Flight Manual

ICARO AgustaWestland AW139

For FS2004

Introduction

The AgustaWestland AW139 is a 15-seat medium sized twin-engined helicopter manufactured by AgustaWestland. Originally designed and developed jointly by Agusta and Bell Helicopters and marketed as the Agusta-Bell AB139, it renamed the AW139 when Bell withdrew from the project. The AW149 is a medium-lift military helicopter being developed as an enlarged version of the AW139.

The AW139 is a conventional twin-engined transport helicopter with a 5-blade fully articulated main rotor and a 4-blade tail rotor and a retractable landing gear. The AW139 is powered by two Pratt & Whitney PT6C turboshaft engines. The helicopter is being marketed for use in a number of roles including Law Enforcement/ Emergency Medical Service, Executive Transport, Search and Rescue, Maritime and Offshore Oil Operations. The first AW139 flew on 3 February 2001 at Vergiate in Italy, and the first production aircraft on 24 June 2002. The first customer aircraft was delivered in 2003. The company has orders for over 500 helicopters of which over 200 had been delivered by January 2009. It was a contender in the U.S. Army Light Utility Helicopter Program (2004-2006), but lost to the Eurocopter EC145-based UH-72A Lakota. In 2007 a second production line at the AgustaWestland Aerospace plant at Philadelphia, United States was established.
Source: Wikipedia.org

In Memoriam

This project is dedicated to Steve Chase, AW139 team member and a wonderful friend, who passes on 28th. of July 2009. Rest in Peace.

Content

Pack 1: Basepack with Offshore and VIP versions, AI Traffic model. Sounds, Panels, AFCP, Effects, Modules, Paintkit and Documentation.
Pack 2: Model and Textures MIL only, CSAR, Tanker, HEMS and SAR versions

All in all, there are **18 different models** availabe:

- **HEMS Shortnose**
- **HEMS Shortnose Ski**
- **HEMS Longnose**
- **HEMS Longnose Ski**
- **HEMS (LAFD)** with SX-16 night sun

all with single winch

- **MIL** (e.g. IAC) with small FLIR, single winch etc.
- **MIL CSAR** equipped with big FLIR, SX-16 night sun, refilling probe, double winch. (Separate model)

- **SAR1 Longnose** like HMC UK with double winch, big FLIR, XP-night sun
- **SAR2 very Longnose** like FB UK flying school with single winch, big FLIR, no night sun
- **SAR3 very Longnose** with big FLIR, SX-16 night sun, double winch, special VHF antanna on the tail (like Spain or other SAR)

- **Transport/Offshore Shortnose** (12 passenger version)
- **Transport/Offshore Longnose** (12 passenger version)

- **Tanker/Fire Fighting Shortnose** (LAFD) with SX-16 night sun, water dropping valves and single winch. (Separate model)

- **VIP Shortnose (12 passenger version)**
- **VIP Shortnose Ski (12 passenger version)**
- **VIP Longnose (4 passenger version)**
- **VIP Longnose Ski (4 passenger version)**

- **AI Traffic model** (separate model)

Models and Animations

We used an older model from Brian Whitelegg from 2005, redesigned by Nate Rosenstrauch later, as a very good basic. We took that great work and built it up with large-scale changes.Thanks to Brian and Nate for providing the source codes.

We follow an extreme **framerate-friendly design work**. Keep in mind, a lot of frames goes into glass cockpit and the animations. And our primary target was to publish a Helicopter which is flyable also **in lower powered PC systems**. Also while online-flying, multiplayer- or AI-Trafic-platforms. All models are multi-LOD.

In this package, there are only rudimental DXT3 repaints available. Every part of exterior models are textured. No mirrored parts are used.

All **models** normally are equipped with **max** antennas, cable cutters, FLIR, single winch, Floats and bigger main gear pads (there are in reality life rafts inside).

Most of these devices you can switch ON or OFF via repaints (alpha channel). VIP versions eg. have no winch or FLIR, night sun etc. So it is possible to make a very big amount of all delivered AW139 until now.

Included is a complete **Repaint Kit with 32-Bit +alpha**. Only the main exterior texture comes with layers – as Corel Photopaint *.cpt or Photoshop *.psd

All models have a fully **operable VC** (virtual cockpit). Most of switches, levelers or knops have animations and are modelled **in 3D**. Control systems like sticks, pedals or collectives are also animated.

Doors will open/close with Shft+E+1 (right sliding door) and Shft+E+2 (front doors and left sliding door). When open/close right sliding door, some winch variants follow to working position.

Front gear (also Ski-versions) is free turning while taxying. You can control it with the padals and/or with differential brakes. **Retraction speed** of gears will follow the original.

Windshield **wipers** are working with **two different speeds**. Control panel is on middle console.

Air-to-air refilling **probe** (out and in) of **CSAR version** is animated with **tailhook** key. Perhaps you have to activate this key function in FS seperately.

Tank valves of fire fighting **Tanker** version will open/close also with **tailhook** key, water dropping effect with **I-key** (smoke) – to reactivate effect, push key double. The **snorkel** follows **Wing Fold key** on and off. (Only on ground availabe).

Installation

Included are all gauges and systems you need. But **take care** – some of them e.g. AFCP autopilot or dsd_xml_sound3.gau are very common and perhaps you did some special and personal configurations on it. In that case do not overwrite your files or configs without saving them before.

