SECTION 1
GENERAL

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SECTION 1

GENERAL

1.1 INTRODUCTION
This Flight Manual contains the information necessary for safe and efficient operation of the EC135 P2+ helicopter with the Center Panel Display System (CPDS with software V 2005 or subsequent) installed.
The user is assumed to have flying experience, therefore elementary instructions and basic principles have been omitted.

1.2 ORGANIZATION OF THE MANUAL
This Flight Manual is largely organized in the standardized format recommended by the Helicopter Association International.
It is divided into an approved part consisting of sections 1 thru 5, and 9, and into a non-approved part consisting of sections 6, 7, 8, 10 and 11.

1.2.1 Approved and non-approved data
The approved part of this manual meets all certificating authority requirements for approved data.
The non-approved part contains data supplied by the aircraft manufacturer.

1.2.2 Description of the sections
The sections of the manual are largely independent with each section beginning with its own table of contents.

Approved part:

SECTION 1 General
presents information of general interest to the pilot, basic helicopter data and conversion tables. In addition, it provides definitions and explanations of symbols, abbreviations, and terminology used in the manual.

SECTION 2 Limitations
contains those limitations required by regulation or necessary for safe operation of the helicopter and approved by the regulatory authority.

SECTION 3 Emergency and Malfunction Procedures
contains the recommended procedures for dealing with various types of emergencies, malfunctions or critical situations.

SECTION 4 Normal Procedures
contains the recommended procedures for normal ground and air operation of the helicopter.
Performance Data
contains airworthiness and performance information necessary for
preflight and inflight mission planning.
Subsection 5.1 contains approved data.
Subsection 5.2 contains non-approved data supplied by the aircraft manufacturer.

SECTION 9
Flight Manual Supplements
Subsection 9.1 contains Flight Manual Supplements (FMS) with instructions for special operations (e.g. Category A, etc.).
Subsection 9.2 contains Flight Manual Supplements (FMS) providing operating instructions of approved optional equipment.

Non-approved part:

SECTION 6
Mass and Balance
contains the definitions for various mass and balance locations and the procedure for the determination of the center of gravity.
Appended to this section are the Mass and Balance Record form for maintaining a continuous record of changes in structure and equipment affecting the mass and balance, and the Equipment List form for the listing of optional equipment with data necessary for mass and balance computations.

SECTION 7
Systems Description
contains a brief description of the helicopter, its systems and the various standard equipment with information considered most important to the flight crew.

SECTION 8
Handling, Service, Maintenance
contains servicing data, cleaning and care procedures as well as information for ground handling.

SECTION 10
Operational Tips
contains general information and indications for an efficient operation of the helicopter bearing in mind environmental aspects (e.g. “minimum noise” procedures, etc.).

SECTION 11
Appendix
contains Flight Manual Appendices (FMA) for optional equipment and special operations.
1.3 GENERAL DESCRIPTION OF THE HELICOPTER

The EC 135 is a light twin-engined multi-purpose helicopter with five seats in the basic version and optional seat arrangements for up to eight persons. The pilot’s seat is on the RH side.

Engines:
The EC 135 P2+ is powered by two Pratt & Whitney PW 206 B2 or PW 206 B2 VR (Vane Rematch modification) engines, both with digital engine control (FADEC) system. In the FLM the term “PW 206 B2 VR” engine is not mentioned.

NOTE All information, limitations, procedures and performance data mentioned for the Pratt & Whitney PW 206 B2 engine, remain valid for the PW 206 B2 VR. It is also possible to operate one PW 206 B2 and PW 206 B2 VR engine at the same time on a EC 135 P2+ without any restriction.

The twin-engine reliability is enhanced by a fully-separated fuel system, a dual hydraulic system, a dual electrical system and a redundant lubrication system for the main transmission.

Transmission:
The main transmission is a two-stage flat design gearbox, with anti-resonance rotor isolation system (ARIS).

Main rotor:
The helicopter is equipped with a four-bladed bearingless main rotor (BMR). The inboard flexbeam enables movement of the blades in all axes. Blade pitch angles are controlled through integrated glass/carbon fibre control cuffs. The main rotor control linkage system is of conventional design. The hydraulic system for the main rotor controls is designed as a duplex system with tandem piston (both systems are active). In case of a failure of one system, the remaining system has sufficient power to ensure safe flight operation and a safe landing.

Antitorque system:
The helicopter is equipped with a “Fenestron-type” antitorque system, having a tail rotor with 10 blades. The Fenestron is controlled via a “Flexball” type cable, routed from the pedals to the input control lever of the Fenestron.

Fuselage:
The primary structure consists mainly of sheet metal design. Cabin frame, bottom shell, doors, engine cowling and nose access panel are made of composite material. The cabin is accessible through six doors: two hinged doors for the front occupants, two sliding doors for the rear passengers, and two aft clamshell doors for the rear compartment.

Tail boom:
The tail boom can be separated from the fuselage, and consists of the horizontal tail plane with end-plates, vertical fin with integrated tail rotor, tail rotor gearbox and fairing.
Fuel tanks:
The fuel system comprises two fuel tanks, a fuel supply system, a refueling and grounding equipment and a monitoring system. The main tank and supply tank with overflow to the main tank and sufficient separated quantity for 20 minutes flight in OEI condition are installed under the cabin floor.

Electrical system:
The fully redundant electrical 28 V DC system is supplied by two generators and the battery.

Landing gear:
The EC 135 has two cross tubes and two skids.

1.4 HELICOPTER DIMENSIONS

Fig. 1-1 shows a three-view drawing of the helicopter with its principal dimensions. For cabin dimensions see Fig. 1-2.

Locations on and within the helicopter can be determined in relation to fuselage stations (F.S. or STA.), waterlines (W.L.), and buttock lines (B.L.), measured in millimeters from known reference points (see Section 6 "Mass and Balance").
Fig. 1-1  Principal dimensions
Fig. 1-2  Cabin dimensions
1.5 **NOISE LEVELS**

Noise levels (corrected values) based on a gross mass of 2910 kg are shown in Fig. 1-3.

<table>
<thead>
<tr>
<th>Flight phase</th>
<th>Measurements according ICAO Annex 16 Chapter 8</th>
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<tr>
<td>Takeoff</td>
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<td>94.5</td>
<td>88.4</td>
<td>94.5</td>
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<tr>
<td>Flyover</td>
<td>84.0</td>
<td>93.5</td>
<td>84.1</td>
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<td>Approach</td>
<td>92.7</td>
<td>95.5</td>
<td>92.7</td>
<td>95.5</td>
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</table>

Fig. 1-3 Noise levels

1.6 **CONVERSION CHARTS**

For conversion of most important units within the FLM use the charts Fig. 1-4 thru Fig. 1-9 and the standard atmosphere table (Fig. 1-10) on following pages.
CELSIUS – FAHRENHEIT

°F = \left(\frac{9}{5}\right) °C + 32 = 1.8 (°C + 17.8) 

°C = \left(\frac{5}{9}\right) (°F – 32)

Examples:
845 °C = 1553 °F
225 °F = 107 °C

Fig. 1-4 Conversion chart: Celsius (°C) – Fahrenheit (°F)
KILOMETERS PER HOUR – KNOTS

1 km/h = 0.54 kt

1 kt = 1.853 km/h

Examples:

266 km/h = 143.6 kt

42 kt = 78 km/h

Fig. 1-5 Conversion chart: Kilometers /hour (Km/h) – Knots (kt)
Fig. 1-6 Conversion chart: Meters/second (m/s) – Feet/minute (ft/min)

1 m/s = 196.85 ft/min

100 ft/min = 0.508 m/s

Examples:

4.7 m/s = 925.2 ft/min

3447 ft/min = 17.5 m/s
KILOGRAMS – POUNDS

1 kg = 2.205 lb
1 lb = 0.454 kg

Examples:
540 kg = 1190.7 lb
5821 lb = 2643 kg

Fig. 1-7  Conversion chart: Kilograms (kg) – Pounds (lb)
LITERS – U.S. GALLONS – IMP. GALLONS

1 U.S. gal = 3.786 l
1 l = 0.264 U.S. gal

1 Imp. gal = 4.544 l
1 l = 0.220 Imp. gal

Examples:
320 l = 84.5 U.S. gal
320 l = 70.4 Imp. gal

or:
70.4 Imp. gal = 84.5 U.S. gal

Fig. 1-8 Conversion chart: Liters (l) – US Gallons (US gal) – Imp. Gallons (Imp. gal)
HECTOPASCALS – INCHES OF MERCURY

1 hPa (mbar) = 0.02953 in. Hg
1 in. Hg = 33.865 hPa (mbar)

Examples:
1007.5 hPa = 29.75 in. Hg
30.96 in. Hg = 1048.4 hPa (mbar)

Fig. 1-9 Conversion chart: Hectopascals (hPa) – Inches of Mercury (in. Hg)
## STANDARD ATMOSPHERE TABLE

Standard sea level conditions:

- Temperature: 15 °C (59 °F)
- Pressure: 1013.25 hPa / mbar (29.921 inches Hg.)
- Density: 1.225 kg/m³ (0.0023769 slugs/cu.ft.)

<table>
<thead>
<tr>
<th>ALTITUDE (ft)</th>
<th>DENSITY RATIO σ</th>
<th>1/σ</th>
<th>TEMPERATURE (°C)</th>
<th>TEMPERATURE (°F)</th>
<th>PRESSURE (hPa/mbar)</th>
<th>PRESSURE (Hg)</th>
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<td>1.0000</td>
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<td>465.63</td>
<td>13.750</td>
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</table>

Fig. 1-10 Standard atmosphere table
NOTE  Charts and calculating examples represented in this Flight Manual do not take into account wind speed factors. Apply any necessary factors as required by operational rules.

Fig. 1-11  Wind Component Chart

EXAMPLE:

Known:  Takeoff heading  270°
Reported wind direction  240°
Reported wind speed  30 kt

Determine:  a) Crosswind component
b) Headwind component

Solution:  a) Crosswind component = 15 kt
b) Headwind component = 26 kt

Wind direction relative to takeoff heading is 270° – 240° = 30°

Enter chart at reported wind speed (30 kt).

Move upward, following the shape of the curved lines to wind direction relative to takeoff heading (30°).

Move vertically upward (read 26 kt headwind component) and horizontally right (read 15 kt crosswind component).
1.7 TERMINOLOGY AND DEFINITIONS OF TERMS

1.7.1 Warnings, Cautions and Notes

Throughout this manual WARNINGs, CAUTIONs and NOTEs are used to emphasize important and critical instructions.

**WARNING**
AN OPERATING PROCEDURE, TECHNIQUE, ETC. WHICH, IF NOT STRICTLY OBSERVED, COULD RESULT IN PERSONAL INJURY OR LOSS OF LIFE.

**CAUTION**
AN OPERATING PROCEDURE, TECHNIQUE, ETC. WHICH, IF NOT STRICTLY OBSERVED, COULD RESULT IN DAMAGE TO OR DESTRUCTION OF EQUIPMENT.

**NOTE**
An operating procedure, technique, condition, etc. which is essential to emphasize.

WARNINGs and CAUTIONs always precede and are located directly above the text to which they relate.

NOTEs are located directly below the text to which they apply.

1.7.2 Use of Procedural Terms

The procedural term usage and meaning are as follows:

- "**Shall**" and **"Must"** have been used to express a mandatory requirement.
- **"Should"** has been used to express non-mandatory provisions.
- **"May"** has been used to express permissiveness.
- **"Will"** has been used only to indicate futurity, never to express a mandatory requirement.
1.8 ABBREVIATIONS AND SYMBOLS

A

A - Ampere
a/c, acft - Aircraft
AC, ac - Alternating current
ADF - Automatic direction finder
AEO - All engines operating
AGL - Above ground level
ALT - Altitude
AMPS - Amperes
AP - Auto pilot
AR - Autorotation
ARIS - Anti-resonance Rotor Isolation System
ASL - Above sea level
ASTM - American Society for Testing Material
ATC - Air traffic control

B

B.A. - Bleed air
BAT - Battery
B.L. - Buttock line
BOT - Bottle

C

CAD - Cautions and Advisories Display
CAS - Calibrated airspeed
Cat. - Category
CAU - Caution
CDS - Cockpit Display System
CFR - Code of Federal Regulations
C.G. - Center of gravity
CHP - Chip
CIS - Community of Independent States
CL - Closed
Coll. - Collision
COMM - Communication (radio)
CPDS - Central panel display system
CSAS - Control stability augmentation system
CT - Continuity test
CTA - Centro Técnico Aeroespacial (Brazil)
cu ft - Cubic feet

D

DA - Density altitude
DAFCS - Digital automatic flight control system
DC - Direct current
DCPL - Decoupled
DEGR - Degraded
DG - Directional gyro
DGAC - Direction Génerale de l'Aviation Civile (France)
DISCH - Discharge
DISCON - Disconnected
DME - Distance measuring equipment
DNA - Dirección Nacional De Aeronavegabilidad (Argentina)

E
EDL - Equipment deviation list
e.g. - For example
EGT - Exhaust gas temperature
EHS - Electrohydraulic servo actuator
EL - Equipment list
EMER - Emergency
ENG - Engine
EPC - Engine power check
EPU - External power unit
ESS - Essential
EXT - External, extinguisher

F
F - Fuel
FAA - Federal Aviation Agency (United States)
FADEC - Full Authority Digital Engine Control
FAR - Federal Aviation Regulation
FDS - Flight Data System
Fig., fig. - Figure
FILT, FLT - Filter
FLI - First limit indication
FLM - Flight manual
FLT ESS BUS - Flight essential bus
FMA - Flight manual appendix
FMS - Flight manual supplement
fpm - Feet per minute
F.S. - Fuselage station
F.S.B. - Fasten seat belt
ft - Foot (feet)
FU - Follow up

G
GA - Go around
GAL, gal - Gallon
GEN - Generator
GM - Gross mass
GS, gs - Ground speed

H
h, hr - Hours of time
Hg - Mercury (hydrargyrum)
HIGE - Hover in ground effect
HOGE - Hover out of ground effect
HOR - Horizon
hPa - Hectopascal
HTR sw - Heater switch
HUMS - Health and Usage Monitoring System
HV - Height-velocity
HY, HYD, HYDR - Hydraulic
| I | IAC-AR | Interstate Aviation Committee-Aviation Register (CIS) |
| IAS | Indicated airspeed |
| IC | Intercommunication |
| ICS | Intercommunication system |
| i.e. | Id est = that is (to say) |
| IFR | Instrument flight rules |
| IGE | In ground effect |
| IMC | Instrument meteorological conditions |
| Imp. | Imperial |
| in. | Inch |
| INP | Input |
| IND | Indicator |
| INV | Inverter |
| ISA | International Standard Atmosphere |
| J | JAR | Joined Airworthiness Requirements |
| KCAS | Knots calibrated airspeed |
| kg | Kilogram |
| KIAS | Knots indicated airspeed |
| km | Kilometer |
| kt | Knot |
| KTAS | Knots true airspeed |
| kW | Kilowatt |
| L | L, LTR, ltr | Liter |
| lb | Pound |
| LCF | Life Cycle Fatigue |
| LBA | Luftfahrt-Bundesamt (Federal Republic of Germany) |
| LDG | Landing |
| LDP | Landing decision point |
| LEP | List of effective pages |
| LH | Left hand |
| LuftGerPo | Luftgeräteprüfordnung |
| M | m | Meter |
| MAN | Manual mode of operation |
| max, MAX | Maximum |
| MC, mc | Maximum continuous |
| MCP | Maximum continuous power |
| MEL | Minimum equipment list |
| MGT | Measured gas temperature |
| MHS | Mechanohydraulic servo actuator |
| MIL | Military standard or specification |
| min, MIN | Minimum |
| min | Minutes of time |
| MINR | Minor |
| MISC | Miscellaneous |
| MM | Mast moment |
mm - Millimeter
MOD - Modification
MSL - Mean sea level
MSTR - Master

N, N - Newton
N₁, n₁, N₉, n₉ - Gas generator speed
N₂, n₂, Nₚ, nₚ - Power turbine speed
NAV - Navigation (radio)
No., no. - Number
NORM - Normal mode of operation
NR, Nₚ₀ - Rotor speed

O, O - Oil
OAT - Outside air temperature
OEI - One engine inoperative
OF - Oil filter
OGE - Out of ground effect
OPN - Open
OPT - Optional equipment
OT - Oil temperature
OVHT - Overheat

P, Pa - Pascal
PA - Pressure altitude
PAX - Passenger
pb - Push button
PEC - Position error correction
PIO/PAO - Pilot induced/assisted oscillation
P/N - Part number
POS - Position
P&R - Pitch and Roll
PWR - Power

R, RAI - Registro Aeronautico Italiano
R/C - Rate of climb
R/D - Rate of descent
RD - Reference datum
Rel. - Release
RES, RST - Reset
Rev. - Revision
RH - Right hand
RPM, rpm - Revolutions per minute

S, sec - Seconds of time
SAS - Stability augmentation system
SB - Service bulletin
SEL - Selector
sel. - select
SGL - Single
SHP - Shaft horse power
SL - Sea level
S/N - Serial number
SOV - Shutoff valve
SPAS - Stick position augmentation system
sq - Square
STA. - Station
STBY - Standby
std - Standard
SW, sw - Switch
SYS - System

T
T - Temperature
AS - True airspeed
TCAG - Transport Canada Airworthiness Group
TDP - Takeoff decision point
TEMP - Temperature
Temp. Rev. - Temporary revision
T/O - Takeoff
TOP - Takeoff power
TOT - Turbine outlet temperature
TRGB - Tail rotor gear box

U
U.S., US - United States

V
V - Volt
VEMD - Vehicle and Engine Multifunction Display
VEH - Vehicle
VFR - Visual flight rules
V_H - Maximum horizontal speed
VHF - Very high frequency
VMC - Visual meteorological conditions
VMO, V_MO - Maximum operating speed
VNE, V_NE - Never-exceed speed (velocity never exceed)
VOR - VHF omnidirectional radio ranging
V_TOSS - Takeoff safety speed
V_Y - Best rate-of-climb speed

W
WAT - Weight/Altitude/Temperature
W.L. - Waterline

X
XFER - Fuel transfer pump
XFER-A - Fuel transfer pump - Aft
XFER-F - Fuel transfer pump - Forward
XFER-(F+A) - Fuel transfer pump - Forward and Aft
XMSN - Transmission

Y
Y - Yaw
SYMBOLS:

- Greater than
- Greater than or equal
- Less than
- Less than or equal
- Degrees Celsius (centigrade)
- Degrees Fahrenheit
- Density ratio
- Deviation from AEO takeoff power N₁ limit (modulated by the influence of PA and OAT)
- Pressure altitude correction
- True airspeed factor (the reciprocal of the square root of the density ratio, at the density altitude)
## SECTION 2
### LIMITATIONS

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SECTION 2

LIMITATIONS

WARNING  IF ANY LIMITATION HAS BEEN EXCEEDED, MAINTENANCE ACTION MAY BE REQUIRED AND NECESSARY BEFORE NEXT FLIGHT. ENTER DURATION AND AMOUNT OF EXCESS IN LOGBOOK AND APPROPRIATE SYSTEM LOGBOOK (FOR EXAMPLE ENGINE LOGBOOK).

2.1 GENERAL

This helicopter shall be operated in compliance with the limitations of this section.

For definitions of terms, abbreviations and symbols used in this section refer to Section 1.

2.2 KINDS OF OPERATION

The helicopter in its basic configuration is certified for land operation under day and night Visual Meteorological Conditions (VMC).

With special equipment installed and operative and under observance of the procedures and limitations, described in FMS 9.2-44 and FMS 9.2-56, the helicopter is also certified for land operation under day and night Instrument Meteorological Conditions (IMC).

With the emergency flotation system installed (optional equipment FMS 9.2-67) the helicopter can be operated over water in accordance with the national operating regulations.

2.3 BASIS OF CERTIFICATION

This helicopter is basically certified according to JAR-27, first issue (Sept 6, 1993), with Category A engine isolation requirements.

2.4 MINIMUM FLIGHT CREW / MAXIMUM NUMBER OF OCCUPANTS

The minimum flight crew consists of one pilot operating the helicopter from the right crew seat.

The maximum number of occupants comprises up to 8 persons (including flight crew).

