AW139
STANDARD OPERATING PROCEDURE

MULTI-PILOT OPERATIONS (VFR & IFR)

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The listed Chapters are included in issue 001, dated 2012-01-13, of this publication.

N = New data module, R = Revised data module, D = Deleted data module.

Updated text is highlighted by a black bar in the outer margin.

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HIGHLIGHTS

Record Issues:

Issue 001: 2012-01-13

The listed changes are introduced in Issue 001, dated 2012-01-13, of this publication

Chapter Code	Reason For Update

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LIST OF ACRONYMS

a.c./AC: Alternating current
ACLCD: Active Liquid Crystal Displays
ADC: Air Data Computer
ADF: Automatic Direction Finder
ADLP: Data Link Processor
ADM: Air Data Module
ADS: Air data System
AEO: All Engines Operative
A/F: Airframe
AFCS: Automatic Flight Control System
AG: Accessory Gearbox
AGL: Above ground level
AHRS: Attitude Heading Reference System
ALS: Ambient light sensor
AMSL: Above Mean Sea Level
AP: Autopilot
ATS: Above Take Off Surface
ATT: Attitude retention
ATC: Air Traffic Control
AWG: Aural warning generator
BFO: Beat Frequency Oscillator
BL: Buttock Line
BOD: Bottom of descent
BOW: Basic operating weight
CAS: Calibrated Airspeed
CAS: Crew Alerting System
CAT: Category
C/B: Circuit breaker
CCD: Cursor Control Devices
CCW: Counterclockwise
CCP: Cockpit Control Panel
CG: Center of gravity
CLTV: Collective
CPI: Crash Position Indicator
CTO: Continued Take Off
CVR: Cockpit Voice Recorder
CW: Clockwise
DAU: Data Acquisition Unit
d.c./DC: Direct current
DEOS: Digital Engine Operating System
DFDAU: Digital Flight Data Acquisition Unit
DGPS: Differential global positioning system
DH: Decision Height
DICP: Display instrument control panel
DME: Distance Measuring Equipment
EAPS: Engine Air Particle Separator
EASA: European Aviation Safety Agency
ENAC: Ente Nazionale Aviazione civile
ECL: Engine control lever
ECS: Environmental Control System
ECU: Engine Control Unit
EDU: Electronic Display Unit
EEC: Electronic engine control
EFIS: Electronic Flight Instrument System
EGPWS: Enhanced Ground Proximity Warning System
ELT: Emergency Locator Transmitter
EMM: Engine Maintenance Manual
EOP: Engine oil pressure
EPU: Estimated position uncertainty
EXT: External
FAA: Federal Aviation Administration
FAF: Final Approach Fix
FCC: Flight Control Circuit
FCU: Fuel Computer Unit
FD: Flight Director
FDR: Flight Data Recorder
FMCW: Frequency-Modulated Continuous Wave
FMM: Fuel Management Module
FMS: Flight Management System
FOD: Foreign Object Damage
FOM: Figure of Merit
FTR: Force Trim Release
FWD: Forward
GA: Go-Around
GC: Guidance controller
GI: Ground idle
GPS: Global Positioning System
GS: Ground Speed
GW: Gross Weight
HCB: Heating Control Box

Hd:	Density altitude
HF:	High frequency
HIGE:	Hover in ground effect
HOGE:	Hover out of ground effect
Hp:	Pressure altitude
HPS:	Hydraulic Power Supply
HSI:	Horizontal situation indicator
H-V:	High Velocity
IAS:	Indicated Air Speed
ICS:	Intercommunication system
I.D.S.:	Integrated Display System
IGB:	Intermediate gearbox
IFR:	Instrumental Flight Rules
IGE:	In ground effect
IGS:	Instrument guidance system
ILS:	Instrument landing system
ISA:	International Standard Atmosphere
ITT:	Interturbine temperature
JAR:	Joint aviation regulation
KCAS:	Calibrated airspeed in knots
KIAS:	Indicated airspeed in knots
LAT:	Lateral
LCF:	Low Cycle Fatigue
LDA:	Landing directional aid
LDP:	Landing Decision Point
LDP_V:	Variable Landing Decision Point
LG:	Landing Gear
LGCP:	Landing Gear Control Panel
LH:	Left hand
LOC:	Localizer
LONG:	Longitudinal
LSS:	Lightning Sensor System
MAN:	Manual override system
MAU:	Modular Avionic Unit
MCDU:	Multifunction Control Display Unit
MCL:	Master Caution Light
MCP:	Maximum Continuous Power
MDA:	Minimum descent altitude
MEC:	Mechanical
MFD:	Multifunction Flight Display
MFR:	Manufacturer
MGB:	Main Gearbox
MLG:	Main Landing Gear
MLS:	Microwave landing system
MPOG:	Minimum pitch on ground
M/R:	Main Rotor
MRC:	Modular Radio Cabinet
MWL:	Master Warning Light
N1:	Gas generator speed
N2:	Power Turbine Speed
NAV:	Navigation
NF:	Power Turbine Speed
NG:	Gas generator speed
NLG:	Nose landing Gear
NR:	Rotor speed
NVG:	Night Vision Goggle
OAT:	Outside air temperature
OEI:	One Engine Inoperative
OR:	Operation range
PAX:	Passengers
PCM:	Power Control Module
PCMCIA:	Personal Computer Memory Card Interface Association
PEP:	Peak Envelope Power
PFD:	Primary Flight Display
PI:	Power Index Indicator
PLA:	Power Lever Angle (throttle)
PMS:	Power Management Switch
PWR:	Power
OEI:	One Engine Inoperative
OGE:	Out of ground effect
RAIM:	Receiver Autonomous Integrity Monitor
RCP:	Reconfiguration Control Panel
RFM:	Rotorcraft Flight Manual
RH:	Right hand
RICP:	Remote instrument control panel
RNP:	Required navigation performance
RoD:	Rate of Descent
ROC:	Rate of climb in ft/min
RPM:	Revolutions per minute
RTO:	Rejected Take Off
RTOD:	Rejected Take Off Distance
RTOM:	Rejected Take Off Mass
SAS:	Stabilization augmentation system
SDF:	Simplified Directional Facility
SID:	Standard instrument departure
SOV:	Shut-off Valve
S/N:	Serial Number
STA :	Station
STAR :	Standard terminal arrival route
TA :	Terrain Awareness

TAD :	Terrain/Obstacle Awareness Display
TAS :	True airspeed in knots
TAWS:	Terrain Awareness and Warning System
TBD:	To be defined
TCAS:	Traffic Alert and Collision System
TDP:	Take off Decision Point
TDP_E:	Extended Take off Decision Point
T-O:	Take-Off
TOC:	Top of climb
TOD:	Top of descent
TOP:	Take Off Power
TOT:	Turbine Outlet Temperature
TQ/TRQ:	Engine torque
TRSOV:	Tail Rotor Shut off Valve
TVC:	Temperature Control Valve
V_{BLSS}:	Balked Landing Safety Speed
VDR:	VHF - Data Radio
VFR:	Visual Flight Rules
VIDL:	VOR/ILS/Data Link
VMS:	Vehicle Monitoring System
VLO:	Maximum landing gear operating speed
VLE:	Maximum landing gear extended speed
Vmini:	Minimum airspeed for flight under IFR
VMO:	Maximum operating limit speed
VNE:	Never exceed speed
VOR:	Very high frequency omni-directional range
VSI:	Vertical speed indicator
V_{TOSS}:	Take Off Safety Speed
Vy:	Best rate of climb speed
W.A.T.:	Weight/Altitude/Temperature
WGT:	Weight
WOW:	Weight on Wheel
WX:	Weather Radar
Xfer:	Transfer
XPDR:	Transponder

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CHAPTER

01

INTRODUCTION

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INTRODUCTION

Standard Operating procedures (SOPs) are universally recognized as basic to safe aviation operations. In order to accomplish safe flying two major aspects stand as a gateway to safety. They are, 'effective crew coordination' and 'crew performance'.
These standard operating procedures are based on AgustaWestland policies and recommendations of engine manufacturers, international rules (JAA, ICAO, FAA, etc.), good airmanship and consolidated practices.
Strict adherence to suitable standard operating procedures (SOPs) and normal checklists is an effective method to:

- Prevent or mitigate crew errors;
- Anticipate or manage operational threats; and thus,
- Enhance ground and flight operations safety.

Without strict adherence to SOPs, the implementation of good crew resources management (CRM) practices is not possible.

AGUSTAWESTLAND' SOPS

Standard Operating Procedures (SOPs) published by Agusta are designed to achieve the following objectives:

- Reflect the Agusta' cockpit design philosophy and operating philosophy;
- Promote the optimum use of aircraft-type design features; and,
- Apply to a broad range of helicopter operations and operating environments.

The initial SOPs for a new aircraft model are based on the above objectives and on the experience gained during the development and certification flight-test campaign and during the route-proving program. After they are introduced into service, the initial SOPs are periodically reviewed and enhanced based on the feedback received from end users (i.e., feedback on use of SOPs in training and in line operations.

OPERATOR' CUSTOMIZED SOPS

Agusta' SOPs can be adopted without change by an operator or used as the basis for the development of customized company' SOPs. SOPs should be simple, clear, concise and directive; the level of expanded information should be tailored to reflect the company operating philosophy and training philosophy.
Operator's SOPs should be reviewed and reassessed periodically based on revisions of the Agusta' SOPs and on internal company feedback, to identify any need for change.
Line pilots and cabin crewmembers should be involved, along with the flight standards team, in the development and revision process of company SOPs to:

- Promote critical and constructive feedback; and,
- Ensure that rules and procedures, as well as reasons for their adoption are fully understood by end users.

SCOPE OF SOPS

SOPs should identify and describe the standard tasks and duties of flight-crew for each flight phase (i.e., *what-to-do* and *when-to-do*).

SOPs should be accomplished by recall but critical tasks (e.g., selections of systems and changes of aircraft configuration) should be cross-checked by use of normal checklists (i.e., for error detection and correction), according to the phase of flight.

SOPs should be supplemented by information on specific operating techniques (e.g., adverse weather operation) and by operational recommendations for specific types of operations (e.g., RNAV operation, EMS operation and/or NVIS).

SOPs should assume that all aircraft systems operate normally and that all automatic functions are used normally.

Note : *A system may be partially or totally inoperative (i.e., in accordance with the company Minimum Equipment List [MEL] without affecting the SOPs.*
SOPs should address and emphasize the following aspects :

- Task sharing (i.e., *who-should-do*);
- Optimum use of automation (i.e., *how-to-use*);
- Standards calls (i.e., *what-to-expect, what-to-observe*);
- Use of normal checklists;
- Approach and go-around briefings;
- Altimeter setting and cross-check procedures;
- Descent profile management;
- Terrain awareness;
- Threats and hazards awareness;
- Use of radio altimeter;
- Approach procedures and techniques for various types of approaches;
- Landing techniques for confined area or helipad and wind conditions; and, Readiness and commitment to go-around (e.g., GPWS warning, unstabilized approach).

REGULATORY REFERENCES

- ICAO – Annex 6 – Operation of Aircraft, Part I – International Commercial Air transport – Appendix 2, 5.9.
- ICAO – Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS, Doc 8168), Volume I – Flight procedures (Post Amendment No 11, applicable Nov.1/2001).
- ICAO – Manual of All-Weather Operations (Doc 9365).
- ICAO – Preparation of an Operations Manual (Doc 9376).
- JAR-OPS 3.1040 and associated Interpretative and Explanatory Material (IEM) – General Rules for Operations Manuals.
- FAR 91.3 – Responsibility and authority of the pilot-in-command (emergency authority).
- FAR 121.133 – Preparation of Manuals,
- FAR 121.135 – Contents of Manuals,
- FAA AC 120-71 - Standard Operating Procedures for Flight deck Crew Members (Draft).
- FAA AC 120-48 – Communications and Coordination between Flight Crewmembers and Flight Attendants.
- FAA AC 120-51 – Crew Resource Management Training.
- FAA AC 120-54 – Advance Qualification Training.
- FAA AC 120-71 – Standard Operating Procedures for Flight Deck Crewmembers.
- FAA AC 121-32 – Dispatch Resource Management Training.

TASK SHARING

The following procedures apply to any flight phase but are particularly important in the high-workload phases associated with takeoff, departure, climb and approach-and-landing.
The designation “C/M--1, C/M--2”, refer to the crew members’ physical location.
“C/M--1” is the right hand seat pilot (R), “C/M--2” the left hand seat pilot (L).
When the pilot in command is in a position other than the C/M-1 position, he will continue to exercise his command authority while performing the duties assigned to that crew position. The pilot in command will brief the other crew members to ensure that they understand the duties of their assigned position.

The **pilot flying (PF)** is responsible for controlling the vertical flight path and horizontal flight path, by either:

- Supervising the auto pilot (AP) vertical guidance and lateral guidance and the collective mode (HOV/SAR) operation (i.e., awareness of modes being armed or engaged, of mode changes through mode transitions and reversions and of selected guidance targets);or,
- Hand flying the aircraft, with or without flight director (FD) guidance and with or without ATT Mode (SAS) assistance.

The **non-flying-pilot (PNF)** has a dual role as pilot-not-flying and pilot monitoring; he/she is responsible for systems-related and monitoring tasks and for performing the actions requested by the PF; this includes:

- Radio communications;
- Systems selection / configuration;
- AP / FD and FMS mode selections and target entries, when PF is hand flying;
- Monitoring the status of the aircraft (e.g., configuration, attitude, speed, trajectory);
- Performing the actions called by paper checklists, in abnormal and emergency conditions; and,
- Monitoring the PF to provide effective cross-check and backup, as required (i.e., standard calls and excessive deviation callouts).

