# FLIGHT MANUAL

## AS365 N2 DAUPHIN

## HH-65A DOLPHIN

TAOG'S HANGAR

VERSION 1

**FOR SIMULATION USE ONLY**

*This manual does not supersede any real-life manual and is intended for flight simulation use only.*

# Contents

*If page numbers are not shown, right-click the table and choose “Update Field”.*

# Conventions Used in This Manual

## Warnings, Cautions and Notes

Throughout this manual, advisory blocks are used with the following meanings:

**WARNING** An operating procedure or condition which, if not observed, may result in loss of control or destruction of the (simulated) aircraft.

**CAUTION** An operating procedure or condition which, if not observed, may result in (simulated) damage to systems or equipment.

**NOTE** An operating procedure or condition which is considered essential to highlight.

## Units and Data Sources

AS365 N2 data is presented metric-first in **kt / kg / °C**, mirroring the DGAC-approved Eurocopter AS365 N2 Flight Manual (1989/1992 revision series). HH-65A data is presented US-first in **KIAS / lb**, mirroring the U.S. Coast Guard Flight Manual C.G.T.O. 1H-65A-1, Change 8 (1 June 2003). Where values differ between variants, both are listed.

## Terminology

**tPad** — the in-cockpit tablet stored on the glareshield above the main instrument panel. It's used for all user options, variant configuration, attachments, see Chapter 15. This device replaces the "clipboard" you might know from our previous helicopters. See Chapter 15 for more information.

# Abbreviations1

| Abbr. | Meaning | Abbr. | Meaning |
|---|---|---|---|
| **ADI** | Attitude Direction Indicator | **MCP** | Maximum Continuous Power |
| **AFCS** | Automatic Flight Control System | **MGB** | Main Gearbox |
| **AGL** | Above Ground Level | **MGT** | Measured Gas Temperature (HH-65A term for EGT) |
| **AMAP** | Avionics Mode Annunciator Panel | **Ng / N1** | Gas generator speed |
| **ASE** | Automatic Stabilization Equipment (attitude hold) | **Nf / Np / N2** | Free (power) turbine speed |
| **ASI** | Airspeed Indicator | **NR** | Main rotor speed. On the AS365 N2 it is expressed in rpm (100% = 350 rpm); on the HH-65A it is expressed in percent. |
| **A/S** | Airspeed (hold mode, AS365 N2) | **OADS** | Omnidirectional Air Data System |
| **CDI** | Course Deviation Indicator | **OEI** | One Engine Inoperative |
| **CDV 85** | Coupler / flight director computer (AS365 N2) | **QNH** | Altimeter setting (sea-level pressure) |
| **CG** | Center of Gravity | **SAR** | Search and Rescue |
| **CMD** | Commanded (airspeed reference, HSVD) | **SAS** | Stability Augmentation System |
| **EFB** | Electronic Flight Bag | **SRR** | Short-Range Recovery |
| **FD** | Flight Director | **t4** | Exhaust gas temperature (AS365 N2 term) |
| **FDS** | Flight Director System (FDS-255, HH-65A) | **TACAN** | Tactical Air Navigation |
| **FFCL** | Fuel Flow Control Lever | **TGB** | Tail (rotor) Gearbox |
| **G/A, GA** | Go-Around (mode) | **T-HOV** | Transition to Hover (mode) |
| **G/S** | Glideslope | **TR** | Trim Release |
| **GW** | Gross Weight | **UM** | Upper Mode(s). the coupled flight director / coupler guidance modes that sit above basic stabilization and attitude hold |
| **HDG** | Heading | **VNE** | Never-exceed speed |
| **HSI** | Horizontal Situation Indicator | **VOR** | VHF Omnidirectional Range |
| **HSVD** | Horizontal Situation Video Display | **V/L** | VOR / Localizer (nav source) |
| **IAS / KIAS** | Indicated Airspeed / Knots Indicated Airspeed | **V/S, VS** | Vertical Speed (hold mode) |
| **IFR** | Instrument Flight Rules | **VVI** | Vertical Velocity Indicator |
| **ILS** | Instrument Landing System | **Vy** | Best rate-of-climb speed |
| **LOC** | Localizer | **WCA** | Warning-Caution-Advisory (panel) |

# Introduction

This add-on for Microsoft Flight Simulator 2024 features two iconic medium twin-engine helicopters: the Aérospatiale AS365 N2 Dauphin and its U.S. Coast Guard variant, the HH-65A Dolphin. While sharing the same airframe lineage and Fenestron anti-torque design, these aircraft are distinct in avionics, mission equipment, and operational philosophy.

The AS365 N2 is a civil/paramilitary version of the second-generation Dauphin, widely operated in offshore transport, EMS, law enforcement, and search and rescue roles worldwide. The HH-65A is the U.S. Coast Guard's dedicated short-range recovery helicopter, fitted with a sophisticated 4-axis Automatic Flight Control System (AFCS), a Flight Director System (FDS), and mission-specific equipment for maritime SAR operations.

The goal of this project is to offer a detailed, procedure-oriented simulation of both aircraft within MSFS 2024, with enough system depth to support realistic workflows while remaining accessible to pilots of varying experience levels. Systems modeling, cockpit layout, and flight behavior have been developed based on real-life flight manuals, pilot feedback, and primary reference documentation.

This manual covers aircraft operation, cockpit familiarization, helicopter aerodynamics, aircraft systems, limitations, normal and emergency procedures, flight techniques, AFCS operation, user options, available attachments and mission operations.

# 2 Aircraft Overview

## 2.1 Origins & Development

### AS365 N2 Dauphin

The Dauphin lineage originates with Aérospatiale's SA 360C single-engine design of the early 1970s. The twin-engine SA 365C, first flown on 24 January 1975, introduced the distinctive Fenestron shrouded tail rotor and Starflex composite rotor head. After successive refinements through the SA 365 N and N1 variants, the AS365 N2 was introduced in 1990, bringing uprated Turbomeca Arriel 1C2 turboshaft engines, an improved main gearbox, increased maximum take-off weight, an enlarged composite Fenestron, and redesigned cabin doors. Licensed production versions, designated Z-9 and Z-9A, were also assembled in China. The AS365 N2 modelled in this add-on is equipped with the AP 155 autopilot and CDV 85 coupler / flight director (see Chapter 13).

### HH-65A Dolphin

The U.S. Coast Guard selected the Aérospatiale AS366G1 variant (a derivative of the AS365 N configured specifically for U.S. requirements) for its short-range recovery mission in the early 1980s, designating it the HH-65A Dolphin. Early production models used Lycoming LTS 101 engines; the later MH-65D/E fleets have been re-engined with Arriel 2C2-CG turboshafts. The variant modeled in this add-on is the HH-65A, reflecting the configuration documented in the U.S. Coast Guard Flight Manual (C.G.T.O. 1H-65A-1, Change 8, 1 June 2003), featuring the original 4-axis AFCS with the dedicated Flight Director System FDS-255 (see Chapter 14).

## 2.2 Roles & Operational Use

- **AS365 N2:** Offshore oil rig transport, emergency medical services (EMS), law enforcement, search and rescue (SAR), VIP and executive transport, border patrol, and firefighting (with optional Bambi Bucket or DART fire attack system).
- **HH-65A Dolphin:** U.S. Coast Guard short-range recovery (SRR) missions — primarily maritime search and rescue,
- law enforcement, and drug interdiction — operated from shore stations and Coast Guard Cutters.

## 2.3 Specifications

| Feature | AS365 N2 | HH-65A |
|---|---|---|
| Crew / Capacity | 1–2 pilots + up to 12 passengers | 2 pilots + rescue crew / survivors |
| Engines | 2 × Turbomeca Arriel 1C2 turboshaft | 2 × Lycoming LTS 101-750B-2 |
| Takeoff Power (each) | 549 kW (737 shp) | 522 kW (700 shp) |
| Empty Weight | approx. 2,175 kg (4,795 lb) | approx. 7,143 lb (3,240 kg) equipped |
| Max Takeoff Weight | 4,250 kg (9,370 lb) | 9,200 lb (4,172 kg) |
| Main Rotor Diameter | 11.94 m (39 ft 2 in) | 11.94 m (39 ft 2 in) |
| Tail Rotor (Fenestron) | 11-blade, shrouded | 11-blade, shrouded |
| VNE — power-on | 175 kt IAS (SL, low GW)* | 165 KIAS (max GW, SL)* |
| VNE — power-off | 135 kt IAS | 135 KIAS |
| Cruise Speed (typical) | ~155 kt (287 km/h) | ~120 KIAS |
| Best Rate of Climb (Vy) | ~75 kt | ~70 KIAS |
| Service Ceiling | approx. 6,000 m (19,680 ft) | approx. 15,000 ft (4,572 m) |
| Range (standard fuel) | approx. 537 km (290 NM) | approx. 200 NM (370 km) |
| Fuel Capacity | approx. 1,135 L (300 US gal) | per mission configuration |
| Landing Gear | Retractable tricycle | Retractable tricycle |

**NOTE** * VNE varies with altitude and gross weight on both variants. See the airspeed limits in Chapter 9 for the full breakdown.

## 2.4 Airframe Overview

Both variants share the same fundamental airframe: a semi-monocoque fuselage constructed primarily of aluminum alloy and composite materials, featuring a four-blade Starflex main rotor, a Fenestron anti-torque device (enclosed tail rotor in a fin), retractable tricycle landing gear, and twin turboshaft engines mounted side-by-side above the cabin.

The Starflex hub is a distinctive design feature: a fully articulated composite head without conventional flap or drag hinges in the traditional sense, using elastomeric bearings and a star-shaped composite hub arm. This reduces vibration, maintenance requirements, and mechanical complexity compared to contemporary all-metal rotor systems.

The Fenestron tail rotor, enclosed within a fin shroud, provides significant safety advantages around personnel and obstacles, a reduced noise signature, and improved yaw authority. Both Fenestrons carry 11 blades.

# 3 Installation & Setup

## 3.1 Purchase & Download

- Open Microsoft Flight Simulator 2024.
- Navigate to the Marketplace.
- Locate the “AS365 N2 Dauphin / HH-65A Dolphin” package and select **Buy & Download**, or **Download** if previously purchased.

## 3.2 Automatic Installation

The simulator installs the add-on into the Official/OneStore packages folder automatically. Updates are handled through the same Marketplace interface. The package does not require manual placement in the Community folder.

## 3.3 Verify the Add-On

- Return to **My Library** under Marketplace, or open **Content Manager** via the Profile menu.
- Confirm the AS365 N2 / HH-65A package shows as Installed.
- Check for available updates if prompted.

## 3.4 Aircraft & Variants

This package provides two aircraft in one: the AS365 N2 Dauphin (civil, military/law enforcement) and the HH-65A Dolphin (U.S. Coast Guard). Each is selectable from the main Free Flight menu.

Available variants and liveries are selected through the “Change Aircraft” dialogue within the “Free Flight” menu of MSFS 2024. Variant and livery selection is available under “Configure”. Selecting a variant automatically adjusts the installed equipment simulation accordingly.

## 3.5 First Flight — Quick Orientation

If you are new to the aircraft, the recommended first-session workflow is:

- Load the AS365 N2 or HH-65A at a helipad or runway with engines running, or at any parking position for a cold & dark spawn.
- Set the simulator to a ready-to-fly state using **Ctrl+E** (auto-start) or follow the full engine start checklist in Chapter 10.
- Familiarize yourself with the main instrument panel layout before attempting flight (see Chapters 5 and 6).
- Attempt a basic hover before transitioning to forward flight.

> **CAUTION** Do not use “Custom Departure — On ground, Shut down” when spawning. This breaks the correct initialization of aircraft parameters and systems (known sim limitation). Use a normal parking position for cold & dark instead.

> **NOTE** The Dauphin family has excellent stability characteristics in cruise, but requires attentive power management during hover, low-speed, and single-engine operations. If this is your first experience with a medium twin helicopter, review the AFCS chapters carefully — the autopilot systems on both variants can significantly reduce workload once properly understood.

# 4 Helicopter Aerodynamics

This chapter is a practical primer on the rotary-wing aerodynamics most relevant to flying the Dauphin family in the simulator. It is written for pilots new to helicopters; experienced rotorheads can skim it and continue to the systems and procedures chapters.

## 4.1 Forces, Torque and the Fenestron

A helicopter's main rotor provides both lift and thrust: tilting the rotor disc with the cyclic directs part of the rotor thrust forward, sideways or aft, while the collective changes the pitch of all blades together to control total thrust. Because the engines drive the rotor through the airframe, the fuselage experiences a reaction torque opposite to rotor rotation.

The Dauphin's main rotor turns **clockwise viewed from above** (the French convention, opposite to most American types). Increasing power therefore yaws the nose **left**, and is countered with **right pedal**. The Fenestron's sideways thrust also pushes the aircraft gently sideways in the hover (translating tendency), which is countered with a small lateral cyclic input — expect the aircraft to sit slightly one-wheel-low in a steady hover.

> **NOTE** If you are arriving from American types such as the UH-1H, the pedal sense under power changes is reversed: where the Huey wants left pedal as power is pulled, the Dauphin wants right pedal.

The Fenestron itself — an 11-blade fan enclosed in the fin shroud — behaves slightly differently from an open tail rotor. It is quieter, far safer around personnel, and keeps good authority at cruise where the fin itself provides much of the anti-torque force. At low speed and high power it can demand noticeably larger pedal displacements than an open tail rotor before the response builds; anticipate this during hover work at high weight, and be deliberate rather than reactive with pedal inputs.

## 4.2 Hover and Ground Effect

Hovering within roughly one rotor diameter of the surface (IGE — in ground effect) requires noticeably less power than hovering out of ground effect (OGE). The ground interrupts the rotor's downwash, reducing the blade-tip vortices and induced flow, which makes the rotor more efficient. Practical consequences: a heavy aircraft may hover comfortably at 5 ft yet be unable to hold an OGE hover at the same weight; and drifting from a surfaced pad over a drop-off (slope edge, building edge, ship deck) can produce a sudden sink as ground effect is lost. Note the hover torque on every pickup — it is your power-margin reference for the rest of the flight.

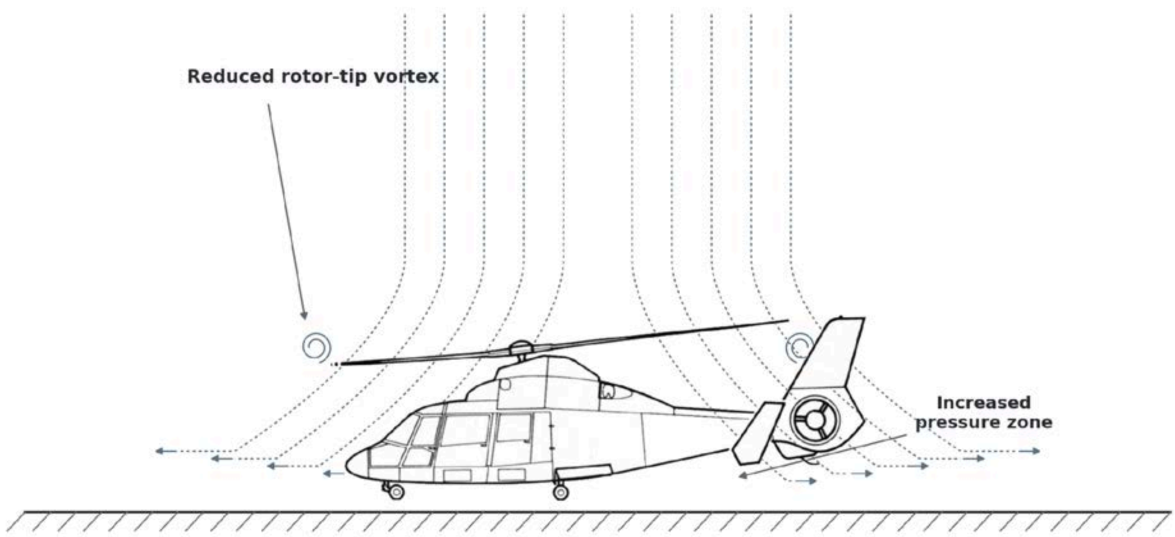



*Figure 4-1 — Airflow in ground effect*

## 4.3 Translational Lift

As the helicopter accelerates from the hover, the rotor moves into progressively cleaner, undisturbed air and becomes more efficient. The effect becomes pronounced at roughly 15–25 kt — effective translational lift (ETL) — and is felt as a slight shudder followed by the aircraft wanting to climb and pitch nose-up. Anticipate it on every takeoff: a small forward cyclic correction holds the attitude through ETL, and the same effect in reverse means power must be added as you decelerate through ETL on approach.

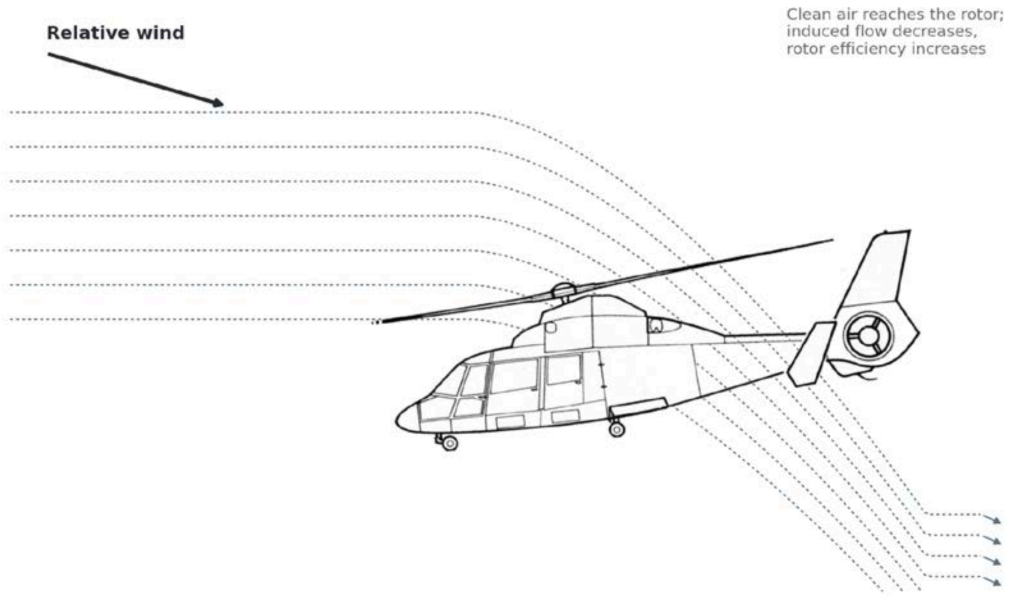



*Figure 4-2 — Translational lift*

## 4.4 Dissymmetry of Lift and Blade Flapping

In forward flight the advancing blade sees a higher airspeed than the retreating blade. Left uncorrected this would roll the aircraft; rotors equalize lift by allowing the blades to flap — the advancing blade flaps up (reducing its angle of attack), the retreating blade flaps down. The Dauphin's Starflex head accomplishes this through elastomeric bearings and flexible composite arms rather than conventional hinges.

> **NOTE** This add-on models per-blade flapping on the four-blade main rotor — watch the rotor disc during cyclic inputs and speed changes and you will see the blades respond individually.

## 4.5 Retreating Blade Stall

At high forward speed, the retreating blade works at increasingly high angles of attack to keep producing lift; eventually it stalls. Onset appears as airframe vibration, followed by a nose-up pitching and rolling tendency. High gross weight, high density altitude, turbulence and aggressive maneuvering all bring the onset speed down — this is one of the physical reasons behind the VNE structure in Chapter 9. Recovery: reduce collective, reduce airspeed, and unload the rotor; do not fight the pitch-up with large forward cyclic alone.

## 4.6 Vortex Ring State (Settling with Power)

Descending steeply into your own downwash — typically a descent rate beyond roughly 300 ft/min combined with airspeed below ETL while carrying power — can put the rotor inside its own recirculating vortex. Adding collective then deepens the condition instead of arresting the descent, and the sink rate can build rapidly. It is the classic trap on steep, slow, downwind approaches.

- **Recognition:** increasing sink rate despite increasing collective, vibration, mushy controls, low airspeed.
- **Recovery:** reduce collective and fly out of the vortex — either forward cyclic to gain airspeed through ETL (classic recovery), or a lateral cyclic input with coordinated pedal to slide sideways out of the downwash (Vuichard-style recovery). Altitude permitting, both work; the essential act is leaving the recirculating air before pulling power.
- **Avoidance:** keep approaches into wind, keep descent rates below ~500 ft/min when slower than ETL, and be especially careful at high weight with downwind or vertical descents.

## 4.7 Autorotation — the Aerodynamics

With engine power removed, air flowing up through the rotor disc in a descent can keep the rotor turning — the inner blade sections drive the rotor while the outer sections produce lift. Rotor RPM becomes the pilot's stored energy: collective position controls it in the descent, and the kinetic energy in the rotor is what cushions the landing. Aft cyclic loads the rotor and raises NR; raising collective unloads it and lowers NR. The practical technique is covered in Section 11.8 and the emergency procedure in Chapter 12.

# 5 AS365 N2 Cockpit

This chapter covers the AS365 N2 Dauphin cockpit: the flight controls (shared in layout with the HH-65A), the main instrument panel, the overhead panel and the center pedestal. The HH-65A Dolphin cockpit is documented separately in Chapter 6.

## 5.1 Flight Controls

### 5.1.1 Cyclic

Controls pitch and roll of the main rotor disc and therefore aircraft attitude. Mounted centrally between the pilot's knees. Key switches vary by variant:

- **AS365 N2 Cyclic:** Trim Release (TR) button — must be held when making manual inputs against autopilot loads. 4-way Beep Trim — updates the attitude reference in fine steps. Coupler Release — drops higher-order coupler modes while retaining the base autopilot. A/S Hold — quick engage/disengage of airspeed hold mode.
- **HH-65A Cyclic:** AFCS Quick-Disconnect — disengages all four AFCS axes immediately. TRIM REL — releases trim loads for manual input. Beep Trim (4-way) — adjusts the attitude reference. FD Slew coolie hat (4-way) — adjusts the T-HOV / IAS HOLD and IAS-VS HOLD speed reference. FD UNCOUPLE — uncouples the FD from the AFCS.

### 5.1.2 Collective

Controls the pitch angle of all main rotor blades simultaneously, increasing or decreasing total rotor lift. Mounted to the pilot's left.

- **AS365 N2 Collective:** G/A (Go-Around) pushbutton, wipers control, and emergency flotation engagement button.
- **HH-65A Collective:** G/A (Go-Around) pushbutton. C-SYNC (Collective Sync) — updates the VS reference in IAS-VS, T-HOV, and HOV AUG modes. FD UNCOUPLE alternate switch. Hover Beep switch — adjusts the hover altitude reference in T-HOV / HOV AUG.

### 5.1.3 Anti-Torque Pedals (Fenestron Control)

Control the pitch of the Fenestron blades, providing directional control in the yaw axis. Push left pedal for left yaw; push right pedal for right yaw. The Fenestron provides effective yaw authority across a wide speed range with reduced pilot workload at cruise compared to conventional tail rotors.

> **CAUTION** Do not apply pedal input when the rotor is stopped on the ground. The Flight Manual explicitly prohibits moving the pedals when the rotor is not turning.

## 5.2 AS365 N2 — Instrument Panel

The AS365 N2 cockpit seats two pilots side-by-side (co-pilot left, pilot right in the real aircraft; the minimum crew is one pilot in the right-hand seat per the approved Flight Manual). The instrument panel is dominated by conventional analogue flight instruments, duplicated at both crew stations. The overhead panel houses engine start controls, electrical bus management, lighting, and the rotor brake.

### 5.2.1 Instrument Panel

*Figure 5-1 — AS365 N2 instrument panel (callout numbers refer to the instrument guide below)*

Instruments 1–5, 7–9 and 11 appear at both crew stations; the RMI (6) is fitted on the pilot side only; the engine fire controls (14) appear once per engine, left and right of the caution panel.

### 5.2.2 Instrument Guide — Flight Instruments (1–10)

**1 Airspeed Indicator (ASI) —** Indicated airspeed in knots from the pitot-static system. Green arc 0–155 kt (normal operating range), red/white line at 135 kt (power-off VNE), yellow caution arc 155–175 kt, power-on VNE 175 kt at sea level and low gross weight (see Chapter 9).

**2 Attitude Direction Indicator (ADI) —** Primary pitch and bank reference. Displays the flight director command bars when CDV 85 upper modes are active, plus warning flags for gyro or FD failures.

**3 Altimeter —** Barometric altitude in feet. The subscale is set with the QNH knob; verify the setting before departure and on approach.

**4 Horizontal Situation Indicator (HSI) —** Gyro-stabilized compass card combining heading, selected course (CRS knob), course deviation bar, glideslope pointers, and the heading bug (HDG knob). RANGE and COURSE windows sit at the top of the bezel.

**5 Vertical Velocity Indicator (VVI) —** Rate of climb or descent in hundreds of ft/min. The orange reference needle, set with the adjacent rotary knob, pre-selects the target for the coupler V/S mode (see Section 13.3.4).

**6 Radio Magnetic Indicator (RMI) —** Pilot side only. Compass card with single- and double-bar bearing pointers indicating the relative bearing to the radio aids selected (both needles can display ADF or VOR, selectable).

**7 Clock —** Conventional analogue clock with elapsed-time function for leg timing and procedural timing (e.g., OEI rating limits).

**8 Radar Altimeter —** Height above ground by radio ranging, independent of barometric pressure. The primary height reference for hover work, low-level flight and approaches; includes a settable decision height index with warning and a PWR/Test button.

**9 Nav Switching Unit —** Selects the source of the green HSI bearing pointer (ADF/VOR) and selects the NAV source (VOR/NAV=GPS) driving the autopilot (the latter is for the pilot's unit only!).

**10 Standby Attitude Indicator —** Self-contained backup artificial horizon with its own gyro and power reserve, independent of the main instrument supplies. Primary attitude reference following an ADI or electrical failure.

### 5.2.3 Instrument Guide — Glareshield, Engine & Systems (11–22)

**11 Triple Tachometer —** Main rotor speed (NR) and both free turbine speeds (N2) (Nf 1 / Nf 2) on concentric scales. Normal governed NR: 350 rpm ±2. Needle match between Nf (N2) and NR confirms both engines are driving the rotor.

**12 Hour Meter —** Airframe operating hours counter, driven while the aircraft is powered and the rotor is turning.

**13 Caution Advisory Panel (CAP) —** Central annunciator matrix carrying the red warning, amber caution and blue advisory captions described in Chapter 8, with integral TEST (lamp check) and DIM (night brightness) functions.

**14 Engine Fire Controls —** Per-engine FIRE warning light with associated FAIL light and pushbuttons commanding the respective extinguishing sequence. Located left (ENG 1) and right (ENG 2) of the caution panel.

**15 Trim Position Indicator —** Displays the PITCH, ROLL and YAW trim actuator positions. Used during the pre-takeoff AFCS check to confirm the actuators are centered.

**16 GPS / NAV-COM (GNS 530) —** Combined GPS navigator, VHF COM and VLOC receiver. Provides the active flight plan leg flown by the coupler NAV (GPS) mode (see Section 13.5.7). Swappable with PMS50 GTN750/650 or TDS GTNXi750/650 via the tPad.

**17 Systems Instrument Cluster —** Vertical strip of twin-needle gauges: t4 exhaust gas temperature (°C ×100) at the top, then engine oil temperature, engine oil pressure, fuel pressure, hydraulic pressure, MGB oil, and DC volts/amps at the bottom.

**18 ΔNg Gauges—** Per-engine gas generator instruments: the analogue needle shows the Ng (N1) deviation (ΔNg) from the reference datum (which is computed depending on OAT and pressure altitude, thus variable), while the digital display shows actual Ng (N1) in percent. Normal governed range 100% ±3.5%. Pushing the test button tests the LIMIT gong and light and displays max takeoff power at present OAT and pressure altitude as a digital readout.

**19 Fuel Quantity Indicators —** Upper gauge: two needles show left and right tank contents in kg ×100. Lower gauge: additional tank content with LED indicating, when the solenoid valve is open (additional tank fuel is usable). A feeder tank level drop triggers the red FUEL.Q warning (see Chapter 8).

**20 Torquemeter —** Transmission torque in percent with separate twin-engine and single-engine (MONO) scales. Key limits: 100% in hover and acceleration to Vy, 88% continuous above 75 kt (see Section 9.5).

**21 Marker Beacon Annunciators —** Outer/middle marker lamps with TEST function, indicating marker passage during ILS approaches.

**22 CDV 85 Mode Selector —** Pushbutton panel for the coupler / flight director upper modes (ALT, A/S, HDG, VOR, B/C, V/L, NAV, V/S, G/S) plus CPL and F/D. Mode annunciations illuminate in the buttons. Full description in Chapter 13.

### 5.2.4 Instrument Guide — Console & Miscellaneous (23–30)

**23 AP155 Autopilot Control Panel —** Engagement controls for the base autopilot: LANE 1 / LANE 2 computers, PITCH / ROLL / YAW channel switches, SAS/ASE selection and auto-trim switches. Full description in Section 13.3.1.

**24 COM Radios —** VHF communication control heads with frequency selection, channel transfer and test functions.

**25 Gyro Control Panel —** GYRO 1 / GYRO 2 controls for the directional gyro and compass system, including slaving/sync.

**26 Fuel Management Panel —** Boost pump switches, transfer pump control (yellow switch) and fuel test function.

**27 Engine Emergency Cut-Off & Electrical Panel —** Guarded EMERGENCY CUT OFF switch plus the electrical management switches: Battery Contactor switches 1 and 2, GEN 1/GEN 2, INV 1/INV 2.

**28 Emergency Flotation Control —** Arming and inflation control (circuits 1 / 2) for the emergency floats. Observe the flotation airspeed limits in Chapter 9 when armed or inflated.

**29 Landing Gear Position Indicators —** Gear position lights confirming down-and-locked / in-transit status, with the associated LIMIT and ALARM annunciators on the glareshield edge.

**30 tPad (Tablet) —** Stowed on the glareshield below the standby compass. Provides all user options, attachments selection and weight & balance UI — see Chapter 15.

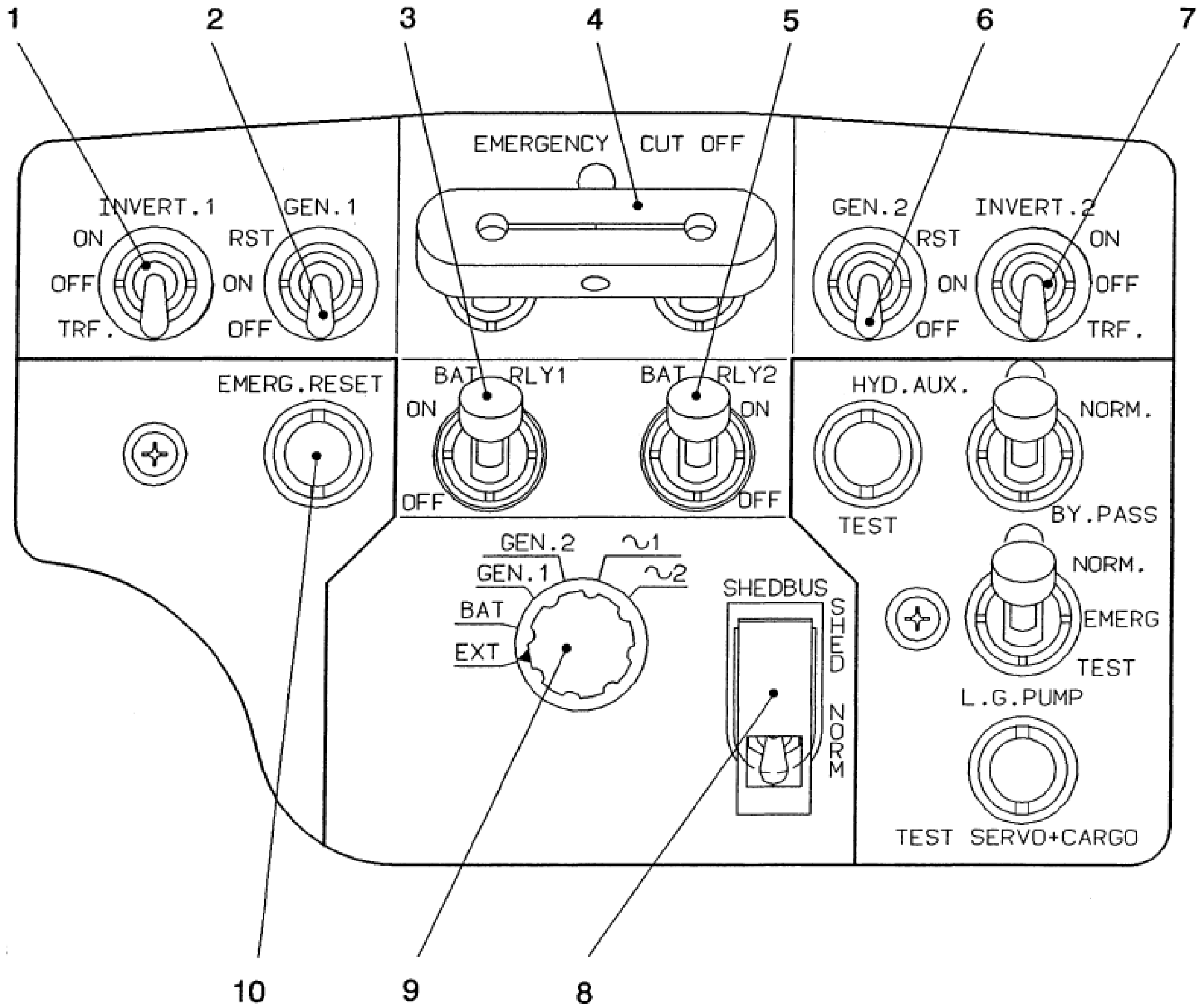
### 5.2.4 Instrument Guide — Electrical panel AS365

The AS365 N2 electrical control panel is located on the center pedestal and groups the main cockpit controls for battery, generator, inverter, and emergency electrical management. The two **Battery Contactor** switches connect or isolate the aircraft batteries from the DC electrical system. For normal operation, both battery contactors should be switched on during cockpit setup and switched off when securing the aircraft.

