

<u>1.1 Contents</u>	<u>Page</u>
<u>1. General</u>	
1.1 Contents	2
1.2 Revisions	3
1.3 Photo	4
1.4 3 - View - Drawings	5
<u>2. Operating Limitations</u>	
2.1 Basis of Certification	6
2.2 Speed Limits	6
2.3 Engine Limits	7
2.4 Crew	7
2.5 Weight	8
2.6 C.G. Flight Limits	8
2.7 Manoeuvres	10
2.8 Operating	11
<u>3. Operating Procedures</u>	
3.1 Normal Procedures	12
3.2 Emergency Procedures	19
<u>4. Performance</u>	20

- Appendix: 1: Weight and Balance
2: Loading Charts
3: Take-off Distances

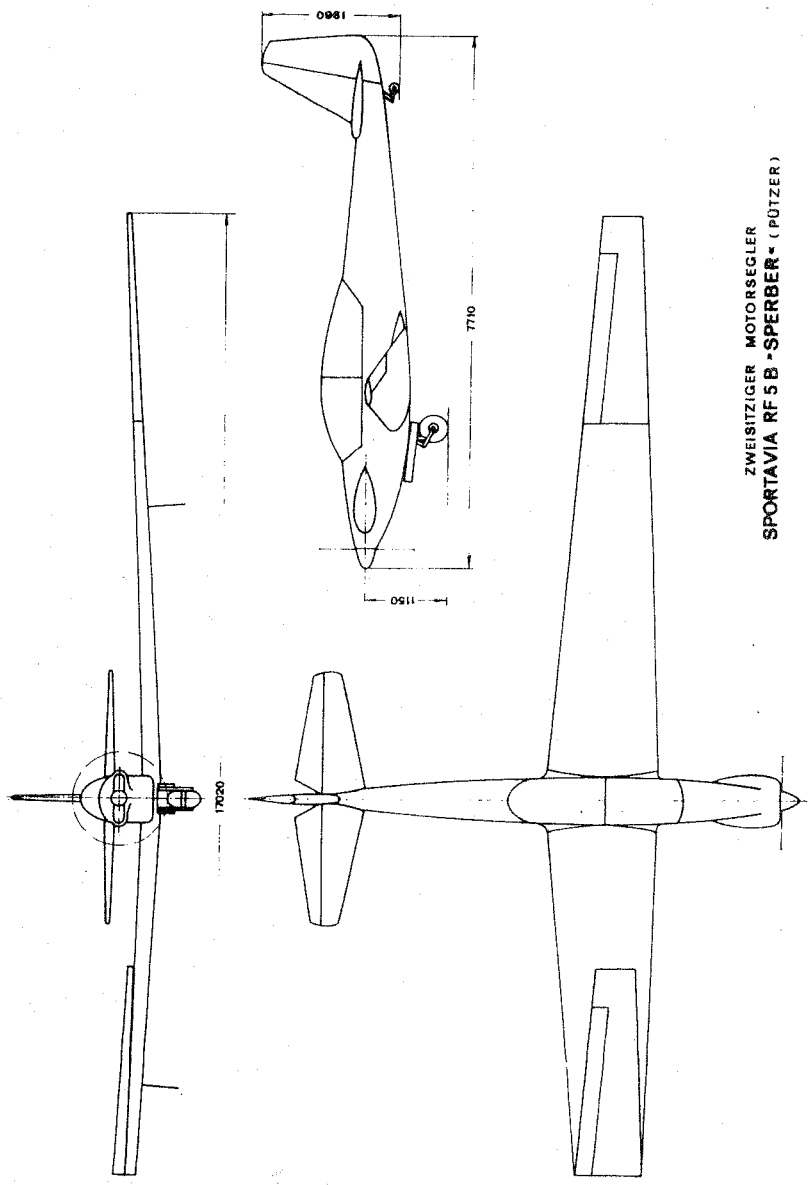
1.2 Revisions

No.	Page	Contents of revision	Date	Signatur
1	9, 10, 2/2	Baggage	2-5-72	
2	7	Oil pressure and specification	1-8-72	

