# CHECK FLIGHT CERTIFICATE

**Agusta A109, A, A II, C**
**Allison Turbine Model 250-C20B, C20R/1** **CFS 288 Issue 2**

Registration:

| Date: | Crew: | Observer: |
|---|---|---|

| **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/Lbs*:

Takeoff cg:

Performance:

SATIS/UNSATIS/NOT APPLICABLE*
*(delete as applicable)**

(-50 ft/min average for A109AII & A109C if carried out AEO)

**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 Check Flights may conduct the test.

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

This sheet replaces any flight test 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.

**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

**Agusta A109, A, A II, C** CFS 288 Issue 2

**Allison Turbine Model 250-C20B, C20R/1**

| Registration | | Test Dates | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

## 1. INTRODUCTION

This scheduled is applicable only to the Agusta A109A, A II or C helicopters. It is based on the assumption that the every day operation of the helicopter services as a continuous check on the 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.

The minimum crew for this flight is to be increased by a flight observer.

**WARNING**

1. 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:

   1) It is preferable to use ballast, and

   2) 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 approved Flight Manual to be exceeded. If the CAA RFM is not applicable to an individual helicopter, each test in this schedule must be checked against the applicable RFM for compatibility.

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. Consideration should be given to removing the dual controls if flying with an inexperienced observer.

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

It is permissible for this Schedule to be completed on separate flights and dates provided the loading for each flight is clearly stated. All defects from all flights must be recorded on the Flight Test Certificate even if rectification work has been carried out between flights.

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

| | |
|---|---|
| Operator/Maintenance Organisation | |
| Weather | |

| | | | | |
|---|---|---|---|---|
| Aerodrome altitude | | | QFE/QNH | | |
| Wind velocity/direction | | | Ground Temp | |
| Take-off time | | | Landing Time | |

## 2. LOADING

The aircraft is to be loaded with full fuel and any necessary ballast to achieve a take-off weight of approximately 2600 Kg (109A and AII models) or 2720 Kg (109C). The C.G. should be approximately in the neutral position.

| | | |
|---|---|---|
| Take-off weight (actual) | | Kg |
| Fuel contents | | |
| C.G. position | | Mm aft of datum |

## 3. PRE-FLIGHT INFORMATION

| | | | |
|---|---|---|---|
| Aircraft model | | | |
| Constructors No. | | | |
| Total airframe hours | | | |
| Floats? | | Particle separator fitted? | |

| | | |
|---|---|---|
| Engine model | | |
| Serial number | | |
| Hours run since new | | |
| Hours run since overhaul | | |

## 4. PRE-FLIGHT CHECKS

Carry out the normal external inspection.

| | |
|---|---|
| Nav, anti-collision lights and landing lights | |
| Note emergency flotation cylinder pressure, if fitted. | |

Carry out the normal pre-flight inspection.

| | |
|---|---|
| Doors and transparencies: Conditions and operation | |
| Seats and harnesses | |
| Placarding: Legibility and accuracy | |

Instruments: Legibility and accuracy of colour bands and markings. General condition.

| | |
|---|---|
| ASI | |
| Triple Tachometer | |
| Torquemeter | |
| TOT | |
| Gas Producer | |
| All other instruments | |

| | |
|---|---|
| Move No1 and then No.2 Power Levers throughout the range of travel, check for adequate friction and lack of Binding | |

| | |
|---|---|
| Freedom, range of travel, adjustment of yaw control | |

With battery switch on, check:

| | |
|---|---|
| Warning/Caution/Advisory panel, Test. Check all warning/caution lights: all bulbs working (note failure of LH or RH bulbs in a caption), markings clearly visible. | |
| (A109C only): Press TEST for less than 5 seconds, check that the vocal alarms are *not* heard (applicable to CAA standard aircraft only).<br>(A109C only): Repeat with the TEST held for greater than 5 seconds, check the following vocal alarms are all given: “Rotor, Eng1 low, Eng2 low, Eng1 fire, Eng2 fire, Warning, Landing gear, 150 feet”. | |
| Engine Fire Extinguisher<br>**Pull CB's FIRE EXTING (EXTGH) 1 & 2**<br>Fuel shut off valves – ON<br>Press ENG FIRE (S/OFF SEL for 109C) push-button of No.1 and No.2 engines in turn (break wire locking), check operation of fuel shut-off valves (on fuel control panel). Push ENG FIRE (S/OFF SEL) to reset valves and reset CB's. | |

**Engine Start:**

| | |
|---|---|
| Check rotor brake caution illuminates with brake on<br>Disengage rotor brake, caution light out | |

During engine start up, check and record:

| | Eng 1 | Eng 2 |
|---|---|---|
| Residual TOT | | |
| Maximum TOT | | |

| | |
|---|---|
| Gas Producer speed at commencement of Main Rotor rotation (25% maximum) | |
| Both flight hydraulic systems, pressure available very soon after rotor engagement (approximately 5% Nr). | |

| | | |
|---|---|---|
| Ground idle 62 ± 2% | | |
| Note $N_1$ for ENG LOW light extinguishing (60%) | | |

| | |
|---|---|
| With collective fully down and both power levers fully forward check beep range (N2).<br>A109A and A II 95 - 102<br>A109C 97 ± 1 - 101.5 ± 1% | _ |

Beep Range and Anti-Ice Check:

Note that Eng Oil Temp must be greater than 50°C.

| | | |
|---|---|---|
| With No.2 engine at ground idle and No.1 fully forward check beep range.<br>A109A and A II 93 – 101% N2<br>A109C 95 ± 1% - 100 ± 1% N2 | _ | No1 |

| | |
|---|---|
| With No.1 engine driving at approx 100% N2 check TOT rise when selecting DEICE switch ON. | |
| Pull ENG 1 DEICE CB, anti-ice should stay on line, switch off DEICE switch, anti-ice should still stay on. | |
| Reset CB, check anti-ice switches off automatically. | |

Repeat for other engine:

| | | |
|---|---|---|
| With No.1 engine at ground idle and No.2 fully forward check beep range.<br>A109A and A II 93 – 101%<br>A109C 95 ± 1% - 100 ± 1% | _ | No 2 |

| | |
|---|---|
| With No.2 engine driving at approx 100% N2 check TOT rise when selecting DEICE switch ON. | |

Pull ENG 2 DEICE CB, anti-ice should stay on line, switch off DEICE switch, anti-ice should still stay on. Reset CB, check anti-ice switches off automatically.

