AIRCRAFT FLIGHT MANUAL

&

PILOT OPERATING HANDBOOK

CAP 10B

APPROVED AIRPLANE FLIGHT MANUAL
&
PILOT'S OPERATING HANDBOOK

Manufacturer

APEX Aircraft
1, route de Troyes
21121 DAROIS
FRANCE

Serial No.

316

Registration No.

HB-SBE

Type (CDN de type)

CAP 10B

Commercial denomination

CAP 10C

THIS DOCUMENT MUST BE CARRIED IN THE AIRPLANE AT ALL TIMES.

THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER.

This airplane Flight Manual is the English translation of the French approved Airplane Flight Manual, which remains the reference in any case.

Date of approval and signature of certificating authority

27 JUIN 2002 IEAAC
P. AURADE

LOG OF REVISIONS

Revision number	date	Revised pages	Description of revision
1	Feb. 2003	I 2-14	Section 2 – Limitations - Placards Placard concerning use of GPS.

Date of revision
Name, title & signature
25 MAR 2003
IEEAC
P. AURADE

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Sections

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1. GENERAL

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1. GENERAL

1.1 INTRODUCTION

This document contains information to be provided to the pilot as required by regulation JAR 23 and additional information provided by the manufacturer. It integrates the aircraft flight manual approved by the French Airworthiness Authorities (D.G.A.C.).

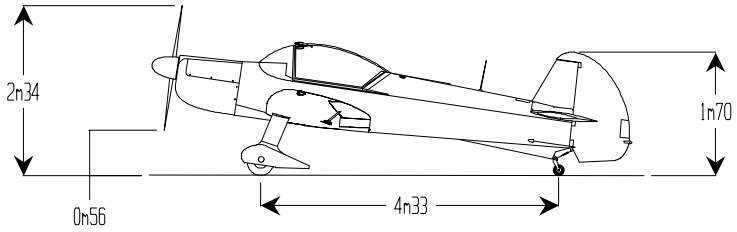
Unless otherwise stated, the speeds used in this flight manual are indicated air speeds.

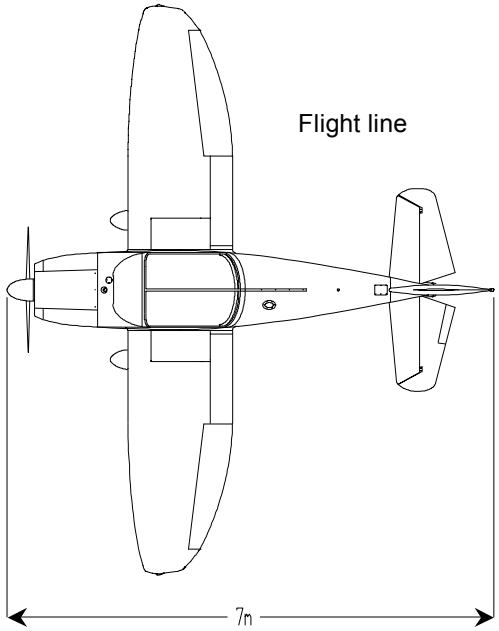
1.2 PRESENTATION

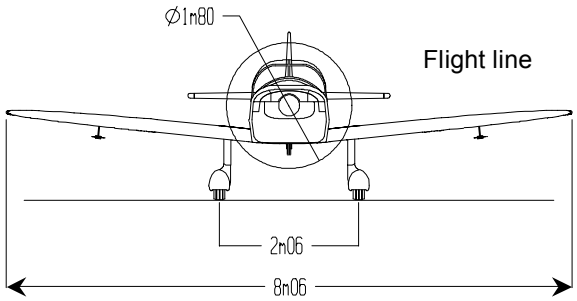
The trade name CAP10C is the commercial denomination for the CAP10B as from serial number 300. This trade name is also associated with application of major change 000302 (SB No. 000302).
The CAP10B is certified in the "Utility" and "Aerobatics" categories in accordance with regulation AIR 2052 and its amendments dated 10 November 1969.
Major change 000302 to the CAP10C is certified in the "Utility" and "Aerobatics" categories in accordance with regulation JAR-23 and its amendments dated 11 March 1994.

The CAP10B is a two-seater training aircraft specially designed for advanced training and aerobatics instruction.
The side-by-side seat arrangement and comfort of its cockpit together with its high speed and long range make it a good travel aircraft. Its instrument panel can accommodate all the radio equipment needed for VFR navigation.
This is a low-wing single-engine aircraft with conventional landing gear. It is equipped with a 180 hp LYCOMING AEIO 360 B2F engine featuring an inverted flight tank.

1.3 THREE-VIEW DRAWINGS







1.3.1 Wings

Surface area	10.85 m²
Span	8.06 m
Wing aspect ratio	5.96
Dihedral	5°
Twist	0°
Profile	NACA 23012

1.3.2 Ailerons

Percentage of span	44 %
Mean relative width	29%
Deflection	± 25° ± 2°
Unit area	0.67 m²

1.3.3 Flaps

Percentage of span	32 %
Mean relative width	25 %
Deflection	+15° / +40° ± 2°
Unit area	0.487 m²

1.3.4 Fuselage

Overall length	7 m
Internal width	1.054 m
Height	2.34 m
Unit area	0.487 m²

1.3.5 Horizontal stabilizer

Span	2.90 m
Total surface area	1.86 m²
Horizontal stabilizer area	1.00 m²
Mobile area	0.86 m²
Aspect ratio	4.52
Deflection	± 25° ± 2°

1.3.6 Electrical elevator trim tab

Surface	0.057 m²
Deflection	± 17° ± 2°

1.3.7 Vertical stabilizer

Height	1.590 m
Total area	1.316 m²
Mobile area	0.659 m²
Deflection	± 18° ± 2°

1.3.8 Landing gear

Main

Track	2.06 m
Wheel dimension	380 x 150
Tyre inflation pressure	2 bars
Shock absorber inflation pressure	8 bars

Auxiliary

Tyre dimension	6 x 200

1.4 POWER PLANT

Manufacturer ..... LYCOMING

Model / type ..... AEIO 360 B2F

Power and rpm

	Power	Engine speed
nominal	180 hp	2 700 rpm
cruise	75 %	2 450 rpm
economy cruise	65 %	2 350 rpm

1.5 PROPELLER

Number	1	1
Manufacturer	HOFFMANN	EVRA
Model	HO 29 HM-180-170	CAP 3. 180-170-H5. F.
Number of blades	2	2
Diameter	180 cm (71 in)	180 cm (71 in)
Type	Fixed pitch	Fixed pitch

1.6 FUEL

1.6.1 Grade

Minimum grade 91/96

1.6.2 Quantities

Overall quantity ..... 154 litres (41 US Gal)
(111 kg - 245 lb)

in

fwd tank ..... 75 litres (20 US Gal)
(54 kg - 119 lb)

aft tank ..... 79 litres (21 US Gal)
(56.9 kg - 125 lb)

Usable quantity ..... FWD tank: 72 litres
AFT tank: 78 litres

1.7 OIL

1.7.1 Characteristics and grade

For longer engine life, you are advised to use:

Up to 50 hours ..... mineral oil
Subsequently ..... detergent oil

Recommended viscosity according to air temperature:

Temperature	Viscosity
Above 15°C (59°F)	SAE 50
From - 1 to 32°C (30.2 to 89.6°F)	SAE 40
From -18 to 21°C (- 0.4 to 69.8°F)	SAE 30
Below - 12°C (10.4°F)	SAE 20

Oil capacity

	Cat. U	Cat. A
Minimum	2 qt (1.9 litres)	2 qt (1.9 litres)
Maximum	8 qt (7.6 litres)	6 qt (5.7 litres)

1.8 CERTIFIED MAXIMUM WEIGHTS

Weight	Category U		Category A	
	kg	lb	kg	lb
Maximum takeoff weight	830	1 930	780	1 720
Maximum landing weight	800	1 764	780	1 720
Maximum load in luggage compartment	50	110	Forbidden	

1.9 CHARACTERISTIC WEIGHTS

Empty weight: ..... 540 kg (1190 lb)

Maximum payload: ..... 290 kg (639 lb)

NOTE

These values are given for information.
The empty weight specific to an aircraft is indicated in the weighting and centring report inserted in the Aircraft Individual Inspection Record (I.I.R.).

1.10 COCKPIT DIMENSIONS

Width (maximum) ..... 1.05 m (3.44 ft)

Height (maximum) ..... 0.98 m (3.21 ft)

1.11 CHARACTERISTIC LOADS

Wing loading with weight of 830 kg (1930 lb) .....76.5 kg/m² (16.5 lb/Sq ft)

Weight – power ratio (180 hp) .....4.5 kg/hp (10.6 lb/hp)

1.12 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

CAUTION: means that failure to observe the corresponding procedure may lead to immediate or significant degradation of flight safety.

REMARK: means that failure to observe the corresponding procedure may lead to a minor degradation of flight safety in the relatively longer term.

NOTE: used to draw attention to a point that has no direct consequences on safety, but that is important or out of the ordinary.

IAS	Indicated airspeed: speed read on the anemometer.
CAS	Calibrated airspeed: indicated airspeed with instrument and anemometric error corrected.
TAS	True airspeed: calibrated airspeed with altitude, temperature and compressibility taken into account.
V_A	Manoeuvring speed: maximum speed at which you can fully deflect the control surfaces.
V_{AD}	Speed never to be exceeded for positive or negative snap manœuvres.
V_{FE}	Maximum speed flaps extended.
V_{NE}	Speed never to be exceeded.
V_{NO}	Maximum speed in normal operation.
V_S	Stalling speed
V_{S0}	Stalling speed in landing configuration (flaps fully extended, maximum weight).
V_X	Best climb angle speed
V_Y	Best rate of climb speed: speed allowing maximum climb speed to be obtained (V_Z max.).
V_Z	Vertical speed.

ISA	International Standard atmosphere: - air is a perfect, dry gas - the sea level temperature is 15°C (59°F) - the sea level pressure is 1013.2 mb (29.92 inches of mercury) - the temperature gradient, from seal level to the altitude where T° is -56.5°C (-69.7 °F), is -0.00198°C/foot and 0°C above.
OAT	Outside Ambient Temperature.
Std T°	Standard temperature: temperature of 15 °C (59°F) at sea level with a decrease of about 2°C/1000 feet (6.5 °C/1000 m).
Zp	Pressure altitude: altitude measured using a barometer with the reference pressure equal to 1013.2 mb (29.92 inches of mercury).
Zd	Density altitude: altitude at which a particular density is encountered in standard atmosphere. The density altitude takes the real temperature into account.

