CABRI® G2

Flight Manual

Helicopter serial N° : .....

Helicopter registration : .....

EASA Type certificate N°R.145

Section 2, 3, 4, 5 and 9 are approved by EASA
Other sections are approved under Hélicoptères Guimbal DOA EASA.21J.211

This flight manual includes the material required to be furnished to the pilot by EASA CS 27 and Part 21

This manual should not be used for any operation or instruction, unless it is in current status.
The helicopter's operator is responsible for maintaining this manual in a current status in accordance with the list of current pages.

GUIMBAL

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The reference of this flight manual is J40-001. The revisions are given in the following table :

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-	-	Original issue	14/12/2007	TC EASA.R.145 approved by EASA letter D(2007) CPRO/ALE/55199
01	3-10 4-12	Carb heat manual test transferred to section 4	17/09/2008	EASA.R.A.01530
	4-9 4-11	Normal procedure correction		
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	7-8		16/09/2008	Approved under the authority of DOA EASA.21J.211
	7-9	Breaker panel update		
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02	9-1	GPS		Approved under the authority of DOA EASA.21J.211
	9-2 to 9-4	Night VFR		EASA.R.C03230
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	1-3	Drive line → gearbox		DOA EASA.21J.211

(*) EASA reference number or "approved under the authority of DOA EASA.21J.211"

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02	4-3 4-7	Tight → Lockwiring		EASA.R.C03230
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	7-18	Code procedure update Note update		

(*) EASA reference number or “approved under the authority of DOA EASA.21J.211”

Section 1 General

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Introduction

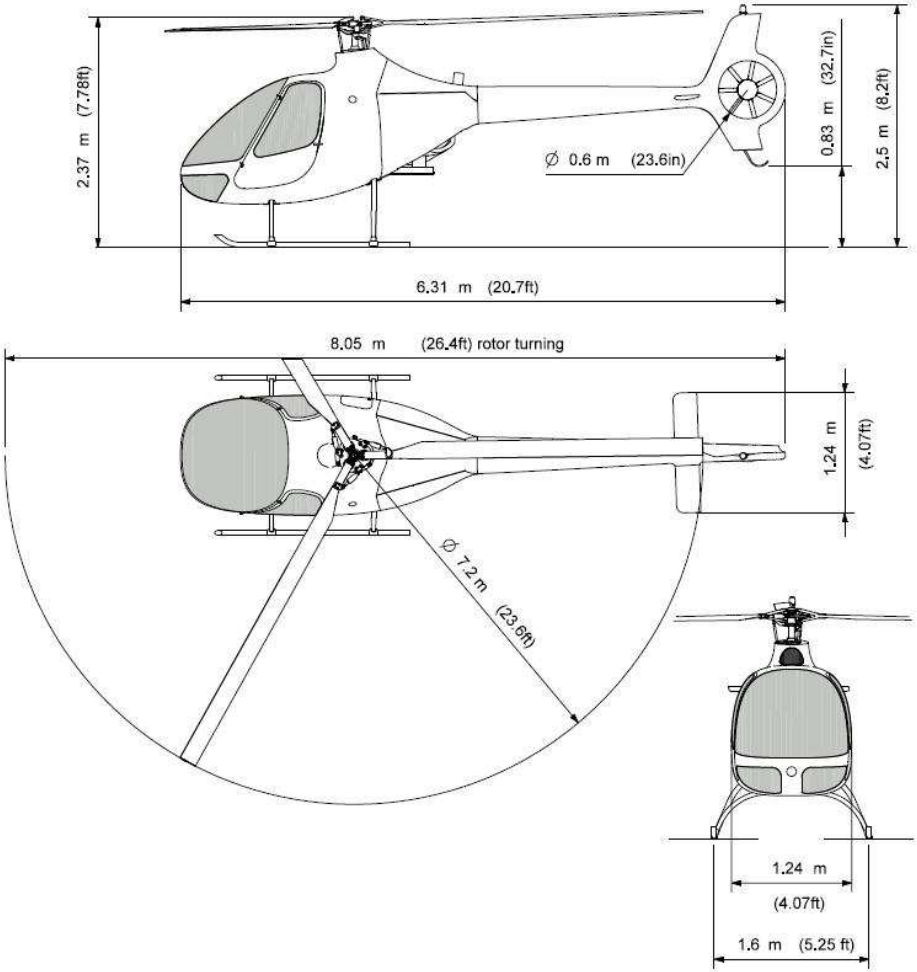
This Flight Manual is designed as an operating guide for the pilot. It includes material required to be furnished to the pilot by EASA CS 27 and Part 21. It also contains supplementary data supplied by the helicopter manufacturer.

This manual is intended to give the pilot the best possible information and to help him find the best answer to most operational situation. However, it cannot replace pilot's appreciation of each particular situation. Pilot must maintain adequate ground and flight instruction, and good proficiency in the type of helicopter.

To achieve the required level of safety, the helicopter pilot-in-command must be familiar with this manual's content, with other safety-related available information, and with all the regulation covering aircraft operation that are relevant in the country of operation. He is responsible for determining that the helicopter is safe for flight, and for operating it in respect to this manual and above information.

The helicopter's owner is responsible for maintaining the aircraft in approved airworthy condition and for maintaining this manual in a current status in accordance with the list of current pages.

Three-view of the CABRI G2



Descriptive data

Main rotor

Type ..... **Articulated, soft-in-plane**
Number of blades **3**
Diameter ..... **7,20 m**
(23.6 feet)
Nominal rotor speed ..... **530 RPM**
Blade chord ..... **180 mm**
(7.1 in)

Tail rotor

Type ..... **Shrouded**
Number of blades **7**
Diameter ..... **600 mm**
(23.6 in)
Nominal rotor speed ..... **5148 RPM**
Blade chord ..... **42 mm**
(1.6 in)

Drive system

Primary transmission ..... **Belt**
0.855/1 reducing ratio

Main rotor gearbox ..... **Spiral bevel gear**
11/47 reducing ratio

Tail rotor gearbox ..... **Spiral bevel gear**
25/11 increasing ratio

Powerplant

Model ..... **Textron Lycoming O360-J2A with STC EASA.E.S.01001**

Type ..... Four cylinders, horizontally opposed, direct drive, air cooled, normally-aspirated, carburetor-equipped, one magneto and one electronic ignition system

Displacement ..... **5,9 L** (361 cu.in)

Power rating (continuous) ..... **108 kW @ 2585 through 2700 RPM** (145 shp)

Nominal speed ..... **2650 RPM**

Cooling system ..... **Direct drive squirrel-cage blower**

Ignition systems

Magneto ..... **Bendix**

Electronic ignition system ..... **LSE Plasma II HG**
Solid-state capacitor discharge ignition system
Variable timing advance

Fuel

Maximum fuel capacity ..... **170 L** (45 U.S. gal)

Unusable fuel ..... **1.5 L** (0.4 U.S. gal)

Approved fuel grade ..... **100 LL**

Symbols and abbreviations

Symbol or abbreviation	Designation
Speeds	
CAS	Calibrated airspeed
IAS	Indicated airspeed
TAS	True airspeed
V_{NE}	Never-exceed speed
Vy	Best rate-of-climb speed
Meteorology	
ISA	International standard atmosphere
OAT	Outside air temperature
P	Outside air pressure
σ	Relative air density
Altitude / Height	
AGL	Above ground level
Z	Geometric altitude
Zp	Pressure altitude
Zσ	Density altitude
h	Geometric height
Power / Engine parameters	
FLO	First MLI limit is Full throttle limit
MCP	Maximum continuous power
MLI	Multiple limit indicator
NR	Rotor speed
NM	Engine speed
PWR	First MLI limit is Power limit
Hover / Take-off / Landing	
IGE	In ground effect
OGE	Out of ground effect
HIGE	Hover in ground effect
HOGE	Hover out of ground effect
Weight and balance	
CG	Centre of gravity
MTOW	Maximum take-off weight
Equipment	
EPM	Electronic Pilot Monitor
BARC	Boîtier Alarme Rotor et Carburant (Fuel and rotor alarm device)
RRM / GOV	Engine governor

Miscellaneous

BB ..... Battery breaker
H/V ..... Height-Velocity
MGB ..... Main gearbox
RPM ..... Revolutions per minute
TGB ..... Tail gearbox
VFR ..... Visual flight rules

Conversion factors

Note : The Cabri G2 EPM display can be set to either Metric or Imperial units. Refer to page 7-13.

Metric to Imperial units

Multiply	By	To obtain
millimeters (mm)	0,0394	inches (in)
meters (m)	3,2808	feet (ft)
kilometers (km)	0,5400	nautical miles (nm)
kilograms (kg)	2,2046	pounds (lb)
liters (L)	0,2642	gallons, U.S. (U.S. gal)
liters (L)	1,0567	quarts (qt)
millibar (mbar)	0,0295	inches of mercury (in.hg)
bars (bar)	14,5038	pounds per square inch (psi)

Imperial to metric units

Multiply	By	To obtain
inches (in)	25,40	millimeters (mm)
feet (ft)	0,3048	meters (m)
nautical miles (nm)	1,8520	kilometers (km)
pounds (lb)	0,4536	kilograms (kg)
gallons, U.S. (U.S. gal)	3,7854	liters (L)
quarts (qt)	0,9464	liters (L)
inches of mercury (in.hg)	33,86	millibar (mbar)
pounds per square inch (psi)	0,0689	bar (bar)

1013,25 mbar = 29.92 in.hg

Temperature

Fahrenheit degrees / Celsius degrees

$F = \frac{9}{5}.C + 32$ $C = \frac{5}{9}.(F - 32)$

Section 2 Limitations

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The information in section 2, Limitations, is approved by EASA.

General limitations

Only day VFR is approved.

Aerobatic flight is prohibited.
Voluntary in-flight engine shut down is prohibited.

Flight in known icing conditions is prohibited.
Flight under snow is prohibited.

Minimum crew is one pilot on the right seat.

Left seat harness must be buckled when seat is empty. Left controls removal is recommended.

Operation is approved with the left seat removed, only if the left controls are removed.

Operation is approved with either or both doors removed, or unlocked and partially open for ventilation.
In these cases, no loose object is allowed in the cabin.
Speed limitations are the same than ones with doors installed and closed.

Color code for instrument markings

Red	Indicates operating limits. The pointer should not enter red zones or exceed red limits during normal operation.
Red cross -hatch	Indicates power-off V_{NE}
Yellow or amber	Precautionary or special operating procedure range
Green	Normal operating range
White or Blue	Other indications

On the EPM, related numerical values are marked with the same color code.

Flight envelope limitations

Altitude limitation

Maximum operating altitude (Zp) ..... **13 000 ft**

Outside air temperature limitation

Maximum temperature .....**ISA + 30℃**
limited to + 45℃
Minimum operating temperature ..... **- 5℃**
Minimum storage temperature ..... **- 30℃**

Airspeed limits

V_{NE} power-on .....**130 kt IAS**
-2 kt IAS per 1000 feet Zp
V_{NE} power-off .....**110 kt IAS**
-2 kt IAS per 1000 feet Zp
Caution range .....**0 – 45 kt IAS**

Rotor speed limits

Power-on

Maximum ..... **540 RPM**
Green arc ..... **515 to 540 RPM**
Minimum ..... **515 RPM**

Power-off

Maximum ..... **610 RPM**
Caution range ..... **540-610 RPM**
Normal range ..... **515-540 RPM**
Caution range ..... **450-515 RPM**
Minimum ..... **450 RPM**

Rotor brake operation

Maximum ..... **150 RPM**

High NR horn ..... **> 594 RPM**
Low NR horn ..... **< 466 RPM**

Powerplant limitations

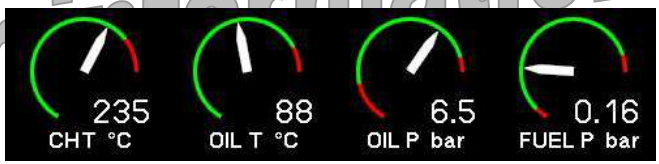
Operating limitations

Engine speed
Maximum engine speed ..... **2700 RPM**
Normal range ..... **2585-2700 RPM**
Minimum engine speed, power-on ..... **2585 RPM**

Temperature
Maximum cylinder head temperature (CHT) ..... **260℃** (500℉)
Maximum recommended CHT for shut down ..... **180℃** (356℉)
Maximum oil temperature ..... **118℃** (245℉)
Minimum recommended oil temperature before take-off ..... **60℃** (140℉)

Oil pressure
Maximum ..... **7.9 bar** (115 psi)
Helicopter minimum for take-off (CLUTCH light OFF) ..... **3.6 bar** (52 psi)
Minimum during idle ..... **1.6 bar** (25 psi)

Fuel pressure
Maximum ..... **0.55 bar** (8 psi)
Minimum ..... **0.02 bar** (0.3 psi)



Fuel

Approved grade ..... **AVGAS 100LL**

Maximum tank capacity ..... **170 L**
(45 U.S. gal)
Unusable fuel quantity ..... **1.5 L**
(0.4 U.S. gal)

Warning : Do not rely on fuel quantity indication when Caution light is ON or EPM warning is active.

Engine Oil

After break-in, use multigrade oil **MIL-L-22851**
Ashless dispersant
SAE 15W50 or 20W50

During break-in (50 hours), use straight mineral oil **MIL-L-6082B**

OAT		Grade
Above 27°C	(80°F)	SAE 60
Above 16°C	(60°F)	SAE 50
-1°C to 32°C	(30°F to 90°F)	SAE 40
-18°C to 21°C	(0°F to 70°F)	SAE 30
Below -12°C	(10°F)	SAE 20

Oil quantity
Oil sump capacity ..... **5.7 L**
(6 U.S. Quarts)
Minimum oil quantity for take-off ..... **3.8 L**
(4 U.S. Quarts)

Gearboxes oil

Use Hélicoptères Guimbal oil referenced **HG30-0039** (85W140).

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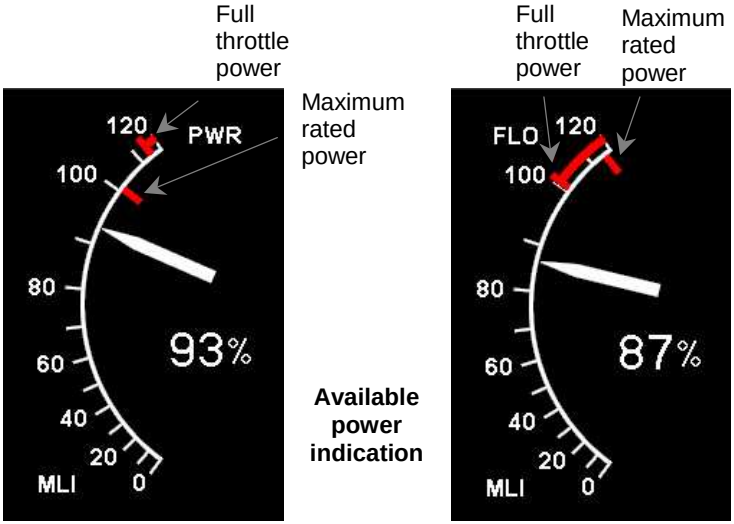
Indicated power on MLI
Maximum..... **100 %**
Maximum rated..... **100 % PWR**
Full throttle..... **100 % FLO**



First limit mode **PWR**

First limit mode **FLO**

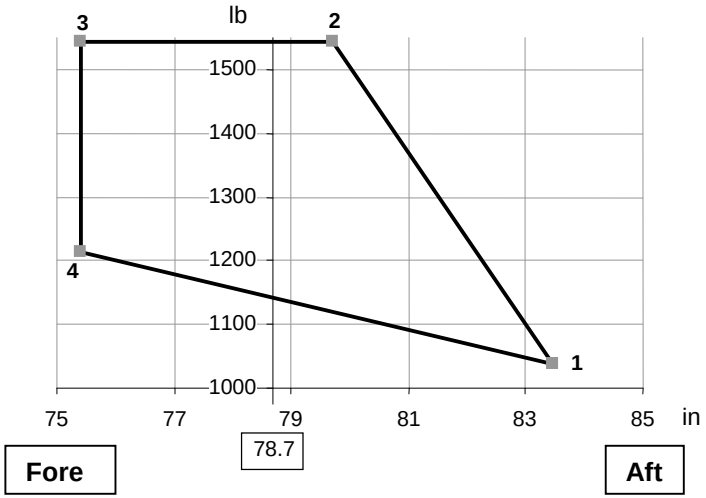
Drive system limitations

Main Gearbox power limitation..... **100 % PWR** on MLI
Main Gearbox temperature..... Caution light

Weight and balance limitations (Imperial units)

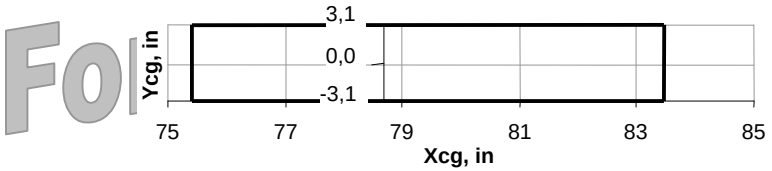
Maximum Gross Weight .....**1543 lb**

Longitudinal Weight and Balance diagram



Point 1	**1038 lb**	**83.4 in**
Point 2	**1543 lb**	**79.7 in**
Point 3	**1543 lb**	**75.4 in**
Point 4	**1213 lb**	**75.4 in**

Lateral Balance diagram

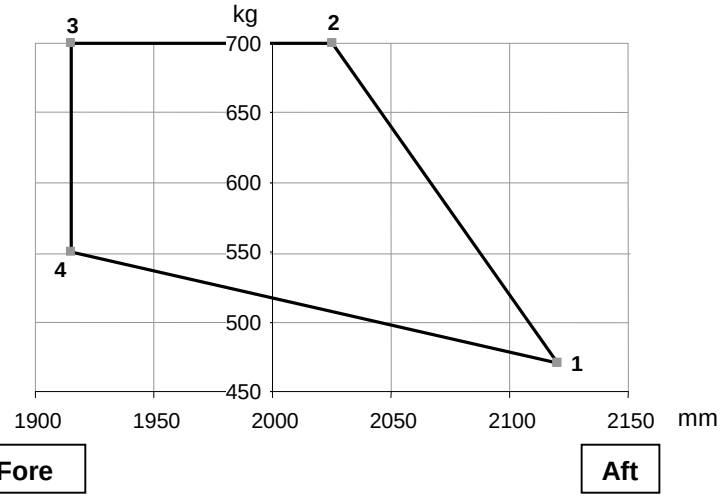


Note : Rotor axis is..... **X = 78.7 in** **Y = 0 in**

Weight and balance limitations (metric units)

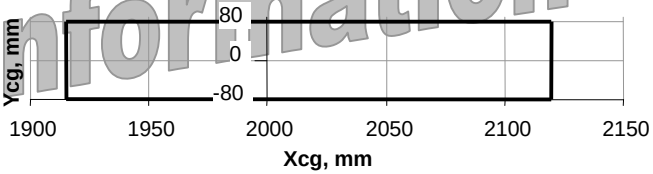
Maximum Gross Weight..... **700 kg**

Longitudinal Weight and Balance diagram



Point 1.....	**471 kg**	**2120 mm**
Point 2.....	**700 kg**	**2025 mm**
Point 3.....	**700 kg**	**1915 mm**
Point 4.....	**550 kg**	**1915 mm**

Lateral Balance diagram



Note : Rotor axis is.....**X = 2000 mm** **Y = 0 mm**

Sensors failures

When the MASTER is switched on, the EPM carries out a self-test and displays a test page (refer to page 7-13).