Set 100% Nr power levers forward.

Record fuel pump pressures in turn:

| | | | |
|---|---|---|---|
| No1 | | No2 | |
| No3 | | No4 | |

**Before Take-off Checks complete ?**

## 5. TAXIING CHECKS

Taxy time

5.1 Check efficiency of parking brake when applied from a taxy at 5Kts.

5.2 During taxi, depress pilot's brakes and insure that the aircraft comes to a smooth controlled stop with no indication of binding or swerving.

5.3 Turns :

Perform a ground taxi turn to the right by depressing the right pedal. Increase to a tight turn. There should be no indications of binding in the pedals.
(Do not depress the brakes during this check).

Repeat the check in a ground taxi turn to the left.

## 6. HOVER CHECKS

Match torques and take-off to low hover and record the following:

Take-off time

If large torque split occurs, note torque mismatch and then re-match for readings below.

| *ENG* | *TORQUE* | *TOT* | *$N_R$* | *PRESS ALT* | *OAT* |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |

## 7. LOW SPEED ENVELOPE

7.1 Helipilot engaged in ATTD mode. See Appendix 1 for test method. Assess the vibration level, control response and position (adequate control margin) during the following manoeuvres:-

a) Turns on the spot.

b) Sideways flight left and right up to an estimated 20 kts

c) Rearwards flight up to 20 kts

7.2 Disengage Helipilot and carry out gentle hover manoeuvres (it is not necessary to fly sideways/rearwards up to 20 kts).

Re-engage Helipilot, note smooth re-engagement.

## 8.1 CLIMB PERFORMANCE *Engine/Climb No 1*

The climbs are carried out OEI (one engine at idle) for the A109A and A109C models but AEO for the A109A II (and C model not using the CAA Flight Manual) as the limitations section of the Flight Manual does not permit use of OEI rating except in the case of actual engine loss for this model. For the A109A II the climb is carried out at half the OEI intermediate contingency torque to simulate the OEI condition of 137% torque (total No1 + No2 torques should = 137%). The AEO climb will need to be carried out at low altitude to be in the conditions where the OEI engine would be torque, not TOT limited (see also section 15.1). For A109C models **not** using a CAA RFM, the climb should be carried out twin engine at a total torque of 118%.

With the altimeter set to 1013 mb (29.91 in hg) climb at rating shown below at the scheduled en-route climb speed, landing gear retracted, for 4 minutes. Anti-ice and other air bleeds OFF unless operationally required, generators ON.

### Conditions

| | A109A | A109A II | A109C (CAA RFM) | A109C (Non CAA) |
|---|---|---|---|---|
| Torque % | 126 | Total = 137 (69+69) | 118 | Total = 118 (59 + 59) |
| TOT °C | 810 | (810) | 810 | (810) |
| N1 % | 105 | (105) | 105 | (105) |
| Nr % | 100 | 100 | 100 | 100 |
| IAS Kts | See Fig 1 | See Fig 1 | 60 | See RFM |

Not necessary to record TOT, N1 or oil temp/press for A109AII and non CAA RFM A109C models during climb.

| Time | Alt | OAT | IAS | Torque | TOT | $N_1$ | $N_R$ | Engine Oil Temp | Engine Oil Press | Fuel |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | |
| 0.30 | | | | | | | | | | |
| 1.00 | | | | | | | | | | |
| 1.30 | | | | | | | | | | |
| 2.00 | | | | | | | | | | |
| 2.30 | | | | | | | | | | |
| 3.00 | | | | | | | | | | |
| 3.30 | | | | | | | | | | |
| 4.00 | | | | | | | | | | |

After the climb, obtain an accurate OAT by flying at approximately mid-climb altitude at Vy in level flight for 1 min. to allow OAT to Stabilise.

| | |
|---|---|
| Alt | |
| OAT | |

## 8.2 CLIMB PERFORMANCE *Engine/Climb No 2*

**NOTE** For A109A II model and A109C not using the CAA RFM a second climb is carried out in the same configuration as the first climb; a second AEO climb is not essential if the conditions for the first climb were good.

### Conditions

| | A109A | A109A II | A109C (CAA RFM) | A109C (Non CAA) |
|---|---|---|---|---|
| Torque % | 126 | Total = 137 (69+69) | 118 | Total = 118 (59 + 59) |
| TOT °C | 810 | (810) | 810 | (810) |
| N1 % | 105 | (105) | 105 | (105) |
| Nr % | 100 | 100 | 100 | 100 |
| IAS Kts | See Fig 1 | See Fig 1 | 60 | See RFM |

Not necessary to record TOT, N1 or oil temp/press for A109AII and non CAA RFM A109C models during climb.

| Time | Alt | OAT | IAS | Torque | TOT | $N_1$ | $N_R$ | Engine Oil Temp | Engine Oil Press | Fuel |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | |
| 0.30 | | | | | | | | | | |
| 1.00 | | | | | | | | | | |
| 1.30 | | | | | | | | | | |
| 2.00 | | | | | | | | | | |
| 2.30 | | | | | | | | | | |
| 3.00 | | | | | | | | | | |
| 3.30 | | | | | | | | | | |
| 4.00 | | | | | | | | | | |

After the climb, obtain an accurate OAT by flying at approximately mid-climb altitude at Vy in level flight for 1 min. to allow OAT to stabilise

| | |
|---|---|
| Alt | |
| OAT | |

## 9. POWER ASSURANCE

Carry out an in-flight engine power check on each engine in turn in accordance with the Flight Manual Section 5 (109 A and A II generator off, anti-ice off, level flight, TOT between 738° and 810°C. A109C one engine at Idle, generator off, anti-ice off, level flight, TOT between 752° and 810°C).
Allow conditions to stabilise then record.

| ENGINE | PRESS ALT | OAT | TORQUE | TOT | $N_1$ | $N_2$ | CHART TQ | ΔTQ |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |

Note: More accurate power assurance checks are achieved with a high TOT. To avoid exceeding engine torque limits this may require the test to be carried out at medium altitude.