With the exception of two bitmaps of the AFCP autopilot, there are only **original gauges** or systems in the package. I renamed the AP gauges so there are no conflicts with the originals. For all third party gauges or systems we have permision to publish them in our package.

Aircraft.cfg is prepared to use shockwave lights (payware).
Panel.cfg´s in PANEL or PANEL.FLIR are prepared to use ICARO GPS (members only) or FSMap (payware)

For **proper installation** please see separate **Installations.txt**.

Main Characteristics

The AW139 is in real a multi-engine helicopter. You have to know, that there is no possibility to create a “real” multiengined helicopter in FS9 like e.g. fixed wing aircrafts. Its the same with the FADEC (Full Authority Digital Engine (or Electronics) Control of the engines. But we tried to cover both.

The behavior to **control the engines** is quite different to standard helicopters in FS. So key functions like **Ctrl+E** to start up engines **is not possible**. Like the real one you have to start up the engines by yourself from the cockpit.

Like the real AW139, there are **manual** or **automatic** procedures possible. The automatic modus is in fact really simple. Later more informations.

Before you start the AW139 in FS, you have to notice:

To get the **correct numbers, and all systems working as intended**, you have to follow following basic steps, also known as **Cold & Dark**:

1. Load the default Flightsim situation (Cessna in Seattle)

2. Shutdown the engine and all systems. **Important**: After that, you have to push Mixture Contol Leveler to 100%.

3. Reposition the Cessena to your favourite location and select a AW139 model of your choice.

4. After loading the AW139 you will hear perhaps engines sound and the rotor is turning. To eleminate this, please go to 2D-Cockpit and open the Overhead Panel Window with Shft+4.

On Overhead Panel window, click both Engine-Control Levelers ECL´s to FLIGHT position and back to upper OFF-position. Sound will stop.

5. Go to the outside view and brake the rotor turning down with the throttle function (on Joystick or keyboard) rising up until turning of rotor is finished.

6. You might save your new situation with the AW139 for future use. If you load this situation the next time – the AW is ready (Cold & Dark) with all systems prepared as intended.

VC Sounds

The **VC** has its own **sound** engine. All the different clic sounds, electrical (IPC´s) fans, air condition/heater fans or altitute announcements/alerts etc. are controlled with dsd_xml_sound3.gau. If you don´t hear these sounds in virtual cockpit, try this:

First check: You have to open the OPTIONS window in FS. Than go to SETTINGS/SOUND and rise the leveler COCKPIT.

Second check: dsd_xml_sound3.gau is not in gauges folder of FS. And/or AW139 folder and AW139_sound.cfg aren´t in Sound folder of your Flight Simulator directory. Do not confuse the issue with aircraft sound. These sounds are totally different.

Flight Characteristics

In the air, the AW139 is like the original very agile. Eco-cruise speed is around 150 kts IAS. But you can operate AW139 with a max. cruise speed up to 165 kts IAS. Vne is 167 kts. Overspeed warnings will flag at 170 kts IAS. No problems with AFCP autopilot in that area of speed. In transition speeds between take off/cruise or cruise/appraoch, the AW is very stable. The speed decrease to reach approach speed is normal for a 5.8 ton class helicopter. Not too slow and not too fast.

The AW139 **swims**, if you ditch very **slowly to the sea**. With or without retracted gears or floats. We couldn´t combine airfiles with gauges/animations functions. So its better to inflate the floating system before you take any screenshots. The switch for inflation the floats could be found on Middle Console 2.

Panel Characteristics

Batteries will **discharge** after 10 minutes without connected engine power. The **generators** are only working, if minimum Engine 1 is running on IDLE. If you have discharged batteries without a running engine, you have to reset your flight in Flight Simulator. If you have engines running and generators off, its a bit easier – switch generators on. Displays and systems will comes alive too.

Anyway, to discover panel and systems function it is recommended to start minimum Engine 1 with connected generators.

To **get all systems proper running in VC** it is **recommended** to turn into the **2D-Cockpit** and open the windows

Middle Console1 with Ctrl+2 and
Middle Console2 with Ctrl+3 and
Overhead panel with Ctrl+4.

You have to do this before you jump into the Virtual Cockpit **once a flight**. The reason is: We did a lot of special things like FADEC or other systems running in background. Some of them do not operate in VC without loading the gauges in 2D.

2D Panel

Main Panel (SHFT + 1) and windows:

Middel Console 1 (SHFT + 2)
Middle Console (SHFT + 3)
Overhead (SHFT + 4)
FMS/FMC (SHFT + 5)
AFCP Autopilot +DUC (SHFT + 6)
Garmin 500 GPS or FLIR/night sun OP (different panel version) (SHFT + 7)
ICARO-FMS (SHFT + 8)*
ICARO-GPS (SHFT + 9)*

* only for ICARO members

Overview Main Panel (Shft + 1)

1 PFD 2 MFD
3 Caution Light
4 Warning Light
5 ATC-ID
6 Chronometer
7 HSI
8 Fire Extinguisher
9 Compass
10 Load Indicator
11 AFCP Autopilot
12 Course/DH/Baro
13 PFD NAV Selectors
14 Autopilot Copilot INOP
15 open FMS/Radios
16 Fuel Control
17 Gear Control
18 GPS/NAV Sel

Middle Console 1 (Shft + 2)

1 Fuel Panel
2 Engines Control Panel
3 Misc. Function Panel
4 Autopilot*
5 Autopilot Modes Panel**
6 Communication Panel
7 to open FMS window

* Settings does not communicate with AFCP Autopilot on Main Panel – to avoid problems with AFCP please do not switch them on – the INOP sticker marks it clearly enough.