Only one flight should be performed after one of following parameters are displayed "**Failed**", with following restrictions :

Failed parameter	Flight restriction
OAT	Use Section 5 to compute available performance Apply a margin on temperature
Pressure	Limit MLI to 95% PWR and 100% FLO (the smallest)
T. induction	Ignore carb. heat test. Control carb. heat manually Use carb. heat below 80% MLI
CHT	Avoid long hover.
Carb. T	Ignore carb. heat test. Control carb. heat manually Use carb. heat below 80% MLI
ManP	Use Section 5 to compute available performance
Throttle	Use Section 5 to compute available performance
Oil T	Avoid prolonged hover. Monitor CHT
Oil P	Monitor CLUTCH and OIL P. lights
Fuel Q	Perform an accurate fuel planning
MGB/TGB Chips	Hand-check corresponding plug at take-off
Battery charge	Minimize electrical loads
CO	Keep cabin heat closed
Carb. heat control	Ignore carb. heat test. Control carb. heat manually Use carb. heat below 80% MLI

Placards

- On cabin ceiling :

VNE POWER ON	
Zp (ft)	**IAS**(kt)
0	130
2000	126
4000	122
6000	118
8000	114
10 000	110
12 000	106
13 000	104
VNE POWER OFF subtract 20 kt	

- On cabin ceiling :

COMPASS	
DATE :	
HEADING	
FOR	STEER
0	
45	
90	
135	
180	
225	
270	
315	

- Above the fuel tank filler cap :

AVGAS 100LL

Max. 170 Litres
45 US Gal

- Under cabin heater control :

CLOSE IN CASE OF ENGINE FIRE

- In clear view of all occupants :

THIS ROTOCRAFT IS APPROVED FOR [ ] DAY VFR OPERATION

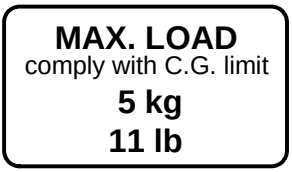
Note : if the aircraft is approved for night VFR, refer to Section 9 Supplements.

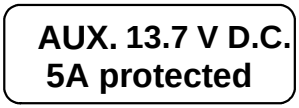
NO SMOKING

- On the right and left side of central console :

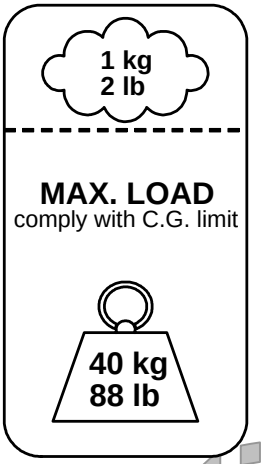
No hard object under seat

- Forward baggage compartment :





- Main baggage compartment :



- GPS (depending on installed type)

Limited to VFR in sight of the ground

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Section 3 Emergency procedures

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The information in section 3, emergency procedures, is approved by EASA.

Introduction

The following emergency procedures describe the actions the pilot must take, relative to the various possible failures that can occur.
However, depending on the many variable external environments, such as the type of terrain flown over, the pilot may have to adapt to the situation according to his experience.

To help the pilot in his decision process, three recommendations are used :

- **LAND IMMEDIATELY**

- **LAND AS SOON AS PRACTICABLE**

Emergency conditions are urgent and require landing at the nearest landing site at which a safe landing can be made.

- **CONTINUE FLIGHT**

Continue flight as planned. Repair at the destination according to maintenance manual.

Note: Immediate action that the pilot shall take, or main parameters are written in bold characters.

Power failures

General

Engine failure can be detected by :

- Yaw acceleration, nose to the right,
- Engine noise level decreases,
- Tachometer needles desynchronization on the EPM (engine decreases)
- OIL P warning on the EPM and OIL P red light coming ON.
- Plasma beeper,
- Rotor speed decreasing and “low NR” horn.

Caution : A slow decay in engine power, caused by carburetor icing or air filter clogging, is compensated by the governor and can be overlooked by the pilot.
The MLI indication will not change while in PWR mode, but will rapidly shift to FLO mode, then increase to 100%.

Primary transmission failure can be detected by :

- High yaw rate, nose to the right,
- Engine noise level increases,
- Tachometer needles desynchronization on the EPM (engine increases). Eventual engine overspeed only if the governor is OFF
- Rotor speed decreasing and “low NR” horn.

In case of a primary transmission failure, apply following power failure actions. Roll off the twist grip as soon as possible.

Warning :

Safe landing may not be possible if the power failure occurs within the “unsafe” zone of the H/V diagram (refer to section 5).

Operation inside this zone should be avoided.

Power failure - hover below 8 feet AGL

The helicopter will normally exhibit little or no tendency to depart in pitch or roll, hence requiring little correction :

1. Use left pedal input to counter yawing to the right,
2. Cushion landing by raising collective, until high pitch stop if necessary,
3. Once landed, lower the collective.

Power failure during take-off

Take-off acceleration is the most critical situation for a power failure to occur, requiring moderate and rapid pilot reaction :

1. Use left pedal input to counter yawing to the right,
2. Use aft cyclic to level the helicopter,
3. Before having reached 30 kt IAS, **do not lower the collective,**
4. **If IAS is above 30 kt IAS**, slightly pitch up while slightly lowering the collective, if needed, to prevent climbing,
5. When approaching the ground, raise the collective to cushion contact,
6. Use pedals to minimize ground drift,
7. Once stopped, lower the collective.

Other in-flight power failures

All cases :

1. Lower the collective immediately and maintain full down,
2. Use pedals to control yaw,
3. Maintain **IAS between 30 and 50 kt IAS (50 kt IAS recommended)**,
4. Select landing area and manoeuvre to land into the wind,
5. Adjust collective to **centre NR in green arc**,
6. When the landing is ensured, consider engine restarting if enough time is available. Refer to page 3-5.
7. At about 60 feet AGL, apply aft cyclic to raise the helicopter nose smoothly and continuously. **Below 50 kt IAS**, this manoeuvre **will not stop sink rate**.
8. As ground closes-on, apply forward cyclic to level the helicopter while raising the collective to stop sink rate.
9. Use pedals to minimize ground drift,
10. Once stopped, lower the collective.

Note : Average manoeuvre requires about 200 to 300 m (650 to 1000 feet) free of high obstacle.

Note : During an emergency autorotation, **always monitor airspeed** carefully.
Increasing airspeed above 50 kt IAS makes the landing easier, but requires a longer landing area.

Confined landing area :

When landing spot is confined, **maintain IAS to 30 kt IAS** in descent. Landing spot can be estimated by looking between the pilot pedals.

Caution : Anticipate that **sink rate will not stop** until final collective raise.

Failure above 2000 feet AGL :

It may be practicable to increase gliding distance to reach a better landing area.

- Best glide ratio is obtained at airspeed **approximately 80 kt IAS** (no wind). Increase airspeed with high headwind,
- Recommended NR is **mid-yellow arc (480 RPM)**,
- **At about 300 feet AGL**, reduce **IAS between 30 and 50 kt IAS (50 kt IAS recommended),** check NR in green arc and refer to the above procedure.

Airspeed and rotor speed adjustments will reduce the gliding distance. Expect a **PRACTICAL glide ratio between 2:1 and 3:1** or 0.7 to 1 nautical mile at 2000 feet AGL.

Ditching

1. Apply same procedures as for landing.
2. Head equally between the wind and wave direction.
3. Reduce forward and vertical speed to minimum possible before contact with water.
4. Keep collective up after contact, to help rotor deceleration.

In-flight engine restart

Attempt engine restart only when the autorotation is stabilized on the trajectory to an appropriate landing area, and sufficient time is available. If successful, power recovery can take only a few seconds.

1. Stabilize autorotation,
2. Check boost pump ON, fuel valve OPEN,
3. Check mixture full forward (RICH),
4. Check both ignition switches ON, upward,
5. Apply about 50 % throttle (90°twist grip),
6. Press starter button.

Note 1 : Governor may be kept engaged or not.

Note 2 : Do not worry for engine very fast acceleration. There is no risk of overtorque at re-synchronization. Be prepared to yawing to the left if power recovers.

Note 3 : In absence of perceivable sound, the STARTER light gives a visual clue that the starter is actually energized.

Engine fire

Engine fire can be detected when the EPM fire warning lights up: **FIRE**

On the ground :

1. Shut cabin heater OFF,
2. Shut fuel valve OFF,

When engine quits :

3. Switch all switches OFF,
4. Pull rotor brake,
5. Wait for complete rotor stop before evacuating the cabin.

In flight :

Once fire is confirmed :

LAND IMMEDIATELY

1. Shut cabin heater OFF,
2. Lower the collective to enter autorotation as per procedure page 3-3,
3. Shut fuel valve OFF,
4. Shut fuel pump OFF,
5. Above 8000 feet AGL, increase airspeed to 90 kt IAS to accelerate the descent,
6. Perform an autorotation landing according to pages 3-3 and 3-4
7. Pull rotor brake,
8. Wait for complete rotor stop before evacuating the cabin.

Electrical fire

Can be detected by a strong smell of burning and/or by smoke.

1. Switch alternator OFF,
2. Switch MASTER OFF,

Note : EPM and NR lights are no longer powered.

3. Move NR switch to “Backup” position,
4. Use NR lights (Backup position) to monitor rotor speed.

Note : Remaining electrical equipments are those on direct battery : BARC backup and ignition system. Refer to page 7-7 for electrical system description.

If fire source is determined, switch the other systems ON

If electric fire continues, **LAND IMMEDIATELY.**

If not, **LAND AS SOON AS PRACTICABLE.**

Notes :

- With MASTER and alternator both OFF, engine still operates with both ignitions,
- With MASTER OFF and NR switch on “Backup”, following lights are still operative :
  - ➔ High, Normal and Low NR,
  - ➔ LOW FUEL caution.

Tail rotor failure

It could consist either in a tail rotor transmission failure, or in a tail rotor loss. This failure can be detected by sudden yaw acceleration - nose to the left - and/or totally ineffective pedals.

Caution : Nose to the right : probable engine failure
Nose to the left : probable tail rotor failure

Hovering IGE :

1. **LAND IMMEDIATELY,**
2. Reduce throttle in order to reduce left yaw rate,
3. Cushion contact with the ground by applying collective pitch up to high stop if necessary.

Other flight cases :

1. Switch governor OFF,
2. Adjust power to maintain 70 to 80 kt IAS,
3. Reach an appropriate surface for an autorotation running landing,
4. Carry out a full autorotation landing. Reduce airspeed as late as you can. Land with as much airspeed as the surface permits. Use small power inputs to correct yaw.

Yaw control failure

Hovering IGE :

1. **LAND IMMEDIATELY,**
2. Lower the collective slowly enough to land smoothly, while rolling-off throttle to reduce yawing nose to the right.

Other flight cases :

1. **LAND AS SOON AS PRACTICABLE,**
2. Adjust IAS to 70 - 80 kt IAS,
3. Adjust power to minimize sideslip and keep nose to the right,
4. Reach an appropriate surface for a running landing.
   Carry out a cautious landing. **Reduce airspeed as late as you can**. Land with as much airspeed as the surface permits. Use small power inputs to correct yaw.
   Note : Prefer wind from the right.

Engine governor failure

Engine governor failure can be detected by the following :

- Rotor/Engine speed is not regulated in green arc and throttle extreme position is not reached,
- Rotor/Engine speed changes in level flight,
- If there is a doubt, roll the twist grip slightly and check grip's reaction.

When it is detected :

1. Hold the twist grip firmly, and overtake the governor action,
2. Switch governor OFF,
3. Regulate Rotor/Engine speed in the middle of green arc with twist grip,
4. **LAND AS SOON AS PRACTICABLE.**

Caution : Always overtake the governor and stabilize NR in green arc before any other action is taken.

EPM failures

Complete loss of EPM display:

1. **LAND AS SOON AS PRACTICABLE**
2. Switch NR switch to Back-up position, check green light,
3. Rotor/Engine speed is controlled by the governor and can be checked using high and low NR warning lights.
4. Monitor carburetor heat manually :
   - Select cold position at high power,
   - Select hot position at low power
5. In this case, if LOW FUEL lights : **LAND IMMEDIATELY**

Erratic engine / rotor speed de-synchronization :

Reduce power gradually.
If de-synchronization indication continues :

1. Refer to NR lights indicator for reliable rotor speed,
2. Switch the engine governor OFF,
3. Monitor the rotor speed in the lower green arc,
4. **LAND AS SOON AS PRACTICABLE**

If de-synchronization stops :

1. Consider the EPM is operative, and the transmission is questionable
2. Limit power to avoid any de-synchronization reading
3. **LAND AS SOON AS PRACTICABLE**
4. Conduct a cautious landing, with minimum power, and gradual power increase. Refer to procedure page 3-2.

MLI failure :

Detected by the indication **XXX** on MLI

1. Above 5500 feet Zp, you will always be limited by full throttle, Below 5500 feet Zp, do not exceed 80 kt IAS in level flight to prevent overpower.

CONTINUE FLIGHT

2. Make a cautious landing in conditions requiring not more power than previous take-off.

MLI degraded modes :

In case of one of following parameters loss, the MLI shifts automatically to a degraded mode :

- Engine speed,
- Throttle position,
- OAT,
- Ambient air pressure.

Degraded mode is signalled by the MLI indication displayed in yellow.

CONTINUE FLIGHT

Loss of engine speed sensor :

Detected by the indication **XXX** on engine EPM indicator and loss of governor (frozen twist-grip).

1. Refer to NR indicator for engine speed indication,
2. Overtake the governor by firmly gripping the twist-grip,
3. Once NR is in green arc, switch governor OFF,
4. Regulate throttle manually to keep the NR in green arc

CONTINUE FLIGHT

Loss of main rotor speed sensor :

Detected by the indication **XXX** on rotor EPM indicator.

1. Keep powered flight, no de-synchronization (no fast descent, nor autorotation practice),
2. Refer to NM indicator for engine speed indication,

CONTINUE FLIGHT

Aural warnings

Loud horn warning :

A continuous tone warns the pilot when rotor speed approaches low speed limit.

An intermittent tone warns the pilot when rotor speed approaches high speed limit.

A short tone warns the pilot when the LOW FUEL light goes on.

Note : The continuous horn can be temporarily muted by setting the NR switch to MUTE. It reengages itself when the condition disappears.

Beeper warning :
A high-frequency continuous beep warns the pilot in three situations :

- when oil pressure is lost with Plasma ignition ON – in conjunction with OIL P red warning light,
- to warn that engine ignition is “hot” at startup,
- to prevent from leaving the Plasma ignition ON when leaving the helicopter (MASTER OFF as well as ON).

EPM parameters out of limitations

Note: All EPM parameters are displayed in corresponding colour (inverted), and blink during 10 seconds when exceeding limit.