Note: *The non-flying-pilot should inquire PF actions that are not understood or considered inappropriate. He/she should also demonstrate assertiveness and express advocacy to share any concern on the flight progress.*
The industry recognizes that both the flying-pilot and the non-flying-pilot have a monitoring role.

PANEL SCAN DIAGRAM

The diagram below describes each crew member's area of responsibility and scan flow pattern for each panel.


CM 2 (L.H.S.)
CM1 (R.H.S.)

CHAPTER

02

CHECKLISTS AND PROCEDURES

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CHECKLISTS & PROCEDURES

This section contains the expanded normal checklists, drills and operating procedures for the AW139 helicopter. The cockpit checklist is reproduced at the end of this section, it covers all drills from Before Start to Shutdown. The cockpit normal checklist (NCL) is intended as a 'check list 'rather than an action list, that is to say that items may be carried out from memory provided they are then followed up by PNF reading the checklist and confirming with PF that all required actions have been completed. Once a checklist drill has been completed, PNF shall announce, e.g. ''(After Take Off) Checks Complete. As far as possible, the checklist indicates the expected response. The term ''As Reqd'' is used where there may be a choice of settings. In these cases, the actual setting is to be announced. The phrase ''As Required'' shall not be used as a response to a checklist item.

CHECKLIST HANDLING

The Captain shall ensure that the following basic guidance shall be complied with:

Company checklist procedure is to follow the 'Challenge and Response' principle:

Pre-start/Engine Start/Post Start/Shutdown checklist:

Challenge: PNF calls checklist item

Response: PF verbally acknowledges item

When the checklist is read, both pilots must be at their flight stations

The PF calls for the appropriate checklist section

The PNF reads the checklist and must report its completion

When the aircraft is parked and the rotors are not yet running, actions in response to the checklist should, as far as possible, be completed by the PF

With the rotors running, the PNF should, as far as possible, read and complete the relevant checklist

Reading and response of the items of the Cockpit, Before Starting, Taxi, Before Take-Off, Approach and the Final Checklist should always be done aloud, regardless which pilot completes the necessary action. The items of - the Cabin, After Engagement, Before Taxi, After Take-off, Cruise, After Landing, Hot Refuelling, Rotor Stop and the Shut Down Checklist may be completed by heart and checked afterwards by reading the relevant checklist; reporting its completion shall always be done aloud

The pilot not performing the action should check the responses and action to be correct

- In flight no checklist should be read below 300 ft AGL

NOTE: It is normal procedure to read the after takeoff checklist after 500ft AGL.

In order to monitor the level off at the cleared altitude, no checklist should be read during climb or descent if the difference between the actual altitude and the cleared altitude is less than 200 ft

During take-off and landing cockpit conversation should be limited to standard calls

Gear selections should be made by the PNF upon command of the PF (It's preferable that gear selections be made by the RH pilot)). Before making the selection, the PNF will satisfy himself that operating limitations and flight procedures allow the configuration change; if not, he will inform the PF accordingly. It should be briefed that any movement of switches on RH collective will be done by RH pilot.

On completion of a checklist section, the reader calls: '(appropriate) Checks complete'.

For example, 'Initial approach checks complete'.

If the calling of a checklist is interrupted, the reader calls 'Checklist suspended at…'.

OPERATING POLICY

Normally both pilots shall occupy their seats during all phases of flight. At the captain's discretion, the first officer may occupy the RH seat. The assignment of the first officer to PF duties is done with the intention that he fulfils these duties for the whole flight.

Either pilot LH/RH may fly the aircraft, unless special circumstances preclude this.

Should the captain wish to take-over control during any stage of the operation, he will clearly call **'My controls'** where upon the transfer of control will take place. This transfer of control shall be acknowledged by calling: **'Your controls'**.
Should the PF wish to hand-over controls during any stage of the operation, he will clearly call: **'Your controls'** where upon the transfer of controls will take place.

This transfer of control shall be acknowledged by calling: **'My controls'**

CREW CO-ORDINATION

Operating procedures have been developed to achieve the optimum use of both pilots. Many duties may be carried out by either pilot, depending upon which one at the particular time is more readily available. However, system handling by the PF shall never interfere with his main task, i.e. flying the aircraft.
The utmost attention must be given to good crew co-ordination during all phases of flight. The captain must ensure that the crew briefing is completed prior to every take-off, approach and landing. Normally the crew briefing will be given by the PF.
Pilot duties are interchangeable. The crew co-ordination procedures use the terminology. 'Pilot Flying' (PF) and 'Pilot Monitoring' (PNF).
Some crew co-ordination procedures may use the terminology: 'Captain' and 'First Officer' or 'Pilot' and 'Co-pilot', indicating the requirement for the captain or the first officer, or the RH pilot or the LH pilot to be actively in control of the aircraft.
All commands related to the handling of the aircraft given by the PF (if PF is First Officer these 'commands' should be regarded as advisory), shall be acknowledged when carried out by the PNF. Commands of which the completion requires some time, (e.g. landing gear, power settings) shall be repeated by the PNF and acknowledged as soon as the desired position, setting etc. has been obtained.

NOTE: These crew co-ordination procedures do not in any way erode the responsibility of the Captain who, regardless of his position (LH / RH seat) or function (PF / PNF), is always the Pilot In Command!

Apart from the necessity to monitor the flight execution generally and inform the PF of any observed deviation, the PNF shall also call:

'APPROACHING'	when approximately 200 ft below/above the cleared altitude or flight level during climb/descent
'BANK'	whenever the bank angle exceeds 35º during normal flight, or 15º where that restriction is applicable
PITCH'	any time the pitch exceeds 30º nose-up or nose-down, or 10º nose-up below 30 ft AGL
'SPEED HIGH/LOW'	if the speed is more than 10 Kts from the intended value, or exceeding minimum or maximum values
'SINK RATE'	when the rate of descent during approach below 1000 ft AGL exceeds 1000 fPNF, or below 500 ft exceeds 500 fPNF
'TORQUE HIGH/LOW'	if the power setting is more than 10% Q from the intended value, or exceeding maximum values
'LOCALIZER'	any time localizer deflection is more than ½ scale (1 dot)
'GLIDESLOPE'	any time the glideslope deflection is more than ½ scale (1 dot)
'RADIAL'	any time the CDI deflection, based on a radial, is more than ½ scale (1 dot)
'TRACKING'	any time the tracking error during an NDB approach exceeds more than 5º
'*ALTITUDE HIGH / LOW*' (BARALT)	any time the deviation is more than 100 ft from intended altitude
'HEIGHT HIGH / LOW'	any time the deviation is more than 100 ft from intended height (RADALT)
'HEADING'	any time the deviation is more than 5° from intended track

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CHAPTER

03

BEFORE FLIGHT

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TECHNICAL REQUIREMENTS

The Commander shall ensure that the requirements of the relevant maintenance inspections have been complied with before flight. During normal scheduled operations, maintenance personnel will conduct all of these inspections. However, if the aircraft has been parked overnight and a technician is not available, the Commander must perform and sign for the Preflight Check (PFC) in the appropriate block in the Technical Log.

GENERAL CONDUCT OF INSPECTIONS

The Commander shall decide which pilot carries out the exterior inspection and which pilot carries out the interior inspection. Both inspections must be completed before engine start.
On approaching the aircraft note the wind direction and check that the surface below the helicopter is ice free with no signs of fuel or oil spillage. Ensure there are no obstructions or loose articles, a fire extinguisher is available and chocks are in place. Remove all protective covers and blanks if they are still fitted

EXTERIOR CHECKS

General

During walk-round checks in cold weather, particular attention must be paid to ensure the airframe, intakes, blades, antennae and emergency exits are free from snow and ice build-up.
During the course of the checks all maintenance access panels and work platforms should be checked closed and secure.

Checks should commence from the right-hand cockpit door and proceed clockwise around the helicopter.

NOTE 1: When checking oil and fluid levels, ensure allowance is made for any sloping ground (MGB) and that levels are re-checked after ground runs in case air has been purged from the systems with a subsequent fall in the levels. Oil and fluid levels should normally be checked within 15 minutes of shutdown.

NOTE 2: When taking over an aircraft rotors running, carry out a visual inspection for leaks, security of panels, obvious signs of damage and any buid up of ice or snow.

NOTE 2: Checks marked with ► are required only before the first flight of the day. All other checks are to be carried out before each flight.

AREA N°1: Helicopter nose

AREA N°2: Fuselage - RH side

AREA N°3: Tail boom - RH side

AREA N°4: Fin, intermediate/tail gearbox, tail rotor

AREA N°5: Tail boom LH side

AREA N°6: Fuselage - LH side

AREA N°7: Cabin and Cockpit interior

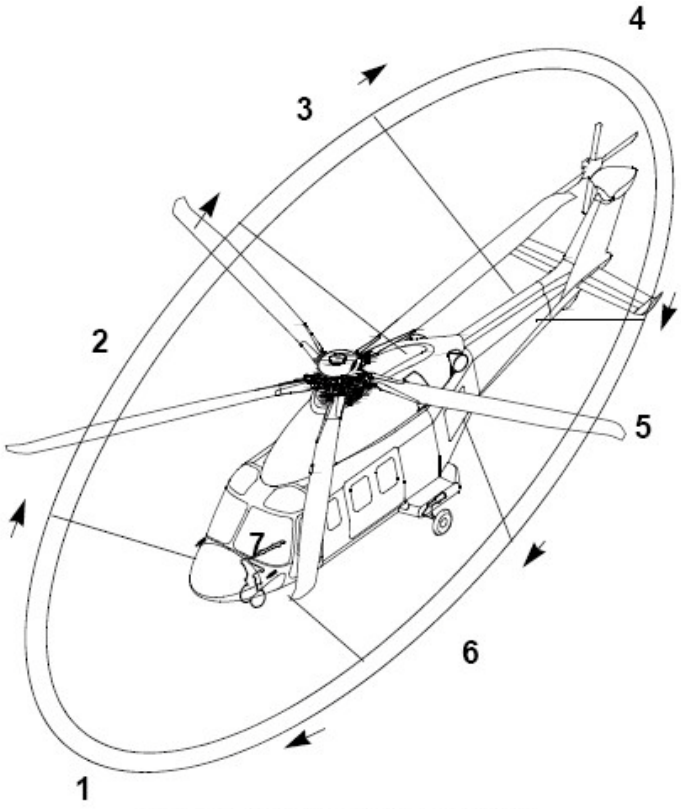

Figure 2-1 Preflight Check Sequence

GENERAL CHECKS

1) Main and tail rotor tie downs (if present).....Removed
2) Check helicopter position..approximately into Wind direction
3) Check for fuel or oil spillage
4) Check if surface is ice and FOD free
5) Check for obstructions
6) Check for loose artiche
7) Check chocks in place
8) Check a fire extinguisher is available and operational for start-up

***The External Pre-Flight check shall be conducted in accordance with the RFM.**

CHAPTER

04

STARTING PROCEDURES

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AW139 CHECKLIST

AgustaWestland
A Finmeccanica Company

Training Academy
AW139 Normal Checklist

ENG PRE-START

External Check	COMPLETED	L-R
A/C Records	CKD/ON BOARD	PIC
Doors	CLSD	L-R
Belts/Seat/Pedal	FASTENED/ADJUST	L-R
Park Brake	SET ON	R
Circuit Breakers	ALL IN	L-R
Rotor brake	OFF (Full Back)	L-R
ECL's	FLIGHT	L-R
Overhead Switches	ALL OFF	L-R
Static Source	GUARDED	L-R
Fire Ext Panel	CK	L-R
ELT	CK ARM	L-R
Fuel Panel	CK OFF/CLSD	L-R
ENG 1-2 MODE	CK OFF	L-R
RAD MSTR	GND (Bat Start)	L-R
Pedestal Switches	CK STATUS	L-R
LDG Gear Lever	CK DOWN	L-R
ENG GOV 1 & 2	CK AUTO	R
RPM Switch	100%	R

Eng. Pre-Start ck list completed

ENG START

NOTE: Highlighted Items Only EXT PWR

MASTER-MAIN-AUX Bat	ON	L-R
EXT PWR	CONNECT & ON	L-R
GEN 1 & 2	ON	L-R
BUS TIE	AUTO/AS REQ	L-R
POS Light	ON/AS REQ	L-R
MFD	PWR PLANT/CK	L-R
CAS	CK/Park Brake On	L-R
FLT Controls	CK	L-R
Test Panel:		
FIRE/OIL/LAMP	TEST	L-R
FUEL/CHIPs/AWG	TEST	L-R
ENG TRIM beep	TEST	L-R

Continued .....