1.3 Photo



3 - View - Drawing



ZWEISITZIGER MOTORSEGLER
SPORTAVIA RF 5 B - SPERBER (PÖTZER)

0-19

2. Operating Limitations

2.1 Basis of Certification

The RF 5 B - SPERBER is certified on the basis of:

- a) Requirements for Approval and Certification of Powered Gliders (LBA - Mitteilung 10.05, edition January 8, 1959 incl. amendments of April 14, 1967)
- b) Summary of Requirements for Flight Characteristics of Powered Gliders (LBA - Mitteilung 10.05 - 1, edition February 23, 1971)
- c) Airworthiness Requirements for Gliders (LFS, Edition February 1966 incl. amendments of May 25, 1966 and August 7, 1967).

Category: Normal Powered Glider, Self launching
Aerobatics and Cloud Flying not allowed.

2.2 Speed Limits (IAS)

	<u>km/h</u>	<u>mph</u>
V _{NE} - never exceed speed	225	140
V _A - Manoeuvring speed	165	103
V _{FE} - max. spoiler extended speed	225	140
V _{LE} - max. landing gear extended speed	225	140
V _{LO} - max. landing gear operating speed	130	81
V _{SO} - stalling speed spoiler extended	72	45
V _{S1} - stalling speed spoiler retracted	68	42

Markings on A.S.I.

Red line (max. speed)	225 km/h	140 mph
Yellow arc (caution range)	165...225 km/h	103...140 mph
Green arc (normal operating range)	70...165 km/h	44...103 mph
White arc (spoiler extended range)	75...225 km/h	47...140 mph

2.3 Engine LimitsEngine: SPORTAVIA - Limbach SL 1700 EEngine rpm

max. rpm	(red line)	3600 rpm
caution range	(yellow arc)	3200...3600 rpm
Normal operating range	(green arc)	700...3200 rpm

Propeller: Hoffmann HO 11 - 145 - B 80 L

Run up rpm: 2800 rpm + 100

Fuel: 100/130 octane aviation fuel max. 38 l (8,4 Imp. Gall)Oil specification:

Oil	Air temperature	Specification	
Motoroil of well - known trademarks, e.g.	more than 20°C	SAE 40	SAE 20 W/40
		SAE 30	Multigrade
Shell - BP - Esso	0°C to 20°C	SAE 20 W/40 Multigrade	
etc.	below 0°C	SAE 10 W/30 Multigrade	

Oil content

min. 1,5 l (0,33 Imp. Gall.) max. 2,5 l (0,55 Imp. Gall)

Oil temperature

max. oil temperature	(red line)	120°C
normal operating range	(green arc)	50...120°C
min. oil temperature	(red line)	50°C

Oil pressureoperating range (green arc, limited by red lines) 1,0...4,0 kp/cm²**2.4** Crew

crew	2 persons
min. crew	1 person indispensable minimum of weight 55 kp (121 lbs)

Important:For single crew operating the pilot must occupy the front seat.
Automatic parachute-lines to be fixed at left harness bracket.

2.5 Weight

max. permissible T.O. weight	680 kp (1500 lbs)
empty weight (standard equipment) about	475 kp (1050 lbs)
payload about	205 kp (450 lbs)

Payload consists of fuel (max. 28 kp $\hat{=}$ 62 lbs),
baggage (max. 5 kp $\hat{=}$ 11 lbs) and crew.

2.6 C.G. Flight Limits

Aircraft position: upper stringer of fuselage (cockpit frame)
horizontal

Datum: 200 cm (6,56 ft) in front of leading
edge of wing section 29 cm (0,95 ft)
from centre line of the aircraft (side wall)

max. forward c.g. : 233,5 cm (7,66 ft) aft datum

max. aft c.g. : 253,7 (8,31 ft) aft datum

Loading

Incorrect loading may spoil flying qualities and performance and cause dangerous manoeuvres. The pilot should pay special regard to correct loading.

The empty weight and its c.g. position shows little difference in serial production, but can differ more with additional equipment (radio, navigation aids, oxygen etc.)

