CHECK FLIGHT CERTIFICATE

Civil Aviation Authority

Sikorsky S76C+ Turbomeca Arriel 2S1 Engines	**CFS 291 issue 1**	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
Power margin			

Airfield:	
Start Weight	Kg/Lbs*:
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 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

Sikorsky S76C+ CFS 291 issue 1

Turbomeca Arriel 2S1 Engines

Registration		Test Date	

1. **INTRODUCTION**

This schedule is applicable only to the Sikorsky S76C+ Helicopter with Turbomeca Arriel 2S1 engines. It is based on the assumption that the every day operation of the helicopter serves 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 CAA approved 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 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 Check Flight 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 ink in the spaces provided.

Operator/Maintenance Organisation		Registration	
Aerodrome		Flight Dates	
		Pilot	
		Co-pilot	
		Observer	

Weather	

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

2. **LOADING**

The aircraft is to be loaded to a weight limit of 11,700 lbs or to the highest AUW as is practicable. A lower weight to comply with the Operator's company policy is also permitted. The CG should be approximately in the neutral position.

NOTE: In general, tests should be carried out at a high AUW, however the autorotation RPM check has to be carried out at a low weight and single engine climbs at approximately 11000 lbs in order to have a positive rate of climb at the reduced power used for this test. It is permissible to carry out the autorotation RPM check (para. 17) on a separate flight/date and without an observer if desired.

Take-off weight (actual)	
Fuel contents	
C.G. position	

3. **PRE-FLIGHT INFORMATION**

Aircraft Serial No.	
Total airframe hours	
EAPS fitted?	

	No.1	No.2
Engine Serial No.		
Hours run since new		
Hours run since overhaul		

4. PRE-FLIGHT CHECKS

4.1 Carry out the normal external inspection (check pitot and static heat, see 4.3 below)

Doors and transparencies: Condition and Operation

Seats and harnesses

Placarding: Legibility and accuracy

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

Check altimeters within ±50 ft for the same pressure setting.

Adjust pedals to full aft position. Alternatively press pedals rapidly to determine if adjusters slip on either side.

CWP and warning lights: all bulbs working, markings clearly visible.

4.2 <u>External Power/DC Primary Busses</u>

a) With battery switch(es)-ON, external DC power connected and - OFF, check that the BUS TIE OPEN caution light is - ON. For aircraft fitted with the dual inverter system it should be possible to switch an inverter ON. Switch inverter OFF.

b) Place the EXT POWER switch-ON. The BUS TIE OPEN caution light should go off and the BATT OFF (and AUX BATT OFF on dual battery installations) caution light(s) should go on.

4.3 <u>Pitot heat:-</u>

a) With the battery switch ON and external DC power on, pull the PLT PITOT HTR PWR and CPLT PITOT HTR PWR circuit breakers.
Turn the pilot and co-pilot heat switches ON.
PITOT HEAT caution light(s) should be ON.

b) Reset the circuit breakers. PLT and CPLT PITOT HTR caution lights should go out. Check the pitot tubes. They should be warm. Also check heated static vents on Sperry DAFCS equipped aircraft. WARNING: The pitot tubes may get very hot.

c) Turn pilot and co-pilot pitot heat OFF.

4.4 Engine Failure Warning System

a) #1 and #2 ENG OUT warning lights - ON.

PILOT

#1/#2	#2/#1

b) Engine out ground test switch (side of console) - hold at TEST. Alternating tone will be heard. To reset tone, press #1 then #2 ENG OUT light on pilot's side. Warning lights will remain on. (If capsules have been previously pressed, no tone will be heard). If tone resets when only one capsule has been pressed this indicates a fault.

c) Cycle battery and external power off and on to reset engine failure warning system

d) Repeat check using #2 then #1 ENG OUT light on pilot's side to reset tone.

CO-PILOT

#1/#2	#2/#1

e) Repeat on co-pilot's side.

4.5 Fire Extinguisher System

a) EXT-FIRE switch - OPEN. Red WARN light - ON.

b) Pull both T-handles back 1 inch.

c) FIRE EXT switch - MAIN, then RESERVE. Check that green TEST light goes - ON in each position. Release switch.

d) EXT-FIRE switch - SHORT. Red WARN light and green TEST light - ON.

e) FIRE EXT switch - MAIN, then RESERVE. Check that green TEST light stays - ON in each position.

f) Both T-handles - Full Forward.

g) EXT-FIRE switch - NORM

h) Check red WARN light and green TEST light - OFF

4.6 Fire Detector System

EXT power ON

a) Fire detector test switch - FWD. FIRE warning lights and T-handle lights should light and continuous tone should be heard.
For aircraft fitted with multi warning AVAD system a chime and "Fire Engine 1", "Fire Engine 2" audio warnings will be heard. Note that the second capsule should not be pressed before the full warning is heard.

b) Press #1 then #2 FIRE warning light capsules to reset tone. If tone resets when only one capsule has been pressed this indicates a fault.

#1/#2

c) Repeat a) to b) with fire detector test switch - AFT/BAG, resetting as required. Press capsules in order shown. SMOKE DET BAGGAGE warning light on.

#2/#1

d) Repeat on co-pilot's side.

i) FWD

#1/#2

ii) AFT/BAG

#2/#1

4.7 Flotation System Test

Perform if not carried out on a regular basis operational.

Before carrying out the Flight Manual check the serviceability of the test switch must be determined as follows:

a) With external power connected, pull out all 6 float circuit breakers, 2 float control and 4 float power, put test
switch to 'TEST' position. No lights should indicate.

b) Reset and pull each POWER CB in turn, as each one is reset, the float test red light should illuminate. If any float POWER CB fails to illuminate the red light, discontinue the testing and investigate.

c) If each float POWER CB correctly lights the red test light in turn, when reset, with the others pulled, then the test switch is serviceable.

d) Reset CB's. (Leave switch in 'TEST' position)

Carry out Flight Manual checks (Part 1, Section II).

Reset 'TEST' switch to NORM.

4.8 Fuel Levers:

a) Move No.1 and No.2 fuel levers to OFF, DIR, PRIME, and XFEED. Check for binding, detents, and alignment with markings.