Electrical power in flight is supplied by the two engine-driven generators, controlled by the **GEN 1** and **GEN 2** switches. Once the engines are running and stable, both generators should be switched on and checked for normal electrical indications. The **INV 1** and **INV 2** switches control the static inverters, which supply AC power to systems that require it. During normal operation, both inverters should be selected on and their associated warning lights should be extinguished.

The panel also includes emergency electrical controls. The **EMERG RESET** function is used to reset the emergency electrical system after a fault or abnormal condition. The guarded **SHED BUS** control is used to reduce electrical load by shedding non-essential equipment when required. Under normal conditions, the shed bus should remain in its normal position and should not be selected unless required by an abnormal or emergency procedure.

A volt/amp selector is provided to monitor electrical system values. Use it to check battery, generator, and bus condition during cockpit setup and after engine start. Abnormal voltage, failed generator indications, inverter warnings, or battery contactor lights should be resolved before flight.




## KEY

1 – Inverter 1
2 – Generator 1 reverse-current relay switch
3 – Battery relay contactor 1 switch
4 – Emergency cut-off switch
5 – Battery relay contactor 2 switch
6 – Generator 2 reverse-current relay switch
7 – Inverter 2
8 – Load shedding switch
9 – Current/voltage measurement selector on multiple indicator array
10 – Generator emergency reset pushbutton

### 5.2.5 Instrument Guide — Fuel management panel AS365

The AS365 N2 fuel system is split into left-hand and right-hand tank groups, each feeding its own engine through a feeder tank, booster pumps, fuel filter and shutoff valve. In normal operation, the feeder tanks are kept supplied by jet pumps as long as fuel remains available in the associated tank group.

The fuel management panel allows the pilot to monitor and manage this system. Each side of the panel has warning lights for **FUEL Q**, **FILT**, and **FUEL P**. **FUEL Q** indicates a low level in the feeder tank, **FILT** indicates a fuel filter beginning to clog, and **FUEL P** indicates low fuel pressure in the corresponding engine supply system. The panel also includes two booster pump switches per side, giving four booster pump switches in total.

The center of the panel contains the **TRANSFER PUMP** control. This is a two-way pump used to transfer fuel from one tank group to the other. The switch is moved left or right to select the desired transfer direction, and the illuminated arrow above the switch shows the active direction of fuel transfer. Use the transfer pump to correct fuel imbalance between the left and right tank groups.

The **FUEL TEST** pushbutton is used to check that the fuel quantity indication system is functioning correctly. When pressed, the fuel contents indication should respond as expected, confirming the gauge system is operating.

The lower part of the panel includes the **FUEL JET** controls and the **ADD TANK** control. The fuel jet controls relate to the jet-pump system that helps keep the feeder tanks supplied. The additional tank control opens or closes the additional tank feed, allowing auxiliary fuel to become available when fitted and selected.

During normal flight, monitor the left and right fuel quantities, keep the booster pumps on as required, and use the transfer pump only when fuel balance needs correction. Any **FUEL Q**, **FILT**, or **FUEL P** indication should be treated as a fuel system abnormality and checked promptly.

## 5.3 AS365 N2 — Overhead Panel

The overhead panel groups the lighting controls, exterior lights, engine crank controls and a number of system switches. The layout follows the configuration after AMS No. 71B43; optional equipment is fitted on a per-customer basis, so an individual airframe may not carry every switch shown in the manufacturer's documentation. The callouts below cover the controls modeled in the simulation.

### 5.3.1 Overhead Panel Layout

*Figure 5-2 — AS365 N2 overhead panel (callout numbers refer to the control guide below)*

### 5.3.2 Control Guide — Lighting & Cabin Services (1–15)

1 **PNL CPLT —** Co-pilot instrument panel lighting rheostat — adjusts integral panel lighting on the co-pilot side.

2 **O.HEAD AND CONSOLE —** Console and overhead panel lighting rheostat.

3 **PNL PLT —** Pilot instrument panel lighting rheostat.

4 **LIGHTING —** Master switch enabling the three lighting rheostats (1, 2 and 4).

5 **CABIN LT —** Cabin lighting switch.

6 **NOTICES —** Passenger notices / instruction lights (e.g. fasten-belts) control switch.

7 **AIR COND —** Air-conditioning control (OFF / FAN / COLL positions).

8 **RECORDER MALFUNCTION LIGHT —** Red light indicating a flight-recorder malfunction.

9 **RECORDER TEST-TOP —** Flight-recorder test and pilot TOP (event-marker) pushbutton.

10 **ANTI COL —** Anti-collision lights switch.

11 **POS LTS —** Position lights switch.

12 **ICE —** De-icing control (OFF / ON / TEST).

13 **DEMISTING —** Windshield demisting switch.

14 **HOT MIKE —** Hot-microphone (intercom) switch.

15 **STEP —** Footstep control (OPEN / CLOSE).

### 5.3.3 Control Guide — Systems (16–31)

**16 STAND BY STATIC PRESS —** Standby static pressure source valve. NORMAL for the primary static source; the alternate position selects the standby static source if the primary is blocked.

**17 HYD ISOLATE —** Tail rotor servo hydraulic isolation valve (CUT / OFF / NORMAL). Used in the hydraulic malfunction procedures (see Section 12.4); leave at NORMAL for normal operations.

**18 MISSION SELECTOR —** Mission selector switch (OFF – WINCH – CARGO) that arms the rescue hoist or the cargo hook circuit. Set to WINCH for hoist operations and CARGO for sling-load or firefighting (see Chapter 16). When flying Miltech Mission Hub (MMH) SAR missions, this selector must be set to WINCH to power the hoist circuit — the hoist will not operate otherwise. For MMH sling loads, or firefighting, this switch must be set to CARGO to power the release mechanism!

**19 STBY HORIZON —** Standby attitude indicator switch with integral lighting (OFF / ON / DIM).

**20 STBY HORIZON CAPTION —** Standby horizon status / caption light.

**21 BARAN selector —** Selects the barometric altitude source / air-data configuration (1 / 1+2 / 2).

**22 CYCL —** Cyclic trim feel release switch.

**23 PITOT 1 —** Pitot head 1 heating switch.

**24 PITOT 2 —** Pitot head 2 heating switch.

**25 ATC —** Transponder (ATC) power switch.

**26 SAND FILTER —** Sand filter / intake protection switch (BAT / NORM / RST).

**27 HORN —** Aural warning (horn) switch.

**28 WIPERS —** Windshield wiper speed selector (SLOW / FAST).

**29 LS —** Loud speaker (not installed) switch.

**30 ENG 1 CRANK —** Engine 1 cranking (dry motoring) pushbutton.

**31 ENG 2 CRANK —** Engine 2 cranking (dry motoring) pushbutton.

## 5.4 AS365 N2 — Center Pedestal

The center pedestal sits between and slightly aft of the two crew seats. It carries the automatic flight control test-and-trim panel, the fuel management panel, the dual audio (intercom / radio) selector panels, the COMM / NAV / ADF radio stack, the transponder, the directional-gyro selector panel, and the avionics circuit-breaker console through which the collective lever passes. The callouts below cover the units modeled in the simulation; individual sub-controls within each unit are described in the accompanying text.

### 5.4.1 Pedestal Layout


*Figure 5-3 — AS365 N2 center pedestal (callout numbers refer to the control guide below)*

### 5.4.2 Control Guide — Flight Control & Fuel (1–2)

**1 AFCS / SAS Test & Trim panel —** SFIM automatic flight control system test and trim unit. The LANE 1 / LANE 2 pushbuttons select the active computer lane; the three status windows display the pitch (P), roll (R) and yaw (Y) channel states. The TEST / RUN switch and the digital readout drive the self-test sequence; NORM / TURB tailors the AFCS gains to turbulent conditions (not simulated). The lower row carries the A.S.E. / S.A.S. control and the AUTO TRIM PITCH, ROLL and YAW plus the COLL LINK (collective link pre-control). See Chapter 13.

**2 Fuel Management panel —** Contains the four boost pump switches (two per engine), a test push button (to test the fuel gauge), the two red-guarded FUEL JET switches (NORAMAL and EMERG) and the switch to open and close the solenoid valve of the additional fuel tank. Above the switches, there are the fuel system warning lights (FUEL Q, FILT, FUEL P, FUEL JET 1 / 2 and the transfer-arrow indicators).

### 5.4.3 Control Guide — Audio & Radios (3–10)

**3 Audio Selector panel (co-pilot) —** Co-pilot intercom and radio audio control. The upper row of volume knobs selects ICS (intercom), VHF1, LS, PA and VHF2 audio; the lower row covers VOR1/MK, ADF and two SPARE channels. The N/S –

EMER/N rotary selector chooses the transmit source, and the TB/ICS toggle (ALT – PTT, with RAD) sets the transmit-button routing between the radio and the intercom.

**4 Transponder (XPDR) —** ATC transponder control head. The IDT button transmits the identification (squawk-ident) pulse; the mode rotary selects OFF / SBY / TST / ON / ALT. The 0–7 octal pushbuttons enter the four-digit code; CLR clears the entry and VFR sets the standard VFR code. Transponder power is enabled by the overhead ATC switch (Section 5.3, item 25).

**5 COMM VHF1 —** No. 1 VHF communication radio. Displays the active and standby (SBY) frequencies; the transfer toggle swaps active / standby. The OFF / VOL knob powers the unit and sets sidetone volume (PUSH TST initiates a self-test); the CHAN selector tunes the standby frequency.

**6 COMM VHF2 —** No. 2 VHF communication radio. Controls and indications are identical to VHF1 (item 5).

**7 NAV VOR1 —** No. 1 VOR / ILS navigation receiver. Displays active and standby (SBY) frequencies with a transfer toggle; the OFF / VOL knob powers the unit and sets the identification-tone volume, and the CHAN selector tunes the standby frequency.

**8 NAV VOR2 —** No. 2 VOR / ILS navigation receiver. Controls and indications are identical to VOR1 (item 7).

**9 ADF —** Automatic direction finder receiver. Displays active and standby (SBY) frequencies with a transfer toggle; the OFF / VOL knob powers the unit, PUSH MODE cycles the receiver mode (e.g. ANT / ADF), and the CHAN selector tunes the standby frequency.

**10 Audio Selector panel (pilot) —** Pilot intercom and radio audio control. Layout and function are identical to the co-pilot audio panel (item 3).

### 5.4.4 Control Guide — Gyros, Collective Head & Breakers (11–14)

**11 Gyro / Directional-Gyro Select panel —** Manages the two directional-gyro (DG) channels. The GYRO 1 and GYRO 2 repeaters show each channel’s heading output; the center NORM / 1 / 2 selector chooses the source feeding the HSI displays (NORM = each pilot on their own gyro). The per-gyro LH / RH switches set the synchronisation, and the MG / DG switches select slaved-magnetic (compass-slaved) or free directional-gyro mode.

**12 Collective-Head —** Mounted at the collective lever head. SHEAR is the guarded emergency load-release button for the cargo hook / external load (see Chapter 16). The LDG LT ON / OFF switch powers the landing light; the EXTEND/RETRACT/LEFT/RIGHT coolie hat moves the cone of light.

**13 Avionics Circuit-Breaker console — left bank —** Left column of avionics and systems circuit breakers, accessible from the pedestal with the collective lever passing over the console. Reset (push) a tripped breaker once; do not reset repeatedly.

**14 Avionics Circuit-Breaker console — right bank —** Right column of avionics and systems circuit breakers.

# 6 HH-65A Cockpit

This chapter covers the HH-65A Dolphin cockpit: the main instrument panel and the center console. The flight controls are common to both variants and are described in Chapter 5 (Section 5.1); differences in the cyclic and collective switch functions are noted there.

## 6.1 HH-65A — Instrument Panel

The HH-65A cockpit is configured for dual-crew IFR SAR operations. Both crew positions have full flight controls and a complete set of flight instruments. The instrument panel combines conventional round-dial instruments with vertical-tape engine displays, dual HSVDs and dual CDUs. The AFCS Control Panel with the four axis engagement levers ("bathandles"), TRIM and FD CPL controls is mounted on the center console between the crew stations (not visible in Figure 6-1); see Chapter 14.

### 6.1.1 Instrument Panel

*Figure 6-1 — HH-65A instrument panel (callout numbers refer to the instrument guide below)*

Instruments 1–8 appear at both crew stations; the pitot-static source controls (9) are at the co-pilot station; the engine fire controls (11) appear once per engine; the electrical panels (22) and CDUs (27) are shared on the center panel.

### 6.1.2 Instrument Guide — Flight Instruments (1–10)

**1 Airspeed Indicator (ASI) —** Indicated airspeed in knots (KIAS). Power-on VNE 165 KIAS at maximum gross weight at sea level; power-off VNE 135 KIAS — see Section 9.3 for the full set of configuration-dependent speed limits.

**2 Attitude Direction Indicator (ADI) —** Primary pitch and bank reference with FD command bars and collective command pointer when the FDS is coupled. ATT and FD warning flags indicate attitude source or flight director failures.

**3 Radar Altimeter —** Height above ground by radio ranging, displayed to 2,500 ft AGL. The controlling reference for the T-HOV and HOV AUG modes and the LOW ALT warning (see Chapter 14).

**4 Barometric Altimeter —** Barometric altitude in feet with inHg subscale. Verify the setting before departure and on approach.

**5 HSVD (Horizontal Situation Video Display) —** CRT display combining HSI function with FD mode annunciations, heading bug, course selector, nav source selection (VOR/TACAN (not simulated)/LOC) and CMD (commanded airspeed) when an IAS mode is active. Switches to the HOVER display format in T-HOV. Both HSVDs update simultaneously with the HDG select knob.

**6 VVI (Vertical Velocity Indicator) —** digital vertical speed display showing rate of climb or descent, complementing the HSVD during instrument flying and vertical mode operations.

**7 Torque Indicators (TORQUE %) —** Per-engine and MGB torque on a vertical scale instrument with the PWR LOSS indicator alongside. Key limits: 100% maximum continuous in hover and up to 75 KIAS, 88% continuous above 75 KIAS (see Section 9.6).

**8 Engine / Rotor RPM (% RPM) —** Triple vertical scale tachometer: Engine 1 Np (N2), main rotor NR (center, marked R) and Engine 2 Np (N2) in percent. Needle/tape match confirms both engines are driving the rotor. RPM limits in Section 9.4.

**9 Pitot-Static Source Controls —** TOTAL PRESS and STATIC source selectors for the air data system, located at the co-pilot station.

**10 Glareshield Annunciators —** Master WARNING, LIMIT, L GEAR and NAV CTL / LOW ALT captions, together with the OEI markers that illuminate in a single-engine condition.

### 6.1.3 Instrument Guide — Engine, Systems & Avionics (11–21)

**11 Engine Fire Controls —** Per-engine test switches with FIRE and FAIL lights and PRI/SEC extinguisher bottle selection, arranged ENG 1 left and ENG 2 right at the top center of the panel.

**12 COMM Radio Control Heads —** COMM 2 (left) and COMM 1 (right) with ACTIVE and PRESET frequency windows and TUNE function.

**13 Caution & Advisory Panel —** Central annunciator matrix for the system cautions and advisories described in Chapter 8, with TEST and DIM functions.

**14 Vertical Scale Instruments —** Hydraulic pressure, transmission (XMSN) oil, fuel pressure, and engine oil temperature and pressure on paired vertical scale instruments, one column per system.

**15 MGT Indicators —** Per-engine Measured Gas Temperature in °C. Key limits: 786°C takeoff (5 min), 765°C max continuous hover, 749°C max continuous cruise, 899°C maximum during start (see Section 9.8).

**16 Ng (N1) Indicators —** Per-engine gas generator speed in % RPM. Takeoff limit 104.1%, maximum continuous 102.9% (see Section 9.8).

**17 Fuel Management Panel —** TRANSFER PUMP switch, red-guarded FUEL JETT switches, a FUEL GAGE TEST push button and the EJECTOR CROSS FEED switch. In the event of an engine failure, motive flow pressure can be provided to ejector pumps in both systems from a single engine by actuating the EJECTOR CROSS FEED switch.

**18 Clock —** GMT clock with elapsed time (ET) and chronograph (CHR) functions for leg timing and OEI rating limits.

**19 Fuel Quantity Totalizer —** Digital TOTAL, LEFT and RIGHT tank quantity readouts.

**20 AMAP (Avionics Mode Annunciator Panel) —** Central annunciator for the AFCS and FDS: the top row shows the per-axis trim cautions (P/R/Y/C); the rows below annunciate the FD modes (HDG SEL, NAV, FD CPL, C-SYNC, APR, IAS, HOV AUG, ALT, VERT, T-HV). Amber = armed/caution, green = captured/active, flashing = crew action required (see Chapter 14).

**21 RMI —** Compass card with VOR 1 and VOR 2 bearing pointers for radio navigation orientation.

### 6.1.4 Instrument Guide — Electrical, Emergency & Miscellaneous (22–28)

**22 Electrical Panels —** AC EXT POWER, Alternate Hydraulic System electrical pump and ALTNR 1 / 2 controls. Bus-tie contactor status lights (BTC), GEN and BATTERY switches, Voltmeter and Loadmeter with source selector rotary knob. EMERG Transformer-Rectifier. See section 6.1.5 for further explanation.

**23 Emergency Flotation Control —** FLOAT ARM switch and PRESS TO INFLATE (circuits 1 / 2). Observe the 90 KIAS limit with flotation bags armed or inflated (see Section 9.3).

**24 Emergency Cutoff —** break-away wired red EMERGENCY CUTOFF control for immediate opening of battery relays and disconnection of both generators and both alternators.

**25 Shed Bus switch** (AUTO and O/R-override), **Avionics switches —** CPLT / PLT Avionics switches (OFF - BUS OFF - ON) and the **EMERG Transformer-Rectifier** switch.

**26 Landing Gear Handle & Position Indicator —** L GEAR handle with the L GEAR IND position lights confirming down-and-locked / up status.

**27 CDUs (Control Display Units) —** Dual keyboard/display units for COM, NAV and flight plan (FPLN) management, shared between both crew stations.

**28 tPad (Tablet) —** Stowed on the glareshield top just beneath the windshield frame (beside the RAM AIR placard on the center pillar). Provides all user options, attachments selection and weight & balance UI — see Chapter 15.

### 6.1.5 Instrument Guide — Electrical panel HH65

The HH-65A electrical system is divided into separate **DC** and **AC** power systems. DC power is supplied by two engine-driven starter/generators and the aircraft battery, while AC power is supplied by two MGB-driven alternators. The electrical control panel groups the main controls and indications for both systems, including battery relays, generators, alternators, bus-tie contactors, avionics buses, external power, emergency cutoff, and emergency transformer-rectifier power.

The **BATT RLY 1** and **BATT RLY 2** switches connect the aircraft battery to the DC electrical system. Their associated **OPEN** lights indicate that the corresponding battery relay is open. The **GEN 1** and **GEN 2** switches control the DC starter/generators. In normal operation, each generator powers its own main DC bus, with bus-tie logic available to keep the DC system powered if one generator is unavailable. Generator **FAIL** lights indicate that the associated generator is not online.

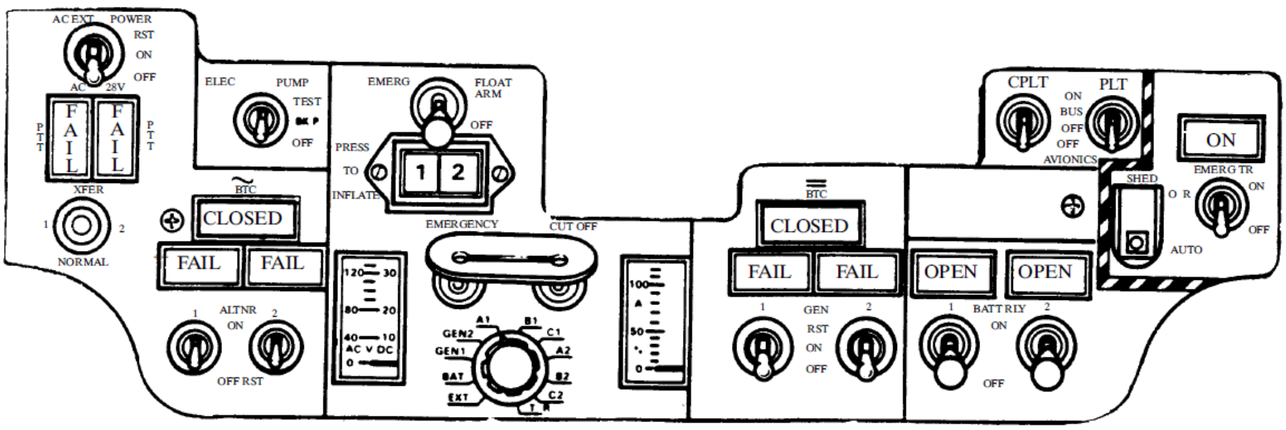
The **ALTNR 1** and **ALTNR 2** switches control the AC alternators. Each alternator normally powers its own AC bus once rotor speed is high enough. If one alternator fails, the bus-tie system can connect the buses so the remaining alternator supplies the AC system. Alternator **FAIL** lights indicate that the associated alternator is not online, while **BTC CLOSED** lights indicate that a bus-tie contactor is closed.

The **PLT AVIONICS** and **CPLT AVIONICS** switches control power to the pilot and copilot avionics buses. For normal flight, both should be selected **ON**. The intermediate **BUS OFF** position is used for reversionary avionics operation, while **OFF** removes power from the associated avionics bus. The **SHED** switch controls automatic or manual load shedding of non-essential equipment to reduce electrical load during abnormal conditions.

The **EMERG T/R** switch connects the emergency transformer-rectifier to the DC system. This allows AC power to be converted into emergency DC power if both starter/generators are unavailable. The **EMERG T/R ON** light indicates that emergency transformer-rectifier power is supplying the DC system.

The guarded **EMERGENCY CUTOFF** bar switch removes electrical power from the helicopter except for battery-powered circuits. In normal operation it remains in the closed/up position. Moving it down opens the battery relays and disconnects the generators and alternators.

A rotary selector and the voltmeter/loadmeter allow the pilot to monitor external power, battery voltage, generator output, AC bus phases, and transformer-rectifier output. Avoid leaving the selector in the battery position for extended periods, as this may deplete the battery.



### 6.1.6 Instrument Guide — Fuel management panel HH65

The HH-65A fuel management panel controls fuel transfer, ejector crossfeed, fuel jettison, and fuel quantity testing. Fuel quantity is displayed on the instrument panel as **TOTAL**, **LEFT**, and **RIGHT** fuel in pounds, while the fuel management panel provides the controls used to balance or manage the system.

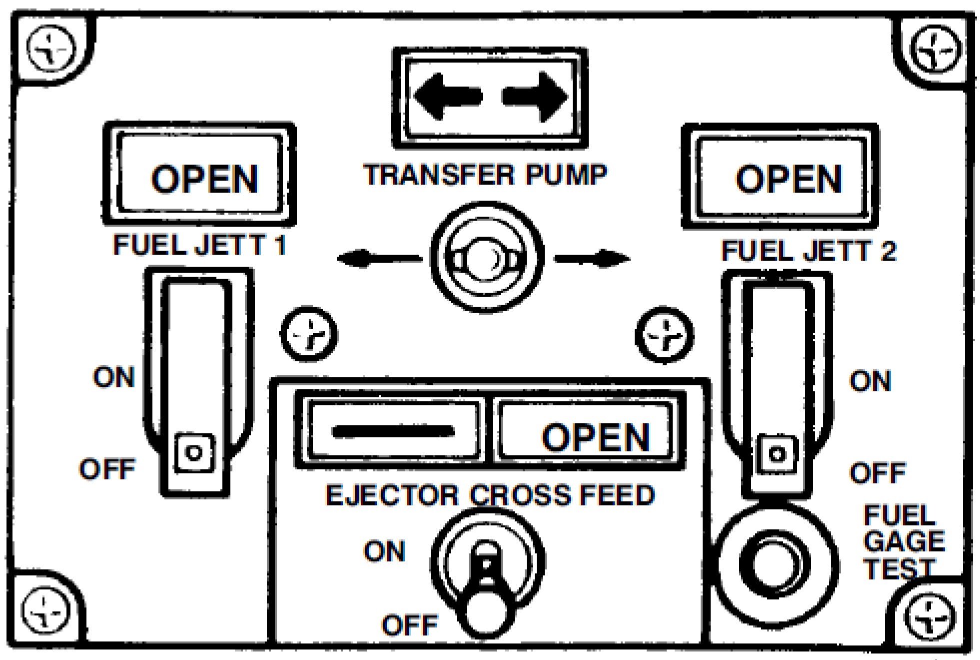
The **TRANSFER PUMP** switch has three positions. In the center position, the transfer pump is off. Moving the switch left or right activates the electrically driven transfer pump and transfers fuel between the center fuel cells in the selected direction. The illuminated green arrow above the switch shows the active direction of fuel transfer.

The **EJECTOR CROSSFEED** switch is used during abnormal or single-engine fuel situations. When selected **ON**, motive flow pressure is routed to the ejector pumps of the opposite or failed engine fuel system. The green **OPEN** light indicates that the crossfeed valve is fully open and that motive flow is being provided.

The guarded **FUEL JETT 1** and **FUEL JETT 2** switches operate the fuel jettison valves. Selecting either switch **ON** opens the corresponding jettison valve and illuminates the associated **OPEN** light. These switches should only be used when fuel jettison is required.

The **FUEL GAGE TEST** button checks the fuel quantity indication system. When held, the displayed fuel quantities should decrease. When released, the indications should return to their previous values.

Fuel quantity indications are affected by aircraft attitude. In a normal hover attitude, the indicated fuel may read approximately 10% lower than actual fuel. Low feed-tank quantity is indicated by the corresponding **FEED TANK 1** or **FEED TANK 2** warning light, accompanied by the master warning lights. Treat any feed-tank warning as a fuel system abnormality and check fuel balance and transfer status immediately.



## 6.2 HH-65A — Center Console

The HH-65A center console differs substantially from the AS365 N2 pedestal, reflecting the Coast Guard SAR mission fit and the 4-axis FDS-255 automatic flight control system. It carries the flight-director mode-select panel, the pilot and co-pilot audio controls, the Horizontal Situation Video Display (HSVD) control, the COMM (secure voice / IFF) panel, the search / weather radar control and the AFCS control panel, together with the nose-wheel lock, emergency landing-gear extension and parking-brake handles, the TCAS and direction-finder controls. The callouts below cover the controls visible in this view; the pilot / co-pilot gyro-compass control panels and the manual cargo-release handle are located further aft on the console and are not shown here.

### 6.2.1 Center Console Layout


*Figure 6-2 — HH-65A center console (callout numbers refer to the control guide below)*

### 6.2.2 Control Guide — Avionics & Flight Control (1–7)

**1 Flight Director System (FDS-255) mode-select panel —** Selects the flight-director / autopilot modes for the 4-axis AFCS. The upper row carries the basic modes IAS (airspeed hold), VS (vertical speed), ALT (altitude hold), HDG SEL (heading select), NAV (navigation) and APPR (approach); the lower row adds IAS·VS (airspeed-vertical speed hold), NAV XFR (navigation source transfer pilot/copilot), HOV AUG (hover augmentation) and T HOV (transition to hover). See Chapter 14.

**2 Pilot's Audio Control panel —** Pilot intercom and radio audio selection. The COMM, VOR, TACAN, ADF and HF receiver-audio knobs set individual monitoring levels; the rotary selector chooses the transmit source (COMM 2 / ICS / ALTN / FM / HF / L HAIL) and the ALL / NORM / ICS controls set the listen mode. The MSTR VOL knob sets the master audio level.

**3 Horizontal Situation Video Display (HSVD) Control —** Configures the two HSVD (horizontal-situation video) displays. The VL / TAC (not simulated) / RNAV row selects the navigation source per display; CRS (left and right) set the course pointers and HDG sets the heading bug. The HSI / MAP / RADAR and HOVER / RMAP buttons select the display format, the rotary selects the radar / map range (2.5–160), and DATA, BRT and CONT control the data overlay and display brightness / contrast. The RADAR itself is not functional due to sim limitations!

**4 Co-pilot's Audio Control panel —** Co-pilot intercom and radio audio selection. Layout and function are identical to the pilot audio panel (item 2).

**5 COM control panel (secure voice / IFF) —** Manages the secure-voice and identification equipment. Provides ARM / RESET, the V / P / BB / CLR and 2430 / NORM / BYPASS mode controls, the MON (monitor) and IDENT functions, ZERO (zeroise crypto keys) and EMERG (emergency) selections.

**6 Search / Weather Radar Control —** Controls the search and weather radar. SRCH 1 / SRCH 2 / SRCH 3 select the search mode; TEST / STBY / OFF set the operating state; WX / WXA select weather modes; GAIN (to MAX) sets receiver gain; SCAN and INTGR set the antenna scan and integration; 60 / HOLD / 120 sets the range or holds the picture; TILT sets antenna elevation; STAB OFF / ON enables antenna stabilisation. The RADAR itself is not functional due to sim limitations!

**7 AFCS Control panel (4-axis) —** Engages the FDS-255 automatic flight control system. The PITCH, ROLL, YAW and COLL ENGAGE bathandles engage each control axis; the TRIM control enables autopilot trim and FD CPL couples the AP computer to the AFCS control axes. See Chapter 14.

### 6.2.3 Control Guide — Console Handles & Selectors (8–12)

**8 Nose-wheel lock handle —** Locks and unlocks the castoring nose-wheel for taxi and landing. Pull to unlock for ground manoeuvring; centred and locked for take-off and landing.

**9 TCAS Control —** Traffic-alert and collision-avoidance system control. ON / OFF powers the system; TEST / ABV / BLW selects the test and vertical display window; RANGE sets the traffic display range; AUDIO MUTE silences the aural alerts. TCAS itself is not functional due to sim limitations!

**10 DF-mode / IFF source selector —** Direction-finder source selector (COMM 1 / COMM 2 / FM / ADF) that routes the selected receiver to the bearing display.

**11 Emergency landing-gear extension handle —** Mechanically releases the landing gear to the extended position if the normal hydraulic extension fails. Pull to release; the gear free-falls and locks down (see Chapter 12).

**12 Parking-brake handle (pull-and-turn) —** Sets the wheel parking brake. Pull and turn to lock the brakes on the ground; release before taxi.

## 6.3 HH-65A — Overhead Panel

The HH-65A overhead panel groups the lighting and cabin-services controls (left), the standby static-pressure source selector (center) and the systems controls — anti-ice, de-ice, pitot heat, engine crank, hydraulics and trim (right). The callouts below cover the controls modeled in the simulation; paired switches (engine 1 / 2, left / right) share a single callout.

### 6.3.1 Overhead Panel Layout


*Figure 6-3 — HH-65A overhead panel  (callout numbers refer to the control guide below)*

### 6.3.2 Control Guide — Lighting & Cabin Services (1–14)

**1  PNL CPLT —** Co-pilot instrument panel lighting rheostat.

**2  O.HEAD CONSOLE —** Overhead and center-console panel lighting rheostat.

**3  PNL PLT —** Pilot instrument panel lighting rheostat.

**4  RRU/BDI —** RRU / BDI (Remote Readout Unit - radios and Bearing-Distance Indicator) display lighting rheostat.

**5  LIGHTING —** Cockpit lighting master switch (OFF / ON) enabling the panel lighting rheostats.

**6  HOIST —** Rescue hoist power selector (PLT / OFF / CREW), selecting which station controls the hoist. When flying Miltech Mission Hub (MMH) hoist missions, this switch must be powered on (PLT or CREW) to energise the hoist — the hoist will not operate, if this switch remains in the OFF position.

**7  CARGO —** Cargo hook power switch (OFF / ON). Must be ON to power the hook for Miltech Mission Hub (MMH) sling load (cargo release) and firefighting (water release) missions.

**8  POS LTS —** Position lights switch (OFF / ON).

**9  ANTI COL —** Anti-collision lights switch (OFF / ON).

**10  EXT LT —** External lighting mode (NORM / IR) — IR selects covert infrared lighting for night-vision operations.

**11  AVIONICS FAN —** Avionics cooling fan (ON / AUTO).

**12  CABIN LT —** Cabin lighting switch (ON / ARM / OFF)

**13  HEAT —** Cabin heating control (OFF / ON / RST).

**14  COOL —** Cabin cooling / ventilation control (OFF / FAN / ON).

### 6.3.3 Control Guide — Static Source & Systems (15–27)

**15 STAND BY STATIC PRESS —** Standby static-pressure source selector. NORMAL uses the primary static source; the alternate position selects the standby static source if the primary is blocked.

**16 ANTICIPATOR 1 & 2 —** Per-engine torque anticipator switches (OFF / NORM). NORM enables collective-anticipation of power demand for tighter rotor-speed governing.

**17 TAIL HYD ISOLATE —** Tail-rotor servo hydraulic isolation valve (CUTOFF / NORM). Leave at NORM for normal operations; used in the hydraulic malfunction procedures (see Chapter 12).

**18 VERT INSTR 1 & 2 —** Vertical-scale instrument power selectors (CUTOFF / ALT / NORM) for the engine vertical scale instruments.

**19 ENG ANTI ICE 1 & 2 —** Per-engine anti-ice switches (OFF / ON) controlling engine inlet and sensor heating.

**20 TEST SERVO —** Servo test pushbutton.

**21 CRANK 1 & 2 —** Per-engine cranking (dry motoring) pushbuttons.

**22 W/S ANTI-ICE L & R —** Left and right windshield anti-ice switches (OFF / ON).

**23 WIPER —** Windshield wiper speed selector (OFF / L / H).

**24 WASH —** Windshield wash pushbutton.

**25 PITOT HEAT L & R —** Left and right pitot-head heating switches (OFF / ON).

**26 HORN AURAL WARN —** Aural warning horn control (OFF / RST); RST resets the aural warning.

**27 TRIM —** Trim power switch (OFF / ON) for the AFCS trim actuators.

### 6.3.4 Landing Gear Safety Pin

The AS365 N2 and HH65 include a simulated landing gear safety pin used to secure the landing gear system while the aircraft is parked. During preflight, confirm the pin is removed before taxi or flight so the landing gear can retract normally after takeoff. After shutdown, the pin may be reinstalled as part of securing the aircraft.

# 7 Aircraft Systems

This chapter describes the major aircraft systems as modeled, at the level of detail needed to operate them and to understand the associated cautions in Chapter 8 and limits in Chapter 9.