## 10. HANDLING

Note:-

It is permissible to carry out 10.3 (autorotation) before 10.1 and 10.2 if the helicopter is at high altitude after performing items 8 and 9.

10.1 Cruise

10.1.1 At a normal cruising speed and power, check and record the following items:

| | *PRESS ALT* | *IAS* | *OAT* | *ENGINE* | *N1* | *TOT* | *TORQUE* |
|---|---|---|---|---|---|---|---|
| PILOT | | | | 1 | | | |
| CO-PILOT | | | | 2 | | | |
| STANDBY (If fitted) | | | | | | | |

Altimeters. Check for proper operation and agreement. E.g. no excessive lag, smooth operation. [ ]

ASI's should agree to within ± 5 knots. [ ]

Check VSI's for correct operation. [ ]

10.1.2 At normal cruise power and speed carry out turns left and right (30° AOB).

Note: Vibration level [ ]

Control response [ ]

10.2 Maximum Speed Test

10.2.1 Determine Vne from placard before next test.

Increase speed progressively to placarded $V_{NE}$ using maximum continuous power.

10.2.2 Carry out gentle turns (up to 20° left and right).

Note: Vibration level

Control response

10.3 Autorotation

10.3.1 Carry out a steady autorotative descent at 75 KIAS (A109A and A II), 70 KIAS (A109C) with the collective lever fully down. It may be necessary to beep back $N_2$ to achieve this.

| ALT | OAT | IAS | $N_R$ | $N_1$ | FUEL STATE |
|---|---|---|---|---|---|
| | | | | | |

NOTE:

Do not exceed power off rotor rpm limitations (90 to 110%).

10.3.2 Carry out turns (up to 30° AOB) left and right in autorotation.

Check Warning light (and for A109C vocal 'WARNING') at 105% $N_R$

10.4 Rapid Engine Acceleration

With power levers in 'Flight' (and beeped up if beeped down for autorev check). Set 60% matched torque and note approximate collective position. Maintain power levers in FLIGHT position and descend with approximately 5% torque set at approximately 70 KIAS. Increase collective to give about 60% torque in not less than 3 seconds. Check there is no tendency for surge and satisfactory engine response.

**NOTE 1**

Care must be taken not to increase collective too quickly; carry out practice collective pulls at a slow rate first and progressively increase rate. Increase collective to the approximate position noted at 60% matched torques.

**NOTE 2**

Do not reduce below $N_R$ limit (95%).

Note: Engine response

Transient droop $N_R$%

## 11. HELIPILOT CHECKS

11.1 At approximately 135 KIAS with both channels engaged check the aircraft returns to its original attitude, with a maximum of one slight overshoot, after the following disturbances:-

In ATTD mode check that autotrim is not engaged

i) Pitch

a) Without re-trimming alter pitch attitude by 5° nose up in less than 2 seconds then release cyclic. (Note this is a 5° change of attitude not 5° nose up absolute).

b) Repeat nose down.

ii) Roll

a) Alter roll attitude by 10° left in less than 2 seconds then release cyclic.

b) Repeat 10° right.

iii) Yaw

Note satisfactory yaw channel functioning during i) and ii).

11.2 Reduce speed to **120 KIAS** and repeat 11.1 with only one channel engaged (not applicable to Simplex systems)

i) Pitch Channel 1

a) 5° nose up.

b) 5° nose down

ii) Roll Channel 1

a) 10° left

b) 10° right

iii) Yaw Channel 1

Note satisfactory functioning.

iv) Pitch Channel 2

a) 5° nose up.

b) 5° nose down

v) Roll Channel 2

a) 10° left

b) 10° right

Re-engage Channel 1, Autotrim ON.

11.3 During the flight test check that when making 30° bank turns without using the trim release or cyclic trimmer, the fly through capability is retained (control forces do not continue to increase during the manoeuvre).

11.4 <u>ALTITUDE HOLD</u>

i) At a normal cruise speed engage ALT hold

check altitude is held ±50 ft.

ii) With heading hold also engaged gently reduce torque by about 20%. Check altitude is held within 100 ft of datum and then returning to datum ± 50 ft.
Check autotrim functions correctly

iii) a) At 120 KIAS engage VS mode and select a rate of climb of 500 fpm. When rate of climb has stabilised engage ALT mode and check altitude returns to level at engagement after maximum of 100 ft overswing.

b) Repeat with a 500 fpm rate of descent.

11.5 <u>AIRSPEED HOLD</u>

i) a) From trimmed level flight at 130 KIAS with fixed collective and heading hold, move cyclic aft against trim and establish approximately 120 KIAS. Release cyclic and check that the aircraft smoothly returns to the trimmed condition ± 5 kts.

b) Repeat with forward cyclic to 140 KIAS (do not exceed Vne).

c) Check airspeed trim rate (collective trimmer) is approx 2 Kts/sec

11.6 HEADING HOLD

i) Check correct operation of heading hold during flight at normal cruise speed.

ii) At 130 KIAS in level flight with feet off the pedals slowly increase and decrease collective to give a ± 10% torque change, check heading maintained.