Parameter	Exceeds	Corrective actions
Carb T	**Yellow arc**	1. Move carb heater switch to HOT 2. Check temp gets out of yellow and **CONTINUE FLIGHT** → If stays, avoid prolonged flight at low power setting. → In case of carb. icing (*), **LAND AS SOON AS PRACTICABLE** Carry-on a cautious landing. (*) Refer to page 3-2 for detection means

Parameter	Exceeds	Corrective actions
CHT	**Red arc**	• If in hover, land or depart in translation • If in translation, reduce power → If indication stays into red arc, **LAND AS SOON AS PRACTICABLE** Once landed, keep nominal NR for cooling
Oil T	**Red arc**	• If in hover, land or depart in translation • If in translation, reduce power → If indication stays into red arc, **LAND AS SOON AS PRACTICABLE** Once landed, keep nominal NR for cooling.
	Yellow arc	Wait to apply full power Allow to warm-up.
Oil P	**Red arc** > 7.9 bar (115 PSI)	• Cold starting : allow engine to warm-up • Flight : reduce power If stays into red arc : **LAND AS SOON AS PRACTICABLE**
	Red arc < 1.7bar (25 PSI)	**LAND AS SOON AS PRACTICABLE** Monitor OIL P warning light. → If ON **LAND IMMEDIATELY**
Fuel P	**Red arc** < 0.03 bar (0.5 PSI)	1. Check boost pump ON 2. Reduce power and reach **Vy = 50 kt IAS** **LAND AS SOON AS PRACTICABLE**
	Red arc > 0.55 bar (8 PSI)	1. Switch boost pump OFF 2. Check a decrease **LAND AS SOON AS PRACTICABLE**
LOW FUEL	Display in **Red** ≤ 10 L (2.6 U.S. gal)	Check with LOW FUEL warning light → If ON : **LAND IMMEDIATELY**
Battery charge	**Yellow**	Check ALT switch ON Switch unnecessary electrical charges OFF **CONTINUE FLIGHT**

EPM Alarms

Alarm	Signification	Corrective actions
CO **Amber**	Carbon monoxide cabin pollution	1. Shut cabin heater OFF 2. Open vents 3. Ground or hover : change heading 4. If symptoms of CO poisoning (headache, drowsiness, dizziness) accompany light, **LAND IMMEDIATELY**
MGB / TGB Chips **Amber**	Gearbox degradation	If alarm is accompanied by any indication of a problem such as noise, vibration or MGB temperature light, **LAND IMMEDIATELY** If there is no other indication of a problem, **LAND AS SOON AS PRACTICABLE**
Fire **Red**	Engine compartment fire	Refer to procedure page 3-6 **LAND IMMEDIATELY**
Carb Heat applied **White**	Carb heat is effective	Anticipate a reduction of available power Refer to page 3-2

Caution / Warning lights

Light	Signification	Corrective actions
STARTER	Starter is energized.	Release starter button as needed
STARTER (maintained)	If stays when starter button is released : starter relay is stuck	On the ground : - Flip MASTER switch OFF - **CANCEL FLIGHT** In flight (engine running) : - Flip MASTER switch OFF - Flip NR switch → Backup **LAND AS SOON AS PRACTICABLE** Failed engine restart (In autorotation) : - Terminate autorotation
GOV OFF	Governor is disengaged	Monitor Engine/Rotor RPM with twist grip. **CONTINUE FLIGHT**
BRAKE	Rotor brake engaged	Disengage and lock
OIL P	Low oil pressure	**LAND IMMEDIATELY**
MGB T°	High gearbox temperature	1. Move to 50 - 80 kt IAS translation 2. If MGB T° stays on and if light is accompanied by any indication of a problem such as noise or vibration, **LAND AS SOON AS PRACTICABLE**
LOW FUEL	About 12 liters (2.6 U.S. gal) remaining	**LAND AS SOON AS PRACTICABLE** Avoid : sideslips & sharp manoeuvres If **EPM reads < 10 liters** (2.6 U.S. gal) : **LAND IMMEDIATELY**
ALT	Alternator, regulator or battery charging malfunction	Check ALT switch ON Switch OFF unnecessary electrical charges. **CONTINUE FLIGHT**
CLUTCH	Belt tensioning (clutching), detensioning (declutching) or clutch pressure too low	Reduce power until light is off. If continuous : Reduce IAS to 50 kt IAS **LAND AS SOON AS PRACTICABLE** Be prepared to enter autorotation

NR (High)	Raise the collective or Reduce throttle
NR (Low)	Increase power or Lower the collective

Note : Blinking light corresponds to..... **Yellow arc** | on EPM tachometer
Continuous light warns when approaching ... **Red limit**

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Section 4 Normal procedures

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The information in section 4, Normal procedures, is approved by EASA.

General

This section contains instructions and procedures for operating the helicopter, from the planning stage through all the mission.

Normal and standard conditions are assumed in these procedures. Pertinent data in other sections is referenced when applicable

The instructions and procedures contained herein are written for the purpose of standardization and are not applicable to all situations.
They cannot replace pilot's appreciation of each particular situation.

Airspeeds for safe operation

Take-off and climbs..... **50 kt IAS**

Best range..... **80 kt IAS**

Autorotation (also see page 3-2)..... **50 kt IAS**

Never-exceed speed (V_{NE}), power on ..... **130 kt IAS**
-2kt IAS per 1000 feet Zp

Never-exceed speed (V_{NE}), power off ..... **110 kt IAS**
-2kt IAS per 1000 feet Zp

Doors

Operation with one or two door(s) removed is allowed with no additional limitation in the whole flight envelope.

Each door is equipped with a restraining strap which enables partial opening for venting purpose.
Operation is allowed with no additional limitation with one or two doors unlatched in this way, partially opened, secured by the restraining strap.

In all these cases, make sure that all harnesses are buckled and secure all loose objects. Warn passenger to keep head, arms and objects inside the cabin to avoid high velocity airstream.

Doors-lock and anti-theft

To unlock / lock the doors, press the corresponding button on the key-ring radio transmitter. Check the flashing strobe light confirmation.
If the transmitter is ineffective, check the "Auxiliaries" breaker inside the battery box.
Unlocking / locking the doors also enables / disables the engine starter, if active (refer to page 7-18).

Note : The starter is enabled when the rotor is turning above 400 RPM, whatever the antitheft state.

Before flight

The pilot should be familiar with helicopter limitations detailed in Section 2 of this manual.

The pilot should have checked weight and balance. Refer to Section 2 and Section 6 of this manual.

The pilot should check helicopter performance according to Section 2 of this manual.

The pilot should carry out a pre-flight check before each flight.

Daily or Pre-flight checks

The following check must be carried out before each flight.

However, if the helicopter is operated by a single pilot, or in an organization where checks are done by a qualified mechanic, this check may be carried-out daily, before the first flight of the day.

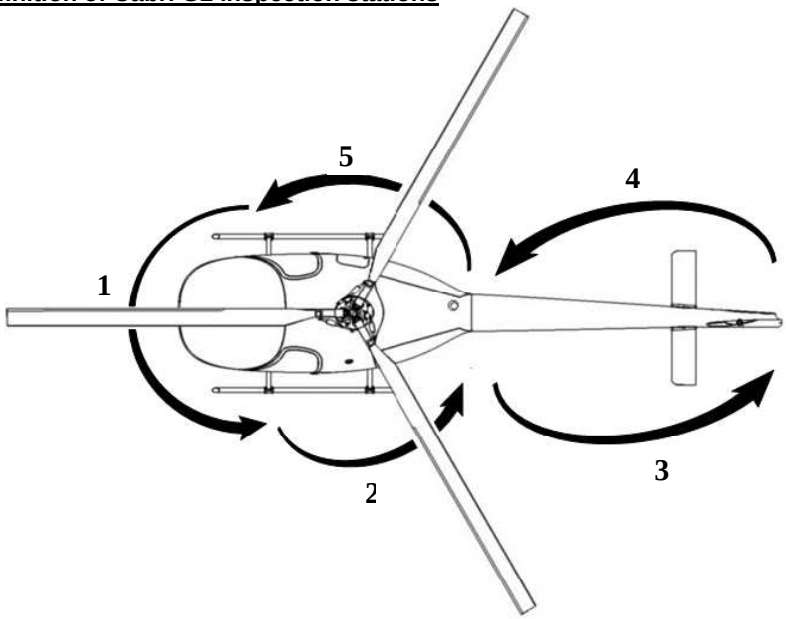
In this case, an inter-flight check should be done between each flight (refer to page 4-7).

Preliminaries

- Remove airframe covers, pitot and static plugs, blade tie downs and exhaust plug.
- In cold weather, remove all frost, ice or snow.
- Purpose of the following inspection is to :
  - Visually check the helicopter general condition,
  - Detect leakage indications,
  - Detect aluminum fretting marks : dark powder marks,
  - Detect steel fretting marks : black or brown marks/residues,
  - Detect overheating marks (color changing),
  - Detect damages (impacts, scratches, cracks, frictions, corrosion…).

Note : All castellated nut must be locked by cotter pin.
Lockwire must be tight.
Torque-seal marks must be intact.

Definition of Cabri G2 inspection stations



Station 1 :

Main rotor blades (each 3) :

Clean, particularly at leading-edge
Leading edge ..... hand-check for damage or debonding
Tips bolts ..... Check lockwiring

Right door hinges ..... Check
Door hinge safety pins ..... Installed
Windshield condition and cleanliness ..... Check
Sideslip string indicator ..... Check
Lower windows condition and cleanliness ..... Check
Landing light ..... Check
Pitot tube ..... Cover removed, check
Static pressure port ..... Plug removed, check
Front gear bow attachment ..... Check
Left door hinges ..... Check
Door hinge safety pin ..... Installed

Station 2 :

Fuel cap ..... Locked
Navigation lights ..... Check
Front and main gear bow condition ..... Check
Landing gear pants and skid condition ..... Check
Skid shoes ..... Check
Fuel manifold ..... No leak
Drain valve ..... Sample
Cowling hinge ..... Check

Open the left engine cowling

Battery strap ..... Check
Battery terminals ..... Tightened
Breakers ..... All set
MAP lines ..... Check
Transmission belt ..... Check
Belt slack ..... Check
Electronic ignition coils attachment ..... Check
Ignition wires ..... Check
Engine and baffling general condition ..... Check
Engine skirts condition and attachment ..... Check
Exhaust pipes ..... Check
Heat muff and hose condition ..... No cracks
Mixture control ..... Check
Throttle control ..... Check
Air box attachment ..... Check
Auto carburetor heat ..... Check cold
Engine connector ..... Locked
Engine mount condition ..... Inspect for cracks or corrosion
Engine rubber mounts ..... Check
Magneto connection ..... Check
Fuel pump and hose ..... No leak
Oil cooler air hose ..... Check
Flexible push-pull control ..... Check
Left tail boom attachments ..... No crack
Cotter pins ..... Installed
Cowling ..... Close and lock front latch

Station 3 :

Left tail boom side general condition ..... No damage
Horizontal stabilizer ..... Shake and inspect
Strobe light ..... Check
Rotor duct ..... Clean
Tail rotor blades condition ..... Clean, no impact
Tail rotor blades slack ..... Check all 7
Tail skid and attachment ..... Check

Station 4 :

Tripod attachments ..... Check
Tail gear box oil level ..... Check
Chip detector ..... Locked
Pitch lever and rod end ..... Check free-play
Horizontal stabilizer ..... Check
Rear transmission tube ..... Check while turning main rotor
Right tail boom side general condition ..... No damage
Transmission bearings bolts and plugs ..... Check tight

Station 5 :

Muffler exhaust ..... Check and shake
Right cowling hinge ..... Check

Open the right engine cowling

Right tail boom attachments ..... No crack
Cotter pins ..... Installed
Muffler ..... No crack or interference with engine frame
Oil filter ..... Locked, no leak
Engine oil dipstick ..... Check 4 to 6 Qt and tighten
Engine mount condition ..... Inspect for cracks or corrosion
Fuel line condition ..... Check
Clutch distributor and attachment ..... Tight, no leak
Oil cooler pipes ..... No leak
VHF antenna ..... Check
Engine cooling intake screen ..... Inspect and clean
Ignition wires ..... Check
Engine and baffling general condition ..... Check
Rotor brake ..... Check pads and clearance
Flex coupling and bolts ..... Tight – no crack
Upper pulley ..... Check
Clutch actuator ..... Retracted
Main gear box oil level ..... Check
Chip detector ..... Locked
Inspection door ..... Closed
Engine skirts condition and attachment ..... Check
Exhaust pipes ..... Check
Carburetor heating hose ..... Check
Air intake duct and hose ..... Check
Gascolator drain ..... Sample
Fuel flow sender ..... Check
Aft landing gear attachment ..... Check
Cowling ..... Close and lock both latches
Front and main gear bow condition ..... Check
Landing gear pants and skid condition ..... Check
Skid shoes ..... Check

Navigation lights.....Check

Open the baggage door, step for main rotor examination :

Blade bolts .....Check
Elastomeric thrust bearings.....Check elastomer condition
Main rotor hub.....Check nicks or corrosion
Lead-lag dampers :
- Elastomer condition .....No crack
- Rod ends..... Free without looseness
All control rod-ends ..... Free without looseness
Droop stop ring.....Visual check
Rotating and non-rotating scissors..... Free with moderate looseness
Swashplate.....Check no free-play
Main gear box upper fitting.....Check
Air intake and MGB compartment .....No foreign object
Engine air intake screen.....Inspect and clean
Blades leading edge..... No debonding

Step down and slam baggage door

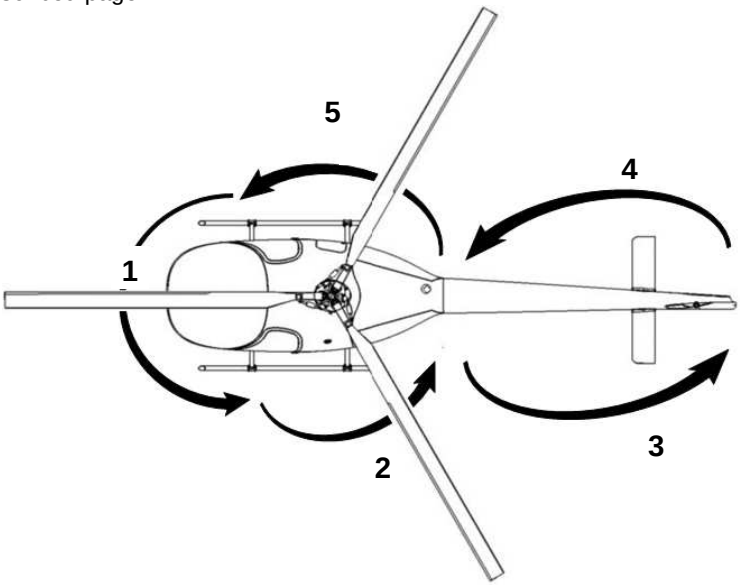
Inside the cockpit

Stroking seats :
- Upper slide .....Aligned
- Attachment .....Check

Harnesses.....Check
Main controls condition .....Check
Pedals condition.....Check
Objects inside.....Stowed
Removable controls (if installed) .....Check
Instruments and switches.....Check
All breakers .....In

Inter-flight check

This paragraph describes the inter-flight check that should be carried out in the case described page 4-2.



Station 1 :

Main rotor blades (each 3) :

Leading edge ..... hand-check for damage or debonding

Right door hinges ..... Check
Pitot tube ..... Cover removed, check
Static pressure port..... Plug removed, check
Left door hinges..... Check

Station 2 :

Fuel cap..... Locked
Front and main gear bow condition ..... Check
Landing gear pants and skid condition ..... Check
Skid shoes..... Check
Cowling..... Latched

Station 3 :

Left tail boom attachments .....Check
Horizontal stabilizer..... Shake and inspect
Rotor duct..... Clean
Tail rotor blades .....No impact
Tail skid and attachment .....Check

Station 4 :

Tripod attachments .....Check
Tail gear box oil level .....Check
Chip detector..... Locked
Horizontal stabilizer.....Check

Station 5 :

Right tail boom attachments.....Check
Muffler exhaust.....Check
Cowling ..... Latched
Front and main gear bow condition.....Check
Landing gear pants and skid condition.....Check
Skid shoes.....Check

Open the baggage door, step for main rotor examination :

Rotor hub .....General check
Air intake and MGB compartment .....No foreign object
Engine air intake screen.....Inspect and clean
Blades leading edge..... No debonding

Step down and slam baggage door

Inside the cockpit

Main controls condition .....Check
Pedals .....Check
Objects inside.....Stowed
Removable controls (if installed) .....Check

Before starting engine

Harnesses ..... Both fastened
Cockpit ..... All objects correctly secured
Pedals ..... Full travel free
Collective ..... Friction released, full travel free
Cyclic ..... Full travel free
Breakers ..... In
Hourmeter ..... Checked
Fuel shut-off valve ..... Checked ON
Collective ..... Down, friction on
Altimeter ..... Set
All switches ..... OFF
Carburetor heating switch ..... Auto
MASTER switch ..... ON
NR switch ..... Backup
NR green light ..... Checked ON
Lights and NR horn automatic check ..... Monitored, all working
..... except STARTER

EPM starts

Watch flight log

Push #2 key to enter configuration page.
Set configuration as desired ..... refer to page 7-13
Push #1 key to freeze flight log page, push again to carry on.

Watch self-test

If a parameter is failed, the page stays until acknowledged.
Refer to page 2-10 for no-go parameters.

Watch flight screen

No alarm except : **OIL P - FUEL P - OIL T - CARB T** (if OAT corresponds)
If engine is cold ..... Cross-check OAT - CHT - OIL T - CARB T
Fuel quantity ..... Check

Governor ..... OFF, check GOV OFF light ON
Mixture ..... Forward, full rich

Note 1 : Before starting, NR green light, GOV OFF, OIL P, ALT. lights are on. CLUTCH light may also be ON.

Note 2 : The EPM has preflight functions described page 7-11 and following pages.

Warning :

- **The clutch may have stayed engaged,** or engage unexpectedly, allowing the rotor to turn at starter engagement.
- **The blades can be very dangerous** particularly at low speed, and with gusts or wind. They are very heavy and flexible.

➔ **Never engage the starter** while the area is not completely clear of people and foreign objects in a **6 meter (20 foot) radius**. The blades may turn unexpectedly.

➔ **The pilot must not leave the cockpit** as long as the engine or the rotor turns. He must wait complete stop.

➔ **Strictly forbid all people presence** in the rotor area – 6 meter (20 foot) radius, while the engine is running or the rotor is turning, unless controlled by the pilot in command as follows :

➔ To allow a person enter or exit the cabin or rotor area – 6 meter (20 foot) radius, the pilot must :

1. Make sure the **wind is less than 20 kt**,
2. Hold the collective down,
3. Hold the cyclic slightly aft,
4. Maintain the RPM steady in the yellow – green arc,
5. Watch the person in lateral sector and allow by a head sign. **Do not move the cyclic while the person has started moving towards the helicopter.**

It is the pilot's responsibility to make sure that take-off and landing area is clear from all people that could be endangered, and that all people approaching the helicopter are well aware of above warnings, and briefed to :

1. Stay clear 6 meters (20 feet) of the helicopter,
2. Watch the pilot and wait his sign before moving into the rotor area,
3. Bend forward and keep hands, cloths and objects low,
4. Move in the lateral area, in pilot's sight.

