Sivel SD-27

Technical Overview

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1. Introduction

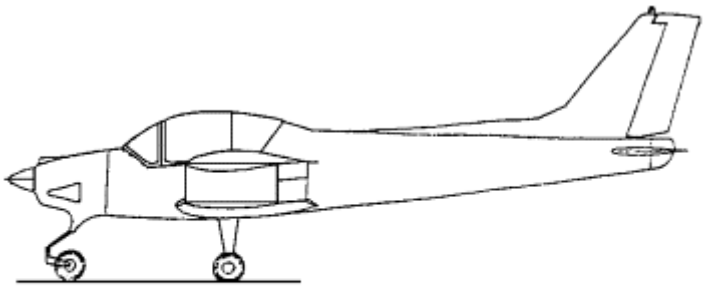
The SD 27 is a monoplane, middle-low wing, two seats, fixed landing gear training aeroplane. It is specifically for the needs of the civil primary training schools, surveillance operations and of the general aviation pilot. It has low acquisition and operation costs.

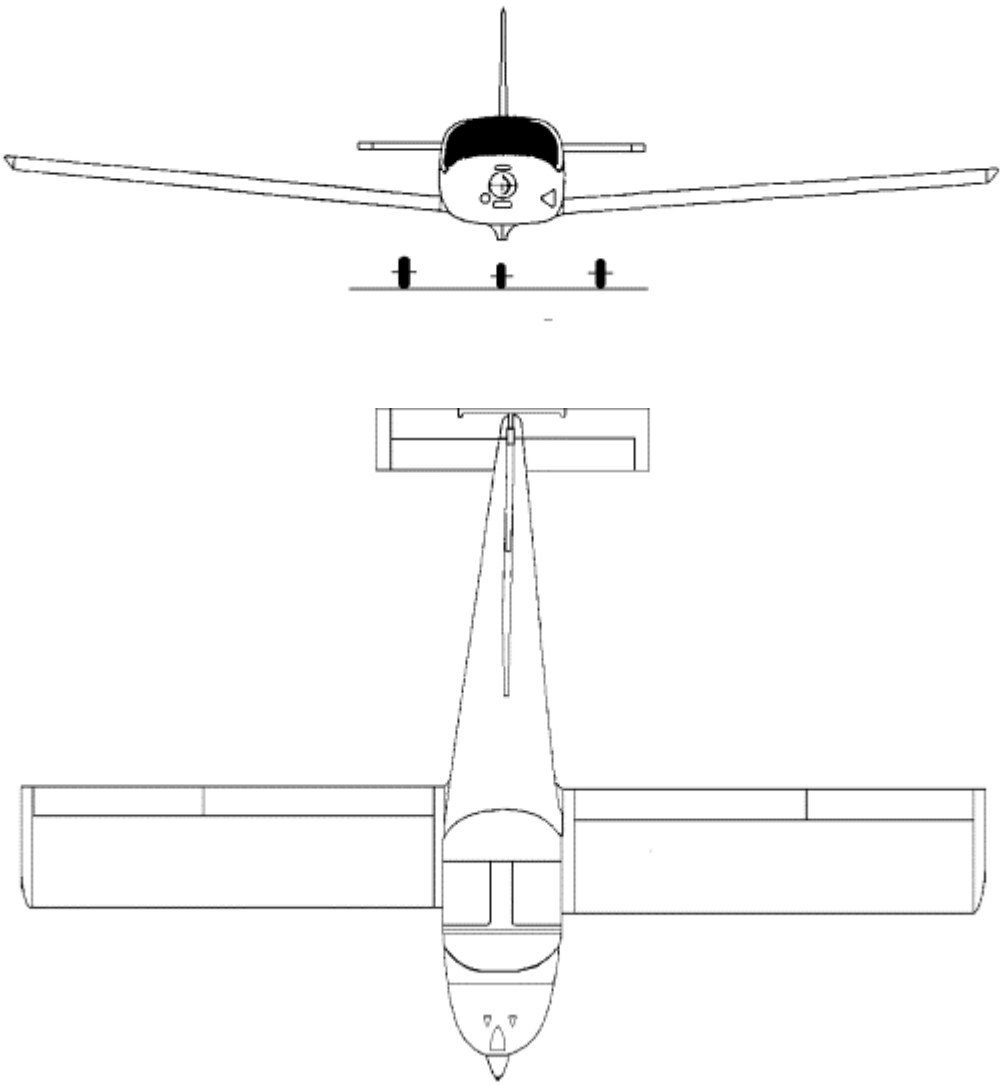
The following are the main characteristics of the SD 27:

- a cabin that can accommodate 2 big adults in a comfortable side-by-side layout
- allow the installation of electronic equipment and avionics suited for the goals
- follows the requirements for certification under JAR-VLA (Joint Aviation Requirements - Very Light Aeroplane) as far as structural strength, flight qualities and equipments are concerned
- underwent an accurate aerodynamic study to obtain good performance
- can perform all instructional maneuvers including spin.