11.7 NAV COUPLING

At a typical cruise speed check tracking in NAV mode

11.8 SAS MODE

At a typical cruise speed check operation in SAS mode (switch off ATTD) during straight flight and turns.

11.9 SAS OUT

At 110 KIAS disengage both SAS 1and 2. Carry out turns, climbs and descents. Check smooth disengagement/ re-engagement
.

11.10 ILS (Optional)

Carry out a coupled ILS at 110 to 120 KIAS. Check correct operation of auto level (If helicopter equipped with Radar Altimeter) and go-around mode (see 11.11 (f) for commanded values in GA).

11.11 Go-Around Mode (if optional 11.10 not carried out)

a) Align the heading bug with present heading. Landing gear down.

b) Set up 110 to 120 KIAS, 500 fpm descent (VS mode).

c) Engage HDG mode.

d) Rotate heading bug left or right 90° to establish 20° to 25° bank angle.

e) Engage GA mode when bank angle is 20° to 25°.

f) Check GA commands wings level (and then constant heading), 750 fpm climb and A109A approx 85 KIAS, A109A II and C greater than 55 KIAS. **Adjust power using collective cue.**

g) Re-engage HDG. Rotate heading bug left or right 30° and check new heading is acquired.

## 12. FUNCTIONING

12.1 Check the following items for satisfactory functioning:

| | |
|---|---|
| Windscreen demisting system | |
| Heater | |

12.2 Landing Gear

| | |
|---|---|
| A109A and AII 'WHEELS UP' caution light. A109C vocal warning 'LANDING GEAR'. Below 200 ft with gear up. | |
| At 100 KIAS Record:<br>Time to lower | |
| Time to raise | |

12.3 Hydraulic Systems

| | |
|---|---|
| At 60 KIAS switch off HYD 2 carry out gentle turns (20° AOB), switch through to HYD 1 off, gentle turns. Increase speed to 100 KIAS, gentle turns. Reduce speed to 60 KIAS and reselect both systems on. Check for any cyclic control load or jump during the tests. | |

## 13. LANDING

13.1 Tail Rotor Control Loads **(Applicable only to A109C fitted with spring bias unit)**

| | |
|---|---|
| At 60 KIAS deselect No1 hydraulic system and carry out an approach to the hover (into wind). The pedal force should not exceed approximately 35 Kg (80 lbs), precise measurement not required. Transition into forward flight and reselect Hyd 1 | |

| | |
|---|---|
| 13.2 If a hard surface is available, carry out running landing at up to 30 Kts groundspeed with nosewheel locked. | |

| | |
|---|---|
| 13.3 Confirm no tendency for lateral padding or resonance during a smooth landing with a gentle collective lowering. | |

**NOTE Should any divergent oscillations be noted, lift off immediately and carry out a normal landing, consider repositioning the helicopter.**

| | |
|---|---|
| Landing time. | |

## 14. SYSTEMS CHECKS

14.1 Electrical System Checks

a) **Single Generator Failure**

Switch off each generator in turn, no services should be lost. #1 (#2) DC GEN caution light.
Both generators back on.

b) **Failure of One Generator and Associated DC Bus**

Switch off GEN 1 and GEN 1 BUS.
Caution lights: #1 DC GEN, BUS TIE, INV 1, and SAS 1 OFF. VG 1 may also illuminate depending on INV 3 speed.

All loads of #1 Bus are lost except those on Essential Bus #1. Emergency Busses are also maintained (If equipped). Check the following are supplied:
Fuel quantity
XMNS oil temp
Hyd press
TOT
Oil press
Oil temp
Fuel press
Torque
N1

Reselect GEN 1 and GEN 1 BUS

Switch off GEN 2 and GEN 2 BUS
Caution lights #2 DC GEN, BUS TIE, INV 2, PUMP 3 and 4. LANDING GEAR (WHEELS UP), and SAS 2 OFF (VG 2 possible).

All loads on #2 Bus and both pilot's EHSI are lost (A109C only) except those on Essential Bus #2. Emergency Busses are also maintained (if equipped). Check the following are supplied:
Fuel quantity
XMNS oil press
Hyd press
TOT
Oil press
Oil temp
Fuel press
Torque
N1
VHF (pilot’s primary)

Reselect GEN 2 and GEN 2 BUS

c) **Failure of Generator Bus(es) <u>A109C Only</u>**

Switch off GEN 1 BUS, BUS TIE caution light illuminates. No loads lost. Leave switch in off position.

Switch off GEN 2 BUS, BATT DISCH (if fitted) caution illuminates after a few seconds (it may be necessary to increase load by switching off INV 1 to activate INV 3). No loads are lost.

Switch battery off, Inverter 3 lost. Switch on INV 1 if switched off, check SAS 1 or 2 can be engaged
Switch on battery and both GEN BUS.

d) **Failure of One Generator and Other Bus (<u>A109C Fitted with Emergency Bus System Only)</u>**

Switch off GEN 1 and GEN 2 BUS.
Caution lights #1 DC GEN, BUS TIE and BATT DISCH (if fitted)

Switch battery off, Caution lights FUEL PUMPS 1 and 2
INV 1and 3, SAS 1and VG 1.

Loads on Essential Bus 1 and 2 retained:
Fuel quantity #1
XMNS oil temp
Hyd press
TOT
Oil press
Oil temp
Fuel press
Torque
N1

Reselect battery *then* reselect GEN 1 and GEN 2 BUS
Reset INV 1& 2

Repeat for GEN 2 and GEN 1 BUS, same services maintained but Cautions will be :
LANDING GEAR, FUEL PUMPS 3 and 4 INV 2 and 3, SAS 2 and VG 2.
Check that SAS 1 can be re-engaged.

e.1) **Failure of both Generators (<u>A109 A and AII Fitted with Emergency Bus System)</u>**

Switch off GEN 1 and 2
Caution lights #1 and #2 DC GEN and BATT DISCH (if fitted)

All loads maintained

Carry out Flight Manual procedure:
Pilot wander light on
Crossfeed open
GEN 1 & 2 BUS off

Additional Cautions;

BUS TIE, INV 1 & 2, SAS 1 & 2 OFF, VG 2 (or VG 1 if INV 3 takes load of INV 2), BATT DISCH (if fitted), FUEL PUMPS 3 & 4 & LANDING GEAR.