1.13 CONVERSION

Nautical miles (nm)	x	1.852	=	kilometres (km)
Statute miles (mile)	x	1.609	=	kilometres (km)
Feet (ft)	x	0.305	=	metres (m)
Inches (in)	x	0.0254	=	metres (m)
Inches (in)	x	25.4	=	millimetres (mm)
Feet/min (ft/min)	x	0.00508	=	metres /second (m/s)
US gallons	x	3.785	=	litres (l)
Gallons (imp)	x	4.546	=	litres (l)
Quarts (US)	x	0.946	=	litres (l)
Knots (kt)	x	1.852	=	kilometres/hour (km/h)
Pounds per square inch (psi)	x	0.0689	=	bars (bar)
Pounds per square inch (psi)	x	68.95	=	hectopascals (hpa)
Inches of mercury (in Hg)	x	33.86	=	millibars (mbar)
Pound (lb)	x	0.453	=	kilogrammes (kg)
Degrees Fahrenheit (°F)- 32	x	5/9	=	degrees Celsius (°C)
Kilometres (km)	x	0.539	=	nautical miles (nm)
Kilometres (km)	x	0.621	=	statute miles (mile)
Metres (m)	x	3.281	=	feet (ft)
Metres (m)	x	39.37	=	inches (in)
Millimetres (mm)	x	0.03937	=	inches (in)
Metres /second (m/s)	x	197	=	feet/min (ft/min)
Litres (l)	x	0.264	=	US gallons
Litres (l)	x	0.220	=	gallons (imp)
Litres (l)	x	1.057	=	quarts (US)
Kilometres/hour (km/h)	x	0.539	=	Knots (kt)
Bars (bar)	x	14.51	=	pound / square inch (psi)
Hectopascals (hpa)	x	0.0145	=	pound / square inch (psi)
Millibars (mbar)	x	0.02953	=	inches of mercury (in Hg)
Kilogrammes (kg)	x	2.205	=	pound (lb)
Degrees Celsius (°C)	x	9/5 + 32	=	degrees Fahrenheit (°F)

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2. LIMITATIONS

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2. LIMITATIONS

2.1 PRESENTATION

The limitations included in this section are approved by the French Airworthiness Authorities (D.G.A.C. - Direction Générale de l'Aviation Civile).

2.2 LIMIT SPEEDS

2.2.1 Category U

Speed	IAS			Observations
	km/h	kt	mph	
Maximum full deflection V_A	200	108	124	Maximum speed at which you can fully deflect the control surfaces
Maximum flaps extended V_{FE}	160	86	99	Maximum speed with flaps extended
Never exceed V_{NE}	340	184	211	Speed never to be exceeded
Maximum normal operation V_{NO}	300	162	186	Speed not to be exceeded in normal operation

2.2.2 Category A

Speed	IAS			Observations
	km/h	kt	mph	
Maximum full deflection V_A	235	127	146	Maximum speed at which you can fully deflect the control surfaces
Maximum flaps extended V_{FE}	160	86	99	Maximum speed with flaps extended
Never exceed V_{NE}	340	184	211	Speed never to be exceeded
Maximum normal operation V_{NO}	300	162	186	Speed not to be exceeded in normal use
Never exceed for snap manoeuvres V_{AD}	160	86	99	Speed never to be exceeded for positive or negative snap manoeuvres

2.3 ANEMOMETRIC MARKINGS

All markings are only valid in Category A

Mark	Value or range indicated airspeed (IAS)	Meaning
White speed arc	79 to 160 km/h 43 to 86 kt 49 to 99 mph	Flaps extended range. The lower limit is the stalling speed at maximum weight in landing configuration (V_{SO}) The upper limit is the maximum speed with flaps extended (V_{FE})
Green speed arc	95 to 300 km/h 51 to 162 kt 59 to 186 mph	Normal operation range. The lower limit is the stalling speed at maximum weight (780kg) in clean configuration (V_S). The upper limit is the maximum cruising speed (V_{NO}).
Yellow speed arc	300 to 340 km/h 162 to 184 kt 186 to 211 mph	Must be flown with caution and only in smooth air. Lower limit: V_{NO} Upper limit: V_{NE}
Red limit line	340 km/h 184 kt 211 mph	Maximum speed for use V_{NE}.
Yellow limit line	235 km/h 127 kt 146 mph	V_A Maximum speed at which you can fully deflect the control surfaces.

2.4 ENGINE LIMITATIONS

Manufacturer: ..... LYCOMING

Model: ..... AEIO 360 B2F

Max. engine speed and max. continuous: 2 700 rpm

2.4.1 Oil pressure

Normal: ..... 4.22 bar to 6.33 bar
Precaution: ..... 1.76 bar to 4.22 bar
Maximum on start-up: ..... 7.03 bar

2.4.2 Oil temperature

Maximum: ..... 118 °C (244 °F)

2.4.3 Oil capacity

	Cat. U	Cat. A
Minimum	2 qt (1.9 litre)	2 qt (1.9 litre)
Maximum	8 qt (7.6 litres)	6 qt (5.7 litres)

2.4.4 Cylinder temperature

Maximum: ..... 260 °C (500 °F)

2.4.5 Fuel pressure

Maximum at pump outlet:..... 3.16 bar
Minimum at pump outlet:..... 0.98 bar

2.4.6 Fuel quality

Minimum grade 91/96

2.4.7 Oil characteristics

Ambient temperature	Characteristic
above +15 °C (59 °F)	SAE 50
from -12 °C (10,4 °F) to +32 °C (90 °F)	SAE 40
from -18 °C (-0,4 °F) to +21 °C (70 °F)	SAE 30
below -12 °C (10,4 °F)	SAE 20

2.4.8 Propeller

Number	1	
Manufacturer	HOFFMANN	EVRA
Propeller diameter	180 cm	180 cm

2.5 ENGINE INSTRUMENT MARKINGS

Instrument	Red line	Yellow arc	Green arc	Yellow arc	Red line
	Lower limit	Fly with caution	Normal operation	Fly with caution	Upper limit
Engine speed (rpm)			500 to 2700		2 700
Oil temperature °C *(°F)*			60 to 118 (*140 to 244*)		118 (*244*)
Cylinder temperature °C *(°F)*			66 to 204 (*151 to 399*)	204 to 260 (*399 to 500*)	260 (*500*)
Oil pressure (bar)		1.76 to 4.22	4.22 to 6.33		7.03

2.6 MISCELLANEOUS INSTRUMENT MARKINGS

2.6.1 Accelerometer

Green arc	Yellow arc	Red arc
- 3.5 to 5	5 to 6 - 3.5 to - 4.5	6 to 6.2 - 4.5 to - 6.2

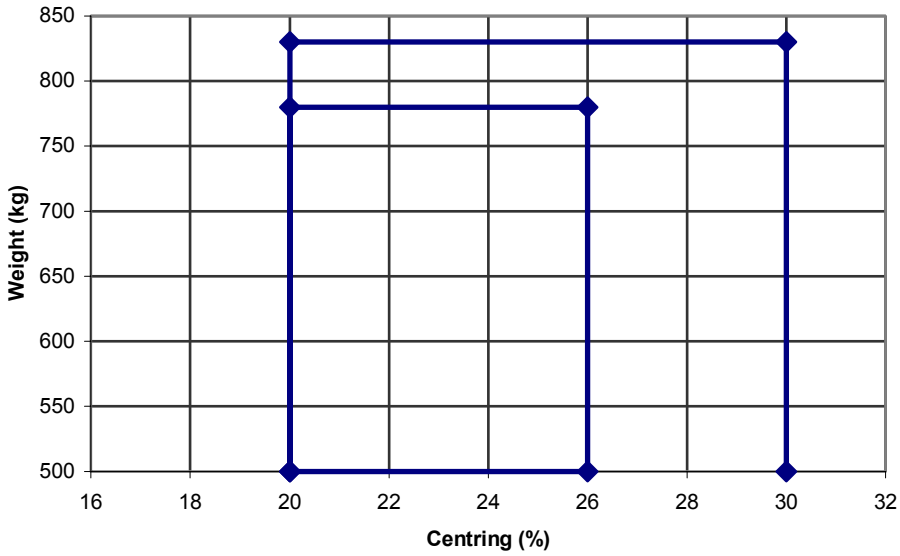
2.6.2 Voltmeter and ammeter

Instrument	Red line Lower limit	Green arc Normal use	Yellow arc Range for caution	Red line Upper limit
Voltmeter (V)	12	12 – 13.8		13.8
Ammeter (A)	2	2 to 52	53 to 60	60

2.7 WEIGHTS

	Category U	Category A
Maximum takeoff weight	830 kg	780 kg
Maximum landing weight	800 kg	780 kg
Maximum load in luggage compartment	50 kg distributed evenly	forbidden
Pilots	2	2 with parachutes
Fuel	154 l (110.8 kg)	75 l (Fwd tank only) (54 kg)

2.8 C.G. LIMITS



Limits	Category U	Category A
Centre of gravity	20 % - 30 %	20 % - 26 %
Maximum weight	830 kg	780 kg

2.9 FLIGHT

Cat. U: - intentional spins forbidden

Cat. A: - aerobatics authorised
- powered spins forbidden

CAUTION

For aerobatic flight, only the fwd tank must be used.
The aft tank must be empty.

CAUTION

Flaps must be retracted for aerobatic flight.

CAUTION

Electrical flap system switched off in Category A.
A/C equipped with an electrical tab: system switched off in Category A.

2.10 LIMIT LOAD FACTORS

At max. weight	Category U	Category A
Flaps retracted positive n	+ 4.4	+ 6
Flaps retracted negative n	- 1.8	- 4.5
Flaps extended positive n	+ 2	+ 2
Flaps extended negative n	- 1.8	- 2

2.11 CREW

Minimum: 1 pilot in left seat
Maximal: 1 pilot (or trainee) in left seat + 1 passenger or instructor

2.12 FLIGHT CONDITIONS

Day VFR in non-icing conditions.

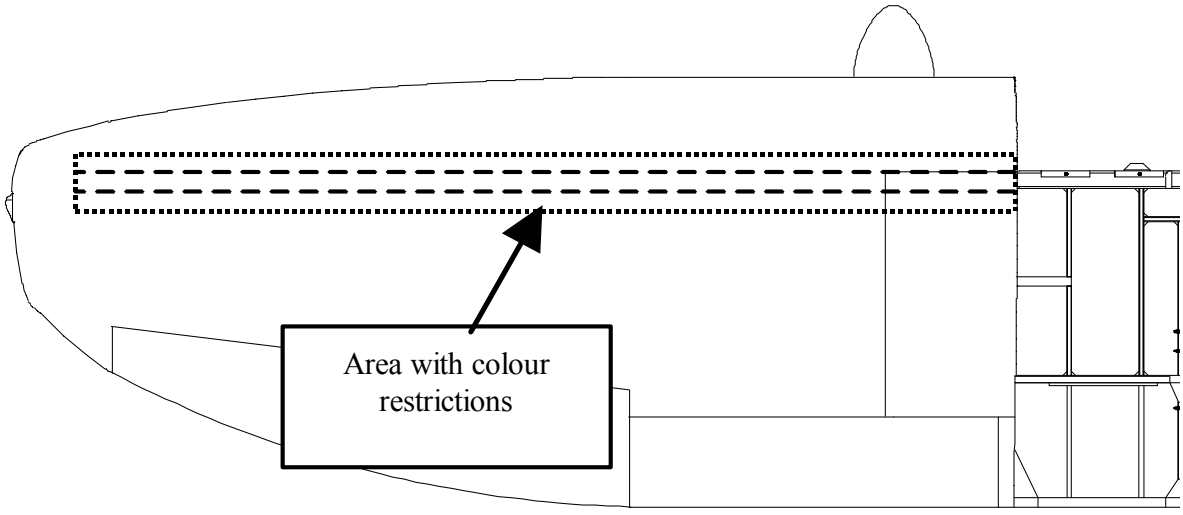
2.13 FUEL

Total quantity: ..... 154 litres
(75 litres Fwd tank
+ 79 litres Aft tank)
Usable quantity ..... Fwd tank: 72 litres
Aft tank: 78 litres
Unusable fuel ..... Fwd tank: 3 litres
Aft tank: 1 litre
Minimum quantity for aerobatics ..... 10 litres usable, in
Fwd tank

The minimum quantity of petrol to ensure perfect engine operation on switches from positive flight to negative flight and vice versa is set at 10 litres (2.6 US Gal) (7.2 kg – 16 lb) usable quantity in the front tank.