## 7.1 Powerplant

**AS365 N2:** two Turbomeca Arriel 1C2 turboshafts (549 kW / 737 shp takeoff each), governed to hold rotor speed automatically. Fuel is introduced and the engine governed range selected with the fuel flow controls (twist grip / fuel levers); in flight both engines remain in the governed range and the pilot manages power with the collective. Key instruments: ΔNg indicators with digital Ng readout, t4 gauges and the torquemeter (see Section 5.2.3).

**HH-65A:** two Lycoming LTS 101-750B-2 turboshafts (522 kW / 700 shp takeoff each) with FFCLs (fuel flow control levers) and an automatic fuel control that compensates the surviving engine in an OEI condition. Key instruments: Ng and MGT tapes and the per-engine torque tapes (see Section 6.1.3).

## 7.2 Fuel System

Fuel is carried in main tanks feeding a feeder (supply) tank from which the engines draw. Electric boost pumps maintain fuel pressure to the engines; a transfer system moves fuel between tanks. A fuel system fault lights the amber FUEL caption, which repeats the fuel management panel cautions; a feeder tank level drop triggers the red FUEL.Q warning — treat the latter as a land-soon condition regardless of total fuel remaining, since only the feeder contents are immediately usable.

On the HH-65A, the fuel panel provides TRANSFER PUMP switch, red-guarded FUEL JETT switches, a FUEL GAGE TEST push button and the EJECTOR CROSS FEED switch. Fuel quantities shown on the digital totalizer (TOTAL / LEFT / RIGHT). On the AS365 N2, pumps and the transfer pump are managed from the fuel management panel on the console (Section 5.2.4).

## 7.3 Electrical System

DC power is provided by a battery and engine-driven starter-generators (GEN 1 / GEN 2) with static inverters or alternators (HH-65A: ALTNR 1 / 2) supplying AC. External power can be connected to substitute the battery on ground.

A battery overtemperature condition (BAT.TEMP warning, AS365 N2) calls for switching the battery off; the generators carry the load in flight.

## 7.4 Hydraulic System

Dual independent hydraulic circuits power the main and tail rotor servos, removing feedback forces and providing the control assistance the AFCS actuators work through. Loss of one circuit (HYD.1 / HYD.2 warning on the AS365 N2) degrades assistance — expect heavier controls and reduce airspeed; loss of both is a serious emergency covered in Section 12.4. Hydraulic pressure is displayed in the systems cluster (AS365 N2) or on the HYD PRESS vertical scal einstrument (HH-65A).

## 7.5 Transmission and Rotors

The main gearbox (MGB) combines both engine inputs and drives the main rotor mast, the Fenestron drive shaft and accessories. It is the torque-limited component in twin-engine operation — the torquemeter limits in Chapter 9 protect it. MGB oil pressure and temperature are monitored continuously: the red MGB.P warning means land immediately, and

OIL.TEMP covers excessive oil temperature in an engine or the MGB. Engine oil chip detection lights the amber CHIP.1 / CHIP.2 captions. The tail gearbox (TGB) drives the 11-blade Fenestron.

The four-blade Starflex main rotor uses a composite star hub with elastomeric bearings in place of conventional hinges. A rotor brake allows the rotor to be stopped quickly after shutdown — observe the application limits in Section 9.4.

## 7.6 Flight Controls, Trim and AFCS Actuation

Cyclic, collective and pedal inputs run through hydraulically assisted linkages to the rotor servos. The AFCS works through trim actuators on each axis: they hold the cyclic in position (the forces you feel and release with the TR button) and apply the autopilot's corrections.The system is described in detail in Chapters 13 and 14.

## 7.7 Anti-Ice and Environmental

Pitot heating protects the air data sources, and engine anti-ice protects the intakes; both are selected from the cockpit and should be ON in visible moisture below +5° C. Flight into known icing remains prohibited (Section 9.9). Bleed-air heating and ventilation serve the cabin; the RAM AIR and duct controls on the HH-65A center pillar manage cockpit airflow.

## 7.8 Emergency Flotation System

Both variants can be fitted with emergency floats for overwater operations: gas-inflated bags armed from the cockpit (FLOAT ARM) and fired by the inflation control (circuits 1 / 2) or the collective-mounted button (AS365 N2). Observe the airspeed limits with floats armed or inflated (Chapter 9). Inflation is intended for ditching — a deliberate, controlled water landing — not for normal operations.

# 8 Warning & Caution Lights

## 8.1 AS365 N2 — Caution Advisory Panel & Alarm Provisions

The AS365 N2 alarm provisions comprise the central Caution Advisory Panel (CAP), a set of instrument panel warning lights, and the overhead panel fire warning lights. The CAP carries an integral TEST function (illuminates all captions for a lamp check) and DIM control (night brightness).

### 8.1.1 Caution Advisory Panel Layout

<table>
<tr><td rowspan="2">TEST</td><td>INV-1</td><td>GEN-1</td><td>BUS-CPL</td><td>GEN-2</td><td>INV-2</td><td>ENG-1</td><td>MGB-P</td><td>ENG-2</td></tr>
<tr><td>FUEL</td><td>BAT-SW1</td><td>SHED-BUS</td><td>BAT-SW2</td><td>ROT-BK</td><td>HYD-1</td><td>AUX-HYD</td><td>HYD-2</td></tr>
<tr><td></td><td></td><td>PITOT-1</td><td>STEP</td><td>PITOT-2</td><td>HORN</td><td>OIL-TEMP</td><td>SERVO</td><td>BAT-TEMP</td></tr>
<tr><td>LAND-LT</td><td></td><td>CHIP-1</td><td></td><td>CHIP-2</td><td>O/HEAT</td><td>CARGO-F</td><td>LG-PUMP</td><td>FUEL-Q</td></tr>
<tr><td rowspan="2">DIM</td><td>EXT-LH</td><td>O/SPEED-1</td><td></td><td>O/SPEED-2</td><td>EXT-RH</td><td></td><td>HYD-LEVEL</td><td>AP</td></tr>
<tr><td></td><td></td><td></td><td></td><td>DOORS</td><td></td><td></td><td></td></tr>
</table>

### 8.1.2 Red Warning Lights

| Warning | Indication | Crew Action |
|---|---|---|
| ENG.1 / ENG.2 | Engine oil pressure low (affected engine) | Reduce power on the affected engine; monitor t4/Ng; land as soon as possible |
| MGB.P | MGB oil pressure low | Land immediately (see Section 12.5) |
| OIL.TEMP | Excessive oil temperature — engine or MGB | Identify source on the systems cluster; reduce power; land as soon as practicable |
| HYD.1 / HYD.2 | Hydraulic pressure loss in the corresponding system | Reduce airspeed; expect heavier controls (see Section 12.4) |
| AUX.HYD | Auxiliary hydraulic system overpressure | Avoid auxiliary hydraulic consumers; monitor |
| HYD.LEVEL | RH hydraulic reservoir below 2 litres and/or RH tail rotor servo body shut off | Reduce airspeed; anticipate degraded yaw servo assistance; land as soon as practicable |
| SERVO | Main or tail rotor servo-control distributor valve jammed | Avoid large or abrupt control inputs; land as soon as practicable |
| BAT.TEMP | Battery temperature abnormally high | Battery — OFF; continue on generators (see Section 7.3) |
| CARGO.F | Cargo bay fire (shows together with O/HEAT) | Land immediately |
| LG.PUMP | Landing gear standby pump system overpressure | Avoid standby pump operation; monitor |
| FUEL.Q | Repeats the red FUEL Q warnings of the fuel management panel — feeder tank level dropping | Check the fuel management panel; land as soon as possible |
| A.P. | Autopilot cut off | Revert to manual flight; check AFCS engagement (see Chapter 13) |

### 8.1.3 Amber Caution Lights

| Caution | Indication |
|---|---|
| GEN.1 / GEN.2 | Generator failure on the corresponding side |
| BUS.CPL | Bus-tie contactor closed |
| BAT.SW1 / BAT.SW2 | Battery contactor 1 or 2 open |
| INV.1 / INV.2 | AC power failure (system 1 or 2) |
| SHED BUS | Electrical load shedding active |
| ROT.BR | Rotor brake applied |
| FUEL | One of the amber cautions on the fuel management panel is lit — check the panel |
| DOORS | Cabin or cargo hold door not correctly closed |
| PITOT.1 / PITOT.2 | Pitot heating failed or switched off on the corresponding side |
| O/HEAT | Overheating in the cargo bay near the P2 hot-air bleed lines |
| EXT.LH / EXT.RH | Fire extinguisher cylinder empty (corresponding side) |
| HORN | Aural warning inhibited |
| CHIP.1 / CHIP.2 | Metal particles detected in engine oil (corresponding engine) — land as soon as practicable |
| O/SPEED 1 / 2 | Overspeed detection system failure (corresponding engine) |
| STEP | One or more boarding steps not closed |

### 8.1.4 Blue Advisory Light

| Advisory | Indication |
|---|---|
| LAND.LT | Landing or Search Light on |

### 8.1.5 Instrument Panel Warning Lights

- **ALARM (2, red):** One on each side of the instrument panel; both flash whenever any red CAP warning illuminates, and when a FIRE light comes on.
- **LIMIT (2, amber):** One on each side of the instrument panel; illuminate on the ground when the cyclic is moved too far forward (excessive rotor head bending loads), in flight at excessive load factor, and when the ΔNg of either engine exceeds 0.4% or total torque exceeds 102.5%.
- **L GEAR (red):** Flashes on the RH side of the panel if airspeed drops below 55 kt (102 km/h) with the gear retracted, or if the gear is extended but not downlocked.
- **Landing gear status indicators:** Three green arrows (one per gear unit, illuminated when that unit is down and locked) and an amber light that comes on whenever the gear is not locked up or down.
- **POWER LOSS (2, red):** One per engine; in normal flight, indicates that the free turbine speed (expressed as equivalent NR) has dropped below 310 rpm.
- **ENG.FIRE repeater (red):** Repeats the engine fire alarm, fitted beside the Caution Advisory Panel.

### 8.1.6 Overhead Panel Warning Lights

Two captions marked SHOT 1 and SHOT 2 are fitted above the overhead panel, one set per engine. Each caption carries a red FIRE light (overheat detected in the engine bay) and an amber FAIL light (failure of the fire detection system). The caption itself, protected by a breakable disc, fires the associated extinguisher cylinder when pressed; a nearby TEST pushbutton checks the detection system.

In addition, a red repeater light on each engine's fuel flow control lever illuminates in case of fire on that engine, or when its oil pressure falls below 1.3 bar.

## 8.2 HH-65A — Warning-Caution-Advisory (WCA) Panel & Caution Lights

The HH-65A centralizes its annunciations on the Warning-Caution-Advisory panel and the associated panel lights, using a consistent color philosophy: red captions are warnings requiring immediate action; amber captions are cautions indicating an abnormal condition requiring monitoring or timely action; green captions are advisories (normal status); white captions (TEST, BRIGHT, DIM) are test and brightness controls, not annunciations. FD and AFCS mode annunciations are not cautions — they appear on the AMAP (see Section 6.1.3 and Chapter 14).

### 8.2.1 Red Warnings

| Warning | Indication |
|---|---|
| **FIRE (ENG 1 / ENG 2)** | Fire detected in the corresponding engine bay — execute the engine fire procedure (Section 12.2). |
| **ENG OIL P (1 / 2)** | Oil pressure below 20 psi on the corresponding engine. |
| **ENG FUEL P (1 / 2)** | Fuel supply pressure low (< 6 psi) on the corresponding engine — check the fuel system (Section 7.2). |
| **PRI SERVO P** | Primary flight-control servo hydraulic pressure low — expect degraded control assistance; reduce airspeed (Section 12.4). |
| **SEC SERVO P** | Secondary flight-control servo hydraulic pressure low — loss of servo redundancy. |
| **MGB warnings** | Main gearbox oil pressure warning — land immediately (Section 12.5). |
| **BATT TEMP** | Battery temperature abnormally high — battery OFF, continue on generators (Section 7.3). |
| **L / R GEAR** | Aircraft descends below 200 feet radar altitude with wheels up. Both L GEAR lights illuminate simultaneously with a steady 3 second 285 Hz aural signal in headsets only. |

### 8.2.2 Amber Cautions

| Caution | Indication |
|---|---|
| **PARKING BRAKE** | Parking brake set. |
| **HORN** | Aural warning system deactivated; extinguishes when the aural warning switch is set to ON. |
| **L / R WSCRN ANT ICE** | Failure of the regulator box of the corresponding windshield anti-ice system. |
| **AFCS** | One or more AFCS axes disengaged and not yet acknowledged — check the bathandles and re-engage as able (see Chapter 14). |
| **MGB PMP MAIN** | Main gearbox main oil pump failed (pressure below approx. 12 psi). The auxiliary pump lubricates automatically, at reduced pressure and without oil cooling — monitor MGB temperature. |
| **MGB PMP AUX** | Main gearbox auxiliary oil pump failed (pressure below approx. 12 psi). Lubrication redundancy lost. |
| **HEATER O/HEAT** | Approx. 275°F sensed at one or more heater duct thermoswitches — potential fire hazard; secure the heater. |
| **IFF/M4** | IFF Mode 4 not operating correctly: no valid code loaded, failed self-test, or a compatible interrogation received without a Mode 4 reply. |
| **ENG 1 / ENG 2 ANT-ICE** | Fault in the corresponding engine anti-ice system (valve, pressure switch, heater or controller). |
| **ROTOR BRAKE** | Rotor brake microswitch not fully seated — verify the rotor brake is fully released. |
| **CHECK CCD** | A starred message is present on the cockpit control display (e.g. engine exceedance, reserve fuel, BINGO) — check the CCD. |
| **AV RACK O/HEAT** | Avionics rack overheat. |
| **HI FUEL LEVEL 1 / 2** | Deactivated by technical order — not functional on the modeled configuration. |
| **L / R PITOT** | Corresponding pitot heat switch OFF, or that pitot heater has failed. |
| **FREON HI PRES** | Air-conditioning condenser inlet pressure above approx. 392 psi for more than 20 seconds — the compressor disengages automatically. |
| **FUEL FILT 1 / 2** | Corresponding engine fuel filter clogging — impending or actual bypass. |
| **L EXT / R EXT** | Corresponding engine fire extinguisher bottle low or exhausted (pressure below approx. 230 psi). |
| **LIMIT** | A main rotor load limit is approached — e.g. during high collective pitch or high-g maneuvering. A microswitch on the right lateral hydraulic servo control closes; both LIMIT lights on the instrument panel illuminate. |
| **LOW ALT** | Flashes in HOV AUG mode (always active) and T-HOV mode (conditionally) when the helicopter descends to the LOW ALT warning trip point: nominally 20 ft below the barometric altitude reference (electrical tolerance ±10 ft; pitot-static tolerance ±5 ft → effective trigger range: 5–35 ft below reference). |

### 8.2.3 Green Advisories

| Advisory | Indication |
|---|---|
| **W/SCRN ON** | Windshield anti-ice operating. |
| **ENG ANT-ICE ON** | Engine anti-ice operating. |
| **LIGHT ON** | External light (landing / search light) on. |
| **BLEED AIR ON** | Bleed air system on. |
| **OEI ARM** | One-engine-inoperative rating armed. |

# 9 Performance and Limitations

The limitations in this section reflect those published in the Eurocopter AS365 N2 Flight Manual (DGAC approved, 1989/1992 revision series) and the U.S. Coast Guard HH-65A Flight Manual (C.G.T.O. 1H-65A-1, Change 8, 2003). Where values differ between variants, both are listed.

## 9.1 Performance

### Performance Overview

The AS365 is a fast twin-engine helicopter and should normally be flown as a smooth, high-speed aircraft rather than a heavy utility helicopter. In cruise, a realistic operating range is approximately 120–135 KTAS depending on weight, altitude, temperature and installed equipment. For endurance or loitering, use a much lower speed, around 75 KTAS.

Performance is strongly affected by weight, density altitude and mission equipment. Hoists, searchlights, skis, sand filters and open or enlarged doors can reduce airspeed, range and hover margin. A clean aircraft will accelerate and cruise more efficiently, while SAR or patrol configurations should feel heavier and less slippery.

For best results in the simulator, plan climbs and approaches with power margin in mind. High gross weight, hot weather, high elevation and out-of-ground-effect hover all reduce available performance. When operating the HH-65-style configuration, expect a more mission-equipped aircraft with slightly more conservative handling and planning margins than a clean civil AS365.

Please refer to the annex for detailed performance charts for both variants

## 9.2 Airspeed Limits — AS365 N2

| Parameter | Value |
|---|---|
| Power-on VNE (sea level, low gross weight) | 175 kt IAS |
| Power-on VNE reduction | 3 kt per 1,000 ft altitude gain |
| Power-off (autorotation) VNE — red/white line | 135 kt IAS |
| Green arc (normal operating range) | 0 – 155 kt |
| Yellow caution arc | 155 – 175 kt |
| Best Rate of Climb (Vy) | 75 kt |
| Maximum wheel braking speed | 38 kt (70 km/h) |
| Maximum slope for takeoff/landing | 10° |

**NOTE** AS365 N2 power-on VNE varies with altitude and weight. The 175 kt value applies at sea level at low gross weights; reduce by 3 kt per 1,000 ft of altitude gain.

## 9.3 Airspeed Limits — HH-65A

| Parameter | Value |
|---|---|
| Maximum Power-On VNE (max GW, SL) | 165 KIAS |
| Maximum Power-Off VNE | 135 KIAS |
| Sliding door removed | 120 KIAS |
| Sliding door locked open | 100 KIAS |
| Sliding door movement | 80 KIAS |
| Rescue hatch locked open | 80 KIAS / 30 kt sideward |
| Maximum cargo hook load speed | 90 KIAS |
| Flotation bags armed or inflated | 90 KIAS |
| Maximum touchdown speed | 60 KIAS |
| Maximum brake speed (≤8,900 lb GW) | 38 KIAS |
| Maximum brake speed (8,901 – 9,200 lb GW) | 30 KIAS |

**NOTE** HH-65A VNE varies with altitude and gross weight. At max gross weight of 9,200 lb: SL = 165 kt, 2,000 ft = 159 kt, 4,000 ft = 153 kt, 6,000 ft = 147 kt. At lighter weights, VNE is correspondingly higher. Refer to Figure 5-2 in the actual HH-65A Flight Manual for the full VNE chart.

## 9.4 Main Rotor RPM Limits

| Parameter | AS365 N2 | HH-65A |
|---|---|---|
| Normal governed speed | 350 rpm (100%) | – |
| Minimum continuous (power-on) | 320 rpm | 97.2% Nr |
| Minimum transient (power-on) | – | 91.5% Nr |
| Underspeed horn | 335 rpm | – |
| Overspeed horn | 380 rpm | 108.5% Nr |
| Maximum continuous (power-off) | 378 rpm | 113% Nr |
| Maximum transient for 5 sec (power-off) | 420 rpm | 120% Nr |
| Minimum emergency transient (power-off) | – | 84% Nr |
| Maximum rotor speed for rotor brake application | 170 rpm | Per instrument marking |

## 9.5 Transmission Limits — AS365 N2

| Condition | Max Torque (%) |
|---|---|
| Transient (yaw control in hover) | 107% |
| Hover and acceleration to Vy (twin-engine) | 100% |
| Forward flight above Vy (twin-engine) | 88% |
| OEI — Maximum transient (20 sec) | 68% |
| OEI — Maximum 2.5-minute rating | 57% |
| OEI — Maximum continuous | 55% |

**NOTE** 100% torque = 965 kW at 350 rpm NR rating (AS365 N2).

## 9.6 Transmission Limits — HH-65A (MGB Torque)

| Condition | Max MGB Torque (%) |
|---|---|
| Maximum continuous — hover | 100% |
| Transient hover | 102.9% |
| Maximum continuous — 0 to 75 KIAS | 100% |
| Maximum continuous — above 75 KIAS (cruise) | 88% |

**NOTE** Twin-engine operation is MGB torque limited in cold conditions; single-engine operation is engine torque limited. The limit reached first must be observed.

## 9.7 Engine Limits — AS365 N2 (Turbomeca Arriel 1C2)

The AS365 N2 is powered by two Turbomeca Arriel 1C2 turboshaft engines, each rated at 549 kW (737 shp) at takeoff. Engine limitations are determined by gas generator speed (Ng), exhaust gas temperature (t4), and free turbine speed (Nf/NR).

### 9.7.1 Gas Generator Speed (Ng)

> **NOTE** 100% Ng = 51,800 rpm. Minimum steady-state Ng = 67%. A maximum governed Ng of 103.9–104.6% is permitted for up to 12 seconds on engine failure.

| Operating Condition | Time Limit | Permitted ΔNg |
|---|---|---|
| Twin-engine — Transient | 5 seconds | +6% |
| Twin-engine — Takeoff rating | 5 minutes | 0% (at 100%) |
| Twin-engine — Max continuous | Unlimited | −3.5% |
| OEI — 2.5-minute rating | 2.5 minutes | +1.5% |
| OEI — 30-minute rating | 30 minutes | 0% |
| OEI — Max continuous | Unlimited | −3.5% |

### 9.7.2 Exhaust Gas Temperature (t4)

| Operating Condition | Max t4 (°C) |
|---|---|
| Twin-engine — Takeoff rating (5 min) | 845°C |
| Twin-engine — Max continuous | 775°C |
| OEI — Transient (12 sec) | 920°C |
| OEI — 2.5-minute rating | 885°C |
| OEI — 30-minute rating | 845°C |
| OEI — Max continuous | 775°C |
| Starting — Maximum transient overtemperature | 865°C |
| Starting — Maximum continuous t4 | 785°C |

## 9.8 Engine Limits — HH-65A (Lycoming LTS 101-750B-2)

| Rating | Time Limit | Ng (%) | MGT (°C) | Eng Torque (%) |
|---|---|---|---|---|
| Takeoff (two engines) | 5 minutes | 104.1% | 786°C | – |
| Max continuous hover flt | Unlimited | 102.9% | 765°C | – |
| Max continuous cruise flt | Unlimited | 102.9% | 749°C | – |
| OEI — Max transient | 12 seconds | 106.1% | 847°C | 109.9% |
| OEI — 2.5-minute rating | 2.5 minutes | 106.1% | 822°C | 100% |
| OEI — 30-minute rating | 30 minutes | 104.8% | 799°C | 95.5% |
| OEI — Max continuous | Unlimited | 102.9% | 765°C | 88.2% |
| Starting — Transient | 12 seconds | – | 822°C | – |
| Starting — Maximum | Start interval | – | 899°C | – |

### 9.8.1 Free Power Turbine Limits (HH-65A)

| Condition | Max Np (%) |
|---|---|
| Power-on (>60% engine torque) | 102.3% |
| Reduced power (25–60% engine torque) | 103.0% |
| Power-off (<25% engine torque) | 107.7% |
| No load / autorotation | 107.7% |
| No load — transient | 109.7% |

## 9.9 Weight Limits

| Parameter | AS365 N2 | HH-65A |
|---|---|---|
| Maximum Takeoff Weight | 4,250 kg (9,370 lb) | 9,200 lb (4,172 kg) |
| Minimum Flight Weight | 2,400 kg (5,291 lb) | N/A (per mission loading) |

### 9.9.1 Prohibited Maneuvers — Both Variants

- Aerobatics of any kind.
- Intentional running landings on soft or unprepared surfaces.
- Takeoff or landing on slopes steeper than 10°.
- Intentional full autorotation landings (training only, with appropriate margins).
- Intentional single-engine flight in normal twin-engine operation.
- Moving the anti-torque pedals when the rotor is stopped.
- Flight in known icing conditions (unless anti-ice equipment is fitted and operative).

# 10 Normal Procedures & Checklists

**NOTE** These checklists reflect the simulated aircraft in MSFS 2024 and are abbreviated for simulator use. They do not supersede any real-life flight manual or regulatory checklist. The in-cockpit Asobo EFB provides an interactive checklist for reference during flight.

This chapter describes the normal operating procedures for the AS365 N2 and HH-65A across each phase of flight — from pre-start and engine start, through taxi, takeoff and climb, cruise, descent and approach, to landing and shutdown. Each phase is summarised here in narrative form to explain the intent and sequence of actions; the detailed step-by-step checklists are provided in the chapter 17 Annex.

- Pre-start and start cover the cockpit setup, electrical and fuel configuration
- The engine start sequence with its associated limits and monitoring.
- Taxi and pre-takeoff address ground handling, control and instrument checks, and final configuration for departure.
- Takeoff, climb and cruise describe power management, target speeds and the transition to en-route flight.
- Descent, approach and landing cover the approach profile, configuration and power control through to touchdown.
- Shutdown covers the engine cool-down, securing of systems, and post-flight checks.
- Always follow the full checklist for the phase of flight rather than relying on these summaries alone.

## 10.1 Automatic Start / Shutdown

For convenience, the simulated AS365 N2 / HH-65A includes support for the simulator's automatic start and automatic shutdown logic. This function is intended as a quick-start aid for users who want to get flying without manually completing the full cold-and-dark procedure.

When automatic start is triggered, the aircraft will progressively configure the main systems required for flight. The sequence powers the aircraft, sets the battery contactors, enables essential electrical systems, configures generators and inverters, switches on basic exterior lighting, prepares the fuel system, starts both engines in sequence, advances the engine fuel flow controls to flight position, and brings the rotor into its normal governed range. Once the start sequence is complete, pitot heat and the basic autopilot lanes are also enabled so the aircraft is ready for taxi and takeoff.

Automatic shutdown performs the reverse process in a staged manner. The autopilot lanes are disengaged, the engine fuel flow controls are reduced, the engines are shut down, and the fuel system is secured. As rotor speed decays, the rotor brake is applied automatically when the rotor is within the safe brake-application range. Once the rotor has stopped, the aircraft is returned to a secured state with covers and shutdown-related items restored as appropriate.

**NOTE** Automatic start is a simulator convenience feature. For normal procedural operation, especially when learning the aircraft, use the cockpit checklist or the tPad interactive checklist. Manual starting provides better understanding of the engine sequence, rotor brake logic, fuel controls, electrical system setup, and temperature monitoring.

# 11 Flight Techniques

Where Chapter 10 tells you what to do, this chapter explains how to fly the maneuvers — the control strategy, the expected aircraft behavior, and the common errors. Control input magnitudes are guidance for typical mid weights in calm conditions; adjust for weight, wind and density altitude.

## 11.1 General Handling Notes

- Fly attitude, not the instruments' second-order effects: set an attitude with the cyclic, set power with the collective, keep the aircraft in trim with the pedals, and let speed and rate stabilize before correcting again.
- Use the trim properly: press and hold **TR** for deliberate attitude changes, release it at the new attitude. Constantly fighting the trim (or flying through it without TR) is the most common source of “the autopilot is fighting me” complaints — see Sections 13.4.3 and 14.4.3.
- Make small and calm corrections in the hover rather than large, jerky ones. If a correction is visibly moving the aircraft, it was probably too big.

## 11.2 Hover — Pickup and Holding

Raise the collective smoothly over several seconds. As the aircraft lightens, torque rises and the nose will start to yaw **left** — correct with **right pedal** to hold heading. Expect to counter the Fenestron's translating tendency with a small **right** lateral cyclic input as the wheels leave the ground; the aircraft lifts slightly one-wheel-first, which is normal. Stop the climb at 3–5 ft with a small collective reduction and note the hover torque.

Hold position on outside references well ahead of the aircraft, not the ground directly below. Corrections: pedals for heading, cyclic for position (think centimeters of stick), collective for height. If the hover diverges, do not chase it — level the attitude, stop the drift, then re-establish position.

> **NOTE** Verify pedal direction and drift behavior against the sim — these reflect the clockwise-turning French rotor and Fenestron geometry described in Section 4.1.

## 11.3 Hovering Turns

Lead the turn with smooth pedal and keep the rate low — a full 360° in no less than 15–20 seconds for early practice. Torque changes with pedal input: turns against torque (right, in the Dauphin) need slightly more power, turns with torque slightly less, so guard the collective. In wind, the rate will try to accelerate as the nose passes through downwind — anticipate with opposite pedal pressure rather than reacting late.

## 11.4 Transition to Forward Flight

From the hover, apply gentle forward cyclic to set a slightly nose-low attitude and let the aircraft accelerate — do not dive for speed. Passing roughly 15–25 kt the aircraft enters effective translational lift: expect the light shudder, a climb tendency and a nose-up pitching moment. Hold the attitude through it with a touch of forward cyclic, then set climb power and capture Vy (75 kt AS365 N2 / ~70 KIAS HH-65A). Keep the aircraft in trim through the acceleration; pedal requirements change continuously as airspeed builds.

## 11.5 Climb, Cruise and Descent

Climb at Vy with climb power, then accelerate to cruise. In cruise, set torque first and let speed settle — remember the 88% continuous limit above 75 kt (Section 9.5/8.6). Use the AFCS upper modes for sustained cruise (Chapters 13 and 14); hand-flying, re-trim with TR every time you settle on a new attitude. Plan descents early: reduce torque, hold attitude, and keep descent rates modest below ETL speeds for the reasons in Section 4.6.

## 11.6 Approach and Landing

Fly a constant-angle approach (a sight picture around 8–12° works well) into wind, decelerating so that you arrive at the hover point with airspeed and rate of descent reaching zero together. Passing back through ETL, power demand increases noticeably — this is where underpowered, downwind approaches go wrong, so be on the power early. Terminate in a 3–5 ft hover, then lower the collective smoothly to touch down; once firmly down, collective to minimum.

For running landings (recommended after certain failures, or at weights/altitudes where an OGE hover is marginal): a shallow approach to a smooth touchdown at 20–30 kt on the mains, then gentle braking — respecting the maximum braking speeds in Chapter 9 (38 kt / 70 km/h AS365 N2; 38 or 30 KIAS by weight, HH-65A) and the 10° slope limit.

## 11.7 Decelerations and the Low-Speed Regime

Avoid aggressive quick-stops: a hard aft cyclic with collective dropped will drive rotor RPM up through increased upflow, and the subsequent low-speed, high-power, descending state is exactly the vortex-ring entry condition described in Section 4.6. Decelerate with a measured nose-up attitude, manage NR with collective, and keep the descent rate shallow once below ETL.

## 11.8 Practical Autorotation

Practice this deliberately and often — it is the most perishable helicopter skill. Set up at a safe height (2,000 ft AGL or more for full sequences) over a landable surface.

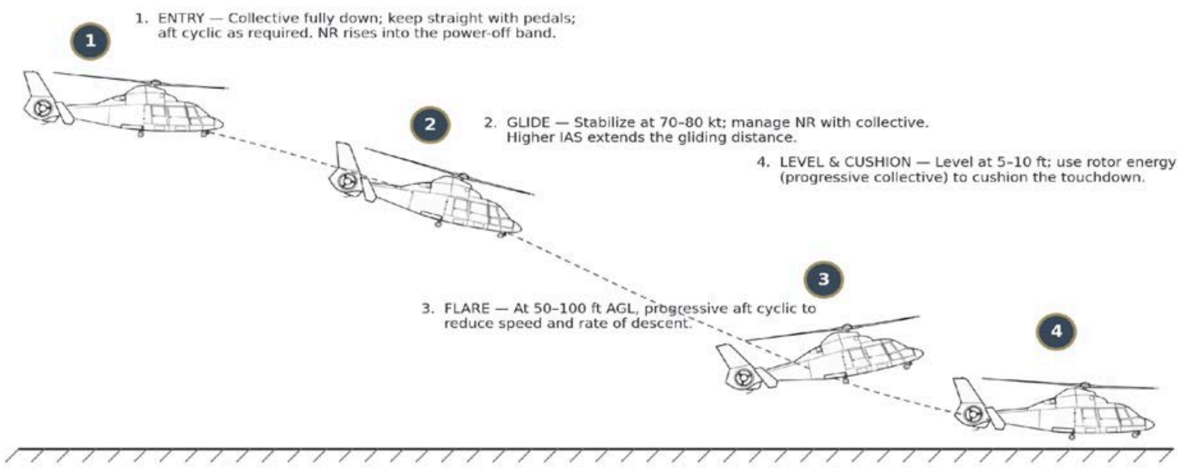



*Figure 11-1 — Power-off approach profile*

- **Entry:** lower the collective fully and promptly. With drive torque gone, the yaw trim changes — ease the pedals toward neutral to keep the aircraft straight. Apply a measured amount of aft cyclic to hold the nose up and the rotor loaded; NR will rise toward the upper band.
- **Glide:** stabilize at 70–80 kt. Manage NR with collective — a small amount of pitch keeps it out of the overspeed band in turns and at high weight; never let it decay below the power-off minimum (Section 9.4). Turns load the rotor and raise NR; anticipate.
- **Flare:** at roughly 50–100 ft AGL, progressive aft cyclic trades airspeed for rotor energy and arrests the descent. Too early wastes the energy high; too late leaves the deceleration unfinished.
- **Level and cushion:** at 5–10 ft, level the aircraft with forward cyclic and use the stored rotor energy — progressive collective — to cushion the touchdown, straight, with minimal ground speed.
- **Common errors:** delaying the entry (NR decays fast), chasing airspeed instead of attitude in the glide, flaring with the wheels out of alignment, and pulling all the collective too early so nothing is left for the last few feet.
-

## 11.9 Single-Engine (OEI) Handling

The Dauphin flies acceptably on one engine at most weights — the discipline is in respecting the OEI ratings (Chapter 9) and flying accurate airspeeds. On a failure: control yaw, lower the nose to hold or capture Vy, and let the live engine spool to the required rating rather than yanking power. Plan a shallow, into-wind approach with a touch of forward speed retained to touchdown (a gentle run-on) instead of demanding an OGE hover the remaining engine may not deliver. The full procedure is in Section 12.1.

# 12 Emergency Procedures

## 12.1 Engine Failure — Twin to Single Engine (OEI)

An engine failure during flight is indicated by a reduction in Ng/MGT on the affected engine, an increase in demand on the remaining engine (torque/MGT rise), and typically an ENG FAIL caution light. On the HH-65A, the fuel control of the surviving engine automatically attempts to compensate.

### 12.1.1 Immediate Actions (both variants)

- **Maintain aircraft control** — prevent yaw toward the failed engine with opposite pedal.
- **Confirm the failed engine** — identify by low or zero Ng, low or zero torque, dropping MGT/t4.
- **Monitor the surviving engine** — ensure it does not exceed OEI limits. Apply OEI power as required — do NOT exceed the 2.5-minute rating unless necessary.
- **Select a landing site** — land as soon as practicable.
- **Declare emergency** as appropriate (radio: MAYDAY / PAN-PAN).