2.5 FLIGHT WITH OPTIONAL EQUIPMENT INSTALLED

Refer to Subsection 9.2 for additional limitations, procedures and performance data.
2.6 MASS AND LOAD LIMITS

2.6.1 Maximum gross mass
Maximum approved gross mass is 2910 kg.

2.6.2 Minimum gross mass
Minimum approved gross mass for flight is 1500 kg.
(see also Fig. 2-1 and observe FMS 9.2-25, Reinforced Rear Crosstube, if applicable)

2.6.3 Loading limits
Maximum allowable floor loading is 600 kg/m².
CAUTION CARGO, BAGGAGE AND LOOSE ITEMS MUST BE PROPERLY STOWED AND TIED DOWN IN ORDER TO MAKE IN-FLIGHT SHIFTING IMPOSSIBLE (SEE ALSO REMARKS IN SECTION 6).

2.6.4 Tie-down ring limits
Maximum allowable load per tie-down ring is 100 kg.
2.7 CENTER OF GRAVITY LIMITATIONS

2.7.1 Longitudinal center of gravity limits

Station zero (datum) is an imaginary vertical plane, perpendicular to the aircraft centerline and located 2160 mm forward of the leveling point (see Section 6).

![Diagram of Allowable C.G. Envelope (longitudinal)](image)

Fig. 2-1 Allowable C.G. Envelope (longitudinal)

2.7.2 Lateral center of gravity limits

Lateral center of gravity limits left and right of the fuselage centerline are . . . . . . 100 mm
### 2.8 AIRSPEED LIMITATIONS

**NOTE** All airspeed values given in this manual are indicated airspeed (IAS) unless otherwise indicated.

#### 2.8.1 Forward flight

The following tables (Fig. 2-2) show the airspeed limits under various atmospheric conditions (PA, OAT). The first table applies to helicopters with takeoff gross mass up to 2300 kg, the second table applies to helicopters with takeoff gross mass above 2300 kg and up to 2720 kg and the third table applies to helicopters with takeoff gross mass above 2720 kg and up to 2910 kg.

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**V<sub>NE</sub>-KIAS- for any takeoff gross mass up to 2300kg**

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**V<sub>NE</sub>-KIAS- for any takeoff gross mass above 2300kg up to 2720 kg**
## 2.9 ALTITUDE LIMITATIONS

**NOTE**  All altitudes given in this Manual are pressure altitudes, unless otherwise indicated.

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<td>115</td>
<td>105</td>
<td>95</td>
<td>85</td>
<td>80</td>
<td>70</td>
<td>70</td>
<td></td>
</tr>
</tbody>
</table>

* Observe para 2.9 ALTITUDE LIMITATIONS

\[ V_{NE} \] -KIAS- for any takeoff gross mass above 2720kg up to 2910 kg

V\(_{NE}\) for **OEL operation** under all conditions is ............................... 110 kt
or as shown in the V\(_{NE}\)- tables (Fig. 2-2), whichever is less.

V\(_{NE}\) for **steady autorotation** under all conditions is ............................... 90 kt
or as shown in the V\(_{NE}\)- tables (Fig. 2-2), whichever is less.
2.10 ENVIRONMENTAL OPERATING CONDITIONS

2.10.1 Ambient air temperature limitations

Minimum air temperature is \(-35^\circ C\)

Maximum air temperature is \(ISA+39^\circ C\) (max. \(+50^\circ C\))

For \(OAT \geq 30^\circ C\) cockpit ventilation must be set to maximum

"Pull for Heating/Defog" lever Push

If Air Condition Unit (9.2–38) is not installed, “Pull for Air” lever Pull

If Air Condition Unit (9.2–38) is installed, AIR COND sw ON

EFFECTIVITY For Transport Canada registered helicopters only

It is prohibited to start the rotorcraft following exposure to temperatures less than \(-27^\circ C\) for more than one hour.

NOTE If the helicopter is cold soaked for more than an hour below \(-27^\circ C\), the helicopter has to be heated up inside a hanger for a sufficient period before start up and/or by careful use of a hot air generator so that the temperature of all helicopter systems is increased above \(-27^\circ C\).

Aircraft ambient temperature limits are also affected by fuel temperature limits, 2.14.2. The helicopter shall not be operated at ambient temperatures below the minimum fuel temperature for the fuel in use.

EFFECTIVITY All

2.10.2 Demisting system

An approved heating system for demisting must be installed.

2.10.3 Icing conditions

Flight into icing conditions is prohibited.

2.10.4 Battery temperature limits

For engine start-up at outside air temperatures below \(-20^\circ C\), using the aircraft battery, the aircraft battery shall be preheated to at least \(-20^\circ C\).
2.11 ROTOR RPM LIMITATIONS

**WARNING**  MAIN ROTOR LEAD–LAG RESONANCE MAY OCCUR IN THE 60–68% ROTOR RPM RANGE. WHEN ROTOR RPM IS WITHIN THIS RANGE, ANY STIMULATION OF LEAD–LAG OSCILLATION MAY RESULT IN SEVERE DAMAGE OF THE MAIN ROTOR BLADES. THEREFORE, MAINTAIN THE CYCLIC STICK IN NEUTRAL POSITION AND THE COLLECTIVE DOWN.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>Power ON</th>
<th>Power OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Transient (max. 20 s)</td>
<td>85 %</td>
<td></td>
</tr>
<tr>
<td>Minimum Continuous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500 kg ≤ GM &lt; 1900 kg</td>
<td>97 %</td>
<td>80 %</td>
</tr>
<tr>
<td>1900 kg ≤ GM</td>
<td>97 %</td>
<td>85 %</td>
</tr>
<tr>
<td>Maximum Continuous</td>
<td>104 %</td>
<td>106 %</td>
</tr>
<tr>
<td>Maximum Transient (max. 20 s)</td>
<td></td>
<td>112 %</td>
</tr>
</tbody>
</table>

RPM Warning Light and AUDIO Warnings:

<table>
<thead>
<tr>
<th>NR RPM</th>
<th>RPM-Light</th>
<th>AUDIO-Tone</th>
<th>Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR ≤ 97 %</td>
<td>ON</td>
<td>Intermittent Low</td>
<td>Yes</td>
</tr>
<tr>
<td>NR ≥ 106 %</td>
<td>Flashing</td>
<td>Gong</td>
<td>Yes</td>
</tr>
<tr>
<td>NR ≥ 112 %</td>
<td>Flashing</td>
<td>Continuous High</td>
<td>No</td>
</tr>
</tbody>
</table>

**NOTE**  
- In normal “Power On” operation the rotor speed is governed automatically as a function of density altitude (see Sect. 7 Engine Control System).
- Observe High NR mode for GM above 2835 kg in sec.7.
# ENGINE AND TRANSMISSION POWER LIMITATIONS

**Engine:** Pratt & Whitney PW 206 B2  
**Transmission:** Zahnradfabrik Friedrichshafen AG (ZF) FS 108

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>FLI Marking</th>
<th>Transmission (Helicopter) Limits</th>
<th>Engine Operating Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>max. %</td>
<td>max. TOT %</td>
<td>max. N1-SPEED / (Gasgenerator) %</td>
</tr>
<tr>
<td>Starting Trans. (max. 2s)</td>
<td>11.0</td>
<td>875</td>
<td></td>
</tr>
<tr>
<td>Starting(max.45s)</td>
<td>8.5</td>
<td>650</td>
<td></td>
</tr>
<tr>
<td>Transient (OEI 30sec./ 2 min.)</td>
<td></td>
<td></td>
<td>107 (5 sec.)</td>
</tr>
<tr>
<td>Transient (AEO TOP, AEO MCP, OEI MCP)</td>
<td></td>
<td></td>
<td>112 (20 sec.)</td>
</tr>
<tr>
<td>Partial power</td>
<td>2 x 10</td>
<td></td>
<td>106</td>
</tr>
<tr>
<td><strong>All Engines Operating</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takeoff Power (5 min) $V \leq V_y$</td>
<td>10.0$^2$</td>
<td>2 x 78</td>
<td>869</td>
</tr>
<tr>
<td>Max. Continuous Power</td>
<td>9.0$^2$</td>
<td>2 x 69</td>
<td>835</td>
</tr>
<tr>
<td><strong>One Engine Inoperative</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 sec. Power$^1$</td>
<td>13.5$^2$</td>
<td>128$^3$</td>
<td>990</td>
</tr>
<tr>
<td>2.0 min. Power$^1$</td>
<td>13.0$^2$</td>
<td>125</td>
<td>950</td>
</tr>
<tr>
<td>Max. Contin. Power$^1$</td>
<td>11.0$^2$</td>
<td>89.5</td>
<td>900</td>
</tr>
</tbody>
</table>

1) Max. torque, max. N$_1$ and max. TOT are logged automatically by the EEC. Read out the stored values from the DCU and record duration and maximum value in the helicopter and engine logbook. For information and maintenance action refer to the Engine Maintenance Manual and the helicopter Maintenance Manual. Use of OEI–Power settings may significantly reduce the engine life time.

2) Markings for torque, TOT and N1 only.

3) When the 128% torque limit has been exceeded, read out the stored values from the DCU and record duration and maximum value in the helicopter logbook. For information and maintenance action refer to the helicopter Maintenance Manual.

**NOTE**
- When reaching topped values on FLI, the pilot has to respect the RPM values with the collective.
- A transient AEO TOP power limit of 2 x 82% torque (10.4 FLI) has been established for $V \leq V_y$ and unintended use of max. 10 seconds duration only. Exceeding of any one of those limits requires maintenance action (refer to the maintenance manual).

**CAUTION** THE OEI POWER RATINGS ARE LIMITED TO USE ONLY AFTER FAILURE OF AN ENGINE EXCEPT OF THE MCP VALUES WHICH MAY
2.13 OTHER ENGINE AND TRANSMISSION LIMITATIONS

2.13.1 Engine starter/Generator

When starting engines, the starter energize time is the time which elapses between initiation of the starter and ignition in the turbine.

When performing engine ventilation, the starter energize time is the time which elapses while the starter switch is placed to the VENT position.

To prevent starter overheat damage, limit starter energize time to the following:

**EFFECTIVITY** If 25 Ah or 26 Ah or 27 Ah battery is installed.

- 30 seconds ON
- 60 seconds OFF
- 30 seconds ON
- 60 seconds OFF
- 30 seconds ON
- 30 minutes OFF

**EFFECTIVITY** If 40 Ah battery is installed or when using ground power unit.

- 15 seconds ON
- 30 seconds OFF
- 15 seconds ON
- 30 seconds OFF
- 15 seconds ON
- 30 minutes OFF

**EFFECTIVITY** All.

The 30 minute cooling period is required before beginning another starting cycle.

- Maximum continuous load per generator ........................................... 200 A
- PA > 15000 ft ................................................................. 126 A
- Short time limitations 2 minutes .................................................... 300 A

2.13.2 Ground Power Starts

The current flow shall be limited to 700 A as a maximum, when using 28V DC ground power units for starting.

**CAUTION** CONNECT EPU ONLY IF BATTERY IS CONNECTED.
### 2.14 FUEL LIMITATIONS

#### 2.14.1 Fuel specifications

**NOTE** Specifications apply to the latest index, latest amendment in force.

Fuel conforming to the following specification is authorized for use:

**2.14.1.1 Primary fuels**

<table>
<thead>
<tr>
<th>TYPE OF FUEL</th>
<th>NATO symbol</th>
<th>S P E C I F I C A T I O N</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Primary Fuels</td>
<td>USA</td>
<td>UK</td>
<td>F</td>
</tr>
<tr>
<td>Kerosene-50</td>
<td>F 34</td>
<td>MIL-T-83 133 JP-8</td>
<td>DERD 2453</td>
<td>AIR 3405/D</td>
<td></td>
</tr>
<tr>
<td>(AVTURFSII)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JP-8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kerosene-50</td>
<td>F 35</td>
<td>ASTM-D-1655 JET A-1</td>
<td>DERD 2494</td>
<td>AIR 3405/D</td>
<td></td>
</tr>
<tr>
<td>(AVTUR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JET A-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kerosene</td>
<td></td>
<td>ASTM-D-1655 JET A-1</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>High flash point Kerosene (AVCAT)</td>
<td>F 43</td>
<td>–</td>
<td>DERD 2498</td>
<td>AIR 3404/C</td>
<td>–</td>
</tr>
<tr>
<td>TS-1 and RT (Kerosene)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>GOST 10227/86</td>
</tr>
</tbody>
</table>

**NOTE** Using this primary fuels, the engine shall operate satisfactorily throughout the altitude-temperature envelope, defined in para 2.14.2.

**NOTE** When TS-1 is used for more than 100 flight hours (continuously or intermittently) refer to 05-50-00 unscheduled maintenance check for disposition.
2.14.1.2 Secondary fuels

<table>
<thead>
<tr>
<th>TYPE OF FUEL</th>
<th>NATO symbol</th>
<th>SPECIFICATION Secondary Fuels</th>
</tr>
</thead>
</table>

Fig. 2-4 Secondary Fuels

**NOTE** Using this secondary fuels, the engine shall operate satisfactorily up to 15000 ft (see: altitude-temperature envelope, para 2.14.2).

2.14.2 Fuel altitude-temperature envelope

<table>
<thead>
<tr>
<th>FUEL</th>
<th>FUEL TEMPERATURE [°C]</th>
<th>PRESSURE ALTITUDE (PA) [FT]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>min.</td>
<td>max.</td>
</tr>
<tr>
<td>Jet A1, Jet A</td>
<td>– 30</td>
<td>+ 54</td>
</tr>
<tr>
<td>JP 5, JP 8</td>
<td>– 27</td>
<td>+ 54</td>
</tr>
<tr>
<td>TS1, RT (CIS-Fuel)</td>
<td>– 35</td>
<td>+ 54</td>
</tr>
<tr>
<td>JP 4, Jet B</td>
<td>– 35</td>
<td>≤ + 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; + 15 up to + 43</td>
</tr>
</tbody>
</table>
2.14.3 Fuel additives

Anti-icing fuel additives:

No fuel additives required down to –30°C fuel temperature.

At fuel temperature range of –30°C down to –35°C one of the following anti–icing additive is required:

<table>
<thead>
<tr>
<th>Fuel System Anti-Icing Additives/ Icing Inhibitors (FSII)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>EGME</td>
</tr>
<tr>
<td>DIEGME</td>
</tr>
</tbody>
</table>

Only for CIS - Fuels

| FLUID I       | –           | –                       | –     | –     | –     | GOST 8313 |
| FLUID I-M     | –           | –                       | –     | –     | –     | TU 6-10–1458-79 |

When using fuels with anti-icing additives (pre-blended or added) it has to be assured that the following requirements are fulfilled:

Concentration by volume: ................................ max 0.15%, min 0.10%

NOTE Observe FLM Section 8 para. 8.2.

2.14.4 Fuel quantities

Fuel mass values are based on a fuel density of 0.8 kg/liter.

**EFFECTIVITY** For helicopters with 680 liters fuel tank

<table>
<thead>
<tr>
<th>TANK</th>
<th>TOTAL FUEL</th>
<th>UNUSABLE FUEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>liters</td>
<td>kilograms</td>
</tr>
<tr>
<td>Main</td>
<td>565</td>
<td>452.0</td>
</tr>
<tr>
<td>Supply</td>
<td>115</td>
<td>92.0</td>
</tr>
<tr>
<td>Totals</td>
<td>680</td>
<td>544.0</td>
</tr>
</tbody>
</table>
EFFECTIVITY  For helicopters with 710 liters fuel tank

<table>
<thead>
<tr>
<th>TANK</th>
<th>TOTAL FUEL</th>
<th>UNUSABLE FUEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>liters</td>
<td>kilograms</td>
</tr>
<tr>
<td>Main</td>
<td>593</td>
<td>474.5</td>
</tr>
<tr>
<td>Supply</td>
<td>117</td>
<td>93.5</td>
</tr>
<tr>
<td>Totals</td>
<td>710</td>
<td>568</td>
</tr>
</tbody>
</table>

EFFECTIVITY  All

CAUTION PRIMARY SOURCE FOR FUEL QUANTITY INFORMATION IS THE DISPLAYED DIGITAL VALUE. THE PICTORIAL INDICATION HAS TO BE CONFIRMED BY THE DIGITAL VALUE.

2.15 OIL LIMITATIONS

2.15.1 Oil specifications

<table>
<thead>
<tr>
<th>Engine</th>
<th>Oil Type / Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to P&amp;W 206B2</td>
<td>Main Transmission</td>
</tr>
<tr>
<td>Maintenance Manual</td>
<td>ZFN L 3001: ZF Oil specification for aviation gearboxes</td>
</tr>
<tr>
<td></td>
<td>for: $-35^\circ C \leq OAT \leq 50^\circ C$</td>
</tr>
<tr>
<td></td>
<td>NATO O–156; MIL-L-23699</td>
</tr>
<tr>
<td></td>
<td>or ZFN L 3001: ZF Oil specification for aviation gearboxes</td>
</tr>
<tr>
<td></td>
<td>for: $-30^\circ C \leq OAT \leq 50^\circ C$</td>
</tr>
<tr>
<td></td>
<td>MIL-L-6086C; Air - 3525 B; NATO O–155;</td>
</tr>
</tbody>
</table>

NOTE Do not mix different oil specifications when refill.

2.15.2 Oil quantities

<table>
<thead>
<tr>
<th></th>
<th>Liters*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engines (each tank)</td>
<td>4.5</td>
</tr>
<tr>
<td>Main Transmission</td>
<td>10.0 – 12.0</td>
</tr>
<tr>
<td>Fenestron Gearbox</td>
<td>0.5</td>
</tr>
</tbody>
</table>

* Oil mass values are assumed as 1.0 kg/ltr.

2.15.3 Engine oil pressure

Minimum ................................................................. 2.1 bar
Caution range ....................................................... 2.1 to 4 bar
Continuous operation .............................................. 4 to 8.5 bar
Maximum (Transient (max. 10 minutes) after start or if oil temp. drops significantly below 71°C) ........................................ 13.8 bar
For engine starting .................................................. 0 to 13.8 bar
2.15.4 **Engine oil temperature**

Caution range ........................................................... –45°C to 10°C
Continuous operation .................................................... 10°C to 129.5°C
Maximum ................................................................. 129.5°C
Minimum for starting .................................................... –35°C
Minimum for power application ........................................ 10°C

2.15.5 **Main transmission oil pressure**

Minimum ................................................................. 0.5 bar
Continuous operation .................................................... 0.5 - 7.8 bar
Caution range (see para. 2.18.2.3.) .................................. 7.8 - max.10 bar

2.15.6 **Main transmission oil temperature**

Caution range ........................................................... –45°C to 0 °C
Continuous operation .................................................... 0°C to 105 °C
Caution range ........................................................... 105°C to 120 °C
Maximum ................................................................. 120 °C
Minimum for power application ........................................ 0°C

2.16 **HYDRAULIC SYSTEM LIMITATIONS**

2.16.1 **Hydraulic fluid specifications**

<table>
<thead>
<tr>
<th>Oil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulicsystem</td>
</tr>
<tr>
<td>MIL-H-5606 F and subsequent</td>
</tr>
<tr>
<td>Air 3520 H-515</td>
</tr>
</tbody>
</table>

2.16.2 **Hydraulic system quantities**

<table>
<thead>
<tr>
<th></th>
<th>Liters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic system 1</td>
<td>1.0</td>
</tr>
<tr>
<td>Hydraulic system 2</td>
<td>1.2</td>
</tr>
</tbody>
</table>
2.17 OPERATIONAL LIMITATIONS

2.17.1 Rotor Starting and Stopping in High Wind

Starting and stopping the rotor is authorized for windspeed up to max. 50 kt from all horizontal directions.

2.17.2 Slope operations

Ground sloping in any direction max. 6° (if an optional mast moment indicating system is installed, refer also to FMS 9.2–69).

2.17.3 Hover turns

Gross mass up to 2835 kg:
Hover turns max. 60°/s (6 seconds for a 360° turn)

Gross mass above 2835 kg and/or High NR mode activated:
Aggressive pedal turns are forbidden.
Hover turns max. 30°/s (12 seconds for a 360° turn)

2.17.4 Collective override stop

The collective pitch lever travel is limited by an override stop.
If, in the event of an emergency, increased collective pitch is required, the collective stop may be exceeded. The required override control force at the beginning of the emergency range is approximately 25 Newton (5.6 pounds).

