CHECK FLIGHT CERTIFICATE

EC 155B1 **CFS 273A Issue 1**

Date:	Crew:	Observer:	Registration:

Performance	Climb #1	Climb #2	
Average Weight			
Average Altitude			ft
Average Temp.			˚C
Speed			KIAS
Achieved Rate			fpm
Scheduled Rate			fpm
Margin			fpm
Permitted Margin	-20	-20	fpm

Airfield:

Start Weight Kg:

Takeoff cg:

Performance:

SATIS/UNSATIS/NOT APPLICABLE*

* Delete as applicable

Defects

No.	Defect	-/R/FT	Action?

(use a continuation sheet as necessary)

Conclusions/Comments

I CERTIFY that I have tested the above aircraft and have detailed the deficiencies and unsatisfactory features above. Those items annotated R or FT must be dealt with as shown in the notes on the reverse side.

Name:	Signed:	Date:	Licence No.:
For CAA Use only	Report Logged by:	Date:	Report No.:

NOTES

General

Only CAA personnel or pilots specifically briefed to carry out CAA check flights may conduct the test.

General notes on test conduct can be found in the CAA Check Flight Handbook.

This sheet replaces any check flight certificate given in the schedule.

Registration: If the aircraft is not on the UK register, add the manufacturers serial number and expected UK registration (if known).

Crew: Captain, co-pilot, Flight engineer (where applicable).

Airfield: Departure airfield.

Start Weight: Actual all up weight at first engine start. Also delete Kg or Lbs as appropriate.

Takeoff cg: Actual cg at lift-off, preferably as a % of the Mean Aerodynamic Chord (Fixed Wing only).

Performance

A full description of climb analysis is given in the CAA Check Flight Handbook.

Climb#1/Climb#2: Enter in these columns data from the first and second climbs.

Average Weight: The aircraft all up weight at the midpoint of the measured climb.

Average Altitude: The altitude at which the line drawn to average the measured points passes through at the mid time.

Average Temp: The temperature at which the line drawn to average the measured points passes through at the mid time.

Speed: The target climb speed (Indicated Airspeed.)

Achieved Rate: The climb rate as given by the slope of the line drawn to average the measured altitude points in feet per minute.

Scheduled Rate: The expected gross rate of climb read from the appropriate graph in the Flight Manual with any adjustments for configuration differences. For large aircraft, the basic gross data are normally to be found in a separate supplement labelled 'Additional Flight Test Data'.

Margin: The difference between the Scheduled and Achieved rates of climb (negative if achieved is lower than scheduled).

Defects

Enter all defects from the flight. All defects must also be entered in the Technical Log. Procedural items entered in the Technical Log (such as re-stowing oxygen masks) need not be entered here. Items affecting flight safety which were known before the flight, whether or not they were deferred should be entered. In the latter case, the defect should be annotated accordingly after the details.

No.: The first column is to allow the items to be numbered.

Defect: Enter details of the defect.

-/R/FT: Classify each defect according to its impact on safety, regardless of whether it can be deferred according to the MEL. Any deferrals should be dealt with in the normal way in the Technical Log. Items requiring rectification (or deferral under the MEL) before further flight for hire or reward or before the issue of the CofA should be marked 'R'. Additionally, items that require re-checking in-flight following rectification (such as inadequate climb performance) should be marked 'FT'. Items requiring both should be marked 'R/FT'.

Action?: This column should be left blank unless further information is required from the engineers or the item is considered to be of sufficient import that CAA action is considered necessary, then the person/department/agency from whom further action is required should be noted in this column. Annotate accordingly if an MOR or similar report is to be raised.

Conclusions/Comments

Any conclusions, notes or comments useful for tracking defects may be entered.

Name: Only the pilot who carried out the test may sign this sheet.

CAA Check Flight Schedules

All CAA Check Flight Schedules (CFSs) are prepared based on a design standard which, before September 2003, was the UK Type Certificate. Following the creation of EASA there may be different design standards in service within the European Union (EU) - this may include modifications approved in any EU country.

It is the responsibility of the flight crew to ensure that the exercises and limitations in the CFS are correct for the aircraft under test.

