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Airplane Flight Manual

CESSNA 150

Series F150L

Engine: ROTAX 912 S3
Propeller: Hoffmann HO-V352F/170FQ+10

SDF Nr. 160

Revision 1
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OK-RTX

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This manual describes the operation and performance of the Cessna () 150 () model with the conversion NS402S with ROTAX 912S3 and HOFFMANN HO-V352F / 170FQ + 10 propeller. The flight manual applies to all models and was created using the original AFM of the Cessna (F) 150M series. Deviating information under the individual model is marked accordingly.

NOTE

The content of this document replaces or supplements the information of the original flight manual only in the relevant section; Only the data that is affected due to conversion NS-402S is amended

SUMMARY OF REVISIONS

Change Nr.	Changed pages	Reason for change / Remarks	LBA – recognized	
			Date	endorsement
A	0-3, 0-4 2-2b 4-2, 4-3 5-6 remove 5-6a, 5-6b, 5-6c, 5-6d, 5-6e add	Operating limits f. (F) 150M Minor corrections Airspeed Correction Tables corrected type specific.	09.07.02/Sp	

TYPE SPECIFIC AFM PAGES

Series	SERIES-SPECIFIC PAGES
(F)150F	1-6a, 2-2a, 2-5a, 2-7a, 5-6a, 7-2a, 7-3a, 7-4a, 7-5a, 7-6a, 8-2a, 8-3a
(F)150G	1-6a, 2-2a, 2-5a, 2-7a, 5-6a, 7-2a, 7-3b, 7-4a, 7-5a, 7-6a, 8-2b, 8-3b, 8-4b
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(F)A150K	1-6b, 2-2c, 2-5c, 2-7c, 5-6c, 7-2c, 7-3c, 7-4c, 7-5c, 7-6c, 7-7c, 8-2d, 8-3d, 8-4d, 8-5e, 8-6e, 8-7e, 8-8e
(F)A150L	1-6b, 2-2c, 2-5c, 2-7c, 5-6d ,7-2c, 7-3c, 7-4c, 7-5c, 7-6c, 7-7c, 8-2d, 8-3d, 8-4d, 8-5f, 8-6f, 8-7f, 8-8g, 8-9g, 8-10g, 8-11g

1 GENERAL

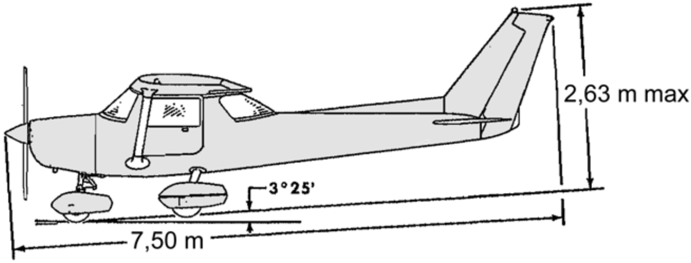
NOTE

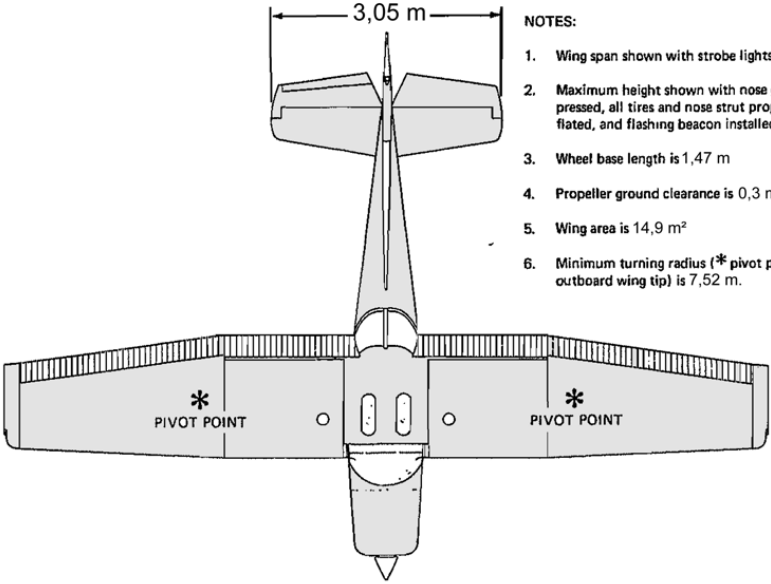
In addition to the instructions for use, this manual also includes a list of maintenance and periodic inspections and performance data.

DOCUMENTS TO BE CARRIED ON BOARD
1) Certificate of Airworthiness
2) Certificate of Registration
3) Radio license
4) Logbooks
5) Airplane Flight Manual

NAMEPLATE AND COLOR CODE PLACARD

In correspondence regarding your aircraft, the aircraft serial number must be specified. The serial number, pattern, registration mark and letter D are indicated on the nameplate, which is located on the cabin floor below the left rear corner of the pilot's seat. The sign is accessible when the seat is forwarded, and the carpet is raised into this area. Next to the nameplate is a color-coded label which contains a code for the color of the cabin lining and the exterior paint of the aircraft. The code can be used in conjunction with a relevant Parts Catalog if paint and cabin lining information is required.





NOTES:

1. Wing span shown with strobe lights installed.
2. Maximum height shown with nose gear depressed, all tires and nose strut properly inflated, and flashing beacon installed.
3. Wheel base length is 1,47 m
4. Propeller ground clearance is 0,3 m
5. Wing area is 14,9 m²
6. Minimum turning radius (* pivot point to outboard wing tip) is 7,52 m.

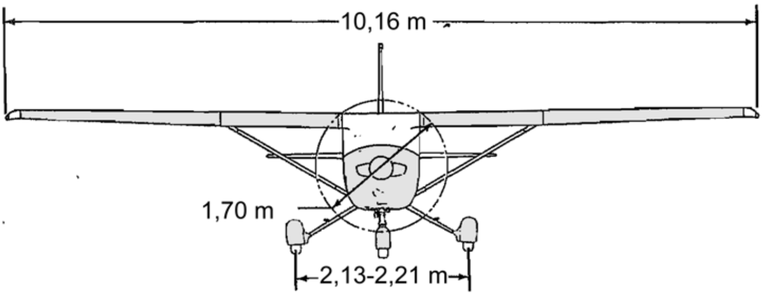


Fig. 1 - 1

DESCRIPTION AND DIMENSIONS

GENERAL DIMENSIONS

Wingspan: 10.16 m
Maximum length: 7.5 m
Maximum height: 2.63 m

WING

Wing profile: NACA 2412
Wing area: 14.9 m2
V position: + 1 ° (top at 25% line)
Setting angle wing root: + 1 °
Wingtip: 0 °

AILERONS

Area: 1.66 m2
Movement up: 20 ° + 2 °-0 °
Movement down: 14 ° + 2 °-0 °

WING FLAPS

Type of operation: Electric / cable
Area: 1.72 m2
Rash: 0 to 40 ° ± 2 °

STABILATOR AND ELEVATOR

Fin area: 1.58 m2
Angle: -3 °
Rudder area: 1.06 m2 (including trim flap)
Movement upward: 25 ° + 1 °-0 °
down: 15 ° ± 1 °

ELEVATOR TRIM

Movement up:	10 ° ± 1 °
Movement down:	20 ° ± 1 °

RUDDER AND FIN

Fin area:	0.83 m2
Rudder area:	0.65 m2
Movement to the left:	23 ° + 0 ° (perpendicular to the axis of rotation) -2°
Movement to the right:	23 ° + 0 °-2 °

LANDING GEAR

Type:	fixed tricycle landing gear	
Strut,	nose gear:	air - oil
Main landing gear:	width: 2,32m	

Distance between main gear wheels and nose gear wheel: 1.46 m

Nose wheel tire and pressure:	5.00 - 5 30 psi (2.109 kg / cm2)
Main tires and pressure:	6.00 - 6 21 psi (1.476 kg / cm2)
Nose landing gear strut pressure:	20 psi (1,406 kg / cm2)

POWER PLANT

ENGINE: ROTAX 912S3 100HP (73.5KW)

FUEL:

Normal, Super, Super Plus unleaded, EN 288 at least 95 RON or avgas 100ll in exceptional cases.

OIL

Corresponding to opposite table (FIG. 1 - 2)

Use only oils meant for OTTO engines that comply with API system with "SF" or "SG" marking

Do not use aircraft engine oil.

Do not use any oil additives.

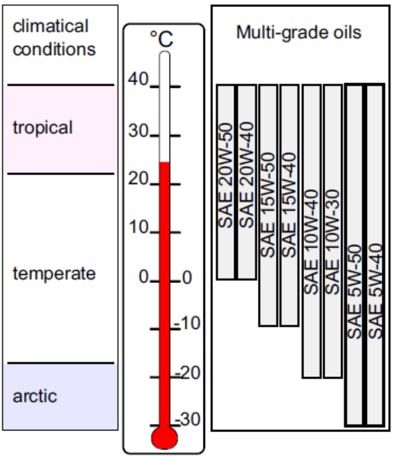


FIG 1-2 OIL TABLE

COOLANT

Approximately 2.5 ltr.for mixing and frost prevention see ROTAX– operating handbook

CARBURETOR HEAT

Manual operation

PROPELLER

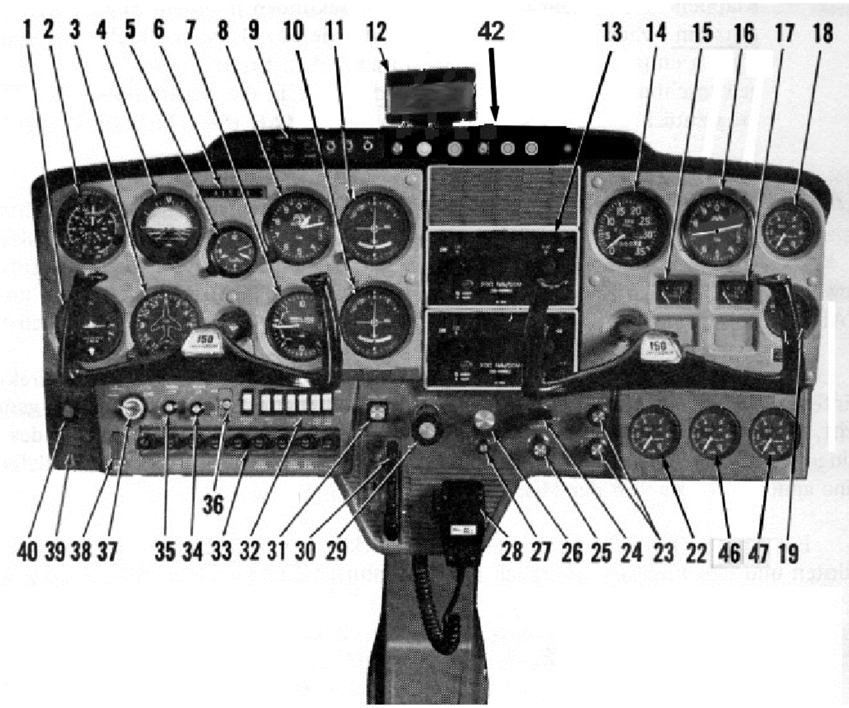
Designation: HOFFMANN HO-V352F / 170FQ + 10

Type:	2-blade, constant speed
Diameter:	1.8 m

CABIN

Seats:	2 (plus optional child seat)
Doors:	2
Luggage:	54 kg

INSTRUMENT PANEL ()(A)150K-L



1 turn Coordinator
2 airspeed indicator
3 Direction indicator
4 Attitude indicator
5 clock
6 airplane registration No.
7 Variometer
8 Altimeter
9 Marker beacon / indicator lights
10 Accelometer (Aerobat) or course deviation and ILS indicator
11 Course deviation and ILS Indicator
12 Mirror
13 radios
14 Tachometer
15 Left fuel gauge
16 Ammeter
17 Right fuel gauge
18 Fuel pressure
19 Amperemeter
22 oil pressure
23 Cabin heat and air controls
24 wing flap switch
25 Cigarette lighter
26 Propeller control
27 Choke
28 Microphone
29 throttle
30 Elevator trim
31 Carburetor heat
32 electrical switches
33 Circuit breakers
34 Rheostat for instruments
35 Rheostat for radios
36 deleted
37 Magneto and starter switch
38 main switch
39 Fuel pump switch
40 Parking brake
42 Generator warning lamps and circuit breakers
46 Oil temperature
47Cylinder head temperature

NOTE
The presented instrument arrangement is only one of several possibilities. Depending on the equipment and space requirements, the arrangement may differ. To improve the visibility, engine monitoring instruments can be switched from the right to the left side of the instrument panel or set up on the right side. The responsible pilot must familiarize himself with the respective order before the flight.

Fuel system description

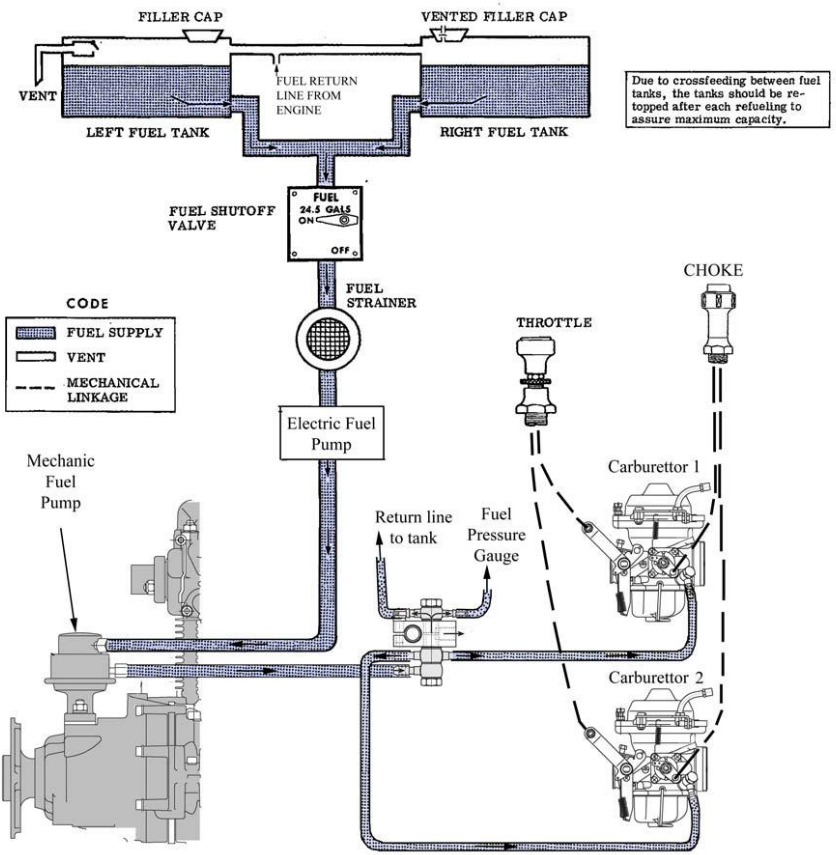


Fig. 1 - 2

FUEL SYSTEM

The fuel is supplied to the engine from two tanks, one located in each wing. From these tanks, the fuel flows by gravity through the fuel shut off valve and from there through a fuel strainer via an electric booster pump and a mechanical main pump to the carburetors

Fuel system venting is essential to system operation. Blockage of the venting system will result in a decreasing fuel flow and eventual engine stoppage. Venting is accomplished by an interconnecting line from the right fuel tank to the left tank. The left tank is vented overboard through a vent line which is equipped with a check valve, and protrudes from the bottom surface of the left wing near the wing strut attach point. The right fuel tank filler cap is also vented.

Information about the fuel system can be found in Fig. 1 - 3. Fuel system maintenance information is included in "Maintenance Instructions" in Section VI.

DRAIN VALVES IN WING TANK SUMPS

Every tanks is equipped with drain valve.to provide a means for the examination of fuel in the system for contamination and grade. The valve protrudes on the underside of the wing just outside the cabin door. When testing the fuel, a sampling cup stored in the aircraft is used. taking a fuel sample, insert the probe of the cup into the center of the quick-release valve and push it upwards. Fuel now flows from the tank sump into the cup as long as the pressure on the valve is maintained.

