CHECK FLIGHT CERTIFICATE

Westland S.55 Series 3 Helicopter **CFS 099 Issue 1**

Date:	Crew:	Observer:	Registration:

Performance Climb #1

Average Weight			
Average Altitude			ft
Average Temp.			°C
Speed			KIAS
Achieved Rate			fpm
Scheduled Rate			fpm
Margin			fpm
Permitted Margin	-70		fpm

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 check flight certificate given in the schedule.
Registration: If the aircraft is not on the UK register, add the manufacturer's 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 check flights on 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 a check flight 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

WESTLAND S55 SERIES 3 HELICOPTER **CFS 099 Issue 1**

Registration	
Flight Date	

INTRODUCTION

This schedule is applicable only to Westland S55 Series 3 helicopters qualifying for renewal of Certificates of Airworthiness. It is based on the assumption that the everyday operation of the helicopter serves as a continuous check on the functioning of all normal services. On these check flights however, the crew are expected generally to monitor the behaviour of all equipment and to report any unserviceable items. In addition to completing all the required tests in the schedule, any characteristics which are considered unsafe or undesirable must be recorded.

MINIMUM CREW

The minimum flight crew shall be increased by one observer to record the results of the tests. The pilot conducting the tests shall be specifically approved by the CAA(SRG) for carrying out check flights on Westland S55 Series 3 Helicopters.

PASSENGERS

While it is legal to carry passengers on a test flight of an aircraft with a valid Certificate of Airworthiness, the practice is not recommended. If passengers are carried, however, they should be informed that the risk is greater than on an ordinary flight.

CHECK FLIGHT SCHEDULE

The pilot conducting the tests must be familiar with the contents of this schedule before flight. All members of the required minimum crew must be provided with copies of the schedule for use in flight.

1. PRE-FLIGHT INFORMATION

Record: Total airframe hours	
Engine Serial No.	
Hours run	
Log book final test shaft horse power at maximum take-off and maximum continuous power conditions.	

2. LOADING

The helicopter is to be loaded to 8000 lb, with the CG in the most forward position so that, at all times during flight, the CG does not exceed the forward limit as qualified in the limitations of the Flight Manual. The actual weight and CG must be recorded.

3. GROUND TESTS

3.1 Carry out a normal start in auto using internal batteries.

Record:

Checks at idling speed (automatic speed control)

Compressor System speed:	14200 ± 500 rpm	
Engine oil pressure:	15 psi min	
Power turbine inlet temp:	450°C Max	
FLT. INST. NORMAL switch OFF	INVERTOR FAILURE magnetic indicator white. Instruments continue to function.	
Fuel Flow:		

3.2 Rotor Starting

Acceleration under automatic speed control:
The rotor brake must be released before advancing the SPEED SELECT lever to the GOVERNED RANGE. Initial relationship between Compressor System rpm and lever travel is coarse and care should be taken to avoid too rapid rotor acceleration. After a rotor speed of approximately 185 rpm is attained there is a dead band in lever travel before any further increase in rotor speed occurs. On release of the rotor it should be noted that a check should be made that oil pressure registers on the MRG gauge. The lever must be moved slowly but progressively to the fully forward setting.

Note:

If the rotor brake has not been released the compressor system speed will "freeze" during initial acceleration. In this event, set:

a)	SPEED SELECT lever	IDLING
b)	FUEL COMPUTOR switch	Off. Wait approx 10 secs, then set ON again.

The compressor system speed will reduce to idling rpm. Then release the rotor brake and again advance the speed select lever to the governed range.

3.3 Selection of Rotor Speed

It should be possible to select 220-222 rotor rpm with the SPEED SELECT lever fully forward in the governed range with collective pitch lever fully down.