Starting the engine

Headset.....ON
Radio.....ON if needed
Altimeter setting ..... Correlated with ATC information
Compass heading indication .....Verified
Strobe .....ON
Fuel pump ..... ON, check Fuel pressure increase
Manual fuel injections.....As needed
Throttle.....Monitor on EPM : START 0% to 15 %
Rotor brake .....Apply - check the light - lock forward
Mixture .....Full rich forward
Ignitions, magneto and Plasma..... ON, check beeper
Area .....Clear
Radio clearance if needed
Starter .....Activate
STARTER light..... checked ON and back OFF when switch is released
After engine starts, Throttle.....Idle, 0% START on MLI
Alternator ..... ON, check ALT goes off
Check oil pressure light.....OFF within 30 seconds of starting
If not, shutdown the engine by mixture off
CLUTCH .....Engage and lock switch – check light is ON
Rotor and Engine indicators.....Synchronized
CLUTCH light.....Wait for OFF

Note 1 : Depending on belt condition and temperature, the rotor may slightly engage from engine start. In this case, engage clutch to avoid prolonged belt slippage.

Note 2 : Maintain throttle on idle stop during clutching, to preserve belt.

Note 3 : As the rotor begins to spin, a cyclic stick rotation may occur. Center the stick smoothly.

Note 4 : ALT light may flicker at idle. Check ALT lights goes off above 1500 RPM.

Ignition test :

Set engine speed to.....2000 RPM (upper purple radial mark)
Maximum drop on Magneto..... 300 RPM (lower radial mark)
Maximum drop on Plasma.....100 RPM
Set rotor speed between.....420 RPM < NR < 450 RPM
Carburetor heating automatic test starts after 5 seconds .....
Check "Carb. heat OK" is displayed
If "Carb h test failed" is displayed, apply the following procedure :
1. Set Carburetor heat switch to "Cool" position,
2. Note carburetor temperature when stabilized,
3. Set carburetor heat switch to "Hot" position,
4. Check that carb. heat temperature increases.

If it increases, switch to "Auto" and monitor Carb temp gage.
If not, consider that carburetor heater is inoperative :
1. Avoid prolonged flight at low power setting,
2. Monitor Carb. temp gage.

Wait for Oil temp increase as needed.

Governor ON ..... Check rotor speed in green arc
Check BARC backup green light lights ON
Roll-off throttle to idle..... Check needles desynchronization
Check lower BARC light blinks when NR in yellow arc
Check warning horn when NR approaches lower red limit
Switch BARC to mute warning horn. This will also switch to normal mode
Check idle stabilization

Roll-in throttle ..... check that governor engages from NR = 400 RPM

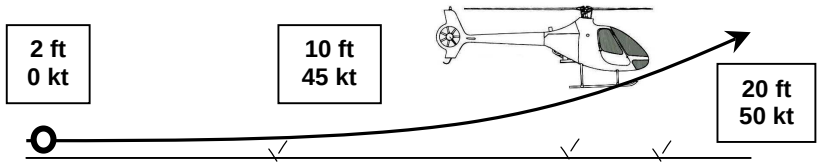
Before take-off

Oil temperature.....60°C (140°F) minimum for max power
Doors..... Closed or secured with strap
Harnesses .....Both fastened
Pressures and temperatures ..... Green arcs
Warning and caution lights .....OFF
Performance calculation ..... first limit checked on MLI
Landing light and NAV. light .....As needed
Radio .....As needed
Collective friction .....Released

Take-off procedure

On clear flat area

1. Apply collective pitch progressively to stabilize hover at **2 feet skid height**.
2. Adjust cyclic trim.
3. Check engine parameters in green arcs and warning / caution lights OFF.
4. Apply slight forward cyclic to accelerate at a constant height.
5. At 45 kt IAS, rotate to reach and maintain 50 kt IAS.
6. Once climb is stabilized, adjust power as needed. Rate of climb should not exceed 500 ft/min below 100 feet in order to ease piloting in case of an engine failure.
7. Follow take-off profile shown on Height-Velocity diagram shown page 5-3 :



Note 1 : Take-off is possible without increasing power in case of a very slow acceleration on hard surface.

Note 2 : Take-off run may be shortened, by raising slightly the collective to compensate for height loss, if power margin enables it.

On other surface (confined area or surrounded by obstacles)

Refer to HOGE performance page 5-4.
Adapt acceleration procedure to environment by keeping rotor disk above horizon and avoiding as far as possible Height / Velocity limiting area (refer to page5-3).

Climb

Prescribed climb speed is 50 kt IAS.
Adjust power to obtain desired rate-of-climb. Maximum allowed power is indicated by 100% on MLI.
If full throttle is reached (100 % FLOW on the MLI), the rotor speed may decrease. In this case, slightly lower the collective to recover rotor speed.

Cruise and/or Level flight

All parameters ..... Green arcs

Warning and caution lights .....OFF

Fuel remaining.....Check

Economy cruise is obtained with .....90% on MLI

Fast cruise is obtained with .....100% on MLI

Maximum endurance speed is..... 50 kt IAS

Best range speed is ..... 80 kt IAS

Flight time management

The EPM has two features to ease flight management :

- A fuel flow computer, giving different data described page 7-15,
- A flight time counter, displaying the real flight time to be logged, described page 7-14.

The flight time display is frozen at rotor shutdown, until next start-up, and is stored in the EPM flight log page.
The average fuel flow during ongoing flight is stored in the EPM flight log page.

One flight is counted from rotor start-up, to rotor shutdown.

Caution : The fuel gage and fuel flow indication have a lower accuracy than their display.
Always perform a cautious fuel planning, and take adequate reserve for the kind of operation.
Always trust the LOW FUEL warning light as per page 3-15.

Automatic carburetor heat

Automatic carburetor heat system is meant to decrease pilot workload.

However, the pilot should always monitor icing risk and manually put carburetor heating in “Hot” position in case of doubt.

Conditions conducive to carburetor icing are high humidity, fog, rain, or when operating near water or at low power.

Caution : A slow decay in engine power, caused by carburetor icing or air filter clogging, is compensated by the governor and can be overlooked by the pilot.
The MLI indication will not change while in PWR mode, but will rapidly shift to FLO mode, then increase to 100%.

Approach and landing

Approach with ..... 50 kt IAS and -500 ft/min

Land on clear area
The target is ..... 50 kt IAS / 50 ft AGL / -500 ft/min

Flare gently with cyclic to reduce rate of descent and forward speed.

Gently raise the collective to stop in ground effect, hovering at 2 feet skid height.

Engine / Rotor shutdown

Collective ..... Down, friction on
Governor ..... OFF
Engine cooling ..... 420 < Nr < 450 RPM until CHT ≤ 180°C
Idle ..... Stable
CLUTCH ..... Switch on disengage – check light is ON
Wait for de-synchronization (needles split) or for CLUTCH light to go OFF
Mixture ..... Pull OFF to shut-down
Ignition switches ..... OFF
Landing light and NAV. light ..... OFF
Alternator ..... OFF
Fuel pump ..... OFF
Rotor brake ..... On request under 150 RPM (white mark)
Rotor ..... Stopped
Strobe ..... OFF
Radio ..... Cleared and OFF
Hourmeter and EPM flight time ..... Noted
MASTER ..... OFF

Note 1 : The CLUTCH switch is active only if the MASTER switch is left ON during a few seconds.

Note 2 : It is possible that the CLUTCH light goes ON again, after the engine has quit.

Disengagement with engine OFF

If the engine was shut-down or has stalled while it was clutched, switch CLUTCH on disengage.
The MASTER switch can then be switched OFF after a few seconds.

Engine disengaged, the complete declutching can take a few minutes.

Training

Caution : The Cabri G2 has a very capable rotor, giving her comparatively permissive autorotation characteristics. This allows efficient training and practice, from different situations and using different piloting techniques.
Following procedures are given as guidelines and should be followed for best safety.

However, pilot and instructor should keep in mind that power failure training is a very demanding practice, requiring a high level of awareness, good health and personal condition, and aircraft in perfect airworthy state.

Power failure practice must be limited to the strict needs of instruction and maintaining good proficiency. Never practice autorotation as a show.

Pilot must stay familiar with procedures described in Section 3 and follow them in case of a real failure.

Smooth and hard surface should be preferred to practice running landings.
In order to familiarize with Cabri G2 landing attitude, practice powered running landings before autorotation training.

Caution : Before attempting running landings, check thoroughly carbide wear shoes. An unexpected drift during a running landing is a clue to a carbide shoe failure. Always check in case of doubt.

During autorotation training, try to keep the helicopter skids level at touchdown, to avoid unpleasant pitch-down and bouncing.

If the ground is not smooth and if the rotor speed is too low when the helicopter touches the ground, a pitch oscillation can happen, leading to an uncomfortable landing. In that case, the pilot has to keep the cyclic control in the neutral position in order to prevent induced oscillations.

Power failure in hover in ground effect practice

1. Roll-off throttle frankly until on its stop,
2. Counteract yaw motion by applying left pedal,
3. Increase collective as ground approaches, to smooth landing,
4. Push collective down once landed.

Note 1 : If the helicopter is light, it may bounce after a first touch down.

Note 2 : The Cabri G2 has no natural tendency to depart in roll or pitch after failure. No systematic corrective cyclic action is needed.
A slight forward motion at impact is recommended for better control.

Note 3 : For a forgiving practice, respect a maximum of 5 feet height.

Note 4 : Avoid practice at maximum gross weight.

Autorotation practice

1. Lower collective full down,
2. Counteract yaw motion by applying left pedal,
3. Roll-off throttle through its spring ramp to its stop,
4. Maintain IAS between **30 and 50 kt IAS (50 kt IAS recommended)** by controlling longitudinal cyclic,
5. Slightly increase collective if required to keep rotor speed in the green arc,
6. At about 60 feet AGL, apply aft cyclic to raise the helicopter nose smoothly and continuously.
7. As ground closes-on, apply forward cyclic to level the helicopter while raising the collective to stop sink rate.
   - With a **50 kt IAS** approach, landing requires a longer distance but is easier to manage. Little action is required on the collective control since the flare will stop the sink rate.
   - A **30 kt IAS** approach needs smaller cleared area for landing but is more difficult to manage.
8. Use pedals to minimize ground drift,
9. Once stopped, lower the collective.

Note : When autorotation is stabilized with collective full down, the rotor speed should stay in the authorized range, whatever the weight and the altitude in flight envelope.

Caution : If airspeed drops below 30 kt IAS, push frankly the cyclic forward to recover airspeed.

Autorotation practice abortion

If power recovery is decided during autorotation :

1. Roll-in throttle until governor engages,
2. Gradually raise collective pitch to stop autorotation and descent,
3. Control yaw during power recovery with pedals.

Note : Do not worry for very fast engine acceleration. There is no risk of overtorque at re-synchronization. Be prepared to yawing to the left when power recovers.

EPM failure practice

In order to be efficient, this practice should be carried out without engine governor.
A flight instructor should make the student familiar with the NR lights :

1. Select an appropriate flight phase with little workload,
2. Mask the EPM screen with a paper,
3. Disengage the governor,
4. Make the student control the rotor speed using twist-grip control, monitoring the “Low NR” and “High NR” caution lights. The central light is inactive.

He may also simulate a more realistic EPM failure, with electric power failure :

1. Select an appropriate flight phase with little workload,
2. Switch ALT OFF,
3. Switch MASTER OFF,

Caution : Only direct battery systems stay powered. Noticeably, EPM, BARC, governor and avionics are off.
Do not Switch MASTER OFF before having switched OFF ALT switch.

4. Switch the NR switch to “backup” to power the BARC,
5. Make the student control the rotor speed using twist-grip control, monitoring the three NR lights. The central light (green) is on when NR is in the green arc.

Engine governor failure practice

Switch-off governor.
Adjust twist grip in order to maintain engine/rotor speed in the middle of green arc.

Note : The mechanical correlation is designed so that a pattern can be flown, in normal conditions, from a stabilized hover with engine/rotor speed in the green arc, without twist grip adjustment.

Section 5 Performance

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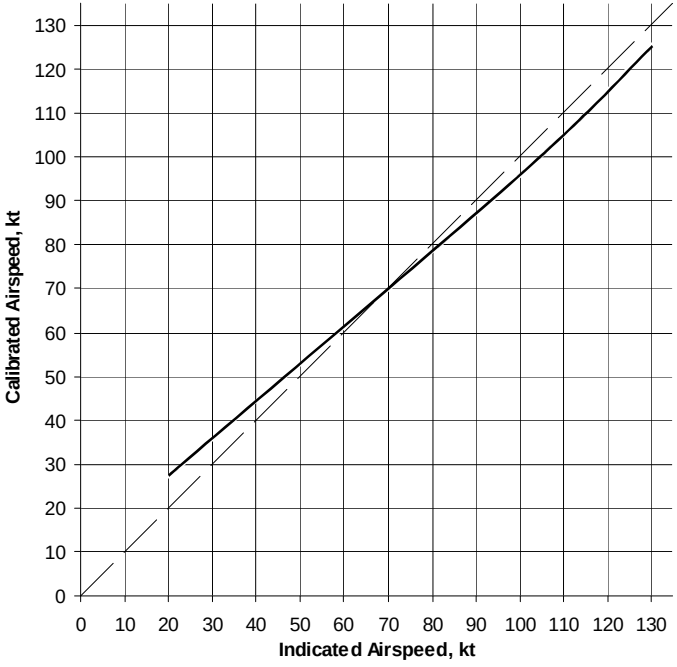
The information in section 5, Performance, is approved by EASA.

Airspeed calibration



Notes :

- Calibrated airspeed is equal to true airspeed at sea level in standard conditions.
- Indicated airspeed assumes zero instrument error. Difference with calibrated airspeed is caused by pressure ports installation.

Rotor starting and stopping limit

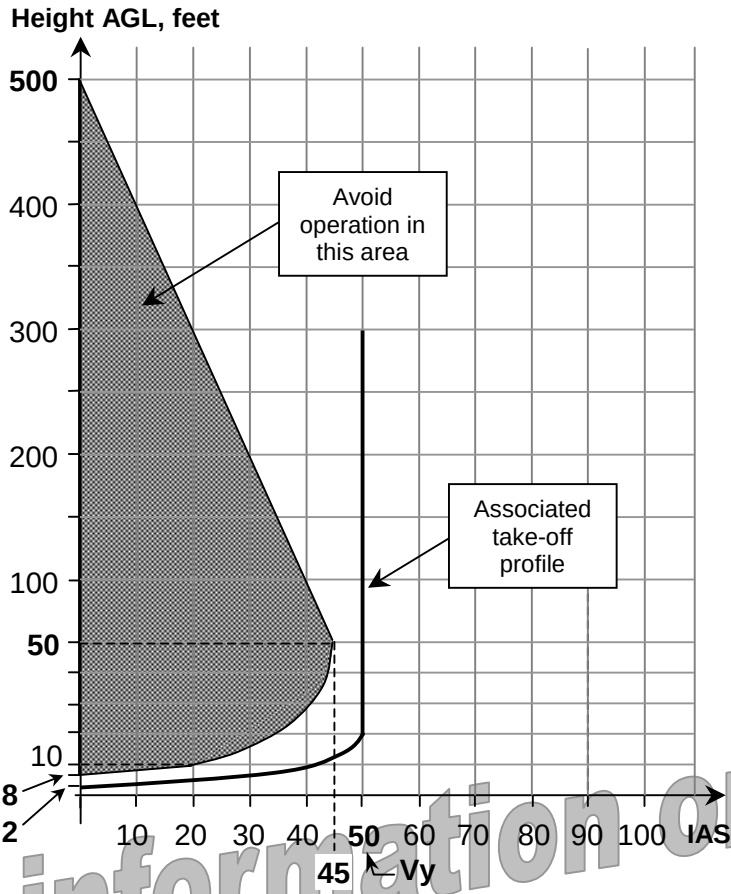
Maximum demonstrated wind for rotor start-up or shut-down : 40 kt, including gusts.

Caution : When starting or stopping the rotor in strong wind, lower fully the collective to its stop, and keep the cyclic in neutral position.

Apply rotor brake frankly from the specified speed.

DO NOT release until full stop.