LONG RANGE FUEL TANKS

For longer flight times and distances wings with long-distance tanks are available, where the standard wings and fuel tanks can be exchanged

FUEL TANKS			
Tanks	Usable All flight conditions	Not usable	Total
Two Standard (each 13 US-Gal. = 49 ltr.)	22,5 US-Gal. = 85 ltr.	3,5 US-Gal = 13 ltr.	26 US-Gal. = 98 ltr.
Two Long range tanks (each 19 US-Gal. = 72 ltr.)	35 US-Gal. = 132 ltr.	3,0 US-Gal. = 12 ltr.	38 US-Gal. = 144 ltr.

Fig. 1 - 3

Electrical system

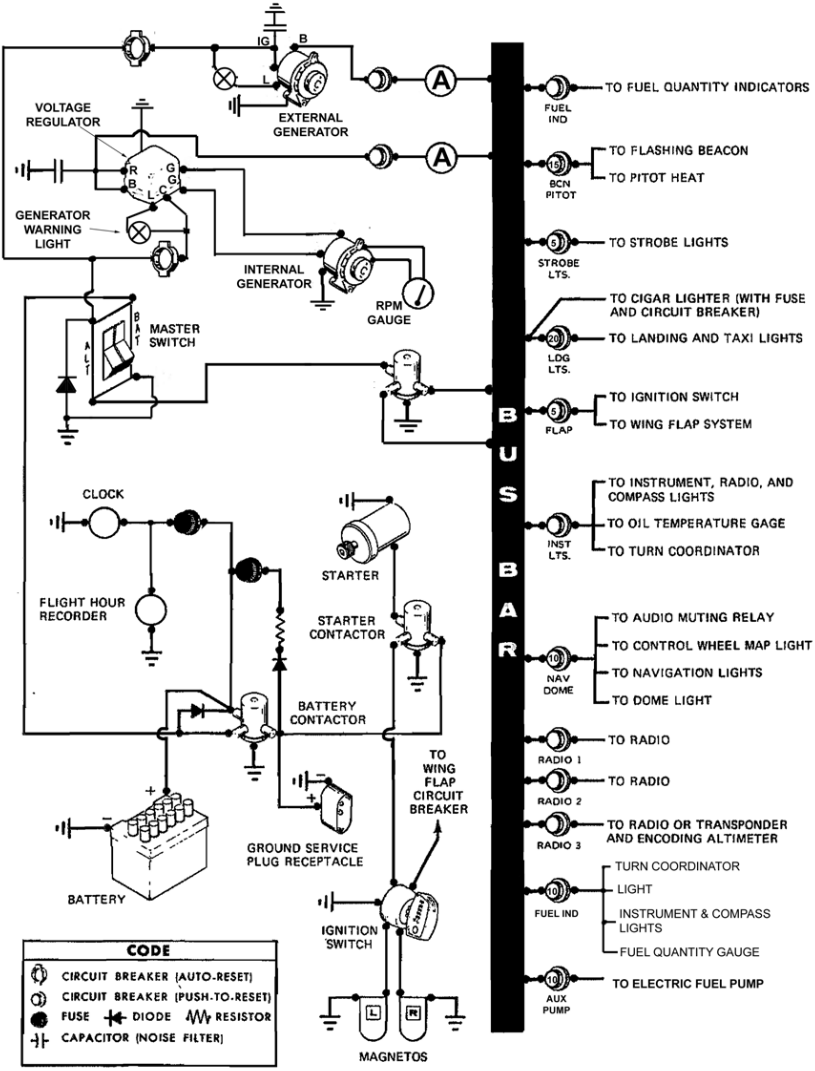


Abb. 1 - 4

ELECTRICAL SYSTEM

The airplane is equipped with a 14-volt, direct current electrical system with one internal generator (Generator 1) and one externally mounted generator (Generator 2) (see Abb. 1 - 4). A 12V battery is located right in front of the firewall immediately under the engine cowling. The power is supplied to a bus bar. A master switch controls this power to all circuits, except the engine ignition system and the optional built-in clock and hour meter (which only operates when the engine is running).

MASTER SWITCH

The master switch is a split-rocker type switch labelled MASTER and is ON in the up position and OFF in the down position. The right half of the switch, labelled BAT, controls all electrical power to the airplane. The left half, labelled ALT, controls the alternators., Alternators are provided with separate indicator lights and circuit breakers. The generators are separated individually from the electrical system by their own circuit breakers

During normal operations both halves of the switch should be switched simultaneously on. However, if devices are to be tested on the ground, the side of the switch labeled "BAT" can be set to "ON." If the side of the switch labeled "GEN" is set to "OFF," both generators are disconnected from the electrical system. In this case, all the electrical load will be on the battery. If the alternator switch in "OFF" position for extended periods, the battery current will be reduced to the point where the battery contactor will disconnect the current from the generator field winding and prevent the generator to be reconnected

AMMETER

The ammeter indicates the current flow, in amperes, from the generators to the battery or to the electrical system. When the engine is running, and the main switch is turned on, the ammeters indicate the amount of the current drawn from each generator. The maximum charging currents are 28A for generator 1 and 44A for generator 2.

OVERVOLTAGE WARNING AND WARNING LIGHT

The aircraft is equipped with an overvoltage protection system consisting of a warning device behind the instrument panel and a red "OVER VOLTAGE" warning lamp below the ampere meter

If an overvoltage occurs, the overvoltage alarm automatically shuts off the alternators by removing the power to the generator winding. As a result, the red warning lights illuminate, indicating to the pilot that the generators are no longer providing power and all the electrical power is being supplied by the on-board battery.

The overvoltage warning can be reseted, by. setting the main switch off and then turned on again. If the warning light does not come on again, the generator has resumed normal power generation. However, if the lamp lights up again, there is a fault and the flight should not be continued and landing performed as soon as possible.

The overvoltage warning light can be checked by briefly switching off the half of the main switch labeled "GEN", while leaving the "BAT" switch half switched on.

GENERATOR – CONTROLIGHT

The red generator indicator lights are indicators of too low a charging current. These warning lights indicate to the pilot an error in the power supply by the respective generator. When one of these lamps lights up, a reduced charge of the on-board battery can be expected.

CIRCUIT BREAKERS AND FUSES

Most of the electrical circuits in the airplane are protected by "push-to reset" circuit breakers mounted under the engine controls on the instrument panel. The cigar lighter is equipped with a manually-reset type circuit breaker located on the back of the lighter and a fuse behind the instrument panel. The control wheel map light (if installed) is protected by the NAV/DOME circuit breaker, and a fuse behind the instrument panel. Electrical circuits which are not protected by circuit breakers are the battery contactor closing (external power) circuit, clock circuit, and flight hour recorder circuit. These circuits are protected by fuses mounted adjacent to the battery

LIGHTING SYSTEM

EXTERIOR LIGHTS

Conventional navigation lights are located on the wing tips and top of the rudder. Additional lighting is available and includes a single or dual landing/taxi light mounted in the cowling nose cap, a flashing beacon located on top of the vertical fin, and a strobe light installed on each wing tip. All exterior lights are controlled by rocker switches on the left switch and control panel. The switches are ON in the up position and OFF in the down position

The flashing beacon should not be used when flying through clouds or overcast; the flashing light reflected from water droplets or particles in the atmosphere, particularly at night, can produce vertigo and loss of orientation

Two high-intensity warning lights on the wing tips (optional) increase protection against the collision. However, the lights should be turned off when taxiing in the vicinity of other aircraft or while flying through clouds, fog or mist.

INTERIOR LIGHTNING

The instrument panel and the operator panel are illuminated by floodlights and optionally by built-in lights. Two concentrically arranged control knobs labeled "FLIGHT LIGHT" and "INSTRUM. /RADIO" regulate the light intensity of the flood light and the built-in lights.

The floodlight of instrument panel and control panel consists of a single red floodlight in the front part of the overhead console. To use the floodlight, turn the "FLOODLIGHT" control knob clockwise to the desired light intensity.

The engine monitoring instruments, fuel gauge, radios, wing position indicator and magnetic compass are illuminated by built-in lights. The light intensity of all built-in lights is adjusted with the control knob "INSTRUM. /RADIO".

A cabin ceiling dome light is mounted in the overhead console. It is operated by a switch on the left switch and control panel. To turn the light on. move the switch to the ON position.

A control wheel map light is available and is mounted on the bottom of the pilot's control wheel. The light illuminates the lower portion of the cabin just forward of the pilot and is helpful when checking maps and other flight data during night operations. To operate the light, first turn on the NAV LT switch; then adjust the map light's intensity with the rheostat control knob located at the bottom of the control wheel

The most probable cause of a light failure is a burned-out bulb; however, in the event any of the lighting systems fail to illuminate when turned on, check the appropriate circuit breaker. If the circuit breaker has opened (white button popped out), and there is no obvious indication of a short circuit (smoke or odor), turn off the light switch of the affected lights, reset the breaker, and turn the switch on again. If the breaker opens again, do not reset it

WING FLAP SYSTEM

The wing flaps are of the single-slot type and are extended or retracted by positioning the wing flap switch lever on the instrument panel to the desired flap deflection position. The switch lever is moved up or down in a slot in the instrument panel that provides mechanical stops at the 10º and 20º positions. For flap settings greater than 10º, move the switch lever to the right to clear the stop and position it as desired. A scale and pointer on the left side of the switch lever indicates flap travel in degrees. The wing flap system circuit is protected by a 15-ampere circuit breaker, labelled FLAP, on the right side of the instrument panel

CABIN HEATING AND VENTILATING SYSTEM

The temperature and volume of airflow into the cabin can be regulated by manipulation of the push-pull CABIN HT and CABIN AIR control knobs

Heated fresh air and outside air are blended in a cabin manifold just aft of the firewall by adjustment of the heat and air controls; this air is then vented into the cabin from outlets in the cabin manifold near the pilot's and passenger's feet. Windshield defrost air is also supplied by a duct leading from the manifold.

Additional ventilation air may be obtained by opening the adjustable ventilators near the upper left and right corners of the windshield

PARKING BRAKE

To apply the parking brake, pull the parking brake knob, press the brake pedals, release, and then release the parking brake knob. To release the parking brake, depress the brake pedals, release and check that the parking brake knob. is fully back.

SEATS

The seating arrangement consists of two separate adjustable seats for the pilot and passenger and, if installed, a child's seat in the rear cabin area. The pilot's and passenger's seats are available in two designs: four way and six-way adjustable

Four-way seats may be moved forward or aft, and the seat back angle changed. To position either seat, lift the lever under the inboard comer of the seat, slide the seat into position, release the lever, and check that the seat is locked in place. To adjust the seat back, pull forward on the knob under the center of the seat and apply pressure to the back. To return the seat back to the upright position, pull forward on the exposed portion of the seat back frame. Both seat backs will also fold full forward

The seats with six adjustment options can be adjusted lengthwise and in height and have adjustable backrests. To adjust a seat, pull the tubular handle on the inside forward under the seat and slide the seat to the desired position. Then release the lever and check that the seat is engaged.

The seats can be adjusted in height in increments of 1 inch by a total of 2 inches (5 cm), which must be done before the flight. To adjust the height of a seat, pull a T-shaped handle on the inside under the seat and push the seat down against the spring tension or push it up to the desired position by the spring tension. Then release the T-shaped lever and snap the seat into place.

The angle of the backrest is adjustable by turning a lever on the inside back of each seat. To adjust the backrest, turn the lever backwards and lean against the backrest until it cannot be adjusted further; then release the lever. The backrest can be returned to its vertical position by pulling forward on the free part of its lower frame. Check that the operating lever has returned to its vertical position. Both backrests can be folded all the way forward.

A child's seat is available for installation in the rear of the cabin. The seat back is secured to the cabin sidewalls, and the seat bottom is attached to brackets on the floor. This seat is non-adjustable

SEAT BELT AND SHOULDER HARNESS

Each shoulder harness is attached to a rear doorpost above the window line and is stowed behind a stowage sheath above the cabin door. To stow the harness, fold it and place it behind the sheath. No harness is available for the child's seat.

The shoulder harnesses are used by fastening and adjusting the seat belt first. Then, lengthen the harness as required by pulling on the connecting link on the end of the harness and the narrow release strap. Snap the connecting link firmly onto the retaining stud on the seat belt link half. Then adjust to length. Adjustment of the shoulder harness is important. A properly adjusted harness will permit the occupant to lean forward enough to sit completely erect but prevent excessive forward movement and contact with objects during sudden deceleration. Also, the pilot will want the freedom to reach all controls easily

Removing the harness is accomplished by pulling upward on the narrow release strap and removing the harness connecting link from the stud on the seat belt link. In an emergency, the shoulder harness may be removed by releasing the seat belt first and allowing the harness, still attached to the link half of the seat belt, to drop to the side of the seat

INTEGRATED SEAT BELT AND SHOULDER HARNESSES WITH INERTIA REELS

Integrated seat belt/ shoulder harnesses with inertia reels are available for the pilot and front seat passenger. The seat belt/ shoulder harnesses extend from inertia reels located in the upper cabin sidewall just aft of each cabin door to attach points outboard of the front seats. A separate seat belt half and buckle is located inboard of the seats. Inertia reels allow complete freedom of body movement. However, in the event of a sudden deceleration, they will lock automatically to protect the occupants.

TRUE AIRSPEED INDICATOR

If a true airspeed indicator is installed, it is equipped with a rotatable ring which works in conjunction with the airspeed indicator dial in a manner similar to the operation of a flight computer

To obtain true airspeed, first rotate the ring until pressure altitude is aligned with outside air temperature in degrees Fahrenheit. Having set the ring to correct for altitude and temperature, read the true airspeed shown on the rotatable ring by the indicator pointer.

> **Note**
> Pressure altitude should not be confused with indicated altitude. To obtain pressure altitude, momentarily set the barometric scale on the altimeter to 1013 mb and read pressure altitude on the altimeter. Be sure to return the altimeter barometric scale to the original barometric setting after pressure altitude has been obtained.

2 LIMITATIONS

INTRODUCTION

This section sets out the operating limitations, instrument markings and placards required for the safe operation of the aircraft, engine and standard equipment and equipment.

AIRSPEED LIMITATIONS

Airspeed limitations in flight operations are presented in the table below

All Models (F)150F, (F)150G, (F)150H, (F)150J, (F)150K, (F)150L			
	Speed	**CAS Mph**	**Significance**
V_{NE}	Never exceed speed	162	Do not exceed this speed in any operation
V_{NO}	maximum structural cruising speed	120	Do not exceed this speed except in smooth air, and then only with caution
V_A	Maneuvering speed	109	Do not make full or abrupt control movements above this speed.
V_{FE}	Maximum Flap extended speed	100	Do not extend flaps above this speed

AIRSPEED INDICATOR MARKINGS

Airspeed markings and their significance of each color are shown in the table below
.