The aircraft is designed and tested for load factors of + 4,4 and - 1,76.

Three view-drawing





2. Data

2.1. Dimensions

- Wing span 10 m.
- Length 7,1 m.
- Height 3 m.
- Wing chord 1,25 m.
- Wing area 12,5 m^2.

2.2. Landing gear

- Tricycle
- Shock absorber nose gear: leaf spring,
  main gear: leaf spring.
- Main wheels 500 - 5, 2,2 atm.
- Nose wheel 400 - 5, 1,8 atm.

2.3. Power plant

- Engine ROTAX 912 A, 80 hp.
- Fuel Gasoline, Avgas 100 LL.
- Oil Synthetic oil for car, not aeronautical oil.

2.4 Propeller

- Type MTV-1-A/170-08, electrical variable pitch
- Diameter 1,70 m
- Propeller governor MT Propeller p/n P-210-A/2500.

2.5. Fuel tank

- Tank capacity 80 liters.
- Usable 78 liters.
- Not usable 2 liters.

2.6. Weights

- Empty weight 420 kg
- Maximum take off weight 620 kg

2.7. Performance

- Max level speed 105 kts
- Cruise speed 95 kts
- Stall speed (flaps up) 50 kts
- Stall speed (flaps down) 43 kts
- Rate of climb (sea-level) 900 ft/min

3. Structure

Most components of the Sivel SD 27, as can be seen in fig. 1, are made in aluminium, except some parts that are made in composite. The framework is in welded steel tube recovered by composite.

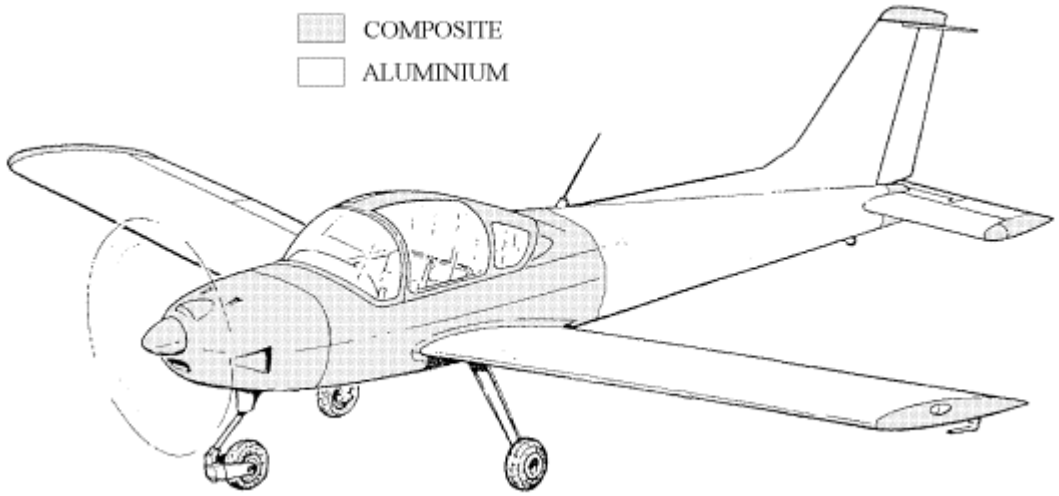


Fig. 1

3.1. Fuselage

The engine is accommodated in the front fuselage, mounted on a cantilevered welded tubular steel frame. Access is provided by removable top and bottom cowlings.

The fuselage can be divided in other two different sections:

1. The first section starts from the firewall to the fuel tank included. This section is the framework and, as we said before, it is made in welded steel tube. Here we have the cockpit. It is a generous size one, with very good visibility and a low noise level. There are one stick and a couple of rudder pedals for each occupant. The control brakes are mounted on the rudder pedals. The two seats are mounted side by side; the fuel tank is just behind them. Over the fuel tank there is the baggage compartment.

2. The second section, the tail, starts from the framework, not included, to the end of the aeroplane. It is composed by 5 ribs, 4 spars made in aluminium. It is covered by aluminium. Inside there are the pulleys and the cables to control the rudder and the elevator; there are also the cables for the antenna, the anticollision beacon and the white navigation light. At the end of the tail there are the horizontal and vertical surfaces.