Cyclic Stick	CENTERED	PF
Main Bus 1	CK + 23V	PF
ENG 1 (2) FUEL	ON	PF
FUEL PUMP 1 (2)	ON	PF
Starting Engine:		
Engine Area	CLEAR	L-R
ANTI COLL Light	ON	L-R
ENG 1 (2) MODE	IDLE	L-R
PWR PLANT	MONITOR	L-R
ENG 1 (2) MODE	FLT	L-R
Systems	ALL WITHIN LIMITS	L-R
After 1st eng start repeat from ENG 2 (1) FUEL		
EXT PWR	OFF/DISCONNECT	L-R
GEN 1 & 2	CK ON	L-R
BUS TIE	AUTO	L-R

Eng Start ck list completed

SYS CHECK

Stby Instrument	SET	L-R
Altimeters	SET & CK	L-R
Radar ALTs	TEST/DH SET	L-R
Fuel Panel	TEST	L-R
RAD MSTR	CK ON	L-R
AFCS	TEST	L-R
Wx/PITOT	AS REQ	L-R
ECS	AS REQ	L-R
EMER Light	ON/ARM	L-R
MCDU-MFD-DC	SET COM/NAV	L-R

Sys ck list completed

GROUND TAXIING

Nose Wheel	UNLK	R
Park Brake	OFF	R
Landing / Taxi Light	ON	L-R
Brakes	CK	L-R

Ground Taxiing ck list completed

AgustaWestland
A Finmeccanica Company

Training Academy
AW139 Normal Checklist

BEFORE TAKE OFF

AFCS	ON	PF
NR/NF	100% (CAT "A" 102%)	PF
PWR PLANT Sys	WITHIN LIMITS	PNF
CAS Messages	CK	PNF
ENG MODE Switches	CK FLT	PNF
ECLs	CK FLT	PNF
Nose Wheel	CK LOCK	PNF
Park Brake	AS REQ	R
XPDR /TCAS	ON	PNF
Wx/Float/EAPS	AS REQ	PNF
TQ Limiter	AS REQ	PF
Take Off Briefing	PERFORMED	PF
Before Take Off ck list completed		

AFTER TAKE OFF

LDG Gear (200 ft/+VS)	UP/LTS OFF	R
NR/NF	100%	PNF
TQ Limiter	AS REQ	PF
MFD/CAS	CK	PNF
After Take Off ck list completed		

CLIMB / CRUISE

Fuel	CK	PNF
ENG's	CK	PNF
Altimeters (TL)	QNE X/CK	L-R
Flight/Nav/Instruments	CK	PNF
Climb/Cruise ck list completed		

APPROACH

Altimeters (TA)	QNH X/CK	L-R
Flight/Nav Instruments	CK/SET	L-R
DA/H	AS REQ	L-R
Approach Briefing	PERFORMED	PF
Approach ck list completed		

FINAL

NR/NF	100% (CAT "A" 102%)	PF
MFD PWR PLANT	CK	PNF
LDG Gear	DWN/CK 3 GREENS	R
Nose wheel	CK LOCK	PNF
Park Brake	AS REQ	R
Landing Light	ON	PF
TQ Limiter	AS REQ	PF
Cabin	SECURE	PIC
Final ck list completed		

AFTER LANDING

AFCS	OFF	PF
Nose Wheel	UNLK (Gnd Taxiing)	R
Cyclic Stick	CENTERED/AS REQ	PF
RPM Switch	CK 100%	R
Wx/Float/EAPS	OFF	PNF
XPDR/TCAS	STBY	PNF
After Landing ck list completed		

SHUT DOWN

Park Brake	ON	R
Nose Wheel	LOCK (If Req)	R
Controls	MPOG/CENTERED	PF
ENG 1 & 2 MODE	IDLE	L-R
FUEL PUMP 1 & 2	OFF	L-R
BUS TIE	ON	L-R
Pos/EMER Light	OFF	L-E
After Cooling Dwn (120 secs @ Ng 65%)		
ENG 1 & 2 MODE	OFF	L-R
Rotor Brake (≤ 40% NR)	ON	L-R
ENG 1 & 2 FUEL	OFF	L-R
X FEED	CLOSED	L-R
BUS TIE	AUTO	L-R
BAT MSTR/GEN 1 & 2 (Ng = 0)	OFF	L-R
BAT Main & Aux	OFF	L-R
ANTI COLL	OFF	L-R
Shut Down ck list completed		

INTERIOR CHECKS

Before start checks:

COCKPIT/ENGINE PRE-START CHECKS

SAFETY CHECKS

1.	Pedals and seats	— Adjust.
2.	Seat belt	— Fasten and adjust.
3.	Circuit breakers	— All engaged.
4.	ECL's	— Confirm at FLIGHT.
5.	All switches	— OFF or closed.
6.	ENG 1 and ENG 2 MODE switches	— OFF.
7.	ELT switch on instrument panel	— Confirm ARM.
8.	LDG GEAR lever	— Confirm DOWN.
9.	External Power (if used)	— Connect and switch ON.
10.	Ground support personnel	— Connected (If required).
11.	BATTERY MASTER	— ON.

Note

If External Power not available carry out checks marked with ♦ on BATTERY to conserve battery power. The remaining checks should be completed after the first engine start.

12.	♦ Main and Aux Battery	— ON.
13.	EXT PWR	— ON (if required).
14.	♦ GEN 1 & 2	— ON.
15.	♦ BUS TIE	— AUTO.
16.	POSITION lights switch	— Confirm functioning then leave as required.
17.	♦ ANTI-COLL lights switch	— ON. (confirm functioning)

18. LT Panel switch	— ON. Confirm emergency lights functioning: cabin (2), sponson (left and right), cockpit door (left and right).
	— OFF or ARM, as required.
19. MFD	— Set SYSTEM page, select SYS CONFIG and verify Top Level System Part Number (EPIC software release) installed: EB 7030191-00105 Phase 4 or EB 7030191-00107 Phase 5 or EB 7030191-00108 Phase 6.
20. ♦ MFD	— Set powerplant page and check configuration setting.

Note

If MFD/PFD are in composite mode, reset to NORMAL before starting using RCP switches (MFD ONLY-PFD ONLY-NORMAL).

21. ♦ CAS messages	— Check.
22. ♦ MFD	— Check fuel quantity.
23. ♦ LDG GEAR panel	— Check 3 green lights and EMER DOWN switch secure.
24. ♦ PARK BRAKE	— Pull and turn handle and press pedals until PARK BRAKE ON advisory illuminates on CAS.
25. ♦ RAD MSTR switch	— As required (GND if battery start).
26. ♦ FORCE TRIM switch	— ON.
27. ♦ CLTV/YAW TRIM switch	— ON.

28. ♦ AWG switch	— As required (REGRADE or INHIBIT position disables "150 FEET" voice message). See Note page 2-47.
29. LD-SH switch	— TORQUE.
30. AFCS	— Confirm not engaged.
31. Cyclic stick	— Centred.
32. Collective lever	— Full down, friction as required.
33. ♦ Flight Controls ➡	— Push ELEC PUMP on HYD panel. Carry out cyclic, collective and yaw pedals full and free check. Utilizing the cyclic position indicator, on PFD, centralize cyclic control by moving in the direction indicated by the yellow arrows to obtain the central circle green. ELEC HYD PUMP select OFF.

CAUTION

Full and free check should be carried out with slow displacement of the controls and one control at a time in order not to overload the electric pump.

Note

Cyclic position indicator is only presented on the PFD when the aircraft is on the ground and the collective is near its down position (MPOG).

Note

Electric hydraulic pump disengages automatically after 2 minutes.

34. HYD SOV switch — Centred and guarded.

35. ♦ FIRE WARNING TEST push button — Press, on the TEST control panel, BAG and confirm the following visual warnings:
    - MWL illuminate
    - 'BAG FIRE' CAS warning
    - 'BAG' on FIRE EXTING panel

    Audio tone and voice warning ("WARNING WARNING")

    — Press ENG1, confirm the following visual and audio warnings :
    - ENG 1 ECL fire light
    - ENG 1 FIRE on FIRE EXTING panel
    - MWL and MCL illuminate
    - '1 ENG FIRE' , CAS warning
    - '1 FIRE DET', CAS caution
    - Audio tone and voice warning ("ENGINE 1 FIRE")
    - FIRE 1 on ENG CONTROL panel

    — Press, ENG2, confirm the following visual and audio warnings :
    - ENG 2 ECL fire light
    - ENG 2 FIRE on FIRE EXTING panel
    - MWL and MCL illuminate
    - '2 ENG FIRE' , CAS warning
    - '2 FIRE DET', CAS caution
    - Audio tone and voice warning ("ENGINE 2 FIRE")
    - FIRE on 2 ENG CONTROL panel

36. FUEL pushbutton	— Fuel test starts automatically at electrical power on. Confirm 1(2) FCU TEST FAIL caution not illuminated. — If further test required press pushbutton and confirm the following: - 'TEST' replaces 'FUEL' legend on Pilot and Copilot MFD - 1(2) FCU TEST FAIL caution not illuminated.
37. CHIP DETECTOR pushbutton	— Press ENG 1 pushbutton and confirm CAS caution: 1 ENG CHIP and MCL illuminates. — Press ENG 2 pushbutton and confirm CAS caution: 2 ENG CHIP and MCL illuminates.
38. AWG TEST pushbutton	— Press, momentarily, on the TEST control panel, AWG. Confirm the AURAL SYSTEM TEST message is heard. If required PRESS and hold pushbutton for 6 seconds and confirm the following aural warnings: Audio tone and voice warning ("WARNING") ROTOR LOW ENGINE 1 OUT ENGINE 2 OUT ENGINE 1 FIRE ENGINE 2 FIRE

ROTOR HIGH
ENGINE 1 IDLE
ENGINE 2 IDLE
WARNING
AUTOPILOT
AIRSPEED
ALTITUDE
LANDING GEAR
150 FEET
AURAL SYSTEM TEST

39. ♦ OIL LEVEL Pushbutton — Press MGB pushbutton and confirm CAS caution:

MGB OIL LOW and MCL illuminates.

— Press IGB pushbutton and confirm CAS caution:

IGB OIL LOW and MCL illuminates.

— Press TGB pushbutton and confirm CAS caution:

TGB OIL LOW and MCL illuminates.

40. ♦ LAMP TEST pushbutton➡ — Press and confirm the following illuminate:

- MWL and MCL Illuminate
- ENG 1 & 2 FIRE/ARM and BAG on FIRE EXTING panel
- FIRE lights on ENG CONTROL panel
- HYD 1 & 2 PRESS/TEMP & ELEC PUMP ON, on HYD panel

- NOSE/LH/RH red and green lamps, NOSE WHEEL UNLK/LOCK lamps on LDG GEAR panel
- All green indications on the AUTOPILOT and GUIDANCE CONTROL panel

41. ♦ RPM switch (on collective) — Set 100%.
42. ♦ 1 ENG GOV (on collective) — AUTO.
43. ♦ 2 ENG GOV (on collective) — AUTO.
44. ENG TRIM beep switches (on collective) — Verify operation, then leave the engine control levers in the FLIGHT position.

♦ On BATTERY power use a single 'click' back and forward to confirm ECL stops in FLIGHT gate.

Note

Each engine trim beep switch controls the respective control lever from MIN to FLIGHT position when in AUTO mode, and from MIN to MAX position when in MANUAL mode.

Note

Both engines control levers should always be operated through the beep switches located on the collective control. They should be operated manually only in case of failure of the remote control (ECL FAIL caution message), or before starting, to position the lever to FLIGHT.

ENGINE START PROCEDURES

Starting limitations are given in AW139 RFM.
The engines may be started in any order, although normal procedure is to start #1 first on odd days of the month and #2 first on even days of the month. After an unsuccessful start the engine should be vented to help drain excess fuel from the engine.
When two pilots are present, the start is normally performed by the PF. PF shall keep his hand on the engine mode switch until the engine is stabilised at ground idle, in order to quickly abort the start when necessary. PF will keep hands and feet on the controls whenever the rotors are turning.
Caution:
An engine battery start should not be attempted if the MAIN BUS 1 voltage is below 23V.

ABORTED ENGINE START PROCEDURES

Engine starting malfunctions are most likely to occur during the engine acceleration cycle to IDLE speed. The list below details the cockpit indications associated with malfunctions and the recommended Abort Procedure. It is important that flight crews be thoroughly familiar with these procedures.

Note:

Starting in high winds

The aircraft maintenance manual imposes a flying hour life penalty factor on the main rotor blades for each start and stop in steady state or gusting wind above 27 knots. The commander shall make an entry in the defect column of the technical log stating the number of starts and stops in winds above 27 knots. The actual wind / gust speed at the moment of start up / shut down above 27 knots shall also be stated in the technical log.

Other than the entry in the technical log a start in high winds is identical to a normal start.

ENGINE STARTING

CAUTION

An engine battery start should not be attempted if the MAIN BUS 1 voltage is below 23V.

ABORTED ENGINE START PROCEDURES

CAUTION

Failure to follow the Abort Procedure may cause damage to the engine.

Engine starting malfunctions are most likely to occur during the engine acceleration cycle to IDLE speed. The list below details the cockpit indications associated with malfunctions and the recommended Abort Procedure. It is important that flight crews be thoroughly familiar with these procedures.

Monitor engine start and if any of the following occur:

— light up is not within 10 seconds of ENG MODE to IDLE

— abnormal noise heard

— ITT increases beyond engine limits (HOT START caution illuminated)

— engine hangs (stagnation in NG below 54%)

— the main rotor has not begun to rotate when the gas generator (NG) reaches 40%

— if engine starter fails to disengage by 49% NG.

shut down engine by:

1. ENG MODE switch — OFF.

   If engine does not shut down then:

   ECL — OFF.

2. FUEL PUMP — OFF.
3. ENG FUEL switch — OFF.

DRY MOTORING PROCEDURE

Following an aborted start shutdown, perform the following procedure allowing a 30 seconds fuel drain period before restarting. The procedure is used to clear internally trapped fuel and vapor:

Note:

Observe the igniter and starter generator duty cycle limitations during re-start attempts. Refer RFM Section 1.

On affected engine:

1. ENG GOV switch – AUTO
2. ENG MODE SWITCH OFF
3. ECL OFF
4. FUEL PUMP SWITCH OFF
5. FUEL VALVE SWITCH OFF (Fuel Valve indicator bar horizontal)
6. ENG IGN CB OUT
7. ECL OFF
8. ENG MODE SWITCH IDLE (Not more than 45 secs, starter duty cycle must be respected)

NOTE: To operate the starter it is possible to select ENG GOV switch to MANUAL mode, then push the starter button on the ECL.

9. Gas Generator (NG) - Note increasing
10. ENG MODE switch - OFF as necessary
11. ENG IGN circuit breaker - IN

NORMAL ENGINE START

Note

During battery start FUEL PUMP 1(2) may illuminate temporarily.