In order to obtain the correct c.g. in flight one should know each item's weight and its distance to datum. Multiplying item weight by its distance to datum the moment is found. Summary of moments divided by the weight results in the c.g. position of the loading in question.

In order to simplify this calculation one can use the loading charts in Appendix 2.

The following example shows how to proceed:

1. Take empty weight and its moment from weight and balance sheet in Appendix 1

example: empty weight 473,6 kp
 its moment 1137,533 mkp

2. Take from loading charts 1 and 2 (Appendix 2) for each part of the payload the moment concerned:

Example:

	Weights	Moments
fuel max. (38 l . . 0,72 kp/l	28 kp	38,7 mkp
front pilot	30 kp	174,0 mkp
front parachute	7 kp	17,5 mkp
aft pilot	80 kp	265,0 mkp
aft parachute	7 kp	25,0 mkp
baggage	4 kp	32,0 mkp
	<hr/> 206 kp	<hr/> 552,2 mkp

3. Add the partial loads and moments to the empty weight and its moment and you have total weight and its moment.

With these figures consult chart 3 (Appendix 2) and you will see, if you are within the permissible range or not.

In the case of the total weight moment being out of the permissible range the payload distribution must be changed or ballast (e.g. sand- or lead cushion) must be used.

When total weight moment is outside the forward limit you should put ballast into the aft seat or into the baggage compartment.

When total weight moment is outside the aft limit you should put ballast into the front seat or remove baggage from its compartment.

In any case with the new partial load the check must be done as before, in order to ensure you are within the permissible range of moment, which means within the permissible c.g. range. Be careful not to exceed the weight limits (max. T.O. weight, max. baggage).

Our example results in:

	Weights	Moments
partial loads	206,0 kp	552,2 mkp
empty weight	<u>473,6 kp</u>	<u>1137,5 mkp</u>
	679,6 kp	1689,7 mkp

Checking in chart 3 you can see that you are within the permissible range for the total weight moment.

Because of the fuel consumption the c.g. is moving backward while the engine is running. Therefore you should do the above check once again leaving the fuel weight and moment away. If you are within the permissible range of moment again, you are sure not to leave the permissible c.g. range in flight.

Our example	Weights	Moments
partial loads	206,0 kp	552,2 mkp
minus fuel	- 28,0 kp	- 38,7 mkp
	178,0 kp	513,5 mkp
empty weight	<u>473,6 kp</u>	<u>1137,5 mkp</u>
	651,6 kp	1651,0 mkp

Checking in chart 3 you can see that the payload and its distribution is o.k.

2.7 Manoeuvres

2.7.1 Gliding Flight (engine stopped, spoiler retracted)

1. Stalling straight ahead

- Stalling speed 68 km/h (42 mph)
- Warning by buffeting of the stabilizer at the speed of 75 km/h (47 mph), controls getting weak.
- Generally stall is followed by nose dropping
- Recovery is effected by pushing forward on the stick
- One can pilot the "Sperber" up to the stalling speed
- The "Sperber" will not spin easily
- The loss of height will be less than 30 m (100 ft)

2. Stalling in 30° banked turns

- Stalling speed 75 km/h (47 mph)
- The aircraft rolls toward level flight when stall occurs
- At stalling speed with a bank angle of 30° the aircraft can be brought back to level flight with normal manoeuvres.

2.7.2 Power Flight(engine idling, landing gear down, spoiler extended)

- Stalling speed 75 km/h (47 mph)
- Warning by buffeting of the stabilizer at the speed of 80 - 85 km/h (50-53 mph)

The buffeting increases as the stall is approached.

- Generally stall is followed by nose dropping
- Recover is effected by pushing forward on the stick
- One can pilot the "Sperber" up to the stalling speed
- The "Sperber" will not spin easily

2. Stalling in sloping position with an angle of 30°

- Stalling speed 80 km/h (50 mph)
- Further stalling characteristics as in gliding flight

It is difficult to make the SPERBER spin at mid or forward C.G. 's. When spinning, the SPERBER recovers by itself after one turn.