2.14WING OUTER SKIN COLOR REQUIREMENT

In order to limit the temperature of the main spar, a white-colored area must cover the upper wing surface. This area must overlap the surface area of the spar by 50 mm on either side (see diagram below).



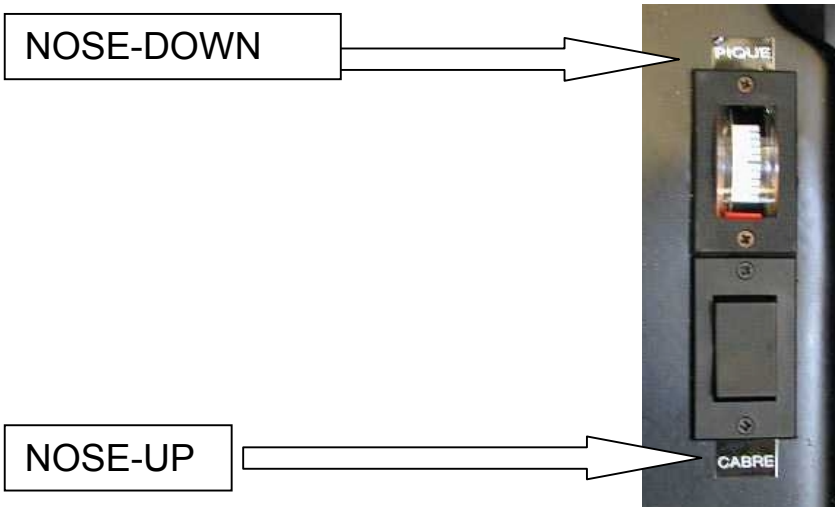
2.15VARIOUS LIMITATIONS

No smoking.
Do not leave objects on the floor.

2.16LABELS

Flaps control

Trim control



Manoeuvring speed VA

CAT A: VA = 235 km/h

CAT U: VA = 200 km/h

Procedure to recover from unintentional spin

<u>Unintentional spin recovery</u>:
Full opposite rudder
Pitch up
Ailerons in neutral.
As soon as you come out of spin, controls to neutral and pull-out gently

Limitations

INDICATED AIRSPEEDS

CAT A			CAT U		
V_{NE}	340 km/h	(184 kt)	V_{NE}	340 km/h	(184 kt)
V_A	235 km/h	(127 kt)	V_A	200 km/h	(108 kt)
V_{AD}	160 km/h	(86 kt)			
V_{SO}	79 km/h	(43 kt)	V_{SO}	86 km/h	(46 kt)

WEIGHT AND BALANCE

CAT A		CAT U	
Maximum weight	780 kg	Maximum weight	830 kg
Front balance limit	20 %	Front balance limit	20 %
Rear balance limit	26 %	Rear balance limit	30 %

AUTHORISED MANOEUVRES

CAT A	CAT U
All aerobatic manoeuvres and idle spins are authorised.	All aerobatic manoeuvres, including spins, are forbidden except for stalls, lazy eights, zooms and turns not exceeding 60° bank angle.

LOAD FACTORS

CAT A		CAT U	
Flaps retracted	+ 6 / - 4.5	Flaps retracted	+ 4.4 / - 1.8

OPERATIONAL LIMITATIONS

CAP10 is certified for VFR condition only.
Flight in known icing conditions is forbidden.

Manoeuvres

Manoeuvres	Single-seater km/h	Single-seater kt	Twin-seater km/h	Twin-seater kt
Loop	220	119	230	124
Half roll	210	113	220	119
Slow roll	220	119	230	124
Dynamic manoeuvre	160	86	160	86
Inverted loop	250	135	270	146
Stall turn (Hammerhead)	200	108	200	108

Navaids

GPS limited to day VFR in view of the ground or the sea

3. EMERGENCY PROCEDURES

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3. EMERGENCY PROCEDURES

3.1 PRESENTATION

This section is D.G.A.C. approved.

3.2 RECOMMENDED SPEED

Best glide speed: ..... 140 km/h (76 kt)

3.3 CHECK-LISTS

3.3.1 Engine failure or loss of power on takeoff and in flight

Before takeoff

Engine speed less than 2 250 rpm or sudden drop ..... interrupt takeoff

Loss of power after takeoff

RPM ≥ 1 700 rpm ..... Integrate down wind leg, land immediately

RPM < 1 700 rpm

Z ≤ 300 feet ..... landing along A/C axis ± 30°

300 < Z < 600 feet	quick troubleshooting, forced landing ahead of aircraft (120°)
Z > 600 feet	apply forced landing procedure (return to runway possible)

3.3.2 Engine shut-down during a spin

Immediately follow spin recovery procedure.
After spin recovery, follow engine re-start instructions.

3.3.3 Re-starting engine at altitude

Tank selector switch	OPEN – FULLEST TANK
Master switch.....	CONNECTED (ON)
Magnetos.....	1 + 2
Throttle lever.....	MID-TRAVEL
Mixture.....	FULL RICH

Dive to reach about 280 km/h (151 kt) IAS.

NOTE

In all cases, loss of altitude will be about 300 metres (≈ 984 ft).

If the engine stalls at low altitude or if the propeller stops, accelerate the procedure using the starter.

3.3.4 Smoke and/or fire

On ground

Fuel selector switch	CLOSED

Throttle lever ..... PUSHED (FULL THROTTLE)
Mixture ..... FULL RICH

After engine shut-down
Magnetos..... OFF
Alternator..... OFF
Master switch ..... OFF

EVACUTE AIRCRAFT WITHOUT PRECIPITATION

In flight

Fuel selector switch ..... CLOSED
Throttle lever ..... PUSHED (FULL THROTTLE)
Mixture ..... FULL RICH

After engine shut-down
Magnetos..... OFF
Alternator..... OFF
Master switch ..... OFF

MAKE A FORCED LANDING
or
EVACUATE AIRCRAFT

3.3.5 Landing in countryside with engine running

Choose a suitable landing area
Transmit position message
Harnesses ..... TIGHT
Final approach..... engine on, 100-105 km/h
FULL FLAPS

As soon as landing accomplished:
Fuel selector switch ..... CLOSED

Contacts ..... OFF
Master switch..... OFF
Mixture..... IDLE CUT-OFF

Normal landing, apply brakes with care

3.3.6 Forced landing with engine shut-down

Speed ..... 140 km/h
Choose a landing area
Troubleshoot
Try to re-start
Transmit Mayday
Harnesses ..... TIGHT
Use flaps to shorten final approach as appropriate
Final approach speed ..... 120 km/h
Fuel selector switch ..... CLOSED
Magnetos..... OFF
Alternator..... OFF
Mixture..... IDLE CUT-OFF
Master switch..... OFF
Canopy ..... UNLOCKED

Normal landing, apply brakes with care

3.3.7 Ditching

Transmit Mayday
Approach: strong wind, rough sea ..... up wind
Approach: low wind, strong swell..... parallel to swell
Flaps..... FULL FLAPS

Canopy	UNLOCKED
Touchdown	LINE OF FLIGHT
Face protection	Protect face (folded clothing)
Evacuation	if necessary, let cockpit fill to balance pressure so you can open the canopy
Life jackets	inflated

3.4 SYSTEM FAILURES

3.4.1 Landing without elevator control

If the elevator control breaks, you can make a landing using the elevator trim tab.
If balance is less than or equal to 21%, it is essential to land in clean configuration, without extending the flaps.

3.4.2 Landing without lateral control

If the aileron control breaks, you can control the aircraft using the rudder pedals on condition that you limit banking to a value of less than 15°. Use the left pedal to bank left and vice versa.

3.4.3 Propeller – Blade breaks

This leads to extremely strong vibrations.

Speed	REDUCE by bringing nose up sharply.
Magnetos	OFF

When IAS < 100 km/h, the propeller stops

Speed ..... 140 km/h
Mixture..... IDLE CUT-OFF
Fuel selector switch ..... CLOSED

MAKE FORCED LANDING
or EVACUATE AIRCRAFT

3.4.4 Engine – high cylinder temperature

Climbing

Stop climb
Engine speed..... reduce
Mixture..... full rich
Oil temperature..... monitor
Return to airfield

Level flight

Engine speed..... REDUCE
Mixture..... INCREASE RICHNESS
If t° fails to drop..... land as soon as possible

3.4.5 Oil failure

Pressure zero, temperature normal or rising

Engine speed..... REDUCE to 1 700 rpm
Avoid accelerations and engine speed changes
Troubleshoot for possible electrical failure

Return to closest airfield while monitoring parameters

If engine seizes before airfield ..... land in countryside

Pressure zero, temperature zero, light off

Fuel gauges..... check

If gauges on 0..... check circuit breaker

3.4.6 Fuel

Low reading on fuel flow meter

Electric pump..... ON

Mixture ..... full rich

Engine speed ..... optimum to avoid vibrations

Return to closest airfield with engine out type integration

High reading or fuel flow fluctuations

Engine speed	avoid vibrations (if necessary)

Return to closest airfield while monitoring cylinder temperature

3.4.7 Mechanical pump failure

Stand-by electric pump ..... ON

If the engine stops, apply instructions from § "Engine restart".

3.4.8 Electrical failure

Alternator failure and battery discharged

Symptoms: ammeter discharge
Oil pressure dropping to 0 or unstable

Horizon & directional gyro warning flags

Electrical equipment ..... off-load as much as possible

Fuel ..... immediately switch to front tank

Fly back to airfield

NOTE

No further oil pressure and temperature reading.
No operation: gauge, stall warning, horizon, turn and bank indicator, heading indicator, radio, VOR, Pitot heating, stand-by electric pump, electronic accelerometer.

Alternator failure

Symptoms: ammeter discharge

Electrical equipment ..... off-load as much as possible

Return to airfield while monitoring oil pressure

Battery failure

No way to detect in flight. Only starter is disabled.

3.5 SPIN

Instructions for recovery from positive or negative unintentional spin.

Rudder..... full opposite rudder (opposite direction of rotation)

Elevator ..... nose-up sector

Lateral control..... neutral

As soon as spin stops, set controls to neutral and pull out gently.

3.6 EVACUATING THE AIRCRAFT

Opening and releasing the canopy

Seize the red handle on the canopy

Pull the handle slightly downwards

Tilt the handle 90° to the left and forward

Raise the canopy while pushing it upward

Evacuation

Release the seat belt

Evacuation

NOTES

If the aircraft is in a spin or a turn, evacuation must where possible be in the outward direction, on the trailing edge of the wing.

Pilot and passenger are to stay "bunched up" as long as possible to avoid being caught by the aircraft when the parachute opens.

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4. NORMAL PROCEDURES

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4. NORMAL PROCEDURES

4.1 PRESENTATION

This section describes the procedures for normal operation.

NOTE

Normal procedures associated with optional systems are in section 9. Supplements.