3.2 Wing

The SD 27 has a middle-low, rectangular wing. It is made by two half-wings. These are connected with the framework by three attachments, one for each spar: one main spar and two secondary spars. The half-wing is also composed by one aileron and one flap.

3.2.1. Half-Wing

It is composed by one main spar, one secondary front spar, one secondary rear spar and ten pressed ribs. It is recovered by aluminium. On the rear spar there are the attachments for the aileron and the flap. At the end of each half-wing there is one navigation light mounted in the composite wig-tip. All these parts are united by rivets.

3.2.2. Flap

It is composed by one spar and nine ribs in aluminium. On the spar there are the attachments for the half-wing. It is recovered by aluminium and all the parts are united by rivets.

3.2.3. Aileron

It is made by one spar and seven ribs in aluminium. On the spar are positioned the attachments for the half-wing. At the end of the aileron there is one counterweight. The aileron is recovered by aluminium and all the parts are united by rivets.

3.3. Empennage

The empennage has a conventional design with one fin, one rudder, one stabiliser and one elevator.

3.4. Stabiliser

It is formed by two spars and eight ribs in aluminium. On the rear spar there are three attachments for the elevator. It is recovered by aluminium and all the parts are united by rivets.

3.5. Elevator

It is composed by one spar and ten ribs in aluminium. On the spar there are the three attachments for the stabiliser. At the end of the elevator there are two tip made in composite. The elevator is recovered by aluminium and all the parts are united by rivets.

3.5.1. Trim

It is positioned in the central zone of the elevator trailing edge. It is composed by one spar and six ribs in aluminium. At the end of the trim there are two counterweights. On the spar there are the three attachments for the elevator. The trim is recovered by aluminium and all the parts are united by rivets.

3.6. Fin

It is composed by two spars and four ribs in aluminium. At the end of the two spars there are four attachments for the tail cone. On the rear spar there are also mounted the attachments for the rudder. There is a composite part on the top of the fin when there is the anticollision beacon. It is recovered by aluminium and all the parts are united by rivets.

3.7. Rudder

It is composed by one spar and four ribs (on the higher one there is a counterweight) in aluminium. On the higher part of the spar there are the attachments for the fin; instead on the lower part there is the torque tube to control the rudder. It is recovered by aluminium and all the parts are united by rivets.

3.8. Landing gear

It is a tricycle one formed by the nose landing gear and the main landing gear is just under the wing. The first one is connected with the firewall, instead the second is connected with the framework by attachments.

The brakes are on the two wheels of the main landing gear.

4. Systems

4.1. Electrical system

It is composed by a generator that provides a direct current (DC) at 14 V and 18,5 A; and by a battery 12 V, 18,5 A. The aeroplane has also an external power supply system to start the engine. Every electrical circuit has a breaker to protect the avionics and all the system.

There is one main bus that energises the engine instrument, the auxiliary fuel pump, the propeller governor, and the turn and bank indicator.

Then there is an avionic bus which energises all the avionics.

There is also a secondary bus that energises the anticollision beacon and the navigation lights.

4.2. Flight controls

All the control surfaces are controlled by stick and rudder pedals.

The elevator and the rudder are actuated by cables. The flaps are moved by push-pull rods. Instead the ailerons are driven by push-pull rods in the fuselage, and by cables in the wing.

Between the two seats there is the flap lever with the take-off and landing position marked. In this position there is also the trim tab to control the aeroplane around its pitch axis.

4.3. Fuel system

This system is composed by an aluminium fuel tank (capacity 80 liters), a filter with its drain valve, a shut-off valve (for emergency situations) located inside the cabin, an electrical auxiliary fuel pump, a mechanical fuel pump mounted on the engine, one televel and a low fuel pressure light on the instrument panel.

4.4. Instrument panel

The SD 27 instrument panel is quite big, so a lot of instruments and avionics can be installed on.

The engine instruments are mounted on the left: RPM indicator; cylinder head, oil and coolant fluid temperature indicator, oil pressure and MAP indicator; one televel, one voltmeter and one loadmeter. In the center there are radio and avionics equipment: one COM and NAV, VOR/ILS and transponder. On the right there are the flight instruments: airspeed indicator, a barometric altimeter, a vertical speed indicator, a artificial horizon, a directional gyro, a turn and bank indicator and a suction gauge. The compass is on the top of the panel, in central position (see figure n.2). On the right there is also the propeller control panel.