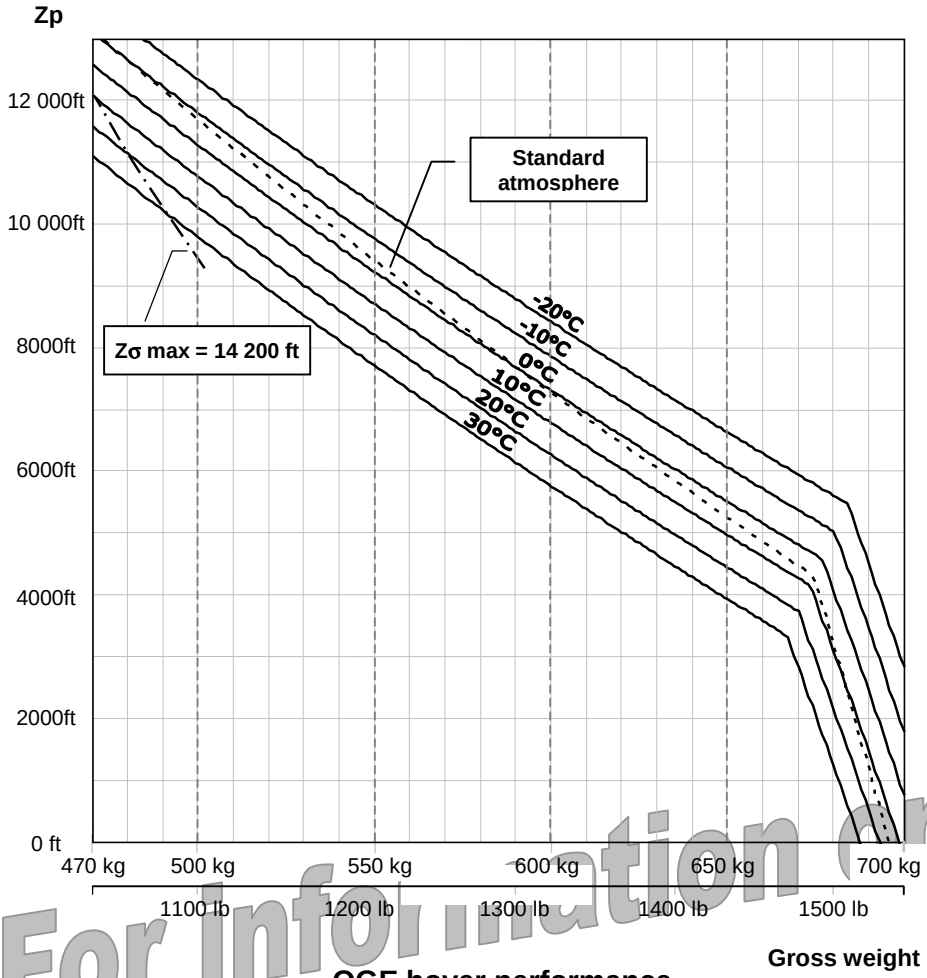
Height-Velocity diagram



Note : With a view to simplicity, the same domain was demonstrated regardless of altitude and temperature. It means that some margin exist at lower altitudes, temperatures and weights.

During take-off, the pilot should pay attention to avoid this zone. In addition, he should limit the rate of climb to a maximum of 500 feet / min below 100 feet AGL, in order to limit the loss of rotor speed in case of power failure (see procedure page 3-3).

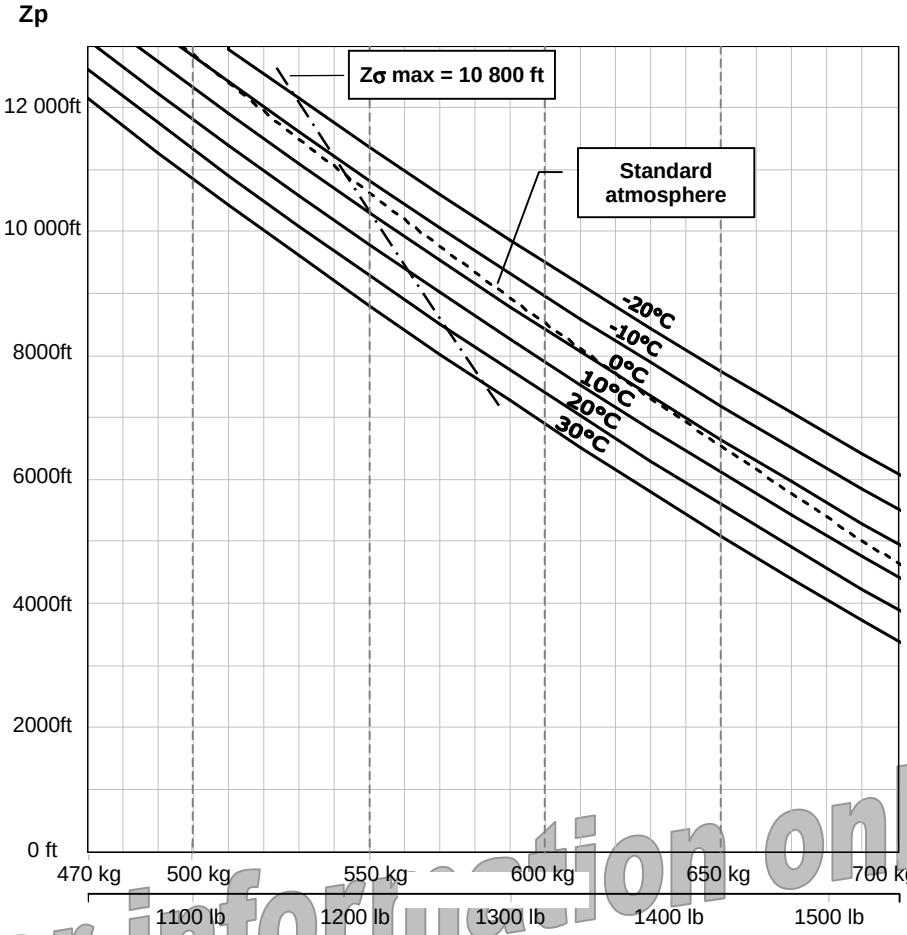
Hover Out of Ground Effect



OGE hover performance

- 5℃ ≤ OAT ≤ ISA+30℃
No wind
Engine speed = 2650 RPM
Max. Continuous Power

Hover In Ground Effect



IGE hover performance

Skid height = 2 feet - No wind
- 5℃ ≤ OAT ≤ ISA+30℃
Engine speed = 2650 RPM
Max. Continuous Power

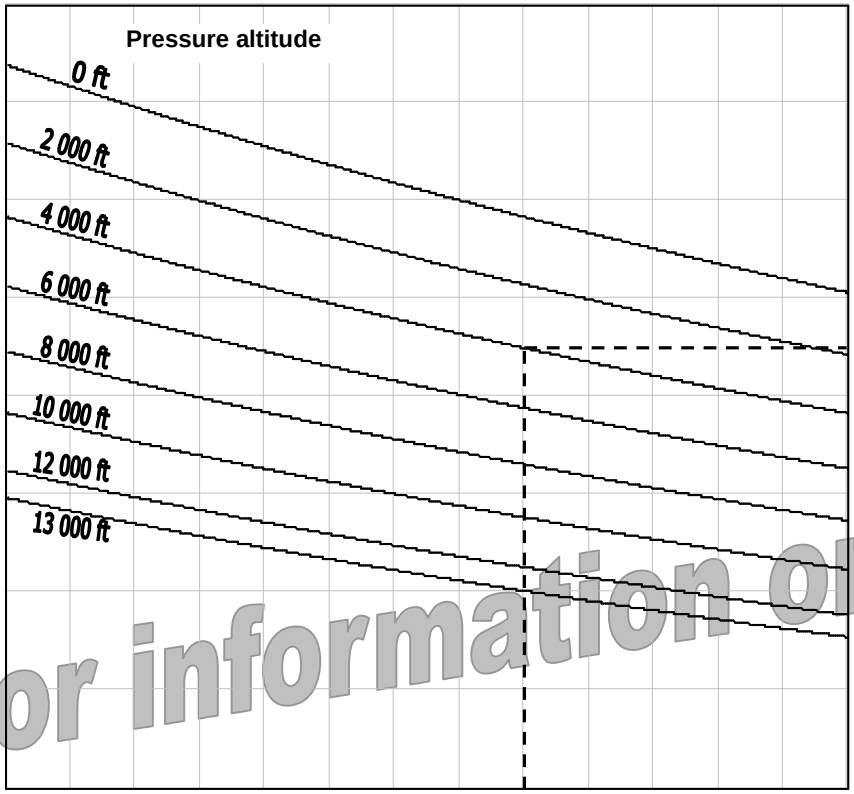
A wind speed of 35 kt at all headings was demonstrated at sea level.
A wind speed of 25 kt at all headings was demonstrated at maximum reduced weight
(M/σ_{max} = 835 kg, refer to following pages for reduced weight computation).

Rate of climb at Vy = 50 kt IAS

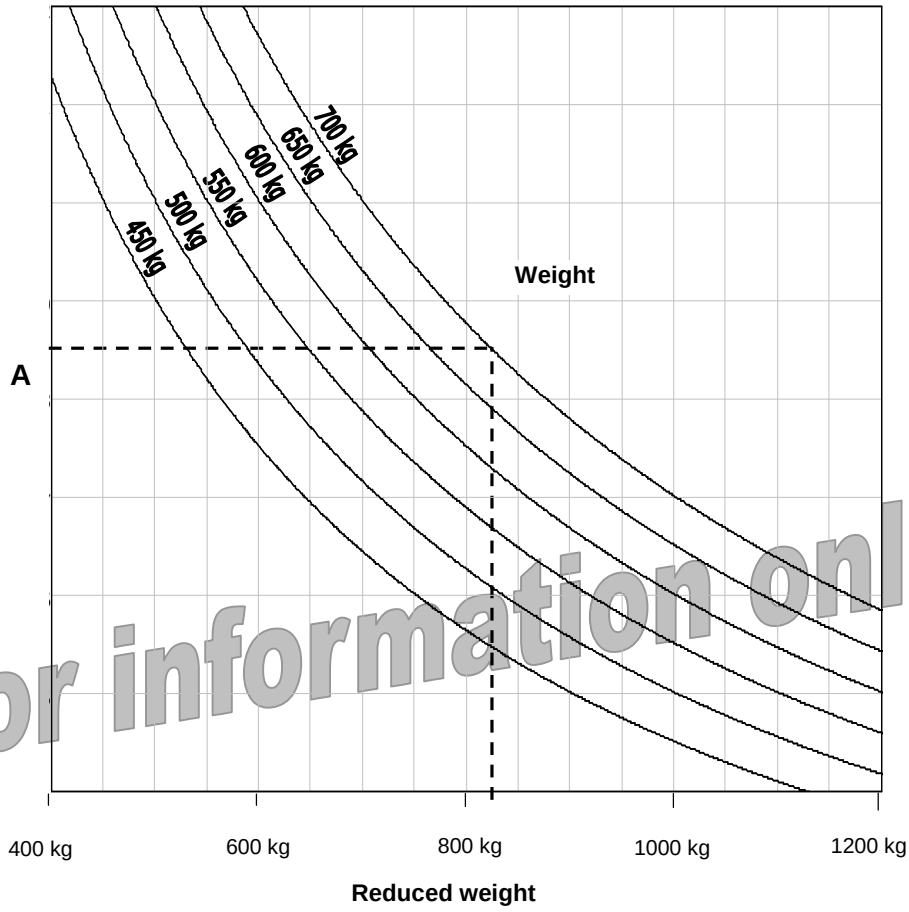
To determine the maximum rate of climb, first determine the reduced weight as follows :

1. Locate A on the left curves from outside temperature and pressure altitude,
2. Report A on the right curves and read the reduced weight from weight.

Note : The example is given for M = 700 kg, OAT = 20℃ and Zp = 4000 ft.

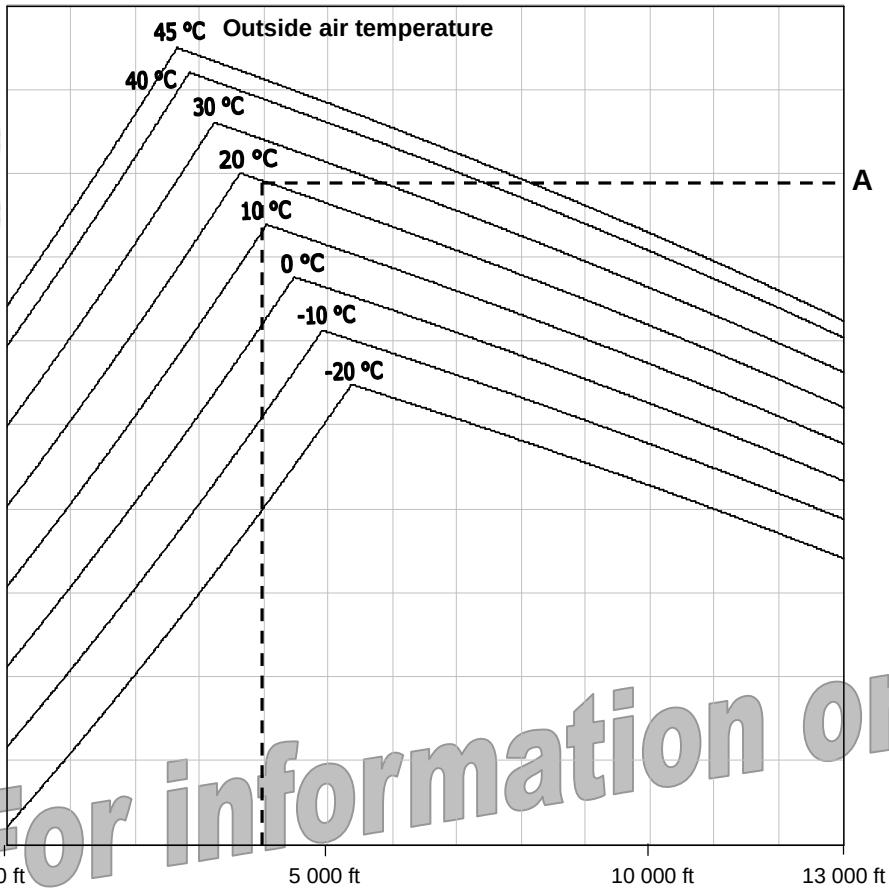


Reduced weight computation



Determine maximum rate of climb as follows :

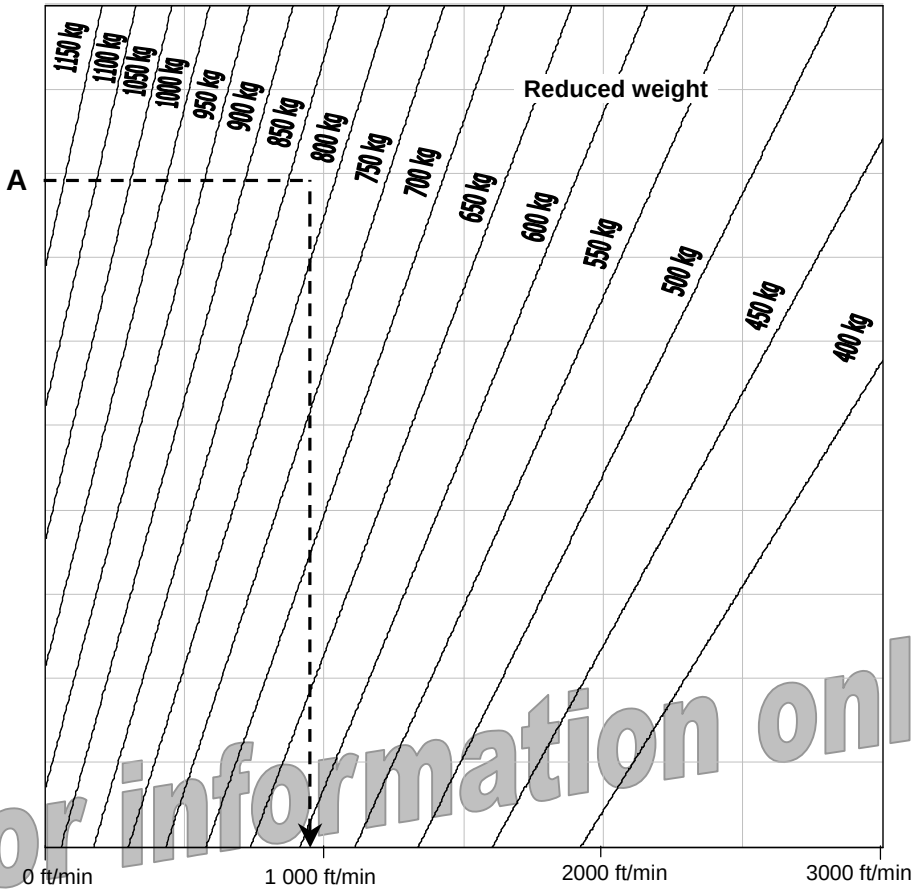
1. Locate A on the left curves from pressure altitude and outside air temperature,
2. Report A on the right curves and find climb rate from reduced weight.



Pression altitude

- 5℃ ≤ OAT ≤ ISA+30℃
Engine speed = 2650 RPM
Max. Continuous power

Rate of climb computation



Take off distance

Take-off distance, following recommended take-off profile described page 5-3 with 50 feet obstacle, at corresponding HIGE maximum gross weight is 330 m (1080 feet).

Glide distance in autorotation

In stabilized autorotation with collective fully down, rotor speed stays within power-off rotor speed range. The following performance is then :

Minimum rate of descent .....1770 feet / min at IAS = 49 kt IAS
- 0.8 kt IAS per 1000 feet Zp

Best angle of glide ..... 0,60 nm per 1000 feet at IAS = 78 kt IAS
- 1.3 kt IAS per 1000 feet Zp

Sound exposure level

Cabri G2 flyover sound exposure level is :

75.7 dB SEL

Confidence interval ± 0.3 dB. This measurement was established taking into account Vh = 100 kt IAS.
The sound exposure level was determined under ICAO regulation, Annex 16, volume 1, 2nd part, chapter 11.

Section 6 Weight and balance

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General

The helicopter must only be flown within the weight and balance envelope specified in Section 2. Operation outside these loading limits can result in degraded safety.

Note : The fuel is not located at the helicopter center of gravity and a change in CG location will occur during flight, particularly laterally. Pilot must make sure that helicopter CG location stays within specified limits until consumption of all fuel.