At aft C.G. 's the SPERBER can be made to spin more readily. When spin recover action is taken, the SPERBER recovers in less than a half turn.

2.8 Operating

The aircraft may be operated for VFR - flights in daylight with following minimum equipment:

2 airspeed indicators	1 oil temperature indicator
2 altimeters	1 fuel storage indicator
1 rpm indicator	2 safety harnesses (4-point-type)
1 oil pressure indicator	2 back cushions

Flights under IFR - and/or icing conditions are not permitted.

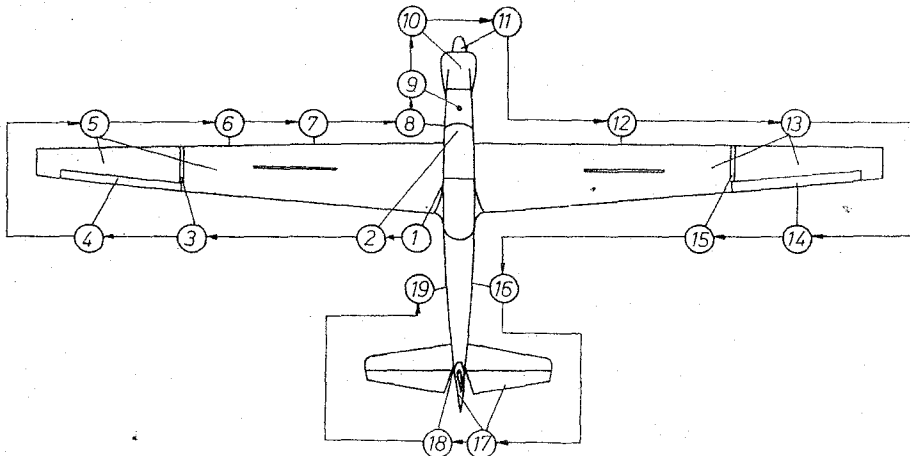
Aerobatics and Cloud Flying is not allowed.

Selflaunching Powered Glider.

3. Operating Procedures

3.1 Normal Procedures

3.1.1 Ground Check



1. Unlock and open canopy.
2. Check: Ignition switch OFF, Master switch OFF, Throttle closed, Fuel cock closed.
3. Fold out the outer part of the wings and lock them. Check the locking device, apply the wing fairing and secure it.
4. Check the aileron for play and freedom of movement. Check the securing.
5. Check the surface with regard to damage and rents.
6. Check outrigger wheels. *servelle*
7. Inspect pitot opening for foreign particles.
8. Check the main landing gear, Shock-absorber, air-pressure, skid marks, abrasion, bowden-cable of the parking brake, undercarriage doors.
9. Check the fuel, the vent-hole must show in to the flight direction, inspect the fuel storage indicator for freedom of movement.

H. Stator

10. Remove cowling, check oil level with tail-wheel on the ground,
min. 1,5 l (0,33 Imp. Gal.)
max. 2,5 l (0,55 Imp. Gal.)

Upper level is the mark, the lowest level is 1 mm above the end of dipstick.

Check engine suspension, spark-plug and ignition harness.
Inspect the alternator-belt, exhaust with regard to rents.

11. Check propeller and spinner for cracks, nicks and security.
12. as 6.
13. as 5.
14. as 4.
15. as 3.
16. Inspect the static source for foreign particles.
17. Check elevator and rudder for freedom of movement and security.
18. Check tail wheel and tail wheel springs.
19. as 16.

For extensive checks see Maintenance Manual!

3.1.2 Before Starting Engine

1. Canopy closed and locked.
2. Sitting position arranged (cushion, parachute)
3. Safety belts adjusted and locked.
4. Brake ON.
5. Check all controls for operation.
6. Spoiler checked and locked.
7. Fuel cock ON.
8. Radio OFF.

3.1.3 Starting Engine

I. In summer conditions:

1. Main fuse and master switch ON.
2. Throttle 2 cm (3/4 inch) open.
3. Ignition ON (check aft panel "ON" also)
4. Pull starter and release immediately, when the engine fires.
5. Inspect oil pressure. If no pressure indication in 30 seconds, shut engine down and determine trouble.