Either engine may be started first and it is recommended that normal engine starts be made using the AUTO mode. For starting procedure in MANUAL mode refer to Section 3.

Note

If engine N°2 is to be started first, set BUS TIE switch to ON and confirm MAIN BUS 2 voltage is not below 23V.

1. ENG 1 FUEL switch — ON - Fuel valve indicator bar vertical.
2. MFD display — Confirm PWR PLANT page.
3. FUEL PUMP 1 switch — ON - 1 FUEL PUMP caution out, check pressure.
4. ENG 1 MODE switch — IDLE.

Note

It is recommended to start the engine to IDLE, if necessary, it is possible to start to FLIGHT by setting the ENG MODE switch directly to FLT.

5. Gas Producer (NG) — Note increasing and START legend displayed.
6. Engine temperature (ITT) — Note increasing and IGN legend displayed.
7. Engine oil pressure — Confirm rising.
8. Engine N°1 starter — Disengaged by 49% NG.
9. Main hydraulic system — When the main rotor begins to rotate, confirm rise in main hydraulic pressure.

— Confirm cyclic control centralized on PFD cyclic indicator.

10. N°1 engine power turbine speed (NF) and rotor speed (NR) — Confirm both stabilized to IDLE speed of 65%±1%.

Note

If the engine was started directly to FLT the NF will stabilise at 100% with rotor speed (NR).

11. Engine and transmission oil — Check pressures and temperatures within limits.

12. ENG 1 MODE switch — FLT.

13. ♦ If BATTERY start carried out, complete pre-start checks.

ENGINE 2 START

14. ENG 2 FUEL switch — ON - Fuel valve indicator vertical.

15. FUEL PUMP 2 switch — ON - 2 FUEL PUMP caution out, check pressure.

16. GEN 1 — Check loadmeter in GREEN band (if EXT PWR not used).

17. Repeat above procedure for engine N°2

CAUTION

Ensure second engine engages as the NF reaches FLIGHT condition. A failed engagement is indicated by positive NF value and near zero torque. If this occurs, shut down the non engaged engine first and when engine stopped shut down other engine. If a hard engagement occurs, shut down both engines for maintenance action.

18. Engine and transmission parameters	— Check within limits.
19. External power switch	— OFF and disconnect external power (if used).
20. GEN 1 and GEN 2 switches	— Confirm ON.
21. BUS TIE switch	— Confirm AUTO.
22. RAD MSTR switch	— ON.
23. Clock	— Set.
24. Rotor speed	— Confirm 100%.

QUICK ENGINE START

QUICK ENGINE START

This procedure may be carried out on BATTERY to speed up the Take Off.

1. BUS TIE switch	— ON.
2. ENG 1 FUEL switch	— ON - Fuel valve indicator vertical.
3. MFD display	— Confirm PWR PLANT page.
4. FUEL PUMP 1 switch	— ON - Check pressure.
5. ENG 2 FUEL switch	— ON - Fuel valve indicator vertical.
6. FUEL PUMP 2 switch	— ON - Check pressure.
7. ENG 1 MODE switch	— FLT.
8. ENG 2 MODE switch	— FLT when N°1 engine NG is above 25%.

CAUTION

Avoid operating the ENG MODE switches simultaneously.

9. Gas Producer (NG)	— Note increasing and START legend displayed.
10. Engine temperature (ITT)	— Note increasing and IGN legend displayed.
11. Engine oil pressure	— Confirm rising.
12. Engine N°1 & N°2 starters	— Disengaged by 49% NG.
13. Main hydraulic system	— When the main rotor begins to rotate, confirm rise in main hydraulic pressure.
	— Confirm cyclic control centralized on PFD cyclic indicator.
14. N°1 & N°2 engine power turbine speed (NF)	— Confirm stabilized at 100%.
15. Engine and transmission oil	— Check pressures and temperatures within limits.
16. External power switch	— OFF and disconnect external power (if used).
17. GEN 1 and GEN 2 switches	— Confirm ON.
18. BUS TIE switch	— Confirm AUTO.
19. RAD MSTR switch	— ON.
20. Clock	— Set.
21. Rotor speed	— Confirm 100%.
22. VENT switches	— As required.

AFTER START CHECKS

The checks are read by PNF and auctioned by both pilots as required.

SYSTEM CHECKS

1. MFD PWR PLANT page	— Check all parameters within limits.
2. Main Hydraulic	— Pressure and temperature within limits. Make small cyclic, collective and pedal movements and confirm hydraulic pressure drop not excessive.
	— Centralize cyclic control on PFD cyclic indicator.
3. Fuel XFEED switch	— Select OPEN, confirm bar horizontal.
	— Select NORM, confirm bar vertical.
4. FUEL PUMP 1	— OFF. Note fall in fuel N°1 pressure, 1 FUEL PUMP caution displayed, automatic operation of cross feed valve (bar horizontal), FUEL XFEED advisory displayed on CAS and consequent increase of fuel N°1 pressure.
5. FUEL PUMP 1	— ON. 1 FUEL PUMP caution out, cross feed automatically closed (bar vertical) and FUEL XFEED advisory extinguishes.

6. FUEL PUMP 2	— OFF. Note fall in fuel N°2 pressure, 2 FUEL PUMP caution displayed, automatic operation of cross feed valve (bar horizontal), FUEL XFEED advisory displayed on CAS and consequent increase of fuel N°2 pressure.
7. FUEL PUMP 1	— OFF. Note fall in fuel N°1 pressure, 1 FUEL PUMP caution displayed, cross feed valve still open (bar horizontal), FUEL XFEED advisory still present. Confirm correct engine operation on engine driven suction pumps.
8. Fuel XFEED switch	— Select CLOSED, confirm bar vertical, wait 15 seconds then confirm correct engine operation on engine 1 and 2. Select NORM, confirm bar horizontal.
9. FUEL PUMP 1 & 2	— ON. 1 & 2 FUEL PUMP caution out and cross feed automatically closed (bar vertical) FUEL XFEED advisory extinguished.
10. OEI TNG switch	— Check (if required).
11. MFD page	— Select as required.
12. MCDU	— Set COM and NAV as required.
13. FD panel	— Check in SBY.

14. TEST button on Autopilot controller	— Press and follow instruction on MFD AFCS synoptic page. Confirm test completes successfully and no AP messages are displayed on Crew Alert System. Reselect TEST button to return MFD display to NORMAL.
15. ICS panels	— Set as required. Set BKUP volume as required.
16. AHRS, ADS and display reversion switches	— NORM.
17. LT panels	— Set as required.
18. CABIN LT panel	— Set as require.
19. COMPASS switches	— MAG.
20. RAD ALT	— Confirm zero altitude (±5 ft).
21. DH TEST button on remote instrument controller	— Press, confirm RAD ALT 100 ft (±10 ft) and 'TEST' message displayed, release, confirm zero altitude (±5 ft).
22. DH selector on remote instrument controller	— Set as required.
23. Altimeters: Pilot, Standby and Copilot	— Set and check.
24. PITOT HEATER 1 & 2	— ON for conditions of visible moisture at indicated OAT of +4° C or less.
25. POSITION light switch	— As required.
26. RPM switch	— Set 100%.
27. NR/NF	— Confirm stabilized at 100%.
28. LDG LT & LDG LT2 switches	— As required.
29. PARK BRAKE handle	— OFF. Check no PARK BRK ON caution message.
30. Warning and Caution messages	— Check, as required.

Note:
If fitted on the aircraft, TCAS & EPGWS test is required

TCAS TEST

MFD.....MAP page
MCDU..... MENU page
Select TEST page
Start XPDR/TCAS test
Verify TCAS TEST amber annunciation inside TCAS status box
Traffic test page presented
At the end of the test sequence confirm aural message TCAS SYSTEM TEST OK is heard.
Verify TCAS OFF white annunciation inside TCAS status box

EPGWS SYSTEM CHECK

Confirm TAWS FAIL and TERR N/A not displayed.
Select TAWS display on MFD MAP page and PFD HSI.
Select TAWS self test ON. Confirm the following:
TAWS TEST message displayed on PFD and MFD
TERRAIN N/A message displayed on PFD and MFD
TAWS LOW ALT advisory displayed momentarily on CAS
PULL UP audio message heard by pilot & co pilot
Terrain Display Self Test pattern displayed on MFD and PFD.
WARNING! TERRAIN audio message is heard by pilot & co-pilot
On conclusion of the test confirm Terrain Self Test pattern is turned off and no TAWS messages remain.

CHAPTER

05

FMS

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FMS SETUP

GENERAL

Normal operating procedures are outlined in the Honeywell Flight Management System (FMS) Pilots Manual for Software Version NZ 7.0 for the Agusta AW 139.

Note: For complete FMS operations, refer to the Honeywell Flight Management System (FMS) Pilot Manual for the AW139.

In the GPS status page (MCDU) RAIM (Receiver Autonomous Integrity Monitor) and FOM (Figure of Merit) are displayed. RAIM and FOM indicate current uncertainty of position expressed in nautical miles. In addition to RAIM for current condition, the GPS receiver predictive RAIM calculation gives the pilot an indication as to whether the GPS geometry will be satisfactory for approach at the selected or expected arrival time. YES indicates RAIM is predicted to be within approach criteria. NO indicates RAIM is predicted to be unacceptable or unavailable.

PRE-DEPARTURE OPERATIONS

At the power-up of the system, NAV IDENT page is presented on MCDU. Basic pre departure operations are:

a) Initialize the position by pressing POS INIT key and loading present position (right keys on POSITION INIT page)
b) Press FLT PLAN key (6R) to prompt ACTIVE FLT PLAN page and recall or create a FPL
c) Press FPL key and activate the flight plan
d) Press PERF pushbutton, enter performance data and confirm (CONFIRM INIT key)
e) If required select and activate arrival and departure
f) If required insert ALTERNATE data and waypoints
g) If required press PATTERNS key (on NAV page) to select and activate holdings, flyovers and other patterns.

Note: Above procedures may be monitored on PLAN page of MCDU
Once in flight, the ACTIVE FLT PLAN page 1 and PROGRESS page 1 are considered the primary pages of the FMS.

MESSAGE (MSG)

MSG is an advisory (amber) annunciator that is displayed on the PFD. This annunciator is displayed when a message is shown in the scratchpad. The annunciator is removed after the message has been cleared from the scratchpad.
Messages are displayed in the MCDU scratchpad at various times. They inform or alert the pilot as to system status.

Messages are divided into the following two major groups:

1. ADVISORY MESSAGES. Advisory messages contain information that is helpful to the pilot. Advisory messages are usually the result of a pilot action on the MCDU (e.g., making an entry with the incorrect format).

2. ALERTING MESSAGES. Alerting messages alert the pilot to the FMS status, assuming the pilot is not looking at the MCDU (e.g., message annunciating, sensor failure).

Messages are stacked for display in priority order on a first in, last out basis. In cases where there are multiple messages stacked, the message annunciator remains displayed until all messages are cleared. Only one message can be cleared per CLR key push

CHAPTER

06

TAKE-OFF BRIEFING

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BEFORE TAKE OFF BRIEFINGS

Under normal circumstances, abbreviated briefings will be used for takeoff. This assumes that PF will fly the takeoff in accordance with the profile specified in this section and emergencies will be handled in accordance with section 2 with the applicable drills in the emergency and abnormal checklist.

Where the abbreviated briefings do not give the necessary degree of information, for example when operating from an unfamiliar airfield, PF must give a full briefing outlining his intentions prior to takeoff.

FULL BRIEFINGS

A full departure briefing shall include the following points:

- Type of takeoff/description of the profile.
- If CAT A: TDP and VTOSS to be used.
- Confirm the radios are tuned to the correct frequencies, the navaids are identified and set correctly for the departure to be flown and the initial course is set on the HSI display or HDG bug.
- Confirm the weather is above minima for departure.
- Standard calls expected.
- Intentions in the event of an emergency after TDP (e.g. visual circuit/ return for instrument approach/different approach at departure airfield/divert to alternate).

In addition, a full IFR departure briefing shall include the following points:

- Instrument Check, Bugs, Idents etc
- Profile to be followed (both pilots shall verify they have the correct chart available).
- AP/CPL modes and IAS to be used during the departure.
- Detailed description of the SID or departure profile, including tracks, radials, altitudes, MOCA, MORA or minimum (or maximum) SID altitudes and otherpertinent performance information.
- Detailed description of the contingency procedure, if published.
- Takeoff alternate.

Note: In the normal checklist, the abbreviation MSA is used throughout. In this context this means the appropriate minimum safe altitude for the phase of flight.

ABBREVIATED BRIEFINGS

Example abbreviated briefings are given in the following paragraphs.

Standard procedure calls during takeoff

An abbreviated briefing assumes that the normal procedure calls listed in section___ Normal Procedure calls during takeoff and departure and in the event of an engine failure, any applicable emergency calls listed in section __ Engine Failures during take and landing will be made during takeoff.

Takeoff brief by PF, CAT A/B takeoff

- Cat A/B (takeoff (TDP XX, VTOSS YY).
- The departure routing is XXX.
- Malfunctions at or after TDP, visual circuit (OR: recovery via instrument approach).

GROUND TAXI CHECKS

This checklist is called for by the PF and read and auctioned by PNF.
Ensure chocks are removed, any GPU is disconnected and clear, and the ground crewman has given the thumbs up signal.
During all ground movements landing light shall be switched ON.

To Start Taxiing
Increase collective slowly then move the cyclic forward to initiate aircraft movement, centre the cyclic and reduce collective pitch to control speed. Check the brake operation.

Note: Taxi speed shall not exceed a brisk walking pace.

