.0 8.9
55%	2500 2400 2300	16.5 17.0 17.6	138	120	168	146	49.6 48.6 47.7	13.1 12.9 12.6	34.0 33.4 32.7	9.0 8.8 8.6

CONDITIONS:

Pressure altitude: 500 ft

ISA: 57.2°F (14°C)

Mixture: Best Economy

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
75%	2500 2400 2300 2200	23.6 24.3 25.1 26.0	169	147	170	148	52.8 51.8 50.9 50.0	14.0 13.7 13.5 13.2	35.6 35.0 34.4 33.7	9.4 9.2 9.1 8.9
70%	2500 2400 2300 2200	22.4 23.1 23.8 24.7	165	143	166	144	50.3 49.4 48.5 47.5	13.3 13.1 12.8 12.6	34.9 34.2 33.6 32.9	9.2 9.0 8.9 8.7
65%	2500 2400 2300 2200	21.2 21.9 22.6 23.4	160	139	161	140	47.9 46.9 46.0 45.0	12.7 12.4 12.1 11.9	34.2 33.5 32.8 32.2	9.0 8.8 8.7 8.5
60%	2500 2400 2300 2200	20.1 20.7 21.3 22.1	155	135	156	136	45.4 44.5 43.5 42.6	12.0 11.8 11.5 11.3	33.5 32.8 32.1 31.4	8.8 8.7 8.5 8.3
55%	2500 2400 2300 2200	18.9 19.5 20.1 20.8	149	129	150	130	43.0 42.0 41.1 40.1	11.4 11.1 10.8 10.6	33.0 32.2 31.5 30.8	8.7 8.5 8.3 8.1
50%	2500 2400 2300 2200	17.7 18.3 18.8 19.5	142	123	143	124	40.5 39.6 38.6 37.7	10.7 10.4 10.2 9.9	32.6 31.8 31.1 30.3	8.6 8.4 8.2 8.0

CONDITIONS:

Pressure altitude: 2,500 ft

ISA: 50°F (10°C)

Mixture: Best Economy

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
75%	2500 2400 2300 2200	23.0 23.8 24.5 25.4	167	145	174	151	52.8 51.9 50.9 50.0	13.9 13.7 13.5 13.2	35.0 34.4 33.7 33.1	9.2 9.1 8.9 8.7
70%	2500 2400 2300 2200	21.9 22.6 23.3 24.2	163	142	169	147	50.4 49.4 48.5 47.5	13.3 13.1 12.8 12.6	34.3 33.6 33.0 32.3	9.1 8.9 8.7 8.5
65%	2500 2400 2300 2200	20.7 21.4 22.1 22.9	158	137	143	143	47.9 46.9 46.0 45.1	12.7 12.4 12.2 11.9	33.6 32.9 32.3 31.6	8.9 8.7 8.5 8.3
60%	2500 2400 2300 2200	19.6 20.2 20.9 21.6	153	133	158	138	45.4 44.5 43.5 42.6	12.0 11.8 11.5 11.2	33.0 32.3 31.6 30.9	8.7 8.5 8.3 8.2
55%	2500 2400 2300 2200	18.5 19.0 19.6 20.3	147	128	152	133	43.0 42.0 41.1 40.1	11.4 11.1 10.9 10.6	32.4 31.7 31.0 30.3	8.6 8.4 8.2 8.0
50%	2500 2400 2300 2200	17.3 17.8 18.4 19.0	139	121	145	126	40.5 39.5 38.6 37.7	10.7 10.4 10.2 10.0	32.1 31.4 30.6 29.9	8.5 8.3 8.1 7.9

CONDITIONS:

Pressure altitude: 4,500 ft

ISA: 42.8°F (6°C)

Mixture: Best Economy

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
75%	2500 2400 2300	22.5 23.2 24.0	165	144	177	154	52.8 51.9 50.9	13.9 13.7 13.4	34.4 33.7 33.1	9.1 8.9 8.7
70%	2500 2400 2300 2200	21.4 22.1 22.8 23.6	161	140	172	150	50.3 49.4 48.5 47.5	13.3 13.0 12.8 12.6	33.7 33.0 32.4 31.8	8.9 8.7 8.6 8.4
65%	2500 2400 2300 2200	20.3 20.9 21.6 22.4	156	136	167	145	47.9 46.9 46.0 45.0	12.7 12.4 12.2 11.9	33.0 32.3 32.4 31.8	8.7 8.5 8.4 8.2
60%	2500 2400 2300 2200	19.2 19.8 20.4 21.1	151	131	161	140	45.4 44.5 43.5 42.6	12.0 11.8 11.5 11.3	33.0 32.3 31.7 31.0	8.6 8.4 8.2 8.0
55%	2500 2400 2300 2200	18.0 18.6 19.2 19.9	145	126	155	135	43.0 42.0 41.1 40.1	11.4 11.1 10.8 10.6	31.9 31.2 30.5 29.8	8.4 8.2 8.1 7.9
50%	2500 2400 2300 2200	16.9 17.4 18.0 18.6	137	119	146	127	40.5 39.6 38.6 37.7	10.7 10.5 10.2 10.0	31.9 31.1 30.4 29.6	8.4 8.2 8.0 7.8

CONDITIONS:

Pressure altitude: 6,500 ft

ISA: 35.6°F (2°C)

Mixture: Best Economy

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
75%	2500	22.1	163	142	180	157	52.8	14.0	33.7	8.9
70%	2500 2400 2300	21.0 21.6 22.3	159	138	175	152	50.3 49.4 48.4	13.3 13.1 12.8	33.1 32.4 31.8	8.7 8.6 8.4
65%	2500 2400 2300 2200	19.8 20.5 21.1 21.9	154	134	170	148	47.9 46.9 46.0 45.0	12.7 12.4 12.2 11.9	32.4 31.8 31.2 30.5	8.6 8.4 8.2 8.1
60%	2500 2400 2300 2200	18.7 19.3 19.9 20.6	149	129	164	142	45.4 44.5 43.5 42.6	12.0 11.8 11.5 11.2	31.9 31.2 30.6 29.9	8.4 8.2 8.1 7.9
55%	2500 2400 2300 2200	17.6 18.2 18.8 19.4	142	124	157	136	43.0 42.0 41.1 40.1	11.4 11.1 10.8 10.6	31.5 30.8 30.1 29.4	8.3 8.1 7.9 7.8
50%	2500 2400 2300 2200	16.5 17.0 17.6 18.2	134	116	147	128	40.5 39.6 38.6 37.7	10.7 10.5 10.2 10.0	31.7 30.9 30.2 29.4	8.4 8.2 8.0 7.8

CONDITIONS:

Pressure altitude: 8,500 ft

ISA: 28.4°F (-2°C)

Mixture: Best Economy

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
70%	2500	20.5	157	136	178	155	50.3	13.3	32.5	8.6
65%	2500 2400 2300	19.4 20.0 20.7	152	132	173	150	47.9 46.9 46.0	12.6 12.4 12.1	31.9 31.2 30.6	8.4 8.2 8.1
60%	2500 2400 2300 2200	18.3 18.9 19.5 20.2	146	127	167	145	45.4 44.5 43.5 42.6	12.0 11.7 11.5 11.3	31.3 30.7 30.0 29.4	8.3 8.1 7.9 7.8
55%	2500 2400 2300 2200	17.2 17.8 18.3 19.0	140	122	159	138	43.0 42.0 41.1 40.1	11.4 11.1 10.9 10.6	31.0 30.4 29.7 29.0	8.2 8.0 7.8 7.7

CONDITIONS:

Pressure altitude: 10,500 ft

ISA: 21.2°F (-6°C)

Mixture: Best Economy

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
65%	2500	19.0	150	130	176	153	47.9	12.6	31.3	8.3
60%	2500 2400 2300	17.9 18.5 19.1	144	125	169	147	45.4 44.5 43.5	12.0 11.7 11.5	30.9 30.2 29.6	8.2 8.0 7.8
55%	2500 2400 2300 2200	16.8 17.4 17.9 18.6	137	119	161	140	43.0 42.0 41.1 40.1	11.3 11.1 10.9 10.6	30.8 30.1 29.4 28.7	8.1 7.9 7.8 7.6

CONDITIONS:

Pressure altitude: 12,500 ft

ISA: 14.6°F (-10°C)

Mixture: Best Economy

Weight: 2,943 lb (1,335 kg)

% BHP	N RPM	PA inHg	CAS		TAS		Mixture Adjusting		Specific Consumption	
			MPH	kt	MPH	kt	l/h	US Gal/hr	l/100 NM	US gal/100 NM
60%	2500 2400	17.5 18.1	142	123	171	149	45.4 44.5	12.0 11.7	30.4 29.8	8.0 7.9
55%	2500 2400 2300	16.5 17.0 17.6	134	116	162	141	43.0 42.0 41.1	11.4 11.1 10.9	30.5 29.9 29.2	8.1 7.9 7.7

Landing performance – TB-10

CONDITIONS:

IAS – clear 50 ft: 72 KIAS / 83 MPH

Weight: 2,407 lb / 1,092 kg

Flaps: Landing position (25°)

Runway: Dry

Temperature	Distance	Pressure altitude (ft)				
		0	2000	4000	6000	8000
ISA -20°C	Roll (ft)	560	610	660	715	765
	Clear 50ft (ft)	1275	1355	1440	1545	1665
ISA	Roll (ft)	610	660	715	765	830
	Clear 50ft (ft)	1360	1460	1545	1665	1765
ISA +15°C	Roll (ft)	650	695	745	815	880
	Clear 50ft (ft)	1425	1525	1630	1730	1835

CONDITIONS:

IAS – clear 50 ft: 73 KIAS / 84 MPH

Weight: 2,535 lb / 1,150 kg

Flaps: Landing position (25°)

Runway: Dry

Temperature	Distance	Pressure altitude (ft)				
		0	2000	4000	6000	8000
ISA -20°C	Roll (ft)	591	640	689	738	787
	Clear 50ft (ft)	1345	1427	1526	1624	1739
ISA	Roll (ft)	640	689	738	787	886
	Clear 50ft (ft)	1427	1542	1624	1739	1870
ISA +15°C	Roll (ft)	673	722	771	869	935
	Clear 50ft (ft)	1509	1608	1706	1821	1936

Landing performance – TB-20

CONDITIONS:

IAS – clear 50 ft: 67.5 KIAS / 78 MPH

Weight: 2,370 lb / 1,075 kg

Flaps: Landing position (40°)

Runway: Dry

Temperature	Distance	Pressure altitude (ft)					
		0	2000	4000	6000	8000	10000
ISA -20°C	Roll (ft)	675	710	755	800	855	905
	Clear 50ft (ft)	1420	1495	1570	1650	1740	1905
ISA	Roll (ft)	720	765	810	865	920	980
	Clear 50ft (ft)	1515	1590	1675	1760	1855	1975
ISA +15°C	Roll (ft)	770	820	870	930	985	1055
	Clear 50ft (ft)	1610	1690	1780	1875	1980	2095

CONDITIONS:

IAS – clear 50 ft: 76 KIAS / 88 MPH

Weight: 3,086 lb / 1,400 kg

Flaps: Landing position (40°)

Runway: Dry

Temperature	Distance	Pressure altitude (ft)					
		0	2000	4000	6000	8000	10000
ISA -20°C	Roll (ft)	770	815	865	915	980	1040
	Clear 50ft (ft)	1713	1800	1895	1995	2110	2235
ISA	Roll (ft)	825	875	930	985	1050	1115
	Clear 50ft (ft)	1820	1920	2015	2120	2245	2380
ISA +15°C	Roll (ft)	885	940	995	1055	1130	1200
	Clear 50ft (ft)	1945	2045	2145	2255	2390	2535

PANEL GUIDE

EFB 2D pop-out

The EFB 2D pop-out arrow appears in the top left corner of the screen every time you load the TB-10/TB-20:



Left-click on this arrow to open the 2D EFB pop-out.

This icon can easily be faded out and hidden completely by hovering your mouse over it and moving the scroll wheel. It will re-appear for the next flight.

Please see the dedicated EFB Manual for further details of EFB operation.



Automatic fuel selector

The TB-10 and TB-20 are capable of flying for several hours so we have included an automatic fuel selector switcher, allowing you to leave your PC for prolonged periods without risking a fuel imbalance.

This system will automatically switch selected fuel tanks every twenty minutes.

The automatic fuel selector can be enabled/disabled using the AUTO FUEL SELECTOR option in the EFB's Engine Config app (see the dedicated EFB Manual).

Left panel



1. Advisory panel
2. Marker lights
3. Emergency radio beacon switch
4. Interior lighting controls
5. Airspeed indicator (ASI) – a true airspeed indicator is incorporated into the airspeed indicator. The true airspeed indicator consists of a rotatable ring which is controlled using the knob located below the ASI. To set the indicator, rotate the ring until the pressure altitude is aligned with the outside air temperature (OAT). To obtain the pressure altitude, set the barometric scale of the altimeter to 29.92 inHg / 1013.2 hPa and then read the pressure altitude. With the ring set, the true airspeed can be read along the bottom scale.
6. Turn and bank indicator
7. Attitude indicator (AI)
8. Horizontal situation indicator (HSI) – driven by GNS 430 (or RealityXP GTN if installed). Press in the OBS knob to sync the heading to the plane's magnetic heading.
9. Altimeter
10. Vertical speed indicator (VSI)
11. VOR/ILS indicator – driven by GNC 255

12. ADF indicator – driven by KR 87 ADF system
13. Magneto/start selector
14. Emergency landing gear control (TB-20 only)
15. Alternate static source valve
16. Standby vacuum control
17. Vacuum gauge
18. Parking brake knob
19. Yoke toggle clickspot
20. NAV/GPS toggle button
21. GPS annunciator lights
22. Electrical attitude indicator (AI) power switch
23. Radio master switch
24. Autopilot power switch
25. DME NAV 1 / NAV 2 selector – selects whether the GNS 430 or GNC 255 is used as the input to the KN 62
26. Landing gear position indicator lights (TB-20 only)
27. Landing gear lever (TB-20 only)
28. Alternator air control (TB-20 only)

Advisory panel



The advisory panel contains separate indicator lights which illuminate green, amber or red when a specific condition occurs in the associated aircraft system.