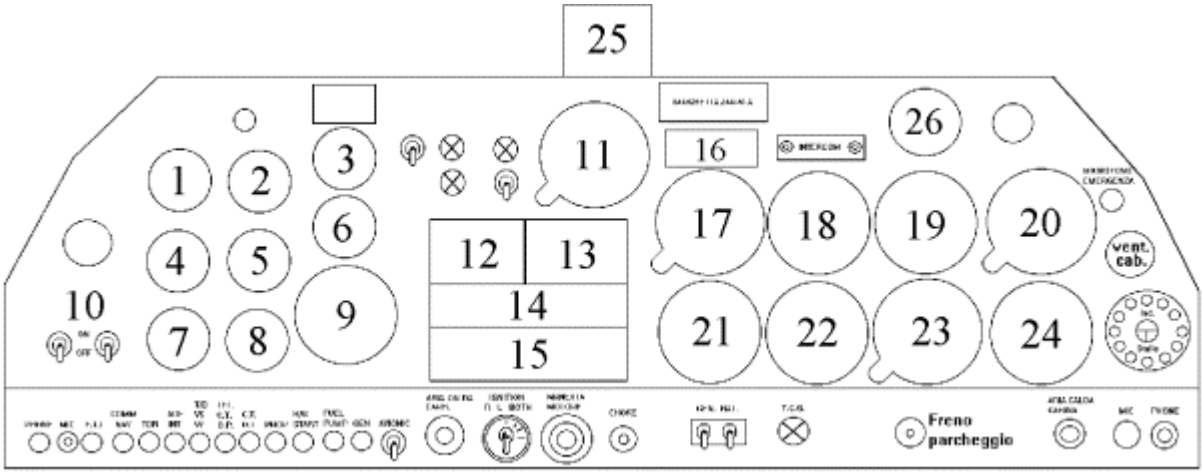


Fig. 2

1. Head Cylinder Temperature
2. Oil Temperature
3. Coolant Fluid Temperature
4. Televel
5. Oil Pressure
6. MAP
7. Loadmeter
8. Voltmeter
9. RPM
10. Navigation Lights
11. ADF
12. COMM
13. NAV Control Panel
14. ADF Control Panel
15. Transponder
16. Propeller Control
17. VOR/ILS
18. Airspeed Indicator
19. Artificial Horizon
20. Altimeter
21. Micro Encoder
22. Turn & Bank Indicator
23. Directional Gyro
24. Vertical Speed Indicator
25. Compass
26. Vacuum

4.5. Engine

The SD 27 is equipped by a four-cylinder in horizontal opposite position (boxer), four-stroke engine made by Rotax. It has two carburettors and a mixed air/water cooling system: air for the cylinder and water for the cylinder heads.

It has a double ignition system without magnetos and has also an electric starter system.

The propeller reduction gear, the fuel and vacuum pump and the generator are installed on the engine.

4.5.1. Engine data

Take-off performance	80 Hp at 5800 rpm
Max. continuos power	78 HP at 5500 rpm
Bore	79,5 mm
Stroke	61 mm
Displacement	1211 cm^3
Compression ratio	9:1
Empty weight	57 kg
Fuel	Gasoline, Avgas 100 LL