2.17.5 Prohibited flight maneuvers

Aerobatic maneuvers are prohibited.

2.17.6 Operation with Gross Mass (GM) above 2835 kg

During any flight with GM > 2835 kg the HIGH NR mode must be selected (see sec.7 for further information).
2.18 **INSTRUMENT MARKINGS**

The pointers and scales of the instruments are marked as follows:

- Left systems (engine, fuel,...) ......................................................... 1
- Right systems (engine, fuel,...) ..................................................... 2
- Main rotor ................................................................................. R
- Minimum and maximum limits .................................................. red radial
- Maximum continuous power OEI .............................................. dashed yellow radial
- 2.0 min power OEI ................................................................. short dashed red radial
- 30 sec power OEI ................................................................. long dashed red radial
- Topping limit (in conjunction with the selected 2.0 min or 30 sec power) ......................................................... active red topping triangle
- Starting transient limits ............................................................. red triangle
- Normal/continuous range ......................................................... green arc
- Start, HOGE and caution range .............................................. yellow arc
- Never exceed speed - power off ............................................ red cross-hatched radial
- Transient Torque limit 82% ....................................................... red dot

2.18.1 **Analog instruments**

2.18.1.1 **Airspeed indicator**

- 0 kt to 30 kt ................................................................. yellow arc
- 30 kt to 155 kt ................................................................. green arc
- 155 kt ................................................................. red radial
- 90 kt ................................................................. red cross-hatched radial

2.18.1.2 **Triple tachometer**

- **Engine RPM (N₂):**
  - 85% ................................................................. red dot
  - 97% ................................................................. red radial
  - 97% to 104% ................................................................. green arc
  - 104% to 106% ................................................................. yellow arc
  - 106% ................................................................. red radial
  - 112% ................................................................. red dot

- **Rotor RPM:**
  - 80% ................................................................. red radial
  - 80% to 106% ................................................................. green arc
  - 106% ................................................................. red radial
  - 112% ................................................................. red dot
2.18.2 VEMD-displayed instruments

2.18.2.1 First Limit Indicator (FLI)

The First Limit Indicator (FLI) (Fig. 2-5) displays all data associated with the helicopter engine primary limitations: N1, TOT, Torque. This indication is completed by the display of digital data for the three parameters. The dial scale is arbitrary and does not represent a percent value.

- Max. TOT starting (appears only during starting)
- TOT starting transient (appears only during starting)
- AEO Takeoff Power Range, max.5min
- AEO max. Takeoff Power
- OEI Max Continuous Power
- OEI 2.0 min. Power
- OEI 30 sec. Power
- Transient Dot TRQ 82% (appears not during starting and Training Mode)

Fig. 2-5 FLI marking symbology on analog display
A value that is within the normal operating range is displayed as shown in Fig. 2-6 a). A solid white rectangle associated with a parameter indicates the parameter shown by the needle (Fig. 2-6 b). If AEO operation in the yellow range (above MCP) or if OEI operation in the 2.0 min. power band is detected, the digital data is yellow underlined (Fig. 2-6 c). If AEO operation above TOP or if OEI operation above the 2.0 min. power band is detected, the digital data is red underlined and the line is flashing.

For the 5 min. limit the counter is invisible. For the OEI 30 sec./2.0 min. power limit the counter is visible in conjunction with the topping symbol and the OEI HI or OEI LO indication, as shown in fig. 2-5.

Five seconds before the counter reaches zero a flashing red box appears around the word “LIMIT”. When the countdown has expired, the red box is fixed and ENG EXCEED caution appears.

When the OEI 30 sec. power limitation has been exceeded, the timer and the OEI HI display disappear and a fixed red limit box appears.

**NOTE**
- If the helicopter is operated in the 30 sec./2.0 min. power band and the flashing red box appears, immediately reduce power in order to go to the next lower power band.

- The total time above OEI MCP is limited to 2 min. 30 sec.. After operation in the 30 sec. power band (OEI HI) for more than 5 seconds, the remaining time in the 2 min. power band (OEI LO) is limited to max. 2 minutes. The possible total time for single excursion above OEI MCP is the time spend in the 30 sec. power band (OEI HI) plus max. 2 minutes. If after multiple operations in the 30 sec. power band (OEI HI) the remaining allowed time above OEI MCP is less than 2 minutes, only this remaining time is displayed.

If one of the parameters is invalid, a yellow failure symbology replaces the information concerning the faulty parameter.

For further FLI information refer sec.7.
2.18.2.2 Engine/transmission oil temperature/pressure bar graph indicators

The symbology and animation logic of the bar graphs which indicate the values for engine/transmission oil temperature/pressure is as follows:

- If the value is in the normal operation range, the limitation display is as shown in fig. 2-7 a).
- If the value reaches the yellow region, the numeric value is yellow underlined (2-7 b)).
- If the value enters the red region, the numeric value is red underlined and flashes and the yellow and red markings grow (2-7 c)).

The animation logic applies analog to the temperature indication.

For further bar graph markings refer to 2.18.2.3.
2.18.2.3 Engine/transmission oil pressure/temperature bar graph markings