The prime source of information will be the aircraft flight manual and in the event of conflict the flight manual should be taken as overriding.

CAA policy is that pilots who conduct airtests on the behalf of the Authority must be acceptable to the Authority, must have been briefed on techniques and safety considerations before carrying out the tests in these schedules and must have carried out an airtest within the last 4 years.

The CAA does not accept responsibility for the use of a CAA CFS on a test flight not directly under their control.

CHECK FLIGHT SCHEDULE

No. 273A, Issue 1, Dec 2009
Eurocopter EC155B1
TURBOMECA Arriel 2C2

Registration		Test Date	

1. INTRODUCTION

This schedule is applicable to the Eurocopter EC155B1 helicopter. It is based on the assumption that the every day operation of the helicopter serves as a continuous check on the correct functioning of all normal services.

The Flight Test must be carried out by an experienced pilot acceptable to the Airworthiness Division of the CAA, in accordance with this schedule and the general guidance given in the CAA Check Flight Handbook. The crew are expected generally to monitor the behaviour of all equipment and report any unserviceable items.

In addition to completing all the tests in this schedule any characteristics which are considered to be unsafe or undesirable must be recorded.

WARNING

1. It is illegal to carry passengers on a test flight made under "A" or "B" conditions except passengers performing duties in the aircraft in connection with the flight. If flying on a Permit to Fly there may be restrictions on carriage of passengers. Although it may be legal to carry passengers on a test flight with a Certification of Airworthiness in force, it is strongly recommended, for Airworthiness Flight Tests and other tests entailing greater risk than normal flight, that:

   a) It is preferable to use ballast, and

   b) Before accepting any passengers on a test flight the pilot in command should inform them that the risk is greater than on an ordinary flight.

2. Under no circumstances are the limitations contained in the Flight Manual to be exceeded.

3. If a clipboard or kneeboard is used to record the results there is a possibility of fouling the controls especially the duals, if fitted. To reduce this possibility, the pilot must have briefed the observer on the need to ensure that the clipboard is well clear of the controls especially during manoeuvres requiring large control deflections such as low speed envelope and autorotation. The pilot should monitor the position of the clipboard during the flight to ensure that it is not in a potentially hazardous position. Whenever possible, flexible, rather than rigid, clipboards should be used.

Should there be any query about the Flight Test or its results, the Helicopter Flight Test Section at Airworthiness Division Flight Department, Aviation House, Gatwick must be consulted.

It is recommended that the tests are performed in the sequence given. The results are to be written in ink in the spaces provided.

1. Pre-Flight Information

Aircraft Variant	Eurocopter EC155B1	Engine	TM Arriel 2C2

Registration		Engine No		
Airframe No		Hours total		
Airframe Hrs		TSO		
Operator/Maint. Organisation				
Airfield				

Pilot(s)	
Observer	

2. Loading

Note: The helicopter shall be loaded to maximum all up weight if possible.
Any ballast must be securely installed

Take-off Weight		Kg
Fuel		Kg
CoG Position		

3. General Flight Information

Airfield Press. Alt.		ft	QFE/QNH	/	
Wind	/		OAT		°C
Weather					

Engine Start		Land	
Take-Off		Shut down	

4. Pre-Start Checks

		Satis.	Remarks
4.1	Carry out the normal external inspection		
	Check for correct functioning of external lighting		
4.2	Doors & windows : Condition & operation		
	Seats & harnesses		
	Placards : Legibility & accuracy		
4.3	Select Standby Horizon ON		
	Confirm Horizon powered and erecting and Light illuminated		
4.4	Select main battery ON		
	Note:		
	FADEC Self Test Satisfactory		
	Battery Voltage		
	Test warning lamps		
	Correct warning lamps for Int. or Ext. start as appropriate		
4.5	Check legibility, general condition & accuracy of colour bands & marking of the following, where appropriate:		
	FLI		
	Triple Tachometer		
	ASI		
4.6	With L/G Pump ON, confirm freedom & range of travel of :		
	Cyclic		
	Collective		
	Yaw control		
4.7	Complete pre-start checks as per FM		

5. Starting

5.1 During engine start, note and record :

	Eng 1	Eng 2	
Residual TOT			°C
Max TOT			°C

5.2 Carry out a Tail Rotor servo check in accordance with FM procedures and confirm correct CAD indications

5.3 Carry out AFCS pre-flight checks in accordance with FM procedures

5.4 Carry out a Ground Engine Condition check iaw Flight Manual and record data below

Eng	P Alt	OAT	Tq	TOT	N_1	N_R	Auto. Thermal Margin	Auto Power Margin
1								
2								

The engine condition data is to be analysed and recorded in Section 16 of this schedule.