- A green light is illuminated to indicate a normal or safe condition in the system.
- An illuminated amber lamp indicates that a cautionary condition exists, but which may not require immediate corrective action.
- A red light illuminates when a hazardous condition exists which requires immediate corrective action.

A day/night switch is installed in the centre of the advisory panel and can be used to control the intensity of the green indicator lights and of the GPS annunciators.

1. Vacuum system
2. Alternator
3. Fuel selector
4. Parking brake
5. Oil pressure
6. Indicator lights test button
7. Day/night toggle switch
8. Fuel pump
9. Pitot heat
10. Taxi light
11. Landing light

Circuit breaker panel



The electrical equipment circuit breakers are located on a separate panel mounted on the left cabin sidewall, adjacent to the pilot.

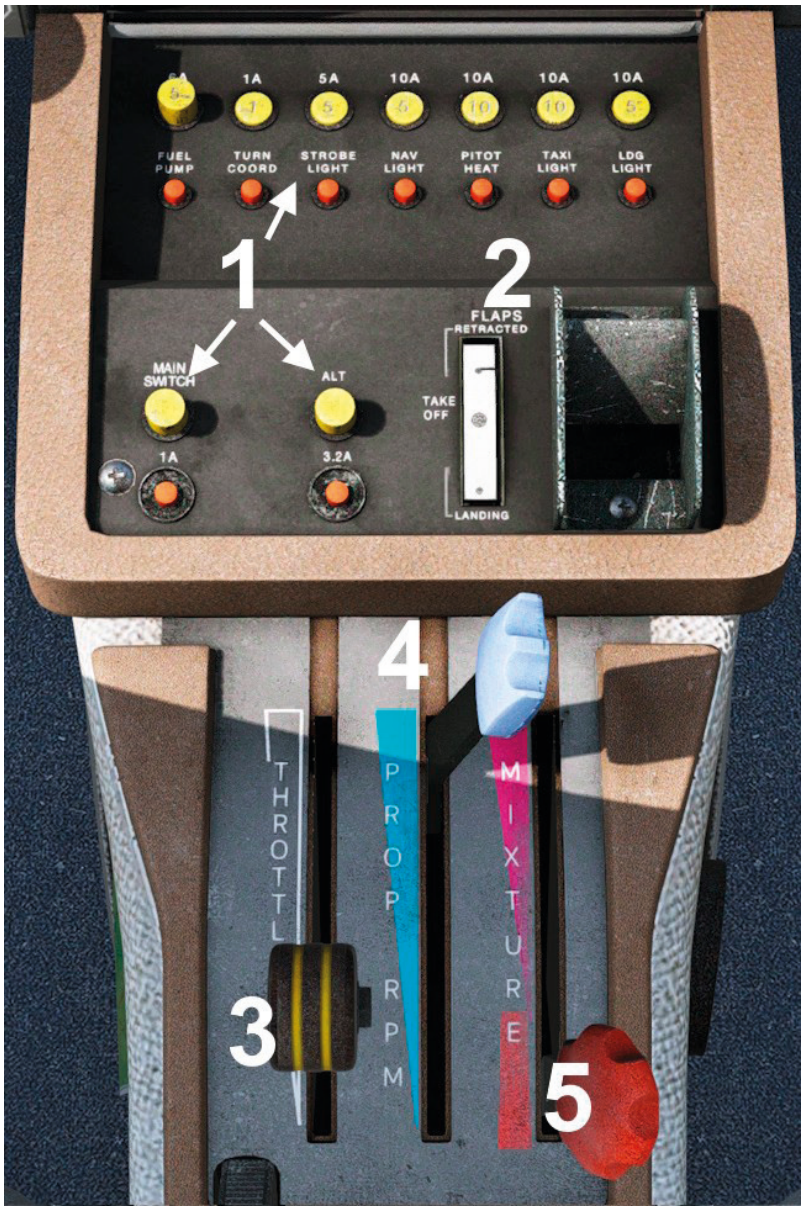
The landing gear (LDG GEAR) circuit breaker is only fitted to the TB-20.

Centre console



1. Oil temperature indicator
2. Oil pressure indicator
3. Fuel tank quantity indicators
4. Voltmeter
5. KMA 24H audio control unit
6. GNS 430 GPS / COM 1 / NAV 1 unit (or RealityXP GTN)
7. GNC 255 COM 2 / NAV 2 unit
8. KN 62A DME unit
9. KAP 150 autopilot unit
10. GTX 330 transponder unit
11. Checklist

Pedestal



1. Switch breakers
2. Flap control and indicator
3. Throttle lever
4. Propeller lever
5. Mixture lever



6. Pitch trim control wheel
7. Stabilator tab position indicator
8. Rudder trim control knob
9. Fuel selector knob

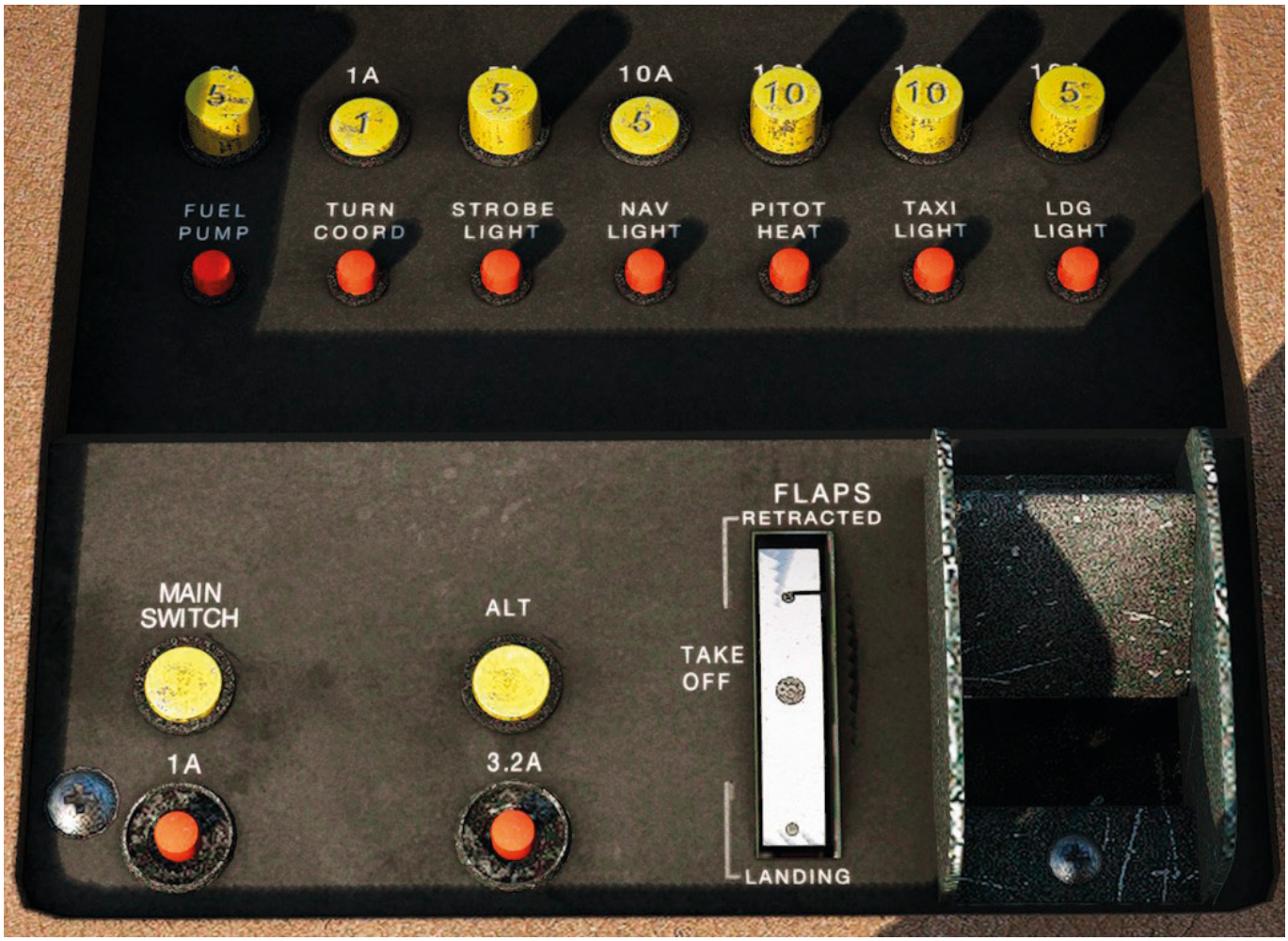
The TB-10 is also fitted with a carburettor heat lever which is located to the left of the throttle lever.

A pointer indicator on the right of the trim control wheel gives the anti-tab position. Forward rotation of the control wheel will trim nose-down and rearward rotation will trim nose-up.

Rudder trimming is accomplished by rotating a control knob, which in turn actuates the rudder tab. Rotating the control knob anti-clockwise will trim nose left and rotating it clockwise will trim nose right.



Switch breaker panel



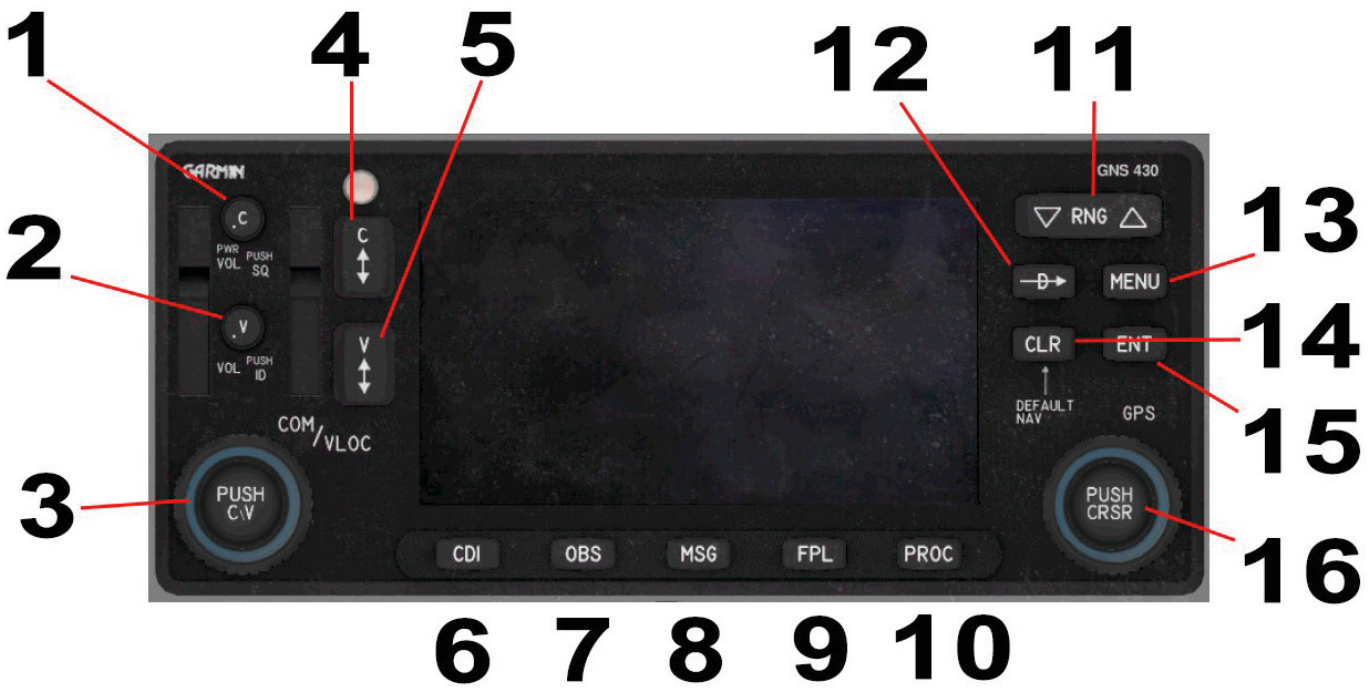
The general electrical equipment switch breakers are located on the front part of the centre pedestal. Co-located red buttons can be pushed to open the switch breakers.

Right panel



1. Tachometer (RPM)
2. Manifold pressure (inHg) and fuel flow / fuel pressure (gallons per hour / PSI)
3. Attitude indicator (AI)
4. Stormscope
5. Altimeter
6. Emergency Locator Transmitter (ELT) switch
7. Cylinder Head Temperature (CHT) and Exhaust Gas Temperature (EGT)
8. M377C outside air temperature (OAT) indicator
9. VDO hour meter
10. KR 87 ADF receiver
11. TKS ice protection
12. Cabin air controls
13. Compass slaving controls

GNS 430 – COM 1 / NAV 1 / GPS



1. Power and COM volume knob
2. VLOC volume knob
3. Left outer and inner knobs
4. COM frequency transfer button
5. VLOC frequency transfer button
6. CDI button
7. OBS button
8. MSG button
9. Flight plan (FPL) button
10. Procedures (PROC) button
11. Range buttons
12. Direct-to button
13. Menu button
14. Clear button
15. Enter button
16. Right outer and inner knobs

Rotate the power knob to switch on the GNS 430 unit.

Rotate the left outer knob to change the frequency in 1MHz increments and rotate the left inner knob to change the values in 25kHz increments. Toggle between changing the COM and VLOC (NAV) standby frequency by pressing the centre of the left inner knob.

Swap the COM active and standby frequencies by pressing the COM frequency transfer button. Swap the VLOC (NAV) active and standby frequencies by pressing the VLOC frequency transfer button.

Detailed instructions can be found in ‘X-Plane 12/Instructions/X-Plane G430 Manual.pdf’.

GNC 255 – COM 2 / NAV 2



1. Power and COM volume knob – rotate the knob clockwise to power on the unit and rotate it anti-clockwise to power off the unit. Once the unit is powered on, rotating the knob will adjust the COM volume.
2. NAV volume knob – rotate the knob to adjust the NAV volume
3. Frequency monitor button – engages the monitor function, allowing the standby frequency to be monitored whilst listening to the active frequency. This has no function due to limitations in the simulator.
4. COM or NAV frequency selection button – swaps between COM and NAV (VLOC) radio modes
5. Function selection button – accesses function categories for the COM/NAV radios and timer. Pressing the FUNC key once displays the function mode and pressing it again exits the function mode. Only the Count Up timer function is available.
6. Clear data button – erases information, cancels entries and resets timers
7. Enter button – saves selected values and confirms prompts
8. Outer and inner knobs – used for tuning frequencies and data entry
9. Frequency transfer button – swaps the active (left) and standby (right) frequency

The GNC 255 is a COM/NAV radio and acts as COM 2 / NAV 2 in the TB-20. In addition to active and standby communication and navigation frequencies, it also has a built-in timer function.