**Engine**

```
<table>
<thead>
<tr>
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<td>8.5</td>
<td>129.5</td>
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<td>10</td>
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**Transmission**

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<tr>
<td>7.8</td>
<td>120</td>
</tr>
<tr>
<td>0.5</td>
<td>0</td>
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**NOTE** The yellow failure symbology of the main transmission oil pressure bar graph may occur during cold start for a few seconds.

Fig. 2-8   Engine/Transmission oil temperature/pressure bar graph markings
2.19 PLACARDS AND DECALS

All placards shown below are usually presented in bilingual form German/English. However, for non LBA-registered helicopters, markings and placards intended for emergency passenger information and instruction, and instruction for operation of passenger doors may be provided in local language.

The following illustrations of placards and decals are typical presentations. Slight formal differences from the real placards and decals do not affect the information presented therein.

Placard:

<table>
<thead>
<tr>
<th>DIESER HUBSCHRAUBER IST</th>
<th>THIS HELICOPTER IS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZUGELASSEN FUER</td>
<td>APPROVED FOR</td>
</tr>
<tr>
<td>VFR TAG- UND NACHTBETRIEB</td>
<td>VFR DAY AND NIGHT OPERATION</td>
</tr>
</tbody>
</table>

Location: Upper RH frame

Placard:

Location: Cockpit door LH, cabin roof, center post or other locations in the field of view depending on configuration

Placard:

Location: Below external power connection

Placard:

Location: Center post, middle portion and beside RH/LH cabin window
Location:  External power connection

Placard:

Location:  Sliding doors, inside (LH) and outside (RH)

Placard:

Location:  Below forward RH cabin door
Placard:

<table>
<thead>
<tr>
<th>SCHIEBETUER</th>
<th>AUF</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEFFNEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>SLIDING DOOR</td>
<td>ZU</td>
</tr>
<tr>
<td></td>
<td>CLOSED</td>
</tr>
</tbody>
</table>

**Location:** Sliding doors, inside (RH) and outside (LH)

---

**EFFECTIVITY**  
For helicopters with 680 liters fuel tank

Placard:

<table>
<thead>
<tr>
<th>KRAFTSTOFF</th>
<th>680 L</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUEL</td>
<td>180 US. GAL.</td>
</tr>
</tbody>
</table>

– PRIMARY FUELS: JETA, JETA1, JP5, JP8

WEITERE KRAFTSTOFFSORTEN SIEHE FLUGHANDBUCH  
FOR ADDITIONAL FUEL TYPES SEE FLIGHT MANUAL

---

**EFFECTIVITY**  
For helicopters with 710 liters fuel tank

Placard:

<table>
<thead>
<tr>
<th>KRAFTSTOFF</th>
<th>710 L</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUEL</td>
<td>187 US. GAL.</td>
</tr>
</tbody>
</table>

– PRIMARY FUELS: JETA, JETA1, JP5, JP8

WEITERE KRAFTSTOFFSORTEN SIEHE FLUGHANDBUCH  
FOR ADDITIONAL FUEL TYPES SEE FLIGHT MANUAL

**Location:** Near fuel tank filler neck

---

**EFFECTIVITY**  
All
Placard:

**BEI FASS- ODER KANISTERBETANKUNG SIEB VERWENDEN**
FOR BARREL OR GAS CAN REFUELING USE SCREEN

**BEI BETRIEB UNTER –30°C (–22°F) ENTEISUNGSZUSATZ**
NACH FLUGHANDBUCH NUR BEI NICHT VORGEMISCHTEN
KRAFTSTOFFEN HINZUFÜGEN

FOR OPERATION BELOW –30°C (–22°F)
ADD ANTI-ICING–ADDITIVE ACC. TO FLIGHT MANUAL
ONLY TO NOT PREBLENDED FUELS

or:

Placard:

**BEI FASS- ODER KANISTERBETANKUNG SIEB VERWENDEN**
FOR BARREL OR GAS CAN REFUELING USE SCREEN

**TEMPERATUREINSCHKRAENKUNGEN IM FLM BEACHTEN**
OBSERVE TEMPERATURE LIMITATIONS IN THE FLM

Location: Near fuel tank filler neck

Placard:

MAX. LAST: 230 KG
MAX. LOAD: 500 LBS

Location: Inside, near safety harness fitting (optional)

Placard:

MAX. BODENLAST 600 kg/m²
LADEGUT VERZURREN
ZUL. BELASTUNG PRO VERZURROESE 100 kg

MAX. FLOOR LOAD 600 kg/m²
CARGO TO BE SECURED
MAX. LOAD PER EYE 100 kg

Location: Cargo compartment panelling, RH
Placard:

TUERGRIFF NICHT WAEHRENDE
DES FLUGES BETAETIGEN

DO NOT OPERATE DOOR
HANDLE DURING FLIGHT

Location: Sliding door, inside, LH and RH and cockpit door LH

Placard:

Location: Center post, middle portion
Placard:

<table>
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<tr>
<th>Pressure Altitude (ft)</th>
<th>COT - °C-</th>
<th>Pressure Altitude (ft)</th>
<th>COT - °C-</th>
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<tbody>
<tr>
<td>0</td>
<td>140</td>
<td>0</td>
<td>140</td>
</tr>
<tr>
<td>2000</td>
<td>140</td>
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<td>140</td>
</tr>
<tr>
<td>4000</td>
<td>140</td>
<td>4000</td>
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</tr>
<tr>
<td>6000</td>
<td>140</td>
<td>6000</td>
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<tr>
<td>8000</td>
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</tr>
<tr>
<td>10000</td>
<td>140</td>
<td>10000</td>
<td>140</td>
</tr>
<tr>
<td>12000+</td>
<td>125+</td>
<td>12000+</td>
<td>125+</td>
</tr>
</tbody>
</table>

Location: Upper part of the instrument panel
Placard: (optional)

**EXIT**

*Location:* Inside, cockpit door LH and above sliding doors LH and RH

---

Placard:

**VORSICHT**  
**HEISS**  
**CAUTION**  
**HOT**

*Location:* Beside RH and LH pitot tubes support

---

Placard:

**MAX 3 Kg**

*Location:* Beside luggage net on LH and /or RH clamshell door

---

Placard:

**ACHTUNG HEIZLUFT**  
**DUESE FREIHALTEN**  

**ATTENTION HOT AIR**  
**KEEP NOZZLE FREE**

*Location:* Air outlet beside RH/LH cabin door
Placard:

**NOTAUSSTIEG / EMERGENCY EXIT**

<table>
<thead>
<tr>
<th>KAPPE ENTFERNEN</th>
<th>REMOVE CAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRIFF ZIEHEN</td>
<td>PULL HANDLE</td>
</tr>
<tr>
<td>SCHEIBE AN EINER MARKIERUNG (○)</td>
<td>PUSH WINDOW AT ONE MARKING (○) INSIDE</td>
</tr>
<tr>
<td>NACH INNEN DRUECKEN</td>
<td>(inside)</td>
</tr>
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</table>

**Location:** Outside, upper part LH and RH sliding door

Placard:

**NOTAUSSTIEG / EMERGENCY EXIT**

<table>
<thead>
<tr>
<th>KAPPE ENTFERNEN</th>
<th>REMOVE CAP</th>
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</thead>
<tbody>
<tr>
<td>GRIFF ZIEHEN</td>
<td>PULL HANDLE</td>
</tr>
<tr>
<td>SCHEIBE AN EINER MARKIERUNG (○)</td>
<td>PUSH WINDOW AT ONE MARKING (○) OUTSIDE</td>
</tr>
<tr>
<td>NACH AUSSEN DRUECKEN</td>
<td>(outside)</td>
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**Location:** Inside, upper part LH and RH sliding door

Placard:

**BEI GESCHLOSSENER TÜR MUSS DER GRIFF VOLLSTÄNDIG VERRIEGELT SEIN (PARALLEL ZUM FENSTERRAHMEN)**

**WHEN THE DOOR IS CLOSED, THE HANDLE MUST BE IN FULLY CLOSED POSITION (PARALLEL TO WINDOW FRAME)**

**Location:** Sliding doors, inside, and cockpit door copilot, inside
SECTION 3
EMERGENCY AND MALFUNCTION PROCEDURES

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SECTION 3

EMERGENCY AND MALFUNCTION PROCEDURES

3.1 GENERAL

This section contains the recommended procedures for managing various types of emergencies, malfunctions and critical situations.

WARNING  AFTER AN ACTUAL EMERGENCY OR MALFUNCTION MAKE AN ENTRY IN THE HELICOPTER LOGBOOK AND, WHEN NECESSARY, THE AFFECTED SYSTEM LOGBOOK (E.G. ENGINE LOGBOOK). MAINTENANCE ACTION MAY BE REQUIRED AND NECESSARY BEFORE NEXT FLIGHT.

For definitions of terms, abbreviations and symbols used in this Section, refer to Section 1.

3.1.1 Basic rules

These procedures deal with common emergencies. However, they do not prevent the pilot from taking additional action necessary to recover the emergency situation.

Although the procedures contained in this Section are considered the best available, the pilot’s sound judgement is of paramount importance when confronted with an emergency.

To assist the pilot during an inflight emergency, three basic rules have been established:

1. Maintain aircraft control
2. Analyse the situation
3. Take proper action

NOTE  It is impossible to establish a predetermined set of instructions which would provide a ready-made decision applicable to all situations.

3.1.2 Memory items

Emergency procedure steps which shall be performed immediately without reference to either this Manual or the pilot’s checklist are written in boldface letters on a gray background (as shown here) and shall be committed to memory.

Therefore, those emergency procedures appearing without boldface letters on a gray background may be accomplished referring to this Manual and when time and situation permit.
3.1.3 Operating condition

The following terms are used in emergency procedures to describe the operating condition of a system, subsystem, assembly or component:

- **Affected**: Fails to operate in the normal or usual manner
- **Normal**: Operates in the normal or usual manner

3.1.4 Urgency of landing

**NOTE** The type of emergency and the emergency conditions combined with the pilot’s analysis of the condition of the helicopter and his proficiency are of prime importance in determining the urgency of a landing.

The following terms are used to reflect the degree of urgency of an emergency landing:

- **LAND IMMEDIATELY**
  The urgency of landing is paramount. Primary consideration is to assure survival of the occupants. Landing in water, trees or other unsafe areas should be considered only as a last resort.

- **LAND AS SOON AS POSSIBLE**
  Land without delay at the nearest adequate site (i.e. open field) at which a safe approach and landing can be made.
  If in IMC, immediate transition to VMC shall be attempted.

- **LAND AS SOON AS PRACTICABLE**
  The landing site and duration of flight are at the discretion of the pilot. Extended flight beyond the nearest approved landing area where appropriate assistance can be expected is not recommended.
  If in IMC, transition to VMC shall be attempted.
3.1.5 Definition of terms

The term

“OEI flight condition ....– Establish”

is used as a leading step in some engine emergency procedures to express the following:

1. In case that power of affected engine tends to zero:
   - Maintain the normal engine within OEI limits.
   - Attempt to obtain a safe single engine flight condition. If a climb is necessary to reach a safe flight altitude, attempt to obtain $V_y = 65$ kts (best rate of climb) or $V_{TOSS} = 40$ kts (best climb gradient speed).
   - Continue with the remaining steps of the relevant procedure.

2. In case that affected engine still delivers power:
   - If deemed necessary, try to escape from immediate danger with both engines operating.
   - Establish steady level flight and determine if the situation will allow for OEI flight. As a rule of thumb, this can be done by checking that the sum of the individual engine torques is lower than the OEI torque limit. If this is fulfilled, re-check OEI power available by setting the affected engine to IDLE while maintaining the normal engine within appropriate OEI limit.

   - If engine power is sufficient for OEI flight and if a safe OEI landing can be assumed, continue with the remaining steps of the relevant procedure.

   - If engine power is not sufficient for OEI flight or if a safe OEI landing is not assured, LAND AS SOON AS POSSIBLE. If necessary, re-establish power of affected engine before landing. After landing perform single engine emergency shutdown of affected engine.
3.2 WARNINGS AND CAUTIONS

Emergency situations will be indicated either by a red warning light on the WARNING PANEL coming on together with a gong signal, or a caution indication on the CAD and a yellow master caution light on the instrument panel.

A red warning light indicates a hazard which may require immediate corrective action.

A yellow caution indicates the possible need for future corrective action.

The cautions, indicated at the CAD, are divided into three sections, SYSTEM I, MISC and SYSTEM II. SYSTEM I indicates the operating conditions of the left power plant or the system 1 of a redundant system. SYSTEM II provides the same features for the right power plant or the system 2 of a redundant system. MISC indicates the operating conditions of the non-redundant systems.

The yellow master caution light in the pilot’s field of view leads the pilot’s attention to the indication(s) on the CAD whenever a caution has been activated there.

Each caution (CAD-indication and master caution light) must be acknowledged by the pilot (copilot) by pushing the CDS/AUDIO RES button on the cyclic stick grip or the SELECT key on the CAD. Acknowledged cautions are indicated in sequence of arrival. In case of lack of space on the screen, further confirmed cautions will be stored on additional pages, which will be indicated by the “1 of 2” message on top of the middle column. They can be called up via the SCROLL key. Any new unconfirmed caution overlies the previous caution and is bordered by two flashing lines to draw the pilot’s attention to the new caution.

It is always possible that a warning light or caution indication will come on unnecessarily. Whenever possible, check the light or indication against its associated instrument to verify that an emergency condition has actually occurred.

Following is an alphabetical listing of the warning light indications (WARNING PANEL) and caution indications (CAD) with the relevant conditions, any further indications and the emergency procedures.
3.2.1  Warning light indications

WARNING LIGHT INDICATIONS

| BAT DISCH |

Conditions/Indications
Battery is the only electrical power source.
– Warning GONG will be activated

NOTE  Normal during engine start

Procedure
1. DC VOLTS, GEN AMPS and BAT AMPS – Check
2. Electrical consumption – Reduce as much as possible to save battery power
3. LAND AS SOON AS PRACTICABLE
WARNING LIGHT INDICATIONS

**BAT TEMP**

**Conditions/Indications**
Battery overtemperature (above 70 °C)
- Warning GONG will be activated

**Procedure**

**● ON GROUND**
1. **BAT MSTR sw** – OFF
2. Engines – Shut down

**CAUTION** BATTERY MUST BE INSPECTED OR REPLACED PRIOR TO NEXT FLIGHT.

**● IN FLIGHT**

- **Single pilot** operation:
1. **BAT MSTR sw** – OFF
2. **LAND AS SOON AS POSSIBLE**
3. Engine shutdown – Perform
4. Visual inspection of battery – Perform

If visual inspection reveals no indication of battery overheating:
5. Start-up procedure – Perform
6. **BAT MSTR sw** – OFF

**NOTE** Continue flight in VMC only. On CAD the BAT DISCON caution will appear.
7. **LAND AS SOON AS PRACTICABLE**

- **Dual pilot** operation:
1. **BAT MSTR sw** – OFF
2. **LAND AS SOON AS POSSIBLE**
3. Pilot remaining on seat – “Hands on”
4. Engines – Leave running in IDLE
5. Visual inspection of battery – Perform

**NOTE** Continue flight (VMC) only if visual inspection reveals no indication of battery overheating. Leave battery OFF or disconnect battery. On CAD the BAT DISCON caution will appear.
6. **LAND AS SOON AS PRACTICABLE**

**CAUTION** BATTERY MUST BE INSPECTED OR REPLACED PRIOR TO NEXT FLIGHT.
WARNING LIGHT INDICATIONS

FIRE or FIRE
(ENGINE 1) (ENGINE 2)

Conditions/Indications

Overtemperature in engine compartment

– Warning BELL will be activated

Procedure

● ON GROUND

1. Respective EMER OFF sw – Open switch guard, press and release

NOTE Respective engine will be automatically cut off, “ACTIVE” will illuminate on the EMER OFF SW panel and F VALVE CL will illuminate on the CAD.

2. Both FUEL PRIME PUMPS – Check OFF

3. Double engine emergency shutdown – Perform

● IN FLIGHT

1. OEI flight condition – Establish

2. Respective EMER OFF sw – Open switch guard, press and release

NOTE Respective engine will be automatically cut off, “ACTIVE” will illuminate on the EMER OFF SW panel and F VALVE CL will illuminate on the CAD.

3. Affected engine – Identify

4. Single engine emergency shutdown – Perform

If FIRE WARNING light is off:

5. LAND AS SOON AS POSSIBLE

If FIRE WARNING light remains on:

5. LAND IMMEDIATELY

NOTE For safety reasons alert and evacuate the passengers as soon as possible.
WARNING LIGHT INDICATIONS

**LIMIT**

(ON VEMD)

**Conditions/Indications**

One of the following limits is exceeded:

- Torque, TOT, N1, Mastmoment, OEI 30 sec. time limit, OEI 2.0 min. time limit, TOP time limit

Warning GONG will be activated

**Procedure**

1. Respective parameter – Reduce

**NOTE** If the counter time limit for OEI 30sec./ 2.0 min. power is exceeded, ENG EXCEED caution will also illuminate.

**WARNING LIGHT INDICATIONS**

**LOW FUEL 1** and / or **LOW FUEL 2**

(SYSTEM I) (SYSTEM II)

**Conditions/Indications**

- Respective supply tank fuel quantity below threshold value
- Warning GONG will be activated

**Procedure**

1. Fuel quantity indication – Check

If positive fuel indication in the main tank:

2. Both fuel pump XFER sw (F + A) – Check ON

3. Both fuel pump XFER circuit breaker (F + A) – Check in

If FUEL LOW warning light remains on:

4. Air Condition (if installed) – Switch OFF

5. Bleed Air – Switch OFF (If OAT > 5°C)

**EFFECTIVITY** For helicopters with 680 liters fuel tank (673 liters if selfsealing supplytanks are installed)

6. LAND WITHIN 8 MINUTES

**EFFECTIVITY** For helicopters with 710 liters fuel tank (701 liters if selfsealing supplytanks are installed)

6. LAND WITHIN 10 MINUTES

**EFFECTIVITY** All
WARNING LIGHT INDICATIONS

**ROTOR RPM**

**Conditions/Indications**

**N_{Ro} LOW**
- \(N_{Ro} 97\% \) or less - steady light
- Audio signal - intermittent low tone (800 Hz)

**N_{Ro} HIGH**
- \(N_{Ro} 106\% \) or above - flashing light and warning GONG
- Audio signal at 112% or above - flashing light and continuous high tone (2400 Hz)

**Procedure**

**\(N_{Ro} LOW / N_{Ro} HIGH\)**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rotor RPM indicator</td>
<td>Check</td>
</tr>
<tr>
<td>2. Collective lever</td>
<td>Adjust as necessary to maintain (N_{Ro}) within normal range</td>
</tr>
</tbody>
</table>

**NOTE**
If in addition to the above indications \(N_{Ro}\) is below both \(N_2\) suspect \(N_{Ro}\) indication system failure. In this case maintain torque above 10% to keep \(N_2\) and Rotor RPM matched.

**WARNING LIGHT INDICATIONS**

**XMSN OIL P**

**Conditions/Indications**

XMSN oil pressure is below minimum
- Both XMSN OIL cautions on CAD are on
- Warning GONG will be activated

**Procedure**

**LAND AS SOON AS POSSIBLE**

**NOTE**
- Reduce power as much as possible.
- If immediate safe landing is impossible, reduce power to a minimum for the continuation of the flight (Vy in level flight) to a safe landing site. Main gearbox dryrun capabilities have been demonstrated in a bench test (AEO condition) over more than 25 minutes.
3.2.2 Caution light indications

CAUTION LIGHT INDICATIONS

MASTER
CAUTION

Conditions/Indications

Caution indication appeared on CAD

Procedure

1. Caution indication on CAD
   – Check and perform corresponding emergency procedure(s)

2. RESET pb
   (on cyclic stick)
   – Push to reset
3.2.3 **CPDS caution indications**

**CAUTION INDICATIONS**

**BAT DISCON**

*(MISC)*

**Conditions/Indications**

Battery is off-line (normal during EPU start or the BAT MSTR switch is in OFF position).

**Procedure**

1. BAT MSTR sw – Reset then ON

If caution indication remains on:

2. LAND AS SOON AS PRACTICABLE

**CAUTION INDICATIONS**

**BUSTIE OPN** and / or **BUSTIE OPN**

*(SYSTEM I)* *(SYSTEM II)*

**Conditions/Indications**

Electrical systems are separated

- High load bus disconnected
- In some cases the generator(s) may be disconnected and GEN DISCON may not appear

**CAUTION** IF BUSTIE OPN APPEARS AS A RESULT OF AN ELECTRICAL FAILURE, RESETTING THE BUS TIE COULD LEAD TO ADDITIONAL DAMAGE AND ELECTRICAL FIRE. THEREFORE, A RESET SHOULD ONLY BE PERFORMED IF THE BUS TIE WAS DELIBERATELY OPENED.

**Procedure**

1. GEN AMPS – Verify normal value(s)

If GEN AMPS shows normal value(s):

2. LAND AS SOON AS PRACTICABLE

**NOTE** Automatic reconfiguration of the BUS connection.
For the respective engine the starting with open BUS TIE is not possible.
If one GEN AMPS value shows XXX:

2. Failed system – GEN sw OFF

3. LAND AS SOON AS PRACTICABLE

**NOTE** For the failed system (electrical/generator) the essential bus will be supplied by the remaining generator through the battery. The SHED BUS can not be activated

If both GEN AMPS values show XXX:

2. Double GEN DISCON procedure – Perform

**NOTE** Observe that both generators are disconnected from the power distribution system.
CAUTION INDICATIONS

CAU DEGR
(On VEMD if CAD is inoperative or on CAD if both VEMD lanes are inoperative)

Conditions/Indications