5.5 Carry out Heating System Automatic Shut Off checks in accordance with FM procedures

5.6 Carry out P_2 Valve Test in accordance with FM procedures

Note that during the above checks a small (approx 5°C) increase in TOT of the engine at Idle is permissible.

5.7 Confirm satisfactory operation of RPM HIGH facility

NOTE: Ensure RPM HIGH is deselected following the check.

5.8 Engine Back-up control
Carry out a check of the engine back-up control in accordance with Flight Manual Section 8, RR3G, Page 7 (or current revision standard)

5.9 Check for correct functioning :

- Intercomm
- Radio
- Cockpit lighting

5.10 Complete pre take-off checks as per FM

6. Taxi

6.1 Satisfactory operation of toe brakes, parking brake and nosewheel lock

Turns left and right

Fast taxi (30 kt approx)

7. Low Speed Envelope

Take off time

7.1 Lift to a low hover, with autopilot engaged where appropriate, and assess the vibration level, control response and position (adequate control margin) during the following manoeuvres :
(See Appendix 1 for test method)

NOTE Determine maximum permitted sideways/rearwards speed from RFM Section 5*

Axial turns Right

Left

Sideways flight left & right up to an estimated 35 kt ***air speed***

Rearwards flight up to an estimated 35 kt* ***airspeed***

NOTE: Do not exceed a groundspeed of 20kt during the above tests

7.2 AP Hover Checks

Engage AP in hover, CYC and Yaw A-TRIM disengaged
Make 0.5 FLI changes without moving pedals and confirm normal aircraft behaviour

Engage CYC and Yaw A-TRIM
Make 0.5 FLI changes without moving pedals and confirm heading is maintained ±5°.

7.3 Follow Up Trim

Engage AP and CYC & Yaw A-TRIM in hover
From a stabilised hover, make a small forward cyclic input to change pitch attitude by approx 5°. Release cyclic.
Confirm stick becomes force free and new attitude is maintained.

Recover the aircraft to a hover and repeat for 5° right bank

7.4 Carry out gentle hover manoeuvres with AP OFF, SAS. ON

AP ON

7.5 Following the hover tests record the following (Select ± to display values)

MGB Oil	
Temp	Press

8. Single engine en-route climbs

8.1 No. 1 Engine

WARNING To ensure no inadvertent usage of 30 sec ratings, the following procedure must be used in selecting an engine to idle.

- At V_Y (80kt –1kt/1000ft) at not more than FLI = 5 (enter a partial power descent if necessary)
- With the altimeter set to 1013mb (29.91in hg), select ENG 2 to IDLE
- Confirm an Eng N_2 split
- Depress OEI Continuous limiting button and confirm correct FLI/VEMD Annunciations (CT)
- Raise collective to achieve max continuous power and droop rotor rpm to 330
- ***CONFIRM POWER IS LIMITING AT MAXIMUM CONTINUOUS***
- Carry out a climb for 4 min at single engine maximum continuous power.
- The climb should be carried out in stable, non turbulent conditions away from cloud.

Associated conditions:

IAS	Vy = 80kt – 1kt/1000ft		
FLI	12.4		
Tq	57.5%	N_1	98.8 – 100.8% {= 0% ΔN_1}
TOT	926ºC	N_R	330rpm
Landing Gear	Retracted	Bleeds	OFF

When a stable condition has been established on a steady heading, slip ball centered, and in as calm conditions as possible, record the following :

Fuel at start of climb [ ]

									Eng	
Time	***Alt***	***OAT***	***IAS***	***FLI***	***Tq***	***N_1***	***TOT***	***N_2/Nr***	***Temp***	***Press***
0										
0.30										
1.00										
1.30										
2.00										
2.30										
3.00										
3.30										
4.00										

Fuel at end of climb [ ]

On completion of the climb, lower collective to allow rotor rpm to recover and FLI to reduce to not more than 5. Select Eng 2 to FLIGHT.