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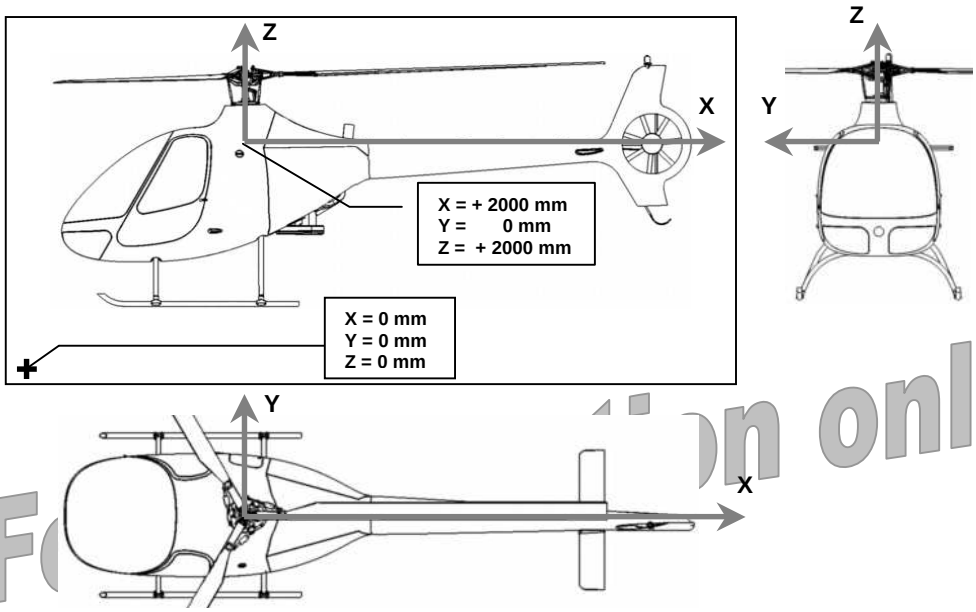
Center of gravity, Standard definitions

The Cabri G2 frame axis are defined as follows :

- Z-axis is parallel to the main rotor shaft, positive upward,
- X-axis is normal to Z-axis in the plane defined by Z-axis and tail rotor transmission axis, positive rearward,
- Y-axis is deduced from the two others, so that the XYZ frame is direct. Positive Y are on the helicopter **right side.**

Datum is defined such that main gearbox center coordinates are :

X = + 2000 mm
Y = 0 mm
Z = + 2000 mm



Notes : - The helicopter is not leveled when on a horizontal ground.
- The tail rotor transmission is angled 2° downward when the helicopter is leveled.

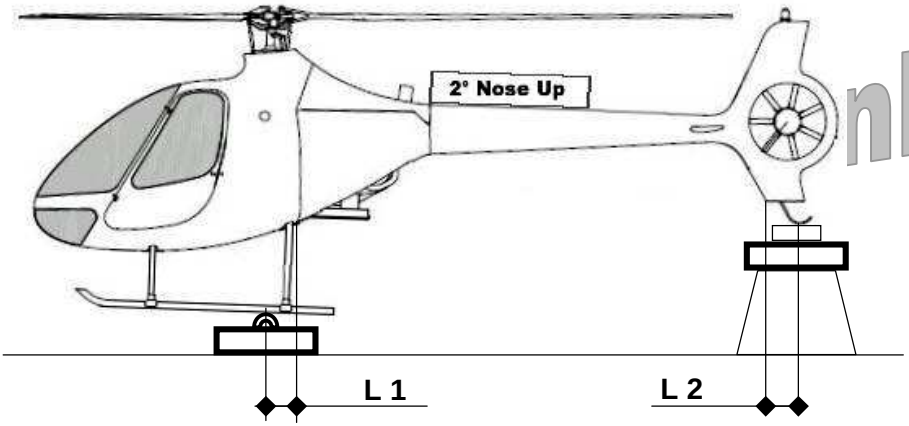
Helicopter weighing procedure

1. Aircraft preparation :

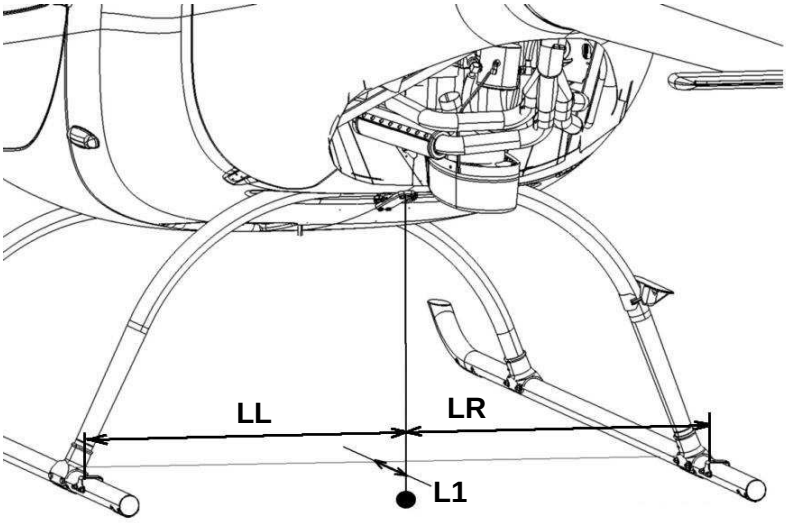
- Drain fuel using drain on Gascolator (boost pump on),
- Fill engine oil and gearboxes to “full” marks,
- Make sure all checked items on equipment list are installed in their proper location,
- Make sure copilot controls are installed or stowed inside,
- Make sure aircraft is clean and remove any foreign item in cabin and baggage compartments such as charts, tools or rags,
- Mark helicopter equipment list to show exactly which equipment is installed,
- Close the doors and cowlings,
- Install wheels.

2. Weighing

- Select a horizontal ground,
- Install three scales at appropriate distances, corresponding to the rear skid pants, and the tail skid. The tail scale should be on a box or a stool, with shims to adjust tail skid height :



- Install a piece of angle or half-round on the two front scales, to bear the skids on a precise point,
- Set the scales zero,
- Lift the helicopter nose by lowering the tail, and install it on the three scales. The front scales position should be forward of skid pants as shown, selected to ensure a 10 to 20 kg (20 to 40 lb) load on the tail skid,
- Remove the wheels,
- Level the helicopter, by adjusting tail skid shim. Use a carpenter level on the main rotor hub, or prefer a clinometer on the tail cone upper surface **2° nose up** as shown,
- Stretch a thin wire between the two contact points of helicopter skids,
- Attach a plumb line to safety wire securing the two **rear bolts** clamping the main landing bow :



- Measure the horizontal distance **L1** between the wire and the plumb line. L1 is positive when plumb is aft. Measure **LL** and **LR** as shown,
- Measure the horizontal distance **L2** between the tail fin lower leading edge, and the tail skid contact point on the scale,
- Note the three scales readings **Mleft, Mright** and **Maft**

3. Calculation

Report these data in following table, to determine the helicopter empty weight and moments.

In millimeters :

Weight	Arm X	Arm Y	Mom X	Mom Y
Mleft	2212 – **L1**	**- LL**		
Mright	2212 – **L1**	**LR**		
Maft	5913 + **L2**	- 90		
Sum = **EW**	**AX = MX/EW**	**AY = MY/EW**	Sum = **MX**	Sum = **MY**

In inches :

Weight	Arm X	Arm Y	Mom X	Mom Y
Mleft	87 – **L1**	**- LL**		
Mright	87 – **L1**	**LR**		
Maft	233 + **L2**	- 4		
Sum = **EW**	**AX = MX/EW**	**AY = MY/EW**	Sum = **MX**	Sum = **MY**

Weight and CG position determination

Before each flight, the pilot should determine helicopter gross weight and CG position in order to check that helicopter CG limits shown page 2-6 are not exceeded, and to determine performance (Refer to Section 5).

This can be done with the following table :

1. Determine all the weights in the first column,
2. Compute longitudinal and lateral moments,
3. Sum each three columns,
4. Calculate total arms by dividing moments by total weight.

In metric units :

Item	Weight (kg)	Arm X (mm)	Arm Y (mm)	Mom X	Mom Y
Equipped aircraft	**EW** ([1])	**AX** ([1])	**AY** ([1])	**MX** ([1])	**MY** ([1])
Right seat		1300	320		
Left seat	([5])	1300	-280		
Doors	([4])	1250	+/- 600		
Main baggage compartment		1854	323		
Front baggage compartment		325	0		
Fuel ([2])	([2])	([3])	([3])		
Total	Sum = **GW**	**MX / GW**	**MY / GW**	Sum = **MX**	Sum = **MY**

([1]) Report aircraft equipped weight data
([2]) Use 0.72 kg/L for AVGAS density
([3]) For precise fuel position, use :

Fuel Quantity	**X**	**Y**
0 to 50 L	1805	-300
50 to 150 L	1966	-330
150 to 170 L	1941	-341

([4]) Use - 4.2 kg (negative weight) when a door is removed
([5]) Use - 5.5 kg when left seat is removed

In Imperial units :

Item	Weight (lb)	Arm X (in)	Arm Y (in)	Mom X	Mom Y
Equipped aircraft	**EW** (1)	**AX** (1)	**AY** (1)	**MX** (1)	**MY** (1)
Right seat		51.2	12.6		
Left seat	(5)	51.2	- 11		
Doors	(4)	49.2	+/- 23.6		
Main baggage compartment		73	12.7		
Front baggage compartment		12.8	0		
Fuel (2)	(2)	(3)	(3)		
Total	Sum = **GW**	**MX / GW**	**MY / GW**	Sum = **MX**	Sum = **MY**

(1) Report aircraft equipped weight data
(2) Use 6.0 lb/gal for AVGAS density
(3) For precise fuel position, use :

Fuel Quantity	**X**	**Y**
0 to 13 U.S. gal	71.1 in	-11.8 in
13 to 40 U.S. gal	77.4 in	-13 in
40 to 45 U.S. gal	76.4 in	-13.4 in

(4) Use - 9.2 lb (negative weight) when a door is removed
(5) Use - 12.1 lb when left seat is removed

Section 7 Systems description

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Airframe

General

The Cabri G2 airframe is composed of three sections :

- The main fuselage, including cabin, central structure, baggage and fuel compartments. It is all made of composite sandwich.
- The engine section, isolated between a front and an aft firewalls. It is made of the steel truss engine mount, and composite cowlings.
- The aft structure, a composite shell combining the tail boom, the fins, and the tail rotor shroud, with the horizontal stabilizer.

Two composite cabin doors enable passenger / pilot access.
One composite door enables external access to the baggage compartment.

Landing gear

The main landing gear is composed of two tubular bows, and two skids. It is attached to the fuselage by soft elastomeric mounts, giving adequate frequency tuning against ground resonance. There is no damper.

The landing skids are protected against abrasion by a set of carbide wear shoes.

Seating

The cabin features two high-energy absorbing, stroking-seats, improving occupants protection in case of a crash.
The left seat pan can be removed to carry large cabin baggage.

Dynamic systems

Main rotor

The Cabri G2 main rotor is a three-bladed, fully articulated, soft-in plane rotor.

The rotor hub is forged from aluminum alloy, and attached to the stainless-steel mast, by a large splines and cones attachment, with a thrust nut. The hub is belted with a tough fiberglass winding, which increases its tolerance to damage.

The blades are made of carbon and fiberglass-reinforced composite, with a large internal steel tip weight, and lead balance weight, to increase rotor inertia.
Their fork attachment is directly connected to an elastomeric, spherical thrust bearing which ensures pitch, flap, and lead-lag motions.
They have a two-section, thick stainless steel leading edge cap which protects them against erosion due to sand, dust and precipitations.
Each blade is linked to the rotor hub via an elastomeric lead-lag damper, made of a single cylindrical layer of special rubber.

The blades are restrained in flapping-down, by a reciprocal droop-stop ring, guided in the rotor hub. They are restrained in flapping-up by an upper positive stop.

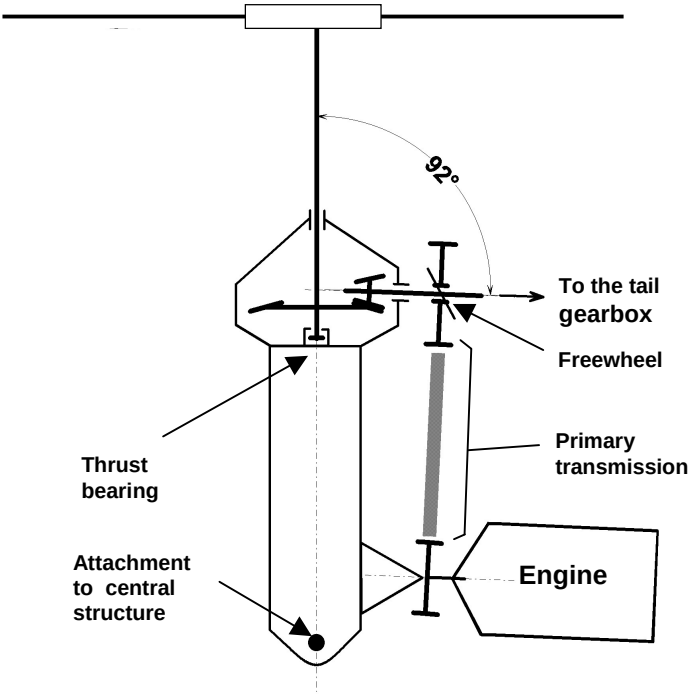
Tail rotor

The tail rotor is shrouded in the vertical fin.
It has seven reinforced-plastic-injected blades. Pitch change is permitted by their stainless steel laminated tension-torsion pack.

The tail rotor hub is directly mounted on, and driven by the tail gearbox, and its pitch control mechanism is part of the gearbox.

The tail gearbox is rigidly supported inside the shroud, by a three-tube mount. The front tube houses the tail rotor driving shaft.

Drive system



The primary transmission is composed of a pulley directly bolted to the engine output flange, a poly-V belt transmitting the power, and an upper pulley connected through a freewheeling unit to the gearbox input.
The power is transmitted :

- forward to main gear box, and
- aft to the tail rotor transmission.

The main gearbox contains a splash-lubricated spiral bevel-gear set which transmits power to the rotor mast. It is equipped with a filler plug / breather, a sight gage and a self-closing magnetic chip detector.

The main gearbox upper and lower casings act as a tough central structure, rigidly bolted in the middle of the fuselage structure.

The steel tail rotor transmission shaft runs inside the tail cone, on three ball bearings.
A disc rotor brake is installed on the fore portion of tail transmission shaft. The brake jaws are actuated through a cable control, from an overhead control quadrant.

The tail gearbox contains a splash-lubricated spiral bevel-gear set which transmits power to the tail rotor.
It also incorporates the tail rotor pitch control mechanism.
It is equipped with a filler plug / breather, a sight gage and a self-closing magnetic chip detector.

Flight controls

The Cabri G2 has dual flight controls which includes cyclic stick, collective stick and pedals.
Left controls are totally removable, without tools, if needed. They can be stowed in the cabin baggage compartment.

Cyclic and collective controls actuate main rotor blade pitch through push-pull rods, bellcranks and the swashplate.

Yaw control is transmitted from the pedals to the tail rotor by a long flexible push-pull control.

The collective stick grip is divided into one fixed part and one twist grip to enable sensitive throttle control, and to allow governor motion.

The collective stick is equipped with a friction mechanism, which is controlled by the pilot, without releasing his hands from the controls.

The cyclic sticks have no friction mechanism, but a dual-axis electric trim, allowing to completely release the static forces in flight.
This trim system is controlled either by the pilot or the copilot, through a circuit which gives priority to the one who activates it first.

Rotor brake

A rotor brake allows the pilot to stop quickly the rotor after flight. This rotor brake is mounted on the tail rotor transmission. It is actuated by a cable connected to a pull handle located above the pilot (yellow handle).

Engine installation

Engine

The engine is a four-cylinder, direct-drive, carbureted gasoline engine.
It is installed in the central compartment, suspended through elastomeric vibration mounts.
It moves slightly to control the main transmission belt tension for clutch engagement / disengagement.

Clutch

The clutch tension actuator is fed by engine oil pressure through a four-way distributor, controlled by the CLUTCH switch.

This system is frozen in case the electrical power is shutdown.

A non-return valve maintains the pressure in case of engine stoppage, or oil pressure loss.

A gas spring maintains the engine disengaged during prolonged stop.

The CLUTCH light lights OFF when the pressure of the oil feeding the distributor is above 3.6 bar. In the clutched position, it means that the belt is tensioned. In the declutched position, it means that the clutch cylinder is on its declutched stop.

Air induction

The engine air intake is located inside the main gearbox compartment, on the right side. It is fed in fresh air, by the front inlet above the cabin.
A wire screen prevents foreign object ingestion.
The air is ducted down the firewall, to an air filter box, behind the carburetor.
This air box includes an electrically-actuated butterfly valve, which controls the carburetor heating, and the air filter.

Both cold and hot air are filtered.

An air intake temperature probe, located inside the air filter, sends the carburetor inlet temperature to the EPM.

Ignition system

The engine has a dual-plug, mixed ignition system comprising :

- One magneto with constant timing,
- One solid-state electronic capacitor-discharge system, with variable timing.

The electronic system is direct-fed by the battery through a dedicated circuit breaker, located on the cabin breaker panel.

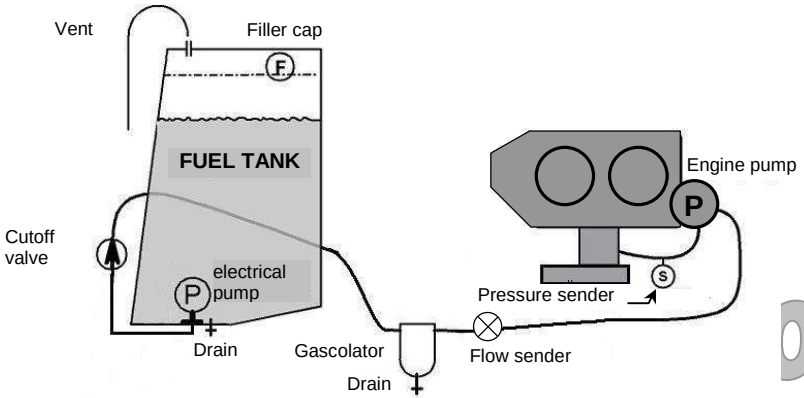
Cooling system

The engine is air-cooled, with an additional oil cooler.
Cooling air enters the upper cowling plenum around the mast and gearbox. It is forced by a squirrel-cage blower, directly driven by the engine.
Warm air is exhausted below the engine.