4.2 SPEEDS

Takeoff: ..... 110 km/h (59 kt)

Normal climb: ..... 160 km/h (86 kt)
Best climb angle (Vx):..... 130 km/h (70 kt) (cat. U)
120 km/h (65 kt) (cat. A)
Optimum climb (Vy) allowing for
Best climb rate (Vz max.):..... 150 km/h (81 kt) 15° flap
160 km/h (86 kt) clean config.
Descent: ..... 200 km/h (108 kt)
Approach: ..... 150 km/h (81 kt) 15° flap
120 km/h (65 kt) Full flaps
Recommended speed
for turbulence penetration:..... 200 km/h (108 kt)

Maximum demonstrated crosswind: ..... 37 km/h (20 kt)

4.3 CHECK-LIST OF NORMAL PROCEDURES

4.3.1 Pre-flight inspection

Cockpit

Make certain cockpit is clean.
Master switch..... OFF
Alternator switch ..... OFF
Magnetos..... OFF
Fuel selector switch ..... OPEN, FWD TANK

CAUTION

For aerobatics, the rear tank must be empty and the ELT must be removed.

Flight controls ..... FREE, in CORRECT DIRECTION
Engine controls..... FREE
Battery contact..... ON
Stall warning indicator..... CHECKED
Warning lights..... CHECKED
Fuel gauges..... CHECKED
Battery contact..... OFF
Seat belts and harnesses ..... CHECKED
Canopy attachment..... CHECKED
Release handle..... CHECKED

Before getting down from aircraft
Fuel tank..... visual inspection
Fuel cap..... closed and locked

Left wing

Flap	hinges and control
Aileron	hinges and control
	Balance plates and deflection
Pitot	clean, not clogged
Main landing gear	shock absorber checked and tyre inflated
Underwing inspection door	locked

Fwd fuselage

Tank drain	checked
Exhaust	checked
Lower inspection door	closed and locked
Cowl left door	closed and locked
Propeller	condition and attachment
Spinner	condition and attachment
Air inlet	free
Oil level	checked
	(6 qt maximum for aerobatics)
Cowl right door	closed and locked

Right wing

Main landing gear	shock absorber checked and tyre inflated
Underwing inspection door	locked

Aileron	hinges and control
	Balance plates and
	deflection
Flap	hinges and control

Rear right fuselage

Static port	clean and not clogged
Antennas	VISUAL INSPECTION
Door	locked

Horizontal stabiliser

Horizontal stabiliser	ATTACHMENT
Elevator and vertical stabiliser	hinges and control
	Deflection and cable tension
Rudder tab	hinges and control
Elevator tab	hinges and control

Tail wheel

Tail wheel rubber	Good condition
Conjugation springs	Condition and operation

Aft left fuselage

Static port	CLEAN, NOT CLOGGED
Tank drains (qty: 2)	CHECKED
Inspection door under fuselage	Closed and locked
Tank cap	CLOSED and LOCKED

4.3.2 Before starting-up

Parking brake ..... ON
Seats ..... ADJUSTED and LOCKED
Pilot and passenger seat belts..... ATTACHED
Master switch ..... OFF
Alternator switch ..... OFF
Magnetos..... OFF
Electrical equipment ..... OFF
Flaps/trim switch (as appropriate)..... ON
Avionics switch (as appropriate) ..... ON
Mixture ..... LEAN
Cockpit heating..... CLOSED

4.3.3 Starting up cold engine

Master switch ..... ON
Flaps ..... RETRACTED - CHECKED
Anti-collision light..... ON
Throttle lever ..... PUSHED (FULL THROTTLE)
Mixture ..... FULL RICH
Tank selector switch ..... FWD
Electric pump..... ON
Fuel flow meter..... CHECKED
Electric pump..... STOP
Throttle lever ..... 1 cm
Mixture ..... LEAN
Magnetos..... 1 + 2
Starter ..... on request

Mixture..... RICH as soon as engine is running

Throttle lever..... set for 1 000 rpm

4.3.4 Starting up hot engine

Master switch..... ON

Anti-collision light (as appropriate)..... ON

Throttle lever..... 4 to 5 cm

Mixture..... LEAN

Magnetos..... 1 + 2

Starter..... on request

Mixture..... RICH as soon as engine is running

Throttle lever..... set for 1 000 rpm

4.3.5 Engine heating

Engine speed..... 1 000 to 2 000 rpm

NOTE

Do not exceed 1 000 rpm for the first minute.

Oil pressure ..... CHECKED (4 to 6 bars)

NOTE

If the oil pressure did not rise to above 1.8 bar within 30 seconds after start-up, stop the engine and proceed with verification.

Fuel pressure..... CHECKED

Cut-off test (magnetos) ..... DONE

Alternator switch ..... ON

Battery charge ..... CHECKED
Electrical equipment ..... ON
Rear tank test ..... 5 min (if use intended)

NOTE

Takeoff is authorised when the oil temperature reaches the green zone.

4.3.6 Taxiing

Parking brake ..... RELEASED
Brakes and conjugation test ..... DONE

NOTE

When starting off, make certain the tail wheel conjugation is operative by checking that the aircraft responds correctly to rudder pedal movements.

4.3.7 Run-up

Brakes ..... APPLIED
(use the pedals)
Temperatures and pressures..... CHECKED
Mixture ..... FULL RICH
Magnetos check at 1 800 rpm..... 1, then 1 + 2
2, then 1 + 2

NOTE

Permitted engine drop: 125 rpm per magneto.
Maximum difference between magnetos: 50 rpm.

Idle ..... test
Magnetos..... cut-off test
Mixture ..... LEAN then RICH

4.3.8 Vital actions before takeoff

Engine

Tank selector switch ..... FWD
Autonomy ..... CHECKED
Mixture..... SET MAX POWER
Master switch..... ON
Alternator switch ..... ON
Battery charge ..... CHECKED
Magnetos..... 1 + 2

Flight controls

Elevator ..... free in correct direction
Lateral control..... free in correct direction
Rudder pedals ..... free in correct direction
Elevator tab ..... CHECKED then NEUTRAL
Flaps..... FULL FLAPS then 15°

Equipment

Mechanical accelerometer..... reset
Altimeter ..... SET
VHF ..... SET

Cockpit

Canopy ..... Closed and locked
Seat belt and harnesses ..... ATTACHED
Brakes ..... RELEASED

4.3.9 Takeoff

Throttle lever ..... FULL THROTTLE
Maximum engine speed..... CHECKED 2 250 ± 50 rpm
Tail up ..... from 50 km/h (27 kt)
Takeoff speed..... 110 km/h (59 kt)

NOTE

Propeller torque is to the left on this aircraft.

Engine speed ..... check 2300 rpm ± 50rpm
Initial climb..... 140 km/h (76 kt)
Flaps ..... RETRACTED (91 m - 300 ft)
Normal climb ..... 160 km/h (86 kt) clean config.

4.3.10 Climb speed

Best climb angle (Vx)..... 130 km/h (70 kt) (cat. U)
120 km/h (65 kt) (cat. A)
Optimum climb (Vy) allowing for
Best climb rate (Vz max.)..... 160 km/h (86 kt) clean config.

NOTE

To obtain the best rate of climb (Vz max.), keep full power and check the engine speed for 2 350 rpm, retract flaps, check pressures and temperatures.

4.3.11 Cruise

In cruising flight, you are advised to use the mixture control at all altitudes. Consumption is then reduced and can be diminished by about 15 %.
The maximum continuous engine speed of 2 700 rpm must in no event be exceeded.
To obtain the best mixture, slowly reduce the mixture going from the full rich position until you obtain maximum power: in the case of a fixed pitch propeller, gradually reduce the mixture until the tachometer shows start of engine speed loss.
If the aircraft is equipped with an EGT indicator, this point represents the maximum temperature. We advise enriching the mixture until the temperature is 50°F (generally 2 graduations) below the maximum observed temperature.
Where there is no EGT, we advise you to enrich the mixture by rotating the mixture knob over two complete turns.

REMARK

Also see the Engine User's Manual.

4.3.12 Descent

Mixture	FULL RICH
Tank	THE FULLEST
Engine speed	1 700 to 1 800 rpm
Recommended speed	200 km/h (108 kt)
Pitot heat	according to weather conditions

4.3.13 Approach

Speed flaps 15 °	150 km/h (81 kt)
Speed flaps 40 °	120 km/h (65 kt)

4.3.14 Interrupted landing

Go-around

Configuration ..... FULL THROTTLE – Full flaps

Best rate of climb speed (Vy)..... 135 km/h (73 kt)

Flaps ..... 15°

NOTE

To obtain the best rate of climb (Vz max.), keep full power and check the engine speed for 2 350 rpm, retract flaps, adjust speed for best rate of climb, i.e. 160 km/h (86 kt) and check pressures and temperatures.

NOTE

In category A, these performance levels are improved in relation to reduction in weight.

4.3.15 Engine shut-down

Parking brake ..... ON

NOTE

If brakes are used intensively during landing and taxiing up to the parking area, do not apply the parking brake before the wheels have cooled down; use chocks.

Electrical equipment ..... OFF

Cut-off test (1 000 rpm)..... DONE then 1 + 2

REMARK

For a short taxiing period before shut-down, let the engine run for 1 (one) minute at 1 100 rpm.

Engine speed ..... 1 100 rpm

Oil pressure ..... CHECKED
Mixture..... LEAN
Magnetos..... OFF
Alternator switch ..... OFF
Anti-collision ..... OFF
Flaps..... EXTENDED
Master switch..... OFF
Tank selector switch ..... CLOSED

4.3.16 Manoeuvres

For any aerobatics manoeuvre:

- the overall weight of the aircraft must be less than 780 kg (1 720 lb) ;
- centre of gravity must be forward of 26 %;
- aft tank must be empty (use fwd tank).

Minimum recommended speeds when beginning trick

	Single-seater		Two-seater	
Manoeuvres	km/h	kt	km/h	kt
Loop	220	119	230	124
Split S	210	113	220	119
Slow roll	220	119	230	124
Snap manoeuvre	140	76	140	76
Inverted loop	250	135	270	146
Wingover	200	108	200	108

Caution

Electrical flaps system switched off in category A.
A/C equipped with an electrical tab: switch system off in category A.

4.3.17 Stalls

You can perform stalls with or without engine in all permitted weight and C.G. configurations.
Generally, stalling is not preceded by warning signs. Only the indicator light comes on in a positive stall.
In negative flight, stalls must always happen in clean configuration.

4.3.18 ELT

The emergency beacon must be removed by the pilot or a mechanic before any aerobatic flight.

4.4 SPINS

Spinning on CAP10 is authorised with engine on idle in category A.

The loss of altitude is about 400 feet per rotation, i.e. 120 metres. Each spin rotation takes about 2 seconds.

4.4.1 Instructions for recovery from positive or negative spin

Positive spin

Rudder	full opposite rudder (opposite to direction of rotation)
Elevator	nose-up sector
Lateral control.....	roll towards spin

Negative spin

Rudder..... full opposite rudder (opposite to direction of rotation)
Elevator ..... nose-up sector
Lateral control..... neutral

If the rudder, elevators or ailerons are not kept in the position indicated above, recovery still remains possible but will tend to take more time.

In all events you must:

BE SURE TO KEEP DIRECTION OF RUDDER FULL OPPOSITE TO DIRECTION OF ROTATION

4.4.2 Influence of centre of gravity

CAUTION

Mainly by acting on the aircraft's attitude, the centre of gravity has tremendous influence on CAP10's behaviour in spin.

Aft C.G. (24 to 26%)

Flat attitude, about 50°, indicated airspeeds of about 150 km/h, tendency to level out more to left than to right.

Fwd C.G (22 to 20%)

Dive attitude up to 70° indicated airspeed being capable of exceeding 180 km/h, tendency to dive more to right than to left.
Risk of Va being exceeded during spin and recovery. Immediately apply instructions for recovery as soon as speed reaches 180 km/h.

4.4.3 Influence of stick position

CAUTION

The stick position (roll control) has an influence on the CAP10's behaviour during spin.