After the climb, obtain an accurate OAT by flying at approx mid- climb altitude at climb speed for 1 min to allow OAT to stabilise

Alt		ft
OAT		°C

NOTE The climb performance must be analysed and compared with the schedule performance. See Section 16 of this document.

8.2 No. 2 Engine

WARNING To ensure no inadvertent usage of 30 sec ratings, the following procedure must be used in selecting an engine to idle.

- At V_Y (80kt –1kt/1000ft) at not more than FLI = 5 (enter a partial power descent if necessary)
- With the altimeter set to 1013mb (29.91in hg), select ENG 1 to IDLE
- Confirm an Eng N_2 split
- Depress OEI Continuous limiting button and confirm correct FLI/VEMD Annunciations
- Raise collective to achieve max continuous power and droop rotor rpm to 330
- ***CONFIRM POWER IS LIMITING AT MAXIMUM CONTINUOUS***
- Carry out a climb for 4 min at single engine maximum continuous power.
- The climb should be carried out in stable, non turbulent conditions away from cloud.

Associated conditions:

IAS	Vy = 80kt – 1kt/1000ft		
FLI	12.4		
Tq	57.5%	N_1	98.8 – 100.8% {= 0% ΔN_1}
TOT	926ºC	N_R	330rpm
Landing Gear	Retracted	Bleeds	OFF

When a stable condition has been established on a steady heading, slip ball centered, and in as calm conditions as possible, record the following :

Fuel at start of climb [ ]

									Eng	
Time	***Alt***	***OAT***	***IAS***	***FLI***	***Tq***	***N_1***	***TOT***	***N_2/Nr***	***Temp***	***Press***
0										
0.30										
1.00										
1.30										
2.00										
2.30										
3.00										
3.30										
4.00										

Fuel at end of climb [ ]

On completion of the climb, lower collective to allow rotor rpm to recover and FLI to reduce to not more than 5. Select Eng 1 to FLIGHT.

After the climb, obtain an accurate OAT by flying at approx mid- climb altitude at climb speed for 1 min to allow OAT to stabilise

Alt		ft
OAT		°C

NOTE The climb performance must be analysed and compared with the schedule performance. See Section 16 of this document.

9. Cruise Checks

9.1 Cruise

9.1.1 Stabilised level flight.

Engage 4 axis AP set approx 160 KIAS to achieve an accurate max continuous power setting. Note power limiting functions correctly. At max. continuous power, check and record the following items :

Note:

P. Alt	OAT	IAS

Vibration level	
Control response	

9.1.2 Steep turns left & right (approx 45°)

Note:

Vibration level	
Control response	
Collective balance (press coll release trigger)	

9.2 Maximum speed test

9.2.1 Increase speed progressively to V_{NE} using max. continuous power

Note:

P. Alt		ft	AUW		kg
OAT		°C	V_{NE} (Placard)		kt
Fuel		kg	V_{NE} (PFD)		kt

9.2.2 Carry out gentle turns (approx 10° AoB) left & right.

Note:

Vibration level	
Control response	

9.3 Engine Power Check

At 140kt stable cruise (allow to stabilise for 3 min), record the following:

NOTE: If it is not possible to achieve 140kt cruise, carry out the check at 100kt.

Eng	P Alt	OAT	IAS	Tq	TOT	N_1	N_R	Auto. Thermal Margin	Auto Power Margin
1									
2									

The engine condition data is to be analysed and recorded in Section 16 of this schedule.

9.4 Standby Static

With the aircraft stabilised in a cruise at max. continuous power, close all windows and vents and deselect ventilation system. Switch between normal and standby static and record difference of values below:

	Δ	Placard
P1 Alt		
P1 ASI		

10. Autorotation

Note: Depending on the Modification state of the aircraft, intentional autorotations may not be permitted. Specifically Modification AMS 07-67B62 embodiment must be assured.