4.9 Engine Levers/T-Handles

Master Start OFF

a) Advance the No1 engine lever forward and check that upon reaching FLY, the lever positively slides upward to engage the manual throttle cable. Pull down and then retard the engine lever checking the IDLE stop. Depress the trigger and retard the lever to STOP. Release the
trigger and check the lever remains aft of STOP.

b) Reposition the lever to FLY and move it slowly forward and aft sufficiently to confirm the presence of a detent at the FLY position. The detent and position where Mixed Mode lights are OFF should approximately line up with the transitional slot connecting the normal and manual tracks. The detent should be easily identifiable by feel but should not cause overshoot when the lever is moved in either direction through and out of the detent. Check that the Mixed Mode light is on when positioned out of the centre of the detent, but also confirm that the light can be easily extinguished within the detent.

c) Slowly advance the lever fully in the manual track and then retard it to IDLE. Depress the trigger and retard to STOP.

There should be no evidence of binding in a) b) or c) although friction levels in the manual track should be higher than in the normal track.

d) Slowly reposition the lever to FLY, check Mixed Mode lights OFF, and select Manual Training switch to No1. Check that the No1 ENGINE CONTROL and engine lever handle lights are on in FLY but go off if engine lever is pulled down into the normal track. Reselect FLY (manual track). Pull the No2 DECU circuit breaker (dc essential), confirm that the No2 ENGINE CONTROL and engine lever handle lights are on, and check that the No1 ENGINE CONTROL and engine lever handle lights extinguish. Reset the No2 DECU cb. Select Manual Training from No1 to AUTO and retard the lever in the normal track to STOP.

e) Repeat a) through d) for No2 engine lever.

EXT-FIRE switch - OPEN

f) Place the engine levers in the FLY position and fuel levers in CROSSFEED. Pull each fire T-handle fully back. There should be no evidence of binding and all levers must reach their OFF position. Reset the T-handles.
EXT-FIRE switch - NORM, lights OFF

4.10 Rotor Brake

a) Apply the rotor brake. Check rotor brake pressure from 200 to 300 psi and the ROTOR BRAKE caution light on. Also check the pressure relief valve by attempting to pump the pressure above 300 psi. Release the rotor brake. Check rotor brake pressure at zero and the ROTOR BRAKE caution light off.

4.11 Engine Starters/Igniters

a) Set the following initial conditions:

No.1 and No.2 Engine Levers.	- STOP, in normal track
No.1 and No.2 Fuel Levers	- OFF
Rotor Brake	- ON
Master Start	- OFF

b) Depress and release the No.1 Engine Starter button. The starter should not engage. Repeat in IDLE position; starter should not engage.

c) Turn the MASTER START switch ON. With lever in the STOP position check that starter engages and operates for the purpose of venting with the button depressed but disengages when the button is released.

d) Advance the lever to IDLE. Depress the starter button and release. Check that starter engages, remains engaged with the button released (**minimise duration**), but disengages when lever is retarded to STOP. Advance the lever to FLY and check that starter engages, remains engaged (**minimise duration**), but disengages when aborted to STOP in normal track. (For IIDS equipped aircraft, the No1/2 start page appears with button depressed).

e) Reposition the lever to FLY, select the MANUAL TRAINING/START switch to No.1 engine, and retard the lever slowly in the manual track to STOP. Confirm ENGINE CONTROL light and engine lever handle light on. With the MASTER START OFF, check that starter will not engage. Repeat with MASTER START ON and confirm that starter engages with the starter button depressed but disengages with the button released. **Leave in manual reversion with lights ON, DO NOT SWITCH TO AUTO.**

f) Position the lever slightly forward of STOP and check that starter will not engage. **DO NOT SWITCH TO AUTO.**
MASTER START - OFF

h) Return No 1 engine to normal configuration (STOP position in normal track with Mixed Mode light off and Manual Training switched to AUTO).

i) Repeat steps a) to h) using the No 2 engine.

4.12 Overspeed and N1 Check

a) Check No 1 and No 2 ENG OVSP lights ON. Actuate the No1 overspeed test switch - No1 ENG OVSP light OFF. Reset No 1 overspeed test switch, ENG OVSP light ON.

b) Repeat a) for No 2 overspeed test.

c) N1 indicators - TEST, check 30 Sec/2 Min lights, green and amber. (Non IIDS aircraft).

Satisfactory completion of pre-start checks.

5. ENGINE START/ROTOR ENGAGEMENT

5.1 Engine Start

Carry out rotor brake on starts for both engines in automatic.
Satisfactory control of T5 during start

Eng. 1	Eng.2

5.2 Rotor Engagement

Hydraulic power (approx. 3000 psi) available before 10% N_R.

No.1	No.2

NOTE: Depending on the modification state of the undercarriage, No.2 system may not produce 3000 psi until 65% N_R.

Overspeed system advisory lights out by 25% N_2.

No.1	No.2

Fuel totaliser set (if fitted)

5.3 Servo Interlock Check

At 65 to 70% N_R set collective approximately 1 inch up from full low. Pilot's flight control SERVO switch to No 1 OFF, co-pilot's No 2 OFF. There should be no jump in the controls. #1 SERVO SYSTEM caution light should remain ON, no transfer should occur. Check disc response.

Recenter co-pilot's switch, and place pilot's in NO.2 OFF. #2 SERVO SYSTEM caution light should go ON. Place co-pilot's SERVO switch to NO.1 OFF. No transfer should occur. Check disc response. Recenter co-pilot's switch.

Repeat check with co-pilot's switch leading

6. POST START CHECKS

6.1 Engine Anti Ice

If Snow Kit is installed this test cannot be carried out above +15°C and may be left blank.

a) With No 1 and No 2 N2 at 107% turn the No 1 and No 2 anti-ice switches ON. Note the following:
No 1 and No 2 Engine T5 rises 5° to 10°C.
No 1 and No 2 Anti-ice On - Advisory Lights - ON
No 1 and No 2 Anti-ice Caution Lights - OFF

6.2 N_1 Tachometers:

Carry out test in accordance with Flight Manual Pre-Take-off check. Note any difference between digital N_1 DECU and direct values.