Stick to counter spin

For example, in left spin, the stick to the right tends to level spin out and, as a result, reduce the indicated airspeed.

CAUTION

In the case of spin with centre of gravity aft, this manoeuvre may prove to be dangerous by exacerbating the tendency to level out and delaying the recovery time.

Stick in direction of spin

For example, in left spin, the stick to the left tends to agitate and/or deepen the spin and, as a result, increase the indicated airspeed.

CAUTION

Whatever the centre of gravity, this manoeuvre may prove to be dangerous due to the increased risk of:

- turbulent to very turbulent spin;
- increase in speed;
- transition to a flick roll.

In all cases listed above, apply the instructions for recovery (see § 4.4.1).

NOTE

In the event of engine shut-down during spin, immediately apply the instructions for recovery from spin then apply the instructions for engine re-start (SECTION 3).

Summary

CAP10's behaviour in spin can be summarised as follows:

Spin stick against direction of spin

- calm
- low speed
- long recovery time

Spin stick in direction of spin

- turbulent to very turbulent
- high speed and unstable
- short recovery time

5.1 PERFORMANCE

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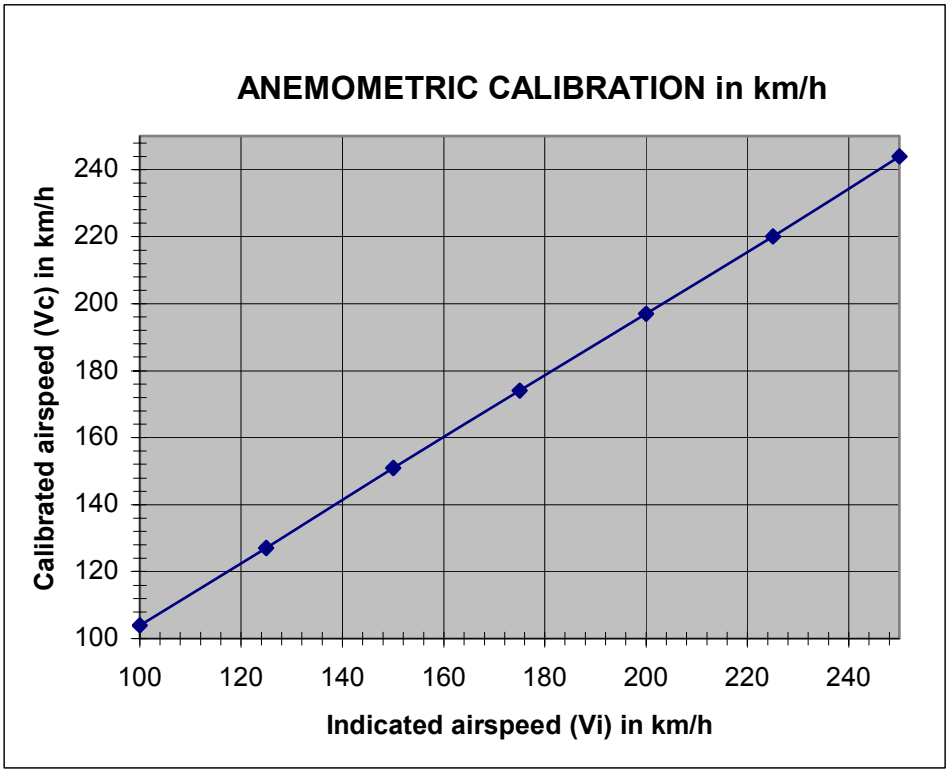
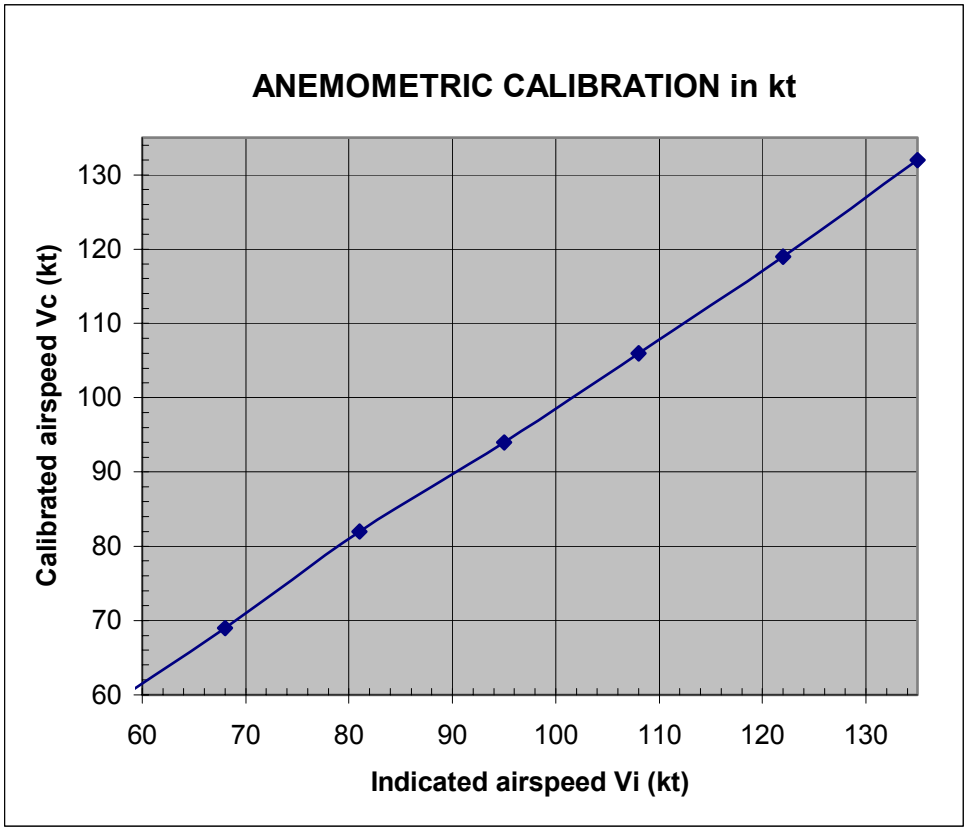
5 PERFORMANCE

5.1 PRESENTATION

Unless otherwise indicated, the parameters given in this section are valid at sea level in standard atmosphere and with a weight of 830 kg.

5.2 ANEMOMETRIC CALIBRATION





NOTE

For aircraft equipped with an AN 5812 type (USA) pitot probe, the stalling speeds indicated in landing configuration (full flaps) are significantly lower. Thus, the new speeds vary from 60 km/h (32 kt) to 65 km/h (35 kt).
Moreover, the difference between the two types of probes (USA-standard) is proportional to the deflection of the flaps. For zero degrees, we measure 85 km/h (46 kt) for probe AN 5812 as against 95 km/h (51 kt) for the standard probe. In inverted flight, these speeds are respectively 79 km/h (43 kt) as against 114 km/h (62 kt).

5.3 SAFETY FACTORS

Conditions	Takeoff		Landing	
	Increase in distance to 15 m obstacle	Factor	Increase in distance from 15 m obstacle	Factor
10% aircraft weight increase	20 %	1.2	10 %	1.1
Increase of airfield altitude by 1000 ft	10 %	1.1	5 %	1.05
10 °C increase in ambient temperature	10 %	1.1	5 %	1.05
Dry grass (1) short (13 cm) length 13-25 cm	 20 % 25 %	 1.2 1.25	 20 % 30 %	 1.2 1.3
Wet grass (1) short long	 25 % 30 %	 1.25 1.3	 30 % 40 %	 1.3 1.4
2 % slope	Rising 10 %	 1.1	Dropping 10 %	 1.1
Tailwind component, 10 km/h	20 %	1.2	20 %	1.2
Wet or snow covered ground	25 % or more	1.25 or +	25 % or more	1.25 or +
Additional safety factor (if raw data)		1.33		1.43
(1) Increased effect for taxiing distances on takeoff-landing. Any change in the technique normally used in operation is likely to lead to increased distances. **Factors are accumulative and must be multiplied.**				

5.4 STALL SPEED

Configuration Flaps: clean Throttle: idle

Weight		Level-flight		Turn 30°		Turn 45°		Turn 60°	
kg	lb	km/h	kt	km/h	kt	km/h	kt	km/h	kt
830	1830	99	54	106	57	118	64	140	76

Configuration Flaps: 15° Throttle: idle

Weight		Level-flight		Turn 30°		Turn 45°		Turn 60°	
kg	lb	km/h	kt	km/h	kt	km/h	kt	km/h	kt
830	1830	91	49	98	53	108	58	129	70

Configuration Flaps: 40° Throttle: idle

Weight		Level-flight		Turn 30°		Turn 45°		Turn 60°	
kg	lb	km/h	kt	km/h	kt	km/h	kt	km/h	kt
830	1830	86	46	92	50	102	55	122	66

5.5 TAKEOFF DISTANCE

Sea level – standard atmosphere– weight of 830 kg – paved runway

Takeoff speed..... 110 km/h (59 kt)

15 m clearance speed. ..... 115 km/h (62 kt)

Takeoff run
and 15 m clearance. ..... 450 m (1 476 ft)

Takeoff run. ..... 350 m (1 148 ft)

5.5.1 Influences of altitude and temperature

Zp. pressure altitude T°. temperature in degrees Celsius

Zp	Temp.		Weight: 680 kg (1 500 lb)				Weight: 730 kg (1 609 lb)			
			Takeoff run		15 m		Takeoff run		15 m	
	°C	°F	m	ft	m	ft	m	ft	m	ft
0	-15	5	258	847	353	1158	272	892	352	1155
	0	32	275	902	354	1161	290	951	374	1227
	15	59	297	974	381	1250	313	1027	402	1319
	30	86	356	1168	455	1493	376	1234	480	1575
760 m 2493 ft 2500 ft	-15	5	288	945	370	1214	304	997	390	1280
	0	32	341	1119	437	1434	360	1181	461	1513
	15	59	410	1345	527	1729	432	1417	556	1824
	30	86	499	1637	646	2119	526	1726	682	2238
1520 m 4987 ft 5000 ft	-15	5	386	1266	497	1631	407	1335	524	1719
	0	32	469	1539	609	1998	495	1624	643	2110
	15	59	576	1890	755	2477	607	1992	797	2615
	30	86	713	2339	953	3127	751	2464	1005	3297

Zp	Temp.		Weight: 780 kg (1 720 lb)				Weight: 830 kg (1 830 lb)			
			Takeoff run		15 m		Takeoff run		15 m	
	°C	°F	m	ft	m	ft	m	ft	m	ft
0	-15	5	287	942	372	1221	304	997	394	1293
	0	32	306	1004	395	1296	324	1063	418	1371
	15	59	330	1083	425	1394	350	1148	450	1476
	30	86	396	1299	502	1647	420	1378	538	1765
760 m 2493 ft 2500 ft	-15	5	320	1050	413	1355	340	1116	437	1434
	0	32	380	1247	487	1598	403	1322	516	1693
	15	59	455	1493	587	1926	483	1585	622	2041
	30	86	554	1818	721	2366	588	1929	763	2503
1520 m 4987 ft 5000 ft	-15	5	429	1408	554	1818	455	1493	587	1926
	0	32	521	1709	680	2231	553	1814	720	2362
	15	59	640	2100	842	2763	679	2228	892	2927
	30	86	792	2598	1063	3488	840	2756	1125	3691

5.6 RATE OF CLIMB

Sea level – standard atmosphere– weight of 830 kg (1 830 lb)

Optimum climbing speed (Vy)..... 160 km/h (86 kt)
Full power..... 5.1 m/s (1 004 ft/min)

The operational ceiling is limited to 5 000 m (16 404 ft).