COM radio

Selecting a COM frequency

New frequencies are first selected as a standby frequency and then toggled to the active side using the FLIP/FLOP key. The standby frequency can be adjusted using the outer and inner knobs to select the desired frequency.

1. Press C/N to select the COM radio function.
2. Turn the outer knob to change the values in 1MHz increments.
3. Turn the inner knob to change the values in 25kHz increments.
4. Press the FLIP/FLOP key to toggle the standby frequency to the active frequency.

NAV radio

Selecting a NAV frequency

The selection of NAV frequencies is the same as for the COM frequencies.

1. Press the C/N key to reach the NAV radio function. The NAV annunciator on the top line of the display will appear.
2. Turn the outer knob to change the MHz values.
3. Turn the inner knob to change the kHz values.
4. Press the FLIP/FLOP key to toggle the standby frequency to the active frequency.

Listening to the NAV audio channel

NAV ident can be heard by turning on the NAV 2 button on the KMA 24H audio selector panel.

Functions

Press the FUNC key to show the functions menu. This menu provides access to the Timer (TMR) configuration menus:

- TMR Configuration
  - o Count Up – Count Up timer

Rotate the outer knob and then press the ENT key to select a menu (e.g. TMR Configuration). Rotate the inner knob and then press the ENT key to select a menu entry (e.g. Count Up).

Timers

The GNC 255 has a Count Up timer, which is shown in the right of the COM/NAV displays.

Setting up the Count Up timer

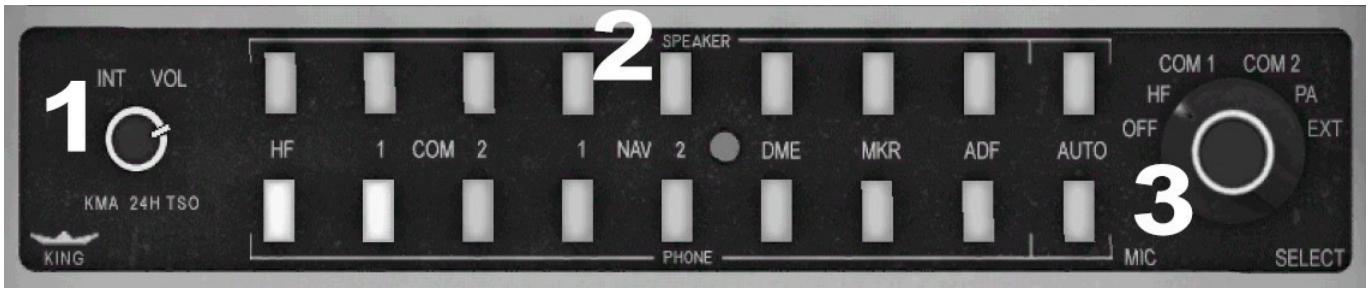


1. Minutes
2. Seconds

To set up the Count Up timer:

1. Press FUNC.
2. Turn the outer knob to TMR CONFIGURATION.
3. Press ENT.
4. Turn the inner knob to COUNT UP.
5. Press ENT.
6. Press the ENT key to start the timer.
7. Press the ENT key again to stop the timer.
8. Press CLR to reset the timer to 0:00 and stop counting.

KMA 24H – audio selector



1. Power knob – controls power to the unit
2. Audio select buttons – control receiver audio selections
3. Microphone selector knob – connects the microphone to the selected output

The KMA 24H is an audio control system which provides control over transceiver and receiver outputs through the use of selector switches. The simulator doesn't allow for separate speaker and headphone outputs so both buttons perform the same function. The buttons will illuminate when they are selected on.

The COM 1 and COM 2 switches are used to toggle the COM 1 and COM 2 transceiver audio, allowing you to select COM 1 and/or COM 2 as the audio sources to monitor.

The NAV, DME, MKR and ADF switches are used to toggle the associated audio sources.

When the AUTO switch is placed in either the SPEAKER or the PHONE position, the unit will automatically match the corresponding receiver audio with the selected transmitter. For example, with COM 1 selected on the microphone selector knob, the COM 1 audio source will be automatically enabled.

The microphone selector knob connects the microphone to the selected output.

KN 62A – DME



1. Three-position function switch – determines the information that is displayed and the channelling source.

   On the Frequency (FREQ) setting, the unit can be channelled internally.

   On the Groundspeed/Time-to-Station (GS/T) setting, the unit holds the internally selected frequency and also displays distance, groundspeed and time-to-station information.

   On the Remote (RMT) setting, the DME is channelled when you select your NAV frequency on the NAV 1 receiver (GNS 430) and displays distance, groundspeed and time-to-station.
2. ON/OFF switch – controls power to the unit. The KN 62A should be powered on only after engine start-up and should be turned off prior to engine shutdown.
3. Frequency selector knobs – used to alter the internally selected frequency. With the inner knob pushed in, it changes the 0.1MHz digit (0.0, 0.1, 0.2 etc.). With the inner knob pulled out, it adds 0.05MHz to the frequency and tunes the frequency in 0.1MHz steps (0.05, 0.15, 0.25 etc.). Turning the outer knob changes the larger digits (1MHz, 10MHz etc.).

The KN 62A is a Distance Measuring Equipment (DME) system. It can be channelled remotely through the NAV 1 receiver (GNS 430) or the NAV 2 receiver (GNC 255), depending on the position of the DME selector switch, or tuned directly with its own frequency selection knobs. This dual channelling compatibility makes two DME frequencies available to you at all times, allowing for DME holds.

Frequency mode



In this mode the DME displays distance and the internally selected frequency. You can alter the frequency using the frequency knobs.

Groundspeed/Time-to-Station mode



In this position the DME holds the internally selected frequency while displaying distance, groundspeed and time-to-station. A ‘frequency hold’ feature prevents you from accidentally altering the frequency when it isn’t displayed.

Remote mode



With remote mode selected, the DME uses the frequency that is selected on the NAV 1 receiver (GNS 430) or the NAV 2 receiver (GNC 255), depending on the position of the DME selector switch. Distance, groundspeed and time-to-station is shown. Dashes will be displayed when there is no valid signal.

GTX 330 – transponder



1. Mode selection buttons
2. Identification (IDENT) button
3. VFR button
4. Function (FUNC) button
5. Start/stop button
6. Cursor (CRSR) button
7. Clear (CLR) button
8. Number buttons

The GTX 330 is a Mode S transponder. It also features several other functions such as an altitude monitor, flight timer and outside air temperature (OAT) display.

The unit is powered on by pressing the ON key. After the unit is powered on, a start-up page is displayed while it performs a self-test.

Mode selection keys

OFF – powers off the GTX 330. Pressing the STBY, ON or ALT key powers on the transponder, displaying the last active identification code.

STBY – selects the standby mode. When in standby mode, the transponder will not reply to any interrogations.

ON – selects Mode A. In this mode the transponder replies to interrogations, as indicated by the reply symbol (R).

ALT – selects Mode A and Mode C. In ALT mode the transponder replies to identification and altitude interrogations as indicated by the reply symbol (R).

Code selection

The transponder code is inputted using the 0-7 numeric keys. Pushing these keys begins the code selection sequence. The new code is not activated until the fourth digit is entered.

Pressing the CLR key moves the cursor back to the previous digit. Pressing the CLR key when the cursor is on the first digit of the code, or pressing the CRSR key during code entry, removes the cursor and cancels data entry, restoring the previous code.

You can press the CLR key up to five seconds after code entry is complete to return the cursor to the fourth digit. The numbers 8 and 9 are not used for code entry, only for entering a Count Down time.

Important codes

1200 – VFR code used in North America

7000 – VFR code used in Europe

7500 – Hijack code

7600 – Loss of communications

7700 – Emergency

Keys for other GTX 330 functions

IDENT – pressing the IDENT key activates the 'special position identification' pulse for 18 seconds, identifying your transponder return to an ATC unit. The word 'IDENT' will appear in the upper left corner of the display while the IDENT mode is active.

VFR – sets the transponder code to the VFR code (7000). Pressing the VFR key again restores the previous identification code.

FUNC – changes the page shown on the right side of the display. Display data includes Pressure Altitude, Flight Time, Altitude Monitor, Count Up and Count Down timers.

START/STOP – starts and stops the Altitude Monitor, Count Up, Count Down and Flight timers.

CRSR – initiates starting time entry for the Count Down timer and cancels transponder code entry.

CLR – resets the Count Up, Count Down and Flight timers. Cancels the previous keypress during code selection and Count Down entry. Returns cursor to the fourth code digit within five seconds after entry.

8 – Enters the number eight into the Count Down timer.

9 – Enters the number nine into the Count Down timer.

Function display

PRESSURE ALT – displays the altitude data supplied to the GTX 330 in hundreds of feet (i.e. flight level).

FLIGHT TIME – timer start is either manual or automatic. It can be manually controlled using the START/STOP and CLR keys. When in automatic mode, the timer begins when take-off is sensed.

ALTITUDE MONITOR – controlled by the START/STOP key. Activates a voice alarm and warning annunciator when the altitude limit is exceeded.

OAT/DALT – displays the outside air temperature (OAT) and density altitude.

COUNT UP TIMER – controlled by the START/STOP and CLR keys.

COUNT DOWN TIMER – controlled by START/STOP, CLR and CRSR keys. The initial Count Down time is entered with the 0-9 keys.

Altitude trend indicator

When the PRESSURE ALT page is displayed, an arrow will be displayed to the right of the altitude, indicating that the altitude is increasing or decreasing. One of two sizes of arrows may be displayed, depending on the vertical speed rate.

Timer operation

To operate the **Flight** timer:

1. Press the FUNC key until ‘FLIGHT TIME’ is displayed.
2. The timer begins automatically when the unit senses that the aircraft has become airborne, or it may be controlled manually.
3. If desired, you can press the START/STOP key to pause or restart the timer.
4. Press CLR to reset the timer to zero.
5. The timer will stop automatically once the aircraft is on the ground.

To operate the **Count Up** timer:

1. Press the FUNC key until ‘COUNT UP’ is displayed.
2. If necessary, press CLR to reset the Count Up timer to zero.
3. Press START/STOP to begin count up.
4. Press START/STOP again to pause the timer.
5. Press CLR to reset the timer to zero.

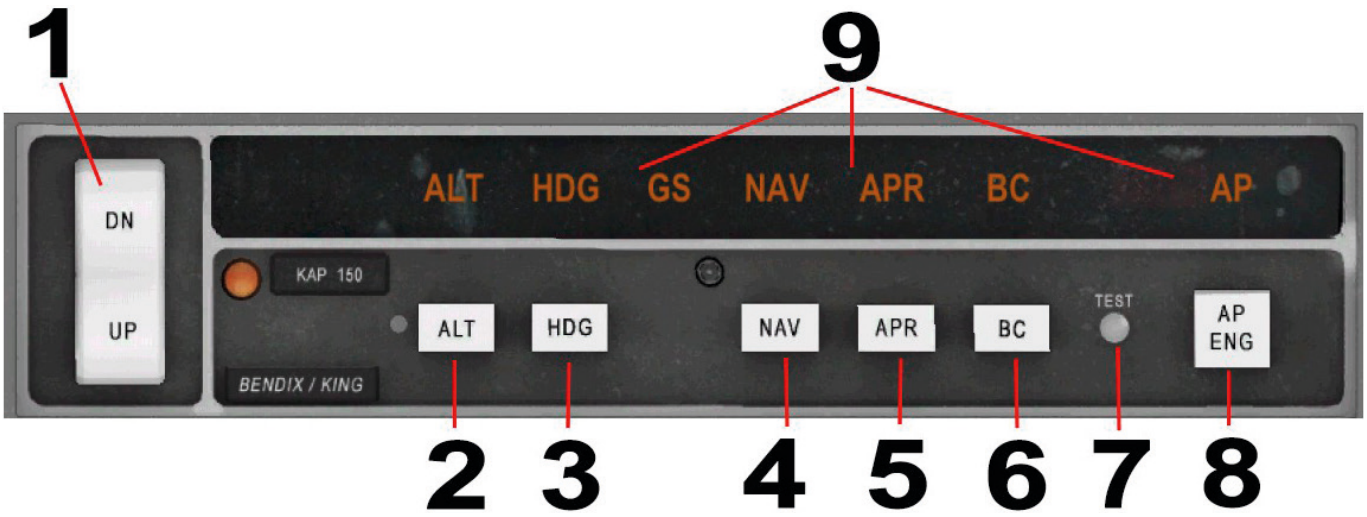
To operate the **Count Down** timer:

1. Press the FUNC key until ‘COUNT DOWN’ is displayed.
2. Press CRSR and use the 0-9 keys to set the initial time. All digits must be entered (use the 0 key to enter leading zeros).
3. Press START/STOP to begin count down.
4. Press START/STOP again to pause the timer.
5. When the Count Down timer expires, the ‘COUNT DOWN’ banner is replaced with a flashing ‘EXPIRED’, and the time begins counting up.
6. Press CLR to reset the timer to the initial value.

Automatic ALT/GND mode switching

Normal operation of the transponder begins when take-off is sensed. When the aircraft is on the ground the screen automatically displays GND. The transponder does not respond to ATC interrogations when GND is annunciated.

KAP 150 – autopilot



1. Vertical trim button – allows you to adjust aircraft pitch or altitude
2. Altitude hold button – press to engage/disengage altitude hold mode
3. Heading select button – press to engage/disengage heading select mode
4. Navigation hold button – press to engage/disengage navigation hold mode
5. Approach hold button – press to engage/disengage approach hold mode
6. Back course button – press to engage/disengage back course hold mode
7. Self-test button – non-functional in this simulation
8. Autopilot engage button – press to engage/disengage the autopilot
9. Mode annunciators – illuminate to show which autopilot modes are engaged. The ‘TRIM’ annunciator illuminates when a trim failure is detected and during the self-test process.