All models (F)150F, (F)150G, (F)150H, (F)150J, (F)150K, (F)150L		
Marking	**Mph Value or area**	**Significance**
White Arc	49 - 100	Full flap operating range. Lower limit is maximum weight (Vso) in landing configuration. Upper limit is maximum speed permissible with flaps extended
Green Arc	56 - 120	Normal operation range. Lover limit is maximum weight Vs at most forward C.G. with flaps retracted. Upper limit is maximum structural cruising speed (V_{NO}).
Yellow Arc	120 – 162	Operations must be conducted with caution and only in smooth air
Red line	162	Maximum speed for all operations

POWERRPLANT LIMITATIONS

ENGINE

Manufacturer	BOMBARDIER-ROTAX GmbH	
Engine model	ROTAX 912S3	
Engine operating limits	for take-off:	73.5 kW (100PS)/ 2385 Rpm
	Continuous:	69kW (94 PS)/ 2260 Rpm

Note

The standard engine speed with full throttle should be (carburetor heat off and no wind conditions) between 2260 und 2320 Rpm

Maximum oil temperature:	130°C (266°F); Desired area 90-110°C (194-230°F)
Oil Pressure:	min. 0.8 bar (12psi) – @ 1400 Rpm 2-5bar(29-73psi) over 1400 Rpm
Maximum oil pressure:	7,0 bar (102 psi) only short term when cold starting
Max. cylinder head temperature:	135°C (275°F)

PROPELLER

Propeller manufacturer:	Hoffmann Propeller GmbH & Co. KG.
Propeller model:	HO-V352F/170FQ+10
Propeller diameter:	1,80 m

ENGINE INSTRUMENT MARKINGS

Engine instrument markings and their significance are in the table below

Instrument	Green Arc	Yellow Arc	Red stipe
	Normal area	**caution area**	**limit (min. or max.)**
RPM	1700 - 2260 Rpm	2260 – 2385 Rpm	2385 Rpm
Oil temperature	90-110°C (194-230°F)	-	50°C (122°F) 130°C (266°F)
Oil pressure	2 – 5 bars	0.8-2 bar (12-29psi) 5-7 bar (73-102psi)	0.8 bar (12psi) 7 bar (102psi)
Cylinder head	-	-	135°C (275°F)
Fuel pressure	0.15 - 0.4 bar (2.2 – 5.8 psi)	-	0.15 bar (2.2 psi) 0.4 bar (5.8 psi)

MAXIMUM WEIGHTS

maximum take-off weight: 726 kg
Maximum landing weight: 726 kg

maximum weight in baggage compartment:

- Baggage area 1 (or passenger in child seat), Station 127 to 193cm 54 kg, note the sign below
- baggage area 2, Station 193 to 239 cm: 18 kg, note the sign below

.

> **Note**
> **Maximum allowed weight in area 1 and area 2 in total is 54kg**

CENTER OF GRAVITY

C.G. area:

- Most forward: 0,8 m aft of datum at 581 kg or less with linear change to 0,835 m aft of datum at 726 kg
- Most rearward: 0,95 m aft of datum for all weights.

Datum: Front side of the firewall.

> **Warning**
> **The pilot in command is responsible for correct loading of the aircraft**

APPROVED FLIGHT MANEUVRES

(Models (F)150F, (F)150G, (F)150H, (F)150J, (F)150K, (F)150L)

This airplane is certified as a utility category and is designed for limited aerobatics. In acquision of various certificates such as professional pilot, IFR and instructor ratings. All these maneuvers are permitted in this airplane.

No aerobatic maneuvers are approved except those listed below:

Maneuver	**Recommended entry speed [mph]**
Chandelle	109
Lazy Eight	109
steep turns	109
stalls (expect whip stalls)	slow deceleration

Warning

Intentional spins are prohibited - unintentional spins, see emergency sections

Aerobatics that may impose high loads should not be attempted. The important thing to bear in mind in flight maneuvers is that the airplane is that the airplane is clean in aerodynamic design and will build up speed quickly with the nose down. Proper speed control is an essential requirement for execution of any maneuver and care should always be exercised to avoid excessive speed which, in turn, can impose excessive loads. In the execution of all maneuvers, avoid abrupt of controls

FLIGHT LOAD FACTORS

Flaps up	:	+ 4.4g,	-0.5g (5 Seconds. Limited by engine)
Flaps down	:	+3,5 g	(No negative loads approved)

KINDS OF OPERATION LIMITS

The aircraft is equipped for VFR day flights but can also be equipped for VFR night flights or IFR flights. The minimum equipment and instruments required for these flights are specified in the relevant regulations. The registration of the approved types of aircraft on the operating limit label indicates which equipment was installed on the aircraft at the time the certificate of airworthiness was issued.

Flight into known icing conditions not permitted

MAXIMUM FUEL QUANTITYS

2 Standard tanks:	each 13 US-gal =	49 ltr.
Total:	26 US-gal	= 96 ltr.
Usable fuel (all flight conditions):	22,5 US-gal	= 85 ltr.
unusable fuel:	3,5 US-gal	= 13 ltr.

2 Long range tanks:	each 19 US-gal =	72 ltr.
Total:	38 US-gal	= 144 ltr.
Usable fuel (all flight conditions):	35 US-gal	= 132 ltr.
unusable fuel:	3,0 US-gal	= 12 ltr.

Note
Due to cross feeding between fuel tanks, the tanks should be re-topped after each refueling to assure maximum capacity

MAXIMUM CROSS WIND

Maximum demonstrated crosswind during take-off	13 kts
Maximum demonstrated crosswind during landing	13 kts

Note
Demonstated crosswind applies only for Model (F)150M from Cessna. For other models there is no data.

PLACARDS

The following information must be displayed in the form of composite or individual placards

IN THE FULL VIEW OF THE PILOT

(Models (F)150F, (F)150G, (F)150H, (F)150J, (F)150K, (F)150L)

(The DAY-NIGHT-, VFR- and IFR-flight ”entry shown on the example below, will wary as the airplane is equipped).

This aircraft is approved for utility category and must be operated in accordance with limitiations presented in markings, placards and airplane flight manual

Maximum weights

Maximum gross weight:	**725 kg**	
Maximum maneuvre speed:	**109 mph**	
Flight load values:		
Flaps up:	**+4.4**	**-0.5 (max. 5 Sec.)**
Flaps down:	**+3.5**	**No negative load**

Aerobatics are limited to following maneuvres

Maneuvre	**Recommended entry speed**
Chandelles	**109 mph**
Lazy Eights	**109 mph**
Steep turns	**109 mph**
Stalls	**Slow deceleration**

Intentional spins prohibited. Recovery from unintentional spin – see emergency section

Flight into known icing conditionds prohibited
This aircraft is certified in accordance with its original Airworhiness Certificate to the following kinds of operations

Day flight, Night flight, VFR- and IFR-flight (depending on equipment).

<u>IN THE PAGGAGE COMPARTMENT</u>

Maximum paggage 54 kg and/or auxiliary passenger For additional loading instructions see weight and balance data.

<u>IN THE VICINITY OF FUEL SHUT OFF VALVE(STANDARD TANKS)</u>

Fuel 22,5 gal = 85 ltr.	**ON**	**OFF**

<u>IN THE VICINITY OF FUEL SHUT OFF VALVE (LONG RANGE TANKS):</u>

Fuel 35,0 gal = 132 ltr.	**ON**	**OFF**

<u>NEAR FUEL TANK FILLER CAP</u>

<u>STANDARD TANKS</u>

49 ltr.

Fuel: Normal, Super, Super plus unleaded, min. ROZ 95 as per EN 228 or AVGAS 100 LL

<u>Do not add oil.</u>

<u>LONG RANGE TANKS</u>

72 ltr.
Fuel: Normal, Super, Super plus unleaded, min. ROZ 95 as per EN 228 or AVGAS 100 LL

<u>Do not add oil.</u>

<u>NEXT TO OIL TANK</u>

Oil 3 ltr.
Sport plus 4
No aviation oil
Use only automotive oils

ON THE INSTUMENT PANEL NEAR OVER VOLTAGE WARNING LIGHT

over voltage

ON COOLANT TANK OR ON COVER

2.5 ltr. - coolant

3 EMERGENCY PROCEDURES

ENGINE FAILURES

ENGINE FAILURE DURING TAKE OFF RUN (WITH ADEQUATE RUNWAY AHEAD)

- ABORTING THE TAKE OFF -

1) Throttle .... Idle (fully drawn)
2) Brakes .... as needed
3) Magneto switch........................... Off
4) Main switch................................. Off
5) Stop

ENGINE FAILURE IMMEDIATELY AFTER TAKE OFF

REDUCED PERFORMANCE

1) Maintain airspeed 65-70mph (56-61kts) (IAS).

If time permits:

2) Throttle .... Full (Forward)
3) Propeller control.......................... Max. RPM (Forward)
4) Carb heat.................................... Cold (Forward)
5) Choke .... Off (Forward)
6) Fuel shut off valve........................ ON
7) Magneto switch............................ Both
8) Electrical fuel pump...................... On

Is the engine power still insufficient for an immediate "normal landing" glide into safe position and make an emergency landing

EMERGENCY LANDING (ENGINE POWER AVAILABLE) OUTSIDE THE AIRFIELD AREA

In most cases landing straight ahead, with small changes of direction to avoid obstacles is the best option.

Before touch down after the landing site has been determined

1) Airspeed (IAS) .... 65-75 mph (55-65kts) – Flaps UP
   .... 60-70 mph (50-60kts) - Flaps DOWN
2) Throttle .... As needed
3) Prop control .... Max. RPM (Pushed in)
4) Flaps .... As needed
5) Doors.. Unlatch
6) Seat belts.................................... Tighten

After landing

7) Throttle .... IDLE
8) Fuel shut off valve........................ OFF
9) Main switch................................. OFF
10) Magneto switch............................ Off

ENGINE STOPPED

1) Airspeed (IAS) .... 65-75 mph (55-65kts) – Flaps UP
   .... 60-70 mph (50-60kts) - Flaps Down
2) Doors.. Unlatch
3) Seat belts.................................... Tighten
4) Flaps... As needed
5) Main switch................................. OFF
6) Fuel shut off valve........................ OFF
7) Magneto switch............................ Off

ENGINE FAILURE DURING FLIGHT

REDUCED PERFORMANCE

1) Throttle .... Keep position
2) Choke .... Off (pushed in)
3) Improvement by trying the following
   i) Carb heat
   ii) Electrical fuel pump
   iii) Magnetos
   iv) Prop control .... Correct procedure

If no improvement occurs reduce power to minimum required and land as soon as possible

LOSS OF OIL PRESSURE

Immediately check the oil temperature

1) When oil pressure drops below green range and oil temperature normal➔
   Land at nearest airport

2) When oil pressure is below green area with increasing oil temperature ➔
   Reduce the engine power to minimum required and land as soon as possible. Prepare for engine stoppage and emergency landing

LOSS OF FUEL PRESSURE

1) Electrical fuel pump om
2) When fuel pressure light does not turn off➔
   Reduce the engine power to minimum required and land as soon as possible. Prepare for engine failure and emergency landing
   .

RELIGTING THE ENGINE WITH PROPELLER WINDMILLING

as long as the airspeed is not below 62 mph (54kts) the propeller continues on wind milling

1) Airspeed (IAS) .... 70-80 mph (60-70kts)
2) Prop control .... Max. RPM (Forward)
3) Electrical fuel pump...................... ON
4) Magneto switch .... both
5) Fuel shut off valve........................ ON
6) Throttle .... 2 cm forward
7) Choke .... Off (in)

If the engine does not start within 10 seconds: Cold start

8) Throttle .... idle (fully drawn)
9) Choke .... On (fully drawn)

Reduce engine power to the minimum required and land as soon as possible. Prepare for engine failure and emergency landing.

RELIGHT OF A STOPPED ENGINE

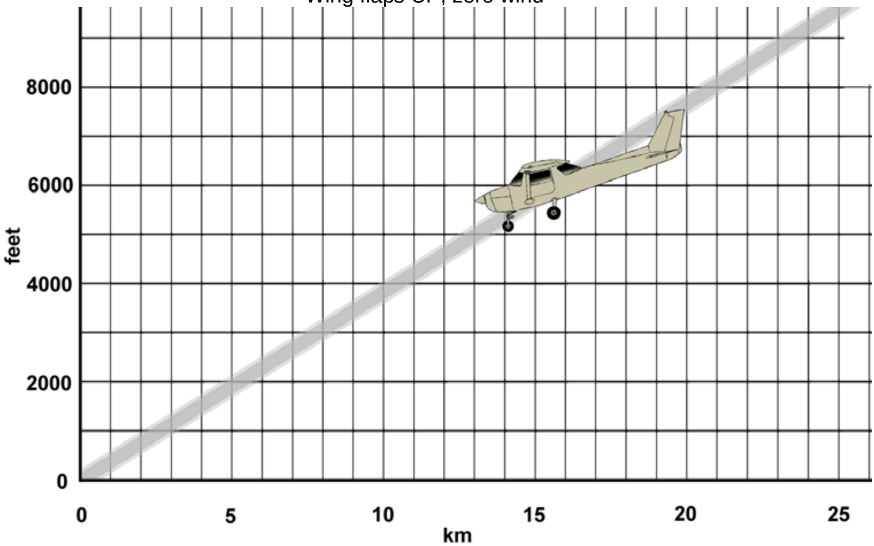
1) Electrical load/consumers .... OFF
2) Main switch................................. ON
3) Prop control .... Max. RPM (forward)
4) Electrical fuel pump...................... ON
5) Cold start
   a. Throttle .... Idle (drawn)
   b. Choke .... On
6) Warm start
   a. Throttle............................. 2 cm forward
   b. Choke .... Off (forward)
7) Magneto switch............................ Start

Note: Increasing the airspeed to approximately. 125 mph (110kts) the engine can be cranked. Altitude loss of approx. 1000 ft. / 300 m must be taken into consideration

After successful engine start, check:

1) Oil pressure .... Normal
2) Choke .... In (forward)
3) Oil temp .... Normal
4) Turn on electrical loads as needed, reduce engine power to minimum required, land as soon as possible, and be prepared for engine failure and emergency landing.

Maximum gliding distance
Airspeed 70 mph (60) IAS
Propeller wind milling
Wing flaps UP, zero wind



FIRES

ENGINE FIRE ON GROUND DURING STARTING

Improper starting techniques in cold weather conditions can lead to kick back and ignition of the accumulated fuel in intake manifold. If this should happen, proceed as follows:

1) Continue cranking the engine with the starter and try to start the engine. Cranking will, suck the flames and accumulated fuel through the manifold into the engine.
.
2) When the cranking succeeds and the flames are sucked into the engine
   a. Fuel shut off valve....................................... Off
   b. Throttle... Full gas (forward)
   c. Main switch.. OFF
   d. Magnetos (with engine stopped) .... Off
   e. Evacuate immediately
3) If the engine fails to start, then
   a. Fuel shut off valve....................................... Off
   b. With throttle open (full gas) continue cranking while an external person prepares fire extinguished.
   c. Main switch.. OFF
   d. Magnetos.. Off
   e. Evacuate immediately

ENGINE FIRE DURING FLIGHT

Although engine fires are extremely rare in flight, the following measures should be taken if such fire occur:

1) Fuel shut off valve.. Off
2) Throttle .... Full gas (forward)
3) Electrical fuel pump.. Off
4) Cabin heating and ventilation.......................... Off
5) Wing root vents... As required
6) Main switch... Off
7) Airspeed .... 90-100 mph
8) If fire is not extinguished, the speed can be increased to find an airflow that does not produce a flammable mixture.
9) Emergency landing with the engine stopped

CABIN FIRE IN FLIGHT

1) Main switch... OFF
2) Cabin ventilation .... Off
3) Cabin heating.. Off
4) Fire extinguisher .... Use
5) After using the fire extinguisher
   cabin ventilation .... On
6) Land as soon as possible

WING FIRE IN FLIGHT

1) Main switch... Off
2) Ventilation... Off
3) Make side slip to keep the flames away from fuel tank and cabin. Land as soon as possible with flaps up.

ELECTRICAL FIRE AND SMOKE DURING FLIGHT

The first sign of a cable fire is usually the smell of burning insulation. In such a case, proceed as follows:

1) Main switch... Off
2) Avionics master (if available) .... Off
3) Electrical consumers....................................... Off
4) Cabin heating.. Off
5) Cabin ventilation .... Off
6) Fire extinguisher .... Use only if the smoke does not decrease.

Important advice: **After using the fire extinguisher the cabin must be ventilated**

If the fire seems to be extinguished and electric power is needed to continue the flight:

7) Main switch.. On
8) Circuit breakers .... Check for faulty circuit do not reset
9) Avionics master .... On
10) radios and electrical switches......................... ON one at the time with delay after each until short circuit is localized
11) Land as soon as possible

CABEL FIRE ON GROUNG

1) Main switch .... OFF
2) Fuel shut off valve....................... OFF
3) If the engine is running:
   a. Throttle............................ IDLE
   b. Magneto switch .... OFF
4) Doors.. Open
5) Fire extinguisher .... use if required

LANDING

LANDING WITH A FLAT MAIN TIRE

1) Anticipate that the aircraft has tendency to turn to flat tire´s side
2) Extend the flaps normally and land tail low with good tire fist. Hold airplane off flat tire as long as possible with aileron control. When the flat tire touches the ground the directional control is maintained with rudder control in conjunction with brake.