Degraded caution indication because of loss of CAD lane or both VEMD lanes

Procedure
– see para 3.3.3 and 3.3.4

CAUTION INDICATIONS

CAD FAN
(MISC)

Conditions/Indications
Failure of CAD fan has been detected during CPDS EXTERNAL TEST.

Procedure
Do not start engines. Maintenance action required.

CAUTION INDICATIONS

CPDS OVHT
(MISC)

Conditions/Indications
Normal operating temperature of I–panel exceeded

Procedure
1. “Pull for Heating/Defog” knob – Push
2. “Pull for Air” knob – Pull
3. VENT SYST rheostat – turn to MAX

If CAUTION indication remains on:
4. Land within 30 min
## CAUTION INDICATIONS

<table>
<thead>
<tr>
<th>ENG CHIP (SYSTEM I)</th>
<th>or</th>
<th>ENG CHIP (SYSTEM II)</th>
</tr>
</thead>
</table>

### Conditions/Indications

Metal particles detected in engine oil.

### Procedure

#### ON GROUND

1. **Affected engine**
   - Identify

2. **Single engine emergency shutdown**
   - Perform

#### IN FLIGHT

1. **OEI flight condition**
   - Establish

2. **Affected engine**
   - Identify

   1. **Alternative:**
      3. **Single engine emergency shutdown**
         - Perform

2. **Alternative:**

   3. **ENG main switch**
      - IDLE

**CAUTION**

THE SECOND ALTERNATIVE ENABLES THE CREW TO USE THE AFFECTED ENGINE FOR LANDING IF NECESSARY. BE PREPARED FOR ENGINE FAILURE. MONITOR N1, TOT, TORQUE, OIL PRESSURE AND TEMPERATURE OF AFFECTED ENGINE CLOSELY. IF THE PARAMETERS FLUCTUATE OR THEIR LIMITS ARE EXCEEDED PERFORM SINGLE ENGINE EMERGENCY SHUTDOWN IMMEDIATELY.

4. **LAND AS SOON AS PRACTICABLE**
CAUTION INDICATIONS

ENG CHP CT or ENG CHP CT
(SYSTEM I) (SYSTEM II)

Conditions/Indications
Test of cables and connectors to the sensor failed during CPDS EXTERNAL TEST

CAUTION  ENG CHIP CAUTION IS NOT AVAILABLE.

Procedure
Do not start engines. Maintenance action required.

CAUTION INDICATIONS

ENG EXCEED or/and ENG EXCEED
(SYSTEM I) (SYSTEM II)

● ON GROUND (before takeoff or after landing)

Conditions/Indications
Counter for OEI 30 sec./2 min. power limitations expired or engine parameter has been exceeded.

Procedure
Maintenance action required before flight.

● IN FLIGHT
  ● If the caution is irreversible:

Conditions/Indications
Engine I or/and II was operated above certified limits.

Procedure

**LAND AS SOON AS POSSIBLE**

  ● If the caution is reversible:

Conditions/Indications
ENG EXCEED triggered by FADEC for exceedance of single excursion time limits.

Procedure

**LAND AS SOON AS PRACTICABLE**

NOTE  Avoid operating in the OEI 30 sec./2 min. power ranges.
CAUTION INDICATIONS (CAD & FLI)

ENG FAIL or ENG FAIL
(System I) (System II)

Conditions/Indications
– Respective N₁-RPM below threshold value.

Procedure
1. OEI flight condition – Establish
2. Affected engine – Identify
3. Single engine emergency shutdown – Perform
4. LAND AS SOON AS PRACTICABLE
CAUTION INDICATIONS (CAD & FLI)

ENG MANUAL (SYSTEM I) or ENG MANUAL (SYSTEM II)

Conditions/Indications

Engine MANUAL mode has been selected unintentionally by setting ENG MODE SEL sw from NORM to MAN.

If ENG MANUAL comes together with TWIST GRIP, refer to TWIST GRIP caution indication.

Following functions of the respective engine are inoperative:
- automatic acceleration, deceleration during power (collective) changes
- NORM start is impossible

Procedure

1. Affected engine
   – Identify by small collective changes

2. Respective TWIST GRIP
   – Adjust torque manually to 20-30% according to weight and ambient conditions (TWIST GRIP caution comes on)

3. LAND AS SOON AS PRACTICABLE

After landing:

4. Respective TWIST GRIP
   – Reduce, before lowering the collective pitch lever to full down position (to keep N_{RO}/N_2 within limits)

WARNING
OPERATE THE TWIST GRIP WITH GREAT CARE AND AVOID QUICK TWIST GRIP ROTATIONS.
HOLD MIN. 10% TORQUE ON THE NORMAL ENGINE TO MAINTAIN AUTOMATIC CONTROL OF N_{RO}.

NOTE
For NORM start return to NORM mode:

- Respective ENG MODE SEL switch – NORM
- ENG MANUAL caution – Check off
- Respective TWIST GRIP – Turn gradually to NEUTRAL position
- TWISTGRIP caution – Check off
- Wait 10 sec. before any power variation.
- Correct operation in NORM mode – Verify by small collective movements
CAUTION INDICATIONS

ENG O FILT or ENG O FILT
(SYSTEM I) (SYSTEM II)

Conditions/Indications
Engine oil filter contaminated.

NOTE During starting the engines it is possible for the caution light to come on for up to two minutes.

Procedure
1. Engine oil pressure and engine oil temperature – Monitor
2. LAND AS SOON AS PRACTICABLE

CAUTION INDICATIONS

ENG OF CT or ENG OF CT
(SYSTEM I) (SYSTEM II)

Conditions/Indications
Test of cables and connectors to the sensor failed during CPDS EXTERNAL TEST

CAUTION ENG O FILT CAUTION IS NOT AVAILABLE.

Procedure
Do not start engines. Maintenance action required.
CAUTION INDICATIONS

ENG OIL P
(SYSTEM I) or ENG OIL P
(SYSTEM II)

Conditions/Indications
Affected engine oil pressure below minimum.

Procedure
1. Engine oil pressure indicator (VEMD) – Check
   - If indication out of limit:
   2. OEI flight condition – Establish
   3. Affected engine – Identify
   4. Single engine emergency shutdown – Perform
   5. LAND AS SOON AS PRACTICABLE
      - If indication in the limits:
      2. LAND AS SOON AS PRACTICABLE

CAUTION INDICATIONS

EPU DOOR
(MISC)

Conditions/Indications
External power receptacle access door is open.

Procedure
● ON GROUND
   After EPU starts:
   EPU access door – Close

● IN FLIGHT
   LAND AS SOON AS PRACTICABLE
CAUTION INDICATIONS

EXT PWR

(MISC)

Conditions/Indications

External power is applied to the electrical distribution system.

NOTE  EXT PWR caution indication going OFF does not indicate that the EPU cable is disconnected.

Procedure

After EPU starts:

1. EPU cable  – Disconnect
2. EPU access door  – Close
   Check EPU door indication off
CAUTION INDICATIONS

**FADEC FAIL**
(SYSTEM I) or

**FADEC FAIL**
(SYSTEM II)

**Conditions/Indications**

Fuel metering valve is blocked.

**Following functions of the respective engine are inoperative:**
- automatic acceleration, deceleration during power (collective) changes
- N1 / TOT/ torque limiter
- NORM start is impossible

**NOTE** No immediate action is required as long as power setting (collective) can remain constant.

In case of FADEC FAIL indication during an acceleration/ deceleration phase, wait until engine parameters are stabilized.

**Procedure**

1. **Collective lever**
   - Adjust as necessary to maintain $N_{RO}$ within normal range

In case of partial failure, that means:
- Torque indication is available

2. **Affected engine**
   - Identify by small collective changes

3. **Respective TWIST GRIP**
   - Adjust torque manually to 20-30% according to weight and ambient conditions (TWIST GRIP caution comes on)

In case of total failure, that means:
- torque and TOT indication is not available
- FADEC cautions are limited to FADEC FAIL
- loss of respective needle on FLI

3. **Collective lever**
   - Adjust slowly to attain 20-30% torque on normal engine. Simultaneously adjust TWIST GRIP of affected engine so that $N_1$ values of both engines get matched (TWIST GRIP caution comes on)

4. **Collective lever**
   - Readjust as necessary without changing TWIST GRIP position
**WARNING** OPERATE THE TWIST GRIP WITH GREAT CARE AND AVOID QUICK TWIST GRIP ROTATIONS.

HOLD MIN. 10% TORQUE ON THE NORMAL ENGINE TO MAINTAIN AUTOMATIC CONTROL OF VARIABLE $N_{RO}$ IN ACCORDANCE WITH SECTION 7 / FIG 7.13.

**CAUTION** DO NOT MOVE TWIST GRIP OF NORMAL ENGINE.

**NOTE** If the flight situation requires maximum engine power, the torque setting of the affected engine may be increased. However, rotor speed and engine parameters shall be observed closely. Do not exceed the $N_1$ / torque value of the normal engine and the AEO limits.

5. LAND AS SOON AS PRACTICABLE

After landing:

6. Respective TWIST GRIP – Reduce, before lowering the collective pitch lever to full down position (to keep $N_2/N_{RO}$ within limits)

**CAUTION** THERE IS NO $N_{RO}$ GOVERNING FOLLOWING FADEC FAILURES OF BOTH ENGINES. $N_{RO}$ AND POWER MUST BE CONTROLLED BY THE PILOT USING A COMBINATION OF COLLECTIVE AND TWIST GRIP MOVES.

**NOTE** Perform appropriate logbook entry. Maintenance action is required.
CAUTION INDICATIONS

FADEC MINR or FADEC MINR

(SYSTEM I) (SYSTEM II)

Conditions/Indications

FADEC minor indicates a change or loss of a number of governing functions.

CAUTION AVOID USING MAXIMUM POWER AND PERFORM POWER VARIATION SLOWLY.
IN CASE OF ENGINE MAIN SWITCH FAILURE, FOR SHUTDOWN, USE THE RESPECTIVE TWIST GRIP.

Procedure

1. Engine parameter – Monitor
   (compare with normal engine)

2. LAND AS SOON AS PRACTICABLE

CAUTION INDICATIONS

FADEC MINR and FADEC MINR

(SYSTEM I) (SYSTEM II)

Conditions/Indications

False operation (pressing for less than 0.25 sec. or more than 3 sec.) of the TOPPING switch on collective pitch.

Procedure

1. ENGINE MODE SEL sw (each engine in turn) – From NORM to MAN and back to NORM position
CAUTION INDICATIONS (CAD & FLI)

FLI DEGR or FLI DEGR
(System I) (System II)

Conditions/Indications
Loss of one engine parameter.
– the numerical value of the failed parameter disappeared
– the parameter designation is yellow

Procedure
1. Do not try to match needles
   CAUTION AVOID USING MAXIMUM POWER. USE THE NEEDLE OF THE OTHER ENGINE FOR LIMIT INDICATION. COMPARE REMAINING DIGITAL PARAMETER VALUES.

2. LAND AS SOON AS PRACTICABLE

CAUTION INDICATIONS (CAD & FLI)

FLI FAIL or FLI FAIL
(System I) (System II)

Conditions/Indications
Loss of two out of three signals (N₁, TQ, TOT) of the same engine.
– the numerical values of the failed parameters disappeared
– the parameter designations is yellow
– the needle of the respective engine disappeared

NOTE If the cautions FLI FAIL and FADEC FAIL appear simultaneously, refer to FADEC FAIL procedure.

Procedure
1. Do not try to trim engines
   CAUTION AVOID USING MAXIMUM POWER. USE THE NEEDLE OF THE OTHER ENGINE FOR LIMIT INDICATION. COMPARE REMAINING DIGITAL PARAMETER VALUES.

2. LAND AS SOON AS PRACTICABLE
CAUTION INDICATIONS

F FLT CT (SYSTEM I) or F FLT CT (SYSTEM II)

Conditions/Indications
Test of cables and connectors to the sensor failed during CPDS EXTERNAL TEST

CAUTION  FUEL FILT CAUTION IS NOT AVAILABLE.

Procedure
Do not start engines. Maintenance action required.

CAUTION INDICATIONS

F PUMP AFT (MISC)

Conditions/Indications
Failure of aft fuel transfer pump, or dry run.

Procedure
1. Fuel level in the main tank – Check

If main tank fuel quantity is sufficient to keep both fuel pumps wet:
2. FUEL PUMP XFER-A sw – Check ON
3. XFER-A PUMP circuit breaker – Check in
If F PUMP AFT indication remains on:
4. FUEL PUMP XFER-A sw – OFF

If main tank fuel quantity is low:
2. FUEL PUMP XFER-A sw OFF

NOTE  • Each fuel transfer pump is capable of feeding more fuel than both engines will consume.
• In hover flight conditions the unusable fuel can be up to 71 kg. The quantity of unusable fuel can be reduced to 7.5 kg when flying with 80 KIAS or more.
CAUTION INDICATIONS

F PUMP FWD
(MISC)

Conditions/Indications
Failure of forward fuel transfer pump, or dry run.

Procedure
1. Fuel level in the main tank – Check

If main tank fuel quantity is sufficient to keep both fuel pumps wet:
2. FUEL PUMP XFER-F sw – Check ON
3. XFER-F PUMP circuit breaker – Check in

If F PUMP FWD indication remains on:
4. FUEL PUMP XFER-F sw – OFF

If main tank fuel quantity is low:
2. FUEL PUMP XFER-F sw OFF

NOTE
• Each fuel transfer pump is capable of feeding more fuel than both engines will consume.
• In forward flight conditions the unusable fuel can be up to 59 kg. The quantity of unusable fuel can be reduced to 3.6 kg when flying with 80 KIAS or less.

CAUTION INDICATIONS

F QTY DEGR
(MISC)

Conditions/Indications
Failure of one main tank sensor.

CAUTION
THE DEGRADED FUEL QUANTITY INDICATION REPRESENTS THE MINIMUM FUEL LEVEL WITHIN PITCH ATTITUDE RANGES OF –3° TO +6°.

Procedure
Set pitch attitude between 0° and +/-1° before reading fuel quantity, then calculate remaining flight endurance in accordance with that “degraded” fuel quantity indication.

NOTE
In this attitude for endurance calculations conservative fuel quantity is displayed.
CAUTION INDICATIONS

F QTY FAIL
(MISC)

Conditions/Indications

Failure of the fuel quantity indication system.

CAUTION  THE FUEL QUANTITY INDICATION SYSTEM HAS FAILED. DO NOT CALCULATE FLIGHT ENDURANCE ACCORDING THE FUEL QUANTITY INDICATION.
FUEL QUANTITY INFORMATION ONLY BY LOW FUEL WARNING LIGHT ON THE WARNING PANEL AND BY GONG.

Procedure
LAND AS SOON AS PRACTICABLE

CAUTION INDICATIONS

FUEL
(MISC)

Conditions/Indications

NOTE  •  For helicopters with 680 liters fuel tank: The fuel quantities of the supply tanks begin to decrease. Caution appears when fuel quantity is approx. 40 kg (tank 1) or 35 kg (tank 2).

•  For helicopters with 710 liters fuel tank: The fuel quantities of the supply tanks begin to decrease. Caution appears when fuel quantity is approx. 36 kg/45 ltr (tank 1) or 32 kg/40 ltr (tank 2).

Procedure

1.  Fuel quantity indication of main tank/supply tanks (CAD)  –  Check

2.  FUEL PUMP XFER-A and –F sw  –  Check ON

3.  LAND AS SOON AS PRACTICABLE

NOTE  Be prepared for LOW FUEL warning
CAUTION INDICATIONS

FUEL FILT
(SYSTEM I) and / or FUEL FILT
(SYSTEM II)

Conditions/Indications
Engine fuel filter(s) contaminated.

Procedure
One caution indication:
LAND AS SOON AS PRACTICABLE
CAUTION BE PREPARED FOR SINGLE ENGINE FAILURE.

Both caution indications:
LAND AS SOON AS POSSIBLE

CAUTION BE PREPARED FOR DOUBLE ENGINE FAILURE.

CAUTION INDICATIONS

FUEL PRESS
(SYSTEM I) or FUEL PRESS
(SYSTEM II)

Conditions/Indications
Engine fuel pump pressure low.

NOTE Caution FUEL PRESS may stay on when Prime Pump I/II selected on and engine is not running.

Procedure
1. FUEL PRIME PUMP sw (affected engine) – ON; PRIME PUMP caution indication will come on.
LAND AS SOON AS PRACTICABLE

CAUTION BE PREPARED FOR ENGINE FAILURE.
CAUTION INDICATIONS

FUEL VALVE or FUEL VALVE
(System I) (System II)

Conditions/Indications
Fuel valve is in a position other than commanded.

NOTE A FUEL VALVE caution indication coming on for a short time while valve is in transition from open to closed position, or vice versa, indicates normal operation.

Procedure
LAND AS SOON AS PRACTICABLE

NOTE Be prepared for respective engine failure.

CAUTION INDICATIONS

F VALVE CL or F VALVE CL
(System I) (System II)

Conditions/Indications
Fuel valve is in closed position.

The respective ACTIVE light on the EMER OFF pb panel (left/right side of the warning panel) will illuminate.

NOTE The F VALVE CL caution indication will come on after pushing the respective EMER OFF pb marked “FIRE”.

Procedure
None

NOTE Before starting the engines, check that respective EMER OFF pb marked “FIRE” is depressed and the ACTIVE light is off.
CAUTION INDICATIONS

GEN DISCON (SYSTEM I) or GEN DISCON (SYSTEM II)

Conditions/Indications
Respective generator has failed or is disconnected from the power distribution system
– High load bus disconnected

CAUTION IF GEN DISCON APPEARS AS A RESULT OF AN ELECTRICAL FAILURE, RESETTING THE GENERATOR COULD LEAD TO ADDITIONAL DAMAGE AND ELECTRICAL FIRE. THEREFORE, A GENERATOR RESET SHOULD BE ONLY PERFORMED IF THE GENERATOR WAS DELIBERATELY SWITCHED OFF.

Procedure
1. Affected GEN sw – OFF
2. DC VOLTS, GEN AMPS and BAT AMPS – Check

If battery is discharged:
3. Electrical consumers – Reduce as much as possible

NOTE One generator alone will provide sufficient power for normal services.

4. LAND AS SOON AS PRACTICABLE
CAUTION INDICATIONS

GEN DISCON and GEN DISCON
(System I) (System II)

Conditions/Indications

Both generators have failed or are disconnected from the power distribution system.

- Only ESS BUS I + II are available

CAUTION IF GEN DISCON APPEARS AS A RESULT OF AN ELECTRICAL FAILURE, RESETTING THE GENERATOR COULD LEAD TO ADDITIONAL DAMAGE AND ELECTRICAL FIRE. THEREFORE, A GENERATOR RESET SHOULD BE ONLY PERFORMED IF THE GENERATOR WAS DELIBERATELY SWITCHED OFF.

Procedure

1. Both GEN sw – OFF

   NOTE The battery will supply the ESS BUS I and II.

2. Electrical consumers – Reduce (as much as possible)

3. SHED BUS sw – EMER ON if necessary

4. DC VOLTS and BAT AMPS – Check
   - below 62 Amps during landing
   - below 51 Amps during cruise

5. Land within 30 minutes

   NOTE Flight time depends on battery type and load condition.
CAUTION INDICATIONS

GEN OVHT or GEN OVHT
(System I) (System II)

Conditions/Indications

Temperature of generator high.

Procedure

1. Affected GEN switch  – OFF

If GEN OVHT caution indication remains on for more than 1 minute:

2. OEI flight condition  – Establish

3. Affected engine  – Identify

4. Single engine emergency shutdown  – Perform

5. LAND AS SOON AS PRACTICABLE

CAUTION INDICATIONS

HTG OVTEMP
(System I)

Conditions/Indications

– The temperature in the duct system or the cabin is exceeded by a certain amount.
– The shut off valves are closed automatically.

Procedure

1. BLD HTG rheostat  – OFF

If the HTG OVTEMP caution disappear:

2. BLD HTG rheostat  – Turn on

If the HTG OVTEMP caution remains on or comes on again:

3. BLD HTG rheostat  – OFF
### CAUTION INDICATIONS

<table>
<thead>
<tr>
<th>HYD PRESS</th>
<th>or</th>
<th>HYD PRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(SYSTEM I)</td>
<td></td>
<td>(SYSTEM II)</td>
</tr>
</tbody>
</table>

**Conditions/Indications**

Pressure loss in the respective system, the other system retains power.

**WARNING**

- DO NOT OPERATE HYD TEST SWITCH IN FLIGHT.

- EXTENDED FLIGHT WITH FAILED HYDRAULIC SYSTEM SHOULD BE AVOIDED. ADDITIONAL LOSS OF THE SECOND HYDRAULIC SYSTEM WOULD RENDER THE HELICOPTER UNCONTROLLABLE.

**CAUTION**

IN CASE OF HYD PRESS (SYSTEM II) FAILURE, YAW SERVO BOOST WILL BE LOST. PEDAL FORCES WILL INCREASE BUT YAW CONTROLLABILITY IS UNAFFECTED. IN HOVER FLIGHT, INCREASE OF FORCES ON LEFT PEDAL WILL BE SIGNIFICANT.

**Procedure**

LAND AS SOON AS PRACTICABLE

### CAUTION INDICATIONS (CAD & FLI)

<table>
<thead>
<tr>
<th>IDLE</th>
<th>or</th>
<th>IDLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(SYSTEM I)</td>
<td></td>
<td>(SYSTEM II)</td>
</tr>
</tbody>
</table>

**Conditions/Indications**

- The respective engine switch is in IDLE position.

**Procedure**

None
CAUTION INDICATIONS

INP FAIL
(MISC)

Conditions/Indications
- Input test has detected one or more missing cautions on CAD
- missing caution(s) flashing
- “External test” indicated on VEMD

WARNING THE FLASHING CAUTION HAS FAILED AND WILL NOT BE INDICATED IN REAL FAILURE CASE.

Procedure
1. Do not start engines
2. Maintenance action required

CAUTION INDICATIONS

PITOT HTR
(System I)

PITOT HTR
(System II)

Conditions/Indications
Pitot tube heater pilot/copilot / static port heater pilot/copilot is switched off or has failed.

Procedure
1. PIT/STATIC HTR PILOT switch – Check ON, if necessary

If switch is in ON position:
2. Altitude indicator – Check
3. IAS – Check

If indications are unrealistic or pointer deflections may be sluggish:
4. Static pressure switch – Select alternate source
CAUTION INDICATIONS

PRIME PUMP (SYSTEM I) and / or PRIME PUMP (SYSTEM II)

Conditions/Indications
Prime pump(s) in operation.

Procedure
None (normal operation during starting engines)

NOTE Prime pumps must be OFF during normal flight operations.

CAUTION INDICATIONS

SHED EMER (MISC)

Conditions/Indications
– SHED BUS switch is switched to EMER because of double generator failure.

NOTE See also emergency procedure for double GEN DISCON failure.

– SHED BUS switch is switched to EMER inadvertently.

Procedure
In case of double generator failure :
1. Electrical consumers – Reduce as much as possible
2. LAND AS SOON AS PRACTICABLE

In case of inadvertent switch to EMER :
1. SHED BUS switch – Set to NORM
CAUTION INDICATIONS

STARTER or STARTER
(SYSTEM I) (SYSTEM II)

Conditions/Indications
If STARTER caution indication remains on after reaching IDLE speed a relay blockage is evident.

NOTE The indication is normal during engine starting or ventilation and needs no corrective action.

Procedure
1. Affected engine – Identify
2. Single engine emergency shutdown – Perform

If failure occurs in flight:
3. LAND AS SOON AS PRACTICABLE

CAUTION INDICATIONS

TRGB CHIP
(MISC)

Conditions/Indications
Metal particles detected in the tailrotor gearbox.

Procedure
LAND AS SOON AS PRACTICABLE

CAUTION INDICATIONS

TRGB CHP CT
(MISC)

Conditions/Indications
Test of cables and connectors to the sensor failed during CPDS EXTERNAL TEST