Check that SAS 1 can be reselected
INV 3 may need to be re-cycled.

Fuel pump 2 off
Inverter 3 off
Hydraulic utility off
Emergency Bus 1 and 2 supply power, check the following are still powered:

Fuel pump No 1
Intercom system pilot (check by transmitting)
Landing gear position indicator
Landing lights
Standby ADI
Warning/caution/advisory system
VHF2

Check that engine instruments can be energised by switching on related GEN BUS
Reselect all systems, crossfeed off.

e.2) **Failure of both Generators (A109 C Fitted with Emergency Bus System)**

Switch off GEN 1 and 2
Caution lights #1 and #2 DC GEN and BATT DISCH (if fitted)

All loads maintained

Carry out Flight Manual procedure:

Pilot wander light on
Crossfeed open
GEN 1 & 2 BUS off

Additional Cautions;

BUS TIE, INV 1 & 2, SAS 1 & 2 OFF, VG 2 (or VG 1 if INV 3 takes load of INV 2), BATT DISCH (if fitted), FUEL PUMPS 3 & 4 & LANDING GEAR.

Check that SAS 1 can be reselected
INV 3 may need to be re-cycled.

Fuel pump 2 off
Emergency Bus 1 and 2 supply power, check the following are still powered:

SAS 1
Attitude engage (Select ATTD HOLD, ATTD OFF light out then disengage)
Force trim
Intercom system pilot (check by transmitting)
Landing gear

Landing light
Standby ADI
Warning/caution/advisory system
VHF2

Check that engine instruments can be energised by switching on related GEN BUS
Reselect all systems, crossfeed off.

e.3) **Failure of both Generators (<u>A109A/AII/C NOT Fitted with Emergency Bus System)</u>**

Switch off GEN 1 and 2
Caution lights #1 and #2 DC GEN and BATT DISCH (if fitted).

All loads maintained.

Reselect GEN 1 and GEN 2

f) **Inverter Failure**

Switch off INV 1, Caution light INV 1
INV 3 automatically takes the load. Check HSI pilot and co-pilot, SAS 1 & 2 operational (reselect SAS 1 if necessary).

Switch off INV 3.
Caution lights, INV1 & 3, SAS 1 OFF and VG 1.

BUS 1 115v and 26v AC lost.
Check the following are inop:
ADI pilot
SAS 1
(E)HSI, pilot and co-pilot
VOR (at least one system)

Reselect INV 1&3

Switch off INV 2, check INV 3 takes the load (reselect SAS 2 if necessary) then switch INV 3 off.
Caution lights, INV 2 & 3 SAS 2 OFF and VG 2

BUS 2 115v and 26v lost
Check the following are inop:
ADI co-pilot
SAS 2
VOR (at least one system)

Switch off INV 1
Cautions INV 1,2 & 3 SAS 1 & 2, VG 1 & 2

Reset all inverters

Note that aircraft with HSI's, not EHSI's, will have inoperative HSI (s) during the inverter failure checks.

14.2 Intercom System checks

Note that individual aircraft may differ slightly in detail from that described below, ensure that it is possible for the pilot to transmit following a failure of that system.

Pull CB PLT INTERCOM (or equivalent means of failing the station box) on overhead panel.

Follow Flight Manual Emergency Procedure.
Set pilot's XMTR selector switch to OFF.
Select ICS NORM/EMERG (or SBY) button/switch on central pedestal to EMERG/SBY and plug headset into co-pilot's socket (if Flight Manual requires).
Use the co-pilot box to select the desired transmitter.
Check that pilot's transmit switch can be used.

14.3 Radio Master

Note: This check is not applicable to all types.

Switch off radio master 1 & 2
Pull CB's RADIO MASTER OVRD 1 & 2 (if applicable to type).
Check radios still function (if applicable to type).

Reset switches and CB's

14.4 Engine Shutdown

Note rotor RPM for activation of warning system. (95%)
Shutdown the engine.

If rotor brake is fitted check for satisfactory operation from 40%

Cockpit lighting.

## 15. POST FLIGHT ACTION

### 15.1 Performance Climb

Plot out the data on the analysis sheet provided and determine the achieved rate of climb (RoC). The scheduled performance must be obtained from the flight manual A109 A Figure 5-49 and 5-50 (initial issue), A109AII Figure 5-44 and 5-45 (initial issue), A109C Fig 5-67 (Rev 1) and compared with the achieved performance. The issue/Rev was that relevant at the time of writing the AFTS, if a later revision has been issued this should be used.

**A109A II only:** Note for the climbs carried out AEO, the OEI scheduled data is still used as the power to the rotor is the same if the OEI climb was on the torque limit. Calculate the ΔRoC for the first and then the second climb and *then* average the two results. Note that the twin engine climb method is only appropriate for low altitude, operators at medium/high altitude sites will need to contact CAA for advice.

The scheduled RoC is determined from the torque limited portion of the OEI chart, these are shown by the near vertical altitude/OAT lines, the sloping lines indicate TOT limited conditions. For example at OAT of 0°C at above 1300 ft the helicopter would normally be TOT limited not torque limited, but the TOT lines would give the incorrect RoC in this case. For Alt/OAT conditions which would lie on the TOT line, the chart should be entered at the far right, this is shown in Figure 2 of this AFTS (vertical line). For conditions which are on the torque lines the chart should be used in the normal manner. Figure 2 shows the above 2450 kg chart (Figure 5-45), a similar method should be used for below 2450 kg (Figure 5-44).