LANDING WITHOUT ELEVATOR CONTROL

Trim for horizontal flight with trim wheel and throttle control(approximately 65mph/56kts IAS and flight flaps 20°). Then do not change the elevator trim control setting. Control the glide angle by adjusting power exclusively.

At flare out, the nose-down moment resulting from power reduction is any adverse factor and the airplane may hit on the nose wheel. Consequently, at flare out, the trim control should be set at the full nose-up position and the power adjusted so that the airplane will rotate the horizontal attitude for touchdown. Close the throttle at touchdown

FORCED LANDINGS

PRECAUTIONARY LANDING WITH ENGINE POWER

Before commencing a landing off airport you should overfly the desired landing area at low but safe altitude to check the terrain for obstacles and conditions. If a safe landing can be performed:

3) airspeed...................................... 65-75mph (55-65kts) – Flaps up
   .... 60-70mph (50-60kts) – Flaps down
4) Throttle .... as required
5) Propeller control.......................... Max. RPM (forward)
6) Flight flaps .... As required
7) Doors.. unlatch
8) seat belts .... tighten
9) Fuel shut off valve....................... Off
10) Main switch................................. Off
11) Magneto switch........................... Off

FORCED LANDING WITHOUT ENGINE POWER

If all attempts to start the engine have failed and a forced landing is imminent, select suitable landing area and,

1) Airspeed .... 70mph (60ts) with flaps in
2) Throttle .... full aft
3) Fuel shut off valve....................... OFF
4) Magneto switch........................... OFF
5) Flaps... As required
6) Main switch................................. Off
7) Doors.. unlatch
8) seat belts .... tighten
9) Main switch................................. off

DITCHING

Prepare for ditching by securing or jettison heavy objects in the luggage compartment. To protect the faces of the occupants, obtain folded coats or cushion ready at hand. Send "Mayday" and state the position and intentions on the frequency 121.5 MHz
.

1) Plan the approach into the wind when there is strong wind and rough seas. In case of strong swells and light wind, fly parallel to the swells.
2) Airspeed 65mph (56 Kts).with 40° flaps and engine power adjusted for descent of 300 ft/min
3) Doors unlatch
4) Touchdown at level attitude with adjusted rate of descent. Do not try to flare off as it is difficult to estimate altitude above the water
5) At touch down protect the face with cushion or folded coat.
6) Evacuate the aircraft thought the cabin doors. If necessary open the windows and flood the cabin for pressure equalization so that the door can be opened
7) Inflate lifejackets or dinghies (if available) only after leaving the cabin. You cannot count on the plane to be floating for more than a few minutes.

INADVERT ICING ENCOUNTER

A flight into know icing conditions is forbidden. However, if unexpected icing occurs;

1) Pitot heat ”ON” (if installed).
2) Turn back of change flight altitude to obtain an outside air temperature that is less conductive to icing
3) Pull the cabin heat control full out to obtain maximum defroster air temperature. For greater airflow at reduced temperatures, adjust the cabin heat as required
4) Increase engine speed to minimize icing in propeller
5) Watch out for the signs of induction air filter icing and use carburetor heater if needed. An unexpected loss of engine power could be a sign of carburetor or air filter icing
6) Plan a landing at the nearest airport. With an extremely rapid ice buildup, select suitable off airport landing site
7) Witch ice built-up of more than 0,5 cm in the wing leading edges be prepared for significantly higher stall speed
8) Leave the wing flaps retracted. With severe ice build-up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
9) Open the left window and if practical scrape ice from a portion of the windshield for visibility in the landing approach
10) Perform a landing approach using a forward slip, if necessary, for improved safety

11) Approach at 75-85 mph (65 bis 75 Kts) depending upon the amount of ice accumulation
12) Perform a landing in level attitude.

SPIRAL DIVE

Should the aircraft enter to a spiral dive:

1) Throttle idle
2) With simultaneous use of aileron and rudder make a coordinated turn to align the miniature aircraft symbol in the turn coordinator to horizon line to stop rotation
3) Pull the control column gently to decelerate the airspeed to 80-90mph (70-80 kts)
4) Trim the aircraft so it maintains airspeed 80 mph (70 kts)
5) Keep your hands off the control wheel and steer a straight course with rudder only
6) Pull on the carburetor heat (if needed)
7) After you have exited the spiral, resume normal operations, set power as needed and continue flight

SPINS

Intentional spins are NOT APPROVED for this aircraft (see Section 2). The following procedure should be used to exit unintentional spin

1) Throttle .... IDLE
2) Rudder... Apply and hold full rudder opposite to the direction of rotation
3) Elevator .... immediately after the rudder reaches the stop move the control wheel briskly forward far enough to brake the stall

> **NOTE:**
> **If the center of gravity is aft, the elevator input may need to be all the way to the front in order to terminate the spin efficiently**

4) Hold these control inputs until rotation stops. Premature relaxation of the control inputs may extend the recovery.
5) As rotation stops, neutralize rudder, and make a smooth recovery from the resulting dive.

> **NOTE**
> **If disorientation precludes a visual determination of the direction of rotation, the symbolic airplane of the turn coordinator may be referred to for this information**

Changes in the equipment of the aircraft or the aircraft weight and center of gravity due to subsequently installed equipment or cabin occupancy may lead to a change in the behavior of the aircraft, especially during prolonged spins. This is normal, but results a change in the spin characteristics and delays the termination of the spin. in maneuvers with more than three turns. However, the above-mentioned method of terminating the spin should always be used as it is the fastest way to terminate a spin.

ELECTRICAL POWER SUPPLY MALFUNCTIONS

Malfunctions in the electrical power system can be detected by periodically monitoring the amperemeter, but the cause is usually difficult to determine. Breakage in the generator winding or a or loose wire is the most likely cause of charging problem, although not always.. A damaged or improperly adjusted voltage regulator can also cause interference. All these kinds of malfunctions create an "electrical emergency" that requires immediate action. Power supply malfunctions usually fall into two categories: too high charging current or insufficient charging current. The following paragraphs describe the recommended countermeasures for the given situation.

EXCESSIVE RATE OF CHARGE

After engine starting and heavy electrical usage at low engine speeds (such as extended taxiing) the battery condition will be low enough to accept above normal charging during the initial part of a flight. However, after thirty minutes of cruising flight, the ammeter should be indicating less than two needle widths of charging current. If the charging rate were to remain above this value on a long flight, the battery would overheat and evaporate the electrolyte at an excessive rate. Electronic components in the electrical system could be adversely affected by higher than normal voltage if a faulty voltage regulator setting is causing the overcharging

To preclude these possibilities, an over-voltage sensor will automatically shut down the alternator and the over-voltage warning light will illuminate if the charge voltage reaches approximately 16 volts. and the malfunction was only momentary; an attempt should be made to reactivate the alternator system. To do this,

1) Circuit breaker „Gen. Feld 1“................................ pull
2) 30A-Circuit breaker „Generator 1“......................... pull
3) Main switch „BAT“ und „GEN“............................... OFF-then OFF
4) Over voltage .... Check

5) <u>If there is no overvoltage/operations resumed normal</u>
   Emergency procedures .... Complete

6) <u>If the overvoltage conditions remains</u>
   a. Circuit breaker „Gen. Feld 1“ .... Push
   b. Circuit breaker „Gen. Feld 2“ .... Pull
   c. 50A-Circuit breaker „Generator 2“ .... Pull
   d. Main switch .... OFF then ON
   e. Over voltage.. check

   f. <u>If there is no overvoltage/operations resumed normal</u>
      i. Emergency procedure .... Complete

   g. <u>If the overvoltage conditions remains</u>
      i. Generator-Main switch „Gen“............ OFF
      ii. Circuit breaker „Generator 1“ .... PULL
      iii. Circuit breaker „Generator 2“ .... PULL
      iv. Emergency procedures..................... Complete(Problem not solved

If the problem no longer exists, normal alternator charging will resume, and the warning light will go off. If the light illuminates again, a malfunction is confirmed. In this event, the flight should be terminated and/or the current drain on the battery minimized because the battery can supply the electrical system for only a limited period of time. If the emergency occurs at night, power must be conserved for later use of the landing light and flaps during landing.

INSUFFICIENT CHARGE

If the ammeters indicate a steady discharge in flight, the alternators will not provide enough power to the system. The faulty generator should then be determined and switched off as described above, since supplying the generator field winding could be an unnecessary load on the system. All equipment not essential for the flight should be switched off and the flight terminated as soon as possible.

ROUGH ENGINE OPERATION OR LOSS OF POWER

CARBURETOR ICING

Gradual airspeed drop and rough engine running can be due to ice formation in the carburetor. To remove the ice, apply full throttle and pull the carburetor heat control knob until the engine runs smoothly again. Then switch off the carburetor heating and reset the throttle control. If the conditions require constant use of carburetor heating in cruising flight, use only the pre-heat required to prevent icing (indicated by the smoothest engine run).

SPARK PLUG FOULING

A slight engine roughness in flight may be caused by one or more spark plugs becoming fouled by carbon or lead deposits. This may be verified by turning the ignition switch momentarily from BOTH to either L or R position. An obvious power loss in single ignition operation is evidence of spark plug or ignition system trouble. Assuming that spark plugs are the more likely cause, determine if a change in cruise power setting would fix the problem. If not, proceed to the nearest airport for repairs using power setting resulting smoothest engine run.

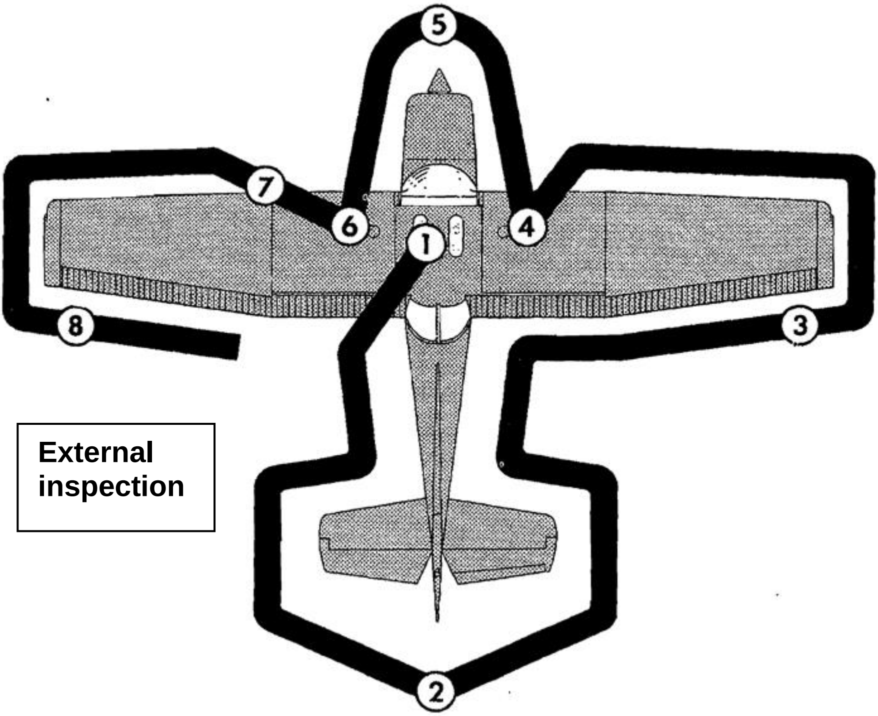
IGNITION MODULE FAULT

A sudden engine roughness or misfiring is usually evidence of ignition module problems. Switching from BOTH to either L or R ignition switch position will identify which system is malfunctioning. Select different power set tings to determine if continued operation on BOTH systems is practical. If not, switch to the better side and proceed to the nearest airport for repairs

LOW OIL PRESSURE

If low oil pressure is accompanied by normal oil temperature, there is a possibility the oil pressure gage or relief valve is malfunctioning. Reduce the engine power to minimum needed and land to a nearest suitable airport to determine the source of the problem. If a total loss of oil pressure is accompanied by a rise in oil temperature, there is good reason to suspect an engine failure is imminent. Reduce engine power immediately and select a suitable forced landing field. Use only the minimum power required to reach the desired touchdown spot
.

4 EXTERIOR CHECK



Note

Visually check airplane for general condition during walk-around inspection. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also, make sure that control surfaces contain no internal accumulations of ice or debris. If a night flight is planned, check operation of all lights, and make sure a flashlight is available

1

1) Remove the gust lock.
2) Magneto switch „OFF"
3) Main switch „ON" test the fuel pump and check fuel pressure. Then Main switch OFF.
4) Fuel valve „ON"

2

1) If rudder locked, remove the lock
2) Check rudder for freedom of movement and security
3) release the tie down
4) Control surfaces freedom of movement and security

3

1) Check aileron for freedom of movement and security.

4

1) wing tie down release.
2) Main tire check for proper inflation.
3) Before first flight of the day and after each refueling, use sampler cup and drain small quantity of fuel tank sum quick drain valve to check for water, sediment and proper fuel grade.
4) Check the fuel level visually and check fuel filler cap for tightness

5

1) **Check coolant level.** (See also ROTAX 912() user's manual). When checking the coolant, the expansion tank must be full. The level in the overflow tank should be between the min. and max. markings.
   Warning: check or refill only when the engine is cold.
2) **Check the engine oil level with dipstick** (see. also, ROTAX 912 () user's manual). Before checking the oil level, run the engine for 1 min. At idle speed or turn the propeller by hand a few turns to pump the engine oil completely out of the crankcase. Stop the engine and check the oil level with the dipstick in the oil tank the oil level in the oil tank should be at least between the two markings (max / min.) Of the dipstick and must never fall below the min. Quantity difference between max and min mark = 0.45 ltr.
   Warning: Check only when the engine is hand warm!
3) Pay attention to any kinds of leaks or abnormal noises
4) Before the first flight of the day and after each refueling, pull the drain plug of the fuel strainer for about 4 seconds to remove any water and debris from the strainer. Check that the strainer outlet is properly closed again. If water is detected, there is a possibility that the fuel system contains even more water and further fuel samples are to be taken from the fuel strainer, at the wing tank sumps and at the drain plug of the fuel line.
5) Check the propeller and spinner for notches, dents and security.
6) Check the carburetor air filter for clogging by dust or other foreign material.
7) Check nose wheel strut and tire for proper pressure.
8) Release nose wheel tie down.
9) Check the static pressure port on the left side of the fuselage for obstruction.

10) Check the venturi for obstruction..

6

1) Check main wheel for correct pressure.
2) Before first flight of the day and after each refueling, use sampler cup and drain small quantity of fuel tank sum quick drain valve to check for water, sediment and proper fuel grade..
3) Check the fuel level visually and check fuel filler cap for tightness

7

1) Remove the pitot cover, if fitted, and check for blockage.
2) Check stall warning.

8

Check aileron for freedom of movement and security.