Turning
To turn the helicopter, initiate forward movement. Gradually press the yaw pedals, or use differential braking for tighter turns. When the turn is established, reduce pedal deflection towards neutral and reduce power slightly, if applicable. Keep the disc level.

Caution:
When ground taxiing, a momentary interruption of the weight on wheels current will cause the nosewheel lock to engage, making the helicopter impossible to turn. If this happens, use the brakes to stop the helicopter first before disengaging the nosewheel lock. If the nosewheel lock is disengaged while moving with significant pedal applied, the subsequent sudden yaw and roll can be very hazardous.

When turning and when stopping a turn, in particular when straightening up from a left turn, cyclic should normally be applied in the same direction as the pedal input (avoid cross-controlling).

Note: Turning whilst taxiing, should be carried out with collective at minimum pitch and cyclic central or as required to compensate for crosswind.

CHAPTER

07

POWER ASSURANCE

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ENGINE POWER ASSURANCE CHECKS

The power assurance check is completed daily at a convenient time, preferably at a high AUM to prevent the aircraft from becoming airborne. Engine Power assurance check should be completed in compliance with Section 4 of the RFM.

HOVER POWER CHECKS PROCEDURE

The following procedure is used to check engine performance before flight:

Caution: Observe all engine and transmission max continuous limits and aircraft operating limits during this check.

1. Position the aircraft into the prevailing wind to minimize hot gas ingestion.
2. Record date, aircraft serial number, aircraft hours, engine serial number and engine hours.
3. Confirm that the AUTO MODE HTR/COND switch is set to OFF and HEATING SOV switches are OFF. (If fitted)
4. Set the barometric pressure to 1013 mb or 29.92 inches.
5. Confirm both the ENG MODE switches at FLT, set BUS TIE switch to ON, select ENG MODE switch of engine NOT being tested to IDLE.
6. With the rotor speed at 100%, set the collective until 'light on wheels' or Hover at 5 feet to obtain a percent torque value within the range shown on the top graph of Figure ___, depending on the airfield elevation.
7. Maintain a fixed collective for one minute, then record the following data from the Primary and MultiFunction Display:
   - — Pressure Altitude
   - — OAT
   - — NG
   - — TRQ
   - — ITT
8. When recording is completed lower collective to MPOG, select ENG MODE switch of engine not being tested to FLT.
9. Repeat steps (1) through (8), for the remaining engine.
10. Select BUS TIE switch to AUTO.
11. On the appropriate figure plot readings for each engine.
12. When recording is complete, lower collective to MPOG and select the ENG MODE switch of the engine not being tested back to flight.
13. On completion

    BUS TIE switch..... AUTO

    ENG MODE switch of both engines... FLT

Compare the recorded Ng and ITT values with the maximum allowable values for the altitude and OAT (on the chart).

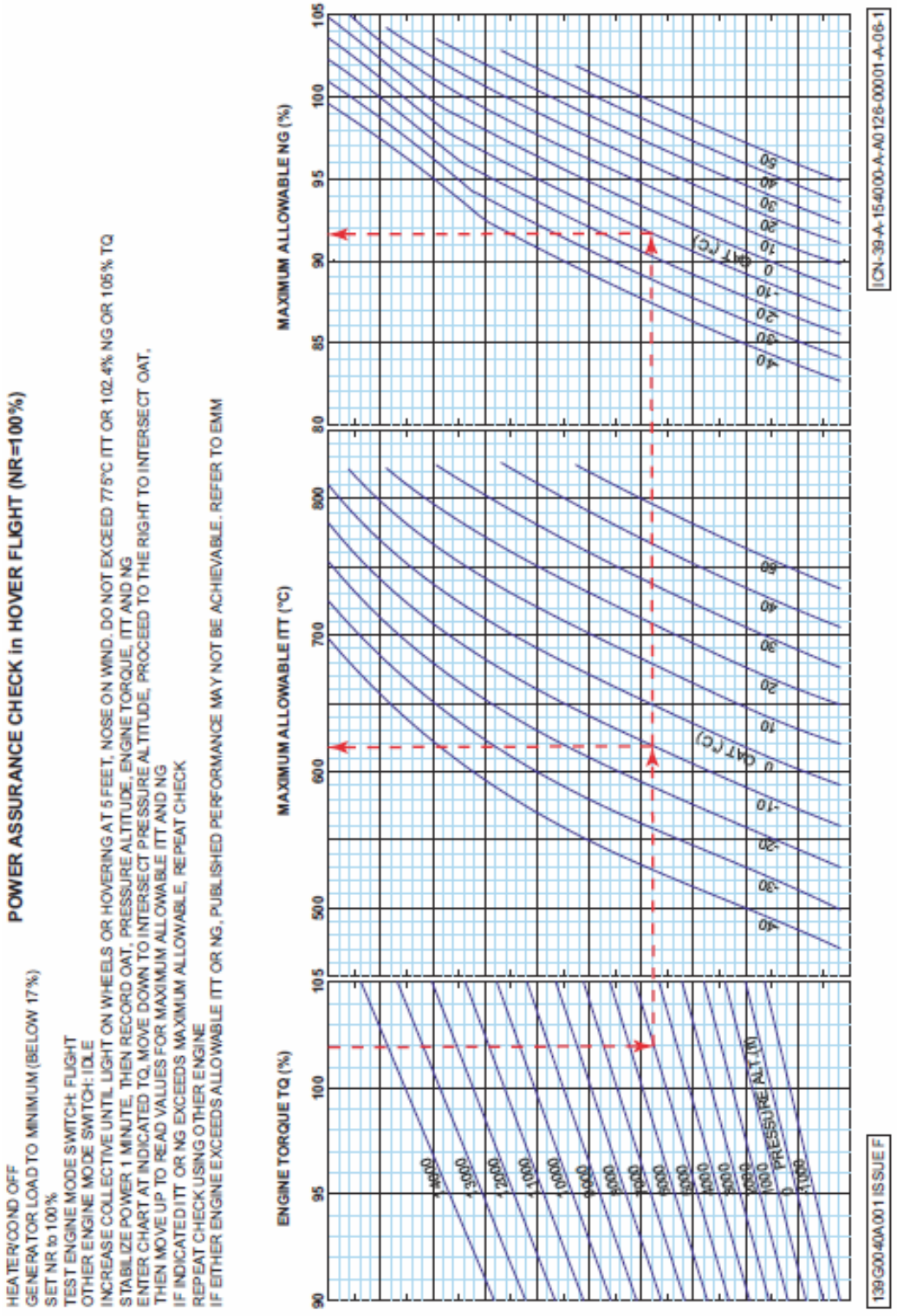
The difference between maximum allowable ITT/Ng and recorded ITT/Ng is called the Power Assurance Margin (PAM). If the recorded ITT or Ng value is less than the maximum allowable value, engine condition is acceptable for flight.

If the recorded ITT or Ng value is greater than the maximum allowable value, the performance in the RFM may not be achieved and Engineering must be informed.

POWER MARGIN TREND MONITORING

Every 50 hrs record engine assurance check values for engine power margin trend monitoring purposes.

PWC\PT6C-67C HOVER POWER CHART 100%NR



CHAPTER

08

TAKE-OFF CAT. A & B

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BEFORE TAKE OFF CHECKS

Strobes and Anti Collision lights are switched on as the aircraft enters the active runway. The remaining checks are done when the aircraft is lined up on the runway.

AFCS.....	**ON**
Nr/Nf.....	**100% (CAT 'A' 102%)**
PWR PLANT Sys.....	**WITHIN LIMITS**
CAS Messages.....	**CHECK**
ENG MODE Switches	**CHECK FLIGHT**
ECL's.....	**Check FLT**
Nose Wheel.....	**Check Locked**
Park Brake.....	**As Required**
XPDR/TCAS.....	**ON**
Wx/Float/EAPS.....	**As Required**
TQ Limiter.....	**As Required**
Take Off Briefing.....	**PERFORMED**

The PF will brief the PNF and note any variations to standard procedure. The normal profiles are described hereafter. Handling of emergencies during takeoff and associated profiles are also detailed.

PRESETTING OF AFCS COUPLE MODES ON DEPARTURE

The HDG bug and ALT SEL may be preset before departure.

NORMAL PROCEDURE CALLS DURING TAKEOFF AND DEPARTURE

The table below shows the normal procedure calls and responses to be used.

Type of takeoff	PNF call	PF response
All takeoffs	'**Two AP's'** Hover checks complete, PI XXX %	'**Lifting'** **'Rotating'**
Clear airfield (Runway takeoff)	Power Set (correct value) Speed Alive TDP VTOSS 50/50 (Cat B Only) Vy	Continuing - -
All takeoffs (unless specified otherwise by the procedure)	Vy plus >200 feet Select & Call "Gea Up,Lights out"	Calls "Gear up" (provided aircraft at or above Vy).
All takeoffs	500 feet Complete after takeoff checks. Call:**"After takeoff checklist complete"**	-**"After takeoff checklist"**
All departures before briefed / clear altitudes	500 to go 100 to go	-500 to go -Levelling
All departures before briefed / clear headings	10 degrees to go	10 to go
All departures changes to clear altitudes or headings	New heading XXX degrees New clearance X000 ft	-New heading XXX -New clearance X000

Note: No response required to speed calls.

HOVER CHECKS

These checks are carried out by the PNF from memory. If satisfactory, PNF reports "Hover Checks complete, PI xxx,". After completion of the Before Take Off Checklist both pilots shall check that the area is clear. When ready the PF will call: "Lifting", the PF will then apply collective to establish a stationary hover.

Temps & Pressures..... IN THE GREEN

- Check that all engine, transmission and hydraulic indications are in the normal operating range.

CAS..... CHECKED

- **Check indications reflect correct system**

NR..... CHECKED (CAT A 102%)

FLIGHT INSTRUMENTS..... CHECKED

PI..... CHECKED

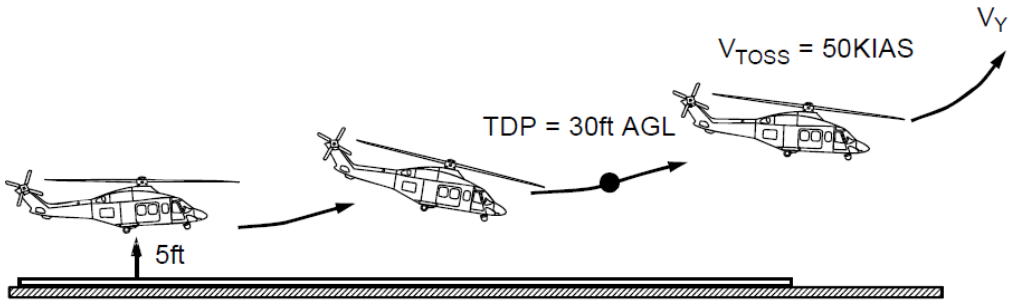
- State the hover value

The PNF shall continue to monitor Nr, PI, engine instruments and the CAS throughout the takeoff.

CLEAR AREA CAT A TAKE-OFF PROCEDURE

Clear Area Normal All Engine Operating Take-Off

The Clear airfield takeoff procedure is an accelerating and gently climbing profile with TDP at 30ft and a Vtoss of 50KIAS



Clear Area Cat A takeoff procedure.

- PF calls "**Lifting**" and lifts to the hover at 5 ft.
- PNF reports PI value as part of the hover checks.
- When hover checks are complete, rotate to 5 nose down. Halfway through the rotation, increase PI to a value 18% above hover power (subject to a maximum of 110%) to initiate a gentle climbing acceleration to TDP.
- At TDP (30FtAGL), verify Vtoss has been reached then adjust attitude to 5 degrees nose up on the ADI to attain Vy.
- At Vy select Nr at 100%.
- After Vy set climb speed and adjust to climb power.
- At 200ft and Vy raise the landing gear.
- Continue climb following the briefed procedure.
- After takeoff Checks when established in the climb above 500 feet AGL.

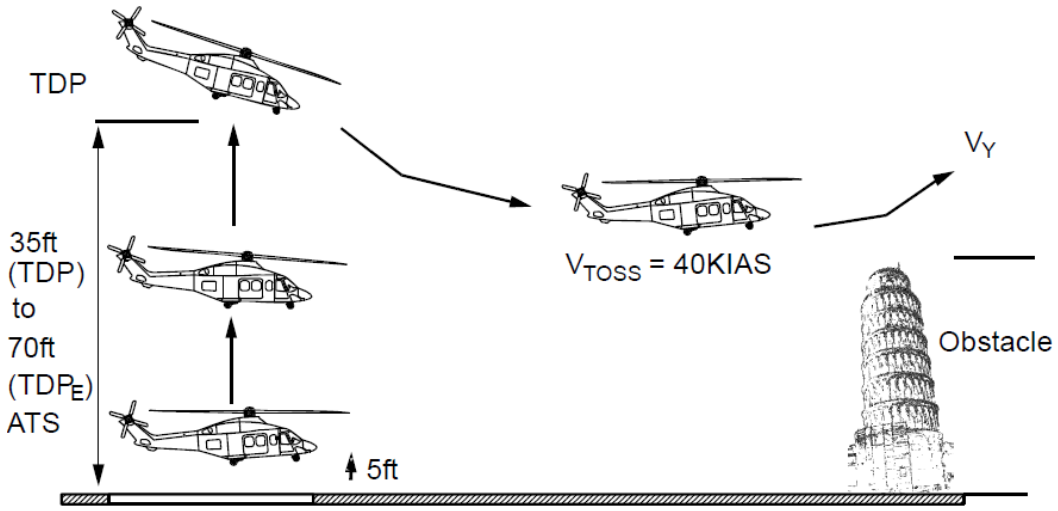
FLIGHT EVENT	PNF call	PF response
Hover & transition	'**Two AP'S'** Call: **"Hover checks complete,PI XXX %"** Call **"Power Set"** (Correct Value) Monitor Takeoff Call " **Speed Alive"**	Call **'Lifting'** '**Rotating'** Rotate nose down to 5, halfway through rotation increase PI to hover power +18%
At TDP	Call "**TDP"**	Call "**Continuing"** - -
At Vtoss	Call "**Vtoss"**	Rotate to 5 nose up
At Vy	Call "**Vy"**	Select 100% Nr
At 200Ft AGL	Call **"200"**	Set climb parameters
Vy and 200ft calls made	Select and Call:" **Gear Up, Lights Out**"	Call" **Gear Up**"
At 500 Ft AGL	Call: **"500"** Complete after takeoff checks. Call**:" After takeoff checklist complete"**	Call:"**After Take Off Checklist**"

GROUND LEVEL & ELEVATED HELIPAD CAT A VERTICAL TAKEOFF

6.4t Helipad (Vertical Procedure)

On a helipad, the TDP is a point located 35 ft above the touchdown point. On the extended procedure, the TDP is 35 ft to 70 ft.