The KAP 150 is a digital autopilot. It is a highly capable two-axis autopilot without a flight director.

Autopilot mode

The autopilot provides two-axis (pitch and roll) stabilisation and automatic elevator trim, as well as automatic response to all selected autopilot modes.

On initial engagement, with no other autopilot modes selected, the KAP 150 will maintain the existing aircraft pitch attitude and fly the aircraft wings level.

Whenever the autopilot is disengaged the ‘AP’ legend will flash and an aural tone will sound to alert the pilot.

Heading select (HDG) mode

In the heading mode the autopilot will intercept and fly the heading selected by the HSI bug.



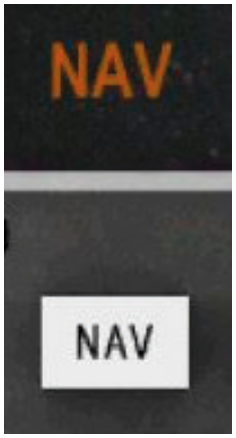


To operate in the heading select mode:

1. Move the heading bug to the desired heading on the HSI.
2. Press the HDG button on the KAP 150 to engage heading select mode.
3. The autopilot will turn the aircraft to intercept and fly the heading.
4. If you move the heading bug again while heading select mode is engaged, the autopilot will immediately turn the aircraft in the direction of the newly selected heading.

Navigation (NAV) hold mode

In the navigation (NAV) mode the autopilot intercepts and tracks VOR and GPS courses. The NAV/GPS toggle button allows you to switch between the two navigation sources.



Tracking a VOR (with the KAP 150 currently in HDG mode):

1. Tune the frequency for the selected VOR station into the GNS 430 (NAV 1).
2. Set the desired course on the HSI.
3. Establish the desired intercept angle by setting the heading bug on the intercept heading and then activate HDG mode (the ‘HDG’ light will illuminate).
4. Press the NAV button on the KAP 150. The HDG light will remain illuminated and the NAV light will flash to signify that NAV mode is armed.

Note: *If NAV mode is selected with the aircraft within 2-3 dots of course deviation, NAV arm mode will be bypassed and NAV mode will engage directly.*

5. The autopilot will continue to fly on the selected heading until it intercepts the desired course. Once within the capture zone, the autopilot will turn to fly the desired course. The capture point will vary depending on the angle of intercept and the rate of change of the VOR radials.
6. The HDG light will extinguish and the NAV light will remain lit.

Approach (APR) hold mode

The approach (APR) mode allows the autopilot to intercept and track ILS (localiser and glideslope).



To operate in the APR mode (with the KAP 150 currently in HDG mode):

1. Tune the frequency for the selected ILS into the GNS 430 (NAV 1).
2. Set the course on the HSI to the final approach course.
3. Establish the desired intercept angle by setting the heading bug on the intercept heading and then activate HDG mode (the 'HDG' light will illuminate).
4. Press the APR button on the KAP 150. The HDG light will remain illuminated and the APR light will flash to signify that the APR mode is armed.

Note: *If the APR mode is selected with the aircraft within 2-3 dots of course deviation, APR arm mode will be bypassed and APR mode will engage directly.*

5. The autopilot will continue to fly on the selected heading until it intercepts the localiser. Once within the capture zone, the autopilot will turn to fly the desired course. The capture point will vary depending on the angle of intercept and the rate of change of the VOR radials.
6. The HDG light will extinguish and the APR light will remain lit.
7. Once localiser course capture has occurred, glideslope mode is armed. Automatic capture occurs as the aircraft approaches the glideslope. When the intercept occurs, the GS light will illuminate. The autopilot will maintain the glideslope with pitch corrections. If altitude hold (ALT) mode has been engaged prior to GS capture, it will disengage at capture and the ALT light will extinguish.

Back course (BC) hold mode

The back course (BC) mode allows the autopilot to intercept and track a reverse course ILS.



To operate in the BC mode (with the KAP 150 currently in HDG mode):

1. Tune the frequency for the selected ILS back course into the GNS 430 (NAV 1).
2. Set the course on the HSI to the final approach course. The ILS front course must be set even though you will be flying a reciprocal heading on an ILS back course approach.
3. Establish the desired intercept angle by setting the heading bug on the intercept heading and then activate HDG mode (the 'HDG' light will illuminate).
4. Press the BC button on the KAP 150. The HDG light will remain illuminated, the BC will illuminate and the APR light will flash to signify that the APR mode is armed.

Note: *If the BC APR mode is selected with the aircraft within 2-3 dots of course deviation, BC APR arm mode will be bypassed and BC APR mode will engage directly.*

5. The autopilot will continue to fly on the selected heading until it intercepts the localiser. Once within the capture zone, the autopilot will turn to fly the desired course. The capture point will vary depending on the angle of intercept and the rate of change of the VOR radials.
6. The HDG light will extinguish and the APR light will remain lit as the BC mode goes from arm to engage.
7. The autopilot will bank as required to maintain course on the localiser but the glideslope is locked out because it is a back course approach.

Altitude (ALT) hold mode

In altitude hold mode, the autopilot maintains the altitude at which the mode was engaged.



To operate in the ALT mode:

1. Press the ALT button when the aircraft has reached the altitude you wish to maintain, with a vertical speed no greater than 500 fpm.
2. The autopilot will adjust the aircraft pitch to keep the aircraft level at the selected altitude.
3. The vertical trim switch can be used to increase or decrease altitude at a rate of approximately 500 fpm without disengaging altitude hold. When the vertical trim switch is released, the autopilot will maintain the new altitude. The vertical trim switch can be controlled by the elevator trim assignment when the autopilot and altitude hold modes are engaged.

Note: *With the autopilot engaged and ALT mode disengaged, the vertical trim switch can be used to adjust the aircraft pitch up or down. The switch can be controlled by clicking and holding either the UP or DN portion of the switch.*

Control wheel steering (CWS)

The black push-button mounted on the yoke allows you to manoeuvre the aircraft in pitch and roll without disengaging the autopilot. After the CWS push-button is released, the autopilot resumes control of the aircraft. For ease of use, the push-button can be toggled in/out using the 'Ballast valve (open/close)' key assignment.

Stormscope – WXR

The panel is fitted with a Stormscope situational aid. This unit detects severe weather conditions and lightning strikes in a 360-degree circle around the aircraft.



TKS – ice protection



1. Light switch – non-functional in this simulation
2. Windshield button – activates the windshield pump
3. Fluid quantity display – displays the remaining de-ice fluid quantity in US gallons
4. Mode switch – selects the ice protection mode: ANTI-ICE, DE-ICE or OFF

Due to simulator limitations, both the ANTI-ICE and the DE-ICE mode activate the default propellor and structural de-ice systems. These systems will be deactivated whenever the mode switch is set to OFF or the de-ice fluid quantity reaches zero.

The two modes differ in the rate at which they consume the de-ice fluid. The DE-ICE mode uses the fluid at a greater rate than the ANTI-ICE mode and, when active, the windshield pump uses considerably more fluid than either the ANTI-ICE or DE-ICE mode.

KR 87 – ADF



1. Frequency transfer button – displays the standby frequency if the timer is currently shown, or swaps the standby and active frequencies if the standby frequency is already displayed
2. Power switch – controls power to the unit
3. Frequency select knobs – tune the standby frequency

Frequency selection

The active ADF frequency is shown on the left side of the display at all times. A standby frequency is shown on the right side of the display.

The standby frequency is selected using the frequency select knobs which are rotated either clockwise or anti-clockwise. The outer knob tunes the 100s and the inner knob tunes the 1s.

The standby frequency selected can be transferred into the active slot by pressing the FRQ button. The standby and active frequencies will be exchanged (flip-flopped).

GROUND EQUIPMENT

The aircraft has a variety of ground equipment – chocks, pitot cover, engine intake covers, tie-downs and aileron locks.



The aileron locks will appear whenever the control lock is fitted to the yoke.

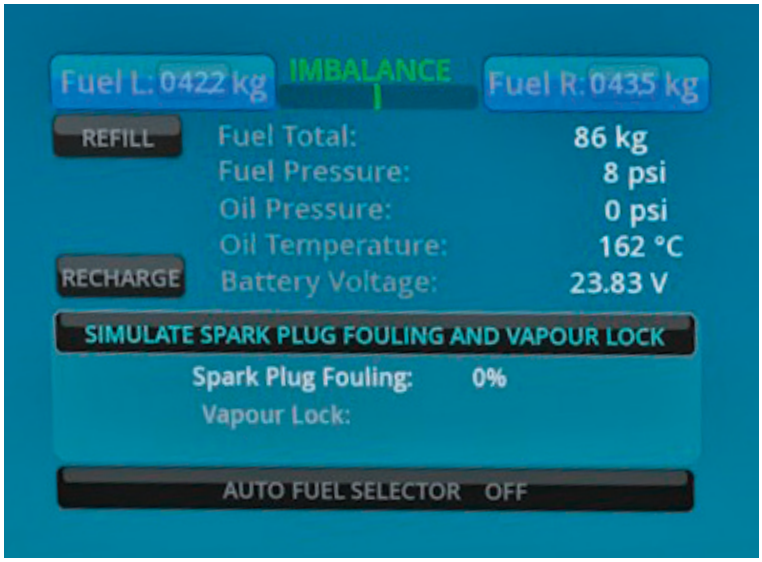
The chocks, pitot cover, engine intake covers and tie-downs are activated by the toggle buttons in the Aircraft Options section of the EFB. They can appear whenever the aircraft is on the ground and stationary with the engine off and the parking brake applied.

They will disappear when those conditions are no longer met.

REFILL MENU

To simulate the operation of the real aircraft, the fuel can be refilled and the aircraft battery recharged. The Refill menu also allows you to view fuel status as well as the status of spark plug fouling and vapour lock.

This menu can be accessed by clicking the fuel droplet icon in the middle row of the panel selector menu.



Clicking the REFILL button will automatically fill both fuel tanks and clicking the RECHARGE button will top up the battery voltage.

FAILURES

In addition to supporting the host simulator's own failures system, this TB-10 Tobago & TB-20 Trinidad simulation includes a few of the more common failures found on these aircraft:

1. **Spark plug fouling** – this can occur if the engine is kept at low RPM for prolonged periods and symptoms include rough running with a subsequent increase in cockpit vibration. If fouling occurs, increase engine RPM and aggressively lean the mixture. This can be done at low power settings on the ground without harming the engine.
2. **Vapour lock** – this can occur for up to approximately 30 minutes after the engine has been shut down. After shutdown, fuel vapour can remain within the fuel lines as the result of high temperatures. This vapour disrupts the operation of the fuel system and creates an incompatible mix of air and fuel, so you might need a few attempts at starting the engine before ignition occurs. This problem is more likely to occur when operating in high temperatures. If vapour lock is suspected, operate the electric fuel pump for 20-30 seconds with the mixture in the idle cut-off position, then repeat the engine starting attempt.
3. **Battery failure** – the battery can be quickly drained either by leaving electrical systems switched on without the engine (and therefore alternator) running, or by repeated attempts to start the engine. The battery can be recharged using the Engine Config EFB app.

These failures are enabled by default and can be disabled/enabled by clicking on 'Simulate Spark Plug Fouling and Vapour Lock' in the Engine Config EFB app.

If you are unable to start the engine, please check the following items:

Fuel flow – to ensure sufficient fuel flow for ignition, confirm that the fuel pump is switched on and the mixture lever is set to rich (forward). Confirm fuel flow using the flow gauge prior to attempting an engine start. Refer to the NORMAL PROCEDURES section in the manual for more information.

Vapour lock – this can occur for up to approximately 30 minutes after the engine has been shut down. After shutdown, fuel vapour can remain within the fuel lines as the result of high temperatures. This vapour disrupts the operation of the fuel system and creates an incompatible mix of air and fuel. If vapour lock is suspected, operate the electric fuel pump for 20-30 seconds (with the mixture in the idle cut-off position), then repeat the engine starting attempt.

You can also start the engine by using the START ENGINES RUNNING toggle in the Aircraft Options EFB app.

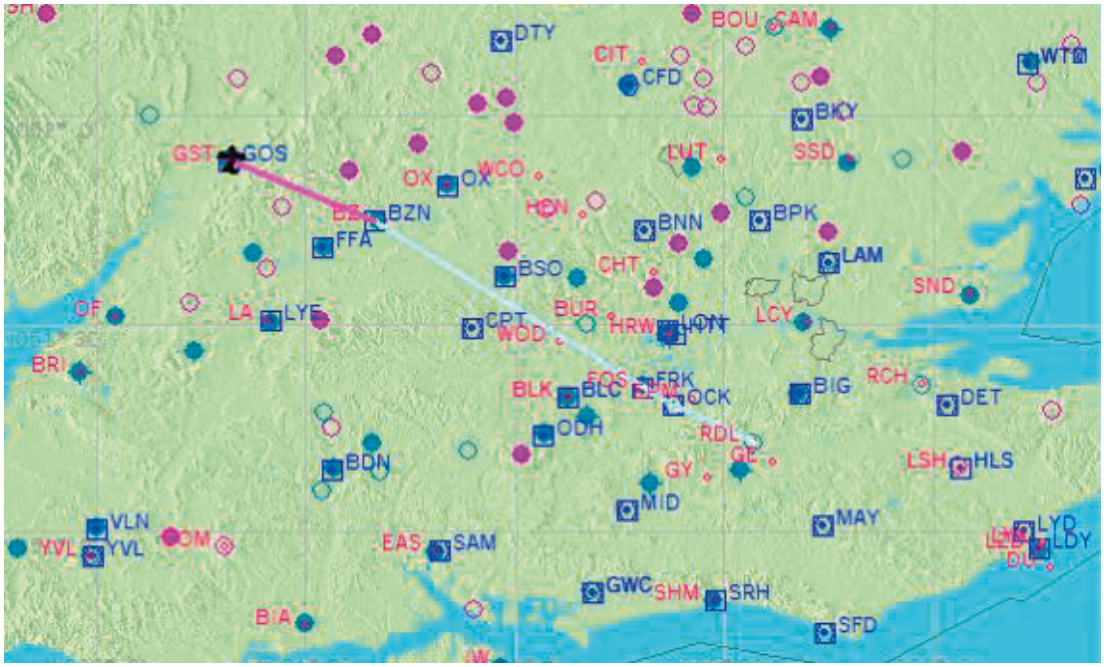
FLYING THE TB-20

For today's tutorial flight we will be departing from Gloucestershire Airport, located 40 miles north of Bristol, on the edge of the Cotswolds. We will be heading south-east, passing over RAF Brize Norton and to the south-west of Heathrow Airport before approaching Redhill Aerodrome, which is only five miles north of Gatwick Airport, from the north-west. Covering a distance of approximately 86 nautical miles, this short flight is the ideal length for learning about the essential systems on board the TB-20.