Note: Rotor rpm at which transmission oil pressure warning light goes out. | |

3.4 Full Checking of Manual Speed Control

The following procedure should be followed for checking the manual twist grip control and may be carried out with the aircraft tethered.

a) Select maximum rotor speed at minimum pitch in automatic speed control, ie., speed select lever fully forward to give 220-222 rotor rpm.
b) Move manual changeover lever to manual (Check GOVERNOR MANUAL MAGNETIC indicator – white). Note stability of rotor rpm.
c) Operate manual twist grip throttle and collective pitch lever carefully in either direction, maintain rotor speed.
d) Return to minimum pitch at 220-222 rotor rpm.
e) Ensuring that speed select lever is still fully forward press the PUSH TO AUTO control (GOVERNOR MANUAL magnetic indicator – black). Note stability of rotor rpm.

3.5 Check Controls in Manual and Functioning of the Servo Systems

4. TAXYING

Check ease of ground manoeuvring, and brakes for satisfactory functioning and freedom from binding.

5. TAKE-OFF

As soon as possible after unstick, maintaining take-off power,

Record:	
Compressor rpm:	
Fuel flow:	
Engine oil pressure:	
Main reduction gear box oil pressure:	
Engine and main reduction gear box temperature:	
Power turbine inlet temperature:	
Main gearbox oil temperature:	

6. HANDLING

A qualitative assessment of the control characteristics and of the response of the aircraft and engine to control movement should be made under the following flight conditions. During these tests a qualitative check should also be made on the vibration level of the aircraft.

6.1 Hovering

Record power to hover within the ground cushion	
and ability to turn through 360° in either direction; check sideways and backward flight.	SAT/UNSAT
Check for regular fluctuations of compressor system speed (3 secs per cycle), particularly under low power conditions. The amplitude should not exceed ±250 compressor system rpm.	SAT/UNSAT

6.2 Maximum Speed

Increase speed at 1 hour power to the maximum permissible forward speed as shown in Figure 2-3 f the Flight Manual. Check all controls gently for satisfactory functioning.	SAT/UNSAT

6.3 Steep Turns

Carry out steep turns to port and to starboard at 55, 65 and 75 knots IAS at approximately 2000 feet altitude.	SAT/UNSAT

6.4 Collective Pitch

Check changes of collective pitch.	SAT/UNSAT

6.5 Autorotation

Transition to autorotation at 2000 ft and at top of performance climb speed select lever forward at 75 knots down to 50 knots IAS. Needles must split between 226 and 230 rotor rpm.	SAT/UNSAT
Check auto revs at 50 knots at 1000 ft 1013 m/b altitude setting	
Note engine idling revs.	
Note any engine instability during the descent.	SAT/UNSAT
Needles split condition should be achieved by 230 rotor rpm max.	SAT/UNSAT
The compressor system rpm which produces 227 rotor rpm in auto speed control is to be noted.	
Also, in manual speed control note compressor system rpm when needles join at 227 rotor rpm.	

6.6 Auto/Manual Engine Control

In level flight at 2000 ft alt 80 knots IAS carry out an auto/manual engine speed changeover. **Note:** Rotor rpm and IAS before changeover.	
On the changeover there should be no excessive change in rotor rpm but a characteristic of the changeover mechanism may cause a change in rotor speed of 18-20 rpm (max) on the ground at minimum pitch after changeover to "manual speed control", with proportionately lower speed changes at higher powers. This should be corrected at twist grip control.	SAT/UNSAT

Note: The twist grip must not be moved until after changeover, but as the rate of change of rotor speed is slow, ample time is available for correction.

Note: While still in manual, operate throughout power range (auto-rotate to maximum climb power).