**WARNING** Do not attempt to restart a failed engine in flight unless the engine failure was caused by a known, correctable cause (e.g., a fuel shutoff valve accidentally closed). In all other cases, secure the failed engine and concentrate on a safe landing.

## 12.2 Engine Fire

| | |
|---|---|
| FFCL / fuel shutoff valve (affected engine) | **SHUT OFF** |
| Fire extinguisher (if installed and fire persists) | **DISCHARGE** |
| MGT / t4 | **MONITOR (verify temperature drops)** |
| | **LAND AS SOON AS POSSIBLE** |

## 12.3 Autorotation

Autorotation is the procedure used to land safely following complete loss of engine power (both engines failed). The rotor continues to spin — and provides lift — by the upward airflow through the rotor disc during a controlled descent.

### 12.3.1 Entry

- Lower the collective fully and promptly to enter autorotation and maintain rotor RPM.
- Apply aft cyclic simultaneously (2–3 inches) to prevent nose-down pitching. The amount required increases with higher entry speed.
- Establish a steady autorotation airspeed — typically 70–80 kt provides best glide performance in the Dauphin family.
- Select a landing area and turn toward it.

**CAUTION** Avoid sudden or excessive aft cyclic input. An excessive nose-up attitude can cause rotor overspeed. At high gross weights, use collective to control rotor RPM within normal limits if overspeed occurs.

### 12.3.2 Flare and Landing

- At approximately 50–100 ft AGL, apply progressive aft cyclic to flare, trading airspeed for rotor kinetic energy.
- Level the aircraft with forward cyclic at approximately 5–10 ft AGL.
- Apply collective progressively to cushion the touchdown. Manage rotor RPM through collective — do not over-pitch.

**WARNING** Intentional full-touchdown autorotations are prohibited in real operations. In the simulator, practice with adequate altitude margins. Abrupt collective application at low rotor RPM will result in hard contact.

## 12.4 Hydraulic System Failure

Loss of hydraulic pressure to the flight control servos results in significantly increased control forces. The Dauphin uses dual hydraulic circuits; total hydraulic failure is rare but possible.

- **Reduce airspeed** — lower speed reduces aerodynamic loads and required control forces.
- **Select a landing site** — land as soon as practicable.
- **Use smooth, deliberate inputs** — avoid rapid or large control deflections.

**CAUTION** High-speed flight with hydraulic failure is not recommended. The pilot must be prepared for substantially heavier-than-normal control forces throughout the approach and landing.

## 12.5 Main Gearbox (MGB) Oil Pressure Failure

- **MGB.P warning (AS365 N2) / MGB oil pressure warning (HH-65A)** — land immediately.
- **Do not attempt to continue flight** — MGB seizure can occur rapidly after oil pressure loss.
- Reduce power to the minimum required to reach the nearest suitable landing area.

# 13 AFCS — AS365 N2 (AP155 + CDV 85, 3-Axis Coupler)

## 13.1 Purpose and Scope

This chapter describes the Automatic Flight Control System (AFCS) as modeled, with the AP155 3-axis autopilot (Pitch/Roll/Yaw) and the CDV 85 coupler / flight director computer. The system provides:

- 3-axis stabilization and attitude hold (AP155).
- Coupled guidance modes driven by the CDV 85: ALT, V/S, A/S, G/A, HDG, VOR, NAV(GPS), V/L(LOC), G/S.
- Flight Director (FD) guidance and Coupler (CPL) coupling to the autopilot.

## 13.2 System Overview (What Controls What)

### 13.2.1 The Building Blocks (Cascading Concept)

Think of the AFCS in layers that stack on top of each other:

- **Stability layer (**Stability Augmentation System **- SAS):**
  Damps low-amplitude motion and reduces pilot workload. Always on when AFCS lanes and channels are engaged.
- **Attitude hold layer (**Automatic Stabilization Equipment **- ASE):**
  Holds a stored attitude reference. This reference can be updated in one large and immediate step using the Trim Release button or in several small steps using the cyclic beep trim coolie hat (see also 13.3.3). You can “fly through” the forces to maneuver (see 13.4.3) and re-center to return to the stored reference.
- **Coupled guidance layer (CDV 85 modes):**
  When a higher-order mode is selected (ALT, V/S, A/S, HDG, VOR, NAV, LOC, G/S), the coupler computes the required pitch/roll/yaw commands and drives the autopilot to achieve the target. The Flight Director (FD) shows the same guidance as command bars on the ADI.

### 13.2.2 Axis Ownership (Critical Rule)

Coupler modes own specific control axes:

- **Vertical modes** (ALT, V/S, A/S, G/A, G/S) primarily command the **pitch axis**.
- **Lateral modes** (HDG, VOR, NAV(GPS), V/L/LOC) command the **roll/yaw axes**.

**One mode per axis family at a time:** selecting a new mode in the same family replaces the previous one (for example, selecting V/S replaces ALT as the active vertical mode).

### 13.2.3 Flight Director vs Coupler (Who Is Flying?)

| Configuration | Who Flies? |
|---|---|
| **FD ON, CPL OFF** | You fly manually, following the command bars. |
| **FD ON, CPL ON** | The autopilot flies the commands; you monitor via the command bars and instruments. |
| **FD OFF, CPL ON** | The autopilot can still fly coupled commands; you monitor by instruments/annunciations. |

## 13.3 Controls and Indications

### 13.3.1 AP155 Autopilot Control Unit (Core)

- **LANE 1 / LANE 2:** Autopilot computers. Both should be ON for normal operations.
- **PITCH / ROLL / YAW:** Individual axis channel engagement switches.
- **SAS / ASE selector:** SAS = stability augmentation only; ASE = attitude hold (normal operating mode).
- **Auto-trim switches (per axis):** Enable automatic trim coordination on each axis.

*Practical takeaway:* If you want the system to control an axis, the corresponding **channel must be engaged**. For normal operations, both lanes, all three channels, and ASE should be ON — this matches the engine start checklist in Section 10.2.

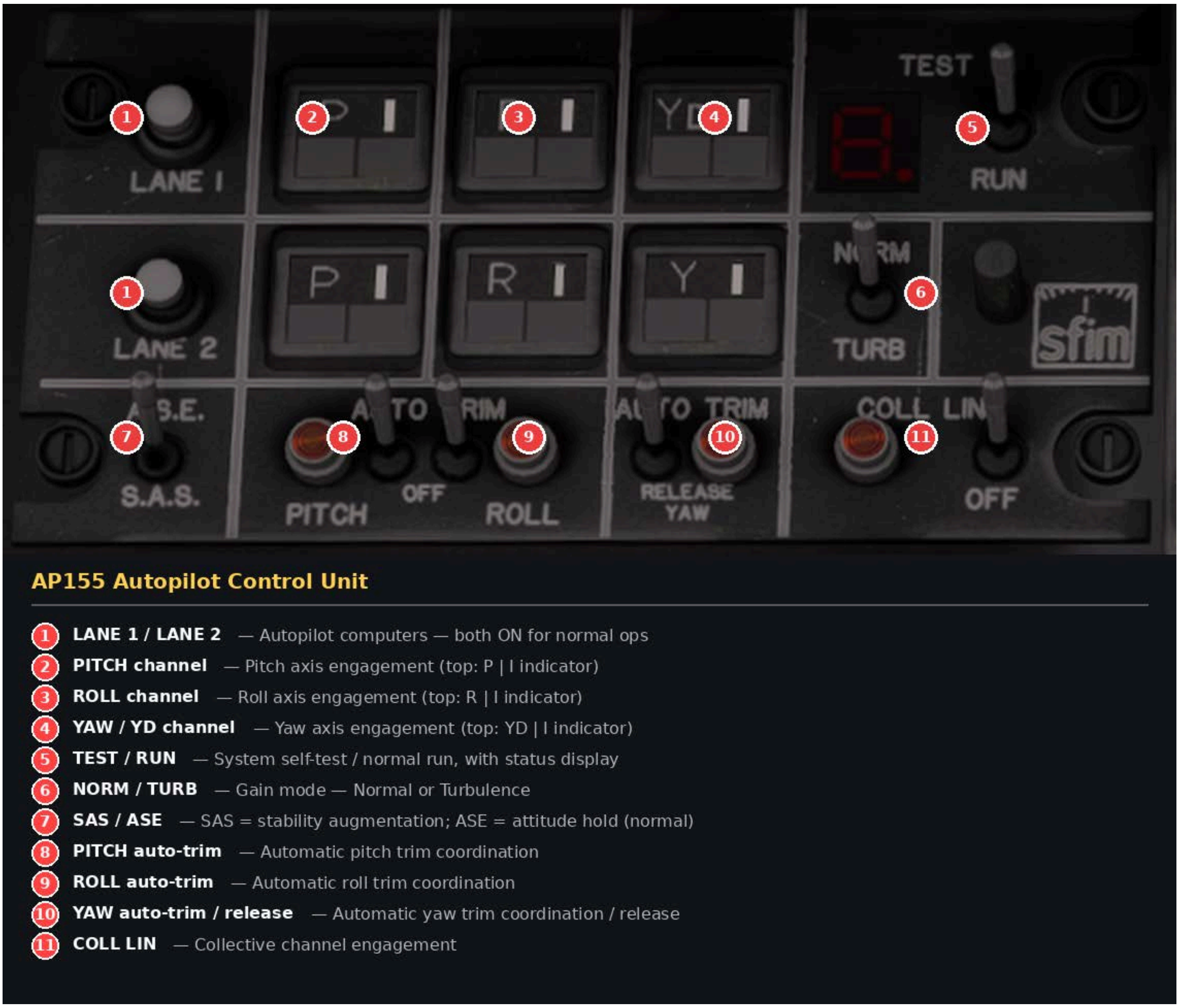



*Figure 13-1 — Autopilot control unit AS365*

### 13.3.2 Coupler / FD Mode Controls (Guidance)

- **F/D:** Enables flight director command cues on the ADI. Command bars only appear when at least one lateral or vertical upper mode is active.
- **CPL:** Couples the guidance to the autopilot (autopilot follows FD commands). Without CPL, the FD provides guidance bars but the autopilot does not follow them.

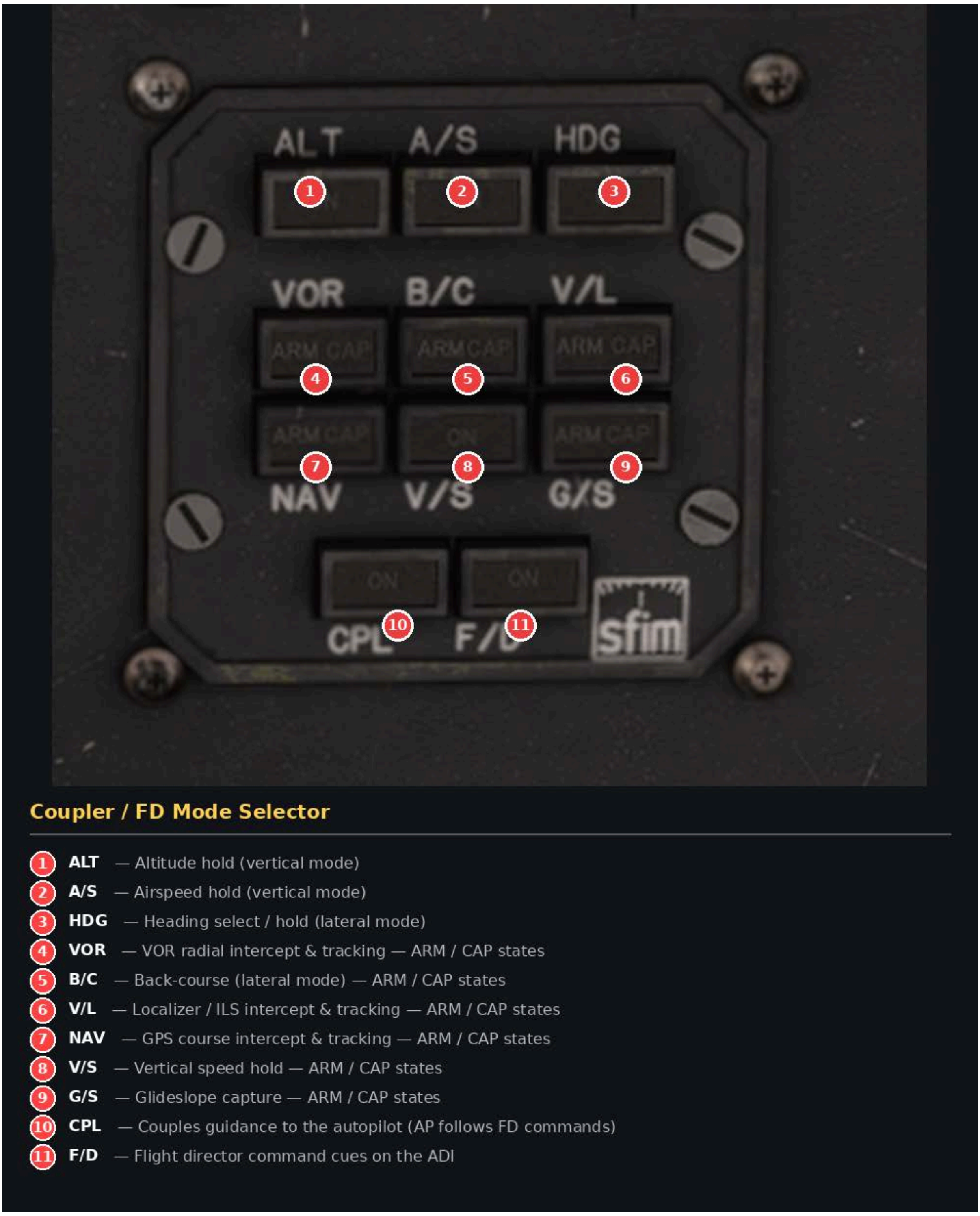



*Figure 13-2 — Autopilot coupler unit AS365*

### 13.3.3 Pilot Grips (High-Use Functions)

- **Coupler / higher-order mode release (cyclic):** Drops all coupled guidance modes while keeping the base autopilot (SAS/ASE) available. Use for rapid reversion to manual attitude hold.
- **Trim Release — TR (cyclic):** Must be pressed and held whenever manual cyclic inputs are made during ASE or upper mode operation. Releasing the TR button causes the autopilot to restore the reference attitude. If enabled on the tPad (GAMEPLAY → AFCS ANNUNCIATORS), a green LED on the main instrument panel lights up whenever a TR press is recognized.

**NOTE** The function of the **Trim Release** button is the **single most important concept** for flight simmers to understand a helicopter fitted with AFCS! Pressing and holding this button, which is located on the cyclic grip and **needs to be bound to a physical button**, releases the artificial spring forces produced by the trim actuators holding the cyclic in its position. Technically, you are now temporarily in SAS mode! The cyclic control persists, you can normally fly the helicopter, only the artificial spring forces produced by the trim actuators are cancelled. As soon as you release this button, the trim actuators close again and hold the cyclic at this very position. At the same time, the new attitude reference is stored and kept by the ASE.

- **Beep Trim (4-way):** Acts as a conventional trim when the AFCS is off or ASE is de-selected (SAS mode). With ASE ON, it adjusts the attitude reference in fine steps. When an upper mode is active on the pitch or roll axis, beep trim in that axis direction is inhibited.
- **A/S Hold (cyclic):** Quick engage/disengage of airspeed hold mode.
- **G/A pushbutton (collective):** Engages go-around mode.

**NOTE** Selecting SAS (instead of ASE) at the SAS/ASE selector, or switching off TRIM FEEL CYCL on the overhead panel, has the same effect as holding TR — but also inhibits ASE and any upper modes. In normal flight, use the TR button for manual inputs rather than these alternatives.

### 13.3.4 V/S Target Selection (Vertical Speed Selector)

**Vertical speed is pre-selected with a rotary knob located at the VVI**. Turning the knob moves an orange reference needle on the VVI to the desired vertical speed. Pressing **V/S** engages the mode using that selected reference value.

## 13.4 Normal Use

### 13.4.1 Recommended Engagement Flow

- Confirm engagement of **LANES 1** and **2** and the three **AFCS channels PITCH/ROLL/YAW** (red AP warning light is out).
- Select **SAS** or **ASE** as desired (**ASE** is the standard default).
- Turn **F/D ON** (optional but recommended for situational awareness).
- Turn **CPL ON** to allow the autopilot to fly coupled modes.
- Hand-fly the helicopter into a position with a **stable** pitch and roll attitude and a **constant** speed and a **constant** vertical speed
- Select a **lateral mode** (HDG / VOR / NAV(GPS) / V/L) as needed.
- Select a **vertical mode** (ALT / V/S / A/S / G/A / G/S) as needed.

### 13.4.2 The Single Most Important Technique Note

**WARNING** **The coupler is NOT an auto-throttle**. Many modes will control **attitude** to achieve a target, but **power management remains the pilot's responsibility at all times**. Expect to adjust torque/collective especially during captures (V/S, G/S, go-around).

### 13.4.3 Fly-Through / Disengagement / Interruption

- **Fly-through:** Moving the cyclic against the trim loads actuates the load-sensing contact in the trim actuator, inhibiting the automatic trim function. When the cyclic is released to its spring centered position, the autopilot restores the reference attitude. This is simulated by detecting cyclic deviation from a reference datum set when the TR button is released. If enabled on the tPad (GAMEPLAY → AFCS ANNUNCIATORS), a blue LED on the main instrument panel lights up whenever a fly-through is recognized.
- **Coupler release (on cyclic):** Quickly drops all higher-order modes while keeping the base autopilot available.
- **Mode replacement:** Selecting a different mode in the same axis family replaces the current one automatically.

**CAUTION** During maneuvers with ASE or upper modes active, always press and hold the TR button before making cyclic inputs. Otherwise you will be triggering the fly-through mode or fight the autopilot!

## 13.5 Upper Modes Reference

### 13.5.1 ALT — Altitude Hold

**Pilot Actions**

- Stabilize at the desired altitude (steady pitch, low vertical speed, ideally <200 fpm).
- Press **ALT**.
- To change altitude: disengage ALT, climb/descend to the new altitude, then re-engage ALT or
- Select another vertical mode (V/S or A/S) as appropriate.

**Indications**

- ALT annunciation indicates the mode is active.
- An altitude deviation warning will occur if you drift significantly away from the captured
- altitude (± 150 ft).

**Limitations / Good Practice**

- **Operating envelope**: IAS higher than **Vy (75 kt)**, vertical speed within **±1,000 ft/min** at engagement.
- ALT holds altitude by commanding pitch; **manage power** to avoid large airspeed changes.

**Common Errors**

- **Engaging ALT while still climbing or descending:** leads to unstable capture or hunting.

- **Expecting ALT to maintain airspeed:** it holds altitude; speed depends on power.

### 13.5.2 V/S — Vertical Speed Hold

**Pilot Actions**

- Set desired vertical speed reference using the **VVI rotary knob** (orange needle).
- Press **V/S** to engage.
- **Adjust collective** as required to maintain a safe airspeed while V/S holds the selected climb/descent rate.

**Indications**

- V/S annunciation indicates the mode is active.
- The orange VVI needle shows the selected target.

**Limitations / Good Practice**

- **Operating envelope**: IAS above **Vy (75 kt)**,
- V/S holds rate by commanding pitch; manage collective for airspeed control.
- Use conservative V/S targets at low airspeed or high gross weight.

**Common Errors**

- **Treating V/S as "set-and-forget"** — airspeed can diverge without power management.
- **Selecting an excessive climb rate without adequate power margin** — will bleed airspeed.

### 13.5.3 A/S — Airspeed Hold

**Pilot Actions**

- Stabilize at the desired IAS.
- Press **A/S** (or use the quick-access switch on the cyclic). The current IAS becomes the reference.
- To change reference airspeed, use beep trim up/down

**Indications**

- A/S annunciation active.
- A digital airspeed reference readout will be displayed in your ASI.

**Limitations / Good Practice**

- **Operating Envelope**: IAS minimum **40 kts**
- A minimum selectable reference will apply (speed references below 40 kts are inhibited).
- Airspeed hold commands pitch; you must still manage power for climb/descent performance and rotor/torque limits.

**Common Errors**

- **Expecting A/S to hold altitude** — it holds airspeed only, altitude will vary with collective power setting.

### 13.5.4 G/A — Go-Around

**Pilot Actions**

- Press the **G/A** pushbutton on the **collective**.
- **A/S reference** will be set to **Vy = 75 kts** (Vy: best rate of climb speed) and digitally displayed on the IAS gauge
- A/S reference is **not adjustable** in G/A mode
- Adjust collective as required

**Indications**

- G/A annunciation indicates the mode is active.
- A fixed airspeed reference is commanded (go-around target speed behavior).

**Limitations / Good Practice**

- Go-around climb performance depends heavily on power margin and configuration.
- Use G/A as a structured escape: stabilize → add power → confirm flight path → then configure.
- G/A can be deselected by pressing it again or by engaging another vertical mode.

**Common Errors**

- **Pressing G/A without adjusting collective** — the pitch command can cause a descent without a corresponding collective input.
- **Not monitoring rate of climb**: the helicopter can accelerate/decay depending on power and pitch limits.

### 13.5.5 HDG — Heading Select / Hold

**Pilot Actions**

- Set the desired heading with the HDG bug on the HSI.
- Press **HDG**. The system turns towards the selected HSG and holds it, once acquired.
- To change heading: adjust the HDG bug — the aircraft turns to the new heading.

**Indications**

- HDG annunciation indicates the mode is active.

**Limitations / good practice**

- **Operating Envelope**: IAS minimum Vy (**75 kts**)
- Bank angle limits apply; don't expect aggressive turns at high speed.

**Common Errors**

- Trying to use lateral beep trim while coupled: lateral trim inputs are inhibited - use heading bug.

### 13.5.6 VOR — VOR Radial Intercept & Tracking

**Pilot Actions**

- Tune and identify a VOR on **NAV2**.
- Verify that the **NAV source selector** switch on the pilot's NAV switching unit is on "**VOR2**"
- Set the desired radial/course on the pilot's HSI.
- Choose a reasonable intercept heading (moderate intercept angles work best).
- Press VOR to arm/capture -
    - intercept HDG is greater than 45°:
        a. The "ARM" light goes off.
        b. The "CAP" light comes on.
        c. The "VOR" light stops flashing.
        d. The "HDG" mode light goes off (if the mode was engaged)
        e. The helicopter turns to take an intercept heading equal to the heading of the radial ± 45°:
        f. When the course deviation is less than a specified threshold, the helicopter turns to align with the QDM or selected radial and follows it (tracking mode).
    - intercept HDG is less than 45°:
        g. In this case, the tracking phase starts when the intercept heading is less than a specified threshold.
        h. It is possible to align the helicopter with the radial manually, before engaging the VOR mode. In this case, the system is directly switched to the tracking mode.

**Indications**

- VOR annunciation shows armed/captured states.
- CDI movement should trend toward center during capture.

**Limitations / Good Practice**

- Operating Envelope: IAS minimum **75 kts**, max intercept angle **90°**, minimum intercept distance: **20 NM**
- Very large intercept angles can delay capture or cause overshoot and oscillation around desired track.
- Station passage behavior can temporarily degrade guidance (cone of silence); expect momentary tracking uncertainty near the beacon.

**Common Errors**

- **Arming VOR with poor intercept geometry**: leads to S-turning or delayed capture.
- **Expecting perfect tracking at station passage**: anticipate transient behavior, monitor amber "OSS" light; "VOR" light flashes

### 13.5.7 NAV (GPS) — Course Intercept & Tracking

**Important**: NAV(GPS) is different from VOR but uses the same interception/ tracking principles. The difference is the **source** (switch on **NAV Switching Unit**): "NAV" uses the GPS course guidance instead of the NAV2/VOR receiver. This switch has **priority over the "CDI" button** on the PMS50 GTN750 and the TDS GTNXi750, that's why the CDI button is deactivated or overridden!

**Pilot Actions**

- Verify that the CRS switch on the pilot's NAV switching unit is on "NAV"
- Ensure the GPS has an active leg/course to track (direct-to or flight plan leg)
- Set course display as appropriate for your avionics configuration
- Select a reasonable intercept heading
- Press NAV to arm/capture
- Monitor capture and tracking; if the GPS leg changes, expect the AFCS to follow the new commanded course

**Indications**

- NAV annunciation shows armed/captured states
- Course deviation should center as capture completes

**Limitations / Good Practice**

- Operating Envelope: analogue to VOR
- GPS course changes can be abrupt (leg sequencing, procedure turns). Be ready to intervene if the commanded turn is not desired
- Ensure the GPS source is actually driving the nav output (pilot's NAV switching unit)

**Common errors**

- **Using NAV when the GPS isn't the active source**: results in "no guidance" or unexpected tracking
- **Letting the GPS auto-sequence into a turn you didn't brief**: always monitor the next leg

### 13.5.8 Fully Automated ILS Approach

**V/L (LOC) — Localizer Intercept & Tracking**

- Tune and identify the ILS frequency on **NAV2** (display on pilot's HSI)
- Tune and identify the ILS frequency on **NAV1** (display on pilot's ADI to detect possible discrepancies)
- Set the inbound localizer **course on the HSI**
- Switch on the radar altimeter and **set DH**
- Arm the automatic intercept function by pressing the "**V/L**" and "**G/S**" push-buttons
- The "**ARM**" indicator light comes on (on control panel). The "V/L" and "G/S" lights start flashing (on function annunciator panel)
- **Test** the "**excessive deviation detector**" by pressing the "V/L" and "G/S" push-buttons : the amber lights come on
- Before the glide path is intercepted, stabilize the helicopter at **100 ± 20 kts**
- Establish a **stable intercept** (moderate intercept angle – max 45°)
- Automatic capture of the localizer is initiated when the course deviation is less than a specific threshold:
    - The "V/L" - "ARM" light goes off (on control panel).
    - The "V/L" - "CAP" light comes on (on control panel).
    - The "V/L" light becomes steady (on function annunciator panel).
    - The "HDG" light goes off (if the function is operating).
    - The helicopter turns and the system is switched to the "LOC" tracking phase

**G/S (GLIDE) — Glideslope Capture**

**Pilot actions and Indications**

The automatic “GLIDE” capture is initiated when the GLIDE deviation is less than a specific threshold:

- The "**G/S**" - "**ARM**" light goes off (on control panel)
- The "**G/S**" - "**CAP**" light comes on (on control panel)
- The "**G/S**" light stops flashing and **stays on** (on function annunciator panel)
- The mode previously engaged on the pitch channel goes off
- At capture, **manage power** smoothly (set torque to around 35% upon G/S intercept) to prevent an unwanted increase of airspeed
- Glideslope tracking is pitch-driven; **power changes matter**
- At **DH disconnect CPL** and **take over manually**, otherwise at a radar altimeter height above GND of about 100 ft, the helicopter will automatically level of and maintain a height of around 80 ft

**Limitations / Good Practice**

- Operating Envelope:
    - IAS recommended 100 ± 20 kts
    - recommended intercept angle 45°
    - minimum intercept distance: 6 NM
- Large intercept angles can produce overshoot (excessive deviation warning light); use a controlled intercept.

**Common errors**

- Arming V/L too early or from an unstable intercept: increases overshoot and workload
- Chasing the needle manually while coupled: let the system converge; intervene only if it diverges
- Trying to “help” by pushing/pulling against the system: either let it track or disconnect and fly manually

### 13.5.9 Semi-Automatic ILS Approach

- Use the "Localizer" mode as described previously
- Engage A/S hold function and follow the GLIDE path manually, by action on the collective pitch

> **CAUTION:** In this case, the glide deviation detector and the automatic radio altimeter level flight function will not be operative!

## 13.6 Practical Tips for Sim Users

### 13.6.1 Best Setup Combination for Stable Cruise

- Lateral: HDG (for heading hold) or NAV(GPS) (for route tracking).
- Vertical: ALT for level cruise; V/S for planned climb/descent; A/S for speed-managed cruise.
- FD ON for awareness; CPL ON when you want the autopilot to fly the modes.

### 13.6.2 When Things Don't Behave as Expected

- Verify LANE 1 and 2 are ON and the AP warning light is out.
- Verify CPL is ON if you expect the autopilot to fly a coupled mode.
- Verify the navigation source:
  - **VOR** expects **NAV2/VOR**
  - **ILS** (LOC; G/S) expects **NAV2/ILS**
  - **NAV** expects **GPS** guidance
- In ASE mode, **pressing and holding TR** is required before any manual cyclic inputs — otherwise you will fight the system or trigger fly-through mode.
- If the aircraft diverges unexpectedly: switch off CPL → stabilize manually → re-engage as required.

# 14 AFCS — HH-65A (AFCS + FDS-255, 4-Axis)

## 14.1 Purpose and Scope

This chapter describes the Automatic Flight Control System (AFCS) and Flight Director System (FDS-255) as modeled in the HH-65A Dolphin. The system provides:

- **3-axis stabilization and attitude hold**
- **4 axis Flight Director (FD) modes**: IAS, VS, ALT, IAS-VS, HDG SEL, NAV, APPR, T-HOV, HOV AUG, GA

## 14.2 System Overview

### 14.2.1 The Building Blocks (Cascading Concept)

Think of the AFCS in layers that stack on top of each other:

- **Stability layer (**Stability Augmentation System **- SAS):**
  Damps low-amplitude motion and reduces pilot workload. Always on when AFCS axes are engaged.
- **Attitude hold layer (**Automatic Stabilization Equipment **- ASE):**
  Holds a stored attitude reference. This reference can be updated in one large and immediate step using the Trim Release button or in several small steps using the cyclic beep trim coolie hat (see also 14.3.3). You can "fly through" the forces to maneuver (see 14.4.3) and re-center to return to the stored reference.
- **Flight Director System (FDS-255)**: Higher-order guidance computer that computes commands for pitch, roll, and collective and drives the AFCS to achieve the target flight path. Modes are displayed on the AMAP and on ADI command bars/pointers.

### 14.2.2 Axis Ownership (Critical Rule)

Each FD mode commands one or more specific AFCS axes:

- **Pitch modes** (IAS, VS, ALT, IAS-VS, APPR, T-HOV, HOV AUG, GA) — command the pitch axis and sometimes collective
- **Lateral modes** (HDG SEL, NAV, APPR, T-HOV, HOV AUG, GA) — command the roll axis
- **Collective modes** (IAS-VS, APPR, T-HOV, HOV AUG, GA) — command the collective axis

**One mode per axis family at a time.** Selecting a new mode in the same family deselects the previous one.

### 14.2.3 Flight Director vs AFCS (Who Is Flying?)

| Configuration | Who Flies? |
|---|---|
| FD CPL ON, mode selected | The AFCS flies the FD commands; the crew monitors. |
| FD UNCOUPLE (FD CPL OFF) | The AFCS reverts to attitude hold; the crew flies manually in ASE mode using the Trim Release button. |
| AFCS Quick-Disconnect | All four axes disengaged; no basic stabilization! |

## 14.3 Controls and Indications

### 14.3.1 AFCS Control Panel (Core)

- **Bathandles (PITCH / ROLL / YAW / COLL)**: move forward to engage the individual axis. All four must be forward for full 4-axis operation. AFCS caution light extinguishes when all axes are engaged
- **TRIM pushbutton**: enables/disables the pitch and roll parallel trim motors and the beep trim circuitry. A chevron light above indicates trim is on; amber **TRM OFF** light on the avionics mode annunciator panel extinguishes. Trim is ON by default at power-up.
- **FD CPL pushbutton**: couples or uncouples the FDS to/from the AFCS. Chevron light illuminates when coupled; **FD UCPL** on the annunciator goes out.
- **Avionics Mode Annunciator Panel (AMAP)**: amber indicator lights for each axis (PITCH, ROLL, YAW, COLL), trim-off warning (TRM OFF), FD uncoupled (FD UCPL), and collective sync (C SYNC).