Although this tutorial flight uses the TB-20, the similarities between the TB-10 and TB-20 will allow you to follow the tutorial using either aircraft, with the most noticeable difference relating to the fixed gear on the TB-10.

Here are the details for today's flight:

EGBJ –BZ (386) – OCK (115.30) – EGKR



Estimated time en route: 40 minutes

Route distance: 86 nautical miles

Departure time: 1200 (local time)

Weather: Clear

Now that we are prepared for the flight we can proceed to the cockpit to begin our pre-flight checks. To load up the TB-20 tutorial flight, follow these steps:

1. Start X-Plane 12.
2. From the Main Menu click **New Flight** or go to the Flight Configuration window.
3. Click on **Tobago + Trinidad** in the Aircraft Selection screen.
4. Click **Customize**, choose the **G-VPPL_TB20** livery from the drop-down menu in the top right, and uncheck the box labelled **Start with engines running**.
5. Under the Location box, type **EGBJ** and select **Gloucester**. Click the **Customize** button.
6. Under 'Starts' select **Ramp**, and choose a ramp start location. Press **Confirm** when done.
7. Click **Start Flight**.

You should now find yourself sitting in the cockpit of a TB-20 at Gloucestershire Airport. Before we continue, we need to configure the aircraft in a ‘cold and dark’ state, with all of the cockpit systems switched off, as you would find the aircraft prior to the first flight of the day. By beginning in this configuration we will need to spend some additional time setting up the cockpit, but doing so will allow you to learn a considerable amount about the features and functions on board this light aircraft.



This tutorial will cover the necessary steps for you to get from point A to point B, but it will not explore each system in depth. Please refer to the rest of this manual for details of each system.

Getting started



The first step is to open the doors to allow entry into the cockpit. In the virtual cockpit, click on the door handle on your left to rotate it to the OPEN position and then click on the door frame to push it open. Repeat the same process for the right door.

Switch to the exterior (chase) view and click on the lock of the baggage compartment on the right-hand side of the aircraft to open the baggage door. You can also use the EFB Aircraft Options app to open the baggage door. Confirm that the baggage door has opened and then return to the cockpit.



We can now start working through the pre-flight inspections.

A control lock prevents movement of the flying controls and prevents the magneto/start selector key from being used. Remove the lock by clicking on the area into which the blocking pin is inserted on the control wheel tube.



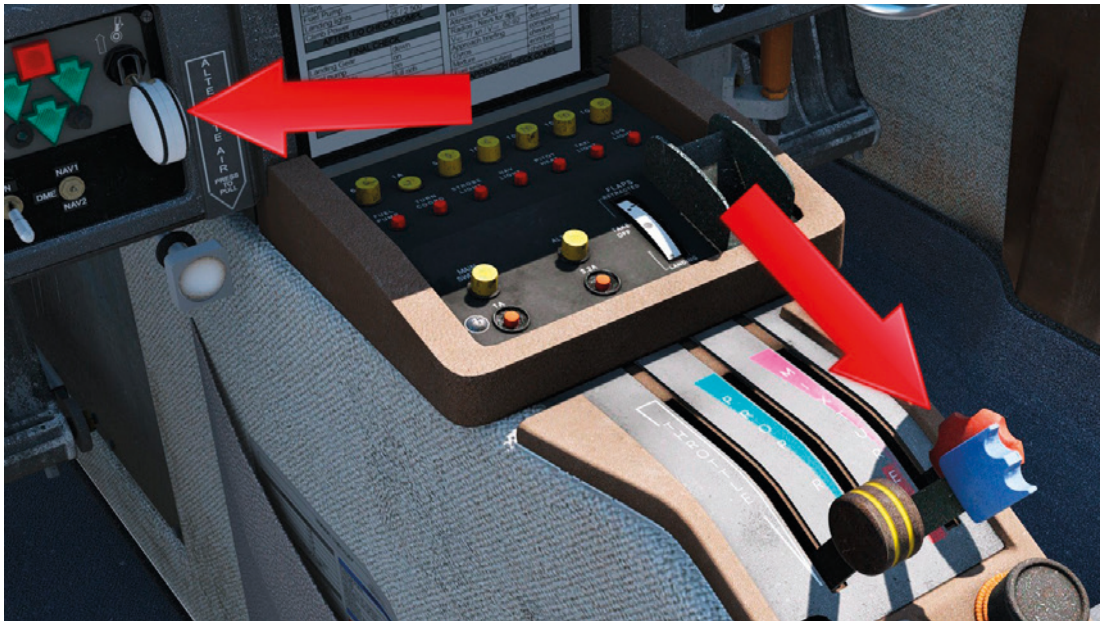
To enable easier access to the controls, you may want to hide the yoke using the clickspot located at the base of the yoke, where it enters the instrument panel.



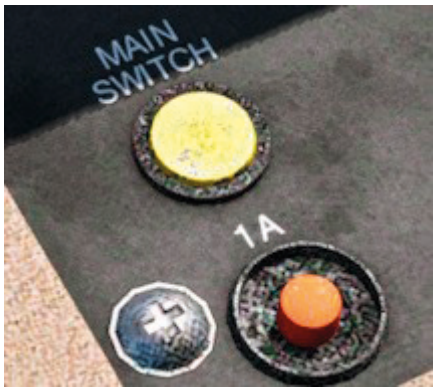
With the control lock removed, check that the magneto selector is set to **OFF** (rotated fully anti-clockwise).



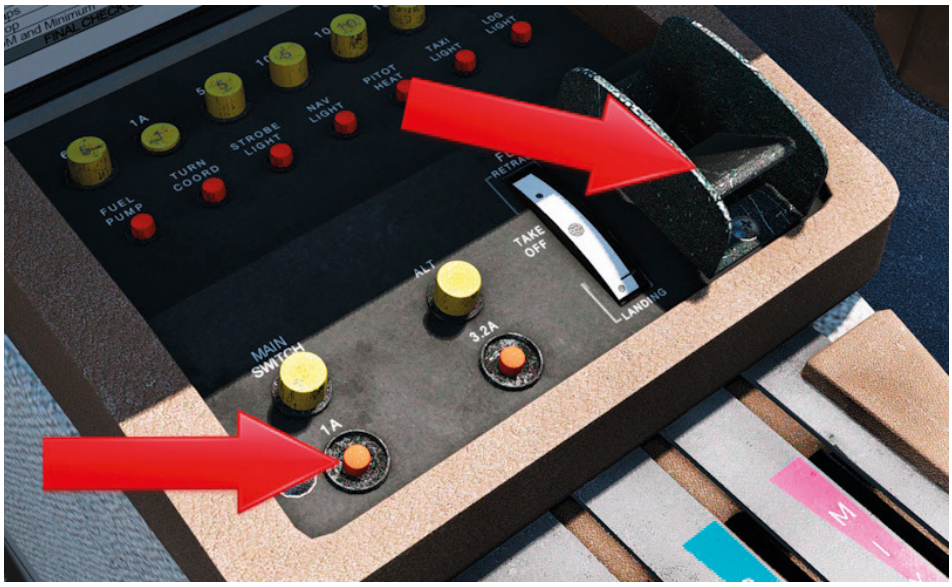
Confirm that the landing gear lever is in the **DOWN** position and that the mixture lever is set to **IDLE CUT-OFF**.



On the centre pedestal, press the MAIN switch to turn it **ON**. This connects the battery to the electrical system, providing power to the aircraft.



Extend the flaps to the **LANDING** (fully down) position and then disconnect the battery power by pressing the red button that is co-located with the MAIN switch.



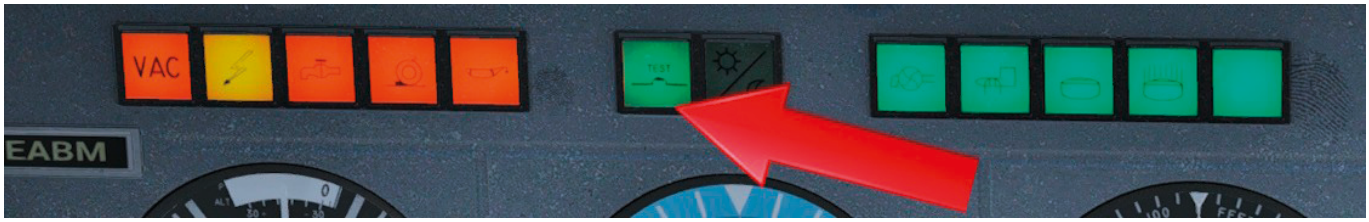
Switch to the external (spot) view and carry out a visual inspection of the aircraft. The ground equipment should be visible, including wheel chocks, pitot cover, tie-downs and engine intake covers. Confirm that the tow bar is not connected/visible.

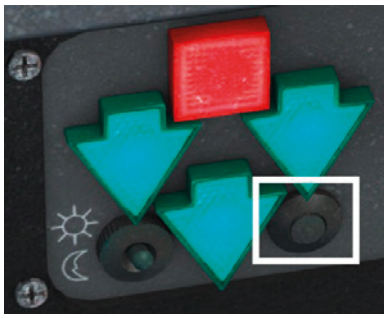


On the centre pedestal, make sure that the ALT and FUEL PUMP switch breakers are **OFF**.



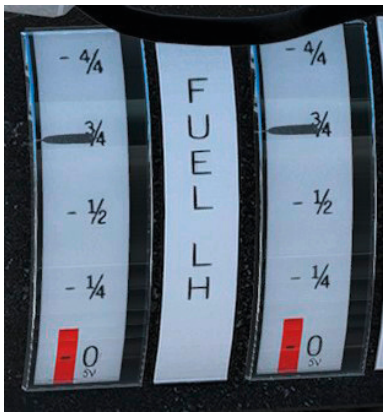
Press and hold the advisory panel TEST button to test the advisory lights, and press and hold the landing gear indicator test button to test the landing gear indicator lights. For both tests, all of the associated lights should illuminate for a successful test.





Confirm that only the three greens remain illuminated once the landing gear indicator test button has been released.

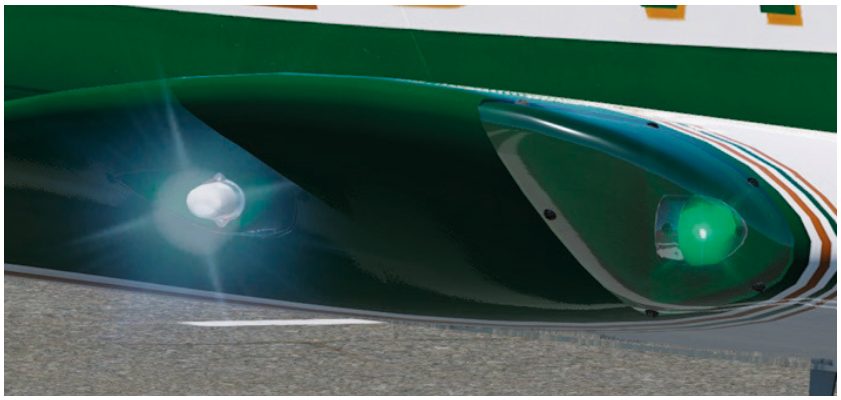
Check that the fuel gauges, on the engine monitoring cluster at the top of the centre console, indicate approximately 3/4 for both the left and right tanks.





Retract the flaps and then switch **ON** the strobe, navigation, taxi and landing lights.

Switch to the exterior (spot) view and confirm that all of the lights are illuminated before returning to the cockpit and switching them all **OFF**.



Starting the engine

To avoid draining the battery, we will start the engine before configuring the avionics for our departure.

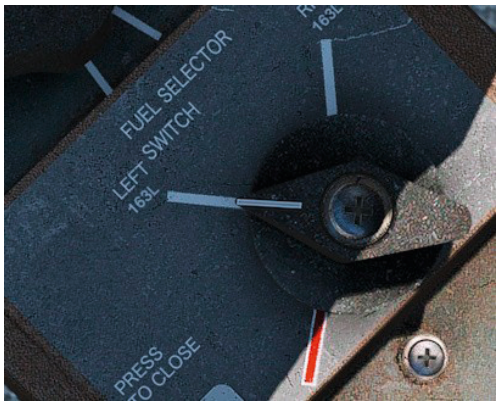
Close the baggage door via the Aircraft Options EFB app and then close both passenger doors by first clicking on the door frames to pull them shut and then clicking on the door handles to rotate them to the **CLOSED** position.



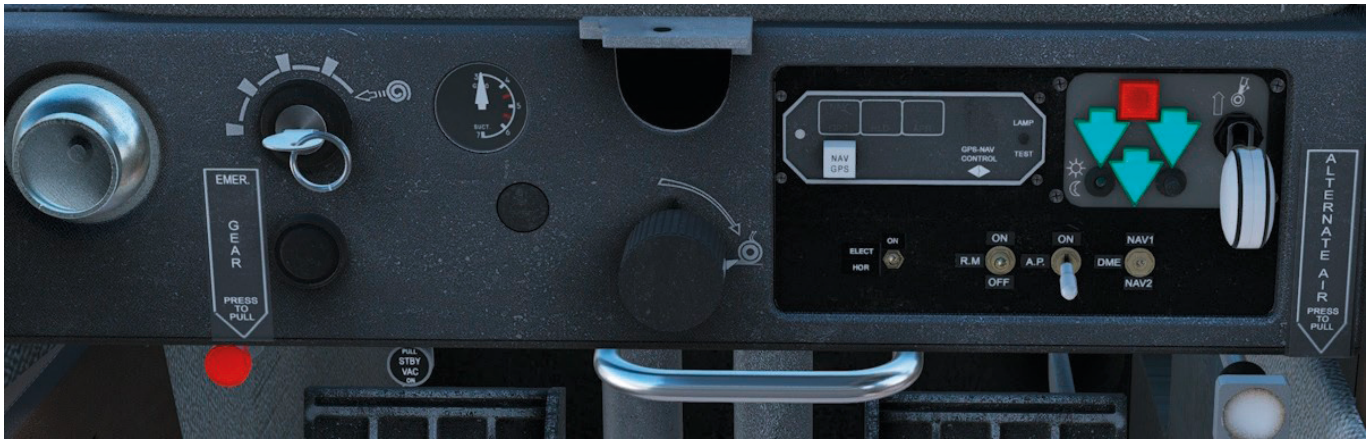
Check that the parking brake is set and that the indication light on the advisory panel is illuminated.