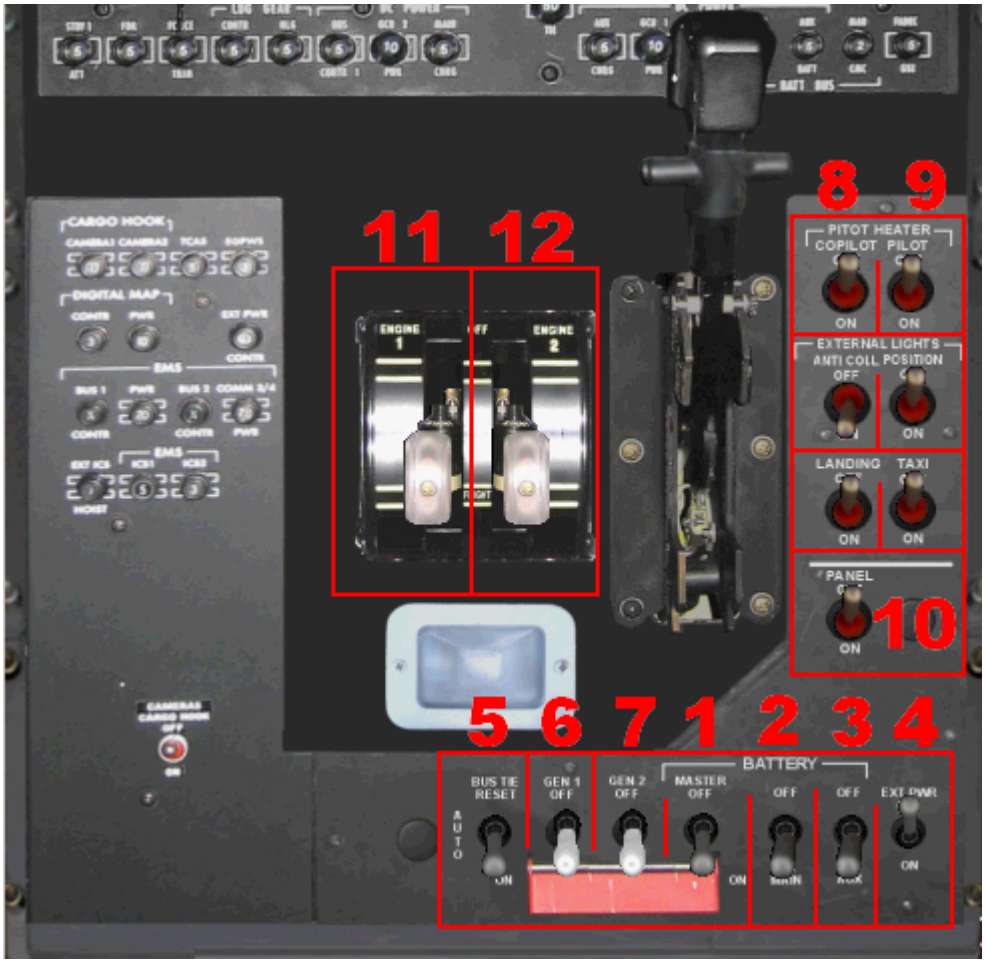
** Autopilot Mode settings FD (Flight Director) and AP1 (Autopilot 1) are mandatory for flight.

Middle Console 2 (Shft + 3)

1 **Hydraulic Control Panel**
2 **Windshield Wiper Control Panel**
3 **Test Panel**
4 **Floatation System Panel**
5 **ELT Emergency Location Transmitter**
6 **Secondary Transponder**
7 **Transmission/Mast Monitoring System***
8 **Air Condition Control Panel**

* inoperable

Overhead Panel (Shft + 4)



1 Battery Master
2 Battery Main
3 Auxiliary Battery
4 Exterior Power Supply*
5 Bus Tie
6 Generator ENG 1
7 Generator ENG 2
8 Pitot Heater copilot side
9 Pitor Heater pilot side
10 Lights
11 ENG 1 Control Leveler
12 ENG 2 Control Leveler

* inoperable

FMS Flight Management System (Shft + 5

How to **operate** with the FMS, please read the **FMS manual.** In FMS it is not possible to set special transponder XPDR idents with a zero (0) at the beginning. To set e.g. 0021, use the secondary transponder on Middle Console 2. Accordingly FMS takes over the settings without problems.