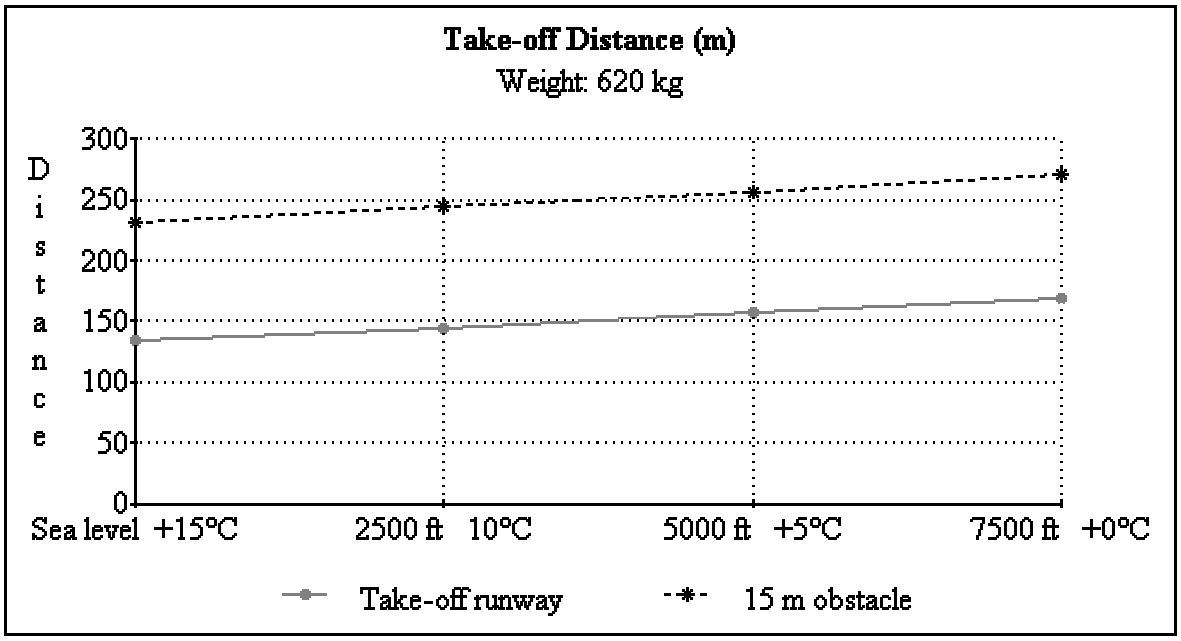
4.6. Propeller

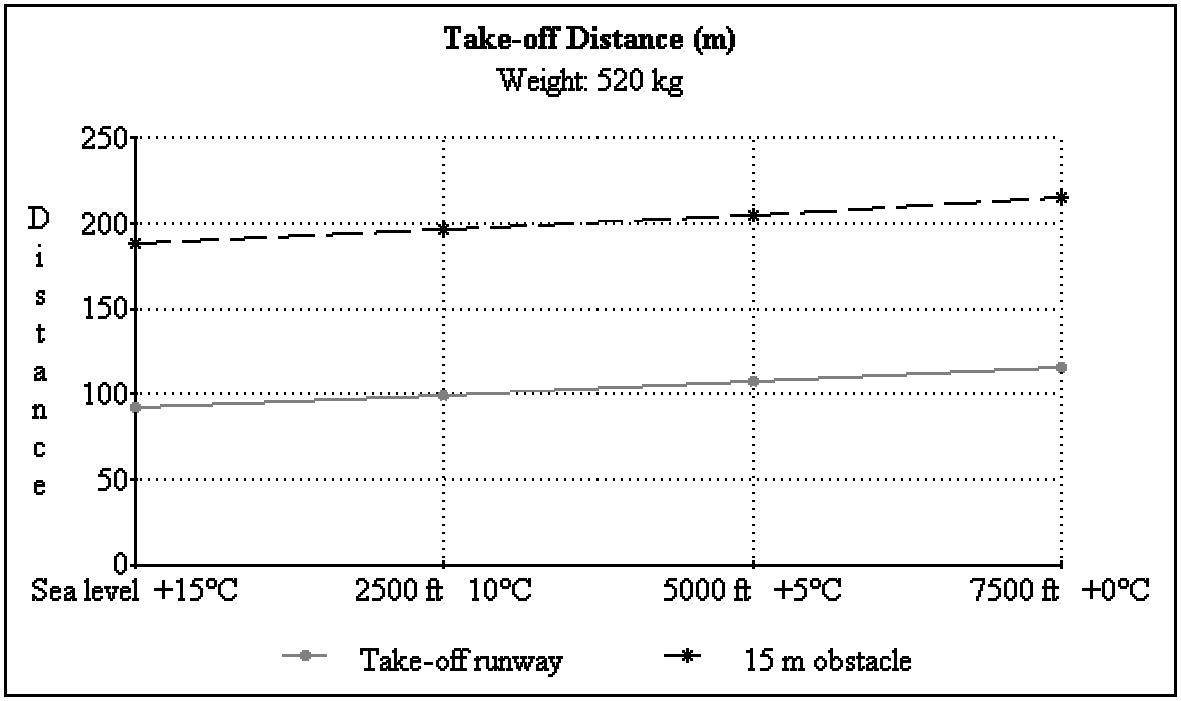
The SD 27 is equipped with two blades, variable pitch propeller made by MT-Propeller (Germany). An electrical system controls the pitch propeller, and the control is installed on the instrument panel, on the right.