The maximum permitted tolerance is increased to 50 ft/min for the A109AII to allow for additional errors in determining the scheduled RoC.

### 15.2 Power Assurance

Use the Power Check Chart in the Flight Manual to determine the scheduled torque.

Achieved torque - Scheduled torque =

| | |
|---|---|
| No1 | |
| No2 | |

### 15.3 Autorevs

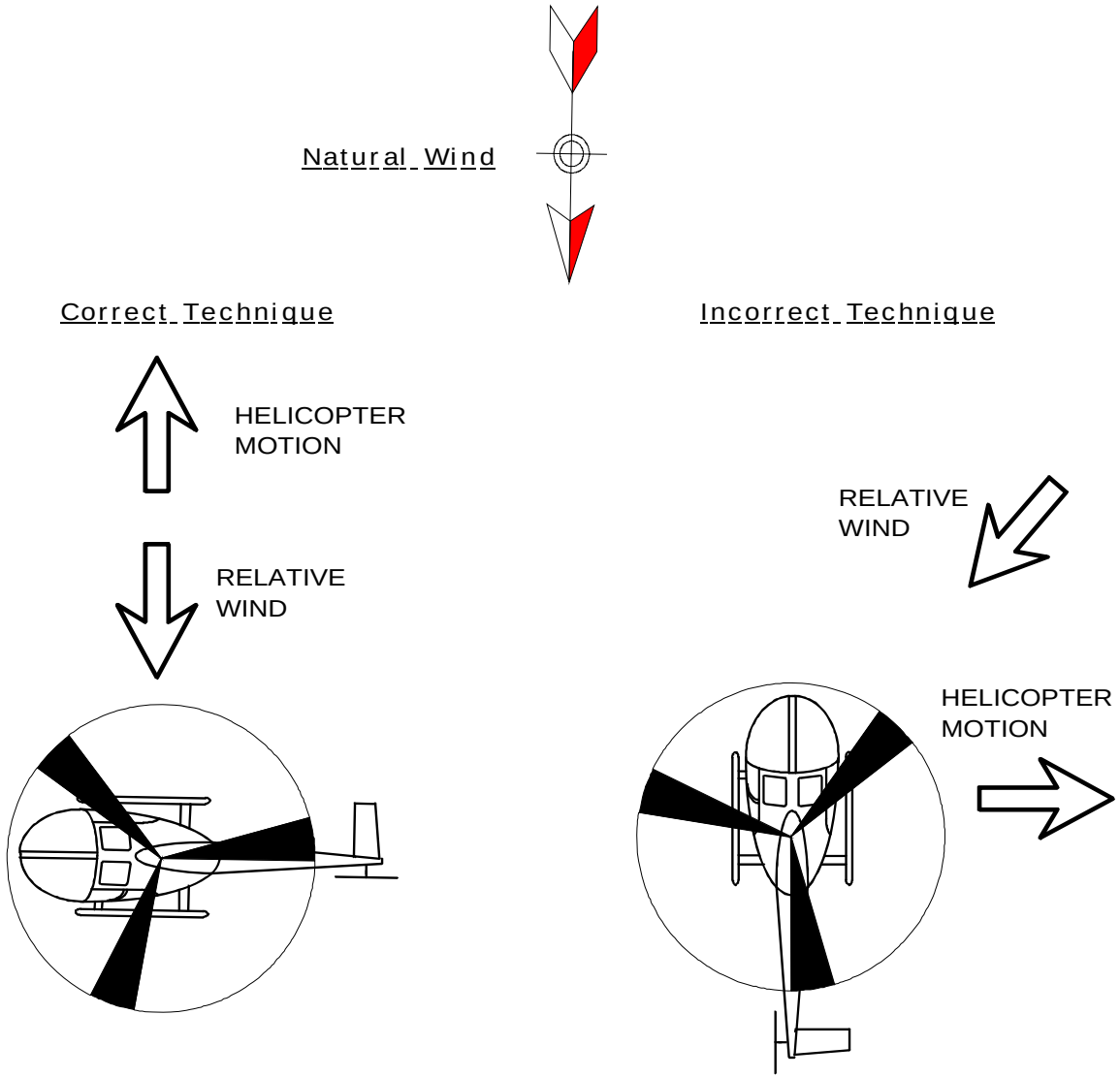
Achieved – Scheduled Nr =

| |
|---|
| |

## SIDEWAYS AND REARWARDS FLIGHT

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

For rearwards flight the helicopter should be lined up tail into wind and gently accelerated rearwards to achieve the required relative air speed.