No.1	No.2

Satisfactory completion of pre-taxy checks.

7. TAXIING CHECKS

Taxy time

7.1 Satisfactory operation of parking brake.

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

Repeat this check using the co-pilots' brakes.

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.

8. **POWER ASSURANCE CHECK**

Carry out auto power assurance checks IAW Flight Manual, Part 1, Section 2 but near the end of the stabilisation period also record the data manually.

Check that each bleed valve light extinguishes before reaching 94% N1 and within 1% of the other.

ENG	PRESS ALT	OAT	TARGET TORQUE	Bleed Close N1	N1 OBS	T5	N_r	Fuel Flow	DDR/IIDS POWER MARGIN	DDR/IIDS T5 MARGIN
1										
2										

(Margins also to be recorded in Post Flight. Action, Section 20)

EAPS	ON	OFF
ANTI-ICE	ON	OFF

9. **HOVER CHECKS**

9.1 Establish a low hover. Record the following:-

Take-off time.

ENG	***TORQUE***	***N_1***	***N_R***	***PRESS ALT***	***OAT***
1					
2					

N1 matching within 0.5%

9.2 While in a stable hover, turn off collective trim. Add left pedal, collective should not drop. Add right pedal, collective should not climb.

Reset collective trim ON.

10. LOW SPEED ENVELOPE

10.1 AFCS engaged. See Appendix 1 for test method. Assess the vibration level, control response and position (adequate control margin) during the following manoeuvres. The tests should be flown at the Flight Manual sideways/rearwards airspeed limits (35 knots) unless this would result in a groundspeed in excess of 20 kts.

Do not exceed 20 kt estimated groundspeed.

a) Turns on the spot.

b) Sideways flight left and right

c) Rearwards flight

10.2 Disengage AFCS and carry out gentle hover manoeuvres (it is not necessary to fly sideways/rearwards up to the speeds flown in b) and c) above).

Re-engage AFCS, note smooth re-engagement.

10.3 Hover Augmentation Mode (if equipped).

Check collective trim is ON.

Check correct operation of hover augmentation mode and radio altimeter hold.

Manoeuvre the helicopter using the 4-way cyclic switch.

11. SINGLE ENGINE CLIMB PERFORMANCE

Carry out a climb on each engine in turn for 4 minutes on a straight course. Climbs should be carried out in stable, non turbulent conditions away from cloud. Do not start to record until established in the climb on condition.

Associated Conditions

Altimeter - set to 1013 mb

Landing gear - retracted.

Speed - V_{BROC} (74 KIAS - 1 knot per 1000 ft PA)

All air bleeds	-	off
EAPS	-	off
AC GEN	-	off
Off line engine	-	Idle, positive N_2 split.
Engine power **collective**	-	Single engine maximum continuous N1, **MCP selected on**
	-	Torque Not to exceed 104%
	-	N_1 100% (OEI Mode)
	-	T_5 912°C
	-	N_R Drooped to 100% against DECU MCP limiter

NOTE 1: The climb must be carried out on the N1 limit, but below 104% torque to avoid long term gearbox damage. The climb will have to be carried out at an altitude/OAT which permits this.

NOTE 2: Torque/engine parameters not to exceed values shown above during climb.

NOTE 3: The climb performance must be analysed and compared with the scheduled performance, see Section 20.1 of this Schedule.

NOTE 4: An engine log book entry is not required for use of 100% N1 and up to 104% torque.

NOTE 5: This climb is carried out at the maximum torque allowed for non-emergency operation. The Flight Manual limits for OEI operation apply for actual emergency use.

11.1 SINGLE ENGINE CLIMB PERFORMANCE *ENGINE No 1*

Conditions

Torque	**not to exceed 104%**
N_1	**100%**
T_5	**912°C**
N_R	**100%**

Reduce speed to Vy. Retard No. 2 engine slightly and set MCP on collective limit select switch. Retard engine lever to idle. Set MCP rating by drooping Nr to 100% **without exceeding 104% torque.**

Time	Alt	OAT	IAS	Torque	N_1	T_5	N_R	Engine Oil Temp	Engine Oil Press	Fuel Flow	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 Vbroc in level flight for 1 min. to allow OAT to stabilise

Alt	
OAT	

11.2 SINGLE ENGINE CLIMB PERFORMANCE *ENGINE No 2*

Conditions

Torque	**not to exceed 104%**
N_1	**100%**
T_5	**912°C**
N_R	**100%**

Reduce speed to Vy. Retard No. 1 engine slightly and set MCP on collective limit select switch. Retard engine lever to idle. Set MCP rating by drooping Nr to 100% **without exceeding 104% torque.**

Time	Alt	OAT	IAS	Torque	N_1	T_5	N_R	Engine Oil Temp	Engine Oil Press	Fuel Flow	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 Vbroc in level flight for 1 min. to allow OAT to stabilise

Alt	
OAT	

12. HANDLING CHECKS

12.1 Cruise

Ensure Landing Gear Up

12.1.1 At normal cruise power note the following in stabilised conditions:

	PRESS ALT	***IAS***	***OAT***	***ENGINE***	***N1***	***T5***	***TORQUE***
PILOT				1			
CO-PILOT				2			
STANDBY							

FUEL [ ] WEIGHT [ ] VIBRATION LEVEL [ ]

If the aircraft is fitted with the optional alternate static system check that the altimeter error at 120 KIAS is in accordance with the FM Supplement (window closed). [ ]

If vibration level is high, note frequency and axis. [ ]

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. [ ]

12.1.2 At normal cruise power carry out turns left and right (30° AOB). Note control response and vibration level. [ ]

12.2 Maximum Speed ***Ensure Landing Gear Up***

Determine Vne from placard before next test.

Without exceeding placarded VNE apply maximum continuous power and stabilise at maximum obtainable speed in level flight. [ ]

Vibration level. [ ]

If vibration level is high, note frequency and axis. [ ]

At Vne carry out gentle turns (up to 20° AOB) left and right.

Note:-

Vibration level.

Control response.