II. In winter conditions:

(Temperature less than $8^{\circ}\text{C} \approx 46,5^{\circ}\text{F}$)

In addition to all items of I; Pull choke before starting engine

III. Restarting Engine in Flight after a longer Gliding

1. Mainfuse and master switch ON.
2. Throttle 1/3 open.
3. Choke ON.
4. Ignition ON.
5. Pull starter and release immediately, when the engine fires.
6. Inspect oil pressure.
7. Choke OFF. *also*
8. Warming up at 2200...2500 rpm until oiltemperature is min. 50°C (122°F).

3.1.4 Engine Run - Up

1. 1200 - 1500 rpm
2. Oil temperature min. 50°C (122°F)
3. Full throttle check with brake on, minimum rpm's 2700 engine is ready for take - off, when it will take full throttle without hesitating or faltering.
4. In the winter the choke is pulled until the engine will run without faltering without the choke. Warming up not longer than five minutes. It is only necessary that it will take full throttle without hesitating. After 5 min ground run the oil temperature will increase insignificantly only.

3.1.5 Taxying

1. Release brake by turning handgrip horizontal and pushing forward.
2. Open throttle slowly.
3. If the SPERBER will not move at part throttle, apply full rudder left and right. Once moving use throttle as required for taxiing.
4. Taxi slowly and follow a zigzag course for a better observation of the taxiway (especially on grassfield).
5. Keep clear of obstacles.
6. Avoid quick sharp turns.

3.1.6 Before Take - off

1. Canopy in front and in the rear closed and locked.
2. Controls fully moveable and free in correct sense.
3. Spoiler locked.
4. Trim adjusted.
5. Flight instruments set.
6. Engine instruments normal.
7. Brake fully released.

3.1.7 Take - off

I. Usual Take - off on a grass runway

1. Open throttle gently.
2. Keep direction with small deflections of rudder. The rudder and the tail wheel are connected by springs.
3. Keep the wings horizontal, but avoid overloading the outriggers, otherwise there is too great a moment on the z-axis, which has to be countered by the rudder.
4. To unload the tailwheel push gently the stick forward and then ease it back during the acceleration.
5. Take off at 75 km/h (47 mph) in about a "Three pointer" attitude (tail wheel height about 5 - 10 cm).

II. Take - off at cross - wind (max. 15 km/h, 9 mph)

1. Open throttle gently.
2. Hold the tail wheel on the ground and ease the stick back slightly, until the rudder is effective.
3. Keep the wings horizontal, but avoid overloading the outriggers otherwise there is too great a moment on the z-axis, which has to be countered by the rudder.
4. Hold the direction with corrections by the rudder.
5. When the rudder is effective hold the elevator in a normal position until take off at 75 km/h (47 mph).

3.1.8 Climb

1. After take-off the SPERBER will accelerate soon to 90 km/h (56 mph).
2. During the climb the throttle is fully open.
3. Climb at
 - a) normal 100 km/h (62 mph)
 - b) at higher outside temperatures 110 - 120 km/h (68 - 75 mph)
 - c) at low temperatures 90 - 100 km/h (56 - 62 mph)
4. Set trim tab.
5. Retract gear at 50 m (150 ft)
 - a) unlock safety lock by pressing the small button and pull back the lever until it locks.
 - b) Pull back gear lever and push down into retracted position. In retracted position the gear lever is just above the seat.
 - c) When the gear lever is in the retracted position the gear device locks itself and the safety lock springs forward into the locked position.
 - d) check the safety lock locked and green light out.

3.1.9 Cruising

1. Power setting 2500 - 3200 rpm
2. Avoid more than 3200 rpm due of the high noise - level
3. Check engine instruments from time to time.