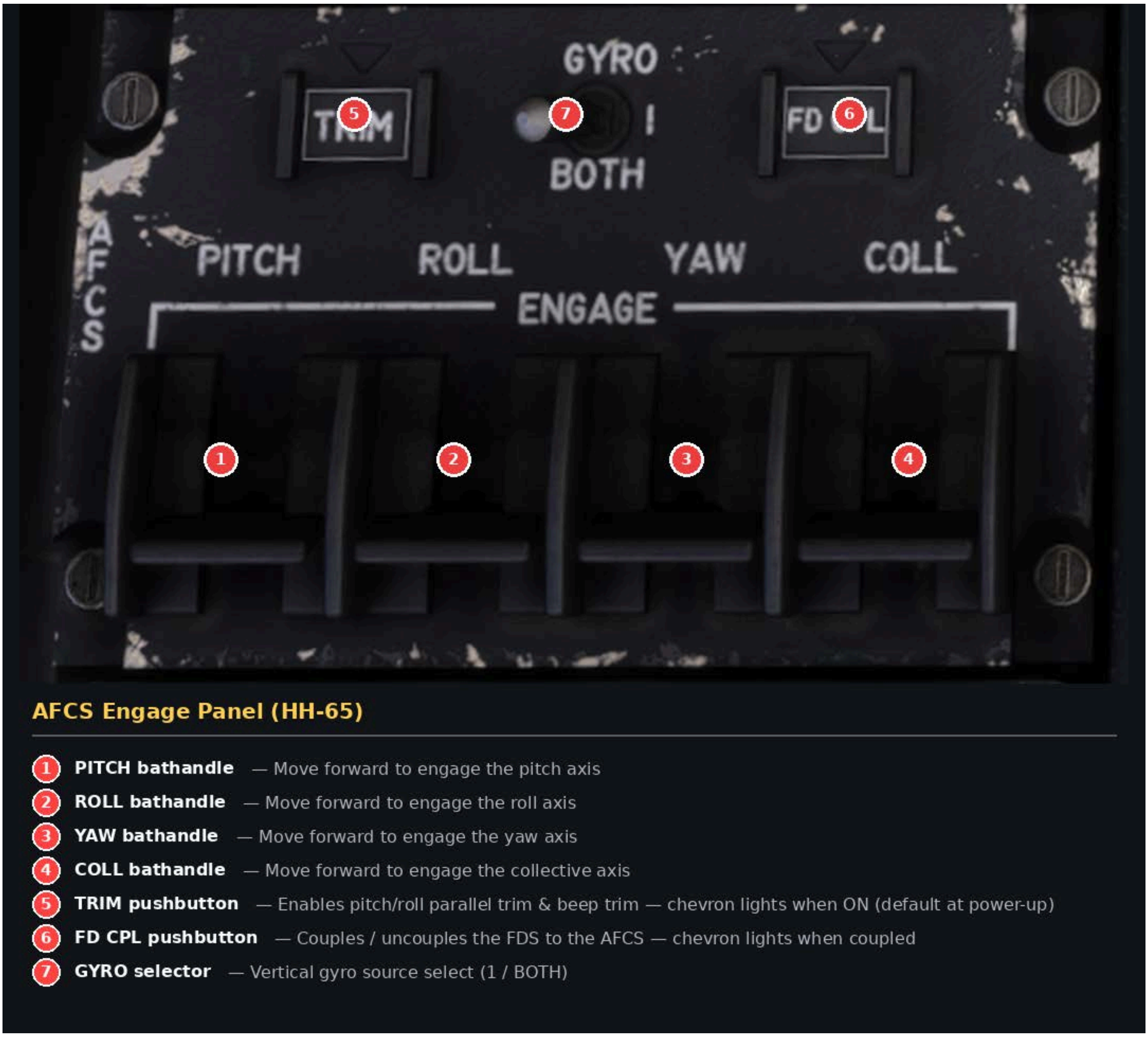



*Figure 14-1 — AFCS panel HH65*

### 14.3.2 Flight Director Control Panel (Guidance Modes)

- **IAS**: Airspeed hold. Press to engage at the current IAS. The FD Slew switch (forward/aft) adjusts the speed reference (CMD airspeed is displayed on the HSVD).
- **VS**: Vertical speed hold at the current rate.
- **ALT**: Altitude hold.
- **IAS-VS**: Combined — pitch holds **IAS**, collective holds **VS**. Automatically arms T-HOV (automatic transition to hover to 50 ft AGL).
- **HDG SEL**: Heading select. Set the bug on the HSVD; press HDG SEL.
- **NAV**: Course intercept and tracking (VOR / TACAN / LOC in non-approach sensitivity).
- **APPR**: Full ILS approach — localizer capture, glideslope capture, and automatic transition to hover to 50 ft AGL.
- **NAV XFR**: Transfers navigation source control. Deactivates all FD modes when pressed. Green **NAV CTRL** indication light on main instrument panel shows which side (pilot or copilot) currently has AP control.
- **T-HOV**: Transition to Hover — captures the current radar altitude and decelerates to zero airspeed.
- **HOV AUG**: Hover Augmentation — active stabilization in hover using OADS and the radar altimeter.
- **GA**: Go-Around.

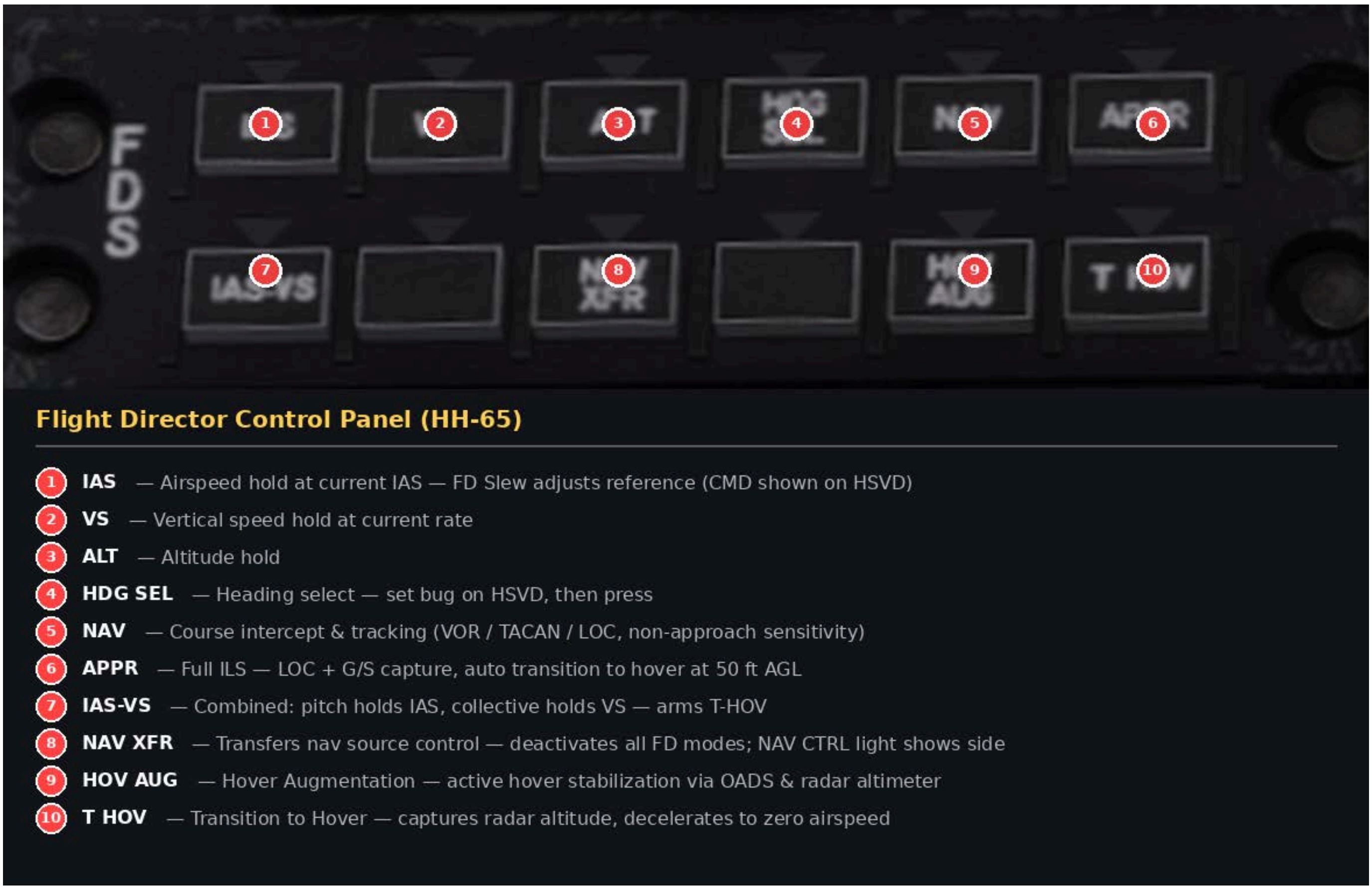



*Figure 14-2 — FDS panel HH65*

### 14.3.3 Cyclic Switches

- **Trim Release — TR:** Must be pressed and held whenever manual cyclic inputs are made during ASE or upper mode operation. Releasing the TR button causes the autopilot to restore the reference attitude. If enabled on the tPad (GAMEPLAY → AFCS ANNUNCIATORS), a green LED on the main instrument panel lights up whenever a TR press is recognized.

> **NOTE** The function of the **Trim Release** button is the **single most important concept** for flight simmers to understand a helicopter fitted with AFCS! Pressing and holding this button, which is located on the cyclic grip and **needs to be bound to a physical button**, releases the artificial spring forces produced by the trim actuators holding the cyclic in its position. Technically, you are now temporarily in SAS mode! The cyclic control persists, you can normally fly the helicopter, only the artificial spring forces produced by the trim actuators are cancelled. As soon as you release this button, the trim actuators close again and hold the cyclic at this very position. At the same time, the new attitude reference is stored and kept by the ASE.

- **Beep Trim ( 4-way):** Acts as a conventional trim when the AFCS is off or ASE is de-selected (SAS mode). With ASE ON, it adjusts the attitude reference in fine steps. When an upper mode is active on the pitch or roll axis, beep trim in that axis direction is inhibited.
- **FD Slew switch (4-way)**: In IAS and IAS-VS modes: adjusts the airspeed reference. In T-HOV: adjusts lateral/longitudinal hover velocity. Inactive in HOV AUG.

> **NOTE** Switching off the **TRIM** pushbutton on the AFCS Control panel has the same effect as holding TR — but also inhibits ASE and any upper modes. In normal flight, use the TR button for manual inputs rather than this alternative.

### 14.3.4 Collective Switches

- **FD UNCOUPLE (collective):** Drops all coupled guidance modes while keeping the base autopilot (SAS/ASE) available. Use for rapid reversion to manual attitude hold.
- **GA pushbutton**: Engages Go-Around mode; deselects any active FD mode.
- **C-SYNC**: Collective Sync — updates the VS reference in IAS-VS; adjusts the hover height reference in T-HOV / HOV AUG.
- **Hover Beep Control (2-way)**: changes hover height reference by 3 ft per beep in T-HOV / HOV AUG.

## 14.4 Normal Use

### 14.4.1 Recommended Engagement Flow

- Verify all four **AFCS bathandles** are forward (ON) and the AFCS caution light is out.
- Set **FD CPL — ON**.
- Select **SAS** or **ASE** as desired (**ASE** is the standard default).
- Turn **FD CPL ON** to allow the autopilot to fly coupled modes.
- Hand-fly the helicopter into a position with a **stable** pitch and roll attitude and a **constant** speed and a **constant** vertical speed
- Select a **lateral mode** (HDG / VOR / NAV(GPS) / V/L) as needed.
- Select a **vertical mode** (ALT / V/S / A/S / G/A / G/S) as needed.

### 14.4.2 The Single Most Important Technique Note

> **WARNING** The FDS is NOT an auto-throttle. IAS mode controls pitch to hold speed. IAS-VS controls both pitch (IAS) and collective (VS). In modes like ALT and VS, power management is the pilot's responsibility. Expect to adjust torque especially during captures and transitions.

### 14.4.3 Fly-Through / Disengagement / Interruption

- **Fly-through:** Moving the cyclic against the trim loads actuates the load-sensing contact in the trim actuator, inhibiting the automatic trim function. When the cyclic is released to its spring centered position, the autopilot restores the reference attitude. This is simulated by detecting cyclic deviation from a reference datum set when the TR button is released. If enabled on the tPad (GAMEPLAY → AFCS ANNUNCIATORS), a blue LED on the main instrument panel lights up whenever a fly-through is recognized.
- **FD UNCOUPLE (on collective):** Quickly drops all higher-order modes while keeping the base autopilot available.
- **Mode replacement:** Selecting a different mode in the same axis family replaces the current one automatically.

## 14.5 Mode Reference

### 14.5.1 IAS — Indicated Airspeed Hold

**Pilot Actions**

- Press IAS on the FD panel. The current IAS becomes the reference (displayed as CMD on the HSVD).
- Use the FD Slew switch (forward/aft) to adjust the airspeed reference at 4 kt/sec. Range: 40–150 KIAS.

**Indications**

- IAS annunciator on the AMAP illuminates. The pitch command bar on the ADI provides guidance. Airspeed is shown as CMD on the HSVD.

**Limitations / Good Practice**

- Operating envelope: above 40 KIAS. IAS controls pitch; altitude varies with collective. Manage collective for altitude.

**Common Errors**

- Expecting IAS to hold altitude — it holds speed; altitude depends on collective.

### 14.5.2 VS — Vertical Speed Hold

**Pilot Actions**

- Establish the desired vertical speed.
- Press VS. The current rate becomes the reference.
- To change the reference: deselect VS, adjust the rate, re-select.

**Indications**

- VS annunciator on the AMAP. Pitch command bar on the ADI.

**Limitations / Good Practice**

- Minimum 70 KIAS; 0 to ±3,000 fpm. If VS is below ±150 fpm at engagement, the system behaves as ALT hold.

**Common Errors**

- Treating VS as set-and-forget — airspeed can diverge without power management.

### 14.5.3 ALT — Altitude Hold

**Pilot Actions**

- Stabilize at the desired altitude (low VS, steady pitch).
- Press ALT.

**Indications**

- ALT annunciator on the AMAP. Pitch command bar on the ADI.

**Limitations / Good Practice**

- Minimum 70 KIAS. ALT holds with pitch; manage power to avoid airspeed changes.

**Common Errors**

- Engaging ALT while climbing or descending — leads to unstable capture.

### 14.5.4 IAS-VS — Combined Airspeed + Vertical Speed Hold

**Pilot Actions**

- Press IAS-VS. Pitch holds the IAS reference (adjust with Slew). Collective holds the VS reference. Use C-SYNC to change the VS reference.

**Indications**

- IAS-VS annunciator and T-HOV arm (amber) both illuminate on the AMAP. Both ADIs show pitch and collective command pointers.

**Limitations / Good Practice**

- Minimum 40 KIAS; 0 to ±3,000 fpm; maximum 80% MCP. Automatically arms T-HOV — if below 2,500 ft radar altitude and descending to 100 ft AGL, T-HOV captures automatically.

**Common Errors**

- Ignoring the T-HOV arm indication — the system may initiate a transition to hover automatically. Monitor radar altitude.

### 14.5.5 HDG SEL — Heading Select

**Pilot Actions**

- Set the desired heading on the HSVD using the HDG select knob.
- Press HDG SEL.

**Indications**

- HDG SEL annunciator and the chevron above the button both illuminate.

**Limitations / Good Practice**

- Minimum 40 KIAS. HDG SEL drops automatically at NAV or APPR course capture.

**Common Errors**

- Engaging HDG SEL while banked — the system levels the wings first, then turns to the heading.

### 14.5.6 NAV — Course Intercept & Tracking (VOR / TACAN / LOC)

**Pilot Actions**

- Tune the nav source (VOR, TACAN, or LOC) and select it on the HSVD (V/L or TACAN button).
- Set the desired course on the HSVD with the CRS set knob.
- Establish a reasonable intercept heading (max 90° intercept angle).
- Press NAV. Arms amber if the CDI is more than 2 dots off; captures green and the aircraft turns onto a 50° course cut at a maximum of 25° bank.

**Indications**

- NAV: amber (armed), green (captured). The DR light illuminates during VOR/TACAN station passage.

**Limitations / Good Practice**

- Above 40 KIAS, max 90° intercept. With LOC as nav source in NAV mode, the glideslope is not captured — use APPR for ILS.

**Common Errors**

- Using NAV with a LOC source and expecting glideslope guidance — use APPR mode instead.

### 14.5.7 APPR — Approach Mode (LOC / ILS)

**Pilot Actions**

- Tune and identify the ILS. Select V/L as the nav source on the HSVD.
- Set the inbound course on the HSVD.
- Couple a pitch mode (IAS, VS, ALT, or IAS-VS) before APPR selection.
- Press APPR. APPR, VERT, and T-HOV arm (amber) illuminate.
- Establish an intercept of 45° or less. Recommended speed: 80–120 KIAS. Max bank: 25°.

**Localizer Capture**

- Captures automatically when deviation is within the threshold. HDG SEL drops; the aircraft tracks the localizer. APPR turns green.

**Glideslope Capture**

- VERT captures automatically when G/S deviation is within the threshold. VERT turns green. Manage power smoothly — reduce torque to maintain approach speed; the system does not command collective at this stage.
- T-HOV Automatic Capture (at 100 ft AGL)
- At 100 ft radar altitude, T-HOV captures (or earlier if the descent rate exceeds 700 fpm). The helicopter decelerates to the computed headwind component and transitions to a 50 ft radar altitude hover. APPR lateral guidance continues.
-

**CAUTION** When the FD is coupled in APPR mode, it commands flight control movements without regard to aircraft limitations or operating altitude. The pilot must maintain vigilance and be prepared to intervene immediately.

**Common Errors**

- Not coupling a vertical mode before APPR — glideslope capture requires an active pitch mode.

### 14.5.8 T-HOV — Transition to Hover (Direct Capture)

**Pilot Actions**

- Select T-HOV directly (below 2,500 ft radar altitude). The system captures the current radar altitude and decelerates to zero forward speed.
- Use the FD Slew switch to adjust hover airspeed (forward/lateral; rearward limited to 5 kt).
- Use C-SYNC or the Hover Beep switch to adjust the hover altitude reference.

**Indications**

- T-HOV amber = armed; green = captured. The HSVD switches to the HOVER display. The LOW ALT warning is active.
-

**CAUTION** Radar altimeter fluctuations can induce large collective movements in T-HOV and HOV AUG. Physical hands-on guarding of the collective is imperative at all times in these modes.

**Common Errors**

- Selecting T-HOV above 2,500 ft radar altitude — the mode will not capture.

### 14.5.9 HOV AUG — Hover Augmentation

**Pilot Actions**

- Press HOV AUG with FD CPL ON. The system provides active stabilization using OADS and the radar altimeter.
- Use fly-through or Beep Trim to change position/velocity. Beeped attitude changes produce airspeed changes; when released, the helicopter returns to level but retains the new airspeed.
- Use C-SYNC to change the altitude reference. The FD Slew switch is inactive in HOV AUG.

**Indications**

- HOV AUG annunciator green when coupled. LOW ALT lights always active.

**CAUTION** Radar altimeter fluctuations can induce large collective movements. Hands-on guarding of the collective is imperative at all times in HOV AUG.

**Common Errors**

- Using the Slew switch in HOV AUG — it is inactive. Use Beep Trim or fly-through instead.

### 14.5.10 GA — Go-Around

**Pilot Actions**

- Press GA on either collective. GA deselects any previously active FD mode.
- If IAS ≤ 40 KIAS (or hover): collective maintains barometric altitude; pitch commands acceleration to 40 KIAS. At 40 KIAS, collective commands a 700 fpm climb; pitch accelerates to 70 KIAS.
- If IAS > 70 KIAS: pitch commands deceleration to 70 KIAS.
- Use the FD Slew switch to adjust the airspeed reference; C-SYNC to adjust the vertical speed.

**Indications**

- GA annunciator on the AMAP. The ADI provides pitch/roll/collective guidance.

**Limitations / Good Practice**

- Above 25 ft AGL. Add torque promptly — GA commands pitch/collective profiles but requires pilot-supplied power.

**Common Errors**

• Pressing GA without managing power. Not monitoring the airspeed transition points (40 kt and 70 kt).

## 14.6 Practical Tips for Sim Users

### 14.6.1 Best Setup for Stable Cruise

- Lateral: HDG SEL or NAV depending on the navigation task.
- Vertical: ALT for steady cruise; IAS for speed-managed cruise; VS for planned climbs/descents.

### 14.6.2 When Things Don't Behave as Expected

- Verify all four bathandles are forward and the AFCS caution is out.
- Verify FD CPL is ON if you expect the AFCS to fly the mode (FD UCPL should be out).
- Verify the correct nav source is selected on the HSVD.
- Verify TRIM is enabled (no TRM OFF amber).
- If the aircraft diverges: press AFCS Quick-Disconnect → stabilize manually → re-engage the axes → re-couple the FD.

# 15 User Options (tPad)

Most user options — equipment configuration, damage and repair, gameplay settings, ground handling, doors and hoist, weight and balance, and the in-flight checklists — are accessed through the **tPad** (EFB tablet). The tPad is stowed on top of the glareshield; click the metal clip to unstow or stow it. This chapter walks through each page of the tablet. Screenshots are representative; live values (fuel, weights, activity bars) shown are examples.

> **NOTE** Variant and livery selection is NOT performed on the tPad. It is available exclusively in the MSFS 2024 menu: "Free Flight" → "Change Aircraft" → "Configure" (see Section 3.4). Selecting a variant automatically adjusts the installed equipment simulation.

## 15.1 Home Menu

The home menu is the tablet's landing screen. The header shows the active aircraft, with the simulator time and date below. Each card opens a functional page: Cockpit, Exterior, Gameplay, Doors/Hoist/Cargo, Heli Tow Cart, Weight & Balance, Live Map, User Guides and Autopilot. Tap a card to open its page; every page has a MENU button to return here.


*Figure 15-1 — tPad home menu*

## 15.2 Cockpit

The Cockpit page selects the avionics fit and cockpit equipment. The GPS NAVIGATOR row chooses the installed navigator (e.g. GNS 530, GTN 750, GTNXi 750); the Equipment & Visibility toggles control items such as crew headsets and the ASOBO EFB. Choices here drive what is modeled and visible in the 3-D cockpit.

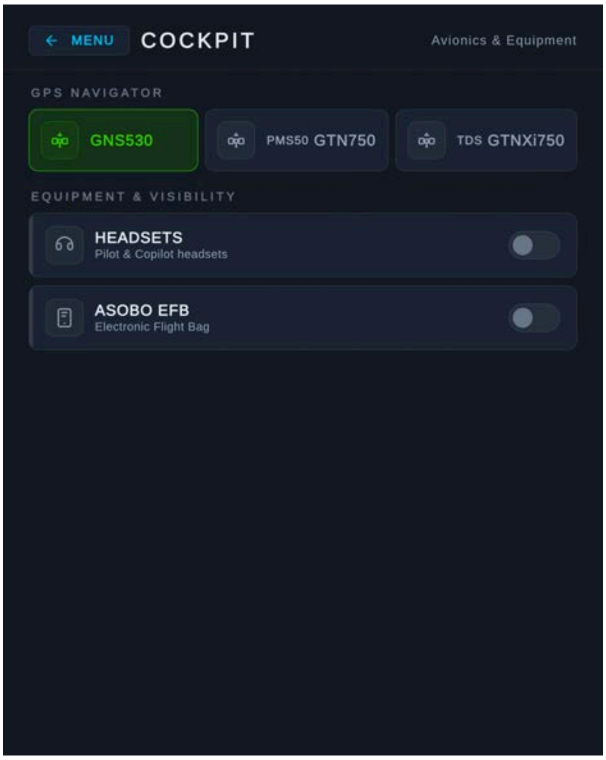



*Figure 15-2 — tPad Cockpit page (avionics & equipment)*

## 15.3 Exterior

The Exterior page manages external equipment and ground handling: lighting (search/IR), sensors (FLIR/FLIP pod), ground-handling items (external battery cart, covers, blade socks, blade fold) and the mission-equipment tiles (rescue winch, cargo hook, Bambi Bucket, water tank, fast rope, wire-strike kit, floaters, radar dome). Tiles that are unavailable on the selected variant are greyed out.


*Figure 15-3 — tPad Exterior page (equipment & ground handling)*

Optional attachments add weight at the correct station for accurate weight and balance. Plan the fuel load before using heavy attachments.

| Attachment | Empty Weight | Capacity / Gross Weight |
|---|---|---|
| Bambi Bucket (Model 2024) | 135 lb (61 kg) | Capacity: 2,000 lb / 240 gal (909 kg) — Gross: 2,135 lb (970 kg) |
| DART Simplex 323 Fire Attack™ | 290 lb (132 kg) | Capacity: 2,645 lb / 317 gal (1,200 kg) — Gross: 2,935 lb (1,331 kg) |
| Rescue Hoist (HH-65A) | Per variant config | 600 lb (272 kg) max load per hook cycle; 150 ft cable |
| Cargo Hook | approx. 10 lb (4.5 kg) | AS365 N2: 1,200 kg (2,645 lb) max sling — HH-65A: 3,000 lb (1,361 kg) max sling |

**NOTE** DART Hover Refill Pump rate: 1,060 L/min (280 gal/min; 2,337 lb/min). Hover at a safe height over the water source before activating hover refill. Observe the 90 KIAS maximum cargo-hook load speed on the HH-65A (see Section 9.3).

## 15.4 Gameplay

The Gameplay page holds control, avionics and comfort options. Control Options include Reduced Trim Sensitivity (for gamepads or smaller controllers), Spring-Centered Joystick (important for correct cyclic handling) and Fly-Through Off. Avionics Options includes the AFCS Annunciators help lights. Airframe Vibration provides a master shake toggle with an intensity slider (OFF–MAX). The Live Activity bars at the bottom give a real-time readout of airspeed, turbulence, G-force, rotor RPM, ETL and VRS margins.

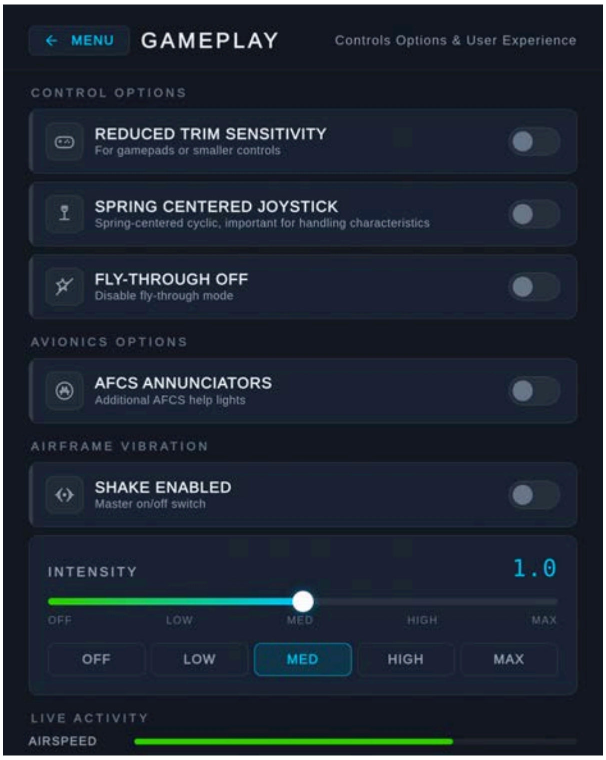



*Figure 15-4 — tPad Gameplay page (controls, avionics & vibration)*

## 15.5 Doors, Hoist & Cargo

This page operates the doors and the rescue hoist, and loads cargo. Door Control opens and closes each door (copilot/pilot front, cabin left/right, rear left/right) individually or with the ALL OPEN / ALL CLOSE buttons. The Rescue Hoist column raises, stops and lowers the hoist cable and shows the cable position. Cargo loading is handled here together with the Weight & Balance page.


*Figure 15-5 — tPad Doors, Hoist & Cargo page*

## 15.6 Heli Tow Cart

The Heli Tow Cart page moves the aircraft on the ground. With the aircraft on the ground (the status badge reads ON GROUND), drag the center thumb on the control pad to taxi: forward/backward and rotate clockwise/counter-clockwise. The current ground speed is shown at top right. Release the thumb to stop.


*Figure 15-6 — tPad Heli Tow Cart (ground movement)*

## 15.7 Weight & Balance

The Weight & Balance page sets fuel and cargo. The fuel diagram and the per-tank sliders (left, right and — where fitted — the additional tank) set the load in each tank, with quick presets for Full, Extended Range and Fire Fighting. The Cargo section shows total weight against maximum takeoff weight (MTOW) and provides a Load slider with a Load Cargo action. Values update live.

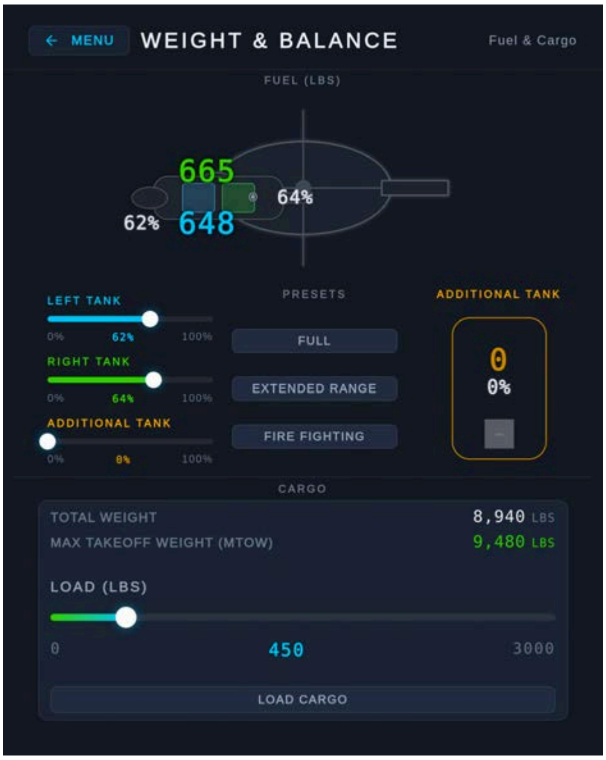



*Figure 15-7 — tPad Weight & Balance page (fuel & cargo)*

## 15.8 Autopilot

The Autopilot page mirrors the aircraft's flight-control panel and differs by variant. On the AS365 N2 it shows the FD Coupler (CDV 85) modes; on the HH-65A it shows the FDS control panel (see Chapters 13 and 14 for full descriptions). The tablet provides a convenient touch interface to engage and arm the autopilot modes.

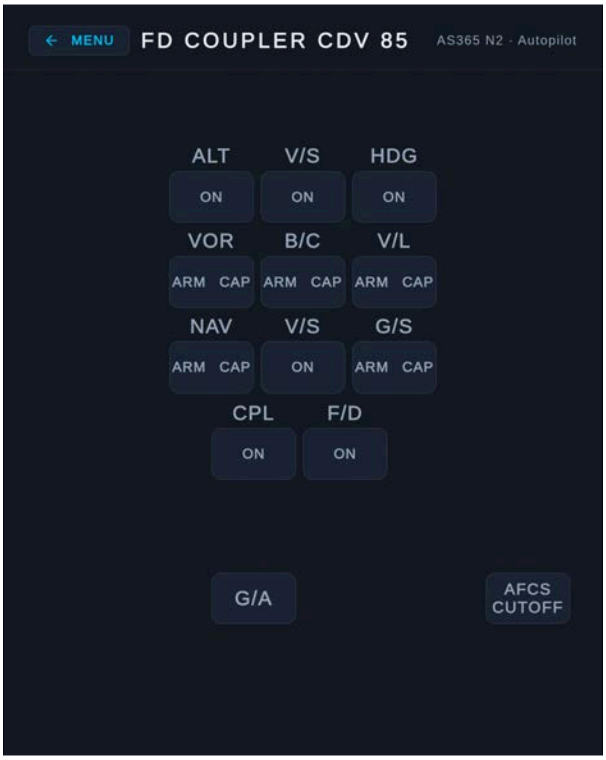



*Figure 15-8 — tPad Autopilot page — AS365 N2 (FD Coupler CDV 85)*

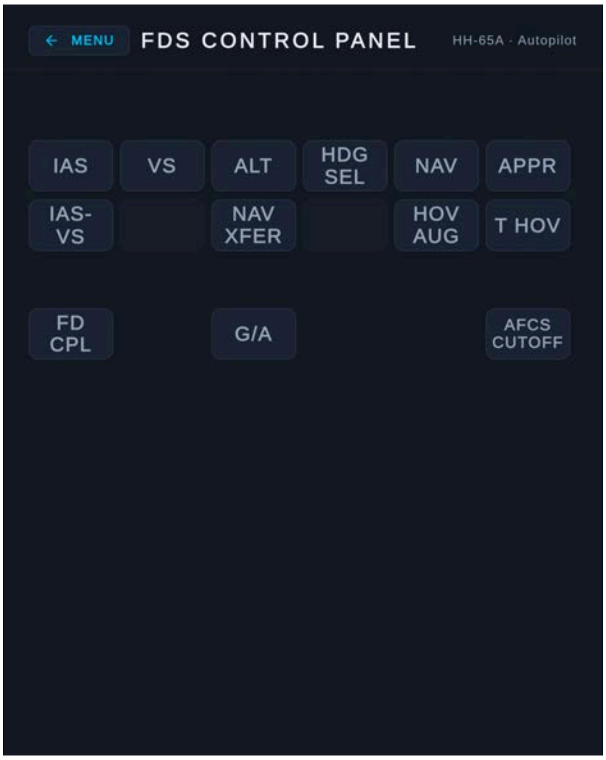



*Figure 15-9 — tPad Autopilot page — HH-65A (FDS Control Panel)*

## 15.9 User Guides & Documentation

The Documentation hub provides quick access to reference material: this Flight Manual, the Emergency Procedures, the Key Bindings reference and the video Tutorials. The Key Bindings page lists the recommended control assignments by function (flight controls, engine & electrical, gear, lights and so on) with the corresponding MSFS bindings.


*Figure 15-10 — tPad Key Bindings reference*

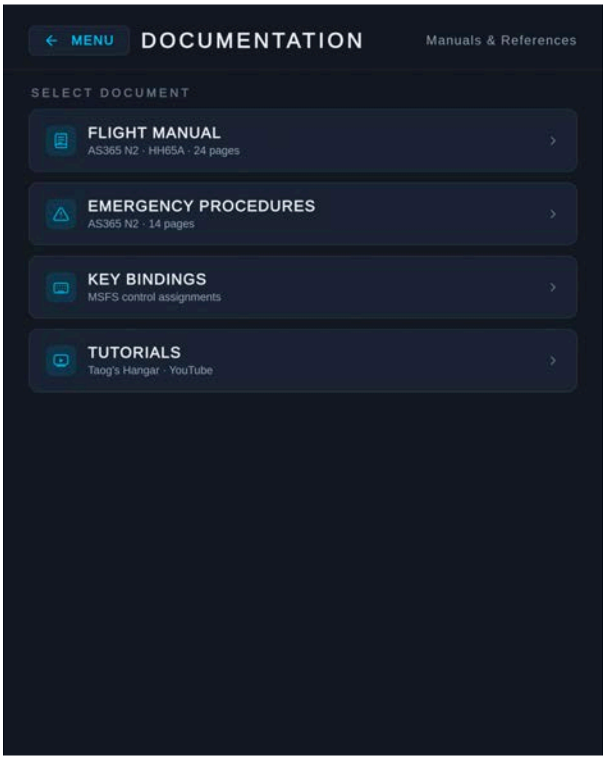



*Figure 15-11 — tPad Documentation hub*

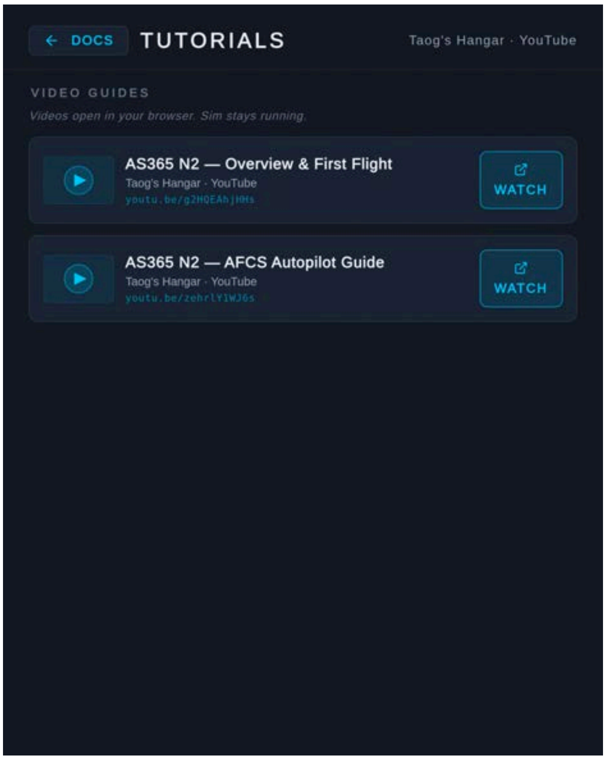



*Figure 15-12 — tPad Tutorials (video guides)*

**NOTE** The tPad also provides the interactive in-flight checklists referenced in Chapter 10.

# 16 Mission Operations

## 16.1 Overview

There are two ways to fly structured missions with this add-on: through the built-in MSFS 2024 Career Mode, and through the Miltech Mission Hub, a third-party mission platform sold separately by Miltech Simulations. Which missions are available depends on the variant flown and its installed mission equipment.