12.3 Rapid Engine Acceleration

Match torques at 70% and note approximate collective position. With engine levers in FLY position in a stabilised descent at approximately 75 KIAS with approximately 5% torque set (do **not** re-match), increase collective to give about 70% torque in 2 to 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 70% matched torques.

Note 2 : Do not reduce below N_R limit (91%)

Engine response/surge

Transient NR droop %

13 **AFCS CHECKS**

The following checks are for Sperry/Honeywell DAFCS equipped aircraft. If Phase II / III or Sperry Helipilot is fitted use appendix 2 or 3 after completing 13.1 to 13.4.

13.1 Trim out at approximately 135 kts. Record any bias in any one trim axis that makes it difficult to fly hands off.

13.2 At approximately 120 KIAS with both channels engaged check the aircraft returns to its original attitude, with a maximum of one slight overshoot, after the following disturbances:-

Note: Phase III equipped aircraft automatically engage airspeed hold when the cyclic is moved against longitudinal trim force, this can result in a significant overshoot of attitude datum as the autopilot regains original airspeed. To avoid this, select cyclic trim from AUTO to ON.

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).

13.3 Repeat 13.2 with only one channel engaged.

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.

i) Pitch Channel 2

a) 5° nose up.

b) 5° nose down

ii) Roll Channel 2

a) 10° left

b) 10° right

iii) Yaw Channel 2

Note satisfactory functioning.

Re-engage Channel 1.

13.4 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).

13.5 <u>ALTITUDE HOLD (2 CUE MODE)</u>

i) At a normal cruise speed 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

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

b) Repeat with a 500 fpm rate of descent.

13.6 <u>AIRSPEED HOLD (2 CUE)</u>

Disengage ALT and engage IAS.

i) a) From trimmed level flight at 120 KIAS with fixed collective and heading hold, move cyclic aft against trim and establish approximately 100 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).

13.7 HEADING HOLD (2 CUE)

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

ii) At 120 KIAS in level flight with feet off the pedals slowly increase and decrease collective to give a ±20% torque change, check heading maintained.

13.8 3 CUE MODE

At 130 KIAS engage IAS/VS/HDG modes and set a rate of descent of 500 ft/min. When stabilised engage ALT mode (AS/ALT/HDG), check altitude overshoot within 100 ft of datum and then returns to datum ±50 ft.

Using the HSI bug alter heading by 90°. (IAS/ALT/HDG mode), check normal operation.

13.9 ALTITUDE PRESELECT (3 CUE)

i) At 120 KIAS select an altitude approximately 1200 ft higher or lower than current altitude and ARM. Initiate the change of altitude using VS mode set to 1000 ft/min (provided torque/engine limits are not exceeded). Note operation of ALT PRE mode recording any overswing.

Altitude alert light illuminates (if installed) 1000 ft before selected altitude.

ii) a) After stabilising at selected altitude increase collective to increase altitude. Alert light should illuminate at 250 ft deviation and tone should also be heard (if fitted).

b) Repeat a) with 250 ft reduction in altitude.

13.10 4-WAY CYCLIC SWITCH

Deselect any flight director modes.

i) At 120 KIAS check correct operation of fore/aft movement of cyclic switch in attitude mode (approximately 2°/second).

ii) Repeat with lateral movement:

a) Release switch below a roll angle of 6° from level - check aircraft returns to wings level.

b) Check that above 6° the roll attitude is maintained.

13.11 4-WAY COLLECTIVE SWITCH

Engage IAS/ALT/HDG, feet off pedals.

i) At cruise speed check ball centres with lateral movement.

13.12 SAS MODE

At a typical cruise speed check operation in SAS mode during straight flight and turns.

13.13 AFCS OUT

At 120 KIAS disengage the AFCS. Carry out turns, climbs and descents. Check smooth disengagement/ re-engagement.

13.14 ILS (Optional Test)

Carry out a coupled ILS (3 cue) at 120 KIAS. Check correct operation of auto level and go-around mode.

13.15 GO-AROUND MODE

a) Align the heading bug with present heading.

b) Set up 120 KIAS, 700 fpm descent (IAS/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 disengages HDG, commands wings level (and then constant heading) at 75 KIAS or more at 700 to 750 fpm climb.

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

14. **PITCH BIAS ACTUATOR (IF FITTED)**

a) Place the AFCS indicator selector knob in the PBA position. Establish level flight at 120 KIAS. Note that both indicator needles are in the same positions and approximately centred.

b) Smoothly lower the collective. Note that the command (CH 2) needle moves aft (right) followed by the actuator (CH 1) needle. Aircraft pitch attitude should remain constant.

c) Raise the collective and note forward (left) movement of the command and actuator needles. Pitch attitude should remain constant.

15. **FUNCTIONING**

15.1 Heating and Ventilation

Check that the heating can be satisfactorily controlled and that the ventilation is adequate.

15.2 Landing Gear

With gear up record speeds at which landing gear warning system operates by reducing speed then increasing speed. LDG GEAR UP caution light - ON. Warning tone should be heard in headset. Reset tone. System should trigger at 65± 7 knots. **For 5x6 EFIS** equipped aircraft carry out with pilot's DH bug set to 150 ft, tone and annunciator light come on at less than 60 kts.

At 130 KIAS record:	Extension time	
	Retraction time	

Maximum time 15 seconds

16. **AUTOROTATION HANDLING**

See Paragraph 17 for measurement of rotor RPM in autorotation.

Carry out a gentle entry to autorotation at 75 kts.

Check handling/vibration levels in turns left and right to 30° AOB in autorotation. [ ]

17. **AUTOROTATION RPM**

17.1 After reducing weight to approximately 9000 lbs* carry out a steady autorotative descent at 80 kts with the collective lever fully down and gear up. Record the following when stabilised.

***** If 9000 lbs cannot be achieved on heavy empty weight aircraft, carry out an autorotation at low weight with collective applied as necessary to contain the Nr within limits. Provided Nr is not below the scheduled value for 9000 lbs the rigging is assumed to be acceptable.

NOTE : Do not exceed power off rpm limits (115).