BEFORE ENGINE START

1) Rudder.. Check movement
2) Seats, belts harnesses .... Adjust and tighten
3) Brakes .... Check and parking brake pull
4) Fuel tank .... Fuel valve selector ON
5) Propeller control.......................... free movement from full aft to forward (max rpm)
6) Fuel pressure .... 0 psi

STARTING THE ENGINE

1) Carburetor heat .... cold(forward)
2) Main switch .... ON
3) Fuel pump .... ON – listen for pump sound
4) Fuel pressure .... 0.15 - 0.40bar (2.13 - 5.70 psi)
5) Throttle .... - cold start - idle
   .... - warm engine - approx. 2cm forward
6) Choke .... - cold start - full aft
   .... - Warm engine - Off (pushed)
7) Propeller control.......................... max. RPM
8) el. fuel pump .... OFF
9) Propeller area .... free
10) Ignition switch .... Start
11) Throttle .... Max 1500 Rpm
12) Oil pressure .... Min. 0.8 bar (12psi) below 1400 rpm
   .... 1,5-5,0 bar (22-73psi)
   .... at cold start not more than 7bar (102psi)

BEFORE TAXI

1) electrical switches..as needed
2) Engine instruments......................................check
3) Flaps(indication and Function)......................check (Flaps down and then again up)
4) Avionics(Switch)..ON
5) Parking brake...release

PRE TAKE OFF CHECK

1) Parking brake...Pull
2) Propeller control...Max rpm (forward)
3) Throttle...1800 Rpm
4) Engine instruments......................................in green
5) Prop check (3x)
   a. Propeller control fully aft for small RPM, RPM must drop at least. 200 rpm
   b. Propeller control forward for max. RPM
6) Ignition – RPM drop on each ignition circuit max. 135 rpm, max. difference max. 50 rpm
7) Carb heat..check (rpm drop at least 30 rpm)
8) Suction (If venturi)..check (less than 1.5 in.Hg.)
9) Rudder..check again
10) Elevator trim...to TAKE-OFF
11) Doors...closed
12) Seat belts...closed and tight
13) flight instruments and radios........................SET
14) Beacon (when installed)...............................ON
15) el. fuel pump..on
16) Parking brake...Release

TAKE OFF

NORMALTAKE OFF

1) Wing flaps...up
2) carburetor heat..cold (forward)
3) Propeller control...max. RPM (forward)
4) Throttle..Full open (forward)
5) Elevator control...55mph (48kts) – rotate.

Note– lifting the nosewheel below 50mph (44kts) can extend the takeoff run.

6) Airspeed...65mph (56kts) until all close in obstacles are cleared. After this select airspeed from section 5
7) el. fuel pump...off
8) Suction
   (If venturi installed).......................................check (3.0 to 5.4 in.Hg.)

SHORT FIEL TAKE OFF

1) Flaps... 10°
2) carburetor heat .... cold (forward)
3) Brakes .... apply
4) Propeller control... max. RPM
5) Throttle .... Full open (forward)
6) Brakes .... release
7) Elevator control.. 50-55mph (43-48kts) list the nose wheel

Note– lifting the nosewheel below 50mph (44kts) can extend the takeoff run.

8) Airspeed.. 60mph (52kts), then select airspeed from section 5
9) Flaps... retract slowly after reaching safe altitude and airspeed
10) el. Fuel pump .... off
11) Suction (If venturi installed)............................ check (3.0 bis 5.4 in.Hg.)

NORMAL CLIMB

1) Airspeed .... 75-80mph (65-70 Kts)

NOTE. If the climb is performed with maximum climb rate, use the speeds given in section 5 in the table "Maximum climb speeds".

2) Throttle .... Full open
3) Propeller control.......................... 2260 rpm

CRUISE (RECOMMENDED)

1) Engine speed.............................. 1700 to 2260 rpm
2) Throttle .... See section 5 – cruise power settings
3) Elevator trim .... adjust

BEFORE LANDING

1) Carb heat.................................... Cold (forward) – apply full heat if conditions are prone to carb ice
2) el. Fuel pump.............................. on
3) Airspeed 65-75mph (55-65kts)
4) Wing flaps................................... as required (airspeed below 100mph (87kts)
5) Airspeed .... 60-70mph (50-60kts) (flaps down)

NORMAL LANDING

1) Touch down .... main wheels first
2) Landing roll .... lower nose wheel gently
3) Brakes .... minimum required

AFTER LANDING

1) Wing flaps .... up
2) carb heat .... cold (forward)
3) el. fuel pump .... OFF

GO AROUND

1) Throttle .... full
2) Propeller .... max rpm
3) Carb heat .... cold (forward)
4) Wing flaps.................................... retract to 20°
5) Airspeed 63mph (55kts)
6) Wing flaps.................................... retract slowly

AFTER LANDING

1) Parking brake............................... Pull
2) Prop control .... max. rpm (forward)
3) Throttle .... Idle
4) Avionics(master) .... OFF
5) All other electrical switches .... OFF
6) Ignition switch .... OFF
7) Main switch.................................. OFF
8) Control lock.................................. insert

OPERATING DETAILS

STARTING THE ENGINE

Usually a warm engine is started with throttle control in for approx. 2 cm. without choke. A cold engine is usually started with choke slightly on and throttle on idle position

Weak intermittent firing followed by puffs of black smoke from the exhaust stack indicates over priming or flooding. Excess fuel can be cleared from the combustion chambers by the following procedure: close choke, the throttle full open, and crank the engine through several revolutions with the starter.

After starting, if the oil gage does not begin to show pressure within 10 seconds in the summertime and about twice that long in very cold weather, stop the engine and investigate. Lack of oil pressure can cause serious engine damage. After starting, avoid using carburetor heating unless icing conditions prevail.

TAXING

When taxiing, it is important that speed and use of brakes be held to a minimum and that all controls be utilized to maintain directional control and balance (see taxing diagram)

Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips

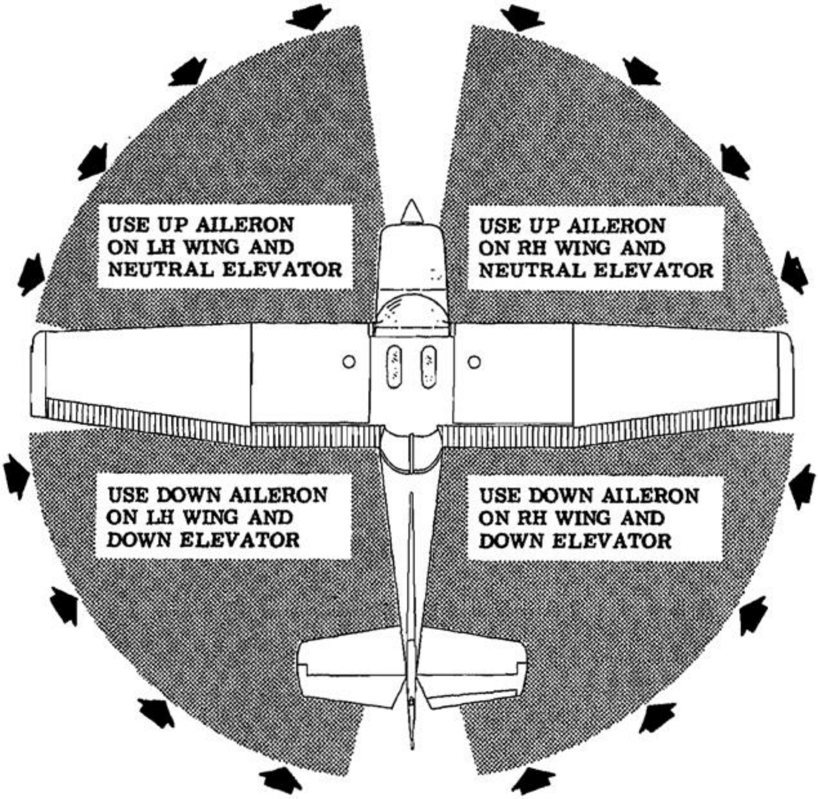
The nose wheel is designed to automatically center straight ahead when the nose strut is fully extended. In the event the nose strut is overinflated, and the airplane is loaded to a rearward center of gravity position, it may be necessary to partially compress the strut to permit steering. This can be accomplished prior to taxiing by depressing the airplane nose (by hand) or during taxi by sharply applying brakes

BEFORE TAKE OFF

WARMING THE ENGINE

Most of the engine warn up will have been conducted during taxi, and additional warm-up before takeoff should be restricted to the checklists procedures. Since the engine is closely cowled for efficient in-flight cooling. Precautions should be taken to avoid overheating on the ground

Taxing diagram



Strong quartering tail winds require caution. Avoid sudden bursts of the throttle and sharp braking when the airplane is in this attitude. Use the steerable nose wheel and rudder to maintain direction.

CHECKING THE IGNITION MODULES

Checking the ignition modules should be done at an engine speed of 1700 rpm, prop control on high setting (forward). Set the ignition switch first to “R" position and notice the rpm droppage. then return the switch to “BOTH“ position to clear the set of spark plugs. Then move switch to „L“ position note the rpm and return the switch to „BOTH“ position. Rpm drop should not exceed 135 rpm on either module or show greater than 50 rpm difference between modules.. If there is a doubt concerning operation of the ignition system, rpm checks at higher engine speeds will usually confirm whether a deficiency exists

An absence of rpm drop may be an indication of faulty grounding of the one side of the ignition system or should be cause for suspicion that the ignition module timing is too early.

CHEKING THE GENERATORS

For flights where electrical power is essential (night or IFR flights) A generator and voltage regulator check can be done by turning on the landing light for short period (3 to 5 seconds) (if installed) or by lowering the landing flaps when engine on idle. The ammeter should remain within needle width of the zero when voltage regulators and generators are working properly

TAKE OFF

ENGINE POWER CHECK

It is important to check full-throttle engine operation early in the take-off run. Any sign of rough engine operation or sluggish engine acceleration is good cause for discontinue the take-off. If this occurs, you are justified in making a thorough full throttle static runup before another take-off attempted the engine should run smoothly and turn 2280 - 2320 rpm with carburetor heat off

Full throttle runups over loose gravel are especially harmful to propeller tips. When take-offs must be made over a gravel surface, it is very important that the throttle be advanced slowly. This allows the airplane to start rolling before high rpm is developed, and the gravel will be blown back of the propeller rather than pulled int.it. If unavoidable small bumps on the propeller blades are detected, they should be removed immediately, as described in Section VI.

After full throttle is applied, adjust the throttle friction lock clockwise to prevent the throttle from creeping back from a maximum power position. Similar friction lock adjustment should be made as required in other flight conditions to maintain a fixed throttle setting

WING FLAP SETTINGS

Normal take-offs are accomplished with wing flaps retracted. Using 10° wing flaps reduces the total distance over an obstacle by approximately 10%. This advantage is however lost in total climb gradient after 15 m obstacle has been cleared. For this reason 10°-flap setting is to be used only for minimum takeoff runs, soft- or uneven fields without obstacles ahead

If 10° wing flaps are used for take-off from uneven or soft fields wing flaps should be left down until all obstacles are cleared. Exception for this rule would be a take-off with hot weather and high pressure altitude where use of 10° wing flap setting would be critical where 10° wing flap setting is not recommended for take-offs

CRUISE PERFORMANCE

Takeoff distances for different weights, headwinds and pressure altitudes are found in Table Takeoff distances Section V

TAKE OFF WITH SIDEWIND

Take-offs into strong crosswinds normally are performed with the minimum flap setting necessary for the field length, to minimize the drift angle immediately after takeoff. The airplane is accelerated to a speed slightly higher than normal, then pulled off abruptly to prevent possible settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

CRUISE CLIMB

CLIMB PERFORMANCE

For detailed data, see the table "Maximum climb rate" in Section V.

CLIMB SPEEDS

Normal climbs are performed for best engine cooling with 75-80mph (65-70kts) with retracted flaps and full throttle. Airspeeds for achieving the best climb rate are in the range of 67mph (58kts) at sea level and 63mph (55kts) at altitudes above 7500ft. If an obstacle requires a steeper climb angle, it is recommended to climb with 63mph (55kts) and retracted flaps.

> **Note**
> **Due to engine cooling steep climbs with low airspeeds should be kept in short term only**

CRUISE FLIGHT

Normal cruise is performed with an engine power between 55 and 75%. The required settings to achieve these performance figures at different altitudes and temperatures can be found or from the performance data in Section V.

The cruise tables in Section V show that greater range and fuel economy can be achieved by flying at lower power settings and at lower altitudes. Using lower power settings and choosing the most favorable wind conditions are important factors that should be considered to reduce fuel consumption on each flight.

The cruise performance table provides the true airspeeds and fuel consumption achievable when cruising at various altitudes and power settings. This table should be used together with valid wind information as a guide to determine the most favorable altitude and engine settings for a given flight

Carburetor icing indicated by unexplained airspeed drop can be eliminated by using full carburetor pre-heating. After regaining the original speed (pre-heating off), it must be determined by appropriate trial and error how much the carburetor pre-heating must be used to prevent ice build-up. The preheated air gives a richer mixture when carburetor heating is used continuously during cruise flight

FLIGHT IN HEAVY RAIN

Important note
During heavy rain rain, the use of full carburetor heating is recommended. This eliminates the possibility of an engine stoppage caused by excessive water intake

STALLS

The stall characteristics are conventional in both retracted and extended flaps. When the flaps are extended, a slight shake of the elevator may occur shortly before stall. The stall warning horn produces a steady signal 5 to 10 mph before actual stall is reached and remains until the attitude is changed. Stall speeds for various combinations of flap setting and bank angle are summarized in Section 5..

SPINS

Spins **not approved** for this airplane (see section 2). To stop an unintentional spin, see. Emergency section

LANDING

Normal landing approaches can be made with power-on or power-off at speeds of 70 - 80 mph (60-70 kts) with flaps up, and 60-70 mph (52-60 kts) with flaps down. Surface winds and air turbulence are usually the primary factors in determining the most comfortable approach speeds.

Actual touchdown should be made with power-off and on the main wheels first. The nose wheel should be lowered smoothly to the runway as speed is diminished.

SHORT FIELD LANDING

For a short field landing in smooth air conditions, make an approach at 60 mph (52kts) with 40° flaps using enough power to control the glide path. After all approach obstacles are cleared, progressively reduce power and maintain 60 mph by lowering the nose of the airplane. Touchdown should be made with power-off and on the main wheels first. Immediately after touchdown, lower the nose wheel and apply heavy braking as required. For maximum brake effectiveness, retract the flaps, hold full nose-up elevator, and apply maximum brake pressure without sliding the tires. Slightly higher approach speeds should be used under turbulent air conditions

LANDING IN SIDE WIND CONDITIONS

When landing in a strong crosswind, use the minimum flap setting required for the field length. Use a wing low, crab, or a combination

Excessive inflation pressure in the nose landing gear strut can prevent the nose wheel from turning and impair the controllability during taxi and side wind landings. This can be counteracted by firmly placing the nose wheel on ground after touch down. This way, the strut is slightly compressed and thereby allows the pivoting of the nose wheel and thus a safe steering on the ground..

BALKED LANDING

In a balked landing (go-around) climb, the wing flap setting should be reduced to 20° immediately after full power is applied. Upon reaching a safe airspeed, the flaps should be slowly retracted to the full up position

COLD WEATHER OPERATIONS

Prior to starting with temperatures below freezing, it is advisable to pull the propeller through several times by hand to "break loose" or "limber" the oil, thus conserving battery energy.

> **Note**
> **When pulling the propeller through by hand, treat it as if the ignition switch is turned on. A loose or broken ground wire on either ignition could cause the engine to fire**

In particularly cold weather (-18 ° C and below) it is recommended to use an external preheater if possible to reduce engine wear and avoid overloading the electrical system.

Cold weather starting procedures are as follows.

1) Electrical fuel pump...................... On (Pump audible)
2) Throttle control............................ Drawn
3) Choke... Drawn
4) Propeller are............................... Clear
5) Main switch................................. On
6) El. fuel pump............................... Off
7) Ignition switch............................. Start
8) Oil pressure................................ Check

> **Note**
> **If the engine does not start during the first few start attempts please consult the instructions in the engine operating manual.**

> **Important note**
> **Fuel accumulations in the intake manifold can cause a fire hazard in the event of a misfire. If this happens, continue cranking with the starter to draw the flames into the engine. When starting in cold weather without preheating, it is always advisable to have a helper standing by with a fire extinguisher outside the aircraft**

Even at very low outdoor temperatures, there must be an indication on the oil temperature gauge before Takeoff. After a reasonable warm-up period (2 to 5 min at 1000 rpm), the engine must be accelerated several times to higher speeds. If the engine accelerates evenly and the oil pressure remains normal and constant, the aircraft is ready to take off.

When operating in temperatures below -18 ° C partial use of carburetor heating must be avoided. Partial preheating could increase the carburetor air temperature to a range between 0 ° C and 21 ° C, where there is a high risk of icing under certain atmospheric conditions.