On the centre pedestal, rotate the FUEL SELECTOR SWITCH to the **LEFT** position.

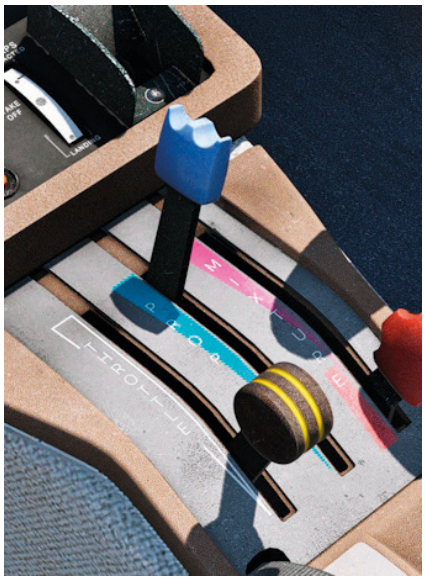


Running along the bottom portion of the panel, confirm that the emergency landing gear, alternate static source and alternate air knobs are pushed **IN**, and that the radio master switch is **OFF**.



Turn **ON** the NAV (navigation) lights switch breaker. This switch breaker also controls the anti-collision beacon, warning anyone in the area that we are about to start the engine.

On the centre pedestal, move the propellor lever to the **FULL FORWARD** position and advance the throttle lever to approximately **1/4 open**.



Switch **ON** the fuel pump and then move the mixture lever to the **FULL RICH** (forward) position until fuel flow is displayed, then move the lever back to the **IDLE CUT-OFF** (back) position and switch **OFF** the fuel pump.



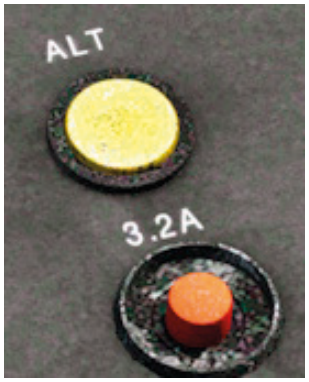
Check that the area surrounding the aircraft is clear of obstructions and then rotate the magneto/start selector to the **START** (fully clockwise) position.



When the engine starts, release the magneto/start selector and it will return to the BOTH position. Move the mixture lever to the **FULL RICH** (forward) position and check that oil pressure and temperature is rising.



Switch **ON** the ALT (alternator) switch breaker and confirm that the associated warning light on the advisory panel extinguishes.



Switch **ON** the turn coordinator switch breaker; confirm that the turn coordinator fail flag is not visible and that the needle is centred.



Moving down the panel, check that the vacuum gauge shows suction within the given limits.



With the engine running and the alternator charging the battery, we can now switch **ON** the radio master. This provides power to the avionics.



Starting at the top of the centre panel and working down, verify power is on for the KMA 24H, GNS 430, GNC 255, KN 62A, GTX 330 and KR 87 units. We will leave the KAP 150 autopilot unit switched off for now.



Finally, rotate the FUEL SELECTOR SWITCH to the **RIGHT** and then **LEFT** positions, checking that the engine operates correctly on both tanks before selecting the fullest tank.

Configuring the avionics

We now need to configure the avionics for our departure.

For the initial climb we are going to maintain the runway heading, so left-click on the HSI heading knob to rotate the heading bug to **266 degrees**.



Once we are settled into our climb to the west, we will make a left turn to fly towards the first waypoint on the route, Brize Norton (BZ) NDB. In preparation, tune the BZ NDB frequency (**386.0**) into the KR 87 unit. The direction to the NDB will now be indicated by the yellow needle on the ADF indicator when it is within range of the aircraft.

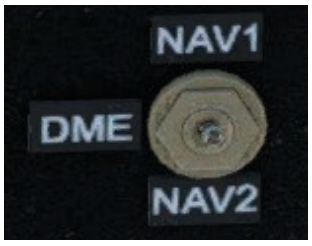


Tune the second waypoint on our route, Ockham VOR (**115.30**), into the GNS 430 (NAV 1 – active). Make sure that VLOC is selected by pressing the CDI button.



Check that the function switch on the KN 62A is set to the **RMT** (remote) position and that the DME selector switch, located to the left of the landing gear lever, is set to **NAV1**.

Selecting the remote function allows the KN 62A to display DME information from either NAV 1 (the GNS 430) or NAV 2 (the GNC 255), rather than from its own internal NAV receiver. The DME selector switch controls which of the two radio units the KN 62A receives its DME information from – in this case the GNS 430, which we have just tuned to the Ockham VOR.





On the HSI, rotate the OBS (course) knob to select a course of 122 degrees. This is the course from the Brize Norton NDB to the Ockham VOR.

We can now switch on the KAP 150 autopilot. Move the autopilot power switch (labelled A.P.), which is located between the radio master and DME selector switches, to the **ON** position to provide power to the unit.



Finally, move the ELECT HOR (electric horizon) switch, which is located to the left of the radio master switch, to the **ON** position. This will provide electrical power to the attitude indicator on the right panel.



Taxi

We can now taxi to the runway. Switch **ON** the taxi light using the TAXI LIGHT switch breaker, release the parking brake and then taxi to the threshold of runway 27, which is in front of us.

Steering the aircraft with the rudder pedals only is generally sufficient. The combined use of the rudder pedals and the brakes permits, if necessary, tight turns.

Check the operation of gyroscopic instruments (horizontal attitude, heading and turn and bank indicators) by means of alternate turns.

Stop at the holding point just short of runway 27. We can carry out the power checks here.

Set the parking brake and leave the throttle approximately an inch open. Check that the oil temperature and pressure needles are within the green sectors.



On the centre pedestal, make sure that the mixture lever is set to **FULL RICH** (fully forward) and the fuel selector is set to the fullest tank.

To carry out a propeller check, advance the throttle lever to obtain 2,000 RPM and then cycle the propeller lever twice, moving it aft towards the **high pitch/low RPM** position and then forwards towards the **low pitch/high RPM** position. Note the RPM drop on the tachometer.

To carry out a magneto check, advance the throttle lever to obtain 2,000 RPM. Rotate the magneto selector to the **LEFT** position, note the RPM drop and then rotate it back to the **BOTH** position. Repeat the process for the right magneto.

To carry out an alternate air check, pull the alternate air knob and check that the manifold pressure doesn't drop, then push the alternate air knob in again.



Finally, reduce the throttle to idle and check for rough running.

We can now run through the before take-off checks. Confirm that both doors are **LOCKED** and that you have full and free movement of the flying controls.

Rotate the pitch trim wheel until the indicator sits below the take-off marking.



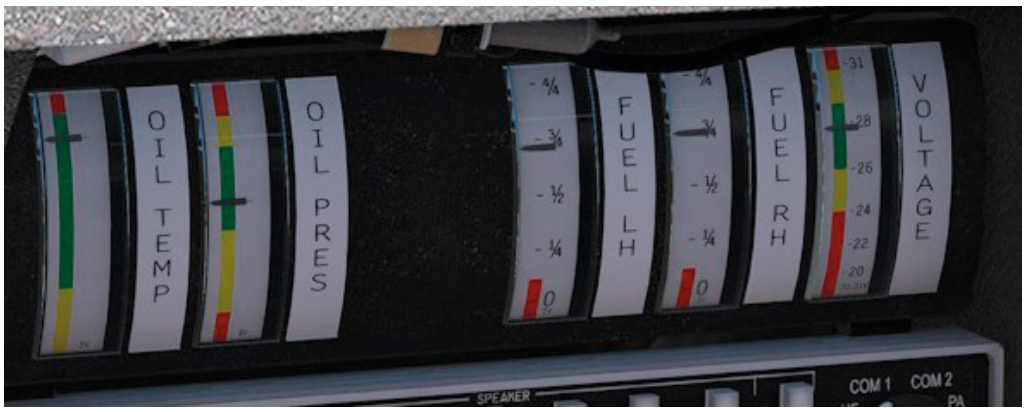
Lower the flaps to the **TAKE OFF** position, indicated by the needle being over the black dot.



Confirm the magneto selector is in the **BOTH** position and that the alternate air knob is pushed **IN**.

On the centre pedestal, make sure that the propeller and mixture levers are fully forward and that the fuel selector is set to the fullest tank.

Switch **ON** the fuel pump and check that the oil temperature and pressure, and the voltmeter, are in the green sector.



Switch **OFF** the taxi light and switch **ON** the landing light (LDG LIGHT) and strobe lights.

Finally, switch **ON** the PITOT HEAT switch.

With the before take-off checks complete, have a look left and right, verify that nothing is on approach and that the runway is clear, and then taxi onto the runway.

Take-off

Line up with the runway centre line and then come to a stop. Smoothly apply full power and, as the aircraft starts to gather speed, keep it running down the centre line with rudder inputs. As you approach **70 knots** start to raise the nose of the aircraft.

The aircraft will begin to climb away from the runway and once you are safely airborne, tap the brakes and then raise the landing gear using the **[G]** key.

Make elevator inputs as required to maintain a climb speed of approximately **75 knots**, holding the runway heading (266 degrees) and retracting the flaps as you pass through **300ft**.

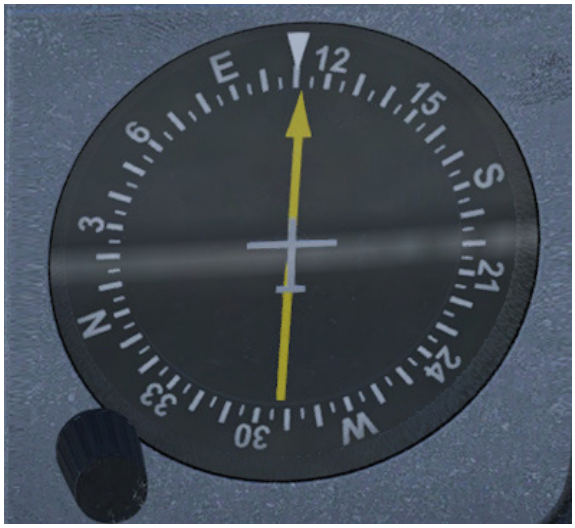


Climb

Once stable in the climb, adjust your pitch to maintain the **75 knots** climb speed and maintain your westerly heading.

Switch **OFF** the fuel pump and landing light upon reaching 1,000 feet.

We now need to make a turn towards the Brize Norton (BZ) NDB, using the ADF indicator to gauge what heading is required for a direct routing to the NDB. In this image, we would be looking to turn left onto a heading of approximately **110 degrees**:



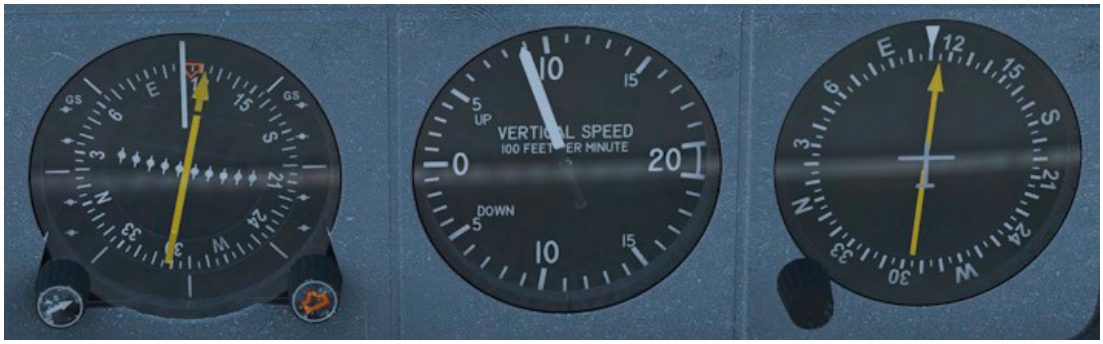
Once you are flying directly towards the NDB, engage the KAP 150 autopilot by pressing the **AP ENG** button.



As no other autopilot modes (ALT, HDG etc.) have been selected, the autopilot will maintain the existing aircraft pitch attitude and fly the aircraft wings level. The pitch attitude can be adjusted by clicking on either the UP or DN portion of the vertical trim button. Lower the pitch attitude to increase our climb speed to **95 knots**. This is the optimum climb speed for the TB-20.



Once the aircraft has stabilised in a 95-knot climb, rotate the HSI heading bug to match your current heading (a direct heading to the BZ NDB) and then engage heading hold mode by pressing the **HDG** button on the KAP 150. The HDG annunciator will illuminate when the heading hold mode is engaged.



Continue to use the heading bug to make any further adjustments to continue tracking towards the NDB, and use the vertical trim button on the KAP 150 to make pitch changes as required.

Cruise



As you approach 4,000ft, use the vertical trim button to reduce the aircraft's pitch and then press the **ALT** button on the KAP 150 to engage altitude hold mode. The autopilot will capture and hold the current altitude (rounded to the nearest hundred feet).



As the aircraft levels out and begins to accelerate, reduce the throttle to obtain 23 inHg on the manifold pressure gauge and then reduce the propeller lever to obtain 2300 RPM on the tachometer. This is a typical cruise power setting.

It is important to remember that the engine is only being fed with fuel from a single tank at any given time, and therefore the quantity of each tank should be carefully monitored. It is recommended that you change fuel tanks every half hour and do not exceed a fuel imbalance of 20 US gallons (75 litres).

If you want to avoid worrying about switching fuel tanks, enable the automatic fuel selector from the EFB Engine Config app.