6.4t Helipad (Vertical Procedure) Normal Take-off



GROUND LEVEL AND ELEVATED HELIPAD CAT A VERTICAL PROCEDURE.

- PF calls "**Lifting"** and lifts to the hover at 5 ft.
- PNF reports PI value as part of the hover checks.
- When hover checks are complete, increase PI within 2 seconds to a value 23% above hover power (subject to a maximum of 110%) to initiate a climb to TDP.
- Pnf calls **"50"** at 50 feet (if TDP is above 50 feet) and **"TDP"** AT TDP.
- At TDP adjust attitude to 10 degrees nose down attitude in 1 second, maintain this attitude for 1 second then recover pitch attitude to 0 degrees to climb and accelerate to Vtoss (40KIAS). Maintain collective position.
- At Vtoss adjust pitch attitude to approximately 5 degrees nose up. Maintain collective position, continue climb and accelerate to Vy.
- At Vy select Nr at 100%.
- After Vy set climb speed and adjust to climb power.
- At 200ft and Vy raise the landing gear.
- Continue climb following the briefed procedure.
- After takeoff Checks when established in the climb above 500 feet AGL.

Note: During all vertical operations from onshore Heliports, the radio altimeter must be serviceable.

FLIGHT EVENT	PNF call	PF response
Hover	'Two AP'S' Call: **"Hover checks complete,PI XXX %"** Call **"Power Set"** (Correct Value) Monitor Takeoff Call " **Speed Alive"**	Call **'Lifting'** '**Rotating'** Increase power to hover power +23% in two seconds
At TDP	Call " **Speed Alive"** Call "**TDP"**	Call "**Continuing"** Rotate to 10 nose down in 1 second then recover to 0 pitch attitude to continue climbing acceleration
At Vtoss	Call "**Vtoss"**	Rotate to 5 nose up
At Vy	Call "**Vy"**	Select 100% Nr
At 200Ft AGL	Call **"200"**	Set climb parameters
Vy and 200ft calls made	Select and Call:" **Gear Up,Lights Out**"	Call" **Gear Up**"
At 500 Ft AGL	Call: **"500"** Complete after takeoff checks. Call**:" After takeoff checklist complete"**	Call:"**After Take Off Checklist**"

SHORT FIELD CAT A NORMAL TAKEOFF

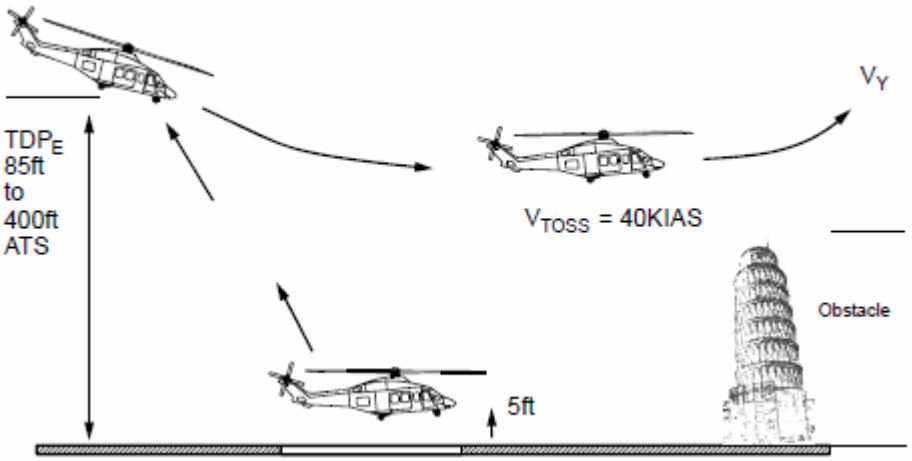
TDP is variable between 35 and 400 ft feet above helipad elevation. Vtoss is 40 KIAS.

The procedure is similar to the vertical procedure above except that PNF shall call radalt heights every 20 feet up to TDP.

The landing gear should be raised at Vy (but not below 200 ft).

BACK UP CAT A NORMAL TAKEOFF

The Cat A back up procedure is a climbing back up profile with a variable TDP between 85 and 400 ft ATS and a Vtoss of 40 KIAS.



- PF calls **"Lifting**" and lifts to the hover at 5 feet.
- PNF reports PI value as part of the hover checks.
- When hover checks are complete, increase PI within 2 seconds to a value 23% above hover power (subject to a maximum of 110%) to initiate a backwards climb to TDP, keeping the helipad in view.
- PNF calls heights every 20ft and "**TDP"** at TDP.
- At TDP adjust attitude to 10 degrees nose down attitude in 1 second, maintain this attitude for 1 second then recover pitch attitude to 0 degrees to climb and accelerate to Vtoss (40KIAS). Maintain collective position.
- At Vtoss adjust pitch attitude to approximately 5 degrees nose up. Maintain collective position, continue climb and accelerate to Vy.
- At Vy select Nr at 100%.
- After Vy set climb speed and adjust to climb power.
- At 200ft and Vy raise the landing gear.
- Continue climb following the briefed procedure.
- After takeoff Checks when established in the climb above 500 feet AGL.

Note: During all vertical operations from onshore Heliports, the radio altimeter must be serviceable.

CAT 'B' TAKEOFF

General

The terrain over which the helicopter is to be flown during the acceleration to Vtoss must be suitable for a forced landing. 'Suitable' means no dynamic parts of the helicopter would be damaged during any forced landing and that there would be no risk to third parties from a forced landing.

The Cat B procedure may be used when the following criteria are met:

- The cloud base and visibility must be such that in the event of an engine failure, acceleration to Vtoss may be achieved whilst manoeuvring clear of cloud and with sufficient forward visibility to permit obstacle avoidance by visual manoeuvring. In practical terms, this means a minimum cloud base of **200ft** and minimum visibility of **800 mtrs.**
- The single engine Height Velocity avoid area must not be penetrated.
- Performance Class 1 must be achieved by the time obstacles can no longer be avoided by visual manoeuvring and at the very latest by 200 ft above the takeoff surface.
- Observe Crosswind limitations. (45 kts demonstrated)

TAKE OFF PROCEDURE

Follow the appropriate Class 1 profile.

AFTER TAKEOFF AND GO-AROUND

General

Unless required by a specific departure procedure, the aircraft should be climbed straight ahead to at least 300 ft AGL (day VMC) OR 500 ft AGL (night or IMC) and accelerated to at least Vy before manoeuvring.

AFTER TAKEOFF/ GO AROUND CHECKS

The checklist may be completed from memory once the aircraft is safely established in the climb (above 200 ft radalt and with a speed at or above Vy after takeoff or on a go-around).

However the checklist should not be read until the aircraft is safely established in the climb above 500 feet radalt on departure. It is particularly important that PNF monitors the flight profile effectively during IMC or night takeoffs and go-arounds. No extra calls or actions are required during this phase unless the PNF notices a deviation from the expected flight profile.

If any checklist items have been completed from memory, PNF must then consult the checklist and review it to ensure that all items have been completed correctly.

- **LDG Gear (200 FT/+VS).....UP/LTS OFF**

  Retract the gear when speed is above Vy and the aircraft is established in the climb above 200 feet. Consider leaving the gear down if there were any hard braking operations for 5 mins to cool the brakes. Confirm the landing gear does actually retract (travel light and green lights out)

- **NR/NF.....100%**
- **Tq Limiter.....As required**
- **MFD/CAS.....Check**

Procedures for engagement of AFCS coupled modes

It is AWTA SOP to operate the aircraft coupled, encouraging better overall management of aircraft systems, navigation and passenger comfort. Deviation from this procedure (e.g. for self-training purposes in raw data flying) is permitted at the Commander's discretion.

It is important to involve both pilots in the process at all times to maintain a closed loop. PF may make coupled mode selections himself or may request PNF to make selections, in particular at times of high workload. All mode selections and deselections must be announced, and confirmed by the other pilot.

PF shall request a mode by calling **"Select (e.g. ALT)"**. PNF shall respond by selecting the desired mode and reporting **"(mode) engaged"**. PF shall state **"(mode)** engaged/armed**"** when the correct indication appears at the top of the PFD. For example:

PF ..... **"ALT green"**

When PF selects a mode himself, he shall announce **"Selecting (mode)"**. PNF will state **"(mode) green"** when the correct indication appears at the top of the PFD. For example:

PF ..... **"Selecting ALT"**
PNF ..... **"ALT green"**

De-selection of a mode must also be requested or announced. If applicable All Flight Director audio chimes must be acknowledged, either with the procedure above, or if an unexpected chime is heard, with a clear statement of what has changed.

USE OF AFCS COUPLED MODES ON DEPARTURE

Preset HDG moce or LNAV may be engaged and ALTA may be set once the aircraft is safely established in the climb (above 200 ft radalt with speed at or above Vy).
Crews should make use of ALTA whenever cleared to a new altitude or flight level remembering to confirm that the new desired altitude is correctly displayed on both PFDs.

- To couple FMS lateral navigation (LNAV) to the flight director, select HSI on the PFD and FMS1 or FMS2 (by pressing LNAV on the DCP) then press the NAV key on the flight director Guidance Controller.
- When the FD is coupled to the FMS the Course arrow and FMS 1 / 2 source indicator on the PFD HSI will turn magenta (from cyan) and the active leg on the MAP page will turn magenta (from cyan).

CLIMB, CRUISE AND DESCENT PROCEDURES

The checklist should be completed until safely established in the climb or cruise. It is preferable that the autopilot is coupled to allow better overall management of the aircraft.

- **FUEL..... CHECK**
  - Confirm fuel usage, fuel at destination and fuel at alternate are in accordance with planned figures, or if not, are still sufficient. Compare FMS fuel total with fuel management panel contents and update if necessary.
- **ENG's..... CHECK**
  - At least every half hour select the PWR PLANT page and confirm all indications are in the normal operating range and no engine matching abnormalities are present.

- **Altimeters (TL)..... QNE X/CK**
  - Both pilots set QNH unless operating above transition altitude when 1013 is set.
  - Standby BARALT..... QNH (regional or field as appropriate)
  - Crosscheck Altimeters. Both pilots report indicated altitude and subscale setting.
  - Radalt Bugs.....Nominally on passing 1000 FEET set “1000’feet”. Prior to descent, set 200 FEET.
- **Flight/Nav/Instruments.....CHECK**

USE OF TCAS

General

While normal ATC procedures and the “see and avoid” principle are the primary means of ensuring aircraft separation, Traffic Alerting or Advisory Systems provide flight crew with an independent backup to visual search and the Air Traffic system by alerting them to collision hazards.

Operational Use

ATC procedures and the “see and avoid” principle will continue to be the primary means of ensuring aircraft separation, but TCA adds a significant backup for collision avoidance. If intruder traffic is observed on TCAS that might develop into a threat (e.g. traffic on a constant bearing and at similar altitude, flight crew should start a visual search for the threat. If the aircraft is not visible, advice should be sought from ATC. Pilots should not manoeuvre solely on the basis of a TA unless the potential threat is believed to pose a definite risk of collision, in which case they should manoeuvre as necessary and in good time. If the manoeuvre involves deviation from the clearance, ATC must be advised as soon as possible and the aircraft must be returned to the original flight path as soon as it is safe and practical to do so.

USE OF EPGWS

1) TAWS PFD and MFD display……SET as required.
2) TAWS map range…… Set as required by rotating the CCB knob
3) TAWS functions…… .Set as required on the MCDUMENU/TAWS page.
4) Unexpected terrain or obstacle awareness caution alert occurs in flight
   Verify aircraft flight path and correct as necessary

Note 1: “Warnings” are those EPGWS alerts that give a red “Pull Up” message on the PFD. EPGWS Cautions do not require immediate action.

5) Unexpected terrain or obstacle awareness warning alert occurs in flight
   Unless visual with the surface and able to determine the aircraft flight path is safe, IMMEDIATELY initiate manoeuvre to provide maximum terrain or obstacle clearance, until all alerts cease.

Caution: The highest and lowest terrain elevation, displayed in the left corner of the PFD/MFD are calculated Geometric Altitude and NOT corrected barometric altitude. The values represent the true height level (AMSL) in hundredths of feet.

Note 2: The audio alerts, visual cautions and warnings may be inhibited on the TAWS page of the MCDU as follows:

- Selecting TERR INHIB a white TAWS INHIB message illuminates on the PFD/MFD. This mode inhibits the terrain and obstacle aural alerts and visual cautions and warnings while the terrain display remains operational.
- Selecting MUTE, a green TAWS AUDIO MUTE advisory illuminates on CAS. This mode inhibits the terrain and obstacle audio alerts for 5 minutes while the visual cautions, warnings remain active. The terrain and obstacle audio alerts are restored immediately by deselecting MUTE.