5 PERFORMANCE

INTRODUCTION

Performance data charts on the following pages are presented so that you may know what to expect from the airplane under various conditions, and, to facilitate the planning of flights in detail and with reasonable accuracy. The data in the charts has been computed from actual flight tests with the airplane and engine in good condition and using average piloting techniques.

It should be noted that the performance information in the range and endurance charts do not include fuel reserves. Cruise fuel flow values are based on normal engine settings. Some indeterminable variables such as engine mixture, fuel metering characteristics, engine and propeller condition, and air turbulence may account for variations of 10% or more. Therefore, it is important to utilize all available information to estimate the fuel required for the particular flight.

USE OF PERFORMANCE CHARTS

Performance data is presented in tabular or graphical form to illustrate
the effect of different variables. Sufficiently detailed information is provided in the tables so that conservative values can be selected and used to determine the performance figure with reasonable accuracy.

SAMPLE PROBLEM

The following example uses values from various tables and charts in this section to define the performance values for a typical flight.

AIRPLANE CONFIGURATION

- Takeoff weight..692kg
- Usable fuel...85ltr. (22.5 US gal)

TAKEOFF CONDITIONS

- Field pressure altitude 1500ft
- Temperature...28°C (16°C above STD)
- Wind component along the RWY....................12 kts Headwind
- Field length...1067m

Fig. 5 - 4 should be used to determine the takeoff distance. For example, in this sample problem, the take-off distance information presented for a pressure altitude of 4000 feet and a temperature of ISA + 22°C should be used and results in the following:

Ground roll:	387m
Takeoff distance	770m

These distances are well within the available take-off field length. However, a correction for the effect of wind may be made based on Note 3 of the takeoff chart. The correction for a 12-knot headwind is:

$$\frac{12kts}{9kts} \cdot 10\% = 13\%$$

to reduce

Ground run: 387m –0.13*387 = 337m
Takeoff distance: 770m –0.13*770 = 670m

If the available runway is not clearly longer than this, interpolation of values is needed. In this case you must use distances of 0 ft and 4000 ft, and at temperatures of ISA and ISA +22°C.

Then:

<u>ISA</u>

At 0ft	Ground roll= 216m	Takeoff distance = 426m
At 4000ft	Ground roll = 308m	Takeoff distance = 609m

Interpolating for 1500ft at ISA conditions

$$x_{roll} = \frac{H}{H2 - H1} \cdot (x_{roll-2} - x_{roll-1}) + x_{roll-1}$$

$$x_{roll} = \frac{1500ft}{4000ft - 0ft} \cdot (308m - 216m) + 216m = 251m$$

$$x_{D15} = \frac{H}{H2 - H1} \cdot (x_{D15-2} - x_{D15-1}) + x_{D15-1}$$

$$x_{D15} = \frac{1500ft}{4000ft - 0ft} \cdot (609m - 426m) + 426m = 495m$$

<u>ISA+22°C</u>

At 0ft	Ground roll= 263m	Takeoff distance = 516m
At 4000ft	Ground roll= 387m	Takeoff distance = 770m

Interpolating for 1500ft and ISA+22°C condition

$$x_{roll} = \frac{H}{H2 - H1} \cdot (x_{roll-2} - x_{roll-1}) + x_{roll-1}$$

$$x_{roll} = \frac{1500ft}{4000ft - 0ft} \cdot (387m - 263m) + 263m = 310m$$

$$x_{D15} = \frac{H}{H2 - H1} \cdot (x_{D15-2} - x_{D15-1}) + x_{D15-1}$$

$$x_{D15} = \frac{1500ft}{4000ft - 0ft} \cdot (770m - 516m) + 516m = 611m$$

FOR ISA+16 THE RESULT IS THEREFORE

$$x_{roll} = \frac{\Delta T}{\Delta T2 - \Delta T1} \cdot \left(x_{roll-2} - x_{roll-1}\right) + x_{roll-1}$$

$$x_{roll} = \frac{16°C}{22°C - 0°C} \cdot \left(310m - 251m\right) + 251m = 294m$$

$$x_{D15} = \frac{\Delta T}{\Delta T2 - \Delta T1} \cdot \left(x_{D15-2} - x_{D15-1}\right) + x_{D15-1}$$

$$x_{D15} = \frac{16}{22°C - 0°C} \cdot \left(611m - 495m\right) + 495m = 579m$$

These are for calm wind conditions. So, we need also wind correction as before:

$$\frac{12kts}{9kts} \cdot 10\% = 13\%$$

Ground roll: 294m –0.13*294 = 256m
Takeoff distance: 579m –0.13*579 = 504m

CRUISE FLIGHT

- Total distance 260NM
- Pressure altitude 5500ft
- Temperature .... 17°C (13°C above STD)
- Expected wind enroute .... 10kts Headwind

The cruising altitude should be selected based on a consideration of trip length, winds aloft, and the airplane's performance. A typical cruising altitude and the expected wind enroute have been given for this sample problem. However, the power setting selection for cruise must be determined based on several considerations. These include the cruise performance characteristics presented in figure 5-9 with corresponding consumptions and ranges, as well as the charts for climb, fuel and distance in climb to cruise altitude.

Pressure altitude of 5500 ft at 20 °C (16°C over ISA) gives density of 7000 ft, for this determination, see Fig. 5 - 1 . From cruise performance charts the following values can be determined for density altitude if 7000ft.

Power setting......................... 55% (2050 Rpm / 21.5 inHg)
Range available:.................... 412NM
Endurance:............................ 4.9 hours. (without reserves)
TAS:..................................... 96mph (84kts)
Consumption .... 17.4 ltr/h

Considering a headwind of 10kts at 5500ft the ground speed affects the range as follows:

Ground speed........................ 84kts-10kts = 74kts
Range available..................... 74kts*4.9 hours. = 363NM

FUEL REQUIRED

The total fuel requirement for the flight may be estimated using the performance information in figures Fig. 5 - 5 to Fig. 5 - 9 . For this sample problem it can be seen from Fig. 5 - 8 that a climb from 1500ft to 5500ft requires 4.1ltr. of fuel. Normal taxi and warm up will need approximately 4 liters of fuel. The distance travelled is approximately 9.5 NM as seen from Fig. 5 - 7 .

With these values the fuel required for cruise and for whole flight can be determined

Distance in cruise phase........260NM – 9.5NM = 250NM
Time req. for cruise................250NM / 74kts = 3.4Std.
Fuel required ....3.4 hours. * 17.4ltr/h = 59ltr.

The total calculated, expected fuel consumption is calculated as follows:

Start warn up and taxi...................4.0ltr.
Climb...4.1ltr.
Enroute.....................................59.0 ltr.
Total..67.1 ltr.

Therefore, an extra fuel of 85ltr. – 67.1ltr. = 17.9ltr. is available

Once the flight is underway, ground speed checks will provide a more accurate basis for estimating the time enroute and the corresponding fuel required to complete the trip with ample reserve.

LANDING

- Pressure altitude 2000ft
- Temperature..25°C
- Field length..914m

A procedure similar to take-off should be used for estimating the landing distance at the destination airport. Fig. 5 - 10 presents landing distances for various airport altitude and temperature combinations Field pressure altitude 2500ft and temperature of 25°C correspond to following values.

Deviation from. ISA...................... +16°C
Ground roll .... 143m + (16°C/33°C) *0.1*143m = 150m
total dist. to clear 15m obst.......... 346m + (16°C/33°C) *0.1*346m = 363m

A correction for the effect of wind may be made based on note of the landing chart using the same procedure as outlined for take-off

CONVERSION CHART PRESSURE ALTITUDE – DENSITY ALTITUDE

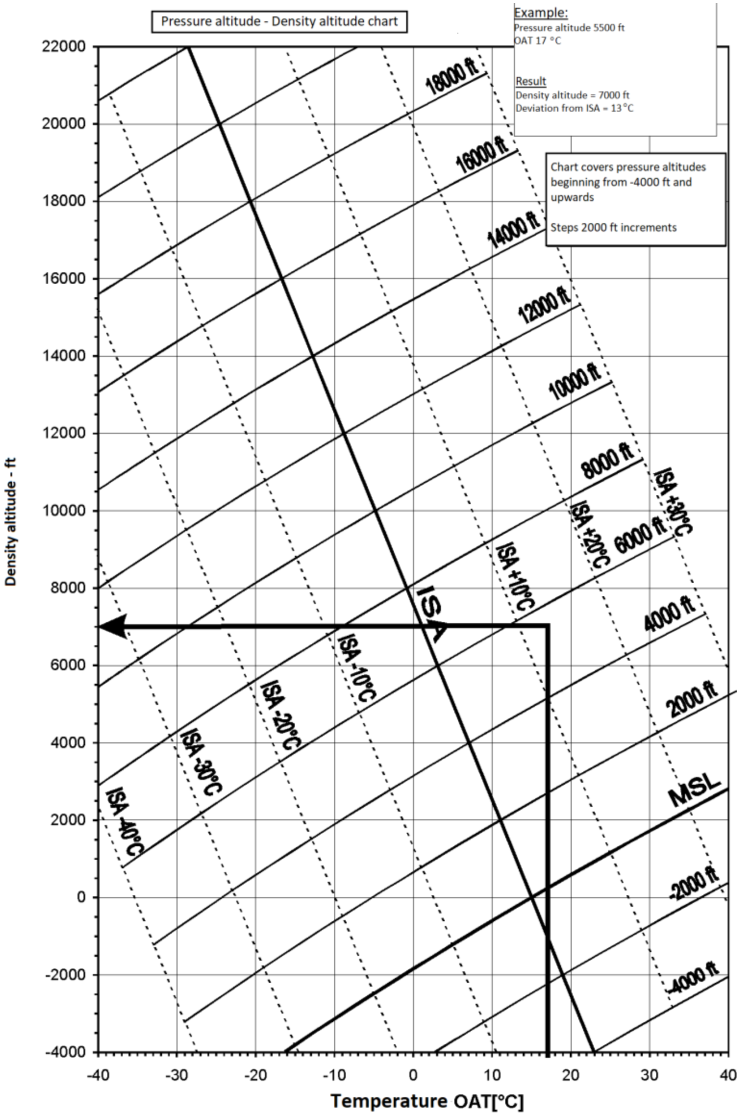


Fig. 5 - 1 – Pressure altitude/Density altitude

AIRSPEED SYSTEM CALIBRATION

Airspeed, IAS, indicated air speed deviates from the calibrated airspeed CAS as follows (mph)

Landing flaps up										
IAS CAS	50 53	60 60	70 69	80 78	90 87	100 97	110 108	120 118	130 128	140 138

Landing flaps full								
IAS CAS	40 40	50 50	60 61	70 72	80 83	90 94	100 105	

Fig. 5 - 2 – Air speed indicator

STALL SPEEDS

Engine on idle, IAS is an approximate.
Weight 726 kg.
.

Flap position	Bank angle							
	0°		20°		40°		60°	
	mph IAS	mph CAS	mph IAS	mph CAS	mph IAS	mph CAS	mph IAS	mph CAS
Flaps up	54	55	56	57	63	63	80	78
Flaps 20°	49	49	50	51	56	56	70	70
Flaps 40°	48	48	49	49	54	54	66	67

Fig. 5 - 3 –Stall speeds

TAKEOFF DISTANCE

	Sea level			4000 ft			8000 ft		
Deviation from ISA °C	OAT °C	Ground run m	Total to clear 15-m obst. m	OAT °C	Ground run m	Total to clear 15-m obst. m	OAT °C	Ground run m	Total to clear 15-m obst. m
-33	-18	158	314	-26	221	438	-34	312	621
0	+15	216	426	+7	308	609	-1	456	915
+22	+37	263	516	+29	387	770	+21	589	1204

Fig. 5 - 4 – Takeoff distance

Conditions:
- Takeoff weight 726kg
- Wind calm
- Paved level, Dry Runway
- Wind calm

Note:
- Airspeed at 15m 65mph (IAS).
- Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
- For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure

CLIMB

RATE OF CLIMB

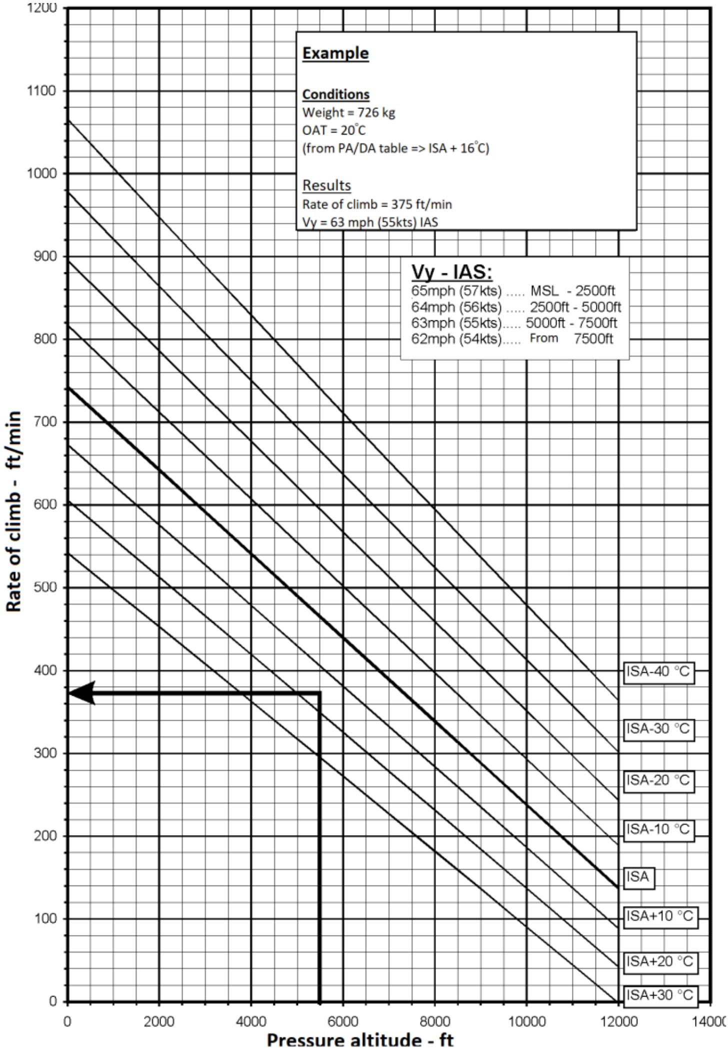


Fig. 5 - 5 – Rate of climb

Note: Flaps up, Full throttle

TIME TO CLIMB

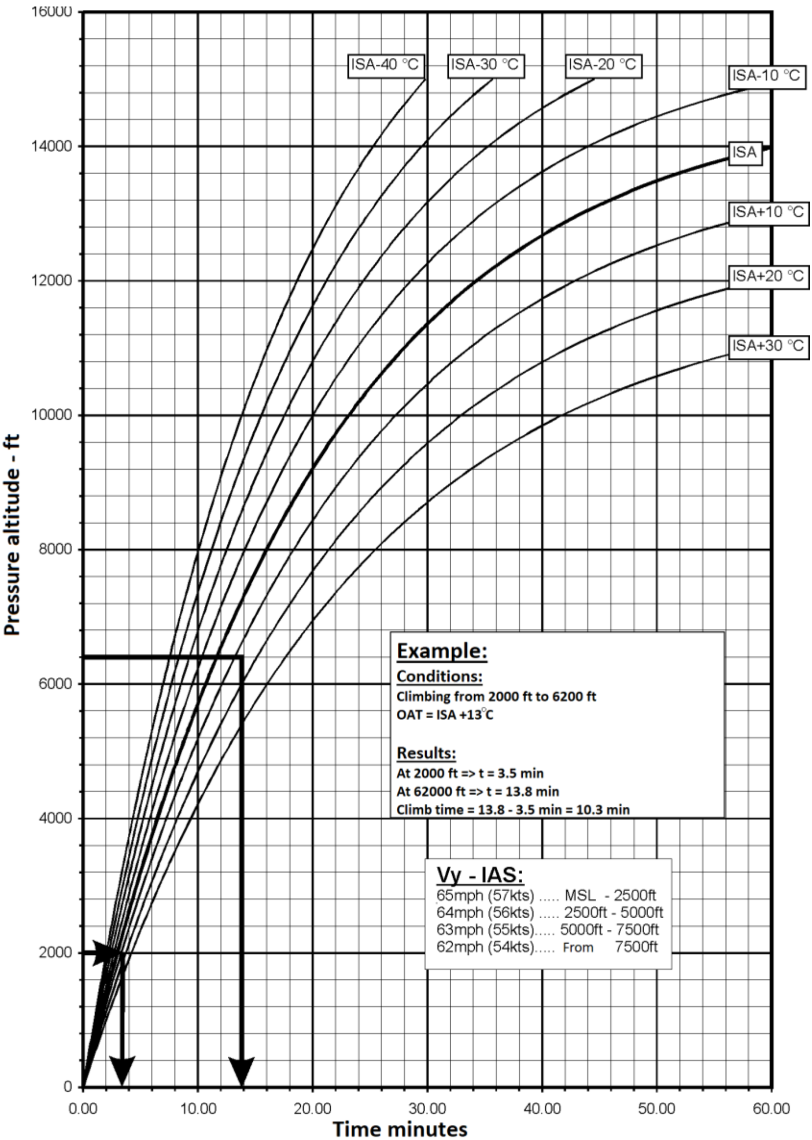


Fig. 5 - 6 – Time to climb

DISTANCE TO FLY

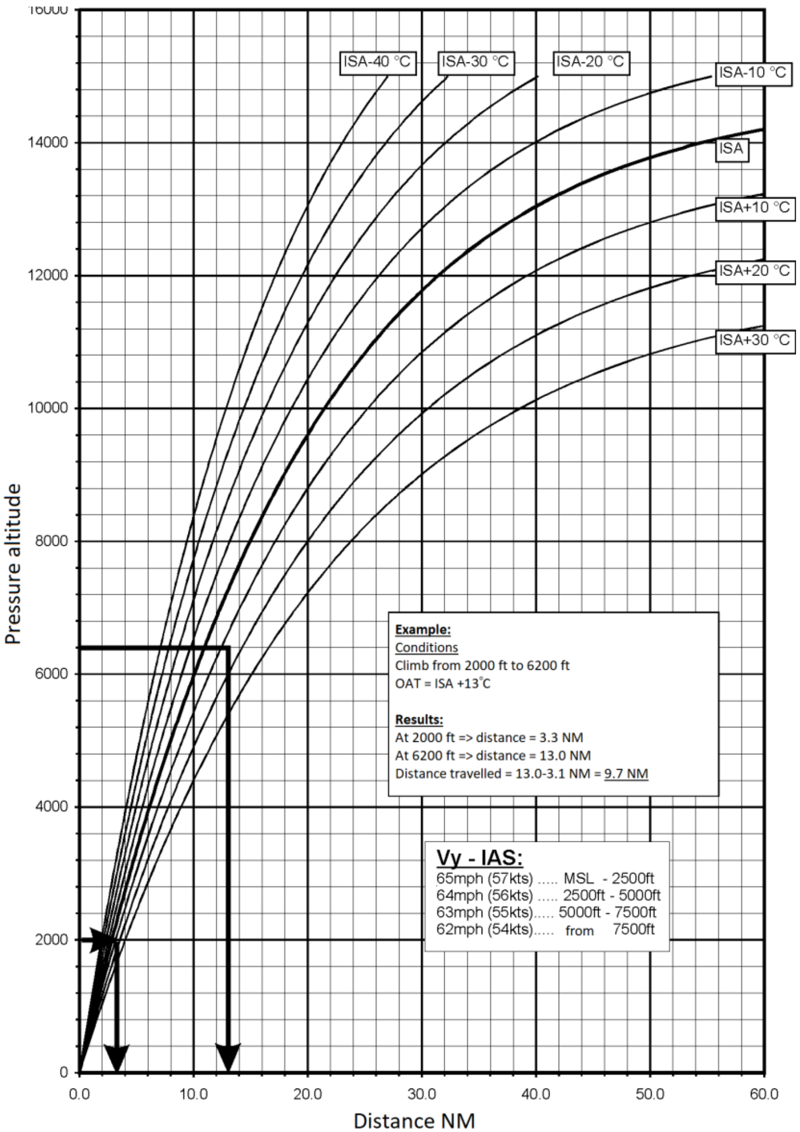


Fig. 5 - 7 –Distance travelled during climb

FUEL USED TO ALTITUDE

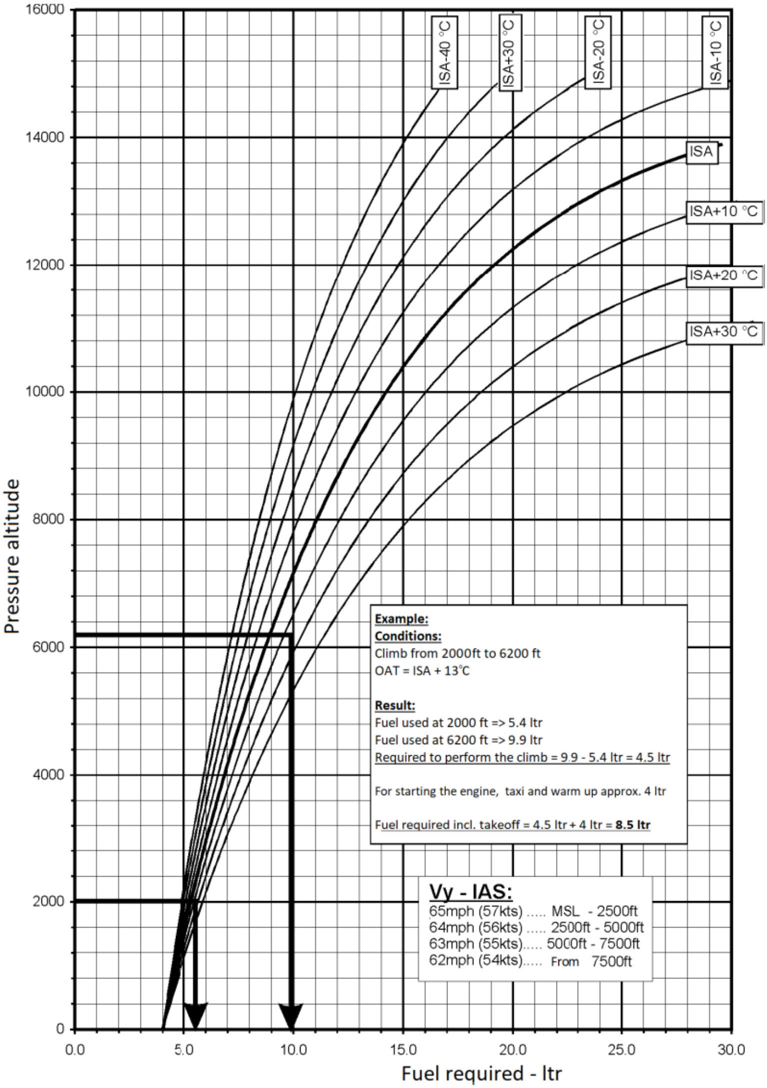


Fig. 5 - 8 – Fuel used during climb

Note: **4 liter for starting the engine, taxi and warm up is reserved**

CRUISE PERFORMANCE

Density alt 2000ft T = 11°C						Endurance, hours		Range, NM	
%P	n[1/min]	Mp [inHg]	TAS[mph]	TAS[kts]	B [ltr./h]	Standard Tanks 85 [tr.]	Longrange Tanks 132 [ltr.]	Standard Tanks 85 [tr.]	Longrange Tanks 132 [ltr.]
max	2260	27,7	113	98	26,8	3,2	4,9	310	482
85	2260	26,7	111	96	22,4	3,8	5,9	365	566
75	2200	25,7	106	92	18,4	4,6	7,2	424	658
65	2000	24,7	100	87	16,0	5,3	8,3	461	715
55	1900	24,0	93	81	14,4	5,9	9,2	476	740

Density alt 4000ft T = 7°C						Endurance, hours		Range, NM	
%P	n[1/min]	Mp [inHg]	TAS[mph]	TAS[kts]	B [ltr./h]	Standard Tanks 85 [tr.]	Longrange Tanks 132 [ltr.]	Standard Tanks 85 [tr.]	Longrange Tanks 132 [ltr.]
85	2260	25,7	112	97	25,2	3,4	5,2	327	508
75	2260	24,3	108	93	19,6	4,3	6,7	405	629
65	2100	23,3	102	88	16,8	5,1	7,9	447	694
55	1900	23,3	95	82	15,6	5,4	8,5	447	695

Density alt 6000ft T = 3°C						Endurance, hours		Range, NM	
%P	n[1/min]	Mp [inHg]	TAS[mph]	TAS[kts]	B [ltr./h]	Standard Tanks 85 [tr.]	Longrange Tanks 132 [ltr.]	Standard Tanks 85 [tr.]	Longrange Tanks 132 [ltr.]
75	2260	23,3	110	95	23,2	3,7	5,7	349	542
65	2200	22,7	104	90	19,6	4,3	6,7	390	606
55	2000	22,0	96	84	16,8	5,1	7,9	423	657

Density alt 8000ft T = -1°C						Endurance, hours		Range, NM	
%P	n[1/min]	Mp [inHg]	TAS[mph]	TAS[kts]	B [ltr./h]	Standard Tanks 85 [tr.]	Longrange Tanks 132 [ltr.]	Standard Tanks 85 [tr.]	Longrange Tanks 132 [ltr.]
71	2260	22,0	109	95	23,0	3,7	5,7	351	546
65	2200	21,7	105	92	21,2	4,0	6,2	367	570
55	2100	21	98	85	18,0	4,7	7,3	401	623

Density alt 10000ft T = -5°C						Endurance, hours		Range, NM	
%P	n[1/min]	Mp [inHg]	TAS[mph]	TAS[kts]	B [ltr./h]	Standard Tanks 85 [tr.]	Longrange Tanks 132 [ltr.]	Standard Tanks 85 [tr.]	Longrange Tanks 132 [ltr.]
65	2260	20,3	107	93	22,4	3,8	5,9	354	550
55	2200	19,7	99	86	19,2	4,4	6,9	383	594

Fig. 5 - 9 – Cruise performance

Note

- Deviation from standard conditions must be taken into account. For this use Fig. 5 - 1
- To minimize the engine wear, engine speeds below 1700 rom are not recommended.
- • These tables do not include fuel consumption at take-off, nor reserves.
- The range is presented in NM (Nautical miles)

LANDING DISTANCE OVER 15 M OBSTACLE

Engine at idle power, flaps 40°, hard surface, wind calm

		SL and 15° C.		2500 ft and 10° C.		5000 ft and 5° C.		7500 ft and 0° C.	
weight kg	Speed. IAS mph	Ground roll m	Total to clear 15 m obst. m	Ground roll m	Total to clear 15 m obst. m	Ground roll	Total to clear 15 m obst. m	Ground roll m	Total to clear 15 m obst. m
726	58	136	328	143	346	151	364	159	383

Fig. 5 - 10 – landing distance

Conditions:

- Flaps 40°
- power at idle
- Maximum braking
- Paved, level dry runway
- wind calm

Note

- Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots
- For each 33° when temperature is over ISA increase distances by 10%.
- For operation on a dry, grass runway, increase distances by 45% of the "ground roll" figure.

6 MAINTENANCE INSTRUCTION – HANDLING ON GROUND

SERVICING

On the following pages, under the header "MAINTENANCE INSTRUCTIONS", the consumables, quantities and specifications of common service items (such as fuel, oil, etc.) are listed to provide you with this information at all times and without delay.

In addition to the "PREFLIGHT INSPECTION" in Section 4, a complete servicing, inspection and test requirements for your airplane are detailed in the service/maintenance manual or in the Appendix to Maintenance Manual No. 126 and in the appropriate equipment manuals (e.g. engine and propeller). The maintenance/service manual outlines all items which require attention at specific intervals of 50, 100 and 200 hours plus those items which require servicing, inspection and/or testing at specific intervals.

All maintenance, inspection and testing must be carried out in accordance with the relevant manuals. It is recommended that you contact your aerospace company for these regulations and that you schedule your aircraft for maintenance at the recommended intervals

However, it is possible for the local aviation authority to require further maintenance, inspection and testing to perform certain flight operations. Regarding these official regulations, the aircraft owners should contact the aeronautical authorities of the country where the aircraft is operated.

FUEL TANKS

Refuel with fuel of at least *95 octane* after each flight. The standard tanks hold 13 US gal (49 ltr.) And the optional long-range tanks 19 US gal (72 ltr.). To maximize the capacity, the tanks should be re-topped after refueling due to cross-feeding between tanks.

For more information regarding fuel types, see Chapter 1 – ENGINE

FUEL STRAINER

before first flight of the day and after each refueling, pull out strainer drain knob for about four seconds to clear fuel strainer of possible water and sediment. check strainer drain closed. If water is observed, the fuel system may contain additional water, and further draining of the system at the strainer, fuel tank sumps, and fuel line drain plug will be necessary

ENGINE OIL

OIL TYPE

Consult Table FIG 1-2 (Chapter 1)

- Use only brand name automotive oils for petrol engines named "SF" or "SG" in accordance with API system.
- Do not use aviation oils
- Do not use any oil additives.

OIL TANK CAPACITY

Note **Before checking the oil level, turn the engine by hand on the propeller a few turns, or let the engine idle for about 1 min. To pump the oil from the engine into the oil tank.**

Capacity
Max.3 Liter (Without oil lines and oil cooler)
Min. 2 Liter (Without oil lines and oil cooler)

Do not operate less than 2 liters. To minimize the loss of oil through the vent line, do not fill more than 3 liters. For longer flights do not fill more than 3 liters. The above mentioned quantities are based on measuring the oil level with the dipstick. (flattened point) After oil and filter change, run the engine, check and refill the appropriate amount of oil.

ENGINE OIL FILTER CHANGE

(For this action, use the latest maintenance manual ROTAX 912 series)

After the first 25 hours of operation, the oil should only be drained from the oil tank. After this, remove and clean the oil tank, remove and check the oil filter, refit the new oil filter and the oil tank and reinstall into aircraft. Fill with engine oil (without additives). This work must be performed in accordance with the ROTAX 912 Series Service Manual () (). When using AVGAS, the engine oil change is required every 50 hours of operation.
.

Airplanes that are operated solely on automotive fuel brands (see section 1) The oil change interval is 100 hours

The oil change must be carried out at least once a year, even if less than 100 flight hours have been flown during this period. reduce intervals for prolonged operations in dusty areas, cold climates, or when short flights and long idle period result in sludging conditions

FUEL

Only unleaded fuel as per EN228 with minimum octane rating of ROZ 95 should be used (see also Chapter 1 - ENGINE) to avoid contamination of the engine by lead. As an alternative fuel, leaded fuel or AVGAS 100 LL can be used.

CAPACITY OF EACH STANDARD TANK:

Total capacity of each tank	49 Ltr. (13 US gal.)

CAPACITY OF EACH LONG-RANGE TANK:

Total capacity of each tank	72 Ltr. (19 US gal.)

> **Note**
> **Due to cross-feeding between fuel tanks, the tanks should be re-topped after each refuelling to assure maximum capacity.**

LANDING GEAR

INFLATION PRESSURE OF THE NOSE WHEEL:
2.1 bar (30 psi) tire size 5.00-5, 4 ply

INFLATION PRESSURE OF THE MAIN WHEELS
1,5 bar (21 psi) tire size 6.00-6, 4 ,ply

Nose gear wheel strut:

Ensure that it is always filled with hydraulic fluid MIL H 5606, or equivalent, and inflated to 1.4 bar (20 psi) with air. Do not over-inflate.