PRESS ALT	***OAT***	***N_R***	***FUEL***		***WEIGHT***

Satisfactory needle split. (It may be necessary to slightly retard the engine levers to achieve this). [ ]

18. **LANDING**

Time [ ]

18.1 Confirm no tendency to 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.

Fuel quantity [ ]

Totaliser reading [ ]

The totaliser reading should agree to within 5% of the actual amount consumed.

18.2 Cabin Address System (If fitted)

Operate cabin address system and ensure it functions adequately for use in directing an emergency evacuation.

18.3 Emergency Load Shed

AC generator on line.

Switch off both DC generators and check that both DC GEN and BUS TIE lights illuminate. Switch from NORMAL to SHED (If aircraft fitted with load shed system) and check essential services maintained by battery.

Switch both DC generators back on.

18.4 Retard each engine in turn to idle stop.

	ENG.1	ENG.2
N1 at ground idle 50% ± 2%		
T5 at ground idle		

18.5 Internal and External Lighting

Internal

Flight Instrument Lights	
Secondary lights (glareshield)	
Lower console lights	
Standby compass and OAT lights	
Cockpit floodlight	
Wander light and cabin dome lights	

External

Anti-collision lights	
Position lights	
Search light	
Landing light	
Strobe lights	

18.6 Emergency Radio/Intercom Systems

The S-76C+ can be fitted with different intercom systems; carry out the check for the appropriate system. *If some of the following tests do not apply, a test must be devised to at least ensure the functioning of the pilot's emergency radio transmit/receive.* Note that it may also be necessary to pull CB PS SIGN PLT ICS. These tests cannot be carried out on internal battery.

a) Check the function of the auxiliary ICS system as follows:

Pull CB ICS Pilot on No.2 DC Pri Bus.

Each Pilot to confirm proper operation of:-

- Receive audio
- Transmit audio
- Intercom, including hot mic operation
- Direct audio warnings

Pull CB ICS Co-pilot on DC Ess Bus

- Check Co-pilot station box is inoperative.
- Check Pilot station box continues to operate.
- Select AUX TALK/EMERG on Co-pilot station box, ensure proper operation is restored.

Reset CB ICS Co-pilot on DC Ess Bus, select NORM TALK on Co-pilot station box.

Pull CB ICS Pilot on DC Ess Bus.

Check Pilot station box remains operative.

Pull CB PS SIGN PLT ICS

- Check Pilot station box is inoperative.
- Check Co-pilot station box continues to operate.
- Select AUX TALK/EMERG on Pilot station box, ensure proper operation is restored.

Select NORM TALK on Pilot station box.

Reset CB ICS Pilot on No.2 Pri Bus.

Pull CB ICS Co-pilot on DC Ess Bus.

- Check Co-pilot station box is inoperative. [ ]

- Check Pilot station box continues to operate. [ ]

- Select AUX TALK/EMERG on Co-pilot station box, ensure proper operation is restored. [ ]

Select AUX TALK/EMERG on Pilot station box.

- Check Pilot station box is inoperative. [ ]

Reset CB ICS Pilot on DC Ess Bus.

Reset CB ICS Co-pilot on DC Ess Bus.

Select NORM TALK on Pilot station box.

Select NORM TALK on Co-pilot station box.

b) Select AUX LISTEN/EMERG on Pilot station box, check:

- Receivers can be heard one at a time as selected, with priority left to right if more than one is selected. [ ]

- Volume control from receiver only. [ ]

- Pilot intercom tels (headset earpiece) are inoperative. [ ]

- Transmit function operates. [ ]

Select Pilot station box to NORM LISTEN.

c) Repeat with AUX LISTEN/EMERG on Co-pilots station box (note that co-pilot intercom tels are then inoperative). [ ]

d) Single Pilot Emergency ICS

Connect Pilot headset to EMER ICS socket on centre console.

Pull CB ICS Pilot on No. 2 DC Pri Bus.

Pull CB ICS Pilot on DC Ess Bus.

Pull CB ICS Co-pilot on DC Ess Bus.

Select ICS switch on centre/overhead console to EMERG.

Ensure VHF 2 can be operated normally using Pilots floor mounted or cyclic PTT switch. [ ]

Reset all CB's

Select NORM on centre console ICS switch.

i) **Andrea System**

Check the function of the auxiliary ICS system as follows:-

a) Pull CB ICS Co-pilot on DC Ess Bus.

Check Co-pilot station box is inoperative. [ ]

Check pilot station box continues to operate. [ ]

Select AUX TALK on Co-pilot station box, ensure proper operation is restored. [ ]

Reset CB ICS Co-pilot on DC Ess Bus, select NORM TALK on Co-pilot station box.

b) Pull CB ICS Pilot on DC Ess Bus.

Check Pilot station box is inoperative. [ ]

Check Co-pilot station box continues to operate. [ ]

Select AUX TALK on Pilot station box, ensure proper operation is restored. [ ]

Reset CB ICS Pilot on DC Ess Bus, select NORM TALK on Co-pilot station box.

c) Select AUX LISTEN on Pilot station box, check:-

- Radio receivers can be heard one at a time as selected with priority left to right if more than one is selected. [ ]
- Volume control from receiver only. [ ]
- Pilot intercom tels (headset earpiece) are inoperative. [ ]
- Transmit function operates. [ ]

Select Pilot station box to NORM LISTEN.

d) Repeat with AUX LISTEN on Co-pilots station box (note that co-pilot intercom tels are then inoperative). [ ]

ii) **Honeywell AV850 Audio System**

a) Pull CB Pilots ICS on DC ESS Bus

Check Pilot station box continues to operate.

Check Co-pilot station box continues to operate.

Select EMERG on Pilot's station box.

No.2 COMM only should be operative (Tx/Rx) to pilot. All other audio inoperative.

Deselect EMERG and reset CB.

b) Pull CB Co-pilots ICS on DC ESS Bus.

Check Co-pilot station box is inoperative.

Check Pilot station box continues to operate.

Select EMERG on Co-pilot's station box

No.1 COMM only should be operative (Tx/Rx) to co-pilot. All other audio inoperative.