Carry out a transition to autorotation from 2000 ft alt 75 knots IAS down to 50 knots IAS. Check auto revs at 1000 ft (230-232)	
and flight idle stop compressor system rpm (18500).	
In level flight at 2000 ft alt 80 knots IAS carry out a manual/auto computer changeover. Procedure as follows: Set IAS and match rotor rpm to that previously recorded (see underlined section); execute changeover. There should only be a slight fluctuation of rotor rpm on changeover.	SAT/UNSAT

6.7 Landing

Check the controls for response, position, range of movement, and the general effectiveness on approach to land.	SAT/UNSAT

6.8 Computor Response Checks

6.8.1	Carry out a slow and snatch takeoff to hover. The slow take-off should produce a rotor rpm which follows the static droop line. The maximum transient droop in the snatch takeoff should be not less than 212 rotor rpm.	SAT/UNSAT
6.8.2	Autorotate from 1000 ft altitude at a speed of 55 knots (needles just joined) and recover using 1 sec rate of pitch application to approx 500 lb/hr fuel flow. There must be no unacceptable transient droop under these conditions (205 min rotor rpm).	SAT/UNSAT
	Check time from initiation of recovery to a stabilised rotor rpm.	
6.8.3	If test 2 is satisfactory carry out a quick stop in level flight from 80 knots IAS or V_{NO}, and recovery when the ASI reaches zero and the aircraft starts to sink, with a not more than 2 sec application of pitch to a predetermined position. (Approx 500 lb /hr fuel flow). The transient droop must not cause rotor speed to fall below 205 rpm.	SAT/UNSAT
	Check time from initiation of recovery to a stabilised rotor rpm.	
	To determine whether 720 shp was actually used on recovery the friction damper should be on the pitch lever and allowed to remain in the recovery position until the fuel flow has stabilised and can be observed.	SAT/UNSAT
6.8.4	Check stability of computer in all conditions from full power to autorotation.	SAT/UNSAT

7. FUNCTIONING TESTS

Controls	A general check of the flying controls at a series of speeds for friction, backlash, heaviness and trim.	SAT/UNSAT
Fuel System	Check general operation and fuel gauges, booster pumps, etc.	SAT/UNSAT
Electrical System	Check generator and voltage regulator (by observation of voltmeter), and all electrical equipment.	SAT/UNSAT
Radio Equipment	Carry out routine radio checks.	SAT/UNSAT
General	Check seat adjustment and safety belts, window and doors for security and operation, and all instruments, gauges and equipment not specifically mentioned.	SAT/UNSAT

8. PERFORMANCE

8.1 For the purpose of measuring the rate of climb, altimeter readings must be recorded against time at intervals of ½ minute from the instrument set at 1013 mbs. Fuel flow readings and air temperatures should be recorded at approximately ½ minute intervals. Other engine characteristics should be recorded early in the climb and any variation with time should be noted. The fuel contents at the time of climb must be established either by fuel gauge readings or by time and consumption calculation, in order to determine the weight of the aircraft. Care must be taken to ensure that the initial times and altitudes are recorded only when the aircraft has settled in the climb and the airspeed should then be kept within ± 2 knots. The climbs should not be carried out in or near cloud or turbulent air and a steady heading should be maintained throughout.

The results should be compared them with the relevant information in the Flight Manual for the aircraft. Due allowance will be made for random variations which may bring the test results below the scheduled performance. If weather conditions prevent the climbs being carried out at the heights stated more suitable altitudes may be selected. Record the result on the Flight Check Certificate.

8.2 Climb En-route – From Approximately 1000 ft for 5 minutes

The aircraft is to be climbed at 55 knots IAS as given in the Flight Manual, Page 24. The engine is to be operated at the lesser of maximum continuous rating or maximum fuel flow. The resultant rate of climb should be compared with that shown at the appropriate weight, altitude and temperature on Figure 5-9 of the Flight Manual.