CAUTION TRGB CHIP CAUTION IS NOT AVAILABLE.

Procedure
Do not start engines. Maintenance action required.
CAUTION INDICATIONS

TWIST GRIP or TWIST GRIP

(SYSTEM I) (SYSTEM II)

Conditions/Indications

Respective engine TWIST GRIP is not in the NEUTRAL position.

NOTE  Respective engine has automatically switched over to MANUAL mode and the ENG MANUAL caution indication comes on.

Procedure

1. Respective ENG MODE SEL switch – MANUAL then NORM
2. ENG MANUAL caution – Check off
3. Respective engine TWIST GRIP – NEUTRAL position
4. Correct operation in NORM mode – Verify by small collective movements

If the TWIST GRIP caution indication remains on:

5. LAND AS SOON AS PRACTICABLE

CAUTION INDICATIONS

VEMD FAN

(MISC)

Conditions/Indications

Failure of VEMD fan has been detected during CPDS EXTERNAL TEST.

Procedure

Do not start engines. Maintenance action required.
CAUTION INDICATIONS

XMSN CHIP

(MISC)

Conditions/Indications

Metal particles detected in the main transmission.

Procedure

1. XMSN oil pressure indication – Check in normal range
2. LAND AS SOON AS PRACTICABLE

NOTE  Reduce power as much as possible.

CAUTION INDICATIONS

XMSN CHP CT

(MISC)

Conditions/Indications

Test of cables and connectors to the sensor failed during CPDS EXTERNAL TEST

CAUTION  XMSN CHIP CAUTION IS NOT AVAILABLE.

Procedure

Do not start engines. Maintenance action required.
CAUTION INDICATIONS

XMSN OIL P (SYSTEM I) or XMSN OIL P (SYSTEM II)

Conditions/Indications

XMSN oil pressure in respective pump system is below minimum.

Procedure

1. XMSN oil pressure indication – Check in normal range
2. LAND AS SOON AS PRACTICABLE

CAUTION INDICATIONS

XMSN OIL T (MISC)

Conditions/Indications

Transmission oil temperature above maximum.

Procedure

1. XMSN oil temperature and oil pressure indication – Check indication
   If indications are within limits:
   2. LAND AS SOON AS PRACTICABLE
   If indications are out of limits:
   2. Power – Reduce, as much as possible
   If oil temperature indication remains out of limits:
   3. LAND AS SOON AS POSSIBLE
CAUTION INDICATIONS

XMSN OT CT

(MISC)

Conditions/Indications
Test of cables and connectors to the sensor failed during CPDS EXTERNAL TEST

CAUTION XMSN OIL T CAUTION IS NOT AVAILABLE.

Procedure
Do not start engines. Maintenance action required.

CAUTION INDICATIONS

YAW SAS

(Optional)

(MISC)

Conditions/Indications
– Yaw SAS inoperative

Procedure
1. SAS DCPL pushbutton – Press
2. P&R // YRST switch – Reset YAW SAS and check proper function

If still inoperative:
3. SAS DCPL pushbutton – Press
3.3 CPDS MALFUNCTIONS

3.3.1 Failure of VEMD lane 1 (upper display)

Conditions/Indications

- Upper VEMD screen blank or abnormal data appearance
- "LANE 1 FAILED" and "PRESS OFF1" appears on the lower VEMD screen
- FADEC caution indication of engine 1 is limited to FADEC FAIL (No indication of ENG IDLE, ENG MANUAL, TWIST GRIP and FADEC MINR)

NOTE Detected overlimits or cautions that are not visible in the current display status will be indicated in the message zone of the FLI.

List of possible messages:

- CAUTION DETECTED
- VEH PARAM OVER LIMIT
- GEN PARAM OVER LIMIT
- BAT PARAM OVER LIMIT
- DC VOLT PARAM OVER LIMIT
- FUEL PARAM OVER LIMIT

Procedure

1. OFF 1 button on the VEMD – Press

NOTE Pressing the OFF 1 button removes power from the faulty lane 1. The FLI appears automatically on the lower VEMD screen and replaces the ELEC/VEH page. The ELEC/VEH page may be displayed on the CAD screen by pushing the SCROLL button on the VEMD. Pressing again the SCROLL button causes the CAD screen to return to the standard CAU/FUEL page display. In case of loss of SCROLL button, press RESET button on VEMD to go back to default page.

2. LAND AS SOON AS PRACTICABLE

NOTE Cycle counter indication on FLIGHT REPORT page is incorrect.
3.3.2 Failure of VEMD lane 2 (lower display)

Conditions/Indications

– Lower VEMD screen blank or abnormal data appearance
– No audio warning in case of overlimit
– “LANE 2 FAILED” and “PRESS OFF2” appears on the upper VEMD screen
– FADEC caution indication of engine 2 is limited to FADEC FAIL (No indication of ENG IDLE, ENG MANUAL, TWIST GRIP and FADEC MINR)
– If HIGH NR mode is selected, rotorspeed increases to high rotorspeed
– Degraded Master Caution indication (only one lamp)

NOTE Detected overlimits or cautions that are not visible in the current display status will be indicated in the message zone of the FLI.

List of possible messages:
– CAUTION DETECTED
– VEH PARAM OVER LIMIT
– GEN PARAM OVER LIMIT
– BAT PARAM OVER LIMIT
– DC VOLT PARAM OVER LIMIT
– FUEL PARAM OVER LIMIT

Procedure

1. OFF 2 button on the VEMD – Press

NOTE Pressing the OFF 2 button removes power from the faulty lane 2. The ELEC/VEH page may be displayed on the CAD screen by pushing the SCROLL button on the VEMD. Pressing again the SCROLL button causes the CAD screen to return to the standard CAU/FUEL page display. In case of loss of SCROLL button, press RESET button on VEMD to go back to default page.

Above 55 KIAS, if HIGH NR mode is selected:

2. HI NR pb – Push, deselect HIGH NR mode

Below 50 KIAS, if HIGH NR mode is necessary:

3. HI NR pb – Push, select HIGH NR mode

4. LAND AS SOON AS PRACTICABLE

NOTE Cycle counter indication on FLIGHT REPORT page is incorrect.
3.3.3 Failure of CAD lane

Conditions/Indications
- CAD screen blank or abnormal data appearance
- CAU DEGR appears on VEMD
- “CAD FAILED” and “PRESS OFF” appears on the FLI (message zone)
- FLI 1 DEGR and FLI 2 DEGR appear on lower left/right side of the FLI page on the upper VEMD
- If HIGH NR mode is selected, rotorspeed increases to high rotorspeed
- No fuel indication available
- Degraded Master Caution indication (only one lamp)

NOTE Detected overlimits or cautions that are not visible in the current display status will be indicated in the message zone of the FLI.

List of possible messages:
- CAUTION DETECTED
- VEH PARAM OVER LIMIT
- GEN PARAM OVER LIMIT
- BAT PARAM OVER LIMIT
- DC VOLT PARAM OVER LIMIT
- FUEL PARAM OVER LIMIT

CAUTION • AFTER CAD LANE FAILURE THE CAUTION INDICATION ON THE VEMD SCREEN IS DEGRADED TO THE FOLLOWING CAUTIONS:

<table>
<thead>
<tr>
<th>SYSTEM I</th>
<th>MISC</th>
<th>SYSTEM II</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG CHIP</td>
<td>XMSN CHIP</td>
<td>ENG CHIP</td>
</tr>
<tr>
<td>FADEC FAIL</td>
<td></td>
<td>FADEC FAIL</td>
</tr>
<tr>
<td>FLI FAIL</td>
<td></td>
<td>FLI FAIL</td>
</tr>
<tr>
<td>FLI DEGR</td>
<td></td>
<td>FLI DEGR</td>
</tr>
<tr>
<td>ENG MANUAL</td>
<td></td>
<td>ENG MANUAL</td>
</tr>
<tr>
<td>TWIST GRIP</td>
<td></td>
<td>TWIST GRIP</td>
</tr>
<tr>
<td>FADEC MINR</td>
<td></td>
<td>FADEC MINR</td>
</tr>
<tr>
<td>ENG FAIL</td>
<td></td>
<td>ENG FAIL</td>
</tr>
<tr>
<td>HYD PRESS</td>
<td></td>
<td>HYD PRESS</td>
</tr>
<tr>
<td>ENG EXCEED</td>
<td></td>
<td>ENG EXCEED</td>
</tr>
</tbody>
</table>

• IN SOME CASES THE “FADEC FAIL” CAUTION MAY BE NO MORE AVAILABLE. PROPER FADEC FUNCTION CAN BE CHECKED BY THE FLI AND THE N_R0/N_2 INDICATOR.
Procedure

1. OFF button on the CAD – Press

NOTE Pressing the OFF button removes power from the faulty lane. The CAU/FUEL page takes priority over the ELEC/VEH page and appears automatically on the lower VEMD screen. The ELEC/VEH page may be reselected on the lower VEMD screen by pushing the SCROLL button on the VEMD. Pressing twice causes SYSTEM STATUS page to appear. To return to the CAU/FUEL page, press the SCROLL button again. In case of loss of SCROLL button, press RE-SET button on VEMD to go back to default page.

Above 55 KIAS, if HIGH NR mode is selected:

2. HI NR pb – Push, deselect HIGH NR mode

Below 50 KIAS, if HIGH NR mode is necessary:

3. HI NR pb – Push, select HIGH NR mode

4. LAND AS SOON AS PRACTICABLE
3.3.4 Failure of both VEMD lanes

**Conditions/Indications**

- Abnormal FLI indication
- CAU DEGR appears on CAD
- If HIGH NR mode is selected, rotorspeed increases to high rotorspeed

**CAUTION** • AFTER DOUBLE VEMD LANE FAILURE THE AVAILABLE CAUTION INDICATION ON THE CAD SCREEN IS DEGRADED TO THE FOLLOWING:

<table>
<thead>
<tr>
<th>SYSTEM I</th>
<th>MISC</th>
<th>SYSTEM I</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG FAIL</td>
<td>TRGB CHIP</td>
<td>ENG FAIL</td>
</tr>
<tr>
<td>ENG OIL P</td>
<td>XMSN OIL T</td>
<td>ENG OIL P</td>
</tr>
<tr>
<td>FADEC FAIL</td>
<td>F QTY DEGR</td>
<td>FADEC FAIL</td>
</tr>
<tr>
<td>FUEL PRESS</td>
<td>DECOUPLE</td>
<td>FUEL PRESS</td>
</tr>
<tr>
<td>FUEL FILT</td>
<td>F PUMP FWD</td>
<td>FUEL FILT</td>
</tr>
<tr>
<td>ENG O FILT</td>
<td>F PUMP AFT</td>
<td>ENG O FILT</td>
</tr>
<tr>
<td>FUEL VALVE</td>
<td>BAT DISCON</td>
<td>FUEL VALVE</td>
</tr>
<tr>
<td>F VALVE CL</td>
<td>EXT POWER</td>
<td>F VALVE CL</td>
</tr>
<tr>
<td>PRIME PUMP</td>
<td>SHED EMER</td>
<td>PRIME PUMP</td>
</tr>
<tr>
<td>XMSN OIL P</td>
<td>F QTY FAIL</td>
<td>XMSN OIL P</td>
</tr>
<tr>
<td>GEN OVHT</td>
<td>ACTUATION</td>
<td>GEN OVHT</td>
</tr>
<tr>
<td>GEN DISCON</td>
<td>EPU DOOR</td>
<td>GEN DISCON</td>
</tr>
<tr>
<td>FIRE EXT</td>
<td>YAW SAS</td>
<td>FIRE EXT</td>
</tr>
<tr>
<td>FIRE E TST</td>
<td></td>
<td>FIRE E TST</td>
</tr>
<tr>
<td>BUSTIE OPN</td>
<td></td>
<td>BUSTIE OPN</td>
</tr>
<tr>
<td>STARTER</td>
<td></td>
<td>STARTER</td>
</tr>
</tbody>
</table>

**Procedure**

1. **OFF 1 and OFF 2 button on the VEMD** – Press; refer to CAD/BACKUP page

**CAUTION** WHEN FLYING IN HIGH ALTITUDE TOT COULD BE THE LIMITING PARAMETER. DESCENT BELOW 10000 FT. AVOID USING MAXIMUM POWER.

Above 55 KIAS, if HIGH NR mode is selected:

2. **HI NR pb** – Push, deselect HIGH NR mode

Below 50 KIAS, if HIGH NR mode is necessary:

3. **HI NR pb** – Push, select HIGH NR mode

4. **LAND AS SOON AS PRACTICABLE**
ENGINE EMERGENCY CONDITIONS

3.4 ENGINE EMERGENCY CONDITIONS

3.4.1 Single Engine Failure - Hover IGE

Conditions/Indications

- Slight jerk in the yaw axis, nose left
- Possible change in noise level

Affected engine:

- ENG FAIL caution indication (CAD & FLI)
- ENG OIL P caution indication
- FUEL PRESS caution indication
- GEN DISCON caution indication
- Instruments indicate power loss

Procedure

1. Collective lever  – Adjust to maintain rotor RPM
2. Landing attitude  – Establish
3. Collective lever  – Raise as necessary to stop descent and cushion landing

NOTE  Below 95% rotor RPM, the torque could increase from 128% up to 133%.

After landing:

4. Affected engine  – Identify
5. Single engine emergency shutdown  – Perform
ENGINE EMERGENCY CONDITIONS

3.4.2 Single Engine Failure - Hover OGE

Conditions/Indications
– Slight jerk in the yaw axis, nose left
– Possible change in noise level
Affected engine:
– ENG FAIL caution indication (CAD & FLI)
– ENG OIL P caution indication
– FUEL PRESS caution indication
– GEN DISCON caution indication
– Instruments indicate power loss

Procedure
1. Airspeed
   – Increase if possible
   and simultaneously
2. Collective lever
   – Adjust to maintain rotor RPM

• FORCED LANDING
3. Landing attitude
   – Establish
4. Collective lever
   – Raise as necessary to stop descent and cushion landing

NOTE Below 95% rotor RPM, the torque could increase from 128% up to 133%.

After landing:
5. Affected engine
   – Identify
6. Single engine emergency shutdown
   – Perform

• TRANSITION TO OEI - FLIGHT
3. Airspeed
   – Gain, 65 KIAS (V_Y)
   and simultaneously
4. Collective lever
   – Adjust to OEI-limits or below

After reaching safe altitude:
5. Collective lever
   – Reduce to OEI MCP or below
6. Affected engine
   – Identify
7. Single engine emergency shutdown
   – Perform
8. LAND AS SOON AS PRACTICABLE

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ENGINE EMERGENCY CONDITIONS

3.4.3 Single Engine Failure - Takeoff

Conditions/Indications
- Slight jerk in the yaw axis, nose left
- Possible change in noise level

Affected engine:
- ENG FAIL caution indication (CAD & FLI)
- ENG OIL P caution indication
- FUEL PRESS caution indication
- GEN DISCON caution indication
- Instruments indicate power loss

Procedure
1. Collective lever – Adjust to maintain rotor RPM

₂ REJECTED TAKEOFF
2. Landing attitude – Establish
3. Collective lever – Raise as necessary to stop descent and cushion landing

NOTE Below 95% rotor RPM, the torque could increase from 128% up to 133%.

After landing:
4. Affected engine – Identify
5. Single engine emergency shutdown – Perform

₂ TRANSITION TO OEI - FLIGHT
2. Collective lever – Adjust to OEI-limits or below
3. Airspeed – Gain, 65 KIAS (Vₘ)

After reaching safe altitude:
4. Collective lever – Reduce to OEI MCP or below
5. Affected engine – Identify
6. Single engine emergency shutdown – Perform
7. LAND AS SOON AS PRACTICABLE
ENGINE EMERGENCY CONDITIONS

3.4.4 Single Engine Failure - Flight

Conditions/Indications
- Slight jerk in the yaw axis, nose left
- Possible change in noise level

Affected engine:
- ENG FAIL caution indication (CAD & FLI)
- ENG OIL P caution indication
- FUEL PRESS caution indication
- GEN DISCON caution indication
- Instruments indicate power loss

Procedure
1. OEL flight condition – Establish
2. Affected engine – Identify
3. Single engine emergency shutdown – Perform
4. LAND AS SOON AS PRACTICAL
ENGINE EMERGENCY CONDITIONS

3.4.5 Single Engine Landing

Conditions/Indications

One engine inoperative (OEI)

Procedure

LANDING APPROACH:
1. Bleed Air Heating (if installed) – Check OFF
2. Airspeed – 65 KIAS (\(V_Y\))
3. Shallow approach – Establish

ON FINAL, AT 50 FT AGL:
4. Airspeed – 40 KIAS
5. Rate of descent – 300 ft/min \(\leq R/D < 500\text{ft/min}\)

TOUCHDOWN:
6. Airspeed – Reduce to minimum, depending on power available
7. Landing attitude – Establish
8. Collective lever – Raise as necessary to stop descent and cushion landing

NOTE  Below 95% rotor RPM, the torque could increase from 128% up to 133%.

CAUTION  AN OSCILLATION, WHICH COULD BE UNINTENTIONALLY INDUCED/ASSISTED BY THE PILOT (PIO/PAO) MAY BE EXPERIENCED DURING RUNNING LANDING OR HARDER VERTICAL LANDINGS. IN CASE OF PIO/PAO, RAPIDLY INCREASE OR DECREASE COLLECTIVE LEVER, WHATEVER SITUATION ALLOWS, UNTIL OSCILLATION HAS STOPPED.

AFTER LANDING:
9. Collective lever – Lower slowly
10. Cyclic stick – Maintain neutral position
ENGINE EMERGENCY CONDITIONS

3.4.6 Single Engine Emergency Shutdown

NOTE • Before performing an inflight single engine emergency shutdown, determine if the situation will allow for OEI flight.
• Make certain that:
  – the controls of the affected engine are selected, and
  – the collective lever is adjusted to maintain the normal engine within the OEI limits
  – START cb is not pulled
• In case of a single engine failure/ emergency shutdown, the bleed air heating will be switched off automatically. Depending on the power margin of the normal engine, the bleed air heating may be re-engaged by selecting heater switch position EMER.
• If CAD message BLEED AIR remains on after single engine failure, the system must be switched off manually. Depending on the power margin of the normal engine, the bleed air heating may be re-engaged.

Procedure

1. ENG MAIN sw (affected engine) – IDLE, check indications, then OFF

NOTE If the FADEC of the affected engine is switched off, caution light FADEC MINR of the remaining engine will appear due to missing parameter redundancy. Therefore, the FADEC switch should remain in ON position.

If there is an indication that the engine is still running:

2. Respective TWIST GRIP – Turn to min. fuel stop, verify correct engine then shut off

NOTE A ventilation is only possible when the START cb is not pulled.
ENGINE EMERGENCY CONDITIONS

3.4.7  **Inflight Restart**

**NOTE**  An inflight restart may be attempted after a flameout or shutdown subject to the pilot’s evaluation of the cause of flameout.

**CAUTION**  DO NOT ATTEMPT INFLIGHT RESTART IF CAUSE OF ENGINE FAILURE IS OBVIOUSLY MECHANICAL.

**Procedure**

1. Collective lever  – Adjust to OEI MCP or below
2. Collective lever friction  – Adjust to maintain position of lever when released
3. Electrical consumption  – Reduce
4. ENG MAIN sw  – Check OFF
5. FADEC sw  – Check ON
6. ENGINE MODE SEL sw  – Check NORM, if necessary sel. NORM to MANUAL to NORM
7. Engine PRIME PUMP sw  – ON
8. Engine TWIST GRIP  – N
9. ENG MAIN sw  – FLIGHT; STARTER caution comes on

**NOTE**  Start will occur when N₁ is dropped below 17%. In the case of switching on at higher N₁ the engine will start automatically when N₁ has decreased below 17%.

**When N₁ > 50%:**

10. Engine PRIME PUMP sw  – OFF
11. Electrical consumption  – As required
12. Starting triangles  – Check disappeared

**If restart is not successful:**

13. Single engine emergency shutdown  – Perform
ENGINE EMERGENCY CONDITIONS

3.4.8 Engine Overspeed - Driveshaft Failure

Conditions/Indications

- $N_{RO}$ decrease

Affected engine:

- Torque decreases to zero
- $N_2$ increases above $N_{RO}$ and oscillates if engine overspeed protection system is active

Normal engine:

- Torque, $N_1$ and TOT increase
- $N_2$ decrease/increase depending on previous torque setting

Procedure

1. **OEI flight condition** – Establish
2. **Affected engine** – Identify
3. **Single engine emergency shutdown** – Perform
4. **LAND AS SOON AS PRACTICABLE**
ENGINE EMERGENCY CONDITIONS

3.4.9 Engine Overspeed - Governing Failure

Conditions/Indications

- ROTOR RPM warning may come on
- $N_{RO}$ and both $N_2$ increase and oscillates if engine overspeed protection system is active

Affected engine:

- Torque, $N_1$ and TOT increase

Normal engine (after shut off of effected engine):

- Torque, $N_1$ and TOT decrease

Procedure

1. Collective lever
   - Raise to maintain $N_2$ and $N_R$ within limits

2. Affected engine
   - Identify

3. TWIST GRIP (affected engine)
   - Reduce torque until the normal engine takes the load (TWIST GRIP and ENG MANUAL cautions come on)

4. Collective lever
   - Readjust as required to stay within limits

5. ENG MODE SEL sw (affected engine)
   - MAN

6. TWIST GRIP (affected engine)
   - Adjust torque manually to 20–30% according to weight and ambient conditions

7. Collective lever
   - Readjust as necessary without changing TWIST GRIP position

8. LAND AS SOON AS PRACTICABLE

After landing:

9. TWIST GRIP (affected engine)
   - Reduce before lowering the collective pitch lever to full down position (to keep $N_2/N_{RO}$ within limits)

WARNING

OPERATE THE TWIST GRIP WITH GREAT CARE AND AVOID QUICK TWIST GRIP ROTATIONS. HOLD MIN. 10% TORQUE ON THE NORMAL ENGINE TO MAINTAIN AUTOMATIC CONTROL OF VARIABLE $N_{RO}$ IN ACCORDANCE WITH SECTION 7 / FIG 7.12.
ENGINE EMERGENCY CONDITIONS

3.4.10 Engine Oil Temperature High

Conditions/Indications

Affected engine:
– Oil temperature indication out of limits

Procedure

1. Airspeed – Increase if possible

If engine oil temperature decreases below limit:

2. LAND AS SOON AS PRACTICABLE

If engine oil temperature remains above limit:

2. Affected engine – Identify
3. OEI flight condition – Establish
4. Engine main sw (affected engine) – Ground Idle
5. Oil temperature indicator (affected engine) – Monitor

If engine oil temperature decreases below limit:

6. LAND AS SOON AS PRACTICABLE

NOTE If conditions require, engine can be switched back to FLIGHT.

If engine oil temperature still remains above limit:

6. Single engine emergency shut-down – Perform

7. LAND AS SOON AS PRACTICABLE
ENGINE EMERGENCY CONDITIONS

3.4.11 Double Engine Failure - Hover IGE

Conditions/Indications

– Yawing motion nose left
– $N_{RO}$ and both $N_2$ decrease
– ROTOR RPM warning ($N_{RO}$ low) on
– Both ENG FAIL caution indications (CAD & FLI)
– Both ENG OIL P caution indications
– Both FUEL PRESS caution indications
– Both GEN DISCON caution indications
– Instruments indicate power loss

Procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Right pedal – Apply as necessary to stop yaw</td>
</tr>
<tr>
<td>2.</td>
<td>Landing attitude – Establish</td>
</tr>
<tr>
<td>3.</td>
<td>Collective lever – Raise as necessary to cushion landing</td>
</tr>
<tr>
<td>After steady ground contact:</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Collective lever – Lower rapidly</td>
</tr>
</tbody>
</table>
ENGINE EMERGENCY CONDITIONS

3.4.12 Double Engine Failure - Flight

Conditions/Indications
- Yawing motion, nose left
- N_{RO} and both N_{2} decrease
- ROTOR RPM warning (N_{RO} low) on
- Both ENG FAIL caution indications (CAD & FLI)
- Both ENG OIL P caution indications
- Both FUEL PRESS caution indications
- Both GEN DISCON caution indications