AFCP Autopilot (Shft +6

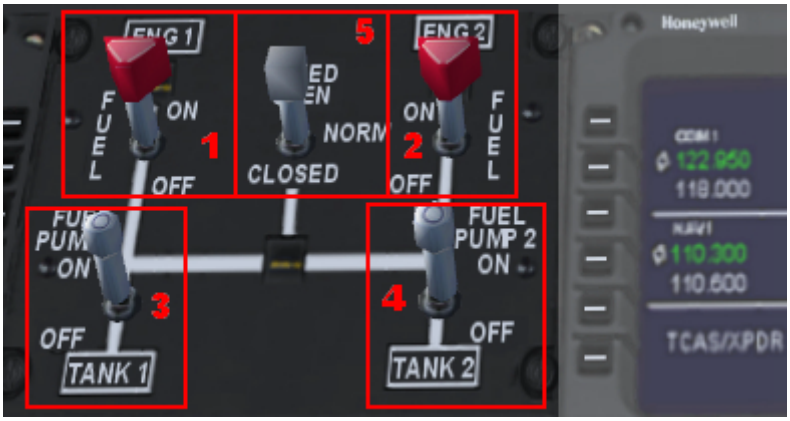
Its the same AFCP autopilot of Antti Pankonen and Dirk Fassbender – but the AW139 AFCP has new textures. Operations and functions are the same.

It is recommended to read the manual in AFCP-folder.

The same AFCP AP could be found in 2D on Main Panel. **Please note** that you can´t share functions with both AFCP systems. You have to control either the AFCP in 2D or the Shft+6 window version.

Also note that LNAV is not working really well in combination with FMC and MFD NAV modes. So, its better to control headings or altitudes “manually”.

Fuel Control Panel



1 Fuel Valve ENG 1 - ON
2 Fuel Valve ENG 2 - ON
3 Fuel Pump ENG 1 - ON
4 Fuel Pump ENG 2 - ON
5 XFEED – ON open position

Gear Contol Panel

1 Gear Leveler
2 Gear POS Indicator
3 Nose Wheel Lock/Unlock
4 Parking Brake

FLIR and Night Sun Control (SHFT + 7)

To **control FLIR and Night Sun** is very easy – they are combined. At the top the night sun could be switched ON, OFF and RTCT (Night Sun will go to retract position).

Down is the control bottom to drive the Night Sun and FLIR in four directions. Pushed in the middle (POS), the night sun will go to op-ready position (45 degree down to the front).

Fire Extinguishers Display

The amber and red lights follow the Light Test Panel on Middle Console. If bag and BTL 1 and BTL 2 (BTL = bottle) are switched, sound of Fire Extinguishers will be activated. There are no other functions behind.

But if you switch ENG1 and/or ENG2, engines will drive down very quickly. The fuel valves will be closed. You have to restart the engines again.

PFD Primary Flight Display

First, the PFD is part of the common Honeywell Epic Glass Cockpit. Variants are used by Embraer Jets like EMB-145 - 195. On AW139, the Epic is an adaption for helicopter usage.

A PFD is a modern aircraft instrument dedicated to flight information. Much like multi-function displays, primary flight displays are built around an LCD or CRT display device. Representations of older six pack or "steam gauge" instruments are combined on one compact display, simplifying pilot workflow and streamlining cockpit layouts.

While the PFD does not directly use the pitot-static system to physically display flight data, it still uses the system to make altitude, airspeed, vertical speed, and other measurements precisely using air pressure and barometric readings. An air data computer analyzes the information and displays it to the pilot in a readable format.

The center of the PFD contains an attitude indicator, which gives the pilot information about the aircraft's pitch and roll characteristics, and the orientation of the aircraft with respect to the horizon. Unlike a traditional attitude indicator, however, the mechanical gyroscope is not contained within the panel itself, but is rather a separate device whose information is simply displayed on the PFD. The attitude indicator is designed to look very much like traditional mechanical AIs. Other information that may or may not appear on or about the attitude indicator can include ILS localizer and glide-path “needles”, and so on.

To the left and right of the attitude indicator are the airspeed and altitude indicators. The airspeed indicator displays the speed of the aircraft in knots, while the altitude indicator displays the aircraft's altitude above sea level (MSL). These measurements are conducted through the aircraft's pitot system, which tracks air pressure measurements. As in the PFD's attitude indicator, these systems are merely displayed data from the underlying mechanical systems, and do not contain any mechanical parts (unlike an aircraft's airspeed indicator and altimeter). Both of these indicators are presented as vertical “tapes”, which scroll up and down as altitude and airspeed change.

The vertical speed indicator, usually next to the altitude indicator, indicates to the pilot how fast the aircraft is ascending or descending, or the rate at which the altitude changes.

At the bottom of the PFD is the heading display, which shows the pilot the magnetic heading of the aircraft. This functions much like a standard magnetic heading indicator, turning as required. This part of the display shows not only the current heading, but also the current track (actual path over the ground), current heading setting on the autopilot, and other indicators.

Other information displayed on the PFD includes navigational marker information, bugs (to control the autopilot), ILS glideslope indicators, course deviation indicators, altitude indicator QFE and QNH settings, VOR-, VOR2-, ADF1-, ADF2- and radio COMM1, COMM2-frequencies, wind direction indicator and much more.

Toggle VOR1, VOR2, ADF1, ADF2, FMS1 and FMS2

CRS sel.
DH = Descition Height sel.
BARO = QNH sel.

MFD Multi Function Display

A Multi Function Display (**MFD**) is a LCD screen that can be used to display information to the pilot in numerous configurable ways. Often an MFD will be used in concert with a Primary Flight Display. The advantage of an MFD over analog display is that an MFD does not consume much space in the cockpit. All information is displayed on the MFD pages.