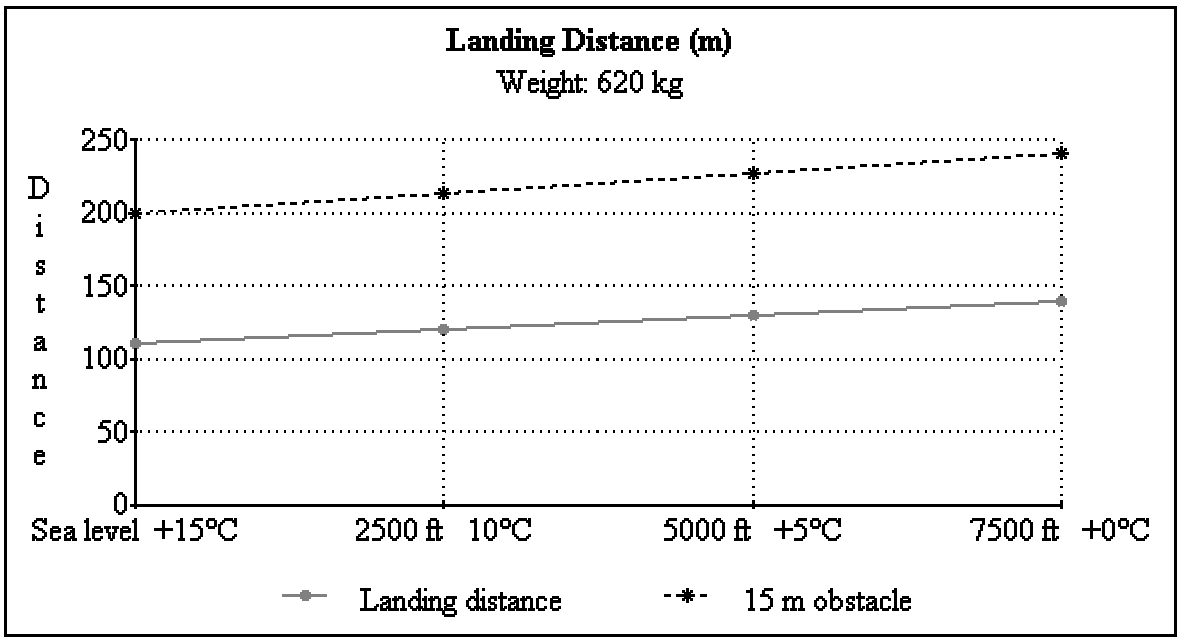
The propeller can be used in manual or automatic position. So the pilot, using the first mode, can select the propeller pitch.