5.6.1 Climb time

Standard atmosphere– weight 830 kg (1 830 lb)

Altitude		Climb time
(m)	(ft)	(min)
0	0	0
1 000	3 280	4
2 000	6 560	7
3 000	9 840	12
4 000	13 120	22

5.7 LEVEL FLIGHT PERFORMANCE (CRUISE)

Conditions: Weight 800 kg
Standard atmosphere +10°C

Engine speed (rpm)	Vi					
	Zp = 500 ft		Zp = 5 000 ft		Zp = 10 000 ft	
	km/h	kt	km/h	kt	km/h	kt
2 350	232	125	205	111	197	106
2 450	242	131	217	117	208	112
2 700	270	146	247	133	237	128

5.8 LANDING DISTANCE

Sea level – standard atmosphere– weight of 830 kg – paved runway

Touchdown speed ..... 100 km/h (54 kt)

15 m clearance speed ..... 120 km/h (65 kt)

Landing run and 15 m clearance ..... 600 m (1 969 ft)

Landing run ..... 360 m (1 180 ft)

5.9 GLIDE CHARACTERISTICS

Vi.	140 km/h (76 kt) (flaps retracted)
Sink rate.	4 m/s (787 ft/min)
L/D ratio	about 10

5.10 PERFORMANCE IN ICING CONDITIONS

Flight in known icing conditions is forbidden.

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6. WEIGHT AND CENTRE OF GRAVITY

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6. WEIGHT AND CENTRE OF GRAVITY

6.1 PRESENTATION

This section is approved by the French Airworthiness Authorities (D.G.A.C. - Direction Générale de l'Aéronautique Civile).
It contains necessary and useful information to fly the aircraft in complete safety.

6.2 REGISTER OF WEIGHT AND CENTRE OF GRAVITY

Changes (in structure or equipment) that affect the weight and centre of gravity are listed in the A/C Individual Inspection Record (I.I.R.) to allow for permanent monitoring of aircraft changes throughout its service life.

6.3 WEIGHING PROCEDURE

Longitudinal levelling: left horizontal canopy rail.

The weighing procedure is described in the A/C Individual Inspection Record.

The aircraft weighing and centre of gravity report is included in the A/C Individual Inspection Record (IIR).

6.3.1 Example of weighing and centre of gravity report

Firme : | REGISTRE INDIVIDUEL DE CONTROLE | Avion : **CAP10C** | Feuille :

Usine : | **PROCES VERBAL DE PESEE ET CENTRAGE** | N° de série : | Date :

Distance du C.G. (m)

A (c.a.m.) = 1,500

D =

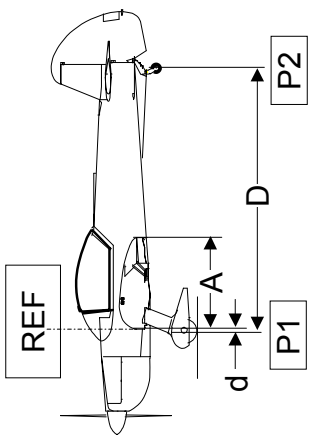
d =

- aux roues principales

d1 = P2 x D / (P2 + P1) = ...

- à la référence

d2 = d1 – d = ...



Niveau : rail horizontal de verrière
Référence : bord d'attaque de voilure à 1,30 m du plan de symétrie

	Poids lu	Tare	Poids net
Roue gauche			.....
Roue droite			+.....
Roue AR			+.....
Poids à vide = P2 + P1			= .....

Poids à vide + huile moteur (kg)

Résultats	Poids à vide (kg)	Bras de levier (m) Distance C.G. à vide	Moment à vide (par rapport à la référence) m.kg

Centrage en % de la corde aérodynamique moyenne (c.a.m.)

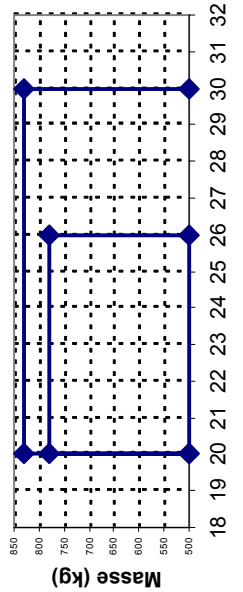
$$\text{Centrage} = \frac{d2}{1{,}500} \cdot 100 = \frac{.....}{1{,}500} \cdot 100 = \ldots\ \%$$

Pour information : essence résiduelle **comprise dans la masse à vide**

	Poids (kg)	Bras de levier (m)	Moment par rapport à la référence (m.kg)
Avant = 3 litres	2,16	- 0,243	- 0,525
Arrière = 1 litre	0,72	1,26	0,907

Limites de centrage et de chargement :

Catégorie	Centrage (%)	Masse (kg)
U	20 – 30	830
A	20 – 26	780



Visa de contrôle :

Visa de contrôle : GSAC

6.4 WEIGHT AND CENTRE OF GRAVITY BREAKDOWN

The centre of gravity reference is defined by the leading edge of the reference profile located 1.30 m from the aircraft plane of symmetry.
The reference chord length is 1.50 m.

C of G limit	Category U		Category A	
Front C of G	0.30 m	20 %	0.30 m	20 %
Rear C of G	0.45 m	30 %	0.39 m	26 %

6.4.1 Method

- Assess weights. Make certain that the maximum weight is not exceeded.

- Calculate the centre of gravity. Make certain that balance is within limits.

- Locate the point (total weight and centre of gravity) on the graph. The point will then be within the weight and centre of gravity envelope.

- Loading is acceptable if the point remains in the weight and centre of gravity envelope throughout the flight. To make certain that the point remains within the envelope throughout the flight, the pilot will calculate the centre of gravity at the end of the flight, taking the fuel consumed into account.

6.4.2 Loading category A

	Weight (kg)	Lever arm (m)	Moment (m.kg)
Empty weight	**a1**	**b1**	c1 = a1 x b1
Pilot	a2	0,55 to 0,65	c2 = a2 x b2
Passenger	a3	0,55 to 0,65	c3 = a3 x b3
Usable fuel FWD tank	a4	- 0,243	c4 = a4 x b4
Totals weight and moment	A = Σan	B = C/A	C = Σcn
Balance in **kg, m** and **m.kg**	(B/1.5) x 100 =		%

Balance must be between 20 % and 26 % (category A).

Maximum weight: 780 kg (1 720 lb)

Empty weight (a1): use of aircraft data in its real configuration. Take residual quantities (unusable) of oil and fuel into account.

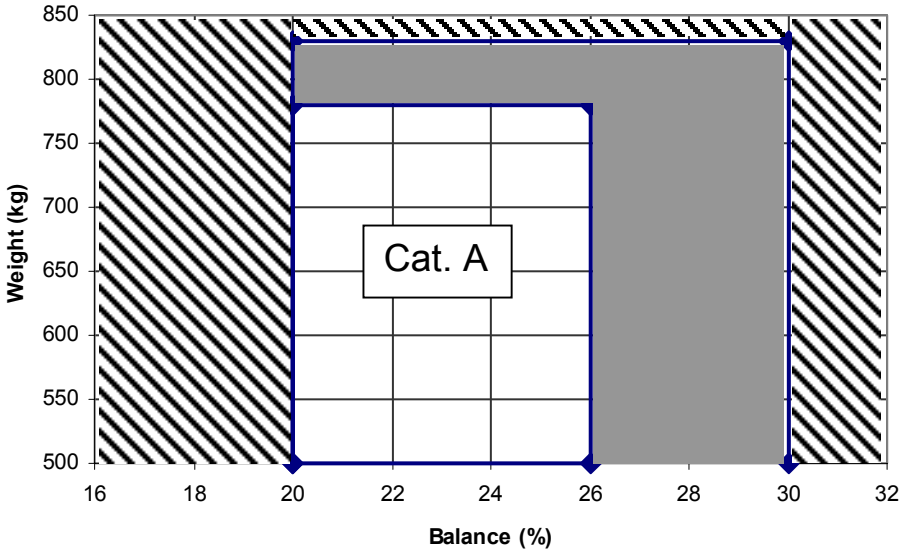
The empty weight (a1), the lever arm (b1) and the moment (c1) must be taken from the aircraft weight and centre of gravity report in the A/C Individual Inspection Record (I.I.R - R.I.C.).

Weight of fuel: use 0.72 kg/litre (6 lb/gal)

Hourly consumption in aerobatics: about 44 l/h

Moment = weight x lever arm

A: sum of a1 to a4
C: sum of c1 to c4

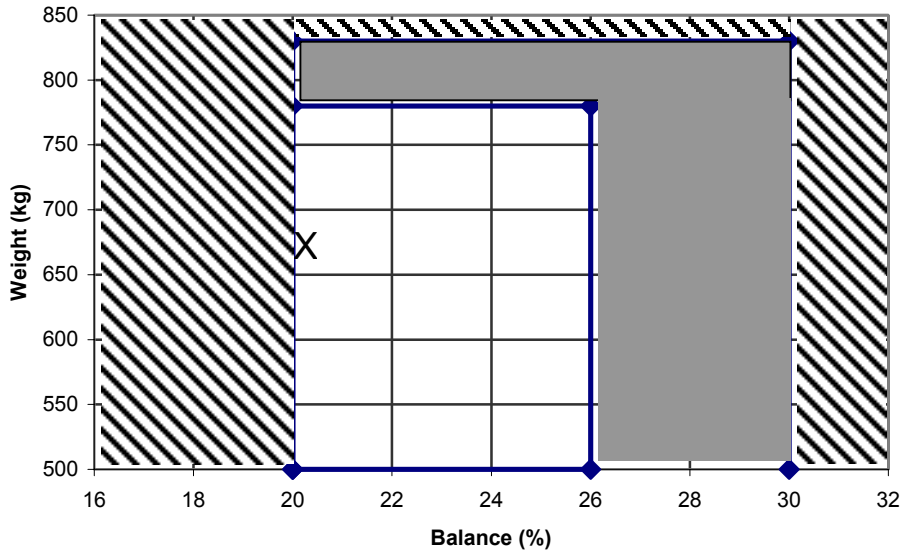


6.4.3 Example of maximum forward balance in category A

CAUTION

An extremely light pilot, flying alone, with the main tank full, may reach the forward balance limit.

	Weight kg	Lever arm m	Moment m.kg
Empty weight	550	0.297	163.4
Pilot	83	0.6	49.8
Passenger	0	0.6	0
Usable fuel FWD tank	40	- 0.243	- 9.72
Totals weight and moment	673	0.302	203,4
Balance (% of MAC) in **kg, m** and **m.kg**	(B/1.5) x 100 =		20.2 %



6.4.4 Example of maximum aft balance in category A

CAP10s with battery aft have higher aft balance.