10.1 Perform a gentle entry to a steady autorotative descent at 80 kt, landing gear retracted.

Do not exceed power-off rotor rpm limitation (375rpm, 390 rpm transient)

Record when stabilised

P Alt	OAT	IAS	N_R	Fuel	AUW	Lever fully down?

10.2 Carry out 30° banked turns left & right in autorotation

10.3 Carry out a rapid recovery from autorotation (N_R/N_F needles just joined to FLI = 6 in not less than 3 sec)

Note: Engine response & absence of surge

Transient rotor droop

	rpm

11. AFCS

11.1 Basic Stabilisation

At V_{NE}-30 kt, level flight, engage AP and A-TRIMS

a) Without retrimming, displace the cyclic to alter pitch angle by 5° nose up. Release cyclic and check pitch attitude returns to datum ±1° with minimal overshoot.

b) Repeat a) for 5° nose-down.

c) Repeat a) for 10° left roll

d) Repeat a) for 10° right roll

11.2 AP Check

From the above condition, disengage A-TRIMS.

a) Without retrimming, displace the cyclic to alter pitch angle by 5° nose-up. Release cyclic and confirm that pitch attitude behaviour is well damped.

b) Repeat a) for 10° right roll

Note that return to original attitude is not required with A-TRIMS disengaged.

Re-engage A-TRIMS

11.3 Alt Hold

Engage AP/A-TRIMS at V_{NE} –30kt.
Engage ALT mode on the APMS
Reduce power by 0.5 FLI

Confirm height is maintained within ±50ft and cyclic beeps to reduce IAS (= 3-axis mode)

Increase power by 0.5 FLI

Confirm height is maintained within ±50ft in 3-axis mode

Override Alt hold by aft cyclic input.

Confirm excess deviation **>ALT<** on PFD at approx. +100ft.

At 400ft deviation, carefully release cyclic and confirm satisfactory return to datum height ±50ft.

Decrease power below that required for level flight at 60kt. Confirm that airspeed does not reduce below 60 kt, IAS hold engages in 4-axis mode.

Disengage IAS and Alt holds

11.4 IAS Hold

At 100 KIAS engage AP and A-TRIMS
Engage IAS mode on the APMS

Confirm airspeed held ±5kt.		
Reduce reference airspeed by 15 kt using beep trim		
Increase reference airspeed by 15 kt using beep trim		
Override IAS hold by fwd cyclic input.		

Confirm excess deviation **>IAS<** on PFD at approx +15 to 20 kt.

WARNING: Do not exceed V_{NE}

Disengage IAS and Alt holds

11.5 Alt A Mode

In level flight at 90kt, A-TRIMS engaged, preselect an altitude approx 1000 ft higher.
Engage Alt A mode

Confirm Alt A engaged and VS increases to 1000fpm		

When stable, change reference to 2000fpm RoC maintaining constant collective

Confirm that IAS does not reduce below 60kt, and IAS hold engages in 4- axis mode		
Reduce reference VS to 1000 fpm Confirm aircraft stabilises at 60kt/1000fpm		
Confirm that target altitude is acquired and ALT engages automatically		

When stable, increase airspeed to 90kt and disengage IAS hold. Preselect a target altitude approx 1000ft lower.
Engage Alt A mode

Confirm Alt A engaged and VS increases to -1000fpm		

When stable, override VS by fwd cyclic input to increase airspeed. (Do not exceed V_{NE})

Confirm excess deviation **>ALT A<** on PFD at 500fpm deviation		
Release cyclic and confirm aircraft stabilises at 90kt, 1000fpm		

Confirm that target altitude is acquired with minimal undershoot and ALT engages automatically

11.6 Heading Hold

Engage ALT hold at V_{NE} –30kt. Keep feet just off the pedals
Turn heading bug to aircraft heading and engage HDG mode
Turn heading bug 90° right using selector on APMS

Confirm aircraft turns onto new heading ±4°

Turn heading bug 10° left using beep trim

Confirm aircraft turns onto new heading ±4°

With ALT and HDG engaged, change aircraft heading by approx 30° by cyclic input.