When any MFD format, other than the MAP page, is being used and a TAWS alert occurs the MAP soft key is automatically armed to the onside Cursor Control to allow quick access to the MAP page. Pressing the ENTER button on the CCD will cause the MAP page to display and TAWS to be automatically selected for display on the MFD map and the map range will be set to 5NM, or 2.5 NM if TAWS in low altitude mode.

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CHAPTER

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APPROACH CHECKS

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APPROACH BRIEFINGS

As for takeoff briefs described. Abbreviated briefs will normally be used for approach and landing. Where the abbreviated briefs do not give the necessary degree of information or a more detailed brief is necessary, for example at an unfamiliar airfield, PF must give a full brief outlining his intentions prior to landing. These briefs may be given at a convenient time before the approach, provided that it is completed before the initial approach segment commences. It should be completed in level flight, preferably with FD coupled modes. The PF may hand over control of the aircraft for the purposes of the briefing. A full IFR approach brief will be given by PF from the Approach Plate checking off the points in the order they appear on the plate. This brief shall include the following points:

- Type of approach.
- FD/FMS modes and speeds.
- STAR (if applicable).
- Procedural approach.
- Navaids.
- FAT.
- Crossing altitudes.
- Timing to be used, if applicable.
- Minima.
- Actions at minima.
- Weather.
- Runway elevation.
- Go-around procedure.
- Intentions after go-around.

Example abbreviated briefs are given in the following paragraphs.

Ifr Approach Brief By Pf, Abbreviated Brief

- ILS [or other approach] to Runway XX at……..,
- FAT is……°, DA/MDA is…..ft, minimum RVR ….. metres.
- The RVR is above minimum and there is no approach ban. (If applicable)
- [I will fly a coupled approach /a flight director approach/ raw data].
- Go-around procedure as on the plate

Vfr Cat B Brief By Pf, Abbreviated Brief

- Standard CAT B approach Runway XX
- Go-around ……with Vtoss 50 knots.

APPROACH CHECKS

1) **Altimeters** **QNHX/CK**
   Confirm the correct QNH is set for the descent. Crossceck altimeters agree +_ 100ft

2) **MFD** **Set Powerplant**

3) **Flight/Nav Instruments Ck Set**
   Confirm that the navaids are tuned, identified and set correctly for the type of approach to be flown.

4) **DH Set** **As Required**

5) **Approach Briefing** **Performed**

Complete the approach briefing from the checklist below.

A. Approach Type/Use of FD/Speeds
- Type of approach
- AP/FD modes and speeds to be used during the arrival, approach and on final.

B. STAR/Procedural sector
- STAR if applicable up to the point where the procedure starts, including tracks, radials, altitudes, descents and MSA.
- Procedural approach up to the final approach course, including tracks, radials, altitudes, use of HSI and presetting of approach mode.

C. FAT/crossing altitude/timing
- Final approach track(FAT) AND TIME FOR THE fat TO BE SELECTED.
- Crossing altitude over the FAF/OM and or non precision step down altitudes
- Timing to be used, if applicable.

D. Minima (DA/MDA/MAPt) and weather
- Minima including the missed approach point and circling height in case of transfer to another approach.
- Confirm there is no approach ban.

E. Runway elevation
Confirm the runway elevation

F. Go Around Procedure/after go around
Go around procedure, AP/CPL modes to be used and navigation settings required
Intentions after go-around(further approach/diversion).

PF/PNF duties and calls are in accordance with the following tables:

Precision Approach: duties, calls and responses – ILS		
Approach phase	**PNF**	**PF**
Initial approach Checks (as required, at PF's request)	Completes and calls. 'Initials complete'	Acknowledges as required and monitors 'Initials complete'
Localiser indicating	'Localiser Alive '	'Localiser Alive'
Localiser half scale	'Half scale' Completes and calls final approach checks (no prompt from PF). 'Finals complete'	'Half scale' Acknowledges as required and monitors 'Finals complete'
From half scale localiser to 100ft above DA	Monitors ILS Warns if approaching half scale LLZ or G/S	Fly ILS Acknowledges approaching half scale
G/S Indicating	'G/S active'	'G/S active'
Final approach fix	'Altitude checks at...' (appropriate DME or fix) Correcting actions as required	'Altitude (….) feet'
500 ft above DA	'500 above'	'500 above'
100 ft above DA	'100 above' watches for required visual references and monitors ILS	'100 above' Continues to fly ILS
At DA		'Decide'
	'Visual' or 'Continue' or 'Nothing seen, go around'	'continue' or….'going around'
Below DA (landing)	Monitors visual profile and ILS. Calls IAS and radalt height.	Flies visual approach and lands.

Approach: duties, calls and responses – Non-Precision Approach		
Approach phase	**PNF**	**PF**
Initial approach Checks (as required, at PF's request)	Completes and calls. 'Initials complete'	Acknowledges as required and monitors 'Initials complete'
Within 5 degrees of final approach track or half scale localiser	'Final Approach track established' Completes and calls final approach checks (no prompt from PF). 'Finals complete'	'Final approach track established' Acknowledges as required and monitors 'Finals complete'
From FAT established to 100 ft above MDA	Monitors instrument approach Warns if approaching +/- 5 degrees or half scale LLZ	Fly instrument approach Acknowledges approaching 5 degrees or half scale LLZ
Final Descent Point	'Descend'	'Descending'
Final approach fix	'Altitude checks at...' (appropriate DME or fix) Start clock if applicable Monitors timing thereafter	'Altitude (….) feet'
500 ft above MDA/DA	'500 above'	'500 above'
100 ft above MDA/DA	'100 above' watches for required visual references and monitors instrument approach and timing if required visual references seen, calls 'Visual' & Clock reference	'100 above' Continues to fly Instrument approach
At MDA/DA/MAP	'Visual' or 'Continue' or 'Nothing seen, go around'	'Visual Landing' or….'going around'
	Monitors visual profile Calls IAS and radalt height.	Flies visual approach and lands.

GO-AROUND PROCEDURES

MANUAL PROCEDURE

- Increase collective to obtain takeoff power and rotate to achieve a standard climb
- When established in a positive climb PNF shall announce **"Climbing"**
- Select the gear up when a positive climb is achieved
- Couple the flight director as required (Speed>60kts)

FLIGHT EVENT	PNF	PF
Go-around required	Call: **"Go-around"** (When PNF decides that a go-around is necessary)	Call: **"Going around"**. Set takeoff power and rotate to achieve a standard climb.
Positive climb established	Call: **"Climbing" Positive Rate**	Command: **"Gear up"**
500 AGL	Call: **"500"** Perform and announce: **"Go-around checks complete"**	Command: **"Go-around checks"**

COUPLED 'GO AROUND'PROCEDURE

NOTE : AIRSPEED > 60 KTS

Go-around required	Call: **"Go-around"** (When PNF decides that a go-around is necessary)	Call: **"Going around"**. Activate Go Around button
Positive climb established	Call: **"Climbing" Positive Rate**	Command: **"Gear up"**
500 AGL	Call: **"500"** Perform and announce: **"Go-around checks complete"**	Command: **"Go-around checks"**

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CHAPTER

10

LANDING CHECKS

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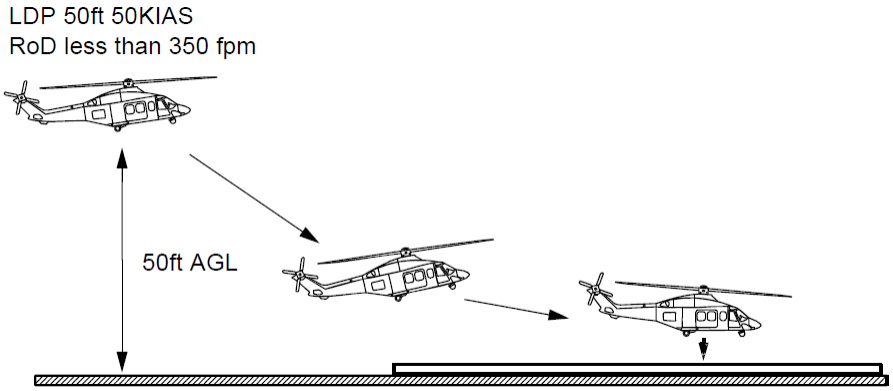
LANDING

Caution: During landings and operations near the ground, avoid pitch attitudes greater than 15 degrees nose up below 15ft AGL, to avoid the tail from contacting the ground.

Normal procedure calls during landing.

Clear Area Normal Landing



- Select NR 102%.
- Establish approach to pass 200 ft at a rate of descent of no more than 500 ft/min.
- PNF to call **"LDP"**
- PF to call **'Continuing'**.
- From LDP, perform a direct approach with steady deceleration down to HIGE.
- Proceed with normal landing.
- Complete 'After Landing Checks'.

The normal procedure calls and responses are given in the table below.

Type of landing	PNF call	PF response
All visual landings Onshore	500ft LDP	Checked Landing
All landings when pitch attitude exceeds +15 degrees below 15 ft	PITCH	Checked

BEFORE LANDING CHECKS

These checks shall be called for at the latest by 3nm to run to the destination on a visual approach. On an instrument approach they shall be called for at the latest by 1nm to run to the FAF, 1 dot GS deviation or when within+- 5 degrees of the FAT on a non precision approach if unable to determine the distance to the FAF.

1. Landing Gear Down .....DWN 3 Greens

Confirm the three amber travel lights illuminate during gear travel and then extinguish. Confirm al three downlock lights illuminate.

2. Nose wheel.....LOCK
3. Parking Brake..... As required
4. Landing Light.....ON
5. Trq Limiter.....As required
6. NR/NF.....100% (CAT 'A' 102%)

For CAT "A" approach ensure speed is below 90KIAS prior to selection

7. CAS messages..... Check

After Landing Checks.

1. AFCS.....OFF
2. Nosewheel.....UNLK (Grd taxi req)
3. Cyclic Stick.....Centered
4. RPM Switch.....CK 100%
5. Pitot heat/Radar...OFF
6. Transponder.....STBY
7. Floats..... OFF

Float Arm caution not displayed on CAS

SHUTDOWN CHECKS

These checks are normally read by the PNF and auctioned by PF.

1. Cyclic stick..... CENTERED
2. Nosewheel..... AS REQ
3. Parking Brake..... ON

Set the parking brake as follows:

CM1 : Pull and turn andle, check PARK BRAKE PRESS caution illuminates

CM2: Block Pedals for parking brake application.

CM2: Press brake pedals until PARK BRAKE PRESS caution extinguishes and PARK BRAKE ON advisory illuminates.

4. External Lights..... OFF
5. ENG 1 (2) mode Switch..... IDLE
6. Fuel Pump 1(2)..... OFF
7. BUS TIE Switch..... ON
8. Emer Light/EAPS..... OFF

After Cooling down (2 minutes at stabilised idle)

Note : Only commence timing when engines have stabilised at idle

9. ENG 1 (2)MODE Switch..... OFF

During shutdown note that the engines decelerate freely without abnormal noise or rapid run down and that ITT does not rise abnormally**.**

10. Rotor brake (<40% Nr). ON

Confirm no abnormal pressure messages illuminate on brake monitor panel

11. Anti Coll..... OFF
12. ENG 1(2) Fuel Switch..... OFF
13. Fuel Crossfeed..... CLSD

Indicator Bar vertical

14. Bus Tie..... AUTO
15. Bat Master/Gen 1&2..... OFF
16. Bat Main & Aux (Ng=0).... OFF

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CHAPTER

11

EMERGENCY AND ABNORMAL PROCEDURES

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ENGINE FAILURES DURING TAKEOFF AND LANDING

General

The following paragraphs set out the procedures and appropriate calls for engine failures during takeoff and landing.
In the event of an emergency during the takeoff or landing, there should be no movement of engine or fuel controls until:

- If the emergency occurs during the takeoff before TDP, until the aircraft is back on the ground and stopped with the parking brake applied, or
- If the emergency occurs during the takeoff after TDP, until the aircraft is above 200feet agl at Vy or greater, or
- If the emergency occurs during the landing below 200feet, until the aircraft is above 200 feet agl at Vy or greater on a go-around, or is on the ground and stopped with the parking brake applied.

The only exception to this procedure should be if there are confirmed signs of fire in addition to the fire warning.

The Emergency Checklist (ECL) is not to be read until the aircraft is above 500 feet agl or safely on the ground.

Care should be taken in confirming the failed engine prior to commencing the ENGINE SHUTDOWN IN AN EMERGENCY procedure.

Immediate Actions and Drills

PF immediate action is to maintain a safe flightpath and to avoid exceeding limitations. The appropriate safe flightpath is recalled from memory (e.g. adoption of an OEI profile, Nr control, entry into autorotation, adjusting to a specific speed range). PNF duty is to recall any immediate action drill from memory and to action, after PF confirmation.

Comply with the following table: Two-Pilot Crew Operating Procedures **Emergency and Abnormal Procedures – Immediate Actions and Drills**	
PNF	**PF**
Monitors flightpath	Handles aircraft to maintain safe flightpath.
Calls diagnosis	Confirms diagnosis
Calls for appropriate drill	
From memory (if required), calls and actions emergency drill	Monitors emergency drill
For any emergency drill requiring operation of engine or fuel system controls or the operation of the controls of any duplicated system, PNF is to place a hand lightly on the nominated control and request PF is to confirm correct identification before further action is taken.	
On completion of Immediate Action Drill	
PNF	**PF**
Calls immediate action checklist drill and verifies immediate action drill complete.	Verifies immediate action drill complete.