## 16.2 Variants and Mission Equipment

The add-on includes nine variants. Mission equipment is fixed per variant — it determines both the Career Mode activities the variant is registered for and the Mission Hub activities it can perform.

| Variant | Crew | Cargo Hook | Winch (Hoist) | Bambi Bucket | Watertank |
|---|---|---|---|---|---|
| AS365 N2 Passenger Transport | 2 | – | – | – | – |
| AS365 N2 VIP Transport | 2 | – | – | – | – |
| AS365 N2 Search and Rescue | 4 | – | ● | – | – |
| AS365 N2 Cargo | 2 | ● | – | ● | ● |
| AS365 F/N Search and Rescue (long nose) | 4 | – | ● | – | – |
| AS365 F/N Cargo (long nose) | 2 | ● | – | ● | ● |
| HH-65A Search and Rescue | 4 | ● | ● | ● | – |
| HH-65B HITRON (long nose) | 4 | ● | ● | ● | – |
| HH-65B Search and Rescue (long nose) | 4 | ● | ● | ● | – |

**NOTE** All variants carry an internal cargo capability. The HITRON kit on the HH-65B HITRON variant is cosmetic mission equipment only — it has no Career Mode or Mission Hub function. The watertank is the DART fire attack system described in Section 15.3.

## 16.3 MSFS 2024 Career Mode

Each variant is registered for the Career Mode activities matching its role. Select the appropriate variant when accepting a career contract:

| Variant(s) | Career Mode Activities |
|---|---|
| AS365 N2 Passenger Transport / VIP Transport | Passenger transport, ferry flights, sightseeing |
| AS365 N2 SAR / AS365 F/N SAR | Search and rescue — standard and hoist |
| AS365 N2 Cargo / AS365 F/N Cargo | Cargo / sling hook missions |
| HH-65A SAR / HH-65B SAR | Search and rescue — standard and hoist |
| HH-65B HITRON | – (display/free-flight variant) |

Career Mode missions are self-guided: the simulator's career interface provides the briefing, objectives and prompts. The hoist works in Career Mode as-is — no aircraft-side configuration is required; follow the career prompts through the pickup sequence.

## 16.4 Miltech Mission Hub

The **Miltech Mission Hub** is a separately sold mission and campaign platform by Miltech Simulations, compatible with MSFS 2020 and 2024. It runs as a toolbar panel in the simulator and provides objective-driven missions — included packs, community-created missions, and a no-code mission editor. The Dauphin's mission systems are compatible with the following Mission Hub activity types:

- **Firefighting** — with the Bambi Bucket or the belly watertank (DART system), on variants carrying that equipment.
- **Search and rescue with hoist** — on all SAR variants.
- **Cargo / sling load missions** — on all cargo-hook-equipped variants.

Playing a mission, in brief: start a normal free flight with the desired variant (at the mission's start location if it has one), open the Mission Hub panel from the in-sim toolbar, browse the mission packs or your own missions, review the briefing and start the mission. Objectives and timers are tracked on a HUD overlay during the flight.

> **NOTE** This manual covers only the aircraft side of Mission Hub operations. For installation, mission creation, mission packs and everything else concerning the Mission Hub itself, refer to the official Miltech Simulations documentation at docs.miltechsimulations.com — it is the authoritative source for that product.

## 16.5 Hoist Operations

In **Career Mode**, the hoist requires no setup — follow the career mission prompts.

In the **Mission Hub**, the aircraft's hoist must be activated before use: set the **hoist switch (mission selector switch)** to ON. For comfortable operation, map the **hoist up** and **hoist down** actions to your controller; alternatively, the hoist can be operated from the collective-mounted controls in the cockpit.

- Establish a stable hover over the survivor or hoisting point — use the radar altimeter as the height reference, into wind, with hover power set (see Section 11.2).
- On the HH-65 variants, the AFCS hover modes carry most of the workload: T-HOV for an automated transition to the hover and HOV AUG for station-keeping (see Chapter 14).
- Lower the hoist, wait for the pickup, then raise it fully before departing the hover. Keep lateral drift to a minimum while the cable is out.

## 16.6 Firefighting Operations

Firefighting is flown with the Bambi Bucket (underslung) or the DART watertank (belly-mounted), selected per variant through the tPad attachments page (Section 15.3).

- **Filling:** establish a low hover over a water source. The Bambi Bucket fills by dipping; the DART system fills via its hover refill pump at approximately 1,060 L/min (280 gal/min) — a full tank takes a little over a minute. Maintain a steady height and guard the collective: weight increases continuously during the fill.
- **Transit:** respect the attachment weights and the sling-load airspeed limits in Chapters 9 and 15. Anticipate noticeably higher hover power at full load.
- **Dropping:** approach the fire line into wind, low and slow, and release over the target. Aircraft reaction to the sudden weight loss is a marked climb tendency — be ready to lower the collective.

## 16.7 Sling Load / Cargo Operations

Cargo missions use the external cargo hook (maximum loads: AS365 1,200 kg / 2,645 lb; HH-65 3,000 lb / 1,361 kg — see Section 15.3).

- Position in a steady hover directly over the load for pickup; vertical alignment matters more than speed. After hookup, lift straight up until the sling is taut, then climb clear before transitioning.
- In transit, fly smoothly: sling loads punish abrupt cyclic inputs with oscillation. If a load starts to swing, decelerate gently and let it damp — do not chase it with cyclic.
- Observe the 90 KIAS cargo hook speed limit on the HH-65 (Section 9.3) and plan approaches shallower and slower than normal.

• At the delivery point, descend vertically until the load grounds and the sling slackens, then release the hook.

## 16.8 Searchlight Operation

When fitted, the external searchlight can be used for night operations, search and rescue, law-enforcement patrols, and general area illumination. The searchlight is simulated as an independently controlled external light that can be switched on or off and slewed vertically or horizontally.

There are no physical searchlight controls modeled in the virtual cockpit. To operate the searchlight, the commands must be assigned through the MSFS control bindings or through compatible external binding software.

Recommended bindings are:

- **AS65 SEARCH LIGHT - ON**
- **AS65 SEARCH LIGHT - OFF**
- **AS65 SEARCH LIGHT - TOGGLE**
- **AS65 SEARCH LIGHT UP - PRESS / RELEASE**
- **AS65 SEARCH LIGHT DOWN - PRESS / RELEASE**
- **AS65 SEARCH LIGHT RIGHT - PRESS / RELEASE**
- **AS65 SEARCH LIGHT LEFT - PRESS / RELEASE**
- **AS65 SEARCH LIGHT - CENTER**

For directional movement, assign the matching **PRESS** and **RELEASE** commands to the same hardware button, hat-switch direction, or keyboard key. This allows the searchlight to move only while the control is held, then stop when released.

When assigning these controls, search for **AS65** in the MSFS control options and use the aircraft-specific bindings listed in the keybinding guide. Do not use generic simulator light commands for the searchlight, as they may not operate this add-on correctly.

For best results, bind the searchlight movement to a joystick hat switch or four-way controller, with a separate button for ON/OFF or TOGGLE. Center the searchlight after use to avoid leaving the beam offset unintentionally.

# 17 Annex

## 17.1 Checklists

| TAOG'S HANGAR<br>AS365 / HH-65 | NORMAL CHECKLIST | June 18, 2026<br>Portrait kneeboard |
|---|---|---|
| SIMULATION USE ONLY | AS365 N2 | MSFS XML checklist flow<br>ONLY FOR SIMULATOR USE |

| EXTERIOR CHECKLIST | | |
|---|---|---|
| 1 | Pitot Covers | REMOVED |
| 2 | Engine covers | REMOVED |
| 3 | Blade socks | REMOVED |
| 4 | Leakage | NO LEAKS |
| 5 | Aircraft heading | INTO WIND |
| 6 | Fuel tank filler caps | CHECKED |
| 7 | L/G units and doors | CHECKED |
| 8 | Engine air intake | CLEAR |
| 9 | Hydraulic reservoirs | CHECKED |
| 10 | Engine oil tanks | CHECKED |
| 11 | Fuel filters | CHECKED |
| 12 | Main rotor blades | CHECKED |
| 13 | Tail rotor | CHECKED |
| 14 | Tail gearbox | CHECKED |
| 15 | Cowlings | CLOSED / LOCKED |
| 16 | Power brakes accumulator | CHECKED |
| INTERIOR CHECKLIST | | |
| 1 | Cabin | CHECKED |
| 2 | Doors | CLOSED / LOCKED |
| 3 | Fire extinguisher | CHECKED |
| 4 | Circuit-breakers | ENGAGED |
| 5 | Yaw pedals | ADJUSTED |
| 6 | Seats | ADJUSTED |
| 7 | Seatbelts and harnesses | FASTENED |
| PRE-START - COCKPIT SETUP | | |
| 1 | Switches | ALL OFF |
| 2 | Voltmeter reading | CHECKED |
| 3 | Battery contactors 1 and 2 | ON |
| 4 | Instrument lighting | AS REQUIRED |
| 5 | Fuel flow control levers | FULLY AFT |
| 6 | Fuel shutoff control levers | FORWARD / LOCKED |
| 7 | Rotor brake control | RELEASED |

| | | |
|---|---|---|
| 8 | Static pressure selector | NORMAL |
| 9 | Mission selector | AS REQUIRED |
| 10 | Aural alarm system | ON |
| 11 | ATC transponder (if installed) | ON NORMAL |
| 12 | Steps (if installed) | CLOSED |
| 13 | Position lights | AS REQUIRED |
| 14 | Anti-collision light | ON |
| PRE-START - SYSTEMS TEST | | |
| 1 | Indicator light TEST function | TESTED |
| 2 | Alarm push-button light push test | ACK / OFF |
| 3 | Engine fire system test | TESTED |
| 4 | Torquemeter | 1 + 2 / FLAG OUT |
| 5 | Generators 1 and 2 | ON |
| 6 | Static inverters 1 and 2 | ON / LIGHTS OUT |
| 7 | Emergency electrical cutoff bar | UP / WIRED |
| 8 | SERVO and CARGO test | TESTED |
| 9 | Landing gear downlock switch | DOWN / PIN REMOVED |
| 10 | Clock | SET |
| 11 | Altimeter | SET |
| 12 | Fuel management panel - Test | TESTED |
| 13 | Fuel management panel - Transfer pump | TESTED |
| 14 | Booster pumps 1, 2, 3 and 4 | ON |
| 15 | Parking brake control lever | APPLIED |
| 16 | Nose wheel castoring lock (if installed) | AS REQUIRED |
| STARTING ENGINE 1 | | |
| 1 | Engine 1 - Start | START / IDLE AT 12% |
| 2 | Engine 1 - Move throttle to flight position | 100% / FLIGHT |
| 3 | Engine 1 - Gong alarm test | TESTED |
| STARTING ENGINE 2 | | |
| 1 | Engine 2 - Start | START / IDLE AT 12% |
| 2 | Engine 2 - Move throttle to flight position | 100% / FLIGHT |
| POST-STARTING CHECKS | | |
| 1 | Ground power unit | DISCONNECTED |
| 2 | Exterior lights | AS REQUIRED |
| 3 | Windshield wiper selector | AS REQUIRED |
| 4 | PITOT 1 and 2 heating | ON |
| 5 | Caution Advisory Panel | LIGHTS OUT |
| 6 | Temperature and pressure readings | CHECKED |
| 7 | Electrical parameters | CHECKED |
| 8 | Engine and flight instruments | CHECKED |
| 9 | Aux hydraulic system test | TESTED |
| 10 | Servo and cargo TEST | TESTED |

| | | |
|---|---|---|
| 11 | Tail rotor servocontrol isolation test | TESTED |
| 12 | Rotor speed trim | MAX FOR FLIGHT |
| 13 | Booster pump test | TESTED / ON |
| 14 | Autopilot test | TESTED |
| PRE-TAXIING CHECKLIST | | |
| 1 | Autopilot | LANES ON / GREEN |
| 2 | Autopilot test | TESTED |
| 3 | Radionavigation systems | TESTED |
| 4 | Radiocommunication systems | TESTED |
| 5 | Collective pitch lever | RELEASED / FRICTION SET |
| 6 | Pressure and temperature readings | NORMAL |
| 7 | Warning lights | ALL OFF |
| TAXIING | | |
| 1 | Parking brake | RELEASED |
| TAKEOFF AND HOVERING | | |
| 1 | Hover IGE | ESTABLISHED |
| 2 | Warning lights and instruments | CHECKED / NORMAL |
| 3 | Landing gear | RETRACT AT Vy |
| APPROACH | | |
| 1 | Landing gear | DOWN / LOCKED |
| 2 | Parking brake | RELEASED |
| 3 | Caution Advisory Panel and instrument readings | CHECKED |
| LANDING | | |
| 1 | Autopilot | OFF AFTER LANDING |
| ENGINE AND ROTOR SHUTDOWN | | |
| 1 | Flight controls | NEUTRAL / LOW PITCH |
| 2 | Engine fuel flow control levers | IDLE |
| 3 | Wait 30 seconds | WAIT 30 SEC |
| 4 | Engine fuel flow control levers | FULLY AFT |
| 5 | Booster pumps | OFF |
| 6 | Rotor brake | APPLY BELOW 170 RPM |
| 7 | All switches | OFF |

| TAOG'S HANGAR<br>AS365 / HH-65 | NORMAL CHECKLIST | June 18, 2026<br>Portrait kneeboard |
|---|---|---|
| SIMULATION USE ONLY | HH-65A | Adapted checklist flow<br>ONLY FOR SIMULATOR USE |

| PREFLIGHT / EXTERNAL | | |
|---|---|---|
| 1. | Aircraft state and documents | CHECK / LOADED CORRECTLY |
| 2. | Fuel quantity | CHECK / SET VIA tPAD OR MSFS |
| 3. | Main rotor and mast area | CLEAR |

| | | |
|---|---|---|
| 4. | Fenestron and tail area | CLEAR |
| 5. | Landing gear | DOWN / LOCKED / CONDITION CHECK |
| 6. | Pitot covers / tie-downs / intake blanks | REMOVED / CLEAR |
| 7. | Engine intakes / exhaust area | CLEAR |
| 8. | Mission equipment / hoist / searchlight | SECURED AS FITTED |
| 9. | Cabin / crew doors | CLOSED / SECURED |
| 10. | Weight and balance | CHECK |
| PRE-START / COCKPIT SETUP | | |
| 1. | Battery | ON |
| 2. | ALTNR 1 and ALTNR 2 | ON |
| 3. | Pilot avionics switch | UP |
| 4. | Copilot avionics switch | UP |
| 5. | Fuel shutoff valves | OPEN |
| 6. | FFCL 1 and FFCL 2 | SHUT OFF |
| 7. | Rotor brake | RELEASED |
| 8. | Collective | FULL DOWN |
| 9. | Flight controls | FREE AND CORRECT |
| 10. | Caution / advisory lights | CHECK |
| STARTING ENGINE 1 | | |
| 1. | Area | CLEAR |
| 2. | Engine 1 starter | ENGAGE |
| 3. | Ng | MONITOR |
| 4. | At Ng approx. 20% | FFCL 1 - FLIGHT DETENT |
| 5. | MGT | MONITOR |
| 6. | At Ng above 40% | RELEASE STARTER |
| 7. | Ng / Np / MGT | STABLE / WITHIN LIMITS |
| STARTING ENGINE 2 | | |
| 1. | Engine 2 starter | ENGAGE |
| 2. | Ng | MONITOR |
| 3. | At Ng approx. 20% | FFCL 2 - FLIGHT DETENT |
| 4. | MGT | MONITOR |
| 5. | At Ng above 40% | RELEASE STARTER |
| 6. | Ng / Np / MGT | STABLE / WITHIN LIMITS |
| 7. | Both engines | STABLE |
| POST-STARTING CHECKS | | |
| 1. | Generators / alternators | CHECK |
| 2. | Nr | 97-103% |
| 3. | MGT and Ng | WITHIN LIMITS / GOVERNED |
| 4. | Hydraulic pressure | CHECK - NO HYD WARNINGS |
| 5. | Caution / advisory panel | CHECK |
| 6. | Pitot heat / exterior lights | AS REQUIRED |
| 7. | Radios / transponder / altimeter | SET |

| | | |
|---|---|---|
| PRE-TAXIING CHECKLIST | | |
| 1. | AFCS switches | ON / UP POSITION |
| 2. | TRIM button | ON / GREEN |
| 3. | CPL button | ON / GREEN |
| 4. | AFCS caution light | OUT |
| 5. | Collective friction | SET AS REQUIRED |
| 6. | Parking brake | RELEASE WHEN READY |
| 7. | Pressure / temperature readings | NORMAL |
| 8. | Warning lights | ALL OFF |
| BEFORE TAKEOFF | | |
| 1. | Nr | 97-103% |
| 2. | MGT and Ng | WITHIN LIMITS / GOVERNED |
| 3. | Torque | ZERO / COLLECTIVE DOWN |
| 4. | Flight controls | FREE AND CORRECT |
| 5. | AFCS / TRIM / CPL | ON / GREEN |
| 6. | Mission equipment and CG | CHECKED |
| 7. | Departure area | CLEAR |
| HOVER CHECK | | |
| 1. | Collective | RAISE SMOOTHLY |
| 2. | Light on wheels | CHECK |
| 3. | Hover | ESTABLISH 3-5 FT |
| 4. | Nr / MGT / torque | STABLE / NOTE TORQUE |
| 5. | Pedal / Fenestron authority | CHECK |
| 6. | Vibration / caution lights | NORMAL / OUT |
| 7. | Power margin | CONFIRM |
| APPROACH / LANDING | | |
| 1. | Landing gear | DOWN / LOCKED |
| 2. | Parking brake | RELEASED |
| 3. | Caution panel / instruments | CHECKED |
| 4. | Landing area | CLEAR |
| 5. | Approach / hover | STABILISED / 3-5 FT AGL |
| 6. | Touchdown | GENTLE - COLLECTIVE FULL DOWN |
| ENGINE AND ROTOR SHUTDOWN | | |
| 1. | Flight controls | NEUTRAL / COLLECTIVE DOWN |
| 2. | FFCL 1 and FFCL 2 | SHUT OFF |
| 3. | MGT | MONITOR DECAY |
| 4. | Rotor brake | APPLY WITHIN LIMITS / AS REQUIRED |
| 5. | Avionics switches | OFF |
| 6. | Generators / alternators | OFF |
| 7. | Exterior lights / radios | OFF |
| 8. | Battery | OFF |
| 9. | Restart note | MGT BELOW 150 C BEFORE FUEL |

## 17.2 Performance charts

Purpose: This document gathers the most useful performance-chart pages from the supplied AS365 N2 and HH-65A performance extracts, with a short plain-English explanation under each chart. It is intended as an addon-manual reference only, not as an operational flight manual.

Reading note: Most values are chart-based rather than fixed numbers. Weight, pressure altitude, density altitude, OAT, wind, installed equipment, bleed/heat/anti-ice state and engine mode all affect the final result.

## 1. AS365 N2 - How to read level-flight speed and fuel charts

COMPLEMENTARY FLIGHT MANUAL

### 3 SINGLE AND TWIN-ENGINE LEVEL FLIGHT SPEED AND HOURLY FUEL CONSUMPTION CHARTS

Choose the altitude/O.A.T. combination nearest to flight conditions. Interpolate if necessary.

Torque scale

Dotted lines :

- TAKEOFF : Indicates the torque at takeoff on two engines, which can deliver the minimum guaranteed power.
- MAX. CONT. : Indicates the torque with two engines at max. continuous power, which can deliver the minimum guaranteed power.
- 30-MIN. : Indicates the torque with one engine at 30-minute power, which can deliver the minimum guaranteed power.

Grossweight curves

At zero airspeed the corresponding torque is that in hover O.G.E. at zero wind speed.

To obtain the torque in hover I.G.E. at a given grossweight reduce the indicated torque by approx. 11 %.

Maximum endurance speed

This is given by dotted line E.

Economical cruise speed

This is given in T.A.S. inside the frame at top of chart.

Correct by half the axial wind component :

- Add, if headwind.
- Subtract, if tailwind

Hourly fuel consumption scale

- OPEN ( AEO - OEI ) : Bleed valve open, green flag visible.
- CLOSED ( AEO - OEI ) : Bleed valve closed, green flag not visible.

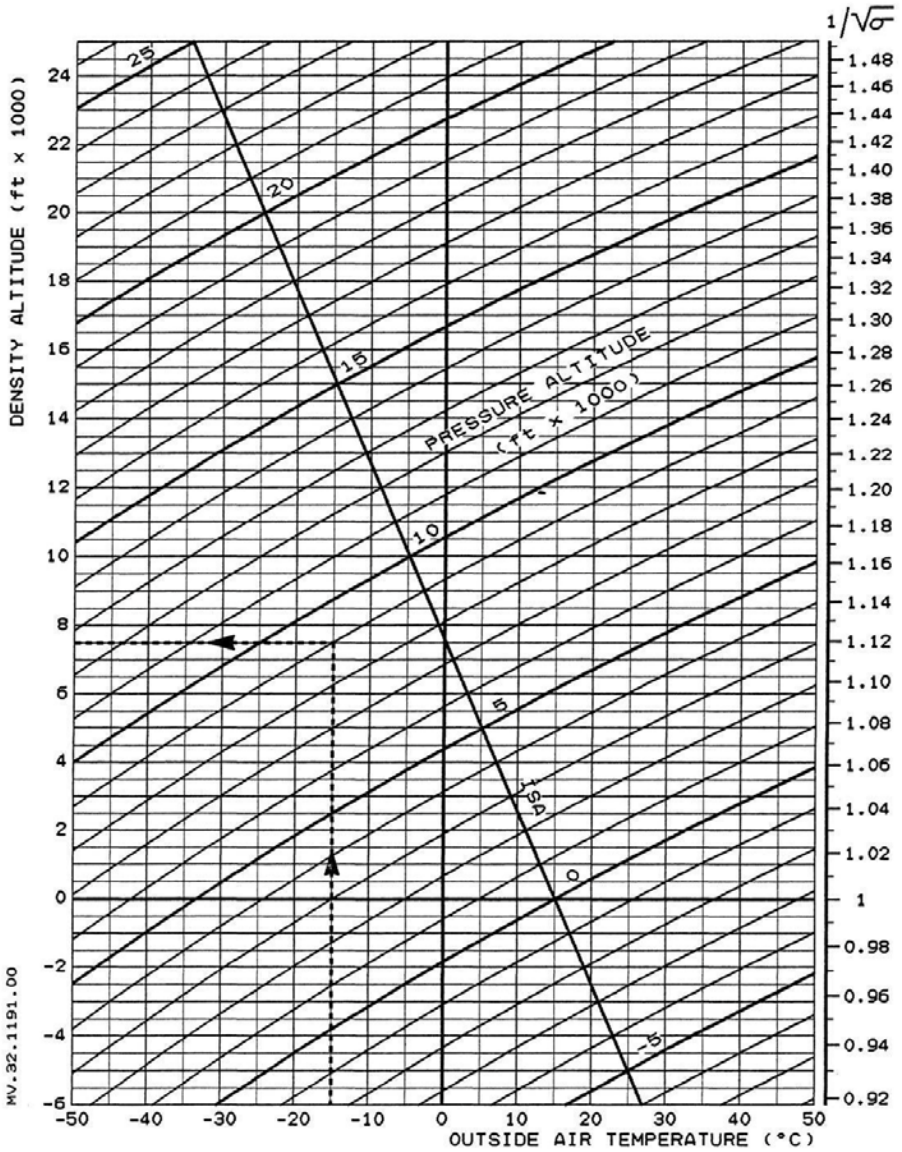
365 N2 10.0

90-06 Page 11
*01*

**What this chart represents:** Explains the symbols and lines used in the AS365 level-flight charts: takeoff torque, maximum continuous torque, 30-minute OEI torque, fuel flow, best range speed and endurance reference lines. This page is the key to interpreting the following AS365 cruise charts correctly.

## 1. AS365 N2 - Pressure altitude to density altitude chart

COMPLEMENTARY FLIGHT MANUAL




PRESSURE ALTITUDE
TO DENSITY
ALTITUDE CHART

Figure 1

365 N2

**10.0**

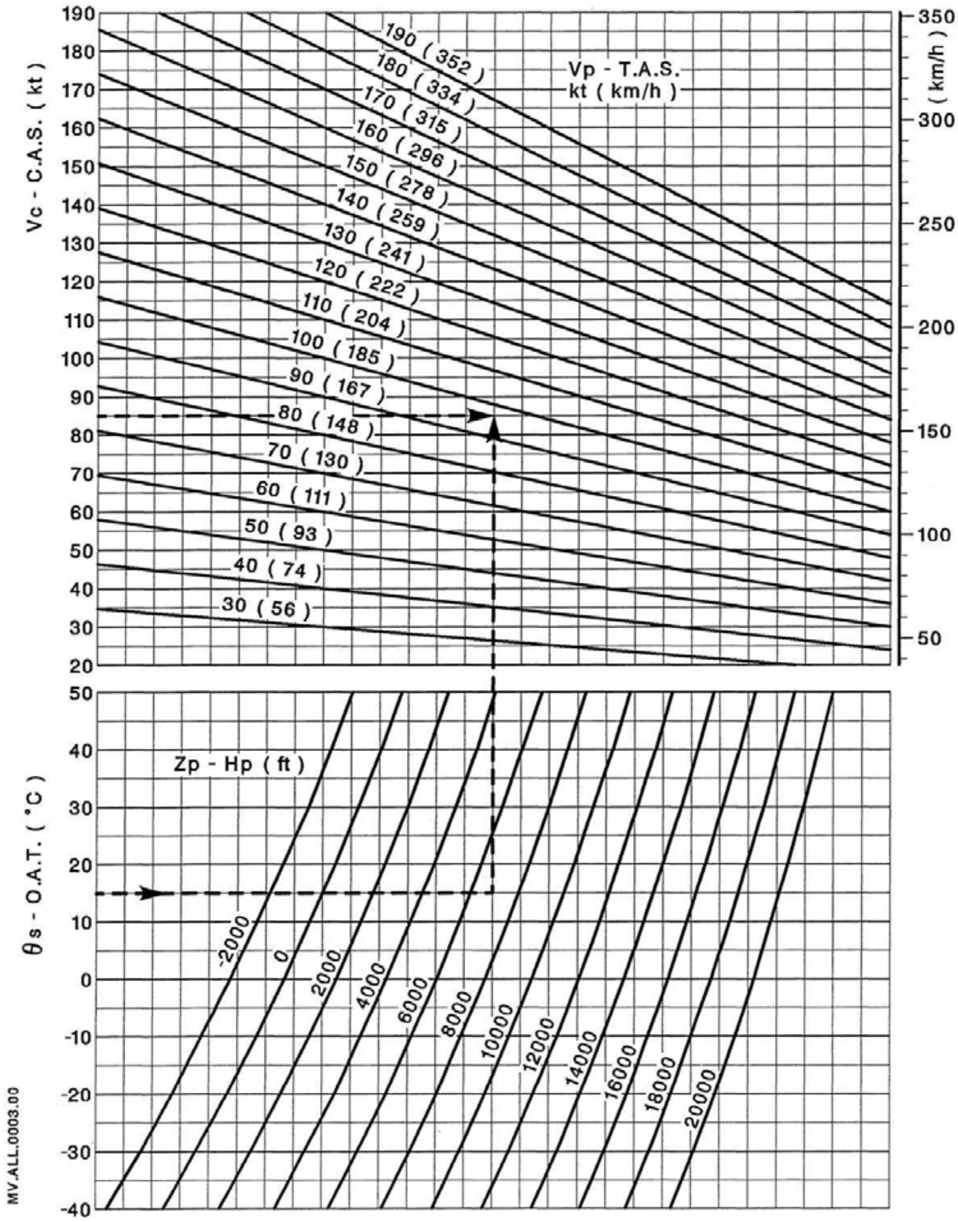
90-06 Page 12
*02*

**What this chart represents:** Converts pressure altitude and outside air temperature into density altitude. This is important because helicopter climb, hover and cruise performance are affected by air density rather than pressure altitude alone.

*Source: selected combined PDF page 6; original source listed in the cover/index of the previous selection PDF.*

## 3. AS365 N2 - True airspeed to calibrated airspeed chart

COMPLEMENTARY FLIGHT MANUAL




TRUE AIRSPEED
TO CALIBRATED
AIRSPEED CHART

Figure 2

R

365 N2 **10.0**

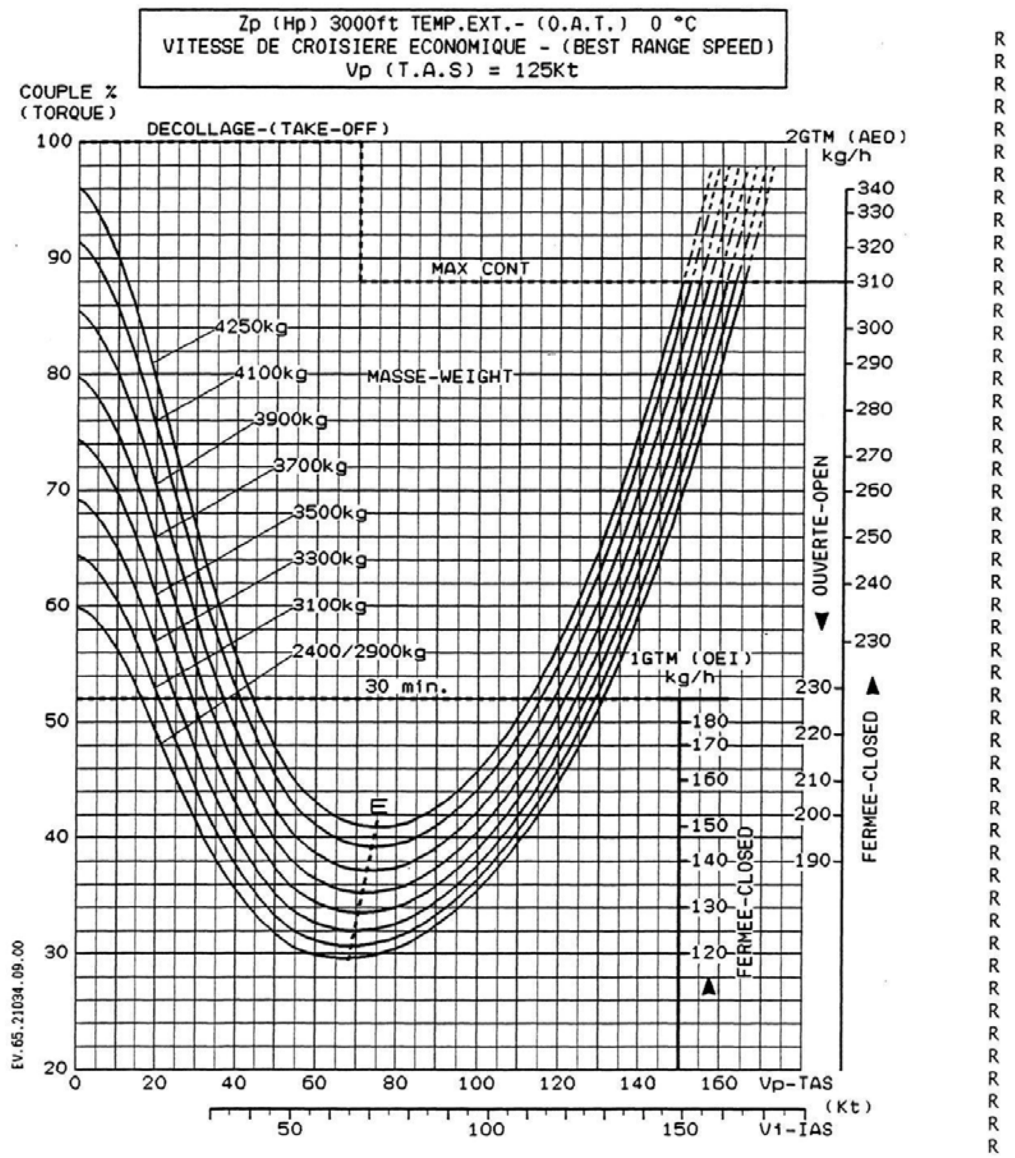
92-18 Page 13
*02*

**What this chart represents:** Provides the relationship between TAS and CAS for the AS365 performance charts. It helps translate charted true airspeeds into cockpit-style indicated/calibrated references for simulator documentation.

*Source: selected combined PDF page 7; original source listed in the cover/index of the previous selection PDF.*

## 4. AS365 N2 - Level flight chart, 3000 ft / 0 C

COMPLEMENTARY FLIGHT MANUAL




CONDITIONS
- L/G up at I.A.S. greater than 55 knots (102 km/h)
- Heating system off

Figure 11

SINGLE AND TWIN-ENGINE LEVEL FLIGHT PERFORMANCE

365 N2 10.0

90-47 Page 22
*03*

**What this chart represents:** Shows level-flight performance at 3000 ft and 0 C. This is a representative low-to-medium altitude cruise chart for comparing fuel flow and power required against the sea-level charts.

