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Section 0 Introduction

This document is the Pilot Operating Handbook and EASA approved rotorcraft Flight Manual of the CABRI G2 Rotorcraft.

The following tables give the list of approved pages and the list of changes.

For flight manual supplements tables (approved pages and revisions log), refer to Section 9.

“B” pages are FAA only pages that cancel and replace original pages with the same page number. Ex: page 2-1.B replaces 2-1 for FAA approval only.

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	C	08		
	D.B	10.1		
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Section 8 Handling and servicing	8-1	09.3	8-i	10
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The information in section 2, Limitations, is approved by EASA.

General limitations

Flight rules

Approved for VFR. Supplement for night VFR is mandatory.

Aerobatic flight is prohibited.

Voluntary in-flight engine shut down is prohibited.

Voluntary in-flight declutching is prohibited.

Flight conditions

Flight in known icing conditions is prohibited.

Flight in falling snow is prohibited if heated Pitot is not installed (MOD14-075 or corresponding SB).

Minimum crew is one pilot on the right seat.

Left seat harness must be buckled when seat is empty. In this case, 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 those 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.

Powerplant limitations

Operating limitations

Engine speed

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

Temperature

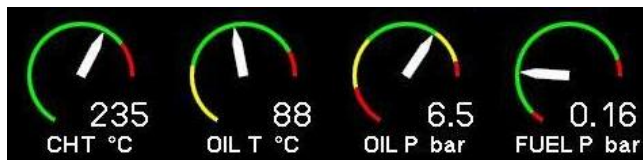
Maximum cylinder head temperature (CHT).....	260°C (500°F)
Maximum recommended CHT for shut down	180°C (356°F)
Maximum oil temperature	118°C (245°F)
Minimum recommended oil temperature before applying full power	60°C (140°F)

Oil pressure

Maximum.....	7.9 bar (115 psi)
<i>Starting and warm-up range</i>	
Maximum for flight	6.6 bar (95 psi)
Minimum for take-off (CLUTCH light OFF)	3.8 bar (55 psi)
Minimum during idle	1.7 bar (25 psi)

Fuel pressure

Maximum.....	0.55 bar (8 psi)
Minimum	0.02 bar (0.3 psi)



Fuel

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

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

Approved grades

.....	AVGAS 100LL
.....	AVGAS UL91

Engine oil

After break-in, use multigrade oil **MIL-L-22851 or SAE J-1899**
Ashless dispersant SAE 15W50 or 20W50

During break-in use straight mineral oil **MIL-L-6082B or SAE J-1966**

(50 hours)	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
	-18°C to 32°C (0°F to 90°F)	SAE 20W50
	Below -12°C (10°F)	SAE 20

Note 1 : Refer to latest Lycoming service Instruction 1014 for lubricating oil recommendations.

Note 2 : Add Lycoming additive LW16-702 or equivalent to oil when using unleaded fuel during break-in.

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 **HG30-0039** (85W140).

Indicated power on MLI

The Multiple Limits Indicator displays the engine power status, based on engine manifold absolute pressure. The indicator (pointer and digits) displays power delivered by the engine in terms of margin to the first of these limits whose relative positions vary with engine inlet air temperature and altitude:

- **Power (PWR) limit:** it corresponds to the engine 5-minute power of 119 kW (160 hp). The red radial PWR mark shows that the limit could be exceeded if the pilot requires too much power.
- **Yellow arc:** it corresponds to the range of power above max cont. power (108 kW – 145 hp) that can be used for 5 minutes, up to 30 kt IAS.
 - After 1 minute in the yellow arc, a countdown indicator appears, displaying time remaining in minutes, surrounded by an increasing arc of ring figuring the time elapsed up to 5 minutes. The pilot should lower the power below the yellow arc before the count-down has elapsed or before exceeding 30 kt IAS.
 - After 5 minutes in the yellow arc, it becomes red, showing maximum duration has elapsed.
 - Limitations to use the yellow arc:
 - Limited to 5 minutes and a maximum airspeed of 30 kt IAS,
 - AVGAS only. Using alternate grades (refer to 2-6 Fuel) forbids the use of the yellow arc.
- **Throttle (FLO) limit:** it corresponds to full throttle power. FLO limit corresponds to the maximum power that the engine can deliver. The red FLO arc warns the pilot that the limit cannot mechanically be exceeded in order to help him anticipate: the consequence of increasing collective when FLO limit is reached is the main rotor speed drop. The part of the yellow arc which extends above FLO limit appears in red, showing it cannot be used.