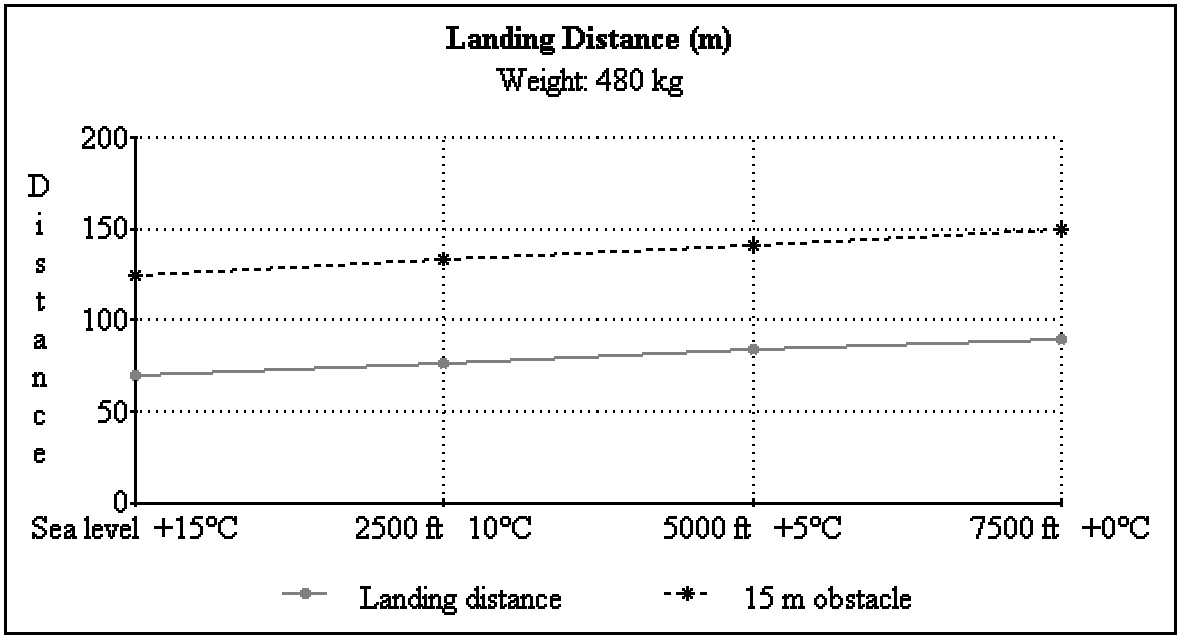
5. Performance

5.1. Take-off and landing distance

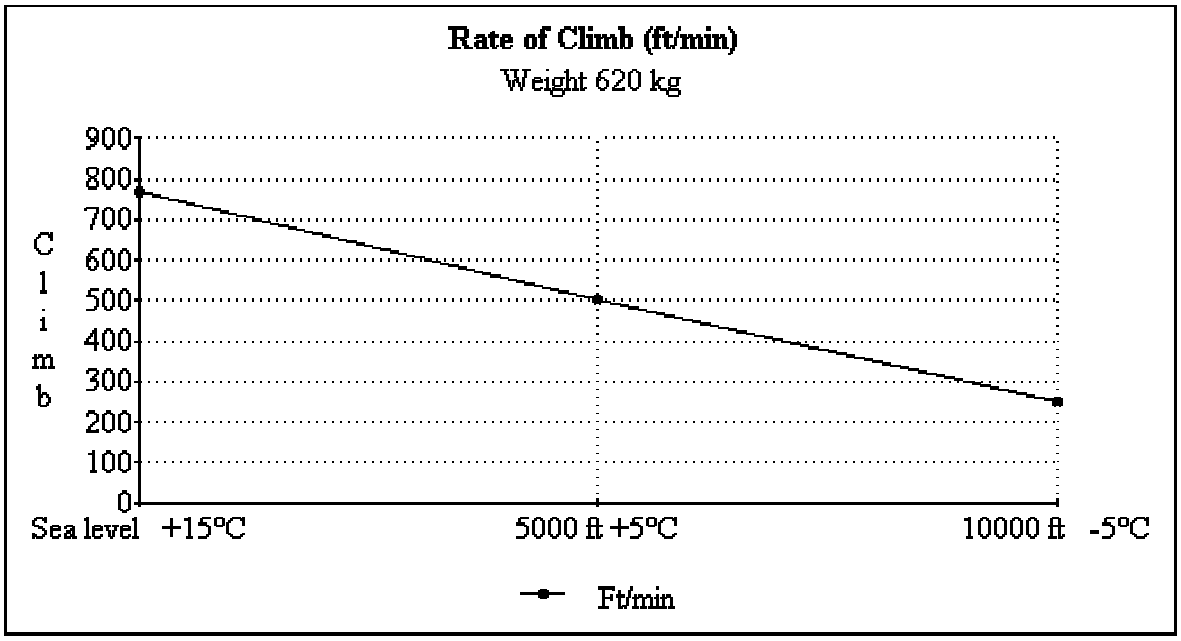


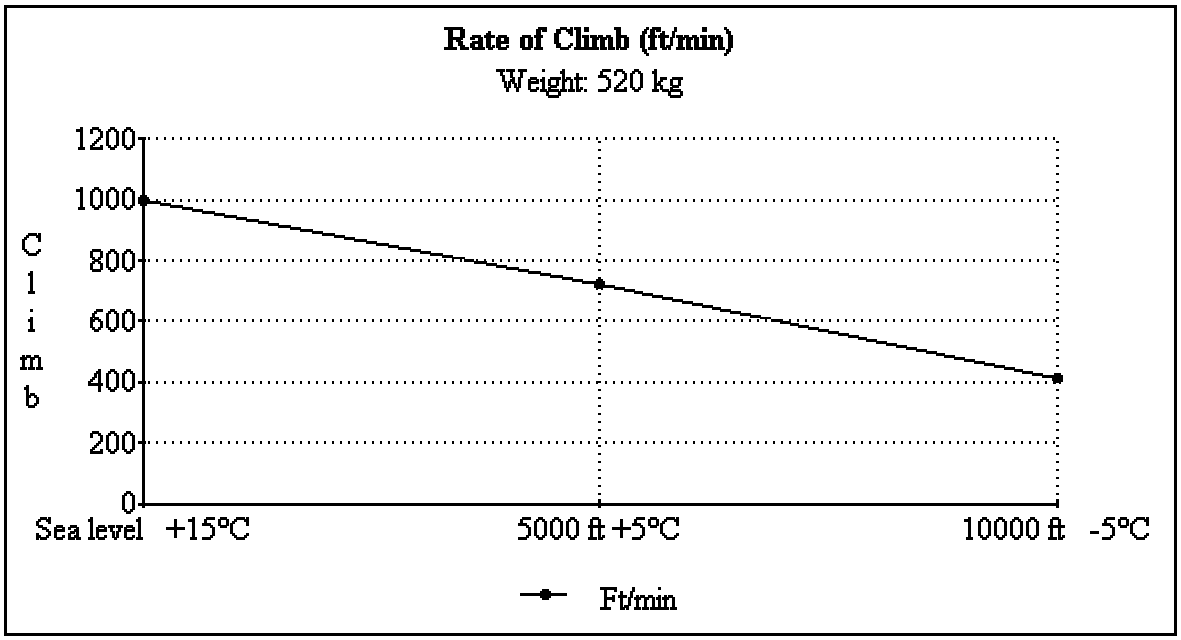



Landing Distance (m)
Weight: 620 kg
Distance
250
200
150
100
50
0
Sea level +15°C
2500 ft 10°C
5000 ft +5°C
7500 ft +0°C
Landing distance
15 m obstacle


Landing Distance (m)
Weight: 480 kg
Distance
200
150
100
50
0
Sea level +15°C
2500 ft 10°C
5000 ft +5°C
7500 ft +0°C
Landing distance
15 m obstacle

5.2. Climb Performance





5.3. Cruise speed

Conditions:

- Weight 620 kg

- No wind

- Altitude: 1500 ft

Engine rpm	MAP Inches Hg	Percent Power	Speed KTAS	Fuel (l/h)	Endurance (h)	Range Nm	Km
5500	27.5	90	100	20	3h 54m	390	722
	26.5	85	98	19	4h 06m	402	745
	25	79	95	17.8	4h 23m	416	771
	24	75	93	17	4h 35m	426	789
5300	27.5	84	96	18.8	4h 09m	398	737
	26.5	80	95	18	4h 20m	411	761
	25	74	92	16.8	4h 38m	427	791
	24	70	90	16	4h 52m	438	812
5000	27.5	75	93	17	4h 35m	426	789
	26.5	72	92	16.2	4h 49m	443	821
	25	66	89	15	5h 12m	463	858
	24	62	87	14.3	5h 27m	474	878
4800	27.5	67	91	15.4	5h 04m	461	854
	26.5	65	89	15	5h 12m	462	854
	25	50	86	14	5h 34m	479	888
	24	57	84.5	13.4	5h 49m	492	912

Conditions:

- Weight 620 kg

- No wind

- Altitude: 5000 ft