A few miles out from RAF Brize Norton visible at our 12 o'clock, we should start to get a valid signal from the Ockham VOR. The NAV flag on the HSI will disappear to indicate that a valid signal is being received and the KN 62A will display the DME distance (nautical miles), groundspeed (knots) and time-to-station (minutes).

RAF Fairford and Kemble should also be visible to the south of the aircraft.



As RAF Brize Norton begins to disappear under the nose of the aircraft, we will begin our turn to track towards the Ockham VOR.

Rotate the HSI course knob to centre the yellow course deviation needle and then press the **NAV** button on the KAP 150.



The autopilot will command a turn to begin tracking inbound to the VOR.

You can now relax for a while as the autopilot takes care of controlling the aircraft. The leg to the Ockham VOR should take approximately 25 minutes, as displayed on the KN 62A. This is the ideal opportunity to take a closer look at some of the features of the aircraft.

The TB-10 and TB-20 have an extensive IFR-capable avionics fit. We'll take a quick look at some of the features of the avionics. Make sure you keep an eye on the distance remaining to the Ockham VOR! We'll need to return to navigating the aircraft once we are ten miles from the VOR.

On the GTX 330 transponder, press the **FUNC** button to cycle through the various functions. The 'FLIGHT TIME' function displays the elapsed time since take-off.



Moving up to the KN 62A unit, move the function switch to the **FREQ** (frequency) position. With this function selected, we can tune the KN 62A's internal receiver (NAV 3).

Rotate the frequency selector knobs to tune in **113.60** – the frequency for the London VOR/DME which is situated at London Heathrow. The DME distance (nautical miles) to the VOR will be shown on the left of the display. Move the function switch to the **GS/T** (groundspeed/time) position to show the DME distance (nautical miles), groundspeed (knots) and time-to-station (minutes) to the London VOR. Note that the display is identical to that shown with RMT (remote) selected, however this display shows the information for the internally tuned frequency rather than the remote frequency (NAV 1 – GNS 430 or NAV2 – GNC 255).



Return the function switch to the **RMT** (remote) position so we can continue to monitor the distance to the next waypoint, Ockham VOR.

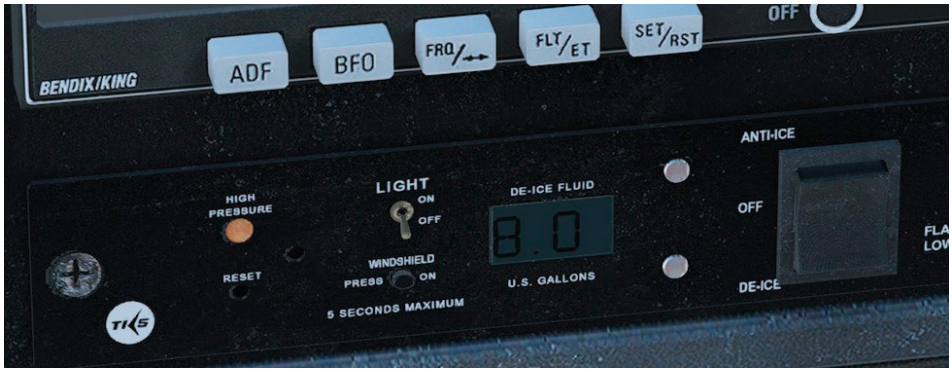
Moving across to the right panel, centre your view on the Stormscope mounted in the centre of the panel. To switch on the Stormscope, rotate the knob on the top right corner of the gauge bezel.

The Stormscope will display any storm threats as crosses.



Rotate the Stormscope brightness/power knob fully anti-clockwise to switch it off.

Moving down from the Stormscope, below the KR 87 ADF radio is the TKS ice protection unit. This unit allows you to control the ice protection system with a three-position mode switch (ANTI-ICE, OFF and DE-ICE) and windshield button. The remaining de-icing fluid quantity is shown on the centre of the unit.



Finally, move back to the centre panel and focus on the GNC 255 which is just above the KN 62A. The GNC 255 acts as a COM 2 / NAV 2 radio but also has a count-up timer function.

Press the **C/N** button to switch to NAV mode. Use the outer and inner knobs located on the right side of the unit to select the Ockham VOR frequency (**115.300**) and then press the flip/flop button to move the frequency into the active position.



Another useful feature for navigation is the Flight Computer panel, which can be opened from the EFB Flight Computer app. The flight computer shows a variety of real-time information related to everything from speed to fuel burn/flow and range/endurance.

We can now practise navigating using the GNS 430 (GPS) unit. Our flight plan can be programmed into the GNS 430. See the 'X-Plane G430 Manual.pdf' inside X-Plane's 'Instructions' folder for detailed instructions on how to program a flight plan into the GNS 430.

Press the NAV/GPS switch located to the left of the landing gear lever. The annunciator will change from NAV to GPS. As navigation hold mode is already engaged (as indicated by the NAV annunciator on the KAP 150), the autopilot will now make any necessary course corrections to maintain our flight plan, which is programmed into the GNS 430.



Descent

We need to begin our descent when we are five miles from the Ockham VOR. Due to the airfield's proximity to Gatwick Airport, we need to be below 1,500ft to avoid entering their airspace.

Move the propeller lever forwards to the **fully forward (high RPM)** position and then reduce the throttle to obtain 15 inHg on the manifold pressure gauge. The airspeed will start to decrease.



Once the airspeed has reduced to 110 knots, start the descent by disengaging ALT mode and pressing the **DN** portion of the vertical trim button a few times. We will aim for a -500ft/min descent rate.

As the aircraft stabilises in its descent, adjust the throttle to maintain **110 knots**.

Approach and landing

As you approach **1,500ft**, press the ALT button and increase the throttle as the aircraft levels out to maintain your airspeed.

Switch **ON** the landing light and fuel pump.



Confirm that the propeller and mixture levers are fully forward and that the fuel selector is set to the fullest tank.

As the aircraft reaches Ockham VOR, the autopilot will bank the aircraft left towards Redhill NDB. Once the wings have levelled, confirm that the ADF indicator needle is pointing directly ahead. Gatwick Airport should be visible to the south as we approach Redhill.

When the KN 62A shows that we are approximately **9 miles** away from the Ockham VOR (note that the distance will be increasing as we are now moving away from it), rotate the HSI heading bug to **180 degrees** and then press the **HDG** (heading) button on the KAP 150 to engage heading hold mode. This will position the aircraft on the base leg for runway 08R, the longest of the grass runways at Redhill.

Reduce your airspeed to **95 knots** and extend the flaps to the **TAKE OFF** position.



When you are established on the base leg with the airfield in the 10 o'clock position, extend the landing gear and confirm that you see three greens.



Reduce your airspeed further to **85 knots** and extend the flaps to the **LANDING** position. Disengage the autopilot by pressing the red autopilot disconnect button on the yoke and then begin a descending turn to position yourself on final for runway 08R.



Maintain 85 knots until short final, at which point you should reduce power to begin slowing to a touchdown speed of approximately **75 knots**.

As the aircraft arrives over the runway, start to bring the aircraft into a flare, gently raising the nose just above the horizon. Reduce the throttles to idle and the aircraft should touch down smoothly.



Apply gentle braking and, once the aircraft has slowed to a fast walking pace, turn left off the runway. When you are safely off the runway, raise the flaps, switch **OFF** the landing light and strobe light, and switch **ON** the taxi light.

You can also switch **OFF** the fuel pump and pitot heat.

Shutdown

Begin your taxi to the nearest available parking spot.

Once you have come to a stop at your chosen parking spot, engage the parking brake and switch **OFF** the taxi light.

Switch **OFF** the turn coordinator and the autopilot power, radio master and electronic horizon switches.

Bring the throttle lever back to **IDLE** and then bring the mixture lever back to **IDLE CUT-OFF** to shut down the engine.

Once the engine comes to a stop, rotate the magneto selector to the **OFF** position.

Switch **OFF** the navigation lights and the ALT (alternator) and MAIN switch breakers to disconnect the electrical power.

Rotate the fuel selector to the **CLOSED** position and then finally install the control lock and open the doors.

Congratulations – you have completed the TB-20 tutorial flight!



NORMAL PROCEDURES

Airspeed (IAS) for safe operations – TB-10

Best rate of climb (flaps retracted)	78 KIAS
Best rate of climb (flaps down)	70 KIAS
Best angle of climb (flaps retracted)	65 KIAS
Best angle of climb (flaps down)	58 KIAS
Operating speed in turbulent air	122 KIAS
Maximum speed with flaps in take-off position	95 KIAS
Maximum speed with flaps in landing position	95 KIAS
Final approach speed (flaps down)	72 KIAS
Maximum demonstrated crosswind	25 knots

Airspeed (IAS) for safe operations – TB-20

Best rate of climb (gear up, flaps retracted)	95 KIAS
Best rate of climb (gear down, flaps down)	73 KIAS
Best angle of climb (gear up, flaps retracted)	81 KIAS
Best angle of climb (gear down, flaps down)	67 KIAS
Operating speed in turbulent air	127 KIAS
Maximum speed with flaps in take-off position	129 KIAS
Maximum speed with flaps in landing position	103 KIAS
Final approach speed (flaps down)	73 KIAS
Maximum demonstrated crosswind	25 knots

Pre-flight inspections – airframe

Cabin

Pilot door	OPEN
Control lock	REMOVED
Magneto selector	OFF
Landing gear lever (TB-20 only)	DOWN
Mixture	IDLE CUT-OFF

Main switch	ON
Flaps	LANDING
Pitch trim	TAKE-OFF
Rudder trim	TAKE-OFF
Main switch	OFF
Fuel selector	LEFT

Left/right wing

Flap and aileron	Check controls and deflection
Wing tip and lights	Undamaged
Wing	Free from frost/snow/ice
Pitot	Cover removed
Tie-down	Removed
Fuel tank	Check level

Left/right/nose gear

Chocks	Remove
Tyres	Check condition
Shock absorbers	Normal position
Landing gear wells	No foreign bodies
Tow bar	Removed (nose gear)

Forward fuselage

Windshield	Clean
Engine cowling	Closed
Oil	Check level
Propeller	Good condition
Air intakes	Clear

Stabilisers

Fin	Check condition
Rudder and rudder tab	Check controls
Stabilator and stabilator tab	Check controls and deflection
Tail cone	Check condition

Rear fuselage

Baggage compartment door	Secured
TKS door	Secured

Pre-flight inspections – electrical systems

Cabin

'ALTr FLD' switch breaker	OFF
Fuel pump	OFF
Main switch	ON
Advisory panel	Tested
Landing gear indicator lights (TB-20 only)	Tested
Fuel gauges	Check
Flaps	UP
Instrument lights	ON
Navigation lights	ON
Anti-collision lights	ON
Pitot heat	ON
Landing and taxi lights	ON

Exterior

Navigation lights	Illuminated
Anti-collision lights	Flashing
Landing and taxi lights	Illuminated
Pitot heater	Warm

Cabin

Instrument lights	OFF
Navigation lights	OFF
Anti-collision lights	OFF
Pitot heat	OFF
Landing and taxi lights	OFF
Main switch	OFF

Before starting engine

Doors	CLOSED
Main switch	OFF
Parking brake	Set
Parking brake light	Illuminated
Seat belts	Secure
Flight controls	Full and free movement
Pitch trim	Check deflection
Rudder trim	Check deflection

Fuel selector	LEFT or RIGHT
Circuit breakers	Closed
Magneto selector	OFF
Emergency landing gear control (TB-20 only)	PUSHED
Radio master switch	OFF
Landing gear lever (TB-20 only)	DOWN
Carburettor heat lever/Alternate Air knob	OFF/PUSHED
Alternate static source	PUSHED

Engine starting

Anti-collision lights	ON

COLD ENGINE:

Main switch	ON
Propeller	FULL FORWARD
Throttle	1/4 OPEN
Mixture	IDLE CUT-OFF
Fuel pump	ON
Mixture	FULL RICH until fuel flow is displayed (3 to 5 sec.) then IDLE CUT-OFF
Fuel pump	OFF
Area	Clear
Magneto/start selector	START

When the engine starts:

Magneto selector	BOTH
Mixture	FULL RICH
Oil pressure	Check – if no pressure within 30 sec., shut down engine

HOT ENGINE RESTARTING PROCEDURE:

Main switch	ON
Propeller	FULL FORWARD
Throttle	FULL POWER
Mixture	IDLE CUT-OFF
Fuel pump	ON
Mixture	FULL RICH for 1 sec. then IDLE CUT-OFF
Fuel pump	OFF
Area	Clear
Magneto/start selector	START

When the engine starts:

Magneto selector	BOTH
Mixture	FULL RICH
Throttle	Reduced

After starting engine

‘ALTr FLD’ switch breaker	OFF
‘ALTr’ warning light	ON
Voltmeter	Yellow sector
‘ALTr FLD’ switch breaker	ON
‘ALTr’ warning light	OFF
Voltmeter	Green sector
Turn and bank indicator	ON
Vacuum gauge	Checked
Advisory panel test	Test
Landing gear indicator lights (TB-20 only)	Test
Radio master switch	ON
Radio navigation equipment	ON
Fuel selector	Check engine operation on each tank
Fuel selector	Set to fullest tank
Flaps	Checked and RETRACTED

Taxiing

Parking brake	Release
Brakes	Checked
Flight instruments	Checked
Taxi light	As required

Avoid exceeding 1,200 RPM as long as the oil temperature indicator pointer is within the yellow sector.

Steering the aircraft with the rudder pedals only is generally sufficient. The combined use of the rudder pedals and the brakes permits, if necessary, tight turns.

Check the operation of gyroscopic instruments (horizontal attitude, heading and turn and bank indicators) by means of alternate turns.

Engine run-up

Parking brake	Set
Oil temperature	Green sector
Oil pressure	Green sector
Mixture	FULL RICH
Carb heat (TB-10 only)	OFF
Fuel selector	Set to fullest tank

PROPELLER CHECK:

Propeller	FULL FORWARD
Throttle	2,000 RPM
Propeller	Cycle twice (max. 500 RPM drop). Return to high RPM (full forward).