- Instruments indicate power loss

Procedure
Autorotation – Perform

ENGINE EMERGENCY CONDITIONS

3.4.13 Double Engine Emergency Shutdown

Procedure

● ON GROUND
1. Both ENG MAIN sw – OFF
2. Both FADEC sw – OFF
3. Both Fuel PRIME PUMP sw – OFF
4. BAT MSTR sw – OFF
If there is an indication that the engines are still running:
5. Both TWIST GRIPS – Turn to shut off

● IN FLIGHT
1. Both ENG MAIN sw – OFF
2. Both FADEC sw – OFF
If there is an indication that the engines are still running:
3. Both TWIST GRIPS – Turn to shut off

NOTE The shut off valves are closing and the engines will shut down only when the START cb is not pulled.
3.4.14 Autorotation

**Procedure**

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Collective lever</td>
</tr>
<tr>
<td>2.</td>
<td>Airspeed</td>
</tr>
</tbody>
</table>

**NOTE**
- Maximum range airspeed \( \cdots \cdots \cdots 90 \text{ KIAS} \)
- Minimum rate-of-descent airspeed \( \cdots \cdots \cdots 60 \text{ KIAS} \)

3. **Double engine emergency shutdown** – Perform

**AT APPROXIMATELY 100FT AGL:**
- 4. Flare attitude – Establish

**TOUCHDOWN:**
- 5. Landing attitude – Establish
- 6. Heading – Maintain
- 7. Collective lever – Increase to stop descent and cushion landing

**AFTER TOUCHDOWN:**
- 8. Collective lever – Lower **slowly** to prevent an abrupt stop of the helicopter
- 9. Cyclic stick – Maintain in neutral position
- 10. **BAT MSTR sw** – OFF
FIRE EMERGENCY CONDITIONS

3.5 FIRE EMERGENCY CONDITIONS

3.5.1 Cabin Fire

Conditions/Indications
– Smoke, burning odor, flames

Procedure

● ON GROUND

1. Double engine emergency shutdown – Perform
2. Passengers – Alert/Evacuate
3. Fire – Extinguish if possible

● IN FLIGHT

1. Airspeed – Reduce, if necessary (65 KIAS recommended)
2. Passengers – Alert
3. Heating/Air conditioning (if installed) – OFF
4. Fire – Extinguish if possible
5. Fumes, smoke – Eliminate, open sliding doors, windows and vents (fresh air)

6. LAND AS SOON AS POSSIBLE

After landing:

7. Double engine emergency shutdown – Perform
FIRE EMERGENCY CONDITIONS

3.5.2 Electrical Fire / Short Circuit

Conditions/Indications

- Odor of burning insulation and/or acrid smoke

Procedure

**ON GROUND**

1. Double engine emergency shutdown – Perform
2. Passengers – Alert/Evacuate
3. EPU, if connected – Disconnect
4. Fire – Extinguish if possible

**IN FLIGHT**

**WARNING** BE PREPARED FOR LOSS OF DISPLAY SYSTEMS, AFCS, COM. SYSTEMS AND OTHER HELICOPTER SYSTEMS EXCEPT STANDBY INSTRUMENTS.

1. GEN I / GEN II sw’s – OFF
2. Heating/ vent/ airco – OFF
3. Passengers – Alert

**NOTE**

- If conditions require, open window(s) or sliding door(s) and vents for fresh air.
- Remaining flight time depends on battery type, load condition and consumers. The minimum flight time on battery is 30 minutes.
- If the source of the smoke or fire can be positively identified, remove electrical power to the equipment, either by switching it off, or by pulling the associated circuit breaker.

4. Follow flow chart procedure
Emergency and Malfunction Procedures

Landing without electrical systems possible?

Fire / Smoke continues?

Both BUS TIE sw's – OFF
GEN II sw – NORM
BAT MSTR sw – OFF

No

Yes

LAND AS SOON AS PRACTICABLE

Fire / Smoke continues?

Yes

LAND ASAP

No

Landing within 30 minutes possible?

Yes

LAND AS SOON AS PRACTICABLE

No

WARNING: By switching "ON" the generators, the electr. fire can restart. This may lead to severe additional damage to the aircraft.

Both BUS TIE sw's – OFF
GEN II sw – NORM

Fire / Smoke restarts?

Yes

LAND AS SOON AS PRACTICABLE

No

GEN I sw – NORM
GEN II sw – OFF
RCU – set to 1
LAND ASAP

The steps in this Flow–Chart are not memory items.
TAIL ROTOR FAILURE CONDITIONS

3.6 TAIL ROTOR FAILURE CONDITIONS

3.6.1 Tail Rotor Drive Failure - Hover

Conditions/Indications
Complete loss of tail rotor thrust
- Tail rotor failure in power-on flight is indicated by a yawing motion nose right; the yaw rate depends on the aircraft power at the time of failure.

Procedure

**HOVER IN GROUND EFFECT**

1. Both TWIST GRIP’s – Turn to minimum

and simultaneously:

2. Landing attitude – Establish

3. Collective lever – Apply as necessary

After landing:

4. Double engine emergency shutdown – Perform

**HOVER OUT OF GROUND EFFECT**

1. Collective lever – Reduce immediately

2. Both TWIST GRIP’s – Turn to minimum

If height permits:

3. Airspeed – Gain

4. Collective lever – Raise to stop descent and cushion landing

After landing:

5. Double engine emergency shutdown – Perform
TAIL ROTOR FAILURE CONDITIONS

3.6.2  Tail Rotor Drive Failure / Fixed-pitch Tail Rotor Control Failure - Forward Flight

Conditions/Indications

– No directional response after pedal inputs and/or
– Complete loss of tail rotor thrust and/or
– Locked pedals

NOTE  The procedure will vary depending on flight conditions, power setting and mass of the helicopter

Procedure

1. Collective lever  – Reduce to obtain minimum sideslip angle

2. Airspeed  – Maintain 70 KIAS or higher

3. Suitable landing area  – Select

NOTE
• Surface of the landing area should be hard (e.g. concrete, asphalt) and flat.
• Crosswind from the left is advantageous

4. Shallow approach with nose left  – Perform

If the airspeed can be reduced below 40 kts with the nose still pointing to the left:

5. Airspeed  – Reduce close to the ground until nose is aligned with the flight direction

6. Landing  – Perform

If the nose direction changes from left to right at airspeeds higher than 40 kts:

5. Airspeed  – Increase

6. Approach  – Abort, climb to sufficient height for autorotation

NOTE  Headwind is advantageous

7. Autorotation  – Perform

NOTE
• In autorotation zero sideslip can be expected at about 60 to 70 kts.
• Before touchdown, the groundspeed should be reduced to a minimum
• In final phase of flare the helicopter can yaw to the left due to friction effects.
SYSTEM EMERGENCY/MALFUNCTION CONDITIONS

3.7 SYSTEM EMERGENCY/MALFUNCTION CONDITIONS

3.7.1 Cyclic Trim Actuator Failure / Runaway

Conditions/Indications
Unsymmetrical cyclic stick forces

Procedure
1. TRIM REL switch on cyclic stick – Press to reduce stick forces
If, after releasing TRIM REL switch, stick forces reappear:

2. Circuit breaker TRIM ACT – Pull

NOTE The FTR (TRIM REL) switch remains functional for force trimming.

3.7.2 Pitot / Static Port Failure

Conditions/Indications
Pitot and/or static ports blocked by foreign objects.

Barometric instruments:
– indications are unrealistic
– pointer deflections may be sluggish

Procedure
1. Static pressure switch – SELECTION VALVE ALTERNATE SOURCE

NOTE For alternate static system correction, refer to Section 5 of this Manual.

3.7.3 Abnormal Vibration During Flight

Conditions/Indications
Possible deposit of foreign objects (e.g. water, ice etc.) in the control cuff(s).

Procedure
LAND AS SOON AS POSSIBLE
3.7.4 Failure of HIGH NR mode

- $N_{RO}$ fails to increase below 50 KIAS

**Conditions/Indications**
- below 50 KIAS, $N_{RO}$ fails to increase and/or HI NR advisory is off

**NOTE** When the HI NR pb is selected at DA > 9000ft, no $N_{RO}/N_2$ increase/decrease happens, due to the normal $N_{RO}$ variation with density altitude (see sec.7).

**Procedure**
1. HIGH NR mode – Check selected
2. $N_{RO}$ – Check

If $N_{RO}$ is $\approx 103\%$:
3. Continue Flight/Approach

If $N_{RO}$ remains nominal:
3. Continue Flight, avoid landing with right cross wind

- $N_{RO}$ fails to decrease above 55 KIAS or $N_{RO}$ increase above 55 KIAS

**Conditions/Indications**
- above 55 KIAS, $N_{RO}$ fails to decrease and/or HI NR advisory is on
- above 55 KIAS, $N_{RO}$ increase and/or HI NR advisory is on

**NOTE** When the HI NR pb is selected at DA > 9000ft, no $N_{RO}/N_2$ increase/decrease happens, due to the normal $N_{RO}$ variation with density altitude (see sec.7).

**Procedure**
1. HI NR pb – Push, check off and HIGH NR advisory goes off
2. $N_{RO}$ – Check

If $N_{RO}$ is nominal:
3. Continue Flight

If $N_{RO} \approx 103\%$:
3. Airspeed – Observe, max. airspeed $V_{NE} = 25$ kts or below
4. Continue Flight

**NOTE** Select HIGH NR mode below 50 KIAS, when it has been deselected.
SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

This Section contains instructions and recommended procedures which are peculiar to the operation of this helicopter.

For definition of terms, abbreviations and symbols used in this Section refer to Section 1.

NOTE

- For para. 4.3.2 “Exterior Check” and para. 4.3.3 “Interior Check” observe:
  - All steps/checks which are mandatory before each flight are marked with an asterisk (★).
  - All other steps/checks in these two paras have only to be performed before the first flight of the day.

- From para. 4.4 to para. 4.10 all steps/checks are mandatory before each flight.

4.2 PREPARATION FOR FLIGHT

EFFECTIVITY  Helicopters equipped with dual controls

NOTE  Before helicopter operation with a passenger on copilot’s seat, cyclic stick, collective pitch lever and the pedals have to be removed from their quick release-able connections on copilot’s side. (see FMS 9.2-3)

If the covers are not available and/or cyclic stick, collective lever, pedals shall remain installed (adjust pedals to max. forward position). However, in this case, the passenger must be briefed properly before starting engines not to interfere with any pilot’s control operation.

EFFECTIVITY  All

4.2.1 Flight Planning

Refer to Section 5 to determine required fuel, airspeeds and power settings for takeoff, climb, cruise, hovering and landing data necessary to accomplish the mission.

4.2.2 Mass and Balance

The takeoff and anticipated landing gross mass and balance should be obtained before takeoff and checked against mass and load limits and center of gravity restrictions (see Section 2).
4.3  **PREFLIGHT CHECK**

4.3.1  **General**

The preflight check shall be accomplished in accordance with the Flight Manual.

The preflight check is not a detailed mechanical inspection, but essentially a visual check of the helicopter for correct condition.

When unusual local conditions dictate, the extent and/or frequency of this check shall be increased as necessary to promote safe operation.

**NOTE**
- The following list contains only check items for the standard configuration.
  - In addition to these items, check antennas and all installed optional equipment.
  - Make certain that all relevant intermediate and special inspections in accordance with the Maintenance Manual have been complied with.
  - For optional equipment check items, refer to the respective Flight Manual Supplement or Maintenance Manual.

4.3.2  **Exterior Check**

The exterior check is laid out as a walk-around check, starting forward right at the pilot’s door, proceeding clockwise to the tail boom, to the left hand side (including the upper and lower areas of the helicopter) and is completed at the helicopter nose area.

**NOTE**
- The helicopter shall be headed into the wind.
- The area around the helicopter should be clear of all foreign objects.
- To avoid excessive drain on the helicopter battery, particularly during cold weather, all ground operations should be conducted using an external power unit (EPU). Prior to EPU connection make sure that battery is connected.
- When the battery is used, the operation of electrical equipment should be kept to a minimum.
BEFORE EXTERIOR CHECK:

- Helicopter forms and documents – Check, complete
- Weight, CG – Check
- Covers and tie-downs – Removed
- Ice and snow (if any) – Removed
- Ground handling wheels – Removed
- Fuel tanks – Drain
- Equipment and cargo – Secured

NOTE For required checks of the installed Hand Fire Extinguisher(s) observe national regulations and manufacturer’s safety advise.
<table>
<thead>
<tr>
<th><strong>DC System Check</strong> (EPU is disconnected)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BAT MSTR switch</td>
<td>ON</td>
</tr>
<tr>
<td>BUS TIE sw (1 and 2)</td>
<td>OFF; Check cautions BUS TIE OPEN 1 and 2 appear</td>
</tr>
<tr>
<td>VEMD</td>
<td>Check DC voltage indication for system 1 and 2 is approx. equal to battery voltage (max. $\Delta$ is $-1,\text{V}$)</td>
</tr>
<tr>
<td>BUS TIE sw (1 and 2)</td>
<td>NORM; Check cautions BUS TIE OPEN 1 and 2 disappear</td>
</tr>
<tr>
<td>VEMD</td>
<td>Check DC voltage indication for system 1 and 2 is approx. equal to battery voltage (max. $\Delta$ is $-1,\text{V}$)</td>
</tr>
<tr>
<td>SHED BUS sw</td>
<td>EMER (to test XFER pump aft)</td>
</tr>
<tr>
<td>Fuel XFER pumps (AFT and FWD)</td>
<td>ON; Check cautions (F PUMP AFT/ F PUMP FWD) off</td>
</tr>
<tr>
<td>Fuel XFER pumps (AFT and FWD)</td>
<td>OFF</td>
</tr>
<tr>
<td>SHED BUS sw</td>
<td>NORM and guarded</td>
</tr>
<tr>
<td>BAT MSTR switch</td>
<td>OFF</td>
</tr>
</tbody>
</table>
## EXTERIOR CHECK

### Fuselage - RH:
- Cockpit air intake: Clear
- Pilot door: Condition, function
- BAT MSTR switch: Check, OFF
- Sliding door: Condition, function
- Landing gear and step: Condition
- Drain port: Clear
- Fuselage underside: Condition, no leakage
- Antennas on underside (if any): Condition
- Windshield, upper part: Condition
- Cabin air intake: Clear
- Antennas on roof (if any): Condition
- Oil cooler fan inlet screen: Clear
- Oil cooler fan: Condition
- Sliding door: Closed
- OAT-Sensor: Condition, clear

### Transmission & Engine Compartments - RH:
- Transmission compartment: No leakage, no foreign objects
- Oil cooler air inlet duct: Check clear
- Oil cooler: Clear, condition
- Hydraulic pressure supply system 2:
  - Fluid level indicator: Check fluid level
  - Sight glass: Check oil visible
- Transmission oil filter clogging indicator pin: Check in
- Transmission oil level: Check
- Generator intake: Clear
- Air opening in access door: Clear
- Transmission access door:
  - Closed, secured
- Engine compartment, wiring, linkages and lines:
  - Condition, no leakage, no foreign objects
- Engine II oil tank: Oil level
- Engine air intake: Clear
- Engine air intake access door: Closed, locked
- Engine drive shaft: Check free wheeling
- Air openings (NACA & vent) in engine cowling: Clear
- Engine access door:
  - Closed, secured
Fuselage - RH (continued):

- Maintenance step
- Avionic bay cooling vent
- EPU access
- Battery
- Vent screen (2) on the top
- Battery compartment door
- Static port(s) (2, if copilot's system installed)
- Engine exhaust pipe
- Clam shell doors
- First aid kit
- Avionic rack
- Clam shell doors
- Hinges

Rear Area:

- Tail boom - right side
- Antennas (if any)
- RH horizontal and vertical stabilizer, position light
- Tail bumper
- Fenestron structure
- Tail rotor blades
- Tail rotor

- Slip marks on tail rotor fairing and hub
- Ring frame between tail boom and Fenestron, RH
- Vertical fin tip, RH
- Position and anti-collision light
- Ring frame between tail boom and Fenestron, LH
- Vertical fin tip, LH
- Stators
- Tail gearbox
  - Oil filler cap
  - Tail gearbox cover
- LH horizontal and vertical stabilizer, position light
- Tail boom - left side
- Antennas (if any)
Fuselage - LH:
★ Static port(s) (2, if copilot’s system installed) – Clear
Engine exhaust pipe – Condition
Avionic bay cooling vent – Clear

Transmission & Engine Compartments - LH:
Engine compartment, wiring, linkages and lines – Condition, no leakage, no foreign objects
★ Engine I oil tank – Oil level
Engine air intake – Clear
Engine air intake access door – Closed, locked
Engine drive shaft – Check free wheeling
Air openings (NACA & vent) in engine cowling – Clear
★ Engine access door – Closed, secured
Transmission compartment – No leakage, no foreign objects
Oil cooler air inlet duct – Check clear
Oil cooler – Clear, condition
Hydraulic pressure supply system 1 – Condition
Fluid level indicator – Check fluid level
Sight glass – Check oil visible
Swash plate sliding sleeve bushing (lower part) – Condition, no shift
Generator intake – Clear
Air opening in access door – Clear
★ Transmission access door – Closed, secured

Main Rotor Area:
Swash plate – Condition
Swash plate sliding sleeve bushing (upper part) – Condition, no shift
Driving links assembly – Condition
Rotor blades (4) – Condition, turn rotor and check free run
PU Erosion-protective film (if fitted) – Condition, no separation
Blade underside in the area between drain holes and beginning of metallic erosion protection – Condition, no cracks
Trim tabs (8) – Condition
Static discharger (4) – Condition
Rotating control rods (4) – Condition, free movement
Blade attachment bolts (8) – Secured
Rotor hub cap – Condition
Blade dampers (8) – Condition
Control cuffs (4) – Condition
  If control cuff covers are installed:
    Control cuff covers (4) – Condition
  If control cuff covers are damaged or not installed:
    Control cuff drain holes – No foreign objects
    Control cuff opening (as far as visible) – No foreign objects
    Lower part of blade dampers – Feel for foreign objects, water or snow inside

Fuselage - LH (continued):
  Deck cowlings – Condition
  Cowling left side – Condition
  Antennas on roof (if any) – Condition
  Windshield, upper part – Clean
  ★ Maintenance step – Closed
    Fuel filler cap – Closed, secured
  ★ Fuel filler door – Closed, locked
    Landing gear and step – Condition
    Vents (2), drainports (2) – Clear
    Antennas on underside (if any) – Condition
    Fuselage underside – Condition, no leakage
    Sliding door – Condition, function
      If the optional “pre–catch device” is installed the door must be in fully closed position prior next opening. The pilot/crew has to instruct the passengers for safety reasons.
    Cockpit air intake – Clear
    Copilot door – Condition, function
    Copilot seat safety belts, if seat not occupied – Fastened, secured

Nose area:
  Windshield, front and lower part – Condition, clean
  ★ Pitot tube(s) (2, if copilot’s system installed) – Condition, no foreign objects
    Windshield wiper (if installed) – Condition
    Nose windows – Condition
  ★ Pedal areas – No foreign objects
    Landing lights – Condition
  ★ Fuselage bottom – Condition
4.3.3 **Interior Check**

- Seats and pedals
  - Adjusted and locked
- Safety belt
  - Fastened
- Pilot/Copilot door
  - Check all latches properly engaged by pushing the door(s) outwards

If the optional “pre–catch device” is installed the door must be in fully closed position prior next opening.

- **Overhead panel:**
  - All circuit breakers
    - In
  - All switches
    - OFF or NORM
  - Rotor brake lever (if rotor brake installed)
    - Check in off (upward) position

- **Instrument panel:**
  - Instruments
    - Check
  - Clock
    - Check and set
  - All switches
    - OFF or NORM
  - Static pressure switch
    - STATIC TUBE STATIC PRESSURE

- **Center console:**
  - COM/NAV equipment
    - Check condition

- **Collective pitch:**
  - All switches
    - OFF, NORM, guarded if possible
  - Twist grips
    - NEUTRAL
  - Collective lever
    - Check locked
4.4 STARTING ENGINES AND SYSTEM CHECKS

4.4.1 Standard start – up procedure

4.4.1.1 Pre–Start check

CAUTION AFTER BAT MSTR SW IS SWITCHED ON, THE LOW ROTOR RPM AUDIO TONE APPEARS. DO NOT PRESS THE RESET PB (CYCLIC STICK) UNTIL THE END OF THE CPDS TEST. OTHERWISE THE INPUT FAIL CAUTION LOGIC MAY BE CORRUPTED.

Instrument panel:

- BAT MSTR switch – ON; CPDS internal test starts
- NR/N2 instrument – Check full deflection
- GND PWR (or GND ON) sw(s) (if installed) – OFF

NOTE Do not switch off CPDS during or after flight. However, if it has been switched off even though, proceed as follows for a correct reactivation:

1. CAD OFF pb – Press
2. VEMD OFF 1 & OFF 2 pb – Press one after the other; several cautions may appear for a few seconds.

CAD – Check no INP FAIL caution

NOTE If INP FAIL appears in conjunction with the appropriate caution(s), this caution(s) will not be provided during flight. Abort pre-start check. Maintenance action is required.

Low NRO-RPM audio tone – Reset

Overhead panel:

- FIRE EW 1 test switch – EXT
  CAD – FIRE EXT must come on (system I)

- FIRE EW 1 test switch – EXT/WARN
  CAD – FIRE EXT and FIRE E TST must come on (system I)

  Warning panel
  Headset
  – FIRE I must come on
  – Aural warning signal must come on

- FIRE EW 1 test switch – OFF
- FIRE EW 2 test switch – EXT
  CAD – FIRE EXT must come on (system II)
FIRE EW 2 test switch – EXT/WARN
CAD – FIRE EXT and FIRE E TST must come on (system II)
Warning panel – FIRE II must come on
Headset – Aural warning signal must come on

FIRE EW 2 test switch – OFF