## BEST RATE OF CLIMB AIRSPEED – Vy
## SINGLE–ENGINE

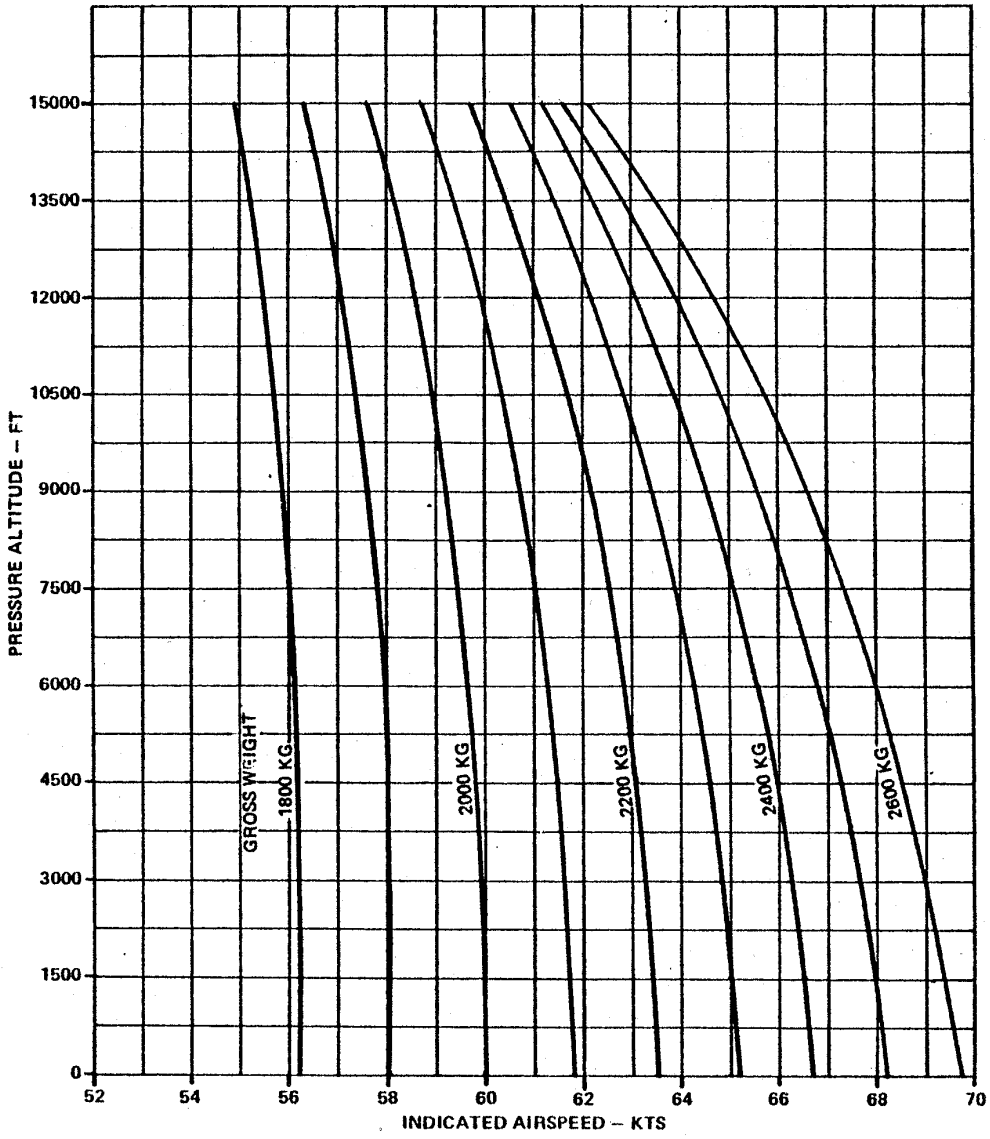
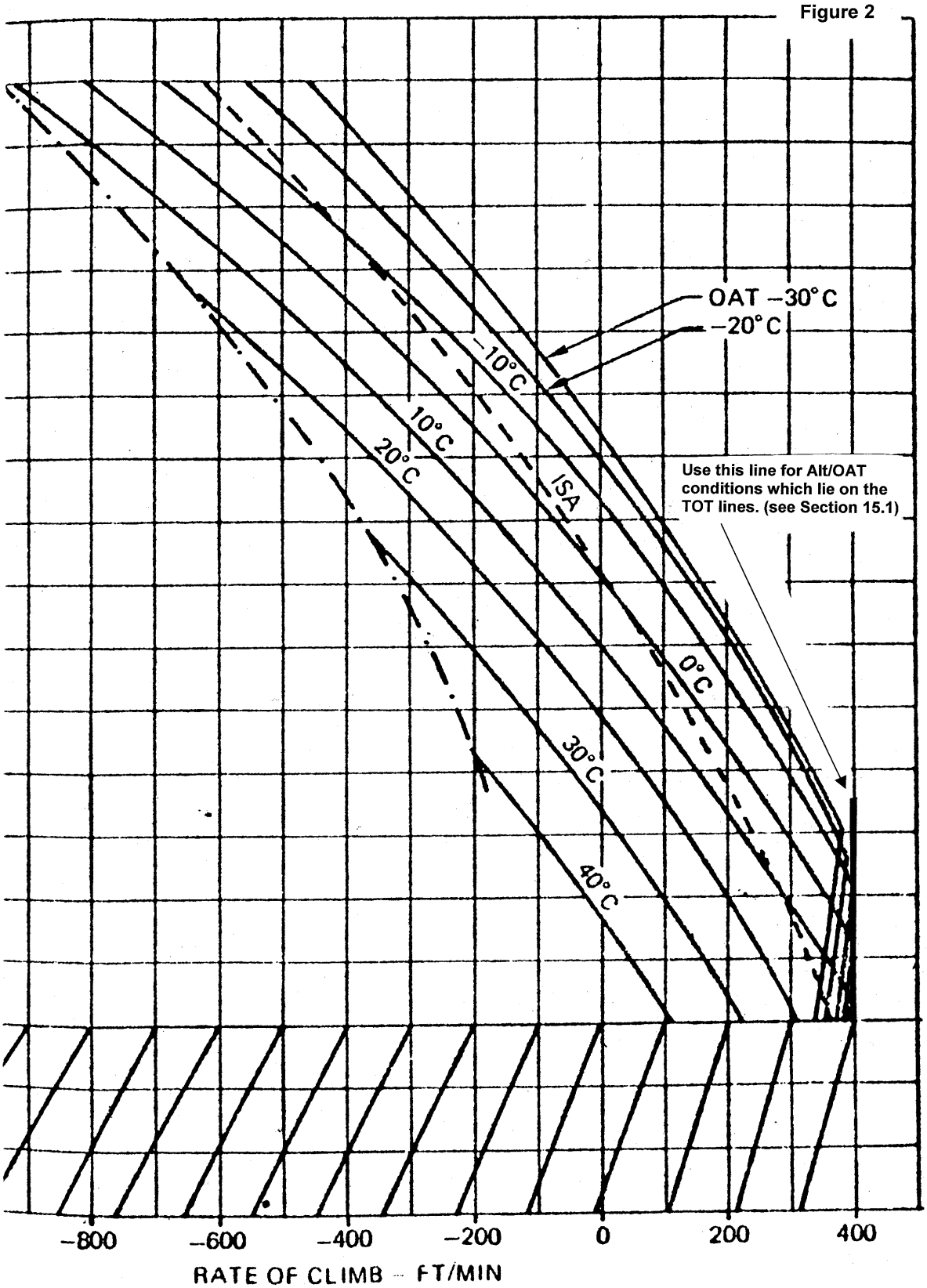
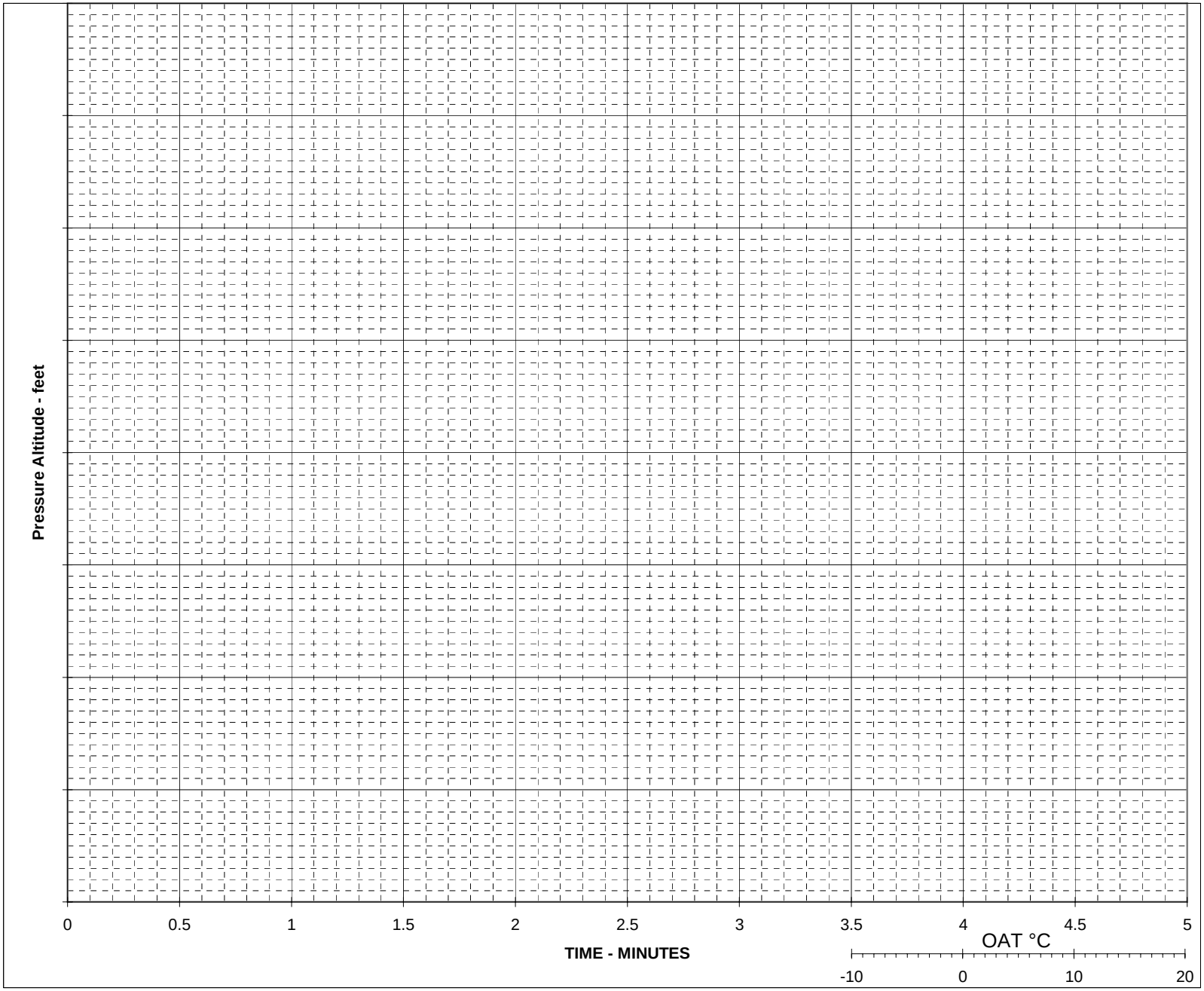