MAGNETO CHECK:

Throttle	2,000 RPM
Magneto selector	Left then BOTH Right then BOTH
Maximum RPM drop on each magneto	175 RPM
Maximum difference between magnetos	50 RPM

CARBURETTOR HEATING CHECK (TB-10 ONLY):

Carburettor heat	ON
Manifold pressure	Decrease
Carburettor heat	OFF

ALTERNATE AIR CHECK (TB-20 only):

Alternate Air knob	PULLED
Manifold pressure	Maintained
Alternate Air knob	PUSHED

MAXIMUM POWER CHECK:

Full throttle	2,575 RPM

Before take-off

Doors	LOCKED
Controls	Free
Pitch trim	TAKE-OFF
Rudder trim	TAKE-OFF
Flaps	TAKE-OFF
Magneto selector	BOTH
Carb heat lever/Alternate Air knob	OFF/PUSHED
Propeller	FULL FORWARD
Mixture	FULL RICH
Fuel selector	Check set to fullest tank
Fuel pump	ON
Oil temperature	Green sector
Oil pressure	Green sector

Voltmeter	Green sector
Altimeter	Set
Horizontal situation indicator (HSI)	Set
Attitude indicator	Set
Parking brake	Release – light OFF
Landing lights	As required
Navigation lights	As required
Pitot heat	As required
Transponder	As required

Take-off

Lined up on runway	Check HSI and compass
Throttle	Smoothly apply full power
Rotation	63 KIAS (TB-10) / 68 KIAS (TB-20)
Initial climb	70 KIAS (TB-10) / 75 KIAS (TB-20)

WHEN SAFELY AIRBORNE:

Brakes	Apply
Landing gear (TB-20 only)	RETRACT

AT 300 FT:

Flaps	RETRACT

AT 1,000 FT:

Fuel pump	OFF
External lights	As required

Climb

Mixture	FULL RICH
Throttle	FULL POWER
Propeller	FULL FORWARD (2,575 RPM)
Optimum climb speed	78 KIAS (TB-10) / 95 KIAS (TB-20)

Cruise

Refer to the PERFORMANCE section for cruise power settings.

It is recommended that you change fuel tanks every half hour and do not exceed a fuel imbalance of 20 US gallons (75 litres).

Flight into known icing conditions is PROHIBITED. If you encounter icing conditions, refer to the Icing section of the emergency procedures.

Descent

Set the required power for descent.

Apply engine power every 1,500 ft to prevent excess engine cooling and spark plug fouling. Avoid prolonged descents with a manifold pressure lower than 14 inHg.

Approach and landing

FINAL:

Airspeed	78 KIAS (TB-10) / 86 KIAS (TB-20)
Flaps	TAKE-OFF below 129 KIAS
Landing gear lever (TB-20 only)	DOWN
Carb heat (TB-10 only)	ON
Fuel pump	ON
Mixture	FULL RICH
Propeller	FULL FORWARD
Brakes	Checked
Landing lights	ON

SHORT FINAL:

Flaps	LANDING below 103 KIAS
Airspeed	See the Landing performance section
Standard airspeed	73 KIAS

Go-around

Throttle	Smoothly apply full power
Carb heat (TB-10 only)	OFF
Airspeed	70 KIAS (TB-10) / 76 KIAS (TB-20)

When climb rate is positive:

Landing gear lever (TB-20 only)	UP
Flaps	TAKE-OFF
Airspeed	73 KIAS (TB-10) / 90 KIAS (TB-20)
Flap	RETRACTED
Airspeed	78 KIAS (TB-10) / 95 KIAS (TB-20)

After landing

Fuel pump	OFF
Flaps	RETRACTED
Landing light	OFF
Taxi light	As required
Trims	TAKE-OFF
Radio equipment	As required
Pitot heat	OFF
Carb heat (TB-10 only)	OFF

Shutdown/secure aircraft

Parking brake	Set
Turn and bank indicator	OFF
Anti-collision lights	OFF
Taxi light	OFF
Interior lights	OFF
Radio master	OFF
Throttle	Reduce to 1,000 RPM
Magneto selector	OFF then BOTH
Throttle	1,200 RPM
Mixture	IDLE CUT-OFF

AFTER ENGINE STOPS:

Magneto selector	OFF
‘ALTr FLD’ switch breaker	OFF
Main switch	OFF
Fuel selector	OFF
Control lock	Installed
Chocks/tie-downs	Installed

Stalls

Power-on stalls require an extremely steep pitch attitude. If the centre of gravity is at or near its aft limit, a slight tendency towards wing rocking or a wing drop may occur when the stabilator is deflected near its stop.

Aerodynamic warning (pre-stall buffet) is low with idle power and more pronounced at higher power settings. Stall recovery can be effected immediately by easing the stick forward. Altitude loss is minor in all cases and is minimised by prompt application of power at the onset of the stall.

The stall warning horn will sound from 5 to 10 knots before stall speed.

Flight with crosswind

Take-off

Apply full power before brake release.

Move the aileron control into wind (raise the aileron on the into-wind side).

Keep the aircraft on the runway centreline using the rudder.

Keep the nose-wheel on the ground up to 65 KIAS.

Lift off cleanly in order to avoid subsequent touchdown.

Landing

When landing in a strong crosswind, use the landing flap setting.

Although the crab or combination method of drift correction may be used, the wing low method gives the best control. Maximum bank angle close to the ground is 15°.

After touchdown, keep the nose-wheel on the ground and hold a straight course using the rudder pedals.

Flight in turbulent air

Maximum airspeed	128 KIAS (TB-10) / 140 KIAS (TB-20)
Recommended airspeed	108 KIAS (TB-10) / 129 KIAS (TB-20)
Seat belts	Secure

EMERGENCY PROCEDURES

Airspeed for safe operations – TB-10

Engine failure after take-off	65/70 KIAS
Manoeuvring speed	122 KIAS
Best glide speed	86 KIAS
Precautionary landing with engine power	65/70 KIAS

Airspeed for safe operations – TB-20

Engine failure after take-off	70/76 KIAS
Manoeuvring speed	129 KIAS
Best glide speed	92 KIAS
Precautionary landing with engine power	70/76 KIAS

Engine failures

Engine failure during take-off run

Throttle	IDLE
Brakes	APPLY
Mixture	IDLE CUT-OFF
Magneto selector	OFF
Main switch	OFF
Fuel selector	OFF

Engine failure after take-off

Airspeed	75 KIAS
Mixture	FULL RICH
Fuel selector	SWITCH TANKS
Fuel pump	ON

If engine does not start:

Mixture	IDLE CUT-OFF
Fuel selector	OFF
Fuel pump	OFF
Landing gear lever (TB-20 only)	AS REQUIRED

Land	STRAIGHT AHEAD
Magneto selector	OFF
Main switch	OFF

Engine failure in flight

Glide speed	92 KIAS
Main switch	ON
Mixture	FULL RICH
Fuel gauges	CHECK
Fuel tanks	SWITCH
Magneto selector	BOTH
Fuel pump	ON

If icing conditions are unintentionally encountered:

Carb heat/Alternate Air knob	FULLY PULLED

If the engine does not start:

Mixture	IDLE CUT-OFF
Throttle	HALF OPEN
Starter	ENGAGE
Mixture	FULL RICH

If the engine still does not start:

Refer to Emergency landing without engine power.

Low oil pressure

Oil warning light	ON
Pressure indicator	IN RED LOW SECTOR
Throttle	REDUCE AS FAR AS POSSIBLE
Oil temperature	CHECKED
If oil temperature in red sector	REDUCE THROTTLE

Prepare for a forced landing and land as soon as possible.

Low fuel flow

Fuel pump	OPERATING
Fuel gauges	CHECKED
Fuel selector	SWITCH TANKS

Propeller governor failure

In case of oil pressure drop in the governor system or pitch control failure, the propeller moves to low pitch.

Oil pressure	CHECKED
Oil temperature	CHECKED
Throttle	AS REQUIRED
Airspeed	REDUCED

Avoid rapid application of power – maximum RPM is 2,575.

Forced landings

Emergency landing without engine power

Glide speed	86 KIAS (TB-10) / 92 KIAS (TB-20)
Radio	TRANSMIT MAYDAY
Seats/harnesses	ADJUSTED/SECURED
Landing gear lever (TB-20 only)	AS REQUIRED
Mixture	IDLE CUT-OFF
Fuel selector	OFF
Magneto selector	OFF
Flaps	AS REQUIRED

When the landing is secured:

Flaps	LANDING
Approach speed	70 KIAS (TB-10) / 75 KIAS (TB-20)
Main switch	OFF

Precautionary landing with engine power

Flaps	LANDING
Approach speed	70 KIAS (TB-10) / 75 KIAS (TB-20)
Radio	ADVISE ATC
Seats/harnesses	ADJUSTED/SECURED
Landing gear lever (TB-20 only)	AS REQUIRED
Main switch	OFF

After landing:

Mixture	IDLE CUT-OFF
Fuel selector	OFF
Magneto selector	OFF

Ditching

Radio	TRANSMIT MAYDAY
Landing gear lever (TB-20 only)	UP
Flaps	LANDING
Seats/harnesses	ADJUSTED/SECURED
Airspeed	70 KIAS (TB-10) / 75 KIAS (TB-20)
Flight path	Parallel to swells

Before touchdown:

Main switch	OFF
Mixture	IDLE CUT-OFF
Fuel selector	OFF

Emergency descent

Throttle	IDLE
Airspeed	129 KIAS
Landing gear lever (TB-20 only)	DOWN
Descent at VLE (TB-20 only)	139 KIAS

Fires

Engine fire during start

Mixture	IDLE CUT-OFF
Starter	HOLD IN START POSITION
Throttle	FULL THROTTLE
Fuel selector	OFF

If fire continues:

Main switch	OFF
Magneto selector	OFF
Passengers	EVACUATE

Engine fire in-flight

Fuel selector	OFF
Mixture	IDLE CUT-OFF
Fuel pump	OFF
Throttle	FULL THROTTLE
Cabin air cooling & demisting	FIRE CUT-OFF

After engine has stopped:

Magneto selector	OFF
'ALTr FLD' switch breaker	OFF
Forced landing	EXECUTE – refer to Emergency landing without engine power

Icing

IMPORTANT! *Flight into known icing conditions is prohibited*

Carb heat / Alternate Air knob	ON/PULLED
Cabin temperature	FULL HOT
Pitot heating	ON
Demisting	OPEN
Engine	MAX POWER/RPM

Adjust course and/or altitude to obtain best outside air conditions. Divert to nearest airport.

Landing gear malfunctions (TB-20 only)

Landing gear fails to retract

Landing gear lever	CHECK UP
'LDG GEAR' circuit breaker	CHECK CLOSED
Emergency landing gear control	CHECKED PUSHED

If landing gear fails to retract:

'LDG GEAR' circuit breaker	PULL OFF
Landing gear lever	DOWN
'LDG GEAR' circuit breaker	PUSH
Landing gear lights	CHECK GREEN ON
Maximum airspeed	139 KIAS

Continue flight with landing gear down.

Landing gear fails to extend

Main switch	ON
Landing gear lever	DOWN
'LDG GEAR' circuit breaker	CHECK CLOSED
Landing gear lights	PRESS TEST AND CHECK FOR ILLUMINATION
Flaps	TAKEOFF
Airspeed	97 KIAS

If landing gear fails to extend:

Landing gear lever	UP
‘LDG GEAR’ circuit breaker	OPEN
Landing gear lever	DOWN
Emergency landing gear control	PULL
Gear down (green) lights	ON
Gear in transit (red) light	OFF

If all electrical power has been lost, the landing gear must be extended using the above procedures. The gear position indicator lights will not illuminate.

Landing without stabilator control

The aircraft must be flown using pitch trim and throttle inputs.

Airspeed	80 KIAS
Flaps	LANDING
Landing gear lever (TB-20 only)	DOWN
Fuel pump	ON
Mixture	FULL RICH
Propeller	HIGH RPM
Throttle and pitch trim	ADJUST TO MAINTAIN A RATE OF DESCENT LOWER THAN 500 FT/MIN
Flare	FLARE USING PITCH TRIM

Radio master switch failure

If electrical power is available and the RADIO MASTER switch is selected ON, but the radio equipment is unpowered:

‘R.M. SWITCH’ circuit breaker	OPEN

Power to the radio equipment will be restored and the flight can be continued as normal.

Electrical failures

Electrical equipment failure

Check the circuit breakers panel. If the circuit breaker is open, close it only once. If it opens again do not try to close the circuit breaker as the equipment has failed.

Alternator failure

ALTr warning light	CONFIRM ON
Voltmeter:	
• Green sector	CONTINUE FLYING
• Red/yellow sector	ALTr FLD switch breaker to OFF then ON
ALTr warning light	REMAINS ON
ALTr FLD switch breaker	OFF
Non-essential electrical load items	OFF

Flight endurance is reduced as electrical power is only supplied by the battery.

The use of the normal landing gear extension may induce a total electrical failure. For landing gear extension, use the emergency system.

Airspeed indicating system failure

In case of erroneous indications in flight:

Pitot heat	ON
Alternate static source	PULL

If erroneous indications persist, carry out a precautionary approach maintaining an adequate airspeed margin above stall warning activation speed.

Flap failure

Flaps circuit breaker	OPEN
Flaps control	ACTUATED

If the procedure is not successful, perform the same operations as for a normal landing but maintain a 90 KIAS approach speed and plan a landing distance increased by approximately 60%.

Involuntary spin

Intentional spins are prohibited. However, should an inadvertent spin occur, the following recovering procedure is recommended:

Throttle	IDLE
Rudder control	HOLD OPPOSITE DIRECTION OF ROTATION
Stabilator control	FULL FORWARD
Ailerons	NEUTRAL
Flaps	UP (if extended)

When spinning stops, centralise rudder, level the wings and ease out of the dive.

CREDITS

Just Flight

Project management	Martyn Northall, John Hodgson
Aircraft modelling and design	I.D.S, Mark Griffiths
Sounds	Turbine Sound Studios
Manual	Martyn Northall, John Hodgson
Design	Fink Creative

Thranda Design

Project management, animation, UI, PBR, lighting, special effects	Daniel Klaue
Sound design (FMOD multi-track audio engineering), flight dynamics	Daniel Klaue, Josh McCreary
Programming	Daniel Klaue, Erick Stromback
Testing and logic	Erick Stromback

Thank you to the Just Flight/Thranda testing team.

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