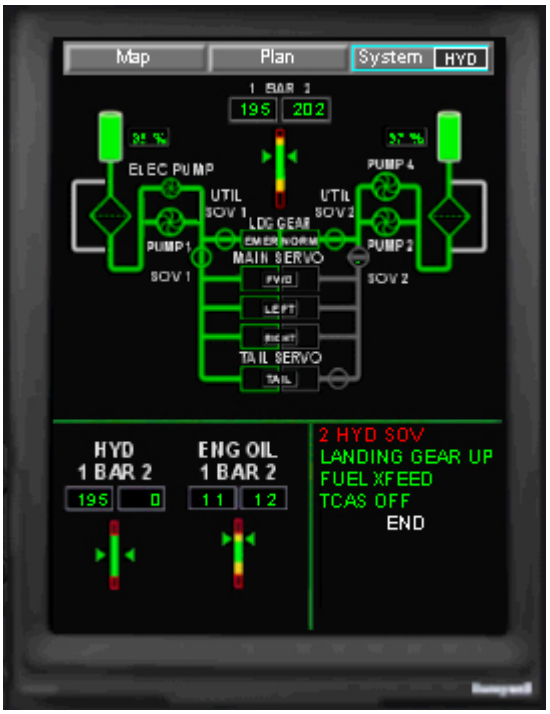
Generally, the MFD in the AW139 allows the pilot to display navigation routes, flight plans, GPS, TCAS and **helicopter systems information** (e.g. EICAS) all **on the same screen**.

Engine Indicating and Crew Alerting System (EICAS) is an integrated system in MFD used to provide aircraft crew with aircraft engines and other systems instrumentation and crew annunciations.

EICAS System Displays

Main EICAS page with engines, hydraulics and electrical data. At the right bottom there is the **CAS**.

The Crew Alerting System (CAS) is used in place of the annunciator panel on older systems. Rather than signaling a system failure by turning on a light behind a translucent button, failures are shown as a list of messages in a small window near the other EICAS indications. The CAS system is, in essence, an electronic version of the Idiot light.



EICAS Hydraulics page

There are two different cycles to contols haudraulic fluids.

You need it for e.g. main and tail rotor control servers or landing gear.

The CAS gives status, cautions and warnings.

2 HYD SOV means hydraulic shut-off valve of second cycle is closed – this is a WARNING because there is only one cycle availible.

EICAS Electrical page

The electrical bus system includes direct supply and the charging of batteries and auxiliary battery.

Warning GEN2 FAIL shows the generator of ENG2 is not working (Shut off)

Caution BUS TIE OPEN did not connect the two bus systems to provide the consumers with power.

CAS colors:

Red – WARNING messages
Amber – CAUTION messages
Green – Status messages – all is **OK**

If red **WARNING** message during flight appears – pilots in real has to react very soon, if the warning persists, they have to land as soon as possible.

In FS that means – **do not fly** with red **WARNING** messages. In most cases, you forgot to switch a consumer on or off or you don´t have a proper engine set up.

CAS communicates with caution and warning lights on Main Panel, too.

On EICAS, there are two more pages available: **flight control** page and **maintanance** page.

Please note, some of the EICAS pages are not selectable in VC cockpit. To display them, you have to select them from system page menue in 2D and go in VC again. Its seems that FS has problems with mouse areas on sloping levels. (Main panel in VC has a slope).

MAP and NAV Display

Map and NAV Display combines many display types like terrain or TCAS with a lot of navigation data.

Note – only in 2D cockpit availible. In VC you have another open window.

Enroute with a “normal” FS9 Flight Plan. Mode is connected to AFCP Autopilot.

Again, LNAV and VNAV-Modes aren´t available due of Autopilot limitations. But it is easy and makes real fun to follow a flight plan only with AFCP HDG, ALT or V/S.

Engines Start Up procedures

To choose between Automatic or Manual Engines Start Up procedures, the real AW has two mode switches for each engine on the pilot´s collective. In FS it is not really clever to allocate switches on a animated stick or collective in VC. It is nearly impossible to set the right clics with the mouse. For this reason we decided not to allocate sticks or collectives with functions. So, the start up procedures are a bit different to the original.

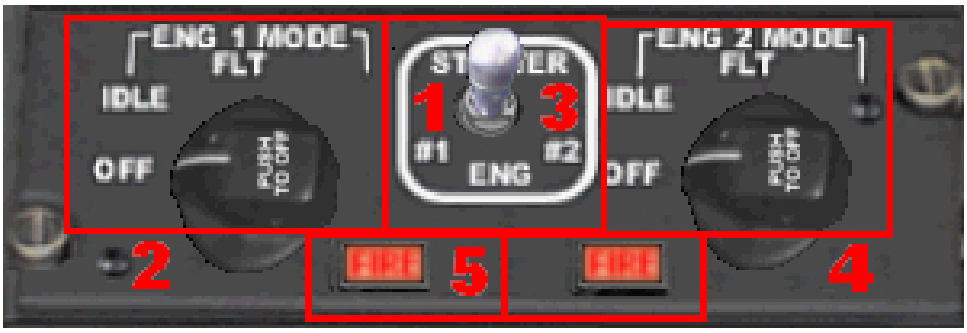
Automatic Mode

Like the real automatic mode, the start up procedure of both engines in FS is quite easy. Either in 2D or VC. (See chapter Panel Characteristics).