Release cyclic and confirm aircraft returns to original heading ±4°

Confirm that during the above manoeuvres, no pedal drift occurs

11.8 Beep trim

Confirm satisfactory functioning of cyclic beep trim

11.9 Fly Through

With IAS > 65kt, engage AP and A-TRIM.

Confirm satisfactory fly-through when manoeuvring without using beep trim or force trim release.

11.7 Cruise Height

This test should be carried out if the Cruise Height mode is used regularly operationally

At 120kt, A-TRIMS engaged, over water or relatively level terrain, engage IAS and ALT hold. Ensure Rad Alt is in tracking range and set a target cruise height 100ft below indicated Rad Alt. Engage CRHT mode.

Confirm aircraft descends and maintains CRHT ± 20ft.

Engage HDG hold and carry out commanded turns left and right through at least 90º
Confirm CRHT is maintained within ± 50ft

Override CRHT by fwd cyclic input note **>CRHT<** Release cyclic, confirm aircraft stabilises at set Rad alt height

11.10 Go around

Carry out this test if it is not possible to carry out an ILS (Section 11.11)

- Engage AP/A-TRIMS, and trim the aircraft at 120kt, 600fpm RoD
- Engage VS and IAS holds
- When stabilised select GA
-

Confirm the aircraft stabilises in a climb at 1000 fpm, wings level and IAS and VS modes engage 15 seconds after pressing GA. Note stabilised IAS	

11.11 ILS

If possible, an ILS approach should be performed. Assess auto level off (approx 65 ft Rad alt) and Go around (see box above)..	

12. Landing

Confirm no tendency to lateral padding or ground resonance during a smooth touchdown with a slow gentle collective lowering	

NOTE: Should any divergent oscillations be noted, lift off immediately, reposition the aircraft and carry out a normal landing.

Landing time

13. Electrical System Checks

With both engine switches selected to FLIGHT:

Switch off both generators. Confirm that both Essential Bus 1 & 2 are retained and Shed Bus 1 & 2 are shed.

Essential Bus 1	
Essential Bus 2 (e.g. VHF Comms 2)	
Shed Bus 1 (e.g. Nav 1)	
Shed Bus 2	

Refer to list of shed equipment in FM Section 3.2

Select Shed Bus switch to EMER.

Confirm that Shed Buses are recovered.

Reset Shed Bus switch to NORM

Switch on both generators and complete pre-shut down checks

14 Training Mode

14.1	Carry out a pre-flight check of the training mode facility in accordance with FM Supp 56		
14.2	With both engines selected to FLT, select training switch to IDL 1 Confirm N_g 1 decreases and correct VEMD indications		
	Select OEI continuous on collective button Confirm Correct FLI indication of limiting at max continuous OEI power		
	Confirm collective is down and locked Select Eng 2 to IDLE Confirm Training Mode inhibited, and Actual OEI LO available on Eng 1		
	Select Eng 2 to FLIGHT Note that a shut down to reset will be required		

15. Shut down

Shut down the engines and confirm satisfactory rotor brake performance.		

16. Post-flight Analysis

16.1 Performance Climb (see para 8)

Plot the data on the analysis sheet provided and determine the achieved rate of climb. The scheduled performance must be obtained from the flight manual, compared with the achieved performance and results recorded on the front sheet.

16.2 Engine Condition Ground Check (see para 5.4)

Use the power check chart in the flight manual to analyse the engine condition.

	Eng 1	Eng 2	
Thermal Margin			°C
Power Margin			%

16.3 Engine Condition in Flight Check (see para 9.3)

Use the power check chart in the flight manual to analyse the engine condition.