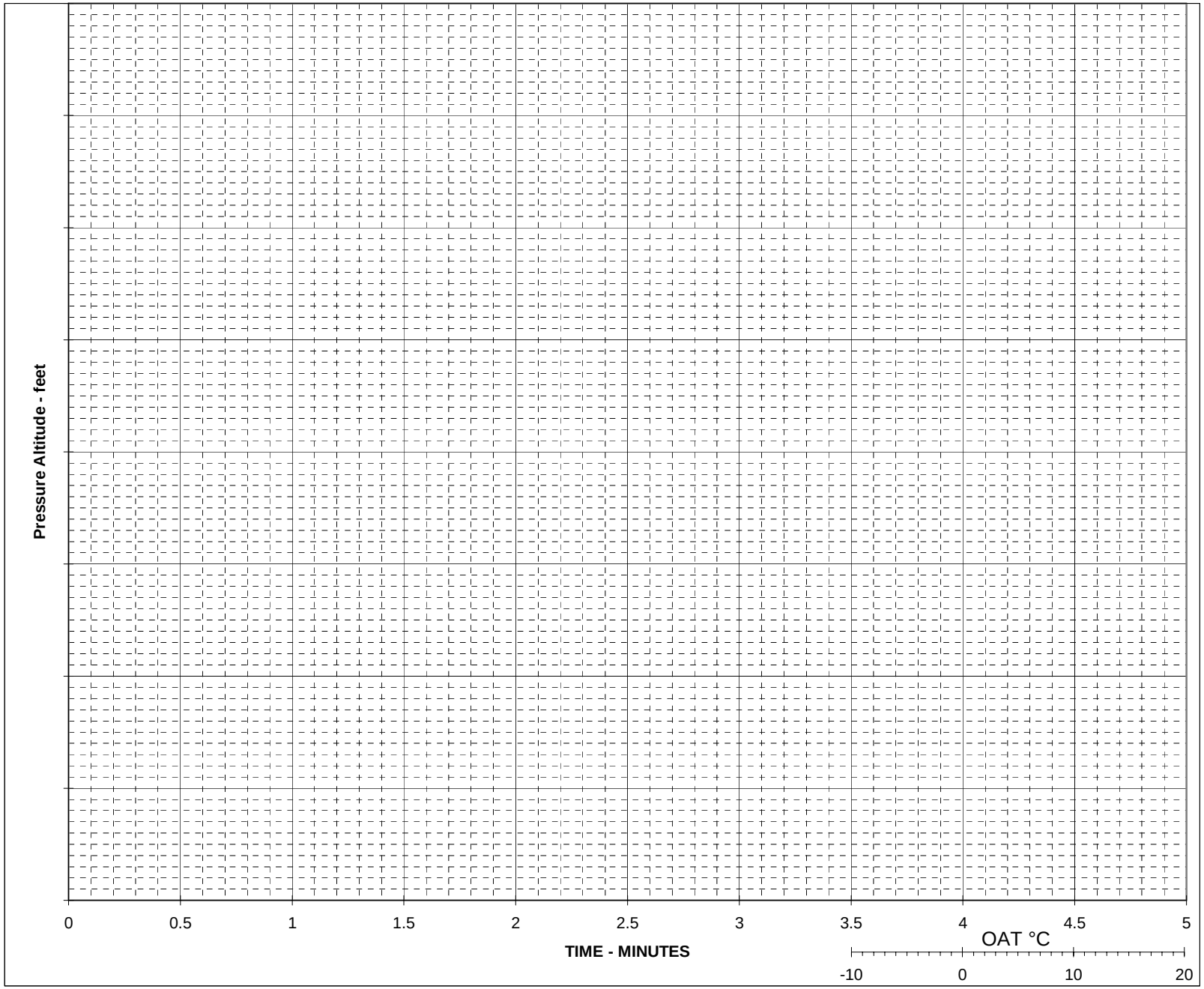
Fuel Contents at start

Time (mins)	Alt (ft)	OAT (°C)	Compressor RPM (%)	Fuel Flow (lbs/hr)	Turbine Inlet (°C)	Gearbox Oil Temp (°C)	Engine Oil	
							Temp	Press
0								
0.30								
1.00								
1.30								
2.00								
2.30								
3.00								
3.30								
4.00								
4.30								
5.00								

Fuel Contents at end

9. GENERAL

This schedule has been drawn up for land undercarriage machines. However, if pontoons are fitted the test may still be carried out and the appropriate limitations as laid down in the Flight Manual are to be observed, together with associated performance information.



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