In 2D, open Overhead Panel window. Switch **on Batteries** (Master, Main, Aux), Anti Col Light and **ENG1+2 Control Levelers to Flight** position.

Important: Check Collective/**Throttle is 0**.

Open Middle Console 1 window. **Switch on Fuel Pumps, Fuel Valves and XFeed**. Open Middle Console 2 window and switch ON **Hydraulic Elect Pump**.



On Engines Control Panel (Middle Console 1): **Click and hold** Starter Switch #1 **(1)** until ENG OIL on EICAS System Display reaches around 24 Bar. You will hear engines start up sound.

Than **immediately** switch **ENG1 Mode (2)** from OFF to **IDLE** (mouse coursor hand sign). Rotor begins to turn. If ENG OIL is rising, engine will drive automatically to IDLE mode. Check EICAS System display.

If ENG OIL BAR is falling back to 0, procedure failes. In that case switch off ENG1 Mode to OFF position (mouse cursor –). Wait until Rotor turning stops. Control, if BATs are ON and/or ENG Control Levelers are on FLIGHT.

If ENG1 is running, go to Overhead and switch ON **Generator ENG 1**.

On Middle Console 1 again, **start ENG#2** with clic and hold Starter Switch #2 **(3)** until EICAS parameters for ENG2 are rising. Switch **ENG2 Mode (4)** from OFF to **IDLE** (mouse cursor hand sign).

If ENG2 is running, go to Overhead and switch ON **Generator ENG 2** and **BUS TIE**

After this switch ENG 1 Mode **and** ENG 2 Mode to **FLT** (FLIGHT) position (mouse cursor +).

Note: In VC the Starter Switch combines both engines – if you clic and hold the switch, both engines will start simultaneously.

Manual Mode

To start up engines manually is only possible from VC (see chapter Panel Characteristics).

The secret is: you have to be fast enough after pushing and holding Starter Bottom ENG #1 on Fuel Levelers in Overhead with the mouse and than switching very immedeately ENG1 Mode from OFF to IDLE on middle console (Engines Control Panel) with the left mouse bottom. To manage this behavior, it is recommended to zoom out VC view to see both, Overhead and Middle Console (Engines Control Panel).

If you get it – it works perfectly.

Abbreviation

ADF: Automatic Direction Finder
AEO: All Engines Operative
AFCS: Automatic Flight Control System
AGL: Above Ground Level
AHRS: Attitude Heading Reference System
ALS: Ambient Light Sensor
AMSL: Above Mean Sea Level
AP: AutoPilot
ATT: Attitude hold
ATC: Air Traffic Control
AWG: Aural Warning Generator
CAS: Calibrated Air Speed
CAT: Category
C/B: Circuit Breaker
CG: Center of Gravity
CLTV: Collective
CVR: Cockpit Voice Recorder
DH: Decision Height
DME: Distance Measuring Equipment
ECL: Engine Control Lever
ECU: Engine Control Unit
EDU: Electronic Display Unit
EEC: Electronic Engine Control
EFIS: Electronic Flight Instrument System
EGPWS: Enhanced Ground Proximity Warning System
ELT: Emergency Locator Transmitter
FCU: Fuel Computer Unit
FD: Flight Director
FMS: Flight Management System
FWD: Forward
GA: Go-Around
GPS: Global Positioning System
GW: Gross Weight
HIGE: Hover In Ground Effect
HOGE : Hover Out of Ground Effect
HPS: Hydraulic Power Supply
HSI: Horizontal Situation Indicator
IAS: Indicated Air Speed
IGB: Intermediate Gear Box
IFR: Instrumental Flight Rules
ILS: Instrument Landing System
IR: Infrared
ITT: Inter Turbine Temperature
KIAS: Knots - Indicated Air Speed
LAT: Lateral
LDG: Landing Gear
LGCP: Landing Gear Control Panel
LH: Left Hand
LONG: Longitudinal
MCDU: Multifunction Control Display Unit
MCL: Master Caution Light
MFD: Multifunction Flight Display
MGB: Main Gear Box
M/R: Main Rotor
MWL: Master Warning Light
NF: Power turbine speed
NG: Gas generator speed
NLG: Nose Landing Gear
NR: Rotor speed
NVG: Night Vision Goggle
OAT: Outside Air Temperature
OEI: One Engine Inoperative
PAX: Passengers
PFD: Primary Flight Display
PI: Power Index
PWR: Power
RTFM: Read the fucking Manual
RH: Right Hand
RPM: Revolutions Per Minute
SAS: Stability Augmentation System
SID: Standard Instrument Departure
SOV: Shut-Off Valve
STAR: Standard Terminal Arrival Route
TA: Terrain Awareness
TAS: True Air Speed
TAWS: Terrain Awareness and Warning System
TCAS: Traffic Collision and Alert System
TOC: Top Of Climb
TOD: Top Of Descent
TOP: Take Off Power
TQ/TRQ: Engine torque
VFR: Visual Flight Rules
VMS: Vehicle Monitoring System
V_{LO}: Maximum landing gear operating speed
V_{LE}: Maximum landing gear extended speed
V_{mini}: Minimum airspeed for flight under IFR
V_{NE}: Never exceed speed
VOR: Very high frequency Omni-directional Range
VSI: Vertical Speed Indicator
V_y: Speed for best rate of climb
WGT: Weight
WOW: Weight On Wheel
WX: Weather radar
Xfer: Transfer
XPDR: Trasponder