	Eng 1	Eng 2	
Thermal Margin			°C
Power Margin			%

16.4 Standby Static Source (see para 9.4)

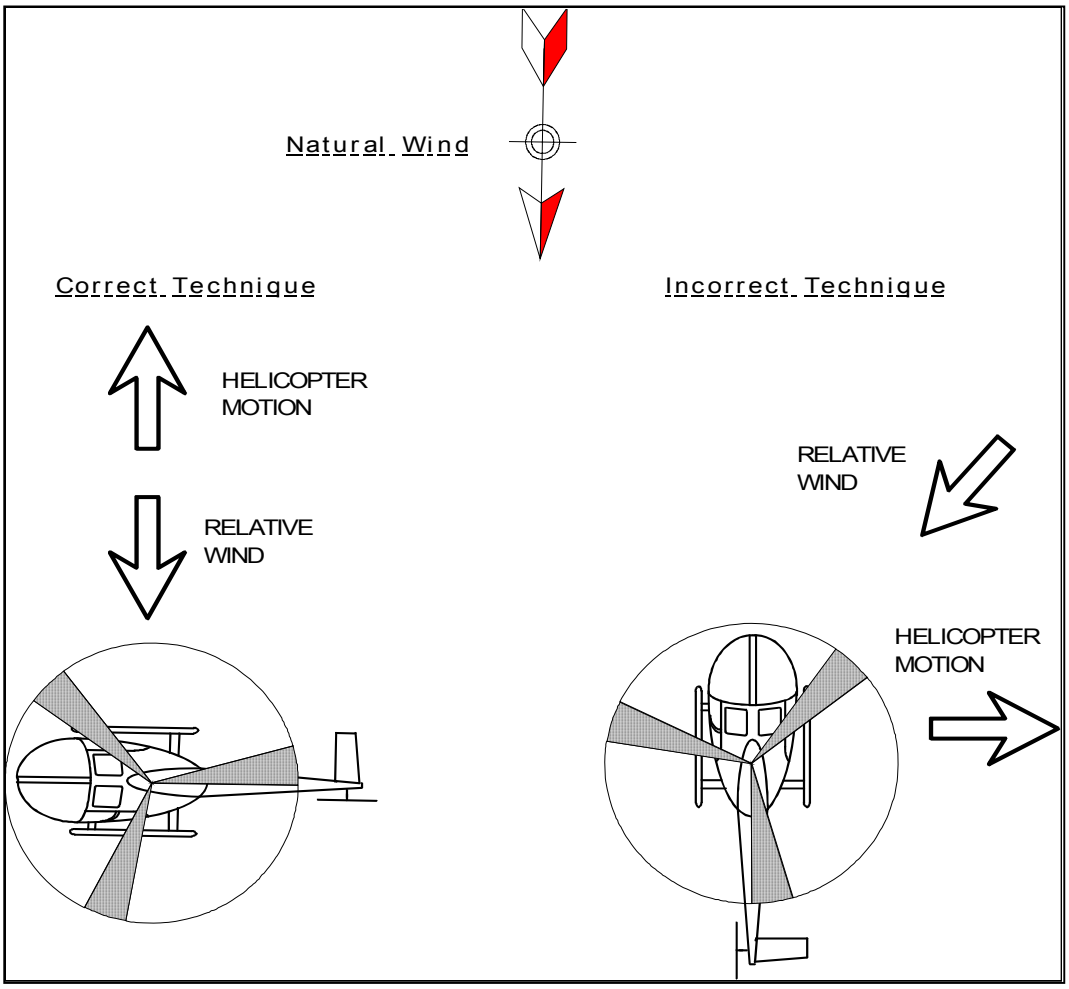
	Δ	Placard
P1 Alt		
P1 ASI		

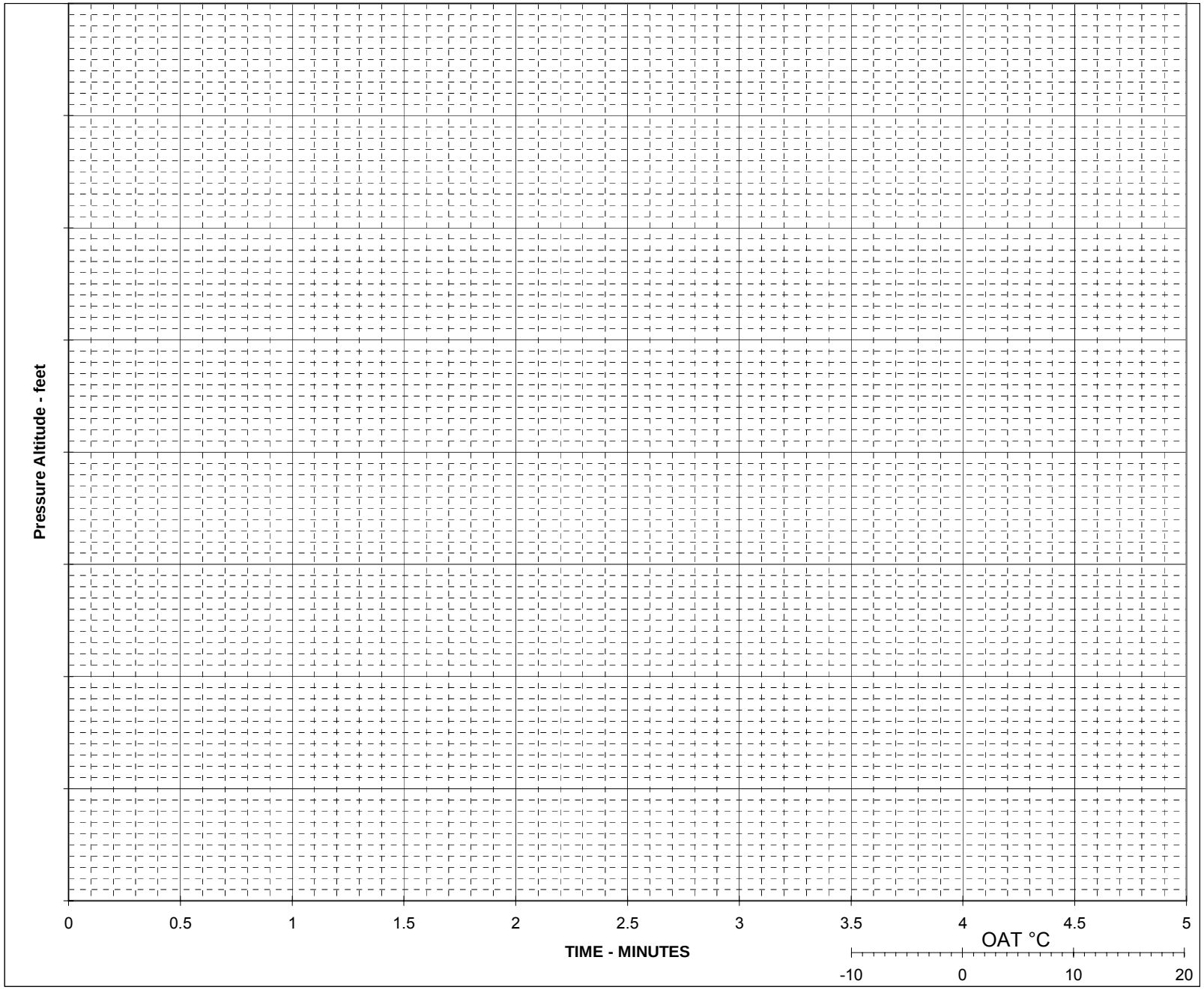
Appendix 1

Sidewards & Rearwards Flight

For the sidewards flight tests the helicopter should be rotated so that the natural wind is on the side of the aircraft. The aircraft should then be gently accelerated into the wind and stabilised. The mean natural wind should be added to the estimated ground speed to give the required relative air speed.

For rearwards flight the helicopter should be aligned tail into wind and gently accelerated rearwards to achieve the required relative airspeed.





AIRCRAFT TYPE
REGISTRATION
DATE OF TEST

Mean Weight		
No 1	_____	Kg
No 2	_____	Kg
Mean Altitude		
No 1	_____	feet
No 2	_____	feet
Mean OAT		
No 1	_____	°C
No 2	_____	°C
ACHIEVED ROC		
No 1	_____	ft/min
No 2	_____	ft/min
SCHEDULED ROC		
No 1	_____	ft/min
No 2	_____	ft/min
DELTA ROC		
No 1	_____	ft/min
No 2	_____	ft/min