Subsequent Actions

Comply with the following table: **PNF**	**PF**
Monitors flightpath. Reads, calls and actions checklist items. Reassess situation if required	Handles aircraft to maintain safe flightpath. Acknowledges and monitors emergency drill

INITIAL CALLS RELATING TO MALFUNCTIONS

On recognising a problem exists, warn the other crewmember using one of the following malfunction calls:

1 "ENGINE OUT, CALL NR" or "Power Loss" for engine failures
2 "FIRE – No 1 Engine / No 2 Engine"
3 "CONTROL MALFUNCTION" for flying control purposes
4 "WARNING" and the appropriate caption
5 CAUTION_APPROPRIATE CAPTION

PNF actions
During these emergencies, PNF shall perform the following actions.

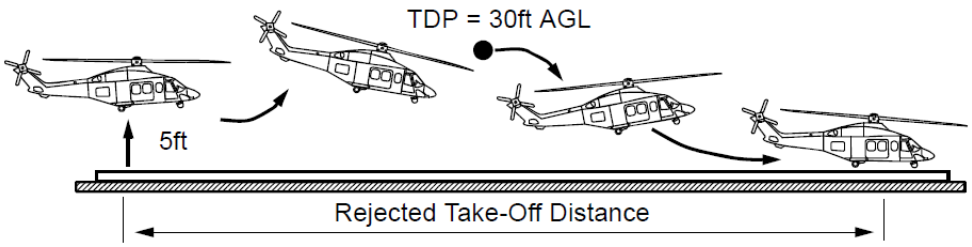
- If an engine malfunction occurs, call " Engine Out" (and "Nr High" (above 102%) or "Nr Low" (below 98%) if applicable; otherwise state the failure indications (e.g.#1 Hydrualic failure).
- Start the clock
- Monitor the failed engine for signs of fire or other dangerous indications.
- Monitor the good engine parameters.
- Call at Vtoss AND Vy and state if the aircraft is climbing.
- Raise the landing gear at Vy and 200ft or when a positive rate of climb has been established if later.
- Call power setting OEI 2.5 minutes/OEI MCP.
- Call if the aircraft is descending.
- Monitor radalt height, pitch attitude and flight path.
- Call passing 200 feet radalt and 500 feet radalt.
- Call " Attitude" if pitch attitude above +15 degrees below 15 feet before landing.

Engine failure in the hover IGE.

- Call "**Rejecting**"
- Maintain collective pitch setting or lower collective slightly if required to land.
- Apply collective to cushion landing.
- When on the ground, centralise cyclic, lower collective and apply brakes as required.
- Apply parking brake.
- Continue with emergency checklist.

The following procedural calls are applicable through the range of Cat A operations & Cat B.

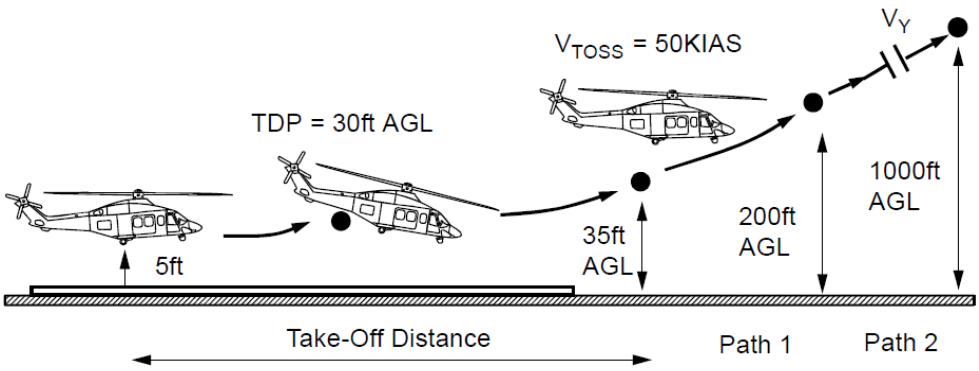
Clear Area Take-off with Single-Engine Failure before TDP



- Abort the take-off procedure immediately when engine failure occurs.
- PNF calls "**Power Loss",** monitor PF
- PF calls **'Rejecting'**.
- Adjust collective to control NR to a minimum of 90%. Lower the collective if required to establish a descent.
- PNF calls "**NR & Rad Alt & Speed"**.
- Adjust cyclic to reduce ground speed below 30 kt.

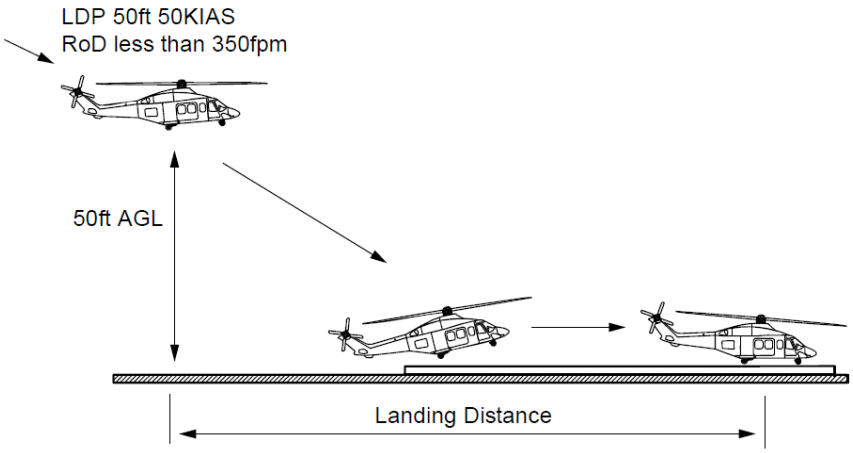
- At approximately 5-10 ft AGL level aircraft.
- As landing becomes imminent increase collective to cushion landing. Maximum nose up 15°.
- On the ground, reduce collective pitch to minimum, centralise cyclic and use wheel brakes to stop the aircraft.
- Check for signs of fire.
- When aircraft comes to a stop, apply parking brake and disengage AFCS.
- Complete the Emergency Operating Procedure 'Single Engine Failure before TDP'.

CLEAR AREA TAKE-OFF WITH SINGLE-ENGINE FAILURE AT OR AFTER TDP



- Engine failure at or after TDP.
- PF calls **'Continuing'**.
- PNF calls "**NR & Rad Alt & Speed".**
- Continue acceleration.
- Adjust collective to control NR to a minimum of 90%. PNF monitors & announces any Nr changes.
- Adjust cyclic to achieve a nose up attitude of 5°.
- Accelerate to Vtoss, the PNF calls 'Vtoss'. PF responds '**Vtoss recovering Nr'**
- At Vtoss and the climb is established, the PNF calls **'Vtoss Climbing'**. On hearing the 'Vtoss' and 'Climbing' calls; the PF adjusts the cyclic to achieve a nose up attitude of approximately 10°.
- Continue climb to 200 ft with 2.5 min rating.
- At 200 ft, PNF calls '**200 ft'**, level off, accelerate to Vy, then continue the climb to 1000 ft.
- PNF calls "**Vy**".
- At Vy select NR to 100%.
- Check for signs of Fire.
- When convenient but before the 2.5 min rating expires, reduce power to 140% PI.
- When at Vy and climbing, retract the landing gear. PF Call "**Gear Up"**. This would normally be at 500 ft but below if required. PNF select and call " **Gear Up, Lights out**"
- At or above 1000 ft, complete the Emergency Checklist Procedure for 'Single Engine Failure at or after TDP'.
- Complete 'After Take-off' checks.

CLEAR AREA LANDING WITH ONE ENGINE INOPERATIVE (CONTINUED LANDING)



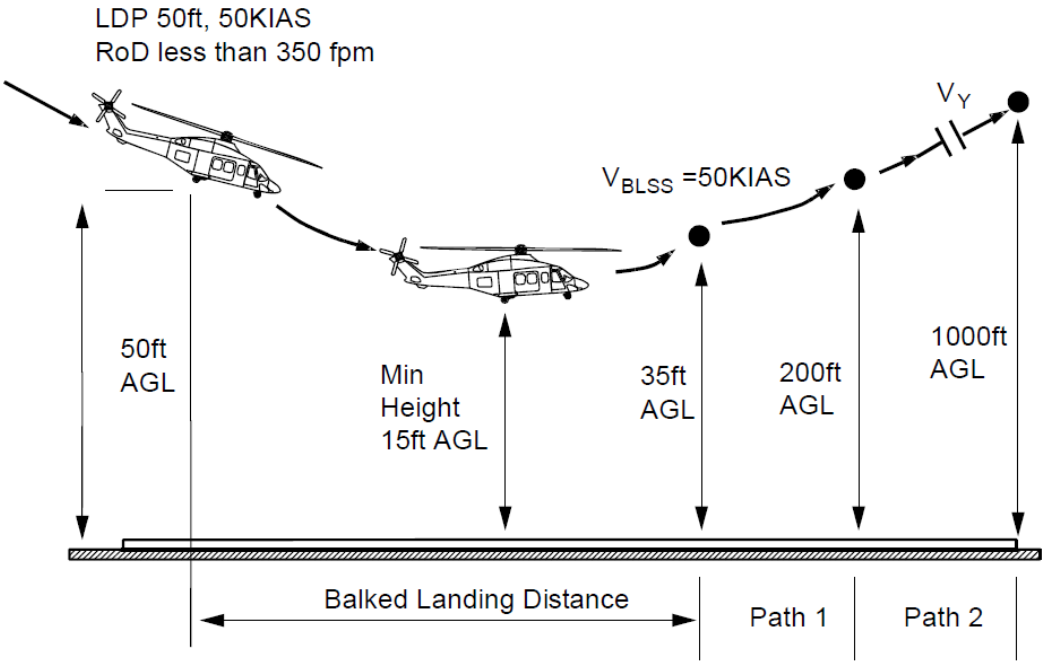
A landing is possible in the event of an engine failure at any point during the approach.

Landing is mandatory if engine failure occurs at or after the LDP.

- PNF call " **Power Loss"**
- Call "**Landing"**
- Adjust collective to control NR to a minimum of 90%.
- Adjust cyclic attitude to decelerate aircraft.
- At 20 ft increase collective to cushion the landing.
- At touchdown maximum nose up 15° and 30 kt GS.
- On the ground, reduce collective pitch to minimum, centralise cyclic and use wheel brakes to stop the aircraft.
- When aircraft comes to a stop, apply parking brake and disengage AFCS.
- Complete Emergency Drills if required.
- Complete 'After Landing Checks'.

CLEAR AREA ABORTED LANDING AND OEI CLIMB

Go-Around is possible if single-engine failure occurs before the LDP.



- Adjust collective to control NR to a minimum of 90%.
- Adjust cyclic to achieve a nose up attitude of 5°.
- Accelerate to Vtoss, the PNF calls **'Vblss'**.
- At Vtoss and the climb is established, the PNF calls 'Climbing'. On hearing the **'Vblss'** and '**Climbing'** calls; the PF lowers collective to recover NR to 102%.
- Continue climb to 200 ft with 2.5 min rating.
- At 200 ft, PNF calls '**200 ft'**, adjust cyclic to achieve a nose up attitude of 2°, accelerate to Vy while climbing.
- PNF to call '**Vy'**.
- At Vy select NR to 100%.
- Check for signs of Fire.
- When convenient but before the 2.5 min rating expires, reduce power to 140% PI.
- When at Vy and climbing, retract the landing gear. PF call "**Gear Up**". PNF select and call "**Gear Up, Lights Out".** This would normally be at 500 ft but below if required.
- At or above 1000 ft, complete the Emergency Checklist Procedure for 'Single Engine Failure at or after TDP'.
- Complete 'After Take-off' checks.

ENGINE FAILURES CAT B

Engine failure on takeoff

If aircraft mass and flight path permit, takeoff and climb out may be continued. For an attempted takeoff, carry out the following:

- Call " **Continuing"**
- Reduce collective as necessary to maintain Nr at least 90% if altitude permits.
- PNF monitors Nr, Rad Alt & Speed.
- Adjust the flight path as necessary using careful cyclic movements and gently attempt to increase speed to 50 kts.
- Trade height for speed if possible.
- Once 50KIAS is achieved with a positive rate of climb, raise the landing gear and continue a climbing acceleration to Vy.
- If flight cannot be maintained, select a suitable site and complete a forced landing with minimum forward speed.

For a rejected takeoff carry out the following:

- Call "**Rejecting"**
- Reduce collective as necessary to maintain Nr at least 90% if altitude permits.
- PNF monitors Nr, Rad Alt & Speed.
- Make a partial flare to reduce ground speed. Limit flare to 15 degrees when close to the ground.
- Apply collective to cushion landing.
- When on the ground, centralise cyclic, lower collective and apply brakes as required.
- Continue with emergency checklist.

Engine failure during approach and landing

- Call "**Landing**"
- Continue the descent aiming to pass through 200ft ALS with a rate of descent of no more than 500fpm. Initiate a deceleration to achieve 30KIAS at 50ft.
- PNF monitors Nr, Rad Alt & Speed.

- At 50ft ALS increase pitch attitude to a maximum of 20% to reduce speed to a suitable groundspeed for the landing surface and apply collective to reduce rate of descent.
- At 20ft ALS apply collective to cushion the touchdown, drooping Nr to a minimum 90% if required. At touchdown maximum nose up attitude 15 degrees.
- When on the ground, centralise cyclic, lower collective and apply brakes as required.
- Continue with emergency checklist.

PILOT INCAPACITATION

If a crewmember fails to answer or to react normally following two clear verbal prompts, or:

A crewmember fails to answer or to react normally to a verbal prompt during any significant deviation from the intended flight profile; then: it must be assumed that a partial or complete incapacitation of that crewmember has occurred. The other crewmember must ensure the safety of the flight by:

- Assuming the duties of Commander
- Assuming the duties of PF
- Declaring an emergency
- Plan a landing as soon as practicable