Fuel system

The fuel system comprises :

- a single, crash-resistant fuel tank,
- an submersed electric booster pump,
- the engine-driven pump,
- a shut-down valve,
- a gascolator.



Electrical circuit

The electrical systems are powered by a 12 V, 25 ampere-hour battery located in the left engine compartment, and a 13.7 V, 60 A alternator controlled by a voltage regulator.

A main breaker panel is provided in the cabin, and a secondary breaker panel is located inside the battery shelter.

Various switches are located on the instrument panel. The MASTER switch disconnects all the systems from the battery except :

- NR lights (BARC) backup,
- PLASMA ignition system,
- Doors remote control,
- the 13.7 V Auxiliary power socket,
- Some supplemental equipments (see Section 9).

Starting protections
On ground, before clutching, the system prevents from cranking the engine if :

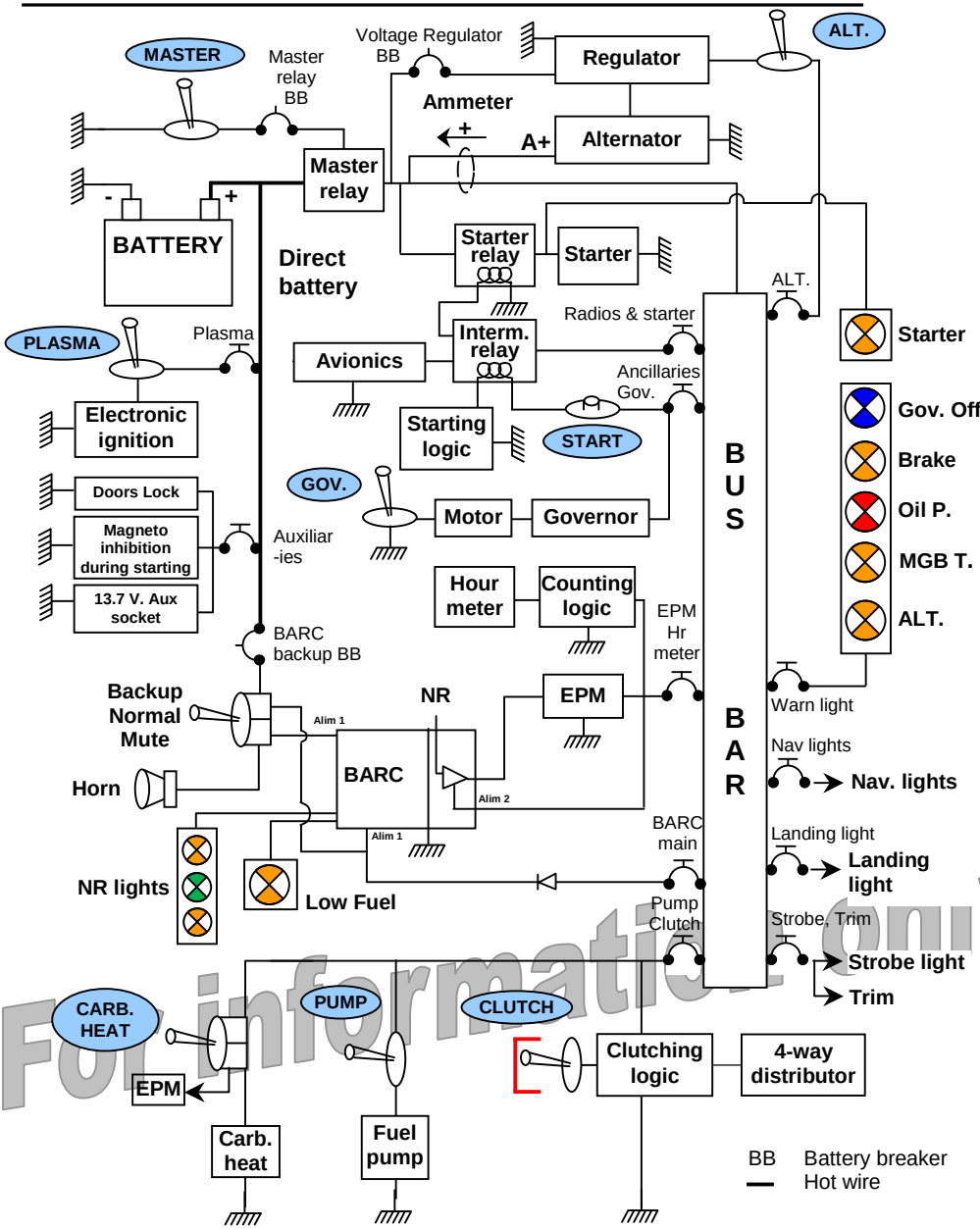
- It is already running,
- The anti-theft system is activated.

During flight, the anti-theft system is disabled to permit engine restart in any situation.

Clutching feature
Clutching is disabled when the rotor brake is applied or seized.

Switches

The instrument panel presents a row of 8 switches, identified by an icon and their function :

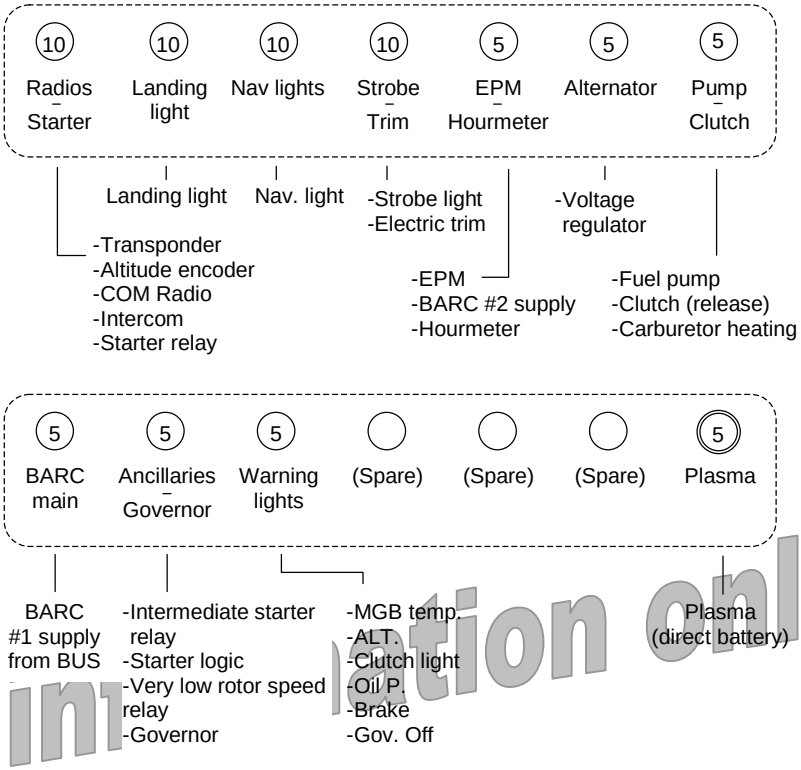


Note : If cabin lights or gyroscopic instruments are installed, refer to Night VFR supplement description for wiring.

Breaker panel

The breaker panel is located on the cabin bulkhead between the two seats. The breakers are marked to indicate their function. They are of push-pull type.

Caution : Some systems are grouped on the same breaker.
If a circuit breaker pops-off, wait a few seconds before resetting it.
Do not try twice.

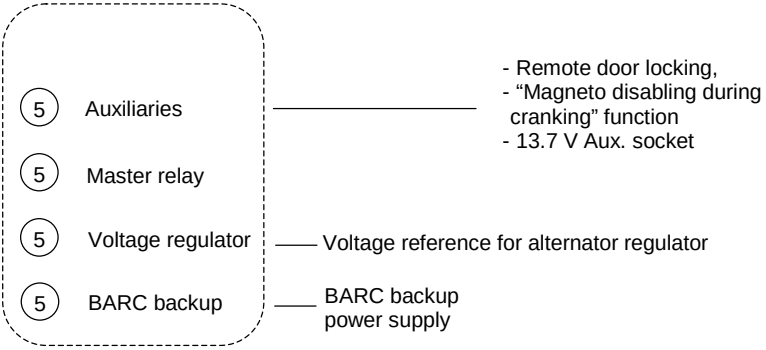


Note : The Plasma is the only direct battery breaker on the panel. Other battery breakers are located in the battery shelter (refer to next page).
The breaker values are given in Amperes on the breaker.

Note : If cabin lights or gyroscopic instruments are installed, refer to night VFR supplement (Section 9) for breaker panel description.

Battery breakers

Four direct battery lines are protected by breakers, located in the battery shelter.



Note : They are "push" breakers except for the Auxiliaries one (refer to page 7-18).

Instrument panel and console

The standard flight instruments include airspeed indicator, altimeter, vertical speed indicator, magnetic compass and the EPM.
Space is available for one additional conventional instrument.
Refer to Night VFR supplement (Section 9)for wide instrument panel optional.

The basic avionics stack includes a VHF transceiver, transponder and an intercom.
Space is available for additional equipment.

Emergency locating transmitter

The ELT is located inside the baggage compartment. It is attached to the main bulkhead by a strap in the lower corner.
The ELT switch should be in ARMED position. Then the 3-position switch on the breaker panel can be used for remote control :

- ON (transmission) enables manual activation of the ELT,
- ARMED : stand by mode to enable automatic activation by the shock sensor. Unless there is an emergency, the switch must stay in that position.

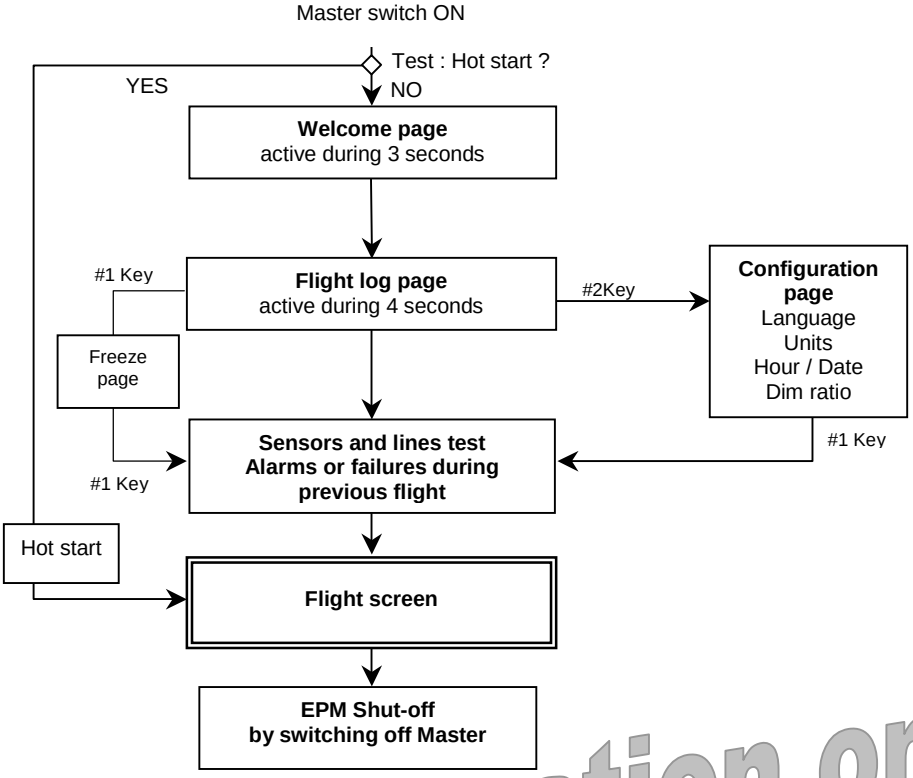
For additional features, refer to ELT operation manual.

Electronic Pilot Monitor - EPM

Flight screen

Starting sequence

The EPM is powered through the MASTER switch. The functioning synoptic after switching on is as follows :



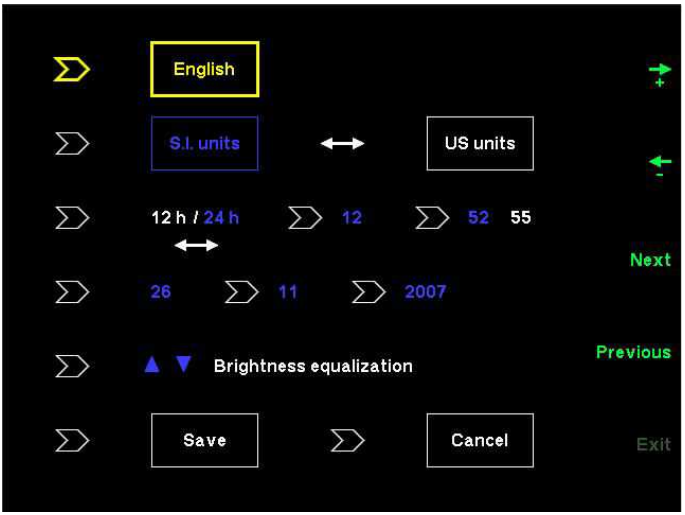
Note : Hot start is defined by "Rotor in flying mode" signal (refer to page 7-16).
After an unexpected power cut in this condition, the EPM flight screen recovers within seconds.

Flight log page

This page presents, for each of the **last 15 flights** :

- The date and time of the engine start-up,
- The flight time (refer to page 7-14),
- The average fuel consumption (refer to page 7-15).

Configuration and settings page :



Note : Brightness equalization is used with the instrument panel lighting. It is set during maintenance.

Sensors and alarms test page :

The amber caution icons indicate failures that were detected during the last flight.
The amber “FAILED” indicates a line/sensor failure during the self-test.

Start indicator

In START mode, MLI indicates the throttle position to assist the pilot to start the engine.

Mode activation when NR ≥ 420 RPM
Mode deactivation when NR ≤ 300 RPM

Clock - Stopwatch - Flight time counter

The clock is a continuous display. 12 or 24 - hour format can be selected through configuration page.

The flight time counter is counting the time spent from **NR ≥ 450 RPM**, and until NR ≤ 400 RPM.
It discounts the warming, cooling and briefing times in a flight.
Its display is frozen when NR drops below 400 RPM, and is reset zero only on the next flight, when NR increases above 450 RPM.

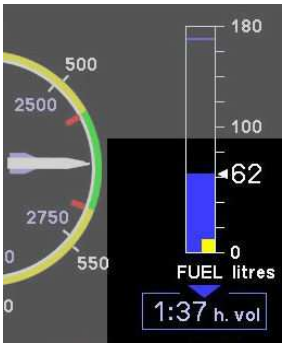
At EPM shutdown, flight time is recorded in the flight log page refer to page 7-12).

The stopwatch can be activated and started instantly by pressing the #1 key once. It then replaces the flight time display.
The flight time display comes back after 20 s of stopwatch being inactive at zero, or by pressing #2 key twice from stopped state.

Fuel flow modes

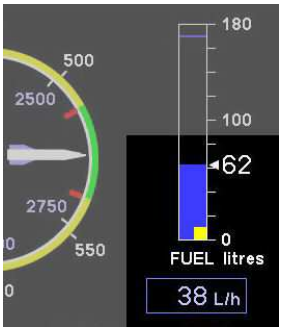
Three different fuel flow display modes can be selected, by pressing the #3 Key cyclically :

- Remaining flight time
- Instantaneous fuel flow
- Average fuel flow



Remaining flight time

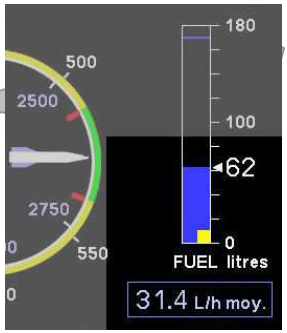
- Standard mode at startup
- Compute approximate flight time to starvation, based on instantaneous fuel flow **averaged about one minute**
- Displays **-:--** during 2 min after startup



Instantaneous fuel flow

- Automatically displayed when approximate fuel quantity is **below 10 liters** (2.6 U.S. gal)

Warning : Do not rely on fuel quantity indication when caution light is ON or EPM warning is active.



Average fuel flow

- Calculate average flow since flight start, based on flight time counter
- Displays -.- during 2 min after startup
- Value at the end of flight is stored in log page

BARC

BARC (Fuel and rotor alarm device). It is designed as an alternate mean in case of EPM failure.
It should be preferred in case of doubt.

When the MASTER is switched ON, the BARC conducts a testing sequence for caution / warning lights on the instrument panel, and the rotor speed horn.

In case of an electrical bus failure, the BARC can be switched to a direct battery backup supply.

Main and backup modes

Continuous
Power-off maximum NR threshold
NR ≥ 594 RPM
Intermittent horn

Flashing
Power-on maximum NR (red limit)
NR > 540 RPM

Flashing
Power-on minimum NR (red limit)
NR < 515 RPM

Continuous
Power-off minimum NR threshold
NR ≤ 466 RPM
Continuous horn

Backup mode only

Green NR arc
515 RPM ≤ NR ≤ 540 RPM

Also comes ON
at non-flying NR
to prevent from draining
the battery low.

"Rotor in flying mode" signal

Signal activation	when NR ≥ 450 RPM
Signal deactivation	when NR ≤ 400 RPM

Switch functions :

Backup mode : BARC is powered directly by the battery. Central green light is active.

Main mode : Normal operation. Green light is inactive.

Mute : Mutes the continuous NR horn (self reactivation).