The pilot should control the power demand to avoid exceeding PWR limit or 5 minute duration, or avoid entering yellow zone when 30 kt IAS is exceeded. Exceedance of the limit may result in accelerated engine and transmission performance degradation, but does not require any emergency procedure. Any degradation should be identified through normal maintenance in a timely manner.

Maximum rated – 5 minutes – Max. 30 kt IAS – AVGAS only	119 kW - 100 % PWR
Maximum rated – Continuous	108 kW - yellow arc threshold
Full throttle	100 % FLO

Caution / Warning lights

Light	Signification	Corrective actions
STARTER Amber	Starter is energized.	Release starter button as needed
STARTER (stays on) Amber	If stays when starter button is released : starter relay is stuck	Immediately pull the mixture OFF to shut the engine down and switch MASTER OFF. Have starting system serviced.
GOV OFF Blue	Governor is disengaged	Control Engine/Rotor RPM with twist grip. CONTINUE FLIGHT
GOV OFF (blinking) Blue	Governor is inoperative	If rotors are desynchronized from engine : Apply collective to resynchronize - If blinking stops CONTINUE FLIGHT and keep rotor synchronized with engine - if blinking does not stop, see below :
		If rotors are synchronized with engine : Disengage the governor Control Engine/Rotor RPM with twist grip. CONTINUE FLIGHT
BRAKE Amber	Rotor brake engaged	Disengage and lock
OIL P Red	Low oil pressure	LAND IMMEDIATELY
MGB T° Amber	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 POSSIBLE
LOW FUEL Amber	About 12 liters (3.2 U.S. gal) remaining	LAND AS SOON AS POSSIBLE Avoid : sideslips & sharp maneuvers If EPM reads < 10 liters (2.6 U.S. gal) : LAND IMMEDIATELY

Light	Signification	Corrective actions
ALT Amber	Alternator, regulator or battery charging malfunction	<p>Check charge indicator on EPM (BATT). <u>If green or white</u> : battery is being charged. CONTINUE FLIGHT. Have the alternator regulator serviced after flight. <u>If yellow</u> : battery is not being charged. Turn all non-essential equipment OFF. LAND AS SOON AS POSSIBLE Caution : Prolonged flight without alternator can result in loss of electronic and electrical equipment.</p>
CLUTCH Amber	Belt tensioning (clutching), detensioning (declutching)	Refer to normal procedure
	clutch pressure too low or Belt worn out	<p>Reduce power until light is off. If continuous : Reduce IAS to 50 kt IAS LAND AS SOON AS POSSIBLE Be prepared to enter autorotation</p>
NR (High) - Amber		Raise the collective or Reduce throttle
NR (Low) - Amber		Lower the collective or Increase throttle
<p>Note : Blinking light corresponds to Yellow arc on EPM Continuous light warns when approaching... Red limit tachometer</p>		

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 7-19).

Note : The starter is enabled when the rotor is turning above 400 RPM, whatever the anti-theft 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 5 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...).

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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 to disengage

Wait 10 seconds – check light is ON

Mixture..... Pull OFF to shut-down

Ignition switchesOFF

Landing light and NAV. lightOFF

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

Disengagement with engine OFF

If the engine was shut-down or has stalled while it was clutched, switch CLUTCH to disengage.

The MASTER switch can then be switched OFF after a few seconds.

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