3.1.10 Stopping the engine in flight

1. Reduce speed to 100 km/h (62 mph)
2. Fly about 2 min at 2200 - 2500 rpm until the oil temperature starts to fall.
3. Move throttle into idling position.
4. Ignition OFF, master switch remains ON
5. Reduce speed to 80 km/h (50 mph) until the prop will stop.
6. Open the throttle so far, that the gear warning horn will stop.
7. If the prop stops vertical pull the starter to turn it to horizontal.

3.1.11 Gliding

1. Best glide ratio at 98 km/h (61 mph) 1 : 26, sinking speed 1,05 m/s (206 ft/min)
2. Minimum sinking speed
 - a) two people 0,95 m/s (196 ft/min) at 80 km/h (50 mph)
 - b) one people 0,89 m/s (175 ft/min) at 75 km/h (46,5 mph)
3. Circling at 85 - 100 km/h (53 - 62 mph)
4. Trim as necessary.

3.1.12 Descent

I. Gliding

1. Extend gear at a speed less than 130 km/h (81 mph).
 - a) Unlock safety lock by pressing the small button and pull back.
 - b) Push gear lever forward until it locks. If you can't reach to the front position push the gear lever with the right foot.
 - c) Locking lever must be gone forward and locked.
 - d) Green lamp lights when gear is extended and locked.
2. Use spoilers if necessary.
3. Speed 120 km/h (74 mph).

II. Powered Flight

1. Extend gear at a speed less than 130 km/h (81 mph)
2. Use spoilers if necessary.
3. Speed 120 - 150 (74 mph - 93 mph).
4. Not less than 2500 rpm.
5. Increase power from time to time to warm up the engine.

3.1.13 Approach

Remark: With powered gliders usually one should approach and land with running engine to permit a baukked landing and overshoot if necessary (an aircraft on the runway, gliders on approach, etc.).

If one approaches for exercise or precision landing, one should fly the whole approach with ignition ON. Then one can restart with one single action.

1. Optimal approach speed

in smooth air 90 km/h (50 mph) spoilers retracted
100 km/h (62 mph) spoilers extended

in rough air 10 km/h (6 mph) faster

2. Engine idling = *minimum*
3. Set the trim tab
4. Use spoilers as necessary and hold them.
5. Gear warning (yellow lamp and horn) operates, when with gear up spoilers are extended or throttle fully reduced.

3.1.14 Landing

1. Landing is of the usual "three pointer" kind below 80 km/h (50 mph) .
2. Extend spoilers completely after touch - down and hold the lever.
3. Hold the control stick right back after touch - down.
4. With little correction by the rudder hold the direction.
5. Hold the wings horizontal.
6. If necessary use the parking brake.

3.1.15 Stop engine

1. Throttle setting 1200 - 1500 rpm for about one minute.
2. Throttle closed.
3. Radio OFF
4. Magneto switch OFF.
5. When engine stopped master - switch OFF .
6. Fuel cock OFF (pulled)

3.2 Emergency Procedures

3.2.1 Engine failure during take - off

- runway length sufficient:

fuel cock	OFF	<i>cock = rucinate</i>
ignition	OFF	
spoilers <i>down</i>	extended	
brake	operate	
stick	full backward	

- runway length too short:

same procedure, eventually retract landing gear or apply ground loop to avoid obstacles.

3.2.2 Engine failure after take - off

fuel cock	OFF
ignition	OFF

make a glider landing

3.2.3 Engine failure in flight

same procedure as 3.2.2

3.2.4 In-flight engine fires

Cabin heat control	OFF
Fuel cock	OFF
Throttle	full power, to burn the fuel in the carburettor
Ignition	OFF
Landing gear	When extended, to be retracted immediately. Select a suitable field for a direct forced landing with landing gear in the up-position. Side slip maneuvers may be used, as necessary to direct flames away from cabin area.

3.2.5 Landing gear extension failure

Gear operation is mechanical, therefore there is little chance of failure, except by mishandling (e.g. trying to extend gear without unlocking and thus damaging the control lever). In such a case unlock the locking lever and apply positive "g", if necessary several times, until the gear is heard to engage down and the green lamp lights. Stop engine before landing.

2.6 Field landing

Generally (except on very bad ground), landing gear and spoiler are to be extended.