LOW FUEL functions :

LOW FUEL light lights on when independent sensor is set off (less than 12 L).
Lighting is signaled by a short tone.
Caution light should be preferred to EPM indication in case of doubt.

Other equipments

Pitot - Static system

The Pitot tube is non-heated. It is located under the helicopter belly.
The static port is located just aft of it.

Engine governor

An electric engine governor helps the pilot control the engine speed. When engaged, it acts on the twist grip to control throttle.

Once switched-on, the governor engages above 2000 RPM (NR = 400 RPM), and self-disengages below.

The pilot can disengage it by two ways :

- Using the GOV switch located on the tip of the collective stick. The GOV OFF light then comes on,
- Forcing the twist-grip to NM < 2000 RPM, for an engine failure simulation.

At any time, a friction clutch in the governor motor enables the pilot to overtake it by acting on the twist grip. The pilot can easily disengage the governor while overtaking its action.

Doors lock / Anti-theft

Remote doors lock is provided by a small radio transmitter. It uses a radio security-code to control the cabin doors locks, and enable/disable the engine starter.

Note : The starter is enabled when the “Rotor in flying mode” signal is active (see page 7-16), whatever the antitheft state.

The antitheft can be disabled (starter enabled) if not needed :

- Peel-off the « CODE » label on the left side of the central console, below the instrument console. Locate the small 8-switch line,
- Key the 8-bit helicopter individual security code : 1 is up, 0 is down
- To activate the antitheft back, just scramble the switches.

If the transmitter is not operative, following procedure permits to fly :

- Locate the backup key lock on the right firewall, above the Gascolator,
- Open the baggage door, using the backup key,
- From the baggage door, reach the right cabin door lock,
- From the right seat, open the left door lock,
- Use above procedure to disable the anti-theft.

Note : The remote door locking circuit has a very small standby current drain. However, when storing the helicopter for more than a month, pull the « Auxiliaries » battery breaker, inside the battery shelter.

Lights

The helicopter is equipped with :

- a strobe light atop vertical fin,
- navigation lights on fuselage sides,
- a landing light in the nose.

Cabin and amenities

Baggage compartments

A 200 liter baggage compartment is provided in the right side of the fuselage.
It can accept two standard trolley cabin suitcases.
It is accessible from the outside, through a hinged door, and from the cabin through a small access hole, limited to soft objects.

Another baggage compartment is provided in the cabin, to stow the removable passenger controls, and some small cabin baggage : camera, drink, etc.
It is accessible from a small door in front of the passenger pedals. It features a cigarette-lighter socket for auxiliary power output.

Soft baggage like clothes can be stowed under the stroking seats.

Ventilation and heating

Each door has an adjustable fresh air vent.
For a better ventilation at lower airspeeds, and particularly in a hover, doors must be partially opened during flight using the cord strap.

A cabin heater / defogger is provided. It takes its air from the engine cooling blower.
The control knob is located between the two seats, on the central console.
In case of fire, shutting the heater off prevents fire from crossing the firewall through heating system.

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Section 8 Handling and servicing

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General

This section outlines procedures recommended for handling and maintaining the Cabri G2. Every Cabri G2 owner should stay in contact with Hélicoptères Guimbal or approved source to obtain the latest service and maintenance information.

Fuel

Refer to page 2-5 for approved fuel.
Refueling while the engine or the rotor are turning is forbidden.
Fuel tank may be topped-off. A slight increase in maximum tank capacity is possible by refueling with the left ground handling wheel installed alone. Fuel gage will still function in this case, with the same accuracy.

Engine oil

Refer to page 2-5 for approved oil types and quantities.
Check oil level with the dipstick.

Gearboxes oil

Refer to page 2-5 for approved oil.
For both main and tail gearboxes :
Check oil level while helicopter is sitting on a horizontal surface, without ground handling wheels.
Add oil when level is below red circle (1/3rd diameter).

Ground handling

Use only approved ground handling wheels on dedicated attachment points.
Use the vertical tail gearbox support tube as a handle to raise the helicopter nose and maneuver.

Caution : Do not use the shroud structure as a handle. The tail rotor blades may be damaged and could cause fingers injury.

Additional people can push the helicopter on the engine cowlings or main gear bow.

Parking and tie-down

Parking the helicopter on a soft surface may cause it to tilt back due to aft center of gravity when empty. In case of doubt, for long time parking, place a hard piece of wood beneath the skid aft tips before removing the wheels.

Tie-down should only be done by straps attaching the landing gear.

Avoid leaving the helicopter exposed to direct sunlight without shielding the canopy with external cover or internal survival blanket.

Tie the blades with appropriate straps in case of strong wind or high gusts. Keep the straps loose to avoid stressing the blades.

Jump-starting the engine

Jump-starting the engine is an acceptable practice in case of a low battery. Only use 12V lead acid battery for jump starting. Proceed in following order:

1. Connect the red cable to helicopter battery plus,
2. Connect it to the external battery plus,
3. Connect the black cable to helicopter battery ground,
4. Connect it to the external battery ground,
5. Start the engine (with left cowling open),
6. Remove in opposite order.

Caution : a dead battery is not airworthy and should not be jump started.

Section 9 Supplements

List of supplements and optionals
Incompatibility of operation
Effect on performance data

Important note

The information contained herein supplements or supersedes the information given in the basic flight manual and/or flight manual supplements listed above

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GPS

1. General

This supplement details data specific for approved GPS.
The following GPS are approved on Cabri G2 :
- GARMIN GNS 430W for night and day VFR
- BENDIX / KING KMD 150 for day VFR

2. Limitations

GARMIN GNS 430W
The GPS use is limited to VFR in sight of the ground.
This label should appear on or next to the GPS.

GPS database information correctness is not ensured. The pilot should therefore check its accuracy with respect to approved documentation.

BENDIX / KING KMD 150
The GPS use is limited to day VFR in sight of the ground.
This label should appear on or next to the GPS.

Position integrity given by the GPS is not ensured. The pilot should therefore check its accuracy through other navigation means available.

GPS user manual should be on board.

7. Description

Refer to GPS user manual.

If a CDI is installed together with the GNS 430W, refer to GPS user manual for information on use.

Night VFR

1. General

This supplement applies specifically to the Night VFR version of the Cabri G2.
If only part of the required optional equipments are installed, the configuration is approved for day VFR only. This supplement then also provides information on these equipments.

In order to be approved for night VFR, the Cabri G2 must feature the following equipments :

- Instrument panel lights, with backup mode in direct battery,
- Two lights to read maps, controlled through a switch on the overhead control module. This same switch also controls the instrument panel lighting backup mode,
- Wide instrument panel,
- Three gyroscopic instruments installed as per this supplement (Refer to page 9-5) :
  - Artificial horizon,
  - Directional gyroscope,
  - Turn coordinator.

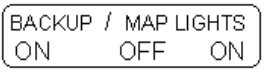
In addition, the specific night vision filter should be positioned on EPM screen to prevent disturbing reflections in the windshield.

Note : Additional equipment may be required by approved operational regulation.

2. Limitations

Category of operation : This helicopter is approved for night and day VFR.
The corresponding placard should be in clear view of the occupants :

Placard for overhead cabin lights switch :



3. Emergency procedures

In case of an electrical failure causing the loss of instrument panel lighting, the pilot should activate the BACKUP / MAP LIGHTS switch.

In case of an Artificial horizon failure (OFF flag), the pilot should refer to the turn coordinator which is powered in direct battery through the PLASMA ignition switch.

Each gyroscopic instruments is equipped with a red flag which appears when the instrument is inoperative. In this case, the pilot should no longer trust the indications of the corresponding instrument.

Caution : In case of an alternator failure (ALT light on, or charge indicator in the yellow zone), the pilot should limit the remaining flight time to 30 minutes.

4. Normal procedures

Day VFR procedures still apply. The following actions should be added for night VFR flight :

Before starting engine

MAP / BACKUP LIGHTS ..... Switch ON during starting procedure
EPM night vision filter .....installed

Caution : If the night flight is started during the day, the filter should be placed within pilot's reach.

Starting the engine

Once the engine is started :
NAV. LT .....Switch ON
MAP / BACKUP LIGHTS ..... Switch OFF
EPM / instrument panel light brightness .....Adjust

Before take-off

Artificial horizon ..... Cage if the ground is horizontal
Otherwise, it should be caged in stabilized straight level flight
Landing light .....Switch ON

Caution : Translation close to the ground should be carried out at very low speed in order to be able to stop as soon as an obstacle is detected. Zones with lighted markers should be preferred.

Climb

Landing light ..... Switch OFF 200 feet above the ground

Cruise and/or level flight

Directional gyroscope .....Regularly set
according to compass reading in straight level flight, as needed
Artificial horizon ..... Cage in stabilized straight level flight, as needed

Approach and landing

Landing light .....Switch ON in final approach, above 200 ft

Shutdown

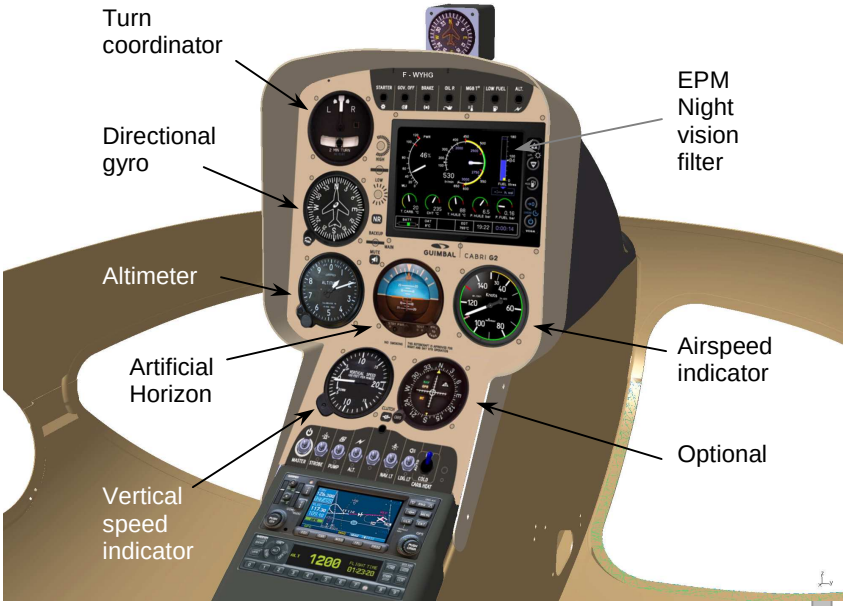
MAP / BACKUP LIGHTS ..... Switch OFF before leaving the helicopter

Note :
The directional gyroscope and the artificial horizon are powered when MASTER switch is ON,
The turn coordinator is powered in direct battery when the PLASMA is switched ON.

7. Systems description

Instrument panel

The instrument panel for night VFR is the wide version.
Gyroscopic instruments are installed on the upper part of the panel and combined with current instruments as shown :



Artificial horizon and directional gyroscope are powered through the Master relay.

The turn coordinator is powered in direct battery through the Plasma ignition overhead switch.

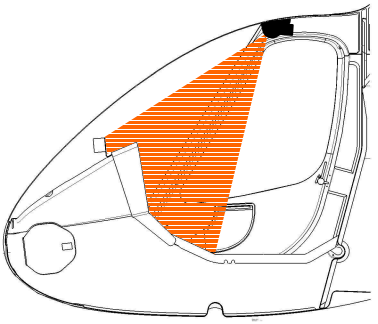
The night vision filter reduces EPM brightness in direct vision and most notably after reflection in the windshield.

Cabin lighting

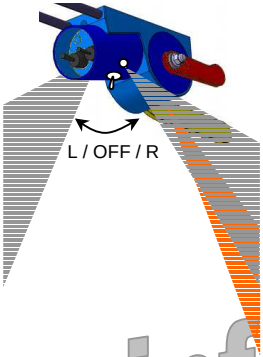
The instrument panel is lighted by four LEDs embedded in the overhead control module.

They are powered by activation of the navigation lights (NAV. LT switch).

EPM « + » & « - » keys enable to adjust panel light and EPM backlight level at the same time. The ratio between the two can be set : refer to maintenance manual.

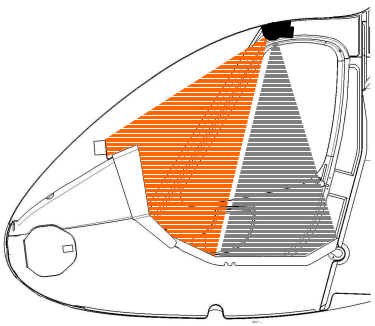


Instrument panel lights



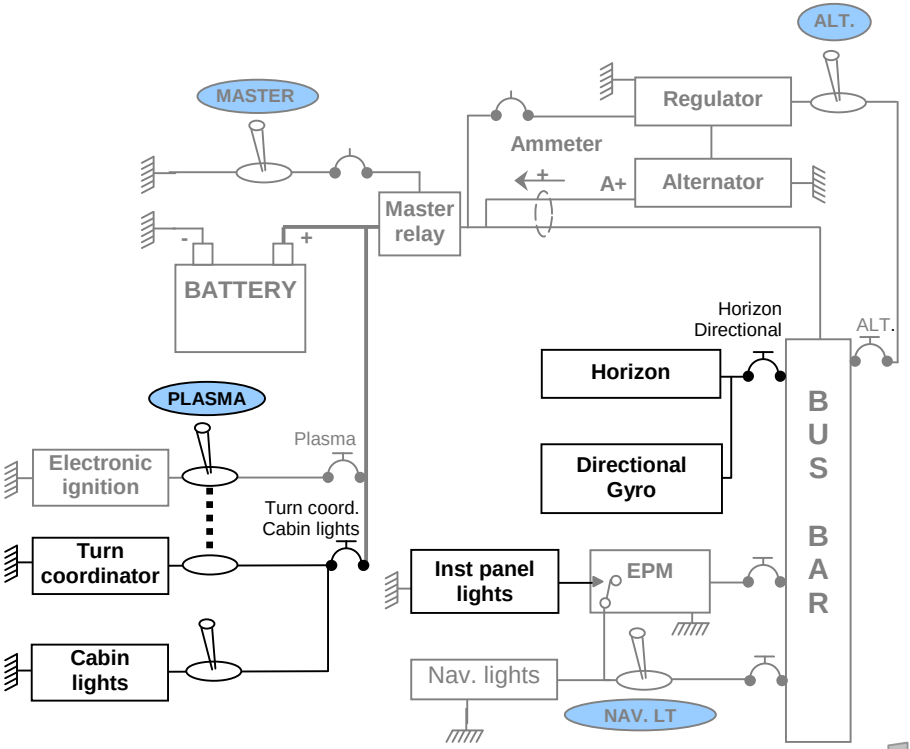
White reading lights are embedded in the overhead module and controlled by a three-position switch.

Map and backup lights



Electrical system

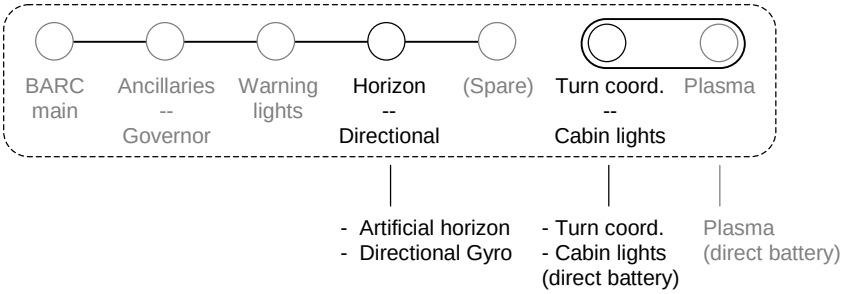
Night VFR configuration :



Note : Common circuit is in gray while night VFR supplement is in black.

Breaker panel

Two breakers are added to the breaker panel, one in direct battery and the other on the main bus :



Air conditioning

Not applicable.

Pop-out floats

Not applicable.

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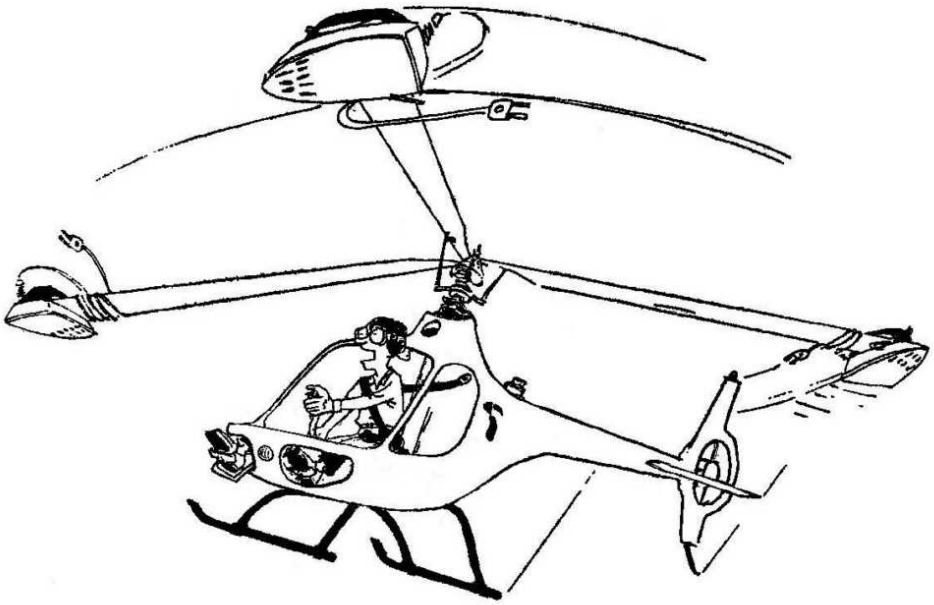
Hélicoptères Guimbal
CABRI G2



Comfort in **A**utorotation **B**elongs to **R**otor **I**nertia

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