Deselect EMERG.

c) Unplug Pilot's headset and plug into centre pedestal EMERG ICS socket and select EMERG on NORM/EMERG pedestal switch.

No.2 COMM should be operative (Tx/Rx), by pilot only, with foot switch regardless of station box selections, no other audio available.

Pull CB Pilots RMU on No.2 PRI DC Bus.

Select EMERG at CDU (Clearance Delivery Unit) and check No.2 COMM is operative as controlled by CDU.

Return headset to normal jack, all switches to normal and reset CB.

iii) **Baker 1045 Audio System**

a) Pull CB Pilots ICS on No.2 PRI DC Bus.

Check Pilot's and Co-pilot's intercomm and audio operative.

Pull CB Pilots ICS on DC ESS Bus.

Check Pilot's audio inoperative.

Check Co-pilot's audio continues to operate.

Select EMERG on Pilot's station box

Check COMM 1 and 2 in turn for correct operation (Tx/Rx) by pilot.

Reset CB's

Pull CB Co-Pilots ICS on DC ESS Bus.

Check Co-pilot's audio inoperative.

Select EMERG on Co-pilot's station box.

Check COMM 1 and 2 in turn for correct operation (Tx/Rx) by co-pilot.

Unplug pilot's headset and plug into centre pedestal EMERG ICS socket and select EMERG on NORM/EMERG pedestal switch.

No.2 COMM should be operative (Tx/Rx), by pilot only, with foot switch regardless of station box selections, no other audio available.

b) For aircraft fitted with Honeywell radios:
Pull CB Pilots RMU No.2 PRI Bus. CDU (Clearance Delivery Unit) should continue to control No.2 COMM.

Return headset to normal socket.
Return all switches to normal. Reset all CB's.

19. **SHUTDOWN**

19.1 T-handle Checks

Complete Pre Shutdown Checks

a) Check both DC generators ON, the Fire Extinguisher Test switch OPEN, and both engine levers at FLY.
MASTER START ON **Autopilot OFF**

CAUTION

If an internal engine fire occurs as indicated by a rapid increase in T_5, immediately pull engine lever fully OFF and engage starter to minimise high T_5 and put out fire.

If a bay or baggage fire is indicated, the Extinguisher Test switch must be re-selected to NORM.

b) Retard No 1 engine lever to IDLE (in normal). Retard slightly to activate engine out warning.
Note N1 for Engine Out Light. (48%)

c) Pull the No.1 T-handle back one inch, observe the No. 1 DC GEN Caution Light goes ON, continue pulling the No.1 T-handle back fully at no greater than 1 inch per second to shutdown the No.1 engine.

Shutdown should be immediate when T-handle is fully aft.
With T5 less than 350° reset No1 1 T-handle and advance the engine lever to FLY to extinguish the Mixed Mode light. Retard the lever to STOP
Reset fuel lever to Direct.

d) Restart No. 1 engine to FLY. Repeat check (b) for the No.2 T-handle.
Note N1 for Engine Out Light

e) Shut down No. 1 engine. Apply rotor brake below 65% NR, check for smooth operation and normal characteristics.

With shutdown confirmed and T5 less than 350°, reset No 2 T-handle and advance the engine lever to FLY to extinguish the Mixed Mode light. Retard the lever to STOP.

Note faults correctly identified.

Reset extinguisher test switch to NORM.

e) With both engines shutdown have ground personnel inspect for leaks or other discrepancies.

20. POST FLIGHT ACTION

20.1 Performance Climb

Plot out the data on the analysis sheet (Appendix 4) and determine the achieved rate of climb for each engine. The scheduled performance must be obtained from Appendix 5, compared with the achieved performance and results recorded on the front page.

20.2 Autorotation RPM

Determine the scheduled rotor speed in autorotation ((Flight Check Procedures Manual) and compare with the achieved value.

Actual NR - Scheduled NR =

20.3 Engine Power Assurance

Determine power margin from Section 2 of the Flight Manual.

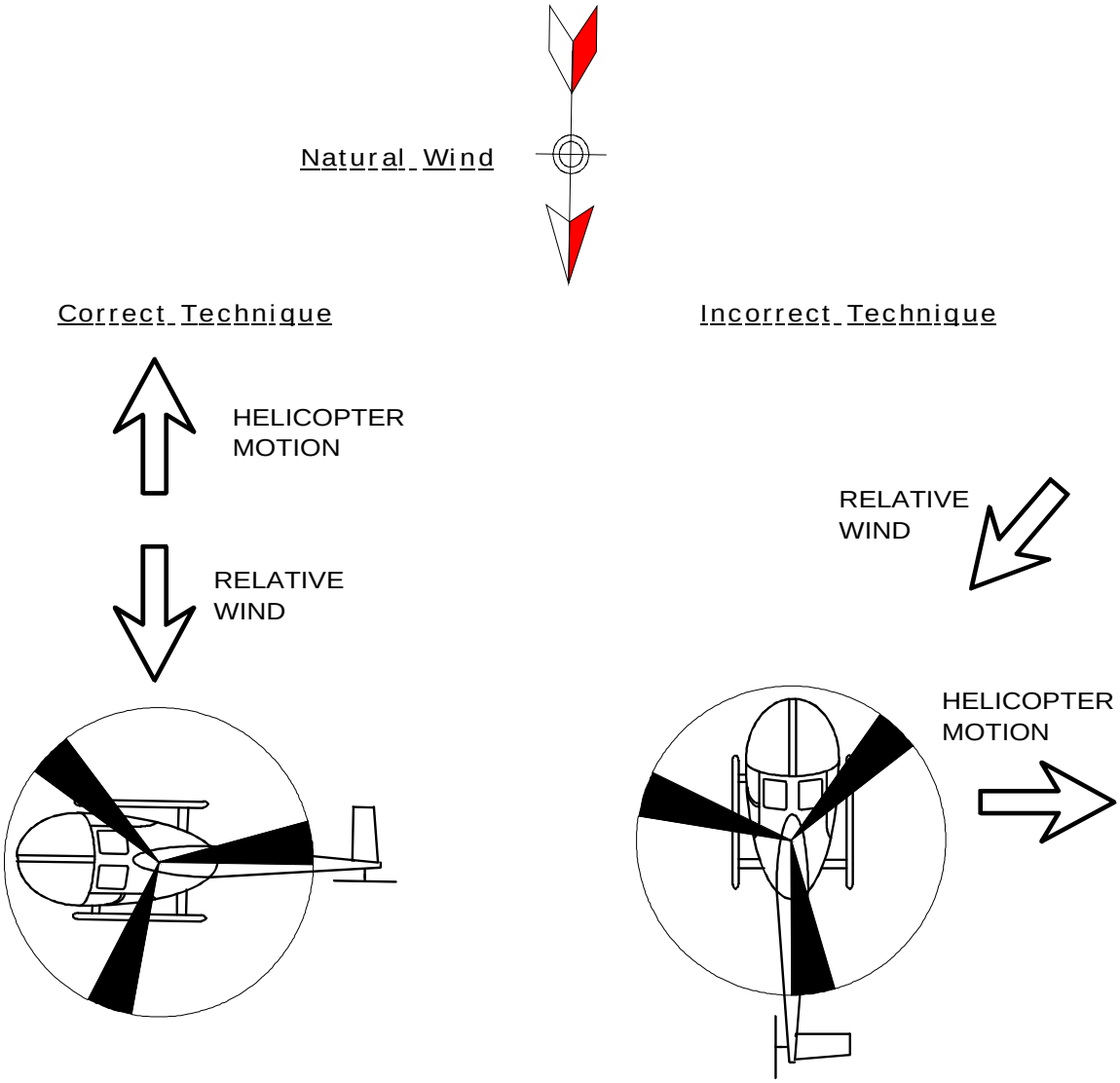
ENGINE	***DDR/IIDS POWER MARGIN***	***DDR/IIDS T_5 Margin***	***'Manual' POWER MARGIN***	***'Manual' T_5 Margin***
1				
2				