Figure 5–7

Figure 2


OAT –30°C
–20°C
–10°C
10°C
20°C
ISA
0°C
30°C
40°C
Use this line for Alt/OAT conditions which lie on the TOT lines. (see Section 15.1)
–800
–600
–400
–200
0
200
400
RATE OF CLIMB – FT/MIN




| 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 |

**Amendment Record**

Changes from issue 1 to issue 2

Cover sheet. Add to Performance summary that the permitted margin is –50 ft/min for A109C for climbs carried out AEO

Para 4. Add box for results.

Para 6. Add instruction to note any torque mismatch on take-off.

Para 7. Increase size of boxes.

Para 8.2. Add to Note that second climb not essential

Para 11.10 and 11.11. Change speed for ILS/GA to 110 to 120 KIAS to be within gear down speed for more representative test. Add gear down.

Para 14. Add "(if fitted)" after BATT DISCH.

Para 14.1 b). Delete check of reselection of SAS 1. Add instruction to reselect electrics.

Para 14 e.3). Add instruction to reselect Generators.

Para 14.1 f). Add instruction to reselect SAS 1 / 2 if necessary. Add "at least" to VOR (one system).

Para 14.2. Add "equivalent means…" Add reference to Flight Manual etc.

Para 14.3. Add Note that this check is not applicable to all types.

End