On very bad ground, rough or marshy, keep landing gear retracted and make a very gentle landing.

If there is any doubt about the ground conditions extend the gear, but be prepared to retract the gear immediately - even just before touch down, - when ground looks bad, and "belly" on.

On water keep gear retracted. Touch - down in nearly stalled condition, stick right back.

Experience shows that the aircraft suffers little damage from a belly landing when engine has been stopped prior to the landing and propellor positioned horizontal.

3.2.7 Emergency bail out

Both canopies can be jettisoned for an easier exit by parachute. Jettison by pushing down the emergency handle and opening the canopy lock, lift the canopy and push it back.

4. PERFORMANCE

The performance given below is based on T.O. weight of 680 kg (1500 lbs), no wind and dry grass runway.

4.1 Take off distance

Sea-level, temperature + 15°C (see Appendix 3)

distance of ground run 195 m (640 ft)

distance to 15 m (50 ft) obstacle 497 m (1630 ft)

take - off speed 75 km/h (47 mph)

speed at passing 15 m (50 ft) obstacle 100 km/h (62 mph).

4.2 Landing distance

sea - level, temperature + 15°C

distance of ground run 204 m (622 ft)

distance from passing 15 m (50 ft) obstacle 363 m (1190 ft)

approach speed 90 km/h (56 mph)

4.3 Climbing speed

sea level, temperature + 15°C

rate of climb (gear and spoiler retracted) 3 m/s (591 ft/min)

optimum airspeed 90 km/h (56 mph)

4.4 Climbing speed (balked landing)

sea level, temperature + 15°C

rate of climb, (gear extended, spoiler retracted)

2,2 m/s (434 ft/min)

optimum airspeed 100 km/h (62 mph)

4.5 Stall

Engine stopped

Engine idling

stalling speed (gear and spoiler retracted)

68 km/h (42 mph) 70 km/h (43,5mph)

stalling speed (gear and spoiler extended)

72 km/h (45 mph) 75 km/h (47 mph)

4.6 Operating range

At cruising speed 160 km/h (100 mph) and 1500 m (5000 ft) altitude the operating range is 420 km/(260 st.M) without reserve.

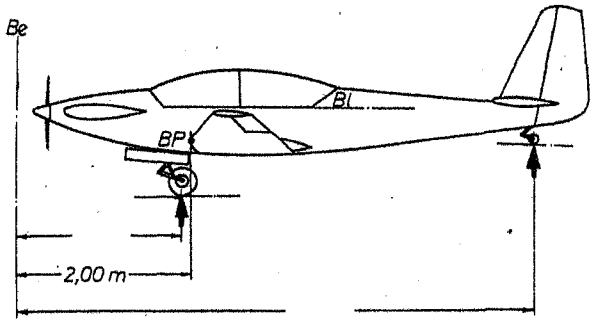
4.7 Fuel consumption

At 1500 m (5000 ft) altitude there is a fuel consumption of

speed	rpm	consumption
160 km/h	3200 U/min	12 l/h (2,64 Imp. Gall/h)
140 km/h	2800 U/min	10 l/h (2,20 Imp. Gall/h)

WEIGHT and BALANCE

Date: _____



Aircraft position: upper stringer of fuselage (cockpit frame) horizontal Bl

Datum: Be 2,00 m (6,56 ft) in front of leading edge of wing section Bp
0,29 m (0,95 ft) from centre line of the aircraft
(side wall)

Aircraft condition: ready to fly, including oil, standard equipment
without/with _____ l fuel

Equipment following list of _____

Permissible
payload:

_____ kp

Empty weight C.G.:

	gross weight -kp-	tare - kp -	net weight -kp-	distance -m-	moment -mkp-
front					
rear					

Pilots Weight
 (kp) (lbs)