APPENDIX 1

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.



APPENDIX 2

ADDITIONAL CHECKS FOR HAMILTON STANDARD PHASE III AP

1. AIRSPEED HOLD

i) a) From trimmed level flight at 120 KIAS with fixed collective and heading hold, move cyclic aft against trim and establish approximately 100 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 V_{NE}).

ii) Check A/S light extinguishes below 45 KIAS (use cyclic beeper trim).

2. HEADING HOLD

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

ii) At 120 KIAS in level flight with feet off the pedals slowly increase and decrease collective to give ±5% torque change, check heading maintained.

3. TURN CO-ORDINATION

i) At 120 KIAS level flight, feet lightly on pedals carry out turns left and right at 30° angle of bank. The slip ball may go as much as ½ ball width out but should be centred when established in the turn.

ii) Check turn co-ordination inoperative below 60 KIAS.

4. AUTO SHUTDOWN

Check that switching off a pitch channel when manoeuvring in pitch results in an AUTO SHUTDOWN light.

Repeat in roll.

APPENDIX 3

ADDITIONAL CHECKS FOR SPERRY HELIPILOT

1. ALTITUDE HOLD

i) At a normal cruise speed 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.

iii) a) Engage VS mode and select a rate of climb of 500 fpm at 120 KIAS. 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.

2. AIRSPEED HOLD

i) a) From trimmed level flight at 120 KIAS with fixed collective and heading hold, move cyclic aft against trim and establish approximately 110 KIAS. Release cyclic and check that the aircraft smoothly returns to the trimmed condition ± 5 kts.

b) Repeat with forward cyclic to 130 KIAS (do not exceed V_{NE}).

3. HEADING HOLD

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

ii) At 120 KIAS in level flight with feet off the pedals slowly increase and decrease collective to give a ± 10% torque change, check heading maintained.

4. SAS MODE

At a typical cruise speed check operation in SAS mode during straight flight and turns.

5. ILS (Optional)

Carry out a coupled ILS at 120 KIAS. Check correct operation of auto level and go-around mode.

6. Go-Around Mode

a) Align the heading bug with present heading.

b) Set up 130 KIAS, 500 fpm descent (IAS/VS mode).

c) Engage HDG mode.

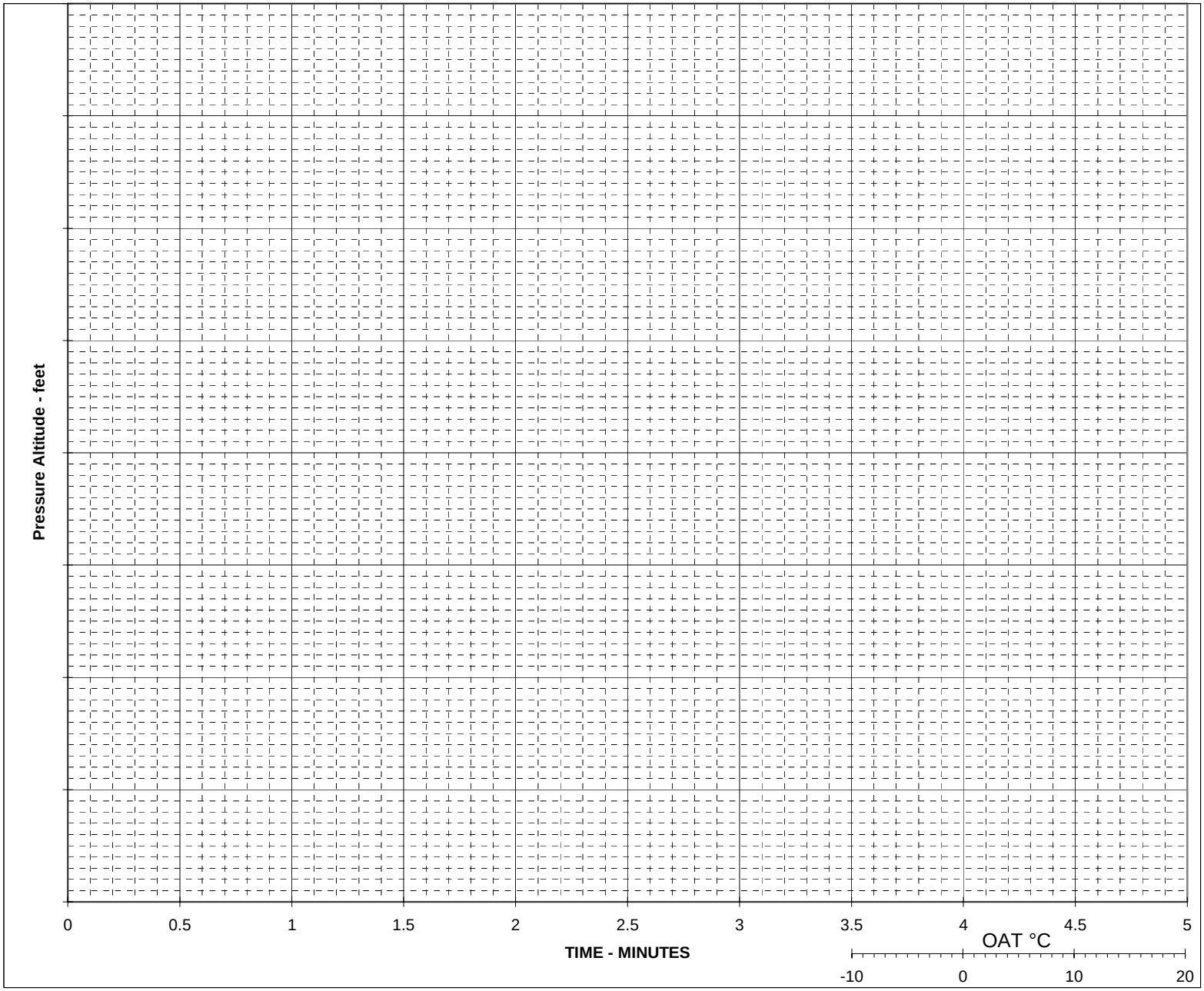
d) Rotate heading bug left or right 90° to establish 20° to 25° bank angle.