*Source: selected combined PDF page 10; original source listed in the cover/index of the previous selection PDF.*

## 5. HH-65A - Density altitude

C.G.T.O. 1H–65A–1

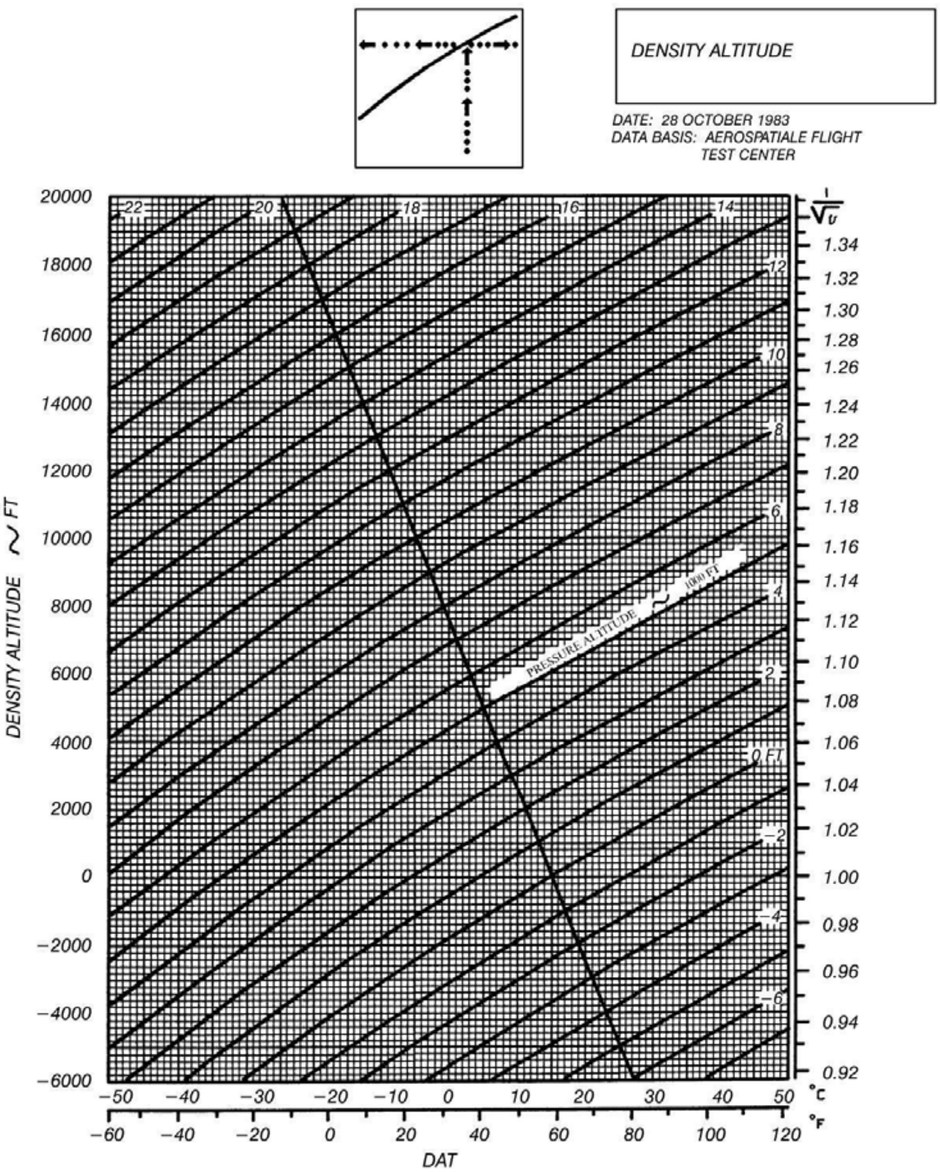



*Figure A–1. Density Altitude*

A-18

**What this chart represents:** Converts pressure altitude and OAT to density altitude, with TAS correction information. This is the starting point for most HH-65A performance planning because nearly every later chart depends on altitude and temperature.

*Source: selected combined PDF page 15; original source listed in the cover/index of the previous selection PDF.*

## 6. HH-65A - 5-minute power available, two engines

C.G.T.O. 1H–65A–1

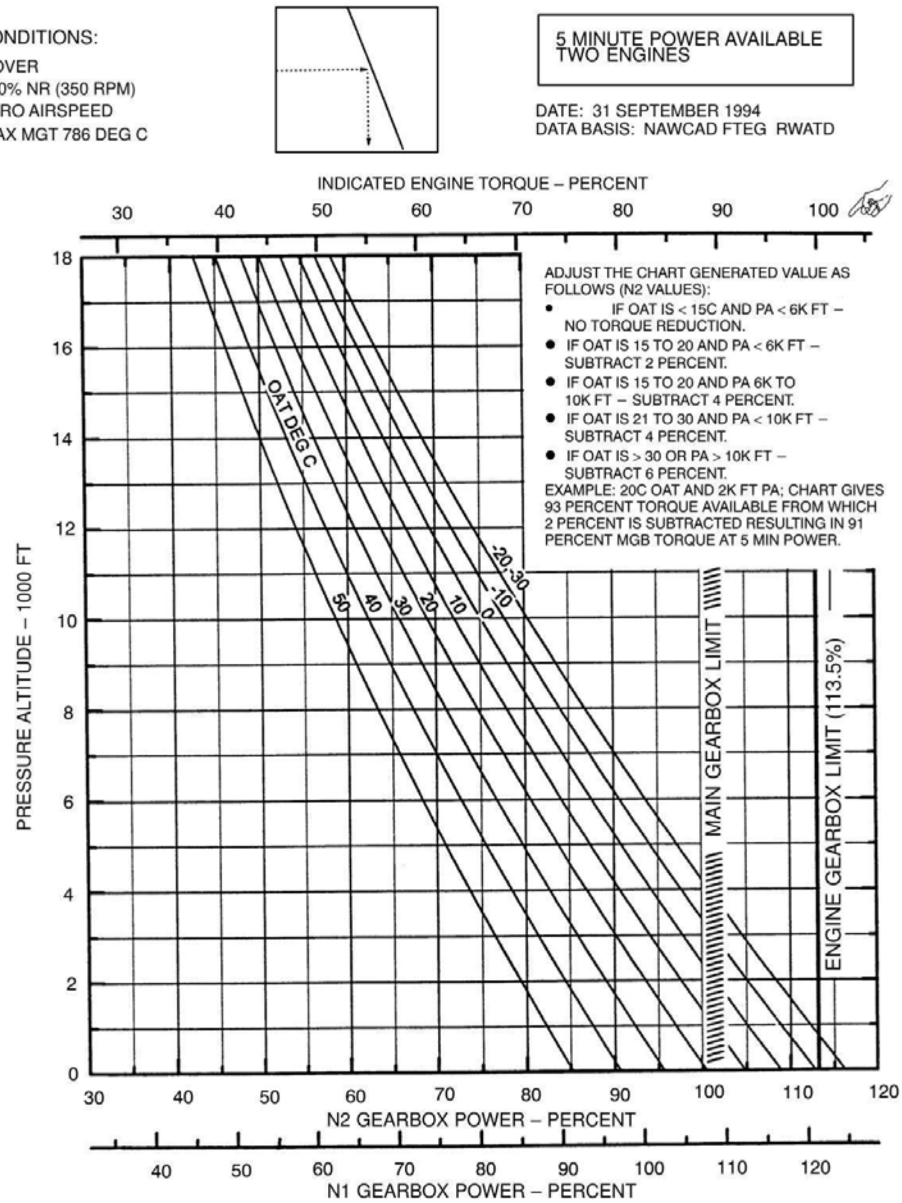



*Figure A–2. 5–Minute Power Available – Two Engines*

A-19

CH–4

**What this chart represents:** Shows the maximum short-duration power available on two engines for altitude and temperature. It is useful for takeoff and hover-margin planning, while still respecting gearbox and engine limits.

*Source: selected combined PDF page 16; original source listed in the cover/index of the previous selection PDF.*

## 7. HH-65A - Torque required to hover, two engines, zero wind

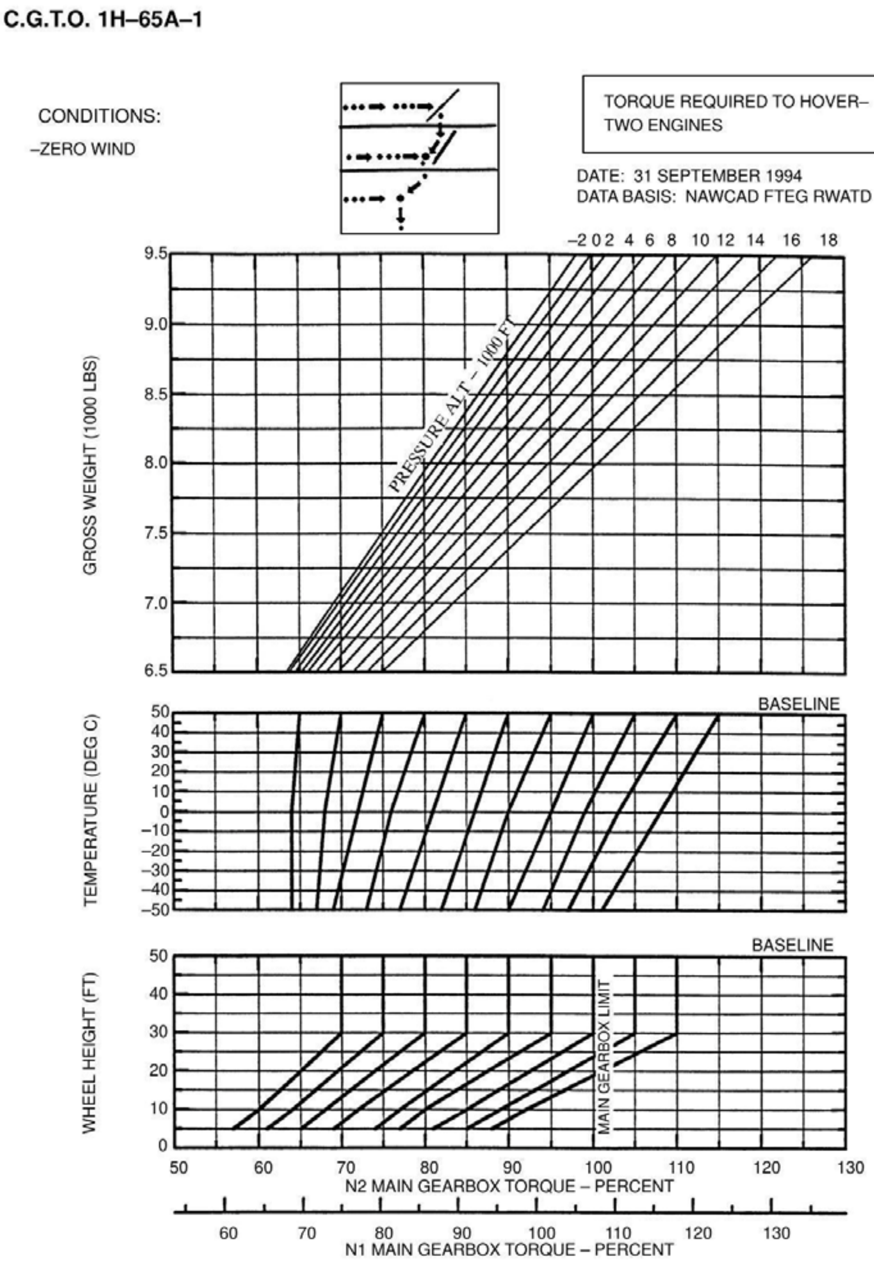



*Figure A–5. Torque Required to Hover – Two Engines*

A-22

**What this chart represents:** Shows hover torque required with no wind, based on weight, altitude, temperature and wheel height. It is a clean reference chart for the basic relationship between gross weight, density altitude and hover power.

*Source: selected combined PDF page 18; original source listed in the cover/index of the previous selection PDF.*

## 8. HH-65A - Height/velocity diagram, one engine inoperative

C.G.T.O. 1H–65A–1

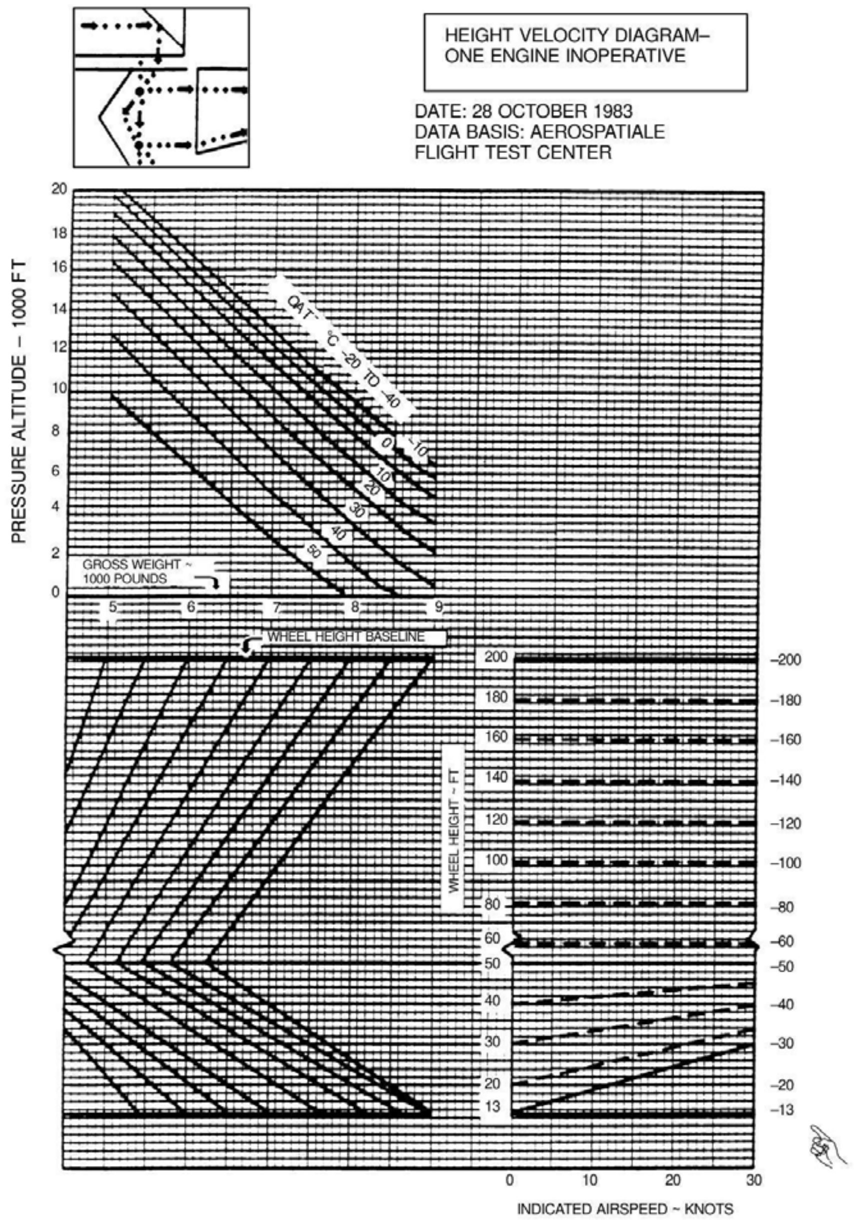



*Figure A–6. Height Velocity Diagram – One Engine Inoperative*

A-23
CH–5

**What this chart represents:** Shows avoid areas and height/speed combinations for safe continued flight or landing after losing one engine. For the addon manual, this is best used as a simplified explanation of why very low, slow flight carries risk.

*Source: selected combined PDF page 19; original source listed in the cover/index of the previous selection PDF.*

## 9. HH-65A - Never exceed speed, VNE

C.G.T.O. 1H–65A–1

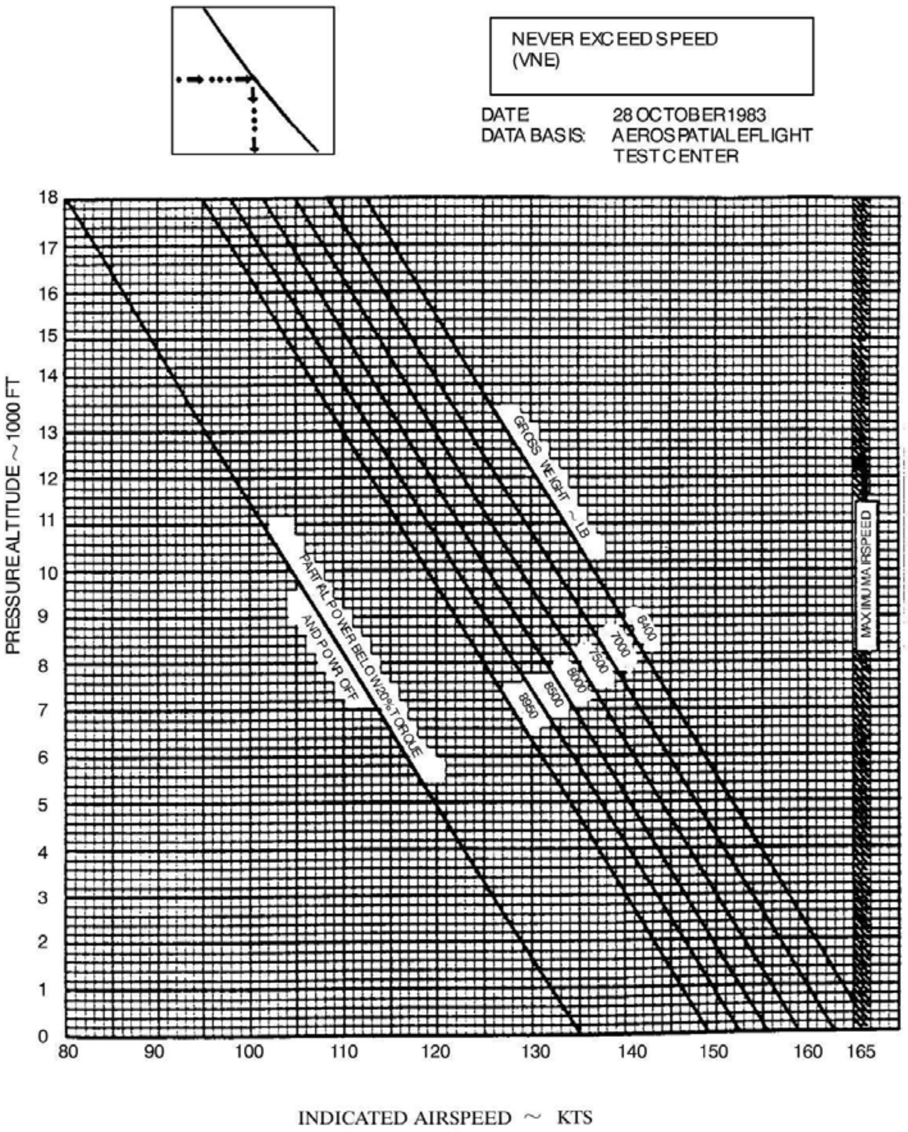



*Figure A–10. Never Exceed Speed (VNE)*

A-27

**What this chart represents:** Shows indicated VNE as a function of altitude and gross weight. It is useful for setting a realistic simulator speed limit and for explaining that VNE is not one universal number in the real aircraft.

*Source: selected combined PDF page 20; original source listed in the cover/index of the previous selection PDF.*

## 10. HH-65A - 30-minute power available, one engine

C.G.T.O. 1H–65A–1

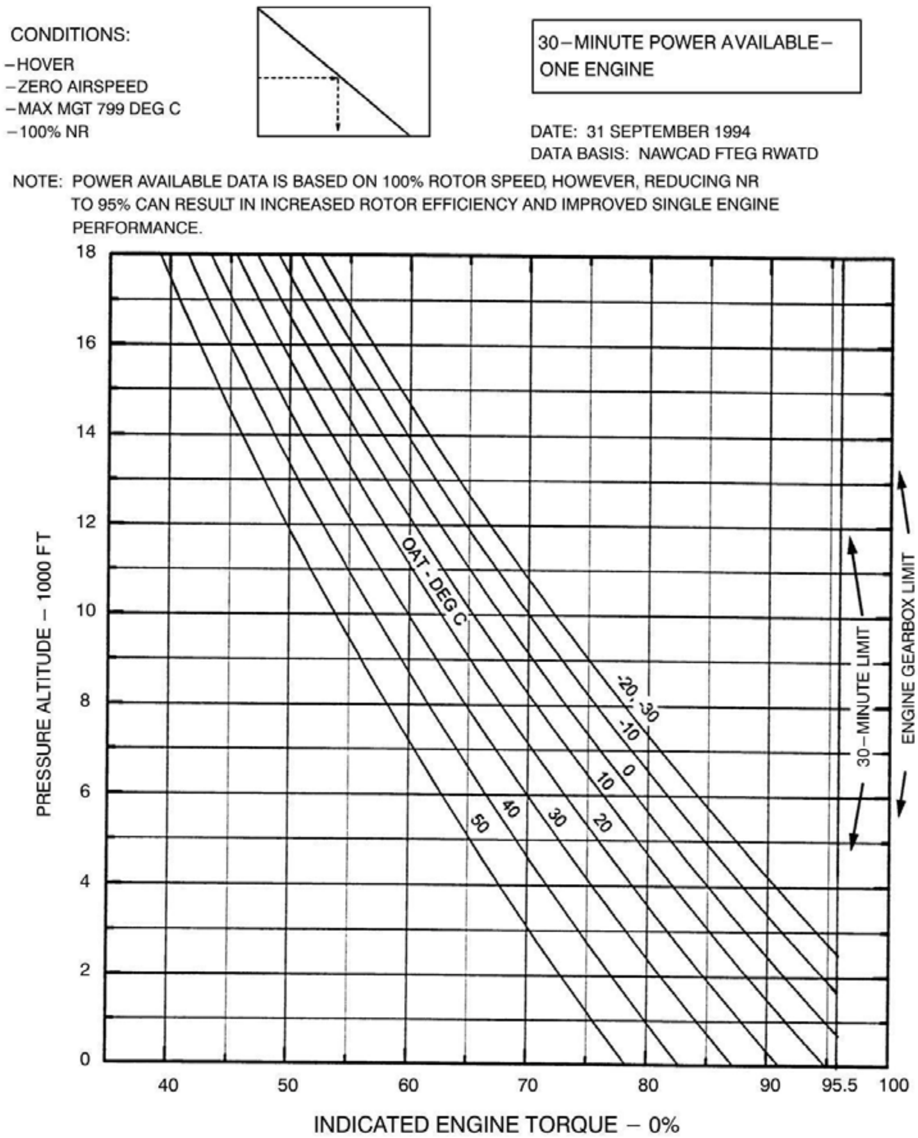



*Figure A–14. 30–Minute Power Available – One Engine*

A-31

**What this chart represents:** Shows available one-engine power for 30-minute operation in hover/zero-airspeed conditions. This chart supports OEI planning and helps explain the difference between temporary emergency power and normal twin-engine operation.

*Source: selected combined PDF page 24; original source listed in the cover/index of the previous selection PDF.*

## 11. HH-65A - Maximum gross weight to hover, two engines

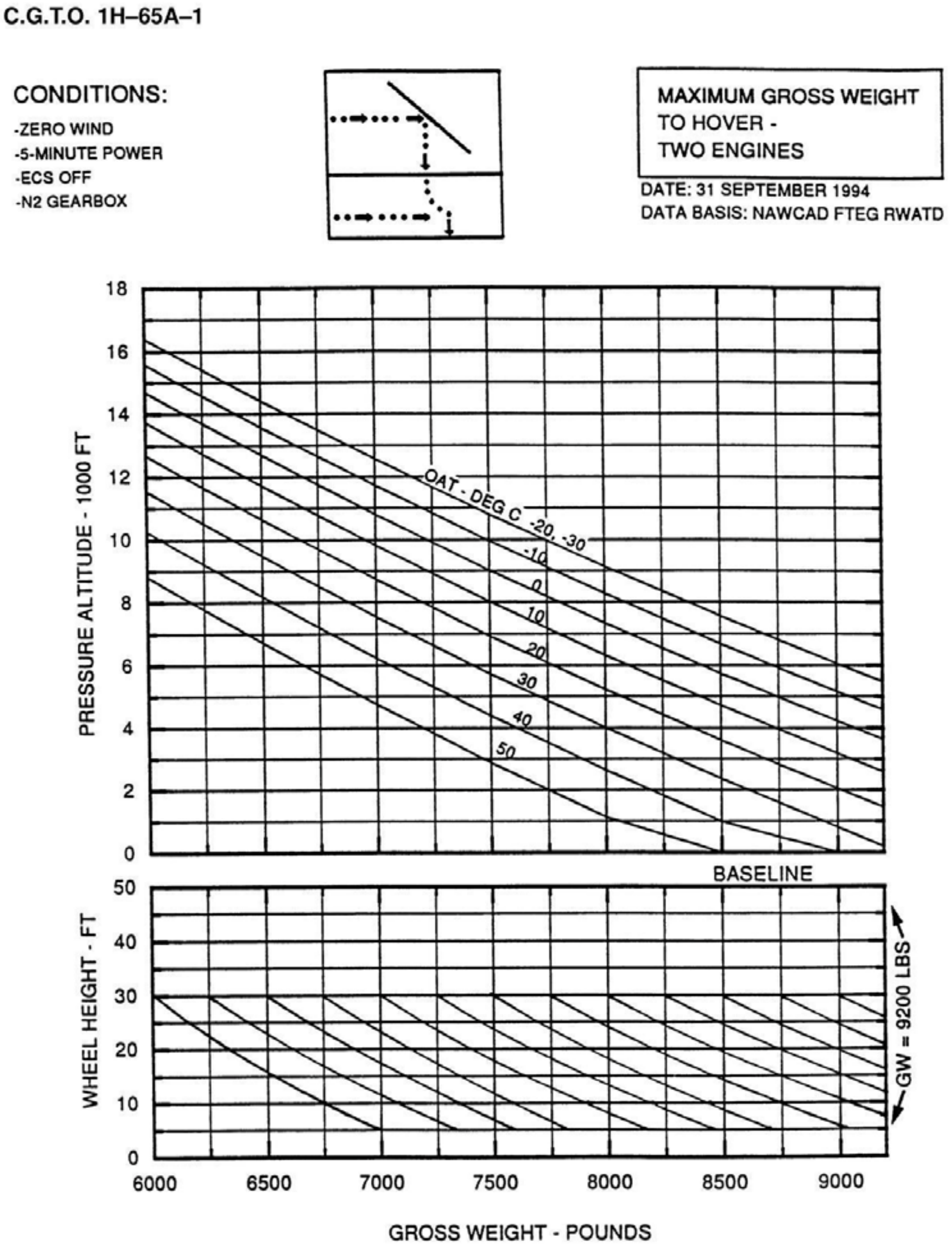



*Figure A–17. Maximum Gross Weight to Hover – Two Engines*

A-34

**What this chart represents:** Shows maximum hover weight for two engines at different altitudes, temperatures and wheel heights. It is a practical summary of IGE/OGE hover capability without wind correction.

*Source: selected combined PDF page 26; original source listed in the cover/index of the previous selection PDF.*

## 12. HH-65A - Height/velocity diagram, both engines inoperative

C.G.T.O. 1H–65A–1

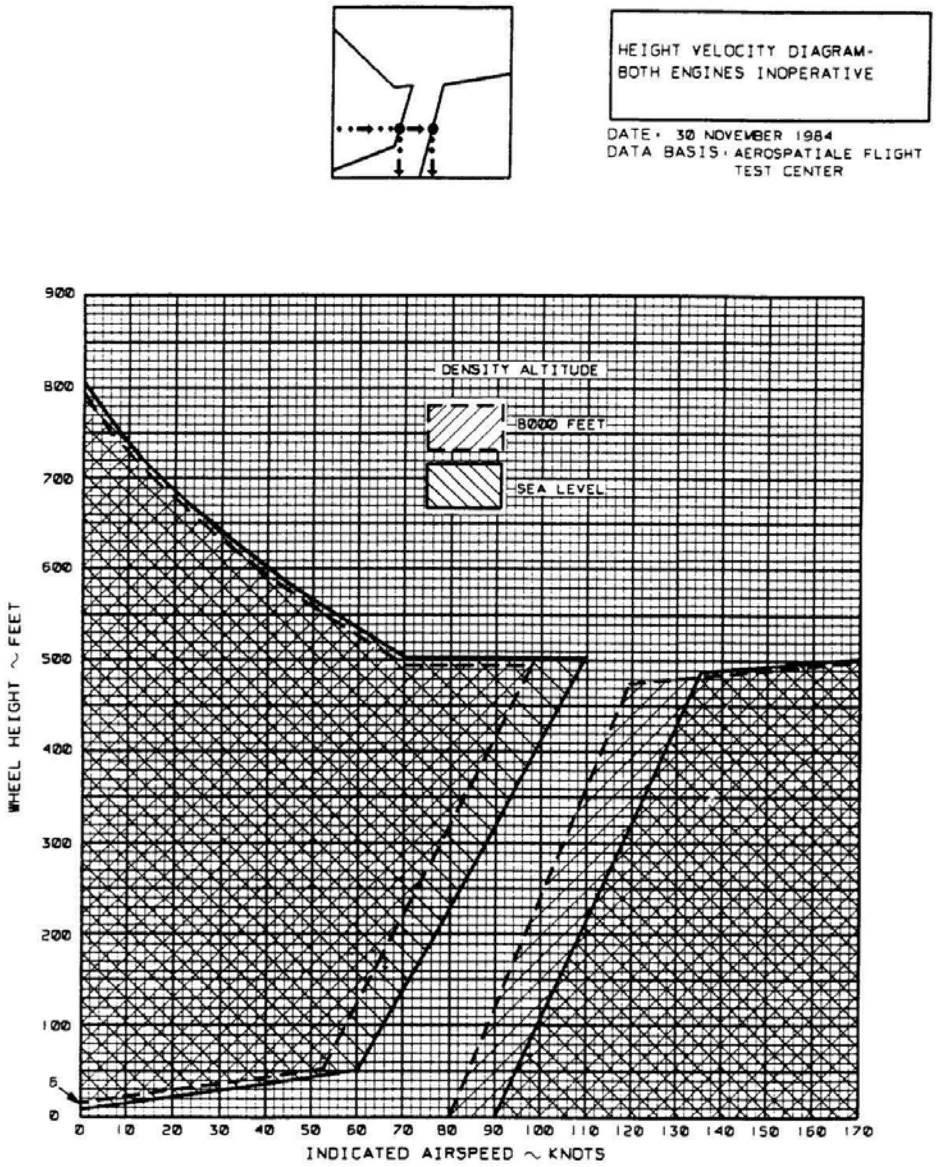



*Figure A–22. Height Velocity Diagram – Both Engines Inoperative*

A-42

**What this chart represents:** Shows avoid areas for autorotation after total power loss at different density altitudes. For simulator use, it supports basic autorotation training and the idea that speed/height combinations matter.

*Source: selected combined PDF page 28; original source listed in the cover/index of the previous selection PDF.*

## 13. HH-65A - Climb, two engines, warm conditions

C.G.T.O. 1H–65A–1

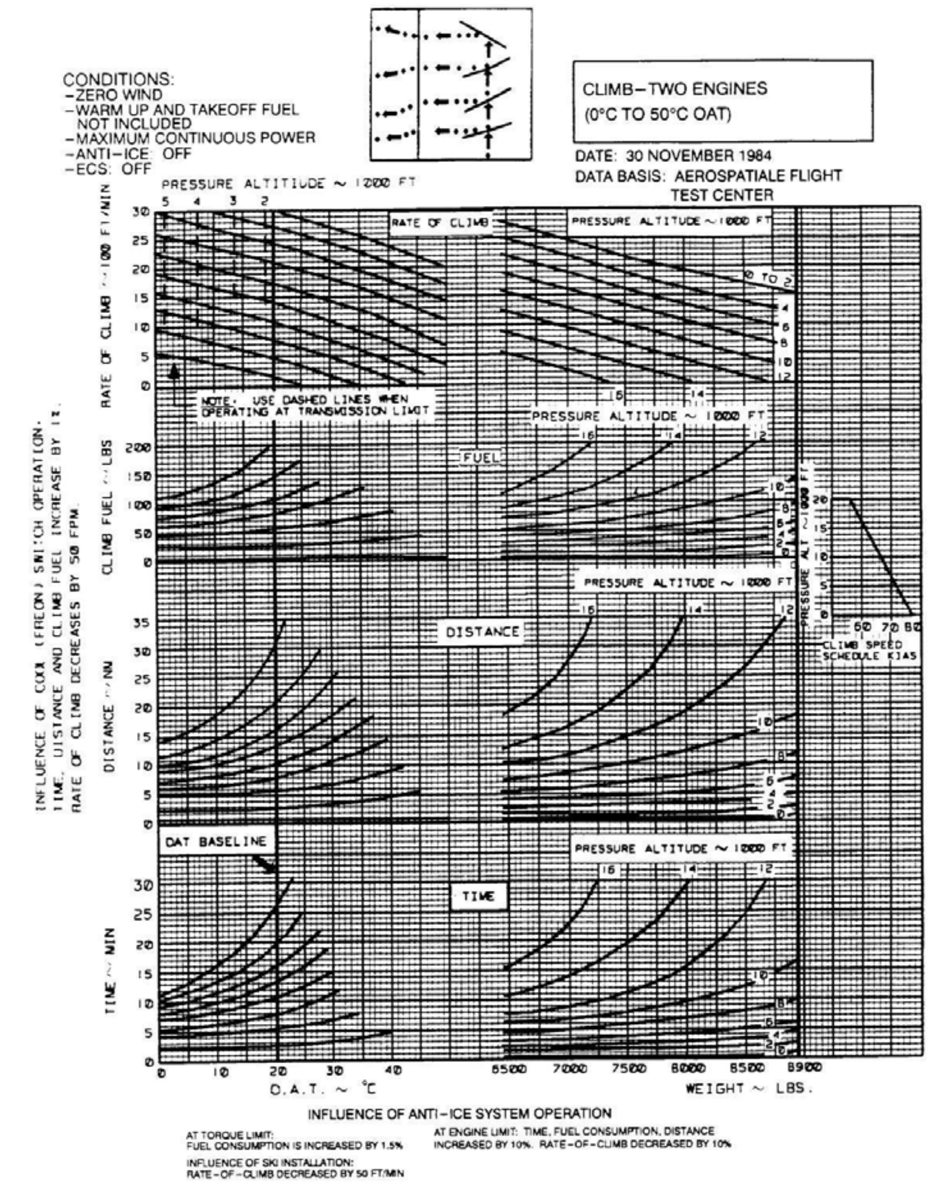



*Figure A–28. Climb–Two Engines (0° C to 50° C OAT) (Sheet 1 of 2)*

A-48

**What this chart represents:** Provides time, distance, fuel and rate-of-climb data for two-engine climbs in warmer OAT ranges. Use it to derive general climb behaviour and to explain that best climb is planned by speed, weight and temperature.