CDS/WARN UNIT TEST sw – WARN UNIT (all warning lights and double gong must come on)
Low N_{RO}-RPM audio tone – Comes on and must be reset
CDS/WARN UNIT TEST sw – CDS; Check CPDS display self test
Fuel PRIME pumps (1 and 2) – ON and check caution PRIME PUMP 1/2 coming on

NOTE Caution FUEL PRESS (1/2) may remain on when engine 1 or 2 is not running.

A-COLL light sw – ON

Instrument panel:
Instrument panel cooling – Check operative
CAD & VEMD brightness – Adjust as required
VEMD – DC voltage: minimum 24V DC
CAD fuel quantity indication – Check quantity
NAV/COM – As required
TRIM REL sw (on cyclic stick) – Press
Cyclic stick – Centered
FADEC sw I then II – ON;
Check following CAUTION indications on CAD coming up for a few seconds (SYS 1/2):
- TRAINING
- TRAIN IDLE
- FADEC MINR

NOTE If one of these cautions remain on, abort pre-start check. Maintenance action is required.
4.4.1.2 Starting Engines

– Before starting engines
  
  Fire guard – Posted (if available)
  
  Rotor area – Clear

– Abort start procedure
  
  CAUTION IMMEDIATELY ABORT START AND, IF INDICATED, PERFORM MAINTENANCE ACTION BEFORE RESTART FOR ANY OF THE FOLLOWING:

  **EFFECTIVITY** If 25 or 26 Ah or 27 Ah battery is installed

  • IF IGNITION DOES NOT TAKE PLACE AFTER REACHING OF N₁= 20% BUT LATEST AFTER 15 SECONDS. PERFORM A 15 SEC. ENGINE VENTILATION (see 4.10) AND WAIT FOR 60 SECONDS BEFORE TRYING STARTING AGAIN.

  **EFFECTIVITY** If 40 Ah battery is installed

  • IF IGNITION DOES NOT TAKE PLACE AFTER REACHING OF N₁= 20% BUT LATEST AFTER 15 SECONDS. WAIT ANOTHER 30 SECONDS AND PERFORM A 15 SEC. ENGINE VENTILATION (see 4.10). WAIT FOR 30 SECONDS BEFORE TRYING STARTING AGAIN.

  **EFFECTIVITY** All

  • IF ABNORMAL NOISES ARE HEARD. (CHECK SOURCE OF NOISE, MAINTENANCE ACTION MAY BE REQUIRED!)

  • TOT RISES ABNORMALLY RAPIDLY ABOVE 650°C AND IS QUICKLY APPROACHING 760°C.  
  (If start is aborted but TOT limits are not exceeded, wait 15 seconds after N₁ RPM has returned to zero before attempting restart. This permits excessive fuel to drain from combustion chamber.)

  • IF ENGINE HANGS. (Stagnation below GROUND IDLE limits)

  • IF START IS NOT COMPLETED WITHIN 45 SECONDS.

  • NO POSITIVE ENGINE OR TRANSMISSION OIL PRESSURE INDICATIONS UPON REACHING GROUND IDLE CONDITION. (MAINTENANCE ACTION!)

  • N₂ RPM AND ROTOR RPM NEEDLES ARE NOT MATCHED AFTER REACHING STABILIZED GROUND IDLE CONDITION. (MAINTENANCE ACTION!)

  • IF N₁ OR N₂ INCREASE BEYOND ENGINE LIMITS. (MAINTENANCE ACTION!)

  • ABNORMAL VIBRATIONS DURING NRO INCREASE (CHECK SOURCE OF VIBRATION, MAINTENANCE ACTION MAY BE REQUIRED!)
ENG MAIN sw(s) – OFF

If the engine is still running:
Respective TWISTGRIP – Turn to SHUT-OFF

**NOTE**
- If, for any reason, a starting attempt is discontinued, the entire starting sequence must be repeated from the beginning.
- In case of a repeated engine start, wait 30 seconds and perform a 15 second engine ventilation (see para. 4.10).

### Starting First Engine

**NOTE**
- In case of operation under low OAT, observe oil limits, fuel limits and warm up procedure as detailed in FLM.
- Either engine may be started first.

**First Limit Indicator**
- ENG MAIN sw first engine – IDLE, simultaneously start clock
- Monitor:
  - $N_1$ increase
  - TOT rise ($\approx 570^\circ C$);
    - note that FLI needle moves not until $\approx 350^\circ C$.
  - Engine oil pressure increase
  - $N_2$ and $N_{RO}$ increase

**NOTE** During start GEN PARAM OVERLIMIT message on the FLI is normal.

**Ground IDLE**
- Check $N_2 \approx 74\%$

### HYDRAULIC Check:

**CAUTION** HYD TEST MUST NOT BE OPERATED DURING FLIGHT

**HYD test sw**
- SYS 1 and hold
  - Check caution indication:
    - **HYD PRESS** (System 2)

Perform small movements:
- with cyclic stick (TRIM REL sw is pressed)
  - Check Mast Moment indication (if installed) and correct operation
- with collective pitch
  - Check correct operation
- with pedals
  - Check higher forces

**HYD test sw**
- SYS 2 and hold
  - Check caution indication:
    - **HYD PRESS** (System 1)

Check correct operation with small cyclic stick, collective pitch and pedal movements.
Starting Second Engine

First Limit Indicator
ENG MAIN sw second engine

Check needle shows TOT
IDLE, simultaneously start clock
Monitor:
- $N_1$ increase
- TOT rise ($\approx 570 \, ^\circ C$);
  note that FLI needle moves not until $\approx 350 \, ^\circ C$.
- Engine oil pressure increase
- $N_2$ and $N_{RO}$ increase

NOTE During start GEN PARAM OVERLIMIT message on the FLI is normal.

When IDLE speed of $N_2 \approx 74\%$ is reached:

Avionic Master switches
Inverter sw (if inverter(s) installed)
Pitot Heater 1/2
Both Fuel XFER pumps
Both Fuel PRIME pumps
Position Lights (mandatory for Night Flight)
Avionics
Instruments
Both ENG MAIN switches

Check on and set
ON
ON
ON
OFF
ON
Set and check
FLIGHT

After rotor RPM has stabilized:
Both ENG MAIN switch guards

Close
4.4.1.3 System Checks

**NOTE** The overspeed system (OVSP sw on overhead panel) has to be checked during scheduled inspections in accordance with the Maintenance Manual.

- **Miscellaneous Checks**
  
  Optional equipment checks – As required (refer to Section 9)

- **Power Check**
  
  Perform power check as required (refer to Section 5).

- **YAW SAS Check**
  
  SAS DCPL push-button – Press  
  Check CAUTION indication: **YAW SAS**

  P&R // Y RST switch – Reengage YAW SAS

- **Cyclic Trim System Check**

  Cyclic stick:

  Cyclic trim system – Check function in all four main directions

  **NOTE** Monitor Mast Moment Indication, if installed, while performing small cyclic inputs.

  TRIM-REL sw – Press while making small cyclic inputs in all four directions. Check, that no spring forces are present.

- **Standby horizon check** (if installed; required for IFR):

  Cage button – Pull and rotate (cage)

  STBY/HOR switch – TEST position (5 seconds)

  CAD – **HOR BAT** remains on (MISC)

  STBY/HOR switch – ON

  CAD – **HOR BAT** must goes off
– **Bleed Air Heating check**: (Before first flight, if the use of the heating system is intended.)
  
  PULL for HEATING/DEFOG knob
  - Pull
  
  BLD HTG switch
  - Norm
  
  BLD HTG rheostat
  - MAX; check if **BLEED AIR** indication comes on

**WARNING**

MOISTURE THAT MAY HAVE ACCUMULATED IN THE HEATER SYSTEM DUCTING WILL CAUSE THE WINDSHIELDS TO FOG UPON INITIAL ACTIVATION OF THE HEATER. THEREFORE, BEFORE TAKEOFF, MAKE CERTAIN THAT ANY MOISTURE IN THE HEATER SYSTEM IS ELIMINATED BY OPERATING THE HEATER IN THE DEFOGGING MODE UNTIL INDICATIONS OF MOISTURE ON THE WINDOWS ARE NO LONGER PRESENT.

BLD HTG rheostat
- OFF; check if **BLEED AIR** indication disappears from the advisory panel

– **HIGH NR Check (if gross mass > 2835 kg):**

HI NR pb
- Push, check “ON” illuminates and $N_{RO}$ increases by up to $\approx 3\%$

HIGH NR advisory
- Check on

**NOTE**

When the HI NR pb is selected at DA > 9000 ft, no $N_{RO}/N_2$ increase/decrease happens, due to the normal $N_{RO}$ variation with density altitude.
4.4.2 **Quick start – up procedure**

**CAUTION** AFTER BAT MSTR SW IS SWITCHED ON, THE LOW ROTOR RPM AUDIO TONE APPEARS. DO NOT PRESS THE RESET PB (CYCLIC STICK) UNTIL THE END OF THE CPDS TEST. OTHERWISE THE INPUT FAIL CAUTION LOGIC MAY BE CORRUPTED.

**NOTE** Quick start–up procedure is recommended only if special circumstances require.

4.4.2.1 **Additional pre–flight checks**

**NOTE** Standard pre–flight checks (according to para. 4.3) and the additional pre–flight checks must be performed to prepare the helicopter for a subsequent quick start (according to para. 4.4.2.2).

**Instrument panel:**
- BAT MSTR switch – ON; CPDS internal test starts
- N₃/N₂ instrument – Check full deflection
- GND PWR (or GND ON) sw(s) (if installed) – OFF
- CAD – Check no INP FAIL caution
- Low NRO-RPM audio tone – Reset

**Overhead panel:**
- FIRE EW 1 test switch – EXT
- CAD – FIRE EXT must come on (system I)
- FIRE EW 1 test switch – EXT/WARN
- CAD – FIRE EXT and FIRE E TST must come on (system I)
- Warning panel – FIRE I must come on
- Headset – Aural warning signal must come on
- FIRE EW 1 test switch – OFF
- FIRE EW 2 test switch – EXT
- CAD – FIRE EXT must come on (system II)
- FIRE EW 2 test switch – EXT/WARN
- CAD – FIRE EXT and FIRE E TST must come on (system II)
- Warning panel – FIRE II must come on
- Headset – Aural warning signal must come on
- FIRE EW 2 test switch – OFF
CDS/WARN UNIT TEST sw

Low N_{RO}-RPM audio tone

CDS/WARN UNIT TEST sw

**SHED BUS**

- Standby horizon check (if installed):
  - Cage button
  - STBY/HOR sw (on cyclic stick)
  - CAD
  - STBY/HOR sw (on cyclic stick)
  - CAD

**Instrument panel:**

- Instrument panel cooling
- CAD & VEMD brightness
- VEMD
- CAD fuel quantity indication
- TRIM REL sw (on cyclic stick)
- Cyclic stick
- FADEC sw I then II

- WARN UNIT (all warning lights and double gong must come on)
- Comes on and must be reset
- CDS; Check CPDS display self test
- EMER

- Pull and rotate (cage)
- TEST position (5 seconds)
- HOR BAT remains on (MISC)
- ON
- HOR BAT must goes off

- Check operative
- Adjust as required
- DC voltage: minimum 24V DC
- Check quantity
- Press
- Centered
- ON;
- Check following CAUTION indications on CAD coming up for a few seconds and disappear (SYS 1/2):
  - TRAINING
  - TRAIN IDLE
  - FADEC MINR

- Avionic checks:
  - Avionic Master switch(es)
  - ON

  - Inverter sw (if inverter(s) installed)
  - ON

  - Avionics
  - Check on and set

  - Instruments
  - Set and check

  - NAV/COM
  - As required

  - FCDS (if installed)
  - Test

  - Rad alt (if installed)
  - Test
– **YAW SAS check:**
  SAS DCPL push-button – Press, check CAUTION indication: YAW SAS
  P&R // Y RST switch – Reengage YAW SAS

– **Bleed Air Heating check:** (Before first flight, if the use of the heating system is intended.)
  PULL for HEATING/DEFOG knob – Pull
  BLD HTG switch – Norm
  BLD HTG rheostat – MAX; check if BLEED AIR indication comes on

**WARNING** MOISTURE THAT MAY HAVE ACCUMULATED IN THE HEATER SYSTEM DUCTING WILL CAUSE THE WINDSHIELDS TO FOG UPON INITIAL ACTIVATION OF THE HEATER. THEREFORE, BEFORE TAKEOFF, MAKE CERTAIN THAT ANY MOISTURE IN THE HEATER SYSTEM IS ELIMINATED BY OPERATING THE HEATER IN THE DEFOGGING MODE UNTIL INDICATIONS OF MOISTURE ON THE WINDOWS ARE NO LONGER PRESENT.

  BLD HTG rheostat – OFF; check if BLEED AIR indication disappears from the advisory panel

Optional Equipment – Check as far as possible
Avionic Master switch(es) – OFF
Static inverters – OFF

– **Preparation for night flight:**
  Cockpit lighting – Set
  Landing lights – Check / set

– **Power OFF:**
  SHED BUS – NORM and guarded
  FADEC sw I then II – OFF
  BAT MSTR switch – OFF
  Helicopter – Ensure that settings or condition are not interfered with until quick start is necessary.
4.4.2.2 Starting phase

**CAUTION** DO NOT USE THE QUICKSTART PROCEDURE IF, AFTER COMPLETION OF THE STANDARD AND ADDITIONAL PRE–FLIGHT CHECKS, ANY OF THE FOLLOWING APPLIES:
– THE HELICOPTER WAS LEFT UNATTENDED.
– THE HELICOPTER’S SETTINGS OR CONFIGURATION WERE CHANGED OR INTERFERED WITH.
– SINCE COMPLETION OF THE STANDARD AND ADDITIONAL PRE–FLIGHT CHECKS, MORE THAN 12 HOURS HAVE PASSED.

**NOTE** In case of operation under low OAT, observe oil limits, fuel limits and warm up procedure as detailed in FLM.

- **Interior & Pre–start Checks**
  - BAT MSTR switch – ON; CPDS internal test starts
  - GND PWR sw(s) (if installed) – OFF
  - Safety belt – Fastened
  - Pilot / Copilot door – Check all latches properly engaged by pushing the door(s) outwards

  If the optional “pre–catch device” is installed the door must be in fully closed position prior next opening.

  - Fuel PRIME pumps (1 and 2) – ON and check caution PRIME PUMP 1 / 2 coming on
  - A-COLL light sw – ON

  **CAUTION** DO NOT SWITCH ON FADEC UNTIL CPDS SELF TEST HAS BEEN COMPLETED.

  - FADEC sw I then II – ON
  - VEMD – DC voltage: minimum 24V DC
  - First Limit Indicator (FLI) – Check needle shows TOT

- **Starting engines**

  **NOTE** For engine start abort refer to para. 4.4.1.2

  - Fire guard – Posted (if available)
  - Rotor area – Clear
Both ENG MAIN switches – FLIGHT, simultaneously start clock

**NOTE** Only one engine will begin starting cycle. After reaching $N_1 \approx 50\%$ (first engine starter drop out), the second engine will begin its starting cycle automatically.

- Monitor:
  - $N_1$ increase
  - TOT rise ($\approx 570 \, ^\circ \text{C}$); note that FLI needle moves not until $\approx 350 \, ^\circ \text{C}$.
  - Engine oil pressure increase
  - $N_2$ and $N_{20}$ increase

$N_1$ – > 50%, check starter dropout first engine

Avionic Master switch(es) – ON
Inverter sw (if inverter(s) installed) – ON
Pitot Heater 1/2 – ON
Both Fuel XFER pumps – ON
Both Fuel PRIME pumps – OFF
Position Lights (mandatory for Night Flight) – ON

– HYDRAULIC Check:

**CAUTION** HYD TEST MUST NOT BE OPERATED DURING FLIGHT

HYD test sw – SYS 1 and hold
Check caution indication:
HYD PRESS (System 2)

Perform small movements:
– with cyclic stick – Check Mast Moment indication (if installed) and correct operation
– with collective pitch – Check correct operation
– with pedals – Check higher forces

HYD test sw – SYS 2 and hold
Check caution indication:
HYD PRESS (System 1)

**NOTE** Check correct operation with small cyclic stick, collective pitch and pedal movements.

Avionics – Check on and set
Instruments – Set and check
Stand–by horizon (if installed) – Release cage, check correct indication
System Checks:

Cyclic trim system
- Check function in all four main directions

NOTE Monitor Mast Moment Indication, if installed, while performing small cyclic inputs.

TRIM-REL sw
- Press while making small cyclic inputs in all four directions. Check, that no spring forces are present.

Optional Equipment
- Check as required (refer to FLM, Secton 9)

When both engines in Flight idle:

Both ENG MAIN switch guards
- Close

- HGH NR Check (if gross mass > 2835 kg):

HI NR pb
- Push, check “ON” illuminates and $N_{RO}$ increases by up to $\pm 3\%$

HIGH NR advisory
- Check on

NOTE When the HI NR pb is selected at DA > 9000 ft, no $N_{RO}/N_2$ increase/decrease happens, due to the normal $N_{RO}$ variation with density altitude.
4.5 PRE-TAKEOFF CHECK

**CAUTION** CHECK THAT THE ADJUSTMENT OF THE INTERCOM VOLUME REGULATOR GUARANTEES AUDIBLE SIGNALS.

- **N\textsubscript{RO} / N\textsubscript{2}**
  - Check ≈ 97%,
  - **If gross mass > 2835 kg:**
    - Check ≈ 100% and HIGH NR illuminates

- **All WARNING, CAD & VEMD indications**
  - Check

- **All doors**
  - Closed

- **Cyclic stick**
  - Check centering device secured

- **Collective pitch**
  - Unlock

**NOTE**

- When pushing the collective down to release the collective lock, the FADEC MINR caution indication may appear. When pressure is released from the collective, the caution indication will disappear.

- Due to start sequence the FLI needle of the second started engine can show TOT start mode instead of torque. Switch this engine to FLIGHT position first.
### 4.6 TAKEOFF

| Collective | – Check if starting triangles disappeared, if not, perform small input (≈ 30% torque) |
| Hover flight | – Perform |
| \( N'_R/N_2 \) instrument | – Check \( ≈ 100\% \) |
| **If gross mass > 2835 kg:** | **Check \( ≈ 103\% \)** |
| FLI needles | – Check matched at same parameter |
| All WARNING, CAD & VEMD indications | – Check |

**Recommended takeoff procedure:**

**CAUTION** AN OSCILLATION, WHICH COULD BE UNINTENTIONALLY INDUCED/ASSISTED BY THE PILOT (PIO/PAO) MAY BE EXPERIENCED INFLIGHT IN TURBULENT WEATHER CONDITIONS. IN CASE OF PIO/PAO, RELEASE COLLECTIVE LEVER MOMENTARILY AND INCREASE COLLECTIVE LEVER BRAKE FRICTION.

| Acceleration and climb | – Start nose down pitch rotation and simultaneously increase power smoothly so that the helicopter gains speed and height. Observe Height–Velocity–diagram as described in Section 5 |
| When reaching 50 KIAS | – Maintain airspeed until reaching 50ft AGL, then accelerate to \( V_Y \) (65 kt) and climb through 100ft AGL |

**Takeoff with gross mass > 2835 kg:**

| When IAS above 55 KIAS | – Check decrease in \( N_{RO} \) to nominal value (by up to \( ≈ 3\% \)); HIGH NR advisory goes off |
4.7 PRE-LANDING CHECK

All instruments – Check
All WARNING, CAD & VEMD indications – Check

**Landing with gross mass > 2835 kg:**

When IAS below 50 KIAS – Check increase in N_{RO} to $\approx 103\%$ and HIGH NR comes on

4.8 LANDING

**CAUTION** AN OSCILLATION, WHICH COULD BE UNINTENTIONALLY INDUCED/ASSISTED BY THE PILOT (PIO/PAO) MAY BE EXPERIENCED DURING RUNNING LANDING OR HARDER VERTICAL LANDINGS.

IN CASE OF PIO/PAO, RAPIDLY INCREASE OR DECREASE COLLECTIVE LEVER, WHATEVER SITUATION ALLOWS, UNTIL OSCILLATION HAS STOPPED.

**Recommended landing procedure:**

After reaching 50 ft AGL – Descent with 300 ft/min $\leq$ R/D $< 500$ ft/min at 40 KIAS

Before touchdown – Establish flare attitude to reduce ground speed and raise collective lever to cushion landing

Touchdown – Establish with zero groundspeed

HI NR pb (if High NR mode was active) – Push, check “ON” goes off and decrease in N_{RO} by up to $\approx 3\%$; HIGH NR advisory goes off

Cyclic stick – Neutral
Collective pitch – Lock
4.9 ENGINE SHUTDOWN

ENG I / II main switches – IDLE
Clock – Start
Inverter sw(s) – OFF
Avionic Master switches – OFF
STBY/HOR sw (if installed) – OFF
Fuel XFER F + A pumps – OFF
All electrical consumers – OFF; except anti-collision light and FADEC sw

Cyclic stick – Centered
ENG I/II main switches – OFF
Engine parameters – Monitor

When rotor has stopped:
Anti-collision light – OFF
VEMD – Check FLIGHT REPORT page for counter cycles and perform appropriate logbook entry.

FADEC switches (2) – OFF

NOTE Allow approx. 10 seconds between rotor stopping and placing FADEC switches to ‘OFF’ to ensure that the LCF data is stored in the DCU.

BAT MSTR switch – OFF
4.10 ENGINE VENTILATION (DRY CRANK)

**EFFECTIVITY**  
*If 25 or 26 Ah or 27 Ah battery is installed.*

- **ENG main switch** – OFF
- **When N₁ < 10% :**
  - **STARTER switch** – VENT position, max. 15 sec.

**EFFECTIVITY**  
*If 40 Ah battery is installed.*

- **ENG main switch** – OFF
- **When N₁ < 10% and 30 seconds have elapsed since start abort:**
  - **STARTER switch** – VENT position, max. 15 sec.

**EFFECTIVITY**  
*All*
4.11  CHANGING ENGINE CONTROL MODE

4.11.1  Switch over from NORM to MANUAL mode:

To choose MANUAL-Mode for pilot’s training:
Respective ENG MODE SEL sw – MAN; ENG MANUAL caution comes on (CAD & FLI)

Refer to ENG MANUAL emergency procedure

**NOTE**  In order to minimize the reaction time in case of emergency, the manual mode may be entered only by turning the respective twist grip out of the neutral position (refer to section 3).

4.11.2  Switch over from MANUAL to NORM mode:

In case of deliberately chosen MANUAL-Mode for pilot’s training by means of the ENG MODE SEL switch:

Respective ENG MODE SEL selector sw – NORM;
ENG MANUAL caution – Check off
Respective Twist grip – Turn gradually to NEUTRAL position
TWIST GRIP caution – Check off
Wait 10 sec. before any power variation.
Correct operation in NORM mode – Verify by small collective movements
4.12 BLEED AIR HEATING SYSTEM OPERATION

PULL for HEATING/DEFOG knob – Pull, set as required
BLD HTG rheostat – Turn towards MAX as far as desired; check if BLEED AIR indication comes on

Ventilation system air outlets – Set as required
Ventilation system blower – Set as required
BLD HTG rheostat – Check temperature; adjust if required

NOTE In case of blower failure check c/b VENT SYST POWER (overhead panel) engaged. For blower reactivation pull and push c/b VENT SYST CONTROL (overhead panel).
If c/b VENT SYST POWER is engaged check c/b VENT PWR (c/b–panel 22VE, located in the baggage compartment RH–side). This check is only possible on ground. For blower reactivation pull and push c/b VENT SYST CONTROL (overhead panel).

4.12.1 Deicing

In case of iced windows proceed as follows:

“Pull for air” knob – Pull
PULL for HEATING/DEFOG knob – Pull
Ventilation system blower – Set to 2/3 power
BLD HTG rheostat – Turn to MAX
Air outlets Instrument panel – Close

4.12.2 Defogging

In case of fogged windows proceed as follows:

“Pull for air” knob – Pull
PULL for HEATING/DEFOG knob – Pull
Ventilation system blower – Turn to MAX
BLD HTG rheostat – Turn to MAX
Air outlets Instrument panel – Close

4.12.3 Bleed air heating system off

BLD HTG rheostat – OFF; check if BLEED AIR indication disappears from CAD