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

f) Check GA commands wings level (and then constant heading) and 750 fpm climb.

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

Performance Climb Analysis Sheet



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

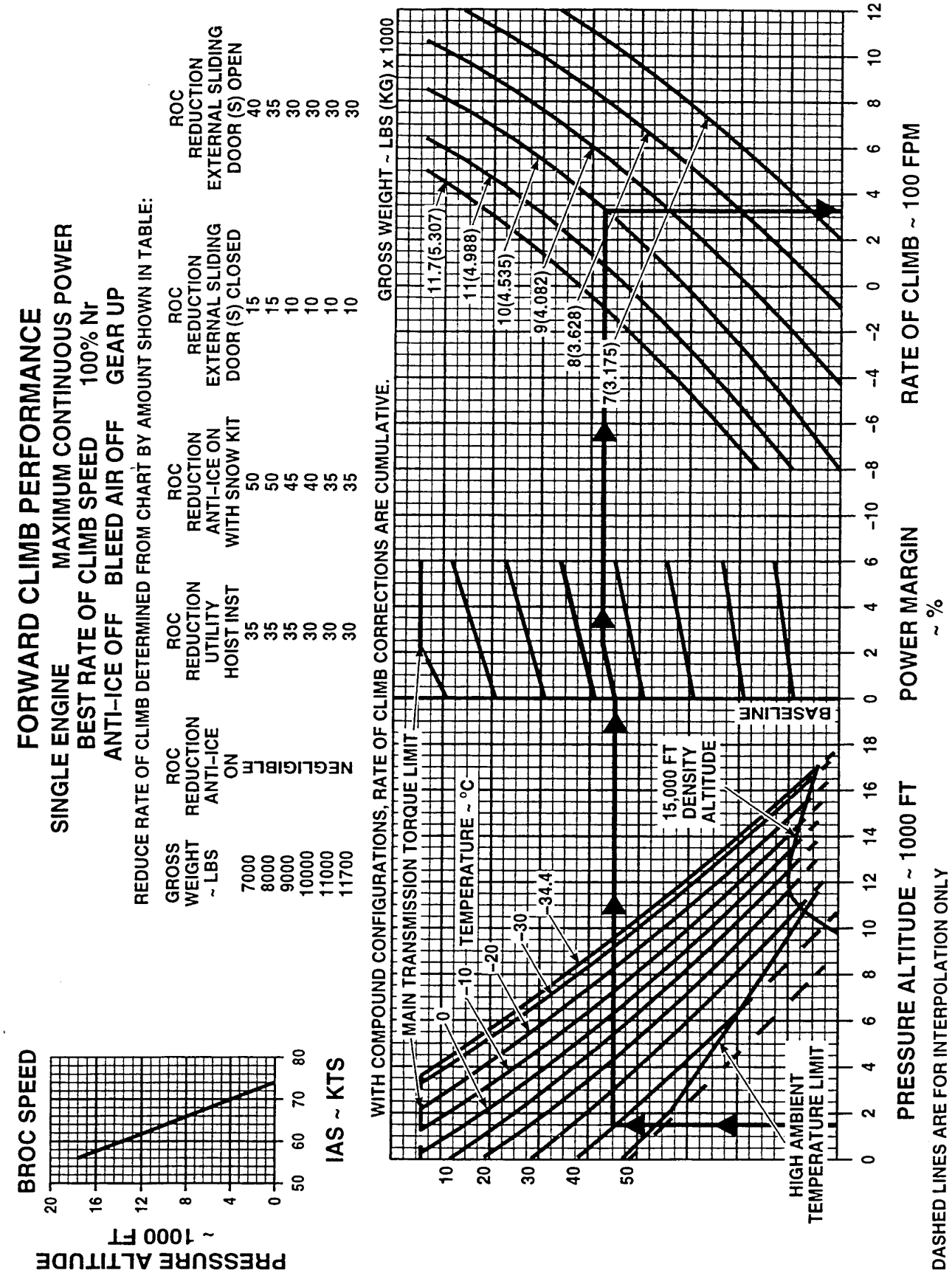


Figure 4-11. Forward Climb Performance - Single Engine, Maximum Continuous Power

Maximum Continuous Power