CARE OF THE AIRPLANE

TOWING

The airplane is most easily and safety maneuvered by hand with the tow-bar attached to the nose wheel. When towing with a vehicle, do not exceed the nose gear turning angle of 30º either side of center, or damage to the gear will result. If the airplane is towed or pushed over a rough surface during hangaring, watch that the vertical movement of the tail and the resulting contact with low hangar door or structure. A flat nose tire or deflated strut will also increase tail height

Proper tie-down procedure is the best precaution against damage to the parked airplane by gusty or strong winds. Tie down the airplane securely, proceed as follows::

1) Set the parking brake and install the control wheel lock.
2) Install a surface control lock between each aileron and flap.
3) Tie sufficiently strong ropes or chains (3200 N tensile strength) to the wing and tail tie-down fittings and secure each rope to ramp tie-down
4) Install a surface control lock over the fin and rudder.
5) Install a pitot tube cover .
6) Tie a rope to an exposed portion of the engine mount and secure a ramp tie-down.
7) Turn the propeller into upright position by hand

WINDSHIELD - WINDOWS

The plastic windshield and window should be cleaned with an aircraft windshield cleaner. Apply the cleaner sparingly with soft cloths, and rub with moderate pressure until all dirt, scum and bug stains are removed. Allow the cleaner to dry, then wipe it off with soft flannel cloths

Is a windshield cleaner is not available, the plastic can be cleaned with soft cloths moistened with Stoddard solvent to remove oil and grease.

> **Note**
> **Never use gasoline, benzine, alchohol, acetone, carbon tetrachloride, fire extinguisher or anti-ice fluid, laquer, thinner or glass cleaner to clean the plastic. These materials will attack the plastic and may cause it to craze**

Followed by Carefully washing with mild detergent and plenty of water. Rinse thoroughly, then dry with a clean moist chamois. Do not rub the plastic with dry cloth since this builds up an electrostatic charge which attracts dust. waxing with good commercial wax will finish the cleaning job. A thin even coat of wax, polished out by hand with clean soft flannel cloths, will fill in minor scratches and help prevent further scratching

Do not use a canvas cover on the windshield unless freezing rain or sleet is anticipated since the cover may scratch the plastic surface

PAINTED SURFACES

The painted exterior surfaces of your Cessna have a durable, long lasting finish and, under normal conditions, require no polishing or buffing. Approximately 15 days are requires for paint to cure completely; in most cases, the curing period will have been completed prior to delivery of the airplane. In the event that polishing or buffing is required within the curing period, it is recommended that the work be done by someone experienced in handing uncured paint. Any Cessna dealer can accomplish this work

Generally the painted surfaces can be kept bright by washing with water and mild soap, followed by a rinse with water and drying with cloths or a chamois. Harsh or abrasive soaps or detergents which cause corrosion or scratches should never be used. remove stubborn oil and grease with a cloth moisten with Stoddard solvent

Waxing is unnecessary to keep the painted surfaces bright. However, if desired, the airplane may be waxed with a good automotive wax. A heavier coating of wax on the leading edges of the wings and tail and on the engine nose cap and propeller spinner will help reduce the abrasion encountered in these areas.

When the airplane is parked outside in cold climate and it is necessary to remove ice before flight, care should be taken to protect the painted surfaces during ice removal with chemical liquids. A 50-50 solution of isopropyl alcohol and water will satisfactory remove ice accumulations without damaging the paint. A solution with more than 50% alcohol is harmful and should be avoided. While applying the de-icing solution, keep it away from the windshield and cabin windows since the alcohol will attack the plastic and may cause it to craze

PROPELLER CARE

Preflight inspection of propeller blades for nicks, and wiping them occasionally with damp cloth to clean off grass and bugs, stains will assure long, trouble-free service. Small nicks on the propeller, particularly near tips and on leading edges, should be dressed out as soon as possible in accordance with propeller Maintenance and User manual. Normal solvents can be used to clean the blades.

Propeller Manual HOFFMANN No. 540 is mandatory for the installation, operation and maintenance of the propeller.

INTERIOR CARE

To remove dust and loose dirt from the upholstery and carpet, clean the interior regularly with vacuum cleaner

Blot up any spilled liquid promptly with cleansing tissue or rags. Don´t pat the spot; press the blotting material firmly and hold it for several seconds. Continue blotting until no more liquid is taken up. Scrape off sticky materials with a dull knife, the spot-clean the area.

Oily spots may be cleaned with household removers, used sparingly. Before using any solvent, read the instructions on the container and test it on obscure place on the fabric to be cleaned. Never saturate the fabric a volatile solvent; it may damage the padding and backing materials.

Soiled upholstery and carpet may be cleaned with foam-type detergent, used according to manufacturer´s instructions. To minimize wetting the fabric, keep the foam as dry as possible and remove it with a vacuum cleaner

The plastic trim, instrument panel and control knobs need only be wiped off with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with Stoddard solvent. Volatile solvents, such as mentioned in paragraphs on care of the windshield, must never be used since they soften and craze the plastic

7 MASS AND BALANCE

DETERMING CENTER OF GRAVITY

Before each flight the pilot must ensure that the airplane is loaded correctly. The Fig. 7c - 3 provides an example how to accomplish this

To determine the CG, proceed as follows:

1) Determine the sum of the individual weights. This gives you the takeoff weight..
2) Determine the sum of the individual moments / 1000 of the weights. This gives you the takeoff moment.
3) Check from the table Fig. 7c - 5, to determine that the takeoff weight and moment lies in permissible area

> **Note**
> **Moments/1000 can be found from Fig. 7c - 4**

LOADING ARRAGEMENT

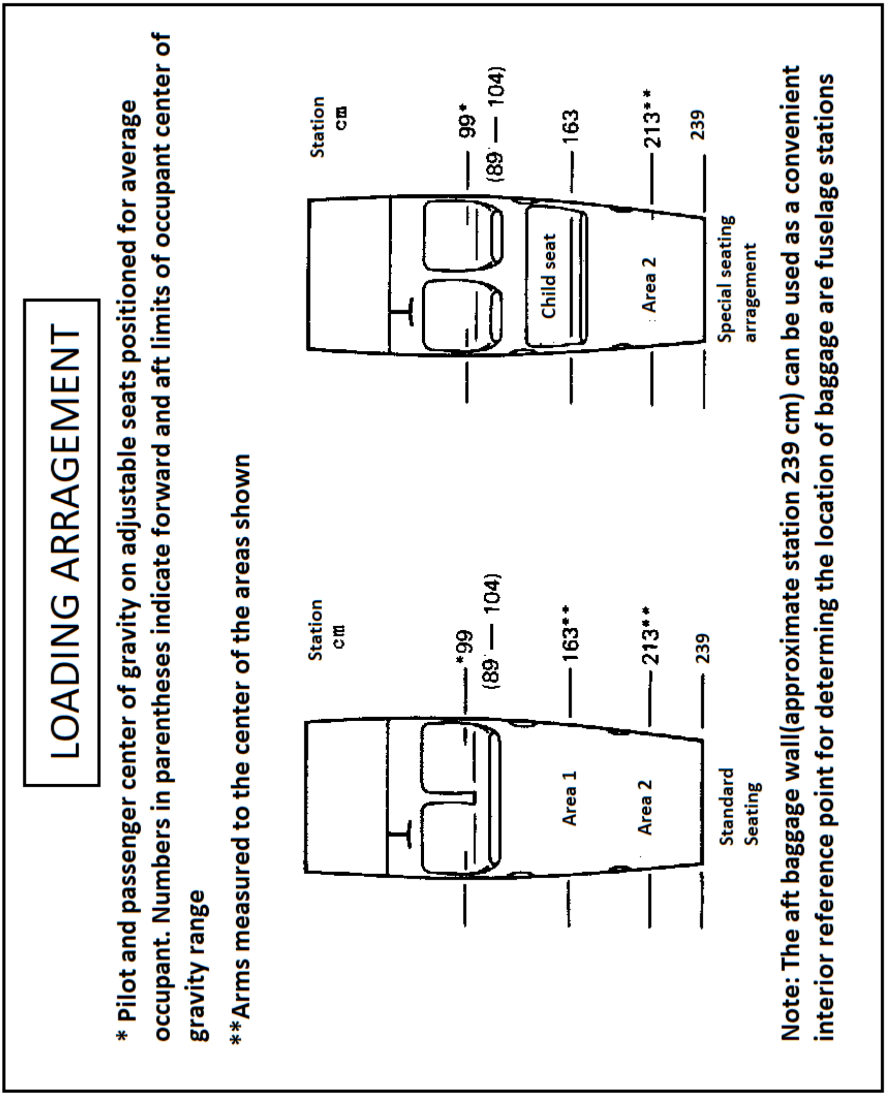


Abb. 7c - 1 – Loading arrangement

BAGGAGE AREA LOADING AND TIE-DOWN

**BAGGARE AREA
MAXIMUM LOADS**

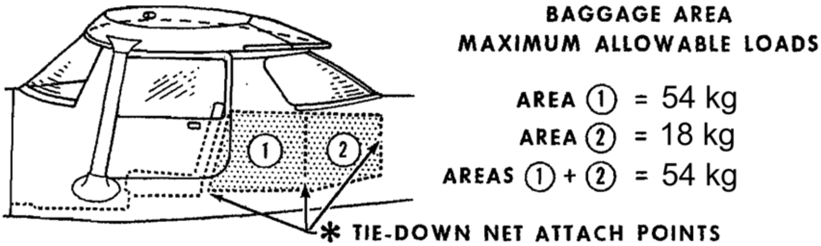


Fig. 7c - 2 – Baggage area loading and tie down

A cargo tie-down net is provided to secure baggage in the baggage area. The net attaches to six tie-down rings. Two rings are located on the floor just aft of the seat backs and one ring located is located 5 cm above the floor on each cabin wall at the aft end of area (1). Two additional rings are located at the top, aft end of area (2).At least four rings should be used to restrain the maximum baggage load of 54 kg.

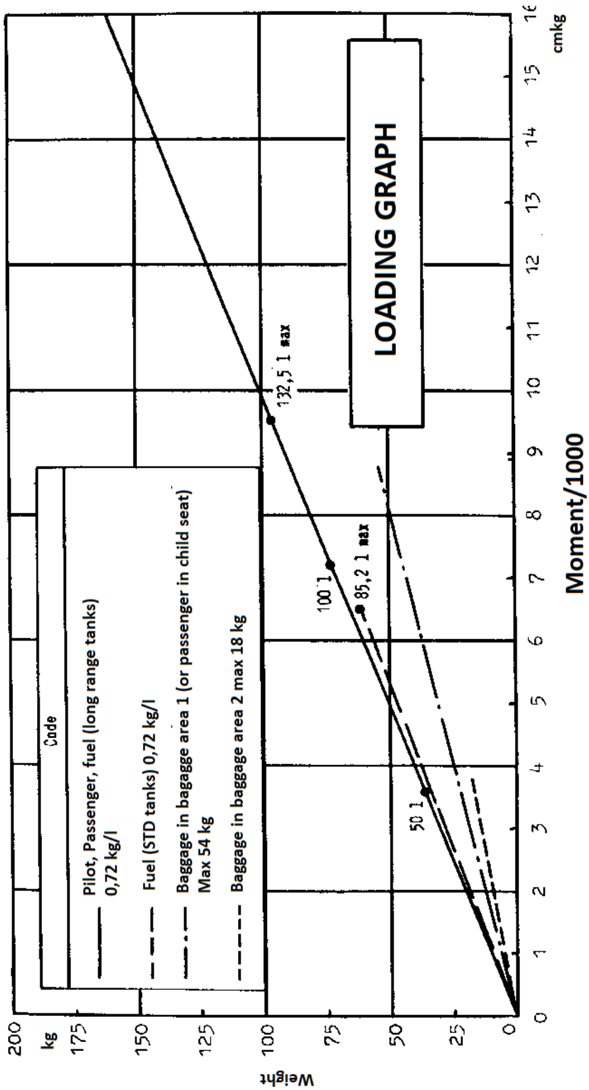
If the aircraft is equipped with optional storage compartment, it should be removed before loading any large items (To do this, push the tabs on both sides of the compartment.) After the large luggage is stowed and secured, the compartment can be either stowed away or, if space permits, reinserted to accommodate small items.

LOADING EXAMPLE

	Example airplane (example)		**Your airplane**	
	Weight kg	**Moment/1000 cmkg**	**Weight kg**	**Moment/1000 Cmkg**
1. Basic Empty Weight (Use the data pertaining to your airplane as it is presently equipped. Includes unusable fuel and full oil)	496.7	41.3		
2. Usable fuel (SPG. 0,72 kg /ltr.) • Standard tanks (85,2 ltr. max.) • Long range tanks (132,5 ltr. max.) (reduced fuel as limited by maximum weight)	61.2	6.5		
3. Pilot and passenger (Sta. 84 to 104 cm)	154.2	15.3		
4. Baggage area 1 (or passenger on child seat) (Sta. 127 to 193 cm, max. 54 kg)	13.6	2.2		
5. Baggage area (2) (Sta. 193 to 239 cm)				
6. TOTAL WEIGHT AND MOMENT	725.7	65.3		
7. Locate this point (65.3 cmkg/1000 at 725.7 kg) on the Center of Gravity Moment Envelope, and since this point falls within the envelope, the loading is acceptable.				

Fig. 7c - 3 – Sample loading problem

LOADING GRAPH



Note
Pilot or passenger center of gravity on adjustable seats positioned for average occuopant.
The front and aft limits for the front seat station can be found from Abb. 7c - 1 –

Fig. 7c - 4 –Loading graph

CENTER OF GRAVITY MOMENT ENVELOPE

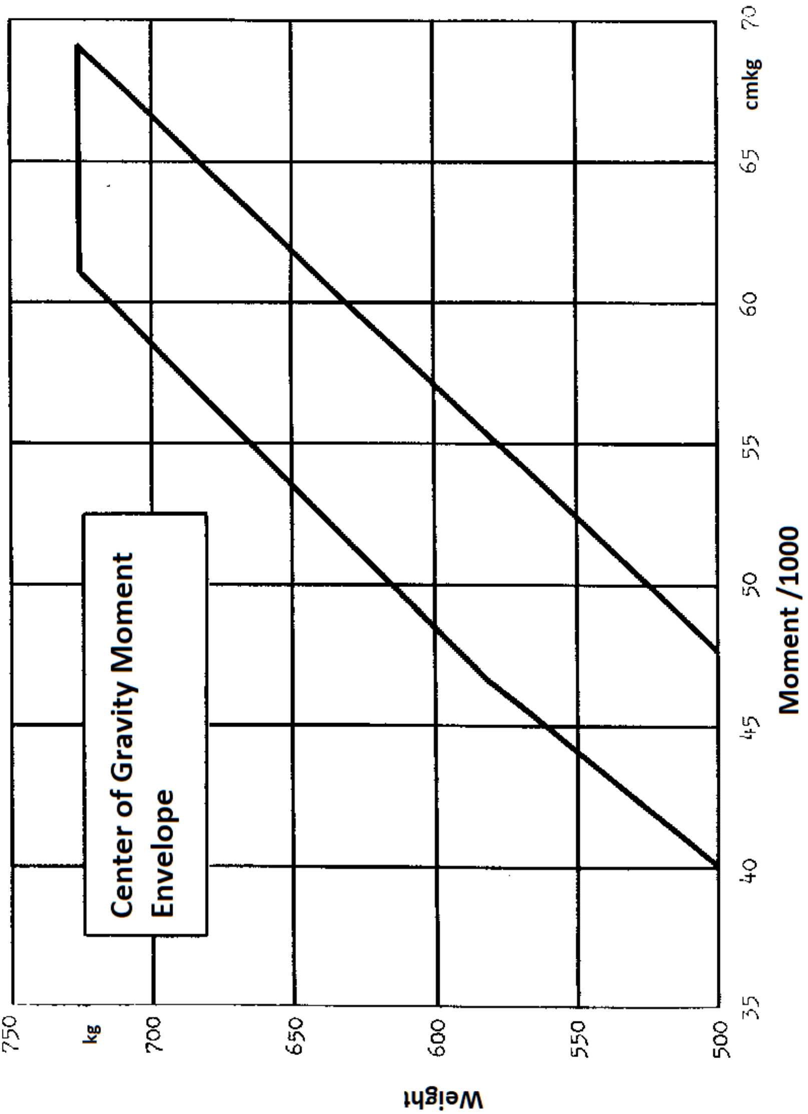


Fig. 7c - 5 – Center of Gravity Moment envelope

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