100
90
80
70
60
50
40
30
20
10

220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10

Loading chart 1
 Pilots moments

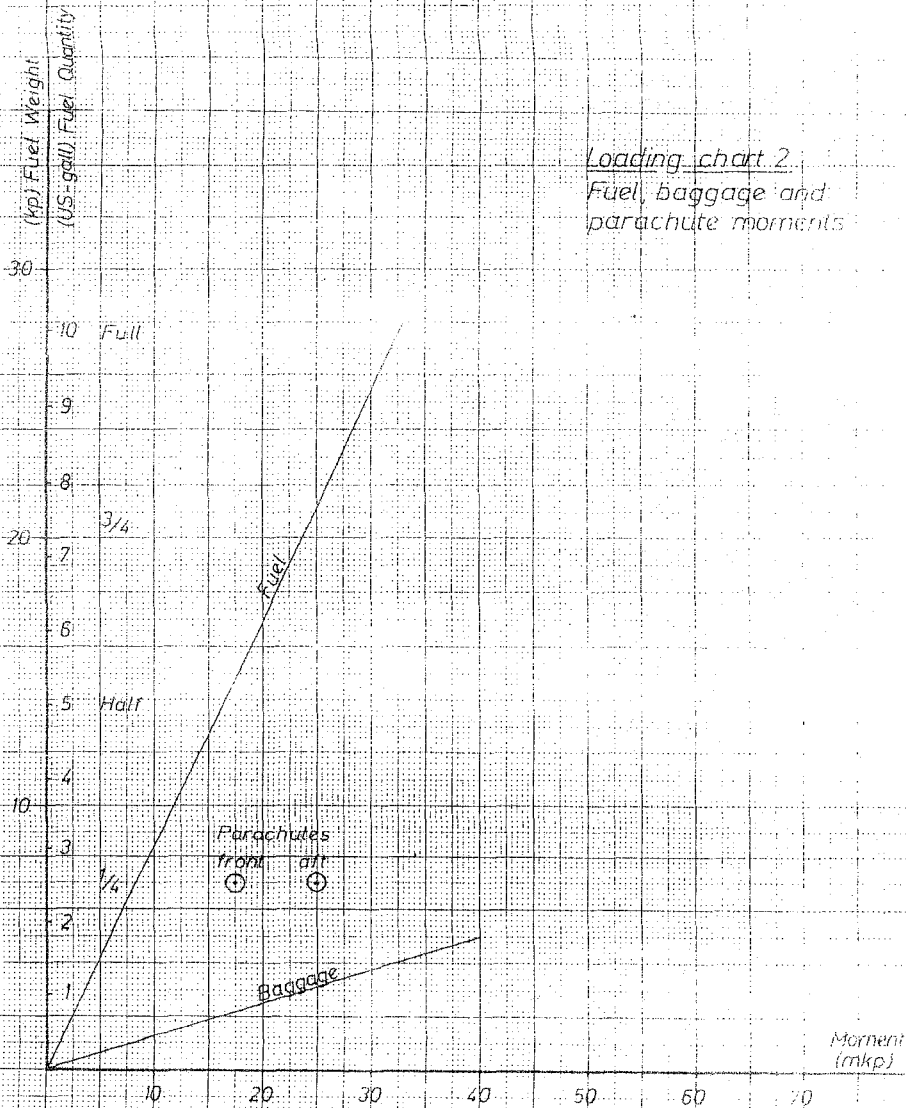
front pilot

rear pilot

Moment
 (m.kp)

50 100 150 200 250 300

Loading chart 2:
Fuel, baggage and
parachute moments



Take - off distance

At maximum allowable weight of 680 kp (1500 lbs), no wind and short, dry grass runway the following ground runs and take off distances apply for different airfield altitudes and temperatures:

Altitude ft over sealevel	ground run in ft at temperatures of				take off distance over 50 ft in ft at temperatures			
	- 15°C	0°C	+15°C	+30°C	-15°C	0°C	+15°C	+30°C
0	575	607	640	676	1467	1550	1630	1713
660	588	620	656	692	1500	1585	1673	1755
1320	600	634	670	708	1535	1625	1715	1800
1980	613	650	686	728	1570	1665	1750	1840
2640	626	666	702	742	1605	1700	1790	1887

These values are based on a good maintenance of the aircraft and a normal flight experience of the pilot.