Engine rpm	MAP Inches Hg	Percent Power	Speed KTAS	Fuel (l/h)	Endurance (h)	Range Nm	Range Km
5500	24	78	98	17.6	4h 26m	434	803
	23	73	96	16.6	4h 42m	451	835
	22	69	94	15.8	4h 56m	463	857
	21	65	92	15	5h 12m	478	885
5300	24	73	95	16.6	4h 42m	446	825
	23	70	94	16	4h 52m	457	846
	22	65	91	15	5h 12m	473	875
	21	61	89	14.2	5h 29m	488	903
5000	24	66	92	15.2	5h 08m	472	874
	23	62	89	14.4	5h 25m	482	892
	22	58	87	13.6	5h 44m	498	922
	21	55	85	13	6h 00m	510	944
4800	24	60	89	14	5h 34m	495	916
	23	56	87	13.2	5h 54m	513	950
	22	53	84	12.6	6h 11m	519	961
	21	50	82	12	6h 30m	533	987

Conditions:

- Weight: 620 kg

- No wind

- Altitude: 10000 ft

Engine rpm	MAP Inches Hg	Percent Power	Speed KTAS	Fuel (l/h)	Endurance (h)	Range Nm	Range Km
5500	20	64	98	14.8	5h 16m	516	955
	19	59	96	13.8	5h 39m	542	1003
	18	55	92	13	6h 00m	552	1022
	17	51	90	12.2	6h 24m	576	1066
5300	20	60	96	14	5h 34m	534	988
	19	56	93	13.2	5h 54m	548	1014
	18	52	91	12.4	6h 17m	571	1057
	17	48	88	11.6	6h 43m	591	1094
5000	20	55	92	13	6h 00m	552	1022
	19	51	89	12.2	6h 24m	569	1053
	18	48	87	11.6	6h 43m	584	1081
	17	44	81	10.8	7h 13m	584	1081
4800	20	50	89	12	6h 30m	578	1070
	19	47	86	11.4	6h 50m	587	1087
	18	43	79	10.6	7h 21m	580	1074
	17	42	76	10.2	7h 32m	572	1059

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