COCKPIT/ENGINE PRE-START CHECKS

1. Seats — Adjust
2. All switches — OFF or closed.
3. ENG 1 and ENG 2 MODE switches — OFF
4. ELT switch on instrument panel — Confirm ARM
5. LDG GEAR lever — Confirm DOWN
6. BATTERY MASTER — ON
7. MAIN and AUX Battery — ON
8. GEN 1 & 2 — ON
9. BUS TIE — ON
10. POSITION lights switch — Confirm functioning then leave as required.
11. ANTI-COLL lights switch — ON. (confirm functioning)
12. LT Panel switch — ON
13. ENGINE CONTROL LEVELERS ECL's — Confirm at FLIGHT
14. MFD — Set System SYS (POWER PLANT) page and check configuration setting
15. CAS messages — Check
16. MFD — Check fuel quantity
17. LDG GEAR panel — Check 3 green lights and EMER DOWN switch secure
18. PARK BRAKE — Pull and turn handle PARK BRAKE ON advisory illuminates on CAS
19. RAD MSTR -— As required (GND if battery start)
20. FORCE TRIM — ON
21. CLTV/YAW TRIM — ON
22. AWG REGRADE — As required
23. LD-SH switch — TORQUE
24. AFCP Autopilot — Confirm not engaged
25. Cyclic stick — Centred.
26. Collective lever — Full down
27. Flight Controls — Push ELEC PUMP on HYD panel. Carry out cyclic, collective and yaw pedals full and free check
28. HYD SOV switch — Check centred and guarded
29. FIRE WARNING TEST push button

— Press, on the TEST control panel, BAG and confirm the following visual warnings :

- MWL illuminate
- ‘BAG FIRE’ CAS warning
- ‘BAG’ on FIRE EXTING panel

— Press ENG1, confirm the following visual warnings:

- ENG 1 FIRE on FIRE EXTING panel
- MWL and MCL illuminate
- ENG 1 ECL fire light (2D only)
- ‘1 ENG FIRE’ , CAS warning
- FIRE 1 on ENG CONTROL panel

— Press, ENG2, confirm the following visual warnings:

- ENG 2 ECL fire light (2D only)
- ENG 2 FIRE on FIRE EXTING panel
- MWL and MCL illuminate
- ‘2 ENG FIRE’ , CAS warning
- FIRE on 2 ENG CONTROL panel

NORMAL ENGINE START (Automatic Mode)

ENGINE 1 START

1. ENG 1 FUEL VALVE switch — ON
2. MFD display — Confirm MFD SYSTEM page
3. FUEL PUMP 1 switch — ON - 1 FUEL PUMP caution out, check pressure
4. STARTER ENG 1 switch — SWITCH and HOLD until Oil Engine Pressure rise >21 BAR
5. ENG 1 MODE switch — IDLE

Note

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

6. Gas Producer (NG) — Note increasing and START legend displayed
7. Engine temperature (ITT) — Note increasing and IGN legend displayed
8. Engine oil pressure — Confirm rising
9. Main hydraulic system — When the main rotor begins to rotate, confirm rise in main hydraulic pressure
10. N1 engine power turbine speed (NF) and rotor speed (NR) — Confirm both stabilized to IDLE speed of 65 % ±1 %

Note

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

11. Engine and transmission oil — Check pressures and temperatures within limits
12. ENG 1 MODE switch — FLT

ENGINE 2 START

1. ENG 2 FUEL VALVE switch — ON
2. FUEL PUMP 2 switch — ON - 2 FUEL PUMP caution out, check pressure
3. GEN 1 — Check loadmeter in GREEN band
4. STARTER ENG 2 switch — SWITCH and HOLD until Oil Engine Pressure rise >21 BAR

Repeat above procedure for engine N2

5. Engine and transmission parameters — Check within limits
6. External power switch — OFF and disconnect external power (if used)
7. GEN 1 and GEN 2 switches — Confirm ON
8. BUS TIE switch — Confirm AUTO
9. RAD MSTR switch — ON

10. Clock — Set
11. Rotor speed — Confirm 100 %

SYSTEM CHECKS

1. MFD PWR PLANT page — Check all parameters within limits
2. Main Hydraulic — Pressure and temperature within limits
3. Fuel XFEED switch — Select OPEN
4. MFD page — Select as required
5. MCDU — Set COM and NAV asrequired.
6. FD FLIGHT DIRECTOR — ON
7. AP1 — ON
8. CABIN LT panel — Set as require
9. DH on main panel — select RAD ALT 100ft
10. PITOT HEATER 1 & 2 — ON
11. POSITION light switch — As required
12. LDG LT switch — As required
13. PARK BRAKE handle — OFF. Confirm CAS message off
14. Warning and Caution messages — Check, as required

TAXIING

1. NOSE WHEEL — Press to UNLK
2. Collective and cyclic — Increase collective slowly then move the cyclic stick forward moderately to start movement
3. Pedal brakes — Check operation
4. Pedal control — As required to select direction
5. Collective and pedal brakes — To reduce speed and stop, lower collective and apply pedal brakes
6. Nose wheel lock — Press to LOCK

Note

If the nose wheel is not aligned forward (UNLK caption flashing) it will self centre and lock as soon as the helicopter lifts off.