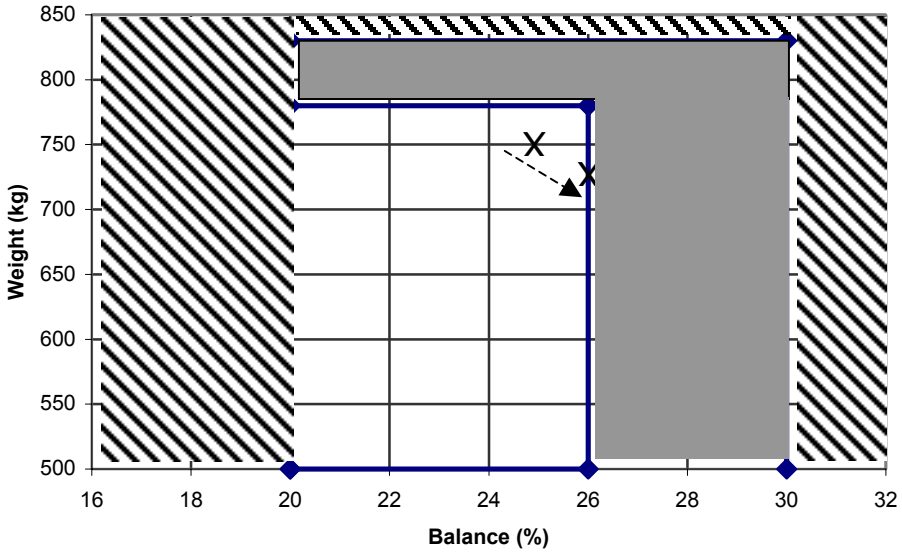
Pilot: 85 kg
Co-pilot: 75 kg
FWD tank: 40 kg (about 55 litres)
Fuel consumption planned during flight: 25 kg (about 35 litres)

Weight and centre of gravity assessment before flight:

	Weight kg	Lever arm m	Moment m.kg
Empty weight	546.5	0.346	189.09
Pilot	85	0.6	51
Passenger	75	0.6	45
Usable fuel FWD tank	40	- 0.243	- 9.72
Totals weight and moment	746.5	0.3688	275.37
Balance (% of MAC) in **kg, m** and **m.kg**	(B/1.5) x 100 = 24.59 %		

Weight and centre of gravity assessment after flight:

	Weight kg	Lever arm m	Moment m.kg
Empty weight	546.5	0.346	189.09
Pilot	85	0.6	51
Passenger	75	0.6	45
Usable fuel FWD tank	15	- 0.243	-3.65
Totals weight and moment	721.5	0.39	281.44
Balance (% of MAC) in **kg, m** and **m.kg**	(B/1.5) x 100 = 26.01 %		



6.4.5 Loading in category U

	Weight (kg)	Lever arm (m)	Moment (m.kg)
Empty weight	**a1**	**b1**	**c1 = a1 x b1**
Pilot	a2	0.55 to 0.65	c2 = a2 x b2
Passenger	a3	0.55 to 0.65	c3 = a3 x b3
Usable fuel FWD tank	a4	- 0.243	c4 = a4 x b4
Usable fuel AFT tank	a5	1.26	c5 = a5 x b5
Luggage	a6	1.1	c6 = a6 x b6
Totals weight and moment	A = Σan	B = C/A	C = Σcn
Balance (% of MAC) in **kg, m** and **m.kg**	(B/1.5) x 100 = %		

Balance must be included between 20 % and 30 % (category U).
Maximum weight: 830 kg (1 830 lb)

Empty weight (a1): use of aircraft data in its real configuration. Take residual quantities (unusable) of oil and fuel into account.

The empty weight (a1), the lever arm (b1) and moment (c1) must be taken from the aircraft weight and centre of gravity register.

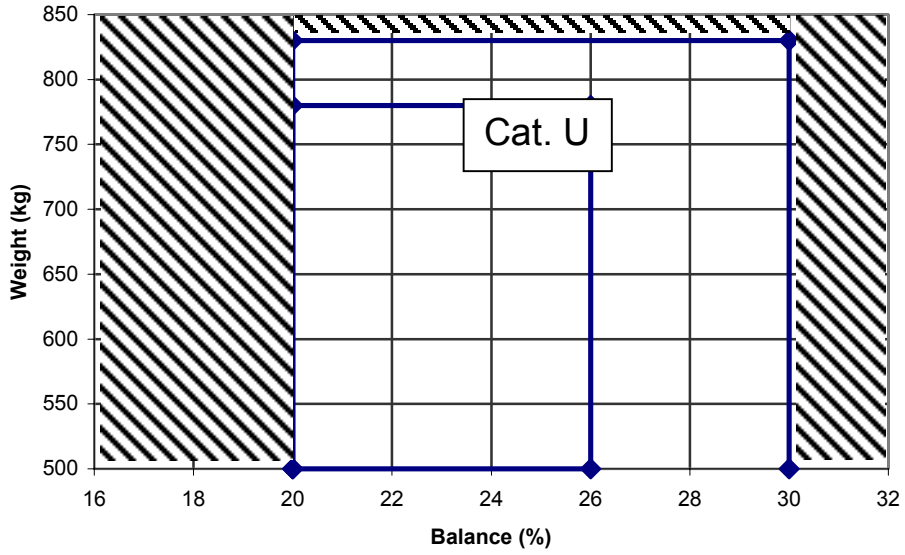
Weight of fuel: use 0.72 kg/litre (6 lb/gal)
Standard hourly consumption:

180 hp to 2 700 rpm	14.5 Gal/h	55 l/h
135 hp to 2 450 rpm (75%)	11 Gal/h	42 l/h
117 hp to 2 350 rpm (65%)	8.5 Gal/h	32 l/h

REMARK

The maximum load in the luggage hold is 50 kg evenly distributed.

Moment = weight x lever arm
A: sum of a1 to a6
C: sum of c1 to c6



6.4.6 Example of calculation in category U

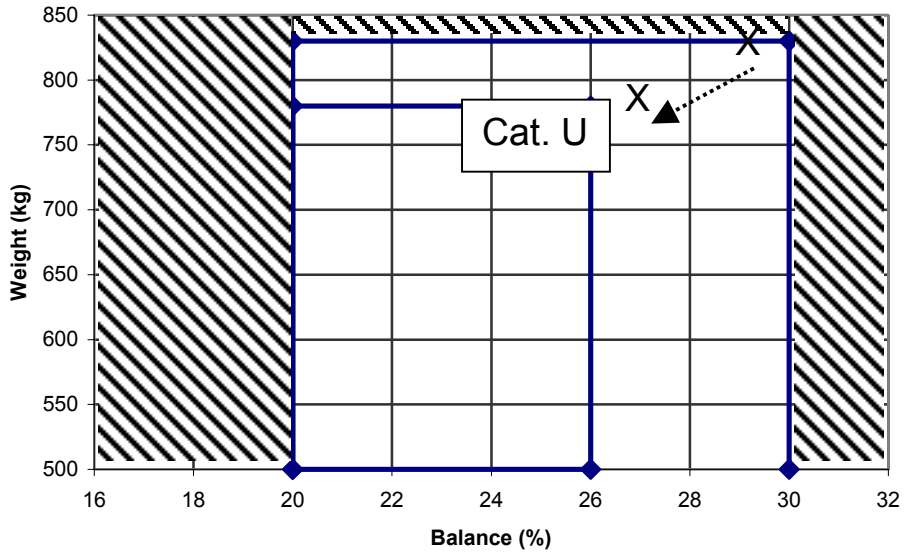
Pilot: 85 kg
Co-pilot: 75 kg
Réservoir avant: 25 kg (about 35 litres)
AFT tank: 45 kg (about 63.5 litres)
Luggage: 50 kg
Fuel consumption planned during flight: 60 kg (about 83 litres)

Weight and centre of gravity assessment before flight:

	Weight (kg)	Lever arm (m)	Moment (m.kg)
Empty weight	**550**	**0.297**	**163.35**
Pilot	85	0.6	51
Passenger	75	0.6	45
Usable fuel FWD tank	25	- 0.243	-6,08
Usable fuel AFT tank	45	1.26	56,7
Luggage	50	1.1	55
Totals weight and moment	830	0.440	364.98
Balance (% of MAC) in **kg, m and m.kg**	(0.440/1.5) x 100 = 29.32 %		

Weight and centre of gravity assessment after flight:

	Weight (kg)	Lever arm (m)	Moment (m.kg)
Empty weight	**550**	**0.297**	**163.35**
Pilot	85	0.6	51
Passenger	75	0.6	45
Usable fuel FWD tank	10	- 0.243	-2.43
Usable fuel AFT tank	0	1.26	0
Luggage	50	1.1	55
Totals weight and moment	770	0.405	311.92
Balance (% of MAC) in **kg, m** and **m.kg**	(0.405/1.5) x 100 = 27.01 %		



6.5 LIST OF EQUIPMENT

The list of airborne instruments is included in the A/C Individual Inspection Record (I.I.R.).

7. AIRCRAFT AND SYSTEMS DESCRIPTION

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7. AIRCRAFT AND SYSTEMS DESCRIPTION

7.1 AIRFRAME

7.1.1 Fuselage

The fuselage made of spruce or hemlock is a truss-type construction. It comprises two sides assembled using four main frames including the vertical stabiliser, the firewall and the fuselage-wing junction frame.
In the forward part, the truss-type structure is reinforced by an inner skin of African mahogany plywood three millimetres thick. The structure is covered with a dome of African mahogany plywood 2 millimetres thick.

7.1.2 Wings

The wings are made of a single part and are of the single spar type with two torsion boxes located on either side of the main spar. The main spar has a wood-carbon structure.
The ailerons and the flaps are secured to a secondary spar. This comprises two booms made of spruce or hemlock joined by two birch plywood webs.
The ribs are built according to a truss-type structure made of spruce or hemlock.
A birch plywood skin 1.5 millimetres thick covers the wings.
The ailerons occupy 43.8 % of the wingspan. Two pallets, on each aileron, ensure static balance.

7.1.3 Horizontal stabiliser

The horizontal stabiliser is of conventional design and comprises a stabiliser and an elevator equipped with an electrically controlled tab.
The single-spar type stabiliser features a torsion box and is secured to the fuselage at four points. It rests on a spruce or hemlock cradle allowing for its setting to be adjusted.
The spar, built of spruce or hemlock, is also conventionally designed. It includes two booms joined by two birch plywood webs to which the ribs are glued.
The skin is made of African mahogany plywood.
The elevator is designed identically and is made of a single part hinged at three points on the stabiliser. It is completely coated in plywood and has a recessed tab electrically controlled by the pilot. It is partially balanced and is aerodynamically compensated by two horn balances.

7.1.4 Vertical stabiliser

The vertical stabiliser, which belongs through its construction to the fuselage, is of the single-spar type with a torsion box.

7.2 FLIGHT CONTROLS

The **elevator control** is of the combined type with rods and cables. A central rod located in the forward part of the fuselage is connected through a bellcrank to two cables connected directly to the elevator.
The elevator is equipped with an irreversible tab.

The **lateral control system** is of the rigid type. The ailerons are controlled by rods and the spar has a torque tube running through it.
The **yaw control** comprises two rudder pedals that actuate the rudder through two cables.

The rudder pedals, equipped with stirrups to retain the feet in inverted flight, are not adjustable. The rudder, designed in identical fashion to the vertical stabiliser, is aerodynamically compensated by a horn balance. It is equipped with a recessed automatic tab.

The **high lift device** comprises high lift flaps located on each half wing, on the trailing edge, close to the root section.

7.3 FLIGHT INSTRUMENTS

As required by French Civil Aviation Requirements, the CAP10 must at least be equipped with the following flight instruments for day V.F.R. and for aerobatics:

- an airspeed indicator
- a side-slip indicator(ball) for normal flight
- an altimeter
- a magnetic compass
- an (electronic) accelerometer

The following instruments can also be installed:

- a vertical speed indicator
- a side-slip indicator (ball) for inverted flight
- an artificial horizon
- a turn-and bank indicator
- a directional gyro
- a turn-and bank indicator (ball and needle)
- a stopwatch
- a second (mechanical) accelerometer

7.4 LANDING GEAR AND GROUND HANDLING

The landing gear is conventional:
- main landing gear,
- auxiliary tailwheel.

7.4.1 Main landing gear

The hydropneumatic main landing gear, with a track of 2.06 metres, has two wheels equipped with disc brakes and associated hydraulic controls. The wheels are equipped with 380x150 mm tyres inflated to 2 bars.
You can activate the parking brake using a handle on the instrument panel.

7.4.2 Auxiliary landing gear

The auxiliary landing gear is equipped with a solid tyre tailwheel measuring 6 x 200 mounted on a rubber shock absorber.
Orientation of the tailwheel is controlled by deflection of the rudder. Slaving is ensured through two springs.
For ground manoeuvres, the roller is automatically disconnected as soon as its orientation exceeds twenty degrees.

7.5 HABITABILITY

You access the cockpit through the jettisonable canopy by sliding it backwards. Two handles on the forward central part, one on the inside and the other on the outside, mean you can open it and close/lock it. A single red handle on the inside can be used to jettison the canopy in a single movement.

The cockpit has two seats side by side between which there is the electric elevator trim control and its indicator.
Each seat is equipped with a longitudinal adjustment.

7.6 POWER PLANT

7.6.1 Description

The CAP10B is equipped with an American LYCOMING AEIO 360 B2F engine.

Characteristics: 4 flat cylinders, with direct drive and air cooling.

This injection engine develops a nominal power of 180 hp at 2 700 rpm for a fuel consumption of 14.5 GPH (55 l/h).

It develops:
- 135 hp at 2 450 rpm (75%), consumption: 11 GPH (42 l/h)
- 117 hp at 2 350 rpm (65%), consumption: 8.5 GPH (32 l/h)

It is secured to a welded steel tubular craddle and drives a fixed pitch propeller.
The engine cowl is made of glass fibre laminate and self-extinguishing resin. Two side doors allow for customary inspections. Disassembly of the cowl is quick and easy.

7.6.2 Engine controls

Engine management involves throttle, mixture, start button and magneto selector switch.

The **throttle control** comprises two slide levers located:
- against the wall for the left seat,
- on the central part of the instrument panel for the right seat.

A knurled wheel located on the lower axis of the left seat throttle lever means you can adjust the unit's stiffness.

The **mixture control lever** (red) located at the left end of the instrument panel allows fine adjustment of the mixture ratio. Setting is implemented using a micrometric screw. Press the central part of the knob to disconnect this screw.
The far rear position of this control corresponds to the leanest mix ("choke").

The **start button** is a pushbutton activating the electric starter.
This pushbutton, which is located on the lower central part of the instrument panel, is not accessible when the tank selector switch is in the "closed" position.

The **magneto selector switch**, controlled by a removable key, is placed above the starter pushbutton. It has four positions:

0 off
1 magneto 1
2 magneto 2
1+2 magnetos 1 and 2

CAUTION

You can only withdraw the key when it is in the 0 position.

7.6.3 Engine instrumentation

The CAP10B must be equipped with the following instruments at least:

- tachometer (rev counter)
- fuel flow indicator
- manifold pressure indicator
- oil pressure indicator
- oil temperature indicator
- fuel gauges

It can be equipped optionally with:

- a cylinder temperature indicator
- an exhaust gas temperature indicator
- an ammeter
- a voltmeter

7.6.4 Lubrication system

The lubrication system allows for normal lubrication of the engine in inverted flight with minimum loss of oil, including during advanced aerobatic manoeuvres with significant and frequent negative load factors.
The quantity of lubricant is 8 qt (7.6 l).

Note

For longer engine service life, you are advised to use mineral oil for the first 50 hours flight then dispersant oil.

7.6.5 Ignition

The engine is equipped with an ignition system for which high voltage is sent directly to the sparking plugs.

7.6.6 Cooling

The engine is designed to be air cooled. Deflectors ensure overpressure on one side of the cylinders. Overpressure forces the air through the cooling fins.

7.6.7 Exhaust

The CAP10B is equipped with a open exhaust.

7.7 PROPELLER

Two fixed pitch propellers are certified to be installed on the aircraft:

- Hoffmann HO 29 HM-180-170
- Evra 3.180-170-H5.F

7.8 FUEL SYSTEM

The CAP10B is equipped with two tanks located in the fuselage.
The main tank is placed forward, behind the firewall. This tank is equipped with a valve device allowing for fuel supply in inverted flight.
The auxiliary tank is placed in the fuselage to the aft of the cockpit, under the luggage hold.

Overall capacity is 154 litres (41 US Gal), representing 111 kg (245 lb) fuel weight.
The FWD tank capacity is 75 litres (20 US Gal), while that for the AFT tank is 79 litres (21 US Gal).
The FWD tank filling hole is located in front of the windshield, along the aircraft axis. The AFT tank filling hole is located behind the canopy, on the left side.

The stand-by electric pump comes into operation by flicking a switch located on the lower panel of the instrument panel.

CAUTION

The AFT tank must be empty for any Aerobatic manoeuvres.

7.9 ELECTRICAL EQUIPMENT

Electrical generation is obtained from an alternator that supplies a 12-volt battery through a voltage regulator.
The installation is of the single-wire type with return by the ground (earth).
The battery allows for autonomous start-up of the aircraft.
If necessary, you can check operation of the electrical circuit through an ammeter located on the instrument panel.

7.10 LIGHTING AND BEACON LIGHTS

The CAP10B can be equipped with the following lights:

- Anti-collision (Rotating)
- Landing light
- Navigation lights

7.11 HEATING AND VENTILATION

Heating in the cockpit is obtained by letting in air heated by the exhaust manifold.
A pull knob placed on the lower left part of the instrument panel controls the flow of hot air let into the cockpit.

Two ventilation holes, placed on either side of the windshield or the canopy let in outside air.

7.12 PRESSURE SAMPLE

7.12.1 Static

Static pressure is sampled through two pressure ports placed on either side of the fuselage.

7.12.2 Dynamic (total)

Dynamic pressure is sampled through a Pitot type head located on the left underwing.
You can heat up the Pitot tube using an electrical resistor.

7.13 STALL WARNING SYSTEM

A red light on the upper left panel of the instrument panel warns of onset of stall.

7.14 AVIONICS

The originally fitted radionavigation equipment includes as a minimum:

- a VHF transceiver

The aircraft can also be equipped with the following instruments:

- transponder
- alticoder
- intercom

- GPS
- VOR / ILS

An ELT is offered as an option.

Note

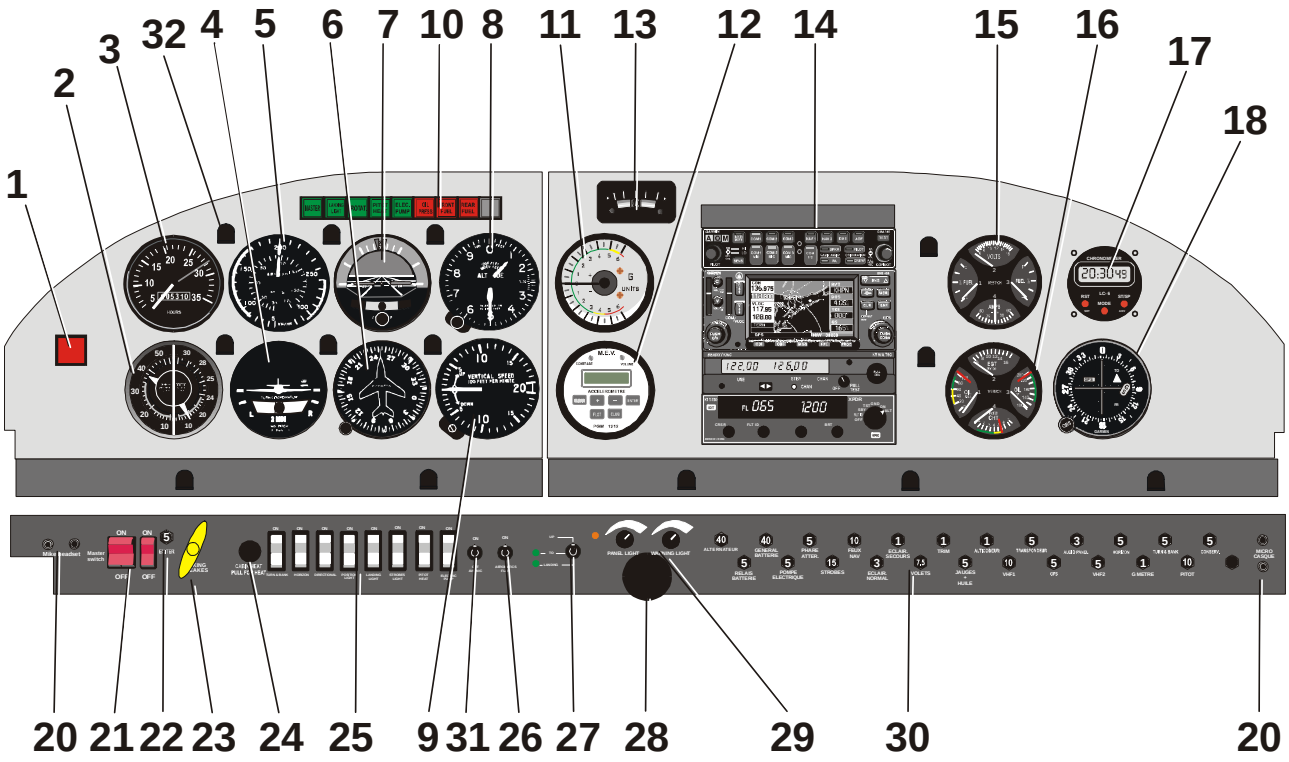
The equipment configuration for each CAP10 forms part of its Individual Inspection Record (I.I.R.).

The instruments specific to an aircraft are described in section 9 "Supplements".

7.15 INSTRUMENT PANEL

This section is customised according to the aircraft.

7.15.1 Upper panel



CAP 10C
Serial nr 316

1	Stall warning light	17	Stopwatch
2	Manifold pressure / fuel flow	18	VOR / ILS indicator
3	Tachometer RPM	19	*not used*
4	Turn and bank indicator	20	Mike / headset jacks
5	Airspeed indicator	21	Master / alternator switches
6	Directional gyro	22	Alternator breaker
7	Gyro horizon	23	Parking brakes
8	Altimeter	24	Cabin heat
9	Vertical speed indicator	25	Switches
10	Annunciator lights	26	Trim flaps switch

11	G-meter	27	Flap control
12	G-meter indicator	28	Throttle
13	Side slip indicator (inverted flight)	29	Panel light / warning light dimmer
14	Audio panel, COM1 NAV GPS VHF2, XPDR	30	Circuit breakers
15	Fuel gauges, voltmeter, ammeter	31	Avionics master switch
16	Oil temperature, oil pressure, EGT, CHT	32	Instrument post lights

7.15.2 Tanks selector switch

The tank selector switch is located on the central lower part of the instrument panel. It has three positions:

- Closed
- FWD tank
- AFT tank

In the position where no tank is selected, the tank selector pallet prevents access to the start pushbutton.

8. HANDLING, SERVICING AND MAINTENANCE

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1.1 INTRODUCTION

Writing in progress

9. SUPPLEMENTS

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1.1 INTRODUCTION

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