7. MFD — Select PWR PLANT page
8. PARK BRAKE handle — Released.
9. ENG MODE — Confirm both to FLIGHT
10. ECL — Confirm both to FLIGHT
11. CAS — Clear/as required.

TAKE OFF (CATEGORY B TAKE OFF)

1. Hover — Establish at 5 feet AGL. Relative wind between 135° and 225° (quartering tail winds) is not recommended
2. NOSE WHEEL steering — Confirm LOCK
3. Engines/Rotor — Check TQ/ITT matching and NR 100%
4. Warnings and cautions — Confirm none displayed
5. MFD PWR PLANT page — Check all parameters within normal operating limits andconfirm no engine matching abnormalities
6. Flight controls — Check correct functioning
7. Collective/Cyclic Control — Apply cyclic to commence a nose down attitude change of 7°. At approximately half way through the rotation apply collective to increase PI to 5% above the hover PI
8. Acceleration and Climb — Accelerate forward and climb to achieve 50ft above take off surface at 50 KIAS, continue up to 80 KIAS
9. Climb — At 80KIAS (Vy) adjust attitude to stabilize at Vy and climb smoothly
10. Power limits — Observe PI limitations for Take Off power rating
11. Landing gear — UP (by 200ft AGL)
12. NR/NF — Confirm 100%
13. After Take-Off checks — Complete
14. Power — Adjust, as required, for cruise flight or continued climb

IN-FLIGHT PROCEDURES (AFTER TAKE-OFF CLIMB CHECKS)

1. Landing gear — Confirm up
2. LDG LT switch — Confirm OFF
3. Engine parameters, temperatures and pressures — Normal, temperatures and pressures within limits
4. LD-SH switch — As required; (TORQUE or TEMP) confirm parameters matched
5. CAS — Clear/as required
6. MFD As required
7. VENT — As required
8. Radios/Navigation — As required
9. Autopilot mode — As required

CRUISE CHECKS

1. Collective — Adjust as necessary to keep engine parameters within limits
2. LD-SH switch — As required; (TORQUE or TEMP) confirm parameters matched
3. FUEL — Every 30 minutes: Check quantity, XFEED closed or as required
4. Airspeed — Maintain within limits
5. PITOT HEATER switches — ON
6. Compass — Check all synchronized
7. Radios/Navigation — As required
8. Standby instrument — Check airspeed, altimeter and artificial horizon against primary flight display
9. Autopilot modes — As required
10. LDG LT switch — OFF, if used
11. MFD — Every flight hour select PWR PLANT page and confirm no engine matching abnormalities.

PRE-LANDING CHECKS

1. NR/NF — Confirm 100%
2. MFD — Select PWR PLANT page
3. Landing gear lever — DOWN; three green lights on LDG control panel
4. NOSEWHEEL steering — LOCK
5. LDG LT switch — As required
6. Temperatures and Pressures — Within limits
7. Fuel — Quantity, XFEED ON
8. RAD ALT bug — As required
9. PARK BRAKE handle — As required
10. Cabin — Secure.
11. PITOT HEATER — As required
12. AFCP — Disengage

APPROACH AND LANDING (CATEGORY B LANDING)

1. Pre-landing checks — Complete
2. AWG — NORMAL
3. Landing direction — If possible orientate the aircraft for an approach into the prevailing wind
4. Initial point — During the approach, reduce airspeed gradually to arrive at a position 200 ft above touchdown point with a rate of descent of no more than 500 fpm. Initiate a deceleration to achieve 30 KIAS at 50 ft. At 50 ft rotate nose up to approximately 20° to decelerate
5. Landing — Continue the decelaration and descent to hover
6. MFD PWR PLANT page — In hover check all parameters within normal operating limits and confirm no engine matching abnormalities

Note

If an ILS approach is required select both NAV's to the same frequency. And the course set to the final ILS course. Recommended airspeed:

Glideslope up to 4 degrees 120 KIAS
Glideslope between 4 and 7.5 degrees 100 KIAS

7. Touch down — Maximum nose up attitude at touch down 15°. Apply wheel brakes, as required.
8. NOSE WHEEL lock — UNLK if ground taxiing is required

POST LANDING AND SHUTDOWN PROCEDURES

1. LDG LT switch — OFF (if used)
2. Position lights — OFF (if used)
3. PARK BRAKE handle — Pull and turn handle
4. NOSE WHEEL — Push to LOCK, if required
5. Collective lever — fully down
6. Avionics — As required
7. PITOT HEATER switches — OFF (if used)
8. ENG 1 and 2 MODE switches — Set to IDLE

Note

A period of 60 seconds stabilization at IDLE is recommended

9. Fuel PUMP 1 and 2 switches — OFF
10. ENG 1 and 2 MODE switches — OFF
11. ENG 1 and 2 FUEL valve — OFF 1 & 2 FUEL PUMP caution messages
12. Fuel XFEED switch — CLOSED
13. Cockpit lights — OFF
14. ANTI-COL lights — OFF
15. BATTERY MASTER and GENerators — OFF
16. BUS TIE — OFF
17. MAIN and AUX BATTERY's — OFF

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To the people on www.hovercontrol.com, www.icaro-group.aero
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Germany, April 2010

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