*Source: selected combined PDF page 29; original source listed in the cover/index of the previous selection PDF.*

## 14. HH-65A - Service ceiling, two engines

C.G.T.O. 1H–65A–1

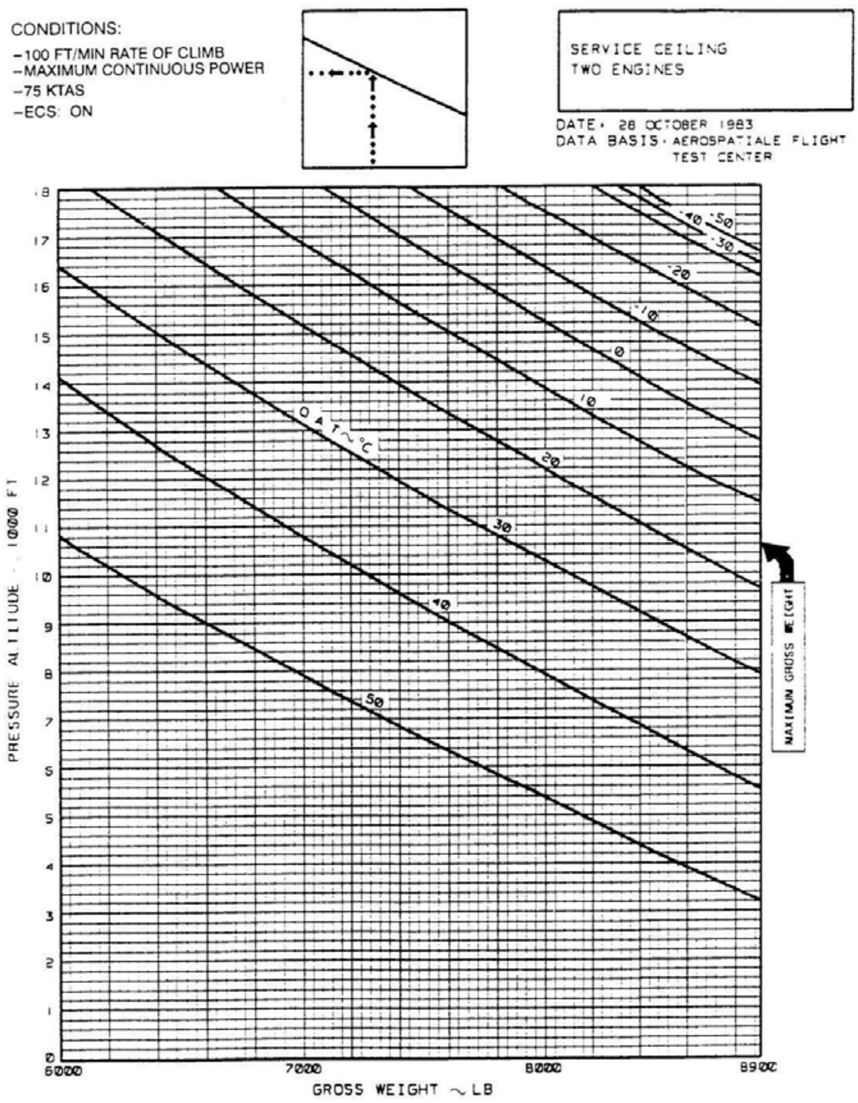



*Figure A–30. Service Ceiling – Two Engines (Sheet 1 of 2)*

A-52

**What this chart represents:** Shows the highest altitude where a 100 ft/min climb can still be maintained on two engines for a given weight and OAT. It is useful for describing practical altitude limits rather than a single advertised ceiling.

*Source: selected combined PDF page 31; original source listed in the cover/index of the previous selection PDF.*

## 15. HH-65A - Service ceiling, one engine, 30-minute power

C.G.T.O. 1H–65A–1

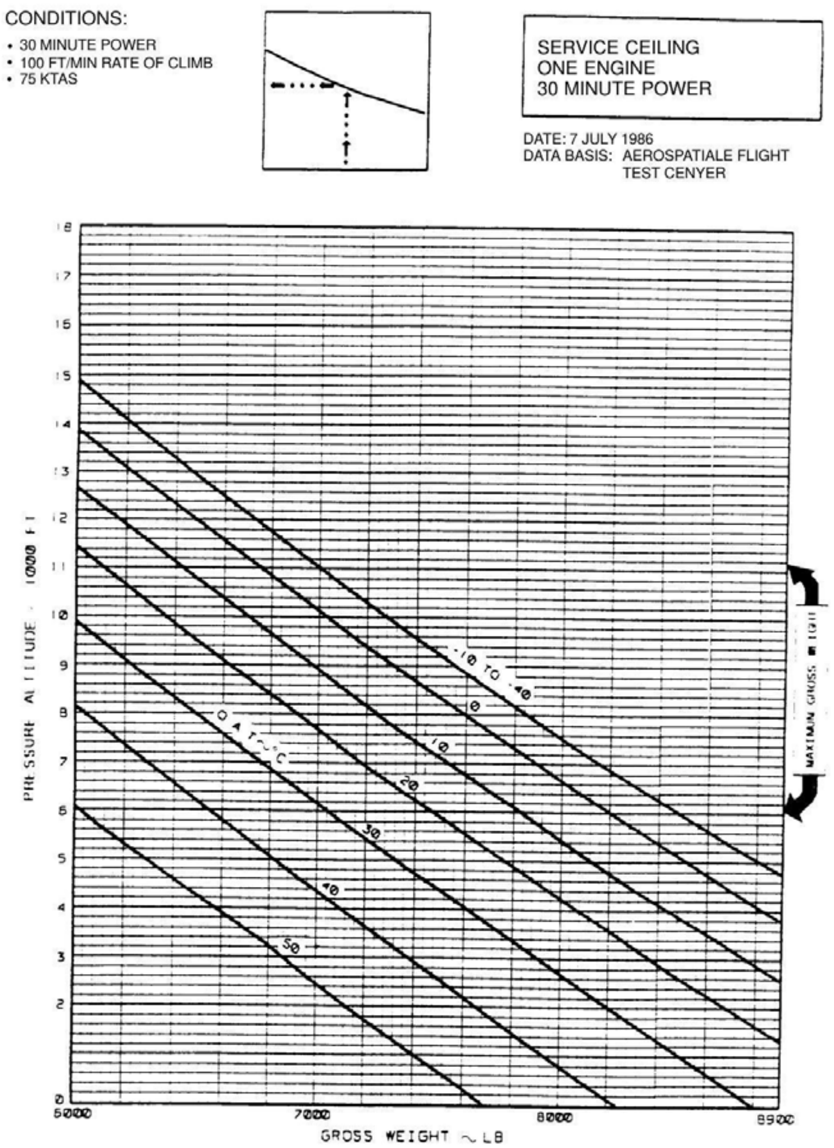



*Figure A–31. Service Ceiling – One Engine – 30 Minute Power*

A-54

**What this chart represents:** Shows one-engine service ceiling at 30-minute power and 75 KTAS. This is a key OEI planning chart because it indicates whether the aircraft can climb, maintain altitude or descend after losing an engine.

*Source: selected combined PDF page 32; original source listed in the cover/index of the previous selection PDF.*

## 16. HH-65A - Cruise maximum range, two engines, sheet 1

**C.G.T.O. 1H–65A–1**

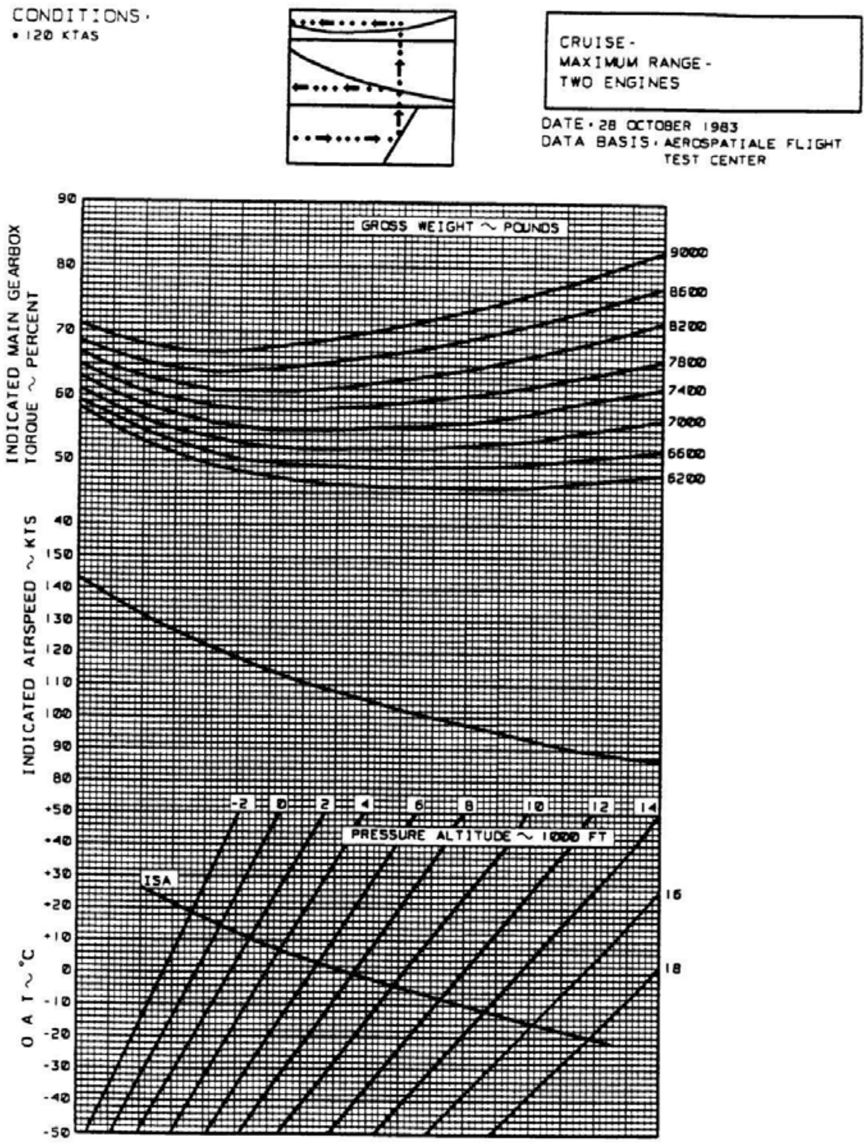



*Figure A–32. Cruise – Maximum Range – Two Engines (Sheet 1 of 3)*

A-55

**What this chart represents:** Gives the two-engine maximum-range cruise schedule, including indicated airspeed and torque. This is the primary chart behind the HH-65A best-range reference of about 120 KTAS.

*Source: selected combined PDF page 33; original source listed in the cover/index of the previous selection PDF.*

## 17. HH-65A - Cruise maximum range, two engines, sheet 2

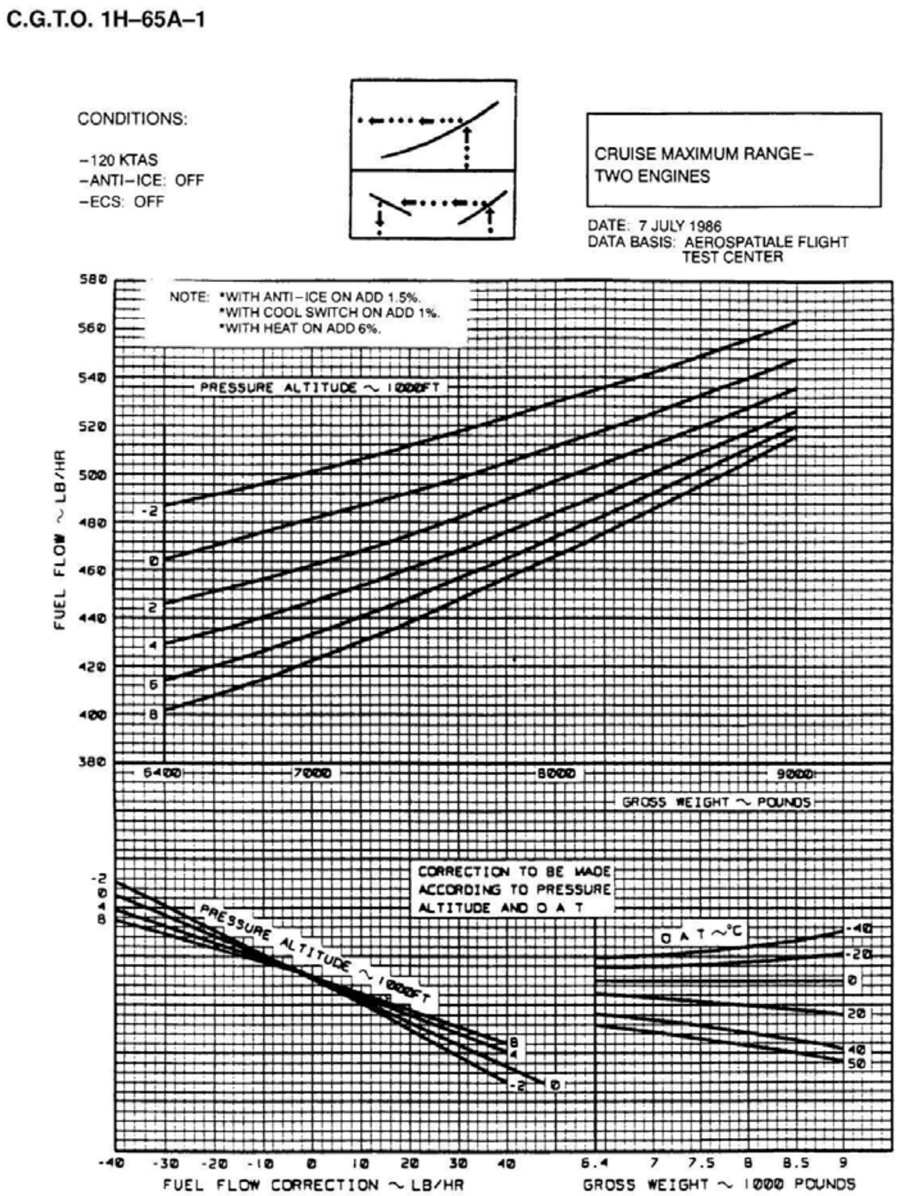



*Figure A–32. Cruise – Maximum Range – Two Engines (Sheet 2 of 3)*

A-56

**What this chart represents:** Provides two-engine maximum-range fuel-flow data for weight, altitude and temperature. Use this together with sheet 1 to estimate realistic cruise economy.

*Source: selected combined PDF page 34; original source listed in the cover/index of the previous selection PDF.*

## 18. HH-65A - Cruise maximum range, two engines, sheet 3



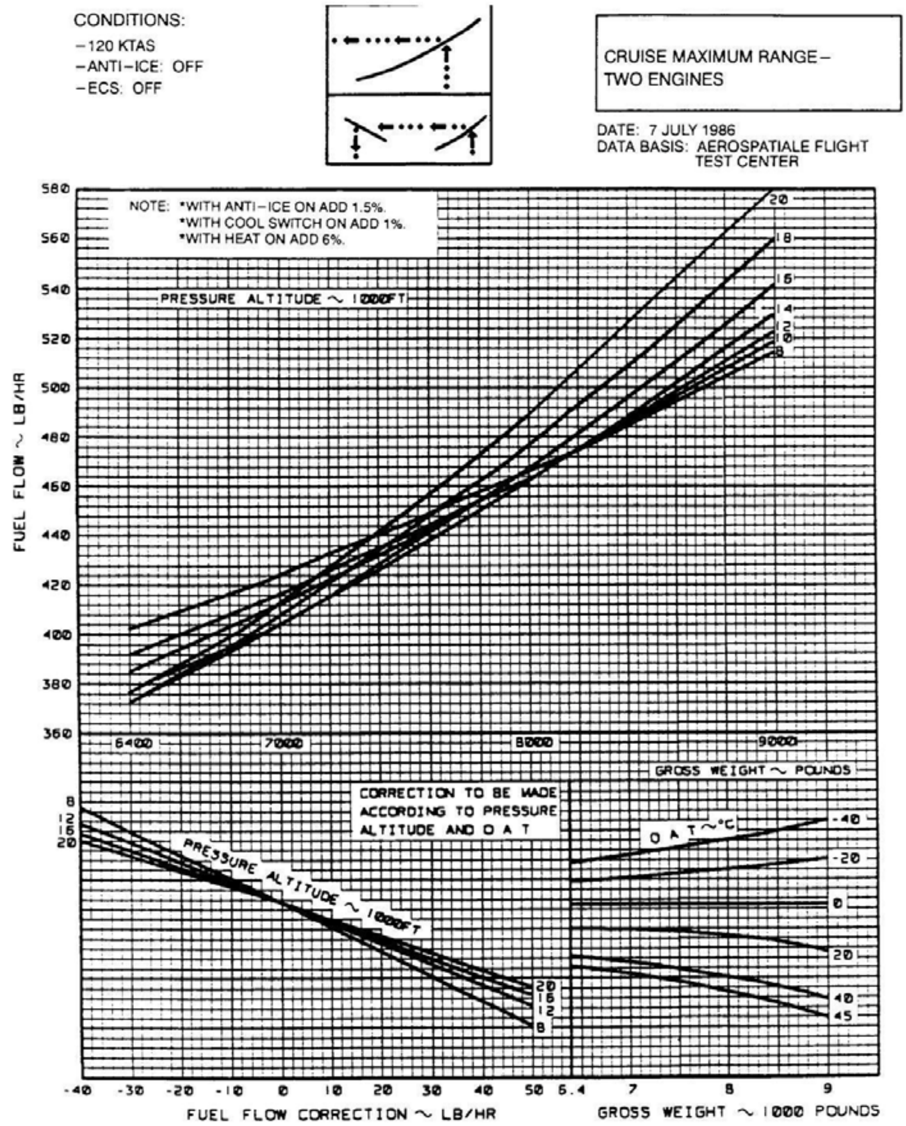



*Figure A–32. Cruise – Maximum Range – Two Engines (Sheet 3 of 3)*



**What this chart represents:** Continues the two-engine maximum-range cruise data and corrections. It supports more complete planning when the operating point falls outside the first sheet.

*Source: selected combined PDF page 35; original source listed in the cover/index of the previous selection PDF.*

## 19. HH-65A - Cruise maximum endurance, two engines, sheet 1

C.G.T.O. 1H–65A–1

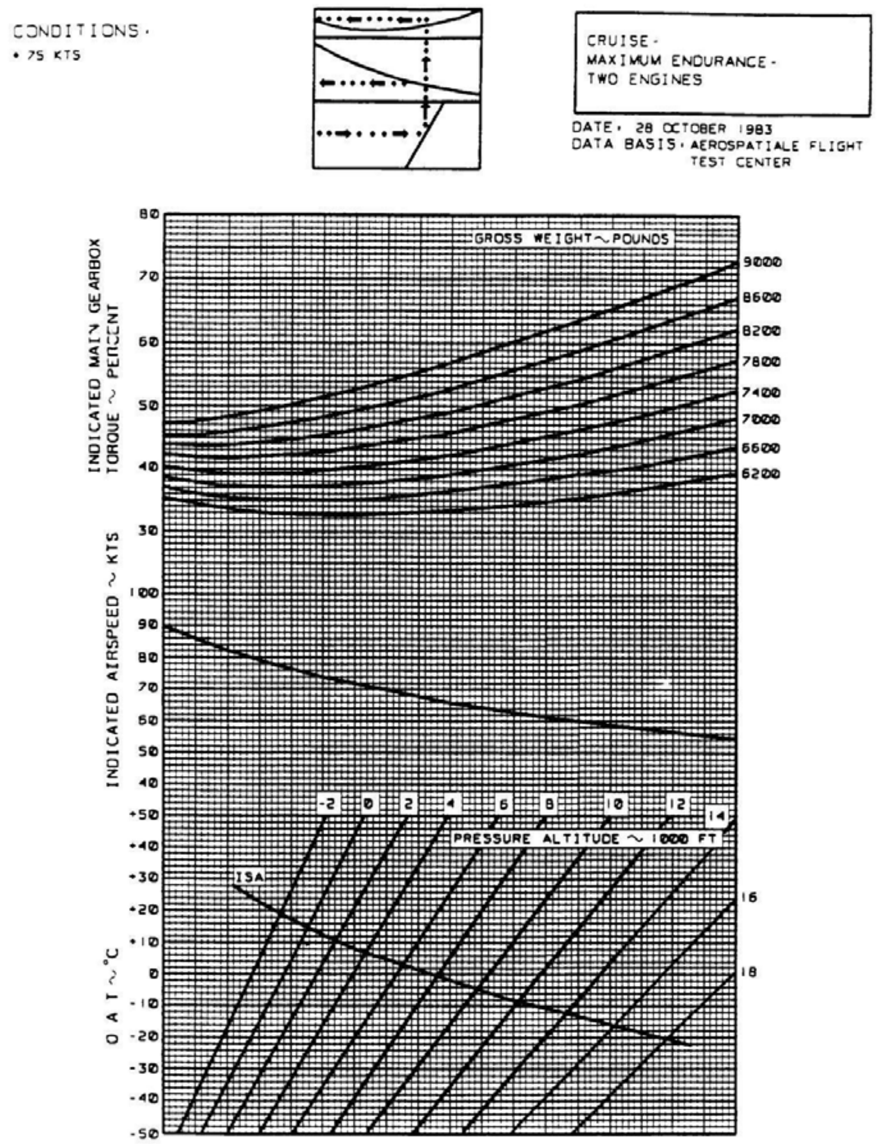



*Figure A–34. Cruise – Maximum Endurance – Two Engines (Sheet 1 of 2)*

A-60

**What this chart represents:** Shows the two-engine maximum-endurance schedule, using the lower loiter speed rather than best-range cruise speed. It is useful for SAR/search patterns or holding where time aloft matters more than distance.

*Source: selected combined PDF page 38; original source listed in the cover/index of the previous selection PDF.*

## 20. HH-65A - Cruise maximum endurance, two engines, sheet 2

C.G.T.O. 1H–65A–1

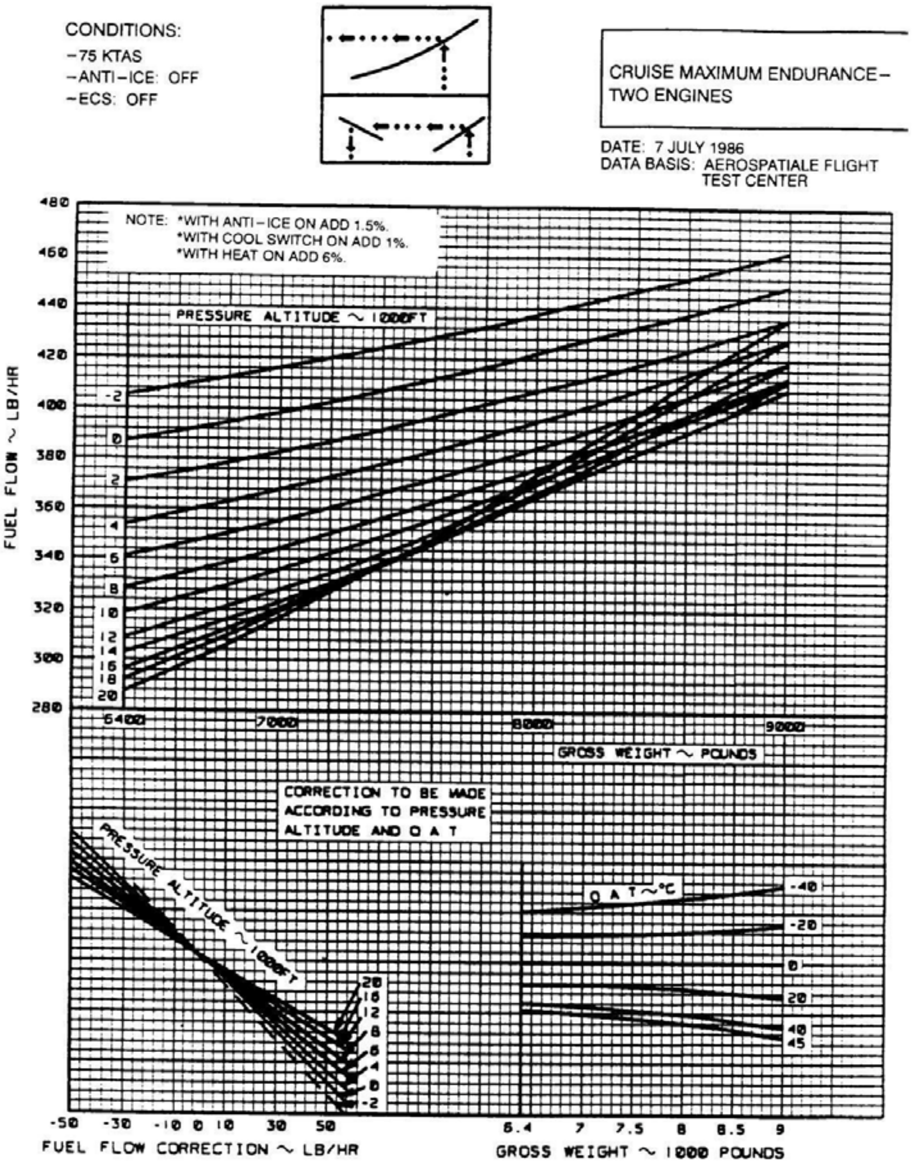



*Figure A–34. Cruise – Maximum Endurance – Two Engines (Sheet 2 of 2)*

A-61

**What this chart represents:** Provides two-engine maximum-endurance fuel-flow data. This is useful for estimating loiter burn and for explaining why endurance speed is much slower than normal cruise.

*Source: selected combined PDF page 39; original source listed in the cover/index of the previous selection PDF.*

## 21. HH-65A - Autorotative performance

C.G.T.O. 1H–65A–1

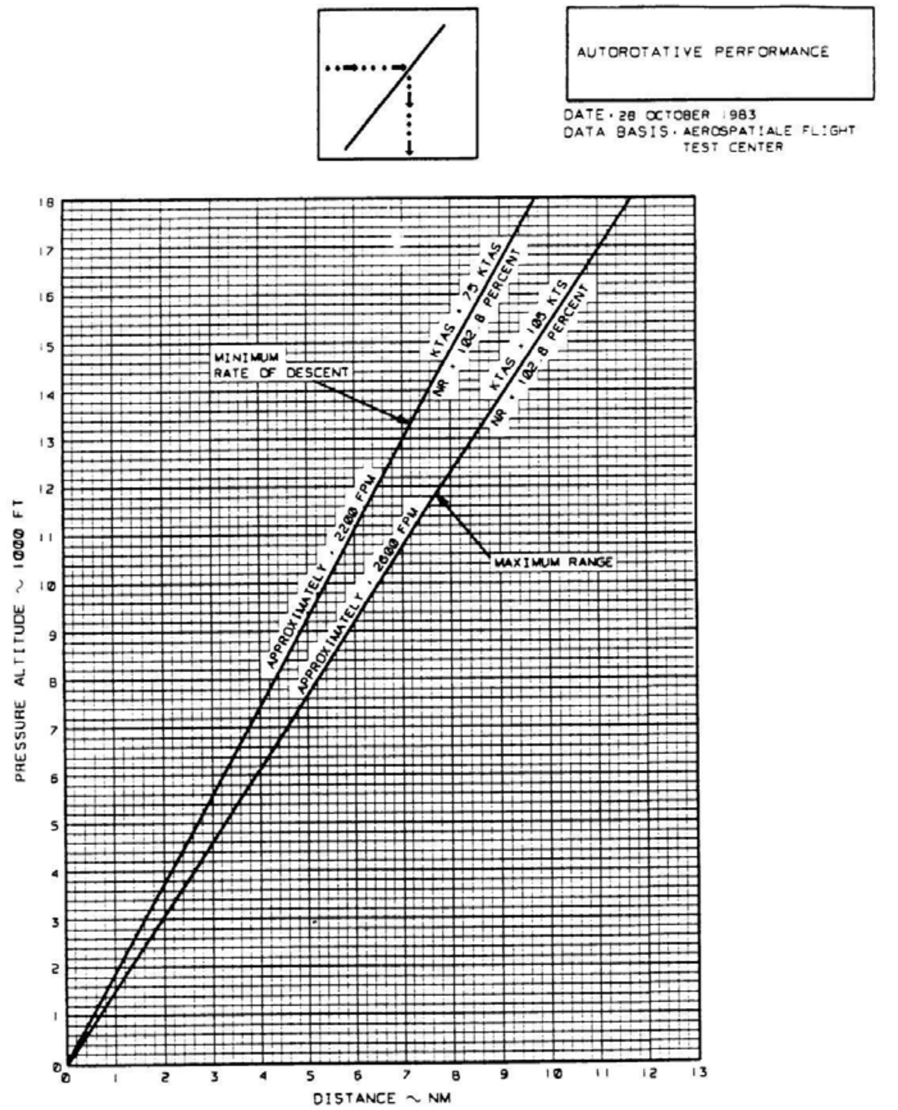



*Figure A–39. Autorotative Performance*

A-69

**What this chart represents:** Shows autorotation descent and glide performance based on speed, sink rate and altitude. It is useful for simulator emergency guidance, especially for estimating glide distance after power loss.

*Source: selected combined PDF page 41; original source listed in the cover/index of the previous selection PDF.*

## 22. HH-65A - Rotor RPM in autorotation

C.G.T.O. 1H–65A–1

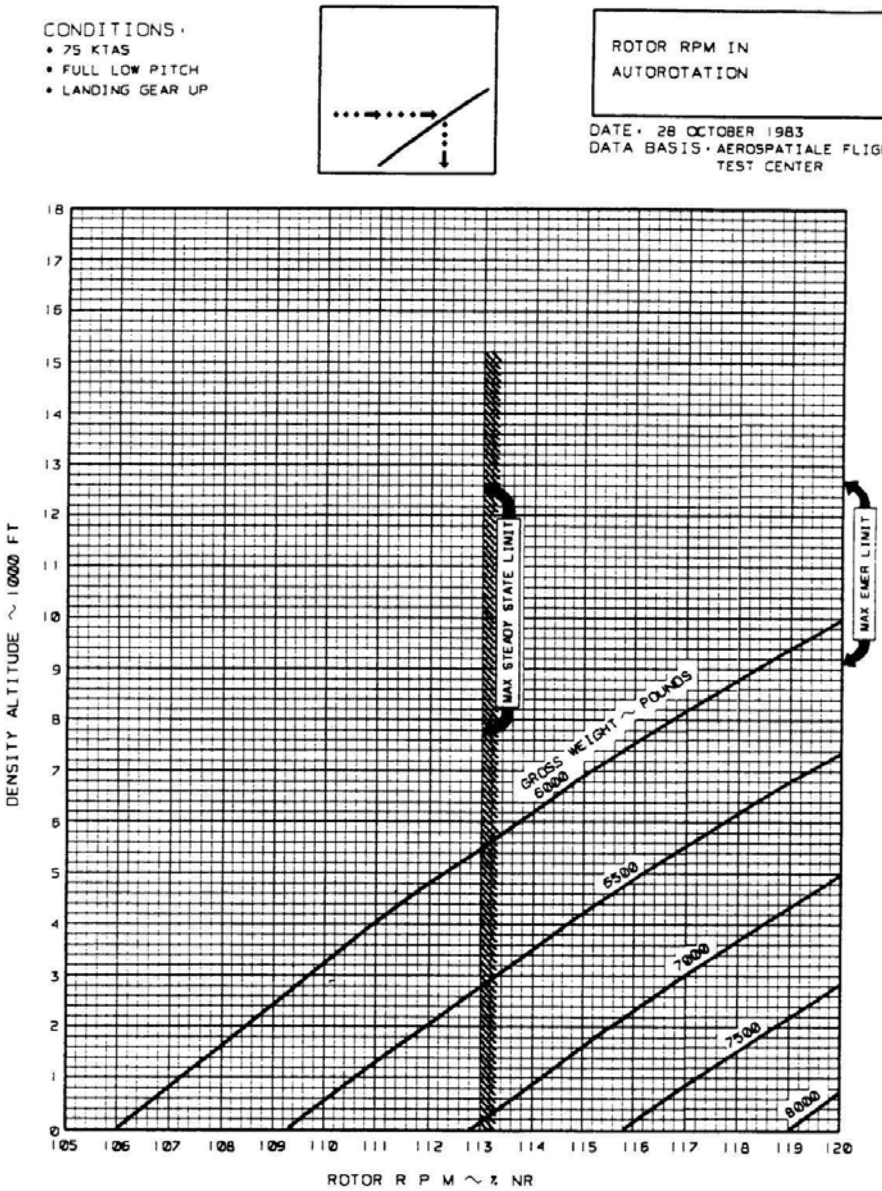



*Figure A–40. Rotor RPM in Autorotation*

A-70

**What this chart represents:** Shows expected rotor RPM in autorotation for weight, altitude, temperature and airspeed. This supports realistic autorotation notes and shows why rotor speed management is a central part of helicopter emergency handling.

*Source: selected combined PDF page 42; original source listed in the cover/index of the previous selection PDF.*

## 23. HH-65A - Takeoff and destination data card

**TODD CARD HELO____________ DATE______________**

| DATA | | TAKEOFF | DESTINATION |
|---|---|---|---|
| Field Elevation | | ___________FT | ___________ |
| OAT | (A–1) | ___________°C | ___________ |
| Pressure Altitude | | ___________FT | ___________ |
| Wind | | ___________KT | ___________ |
| Operating Weight (Crew + Zero Fuel) | | ___________LB | ___________ |
| Extra Crew/Equipment | | +___________LB | ___________ |
| Fuel | | +___________LB | ___________ |
| Mission Gross Weight | | =___________LB | ___________ |
| Power Available Two Engines 5 Min Takeoff Power | (A–2) | __________%MGB Q | ___________ |
| Power Available One Engine 2.5 Minute Power | (A–3) | __________% ENG Q | ___________ |
| Power Available One Engine 30 Minute Power (Cruise Alt) | (A–14) | __________% ENG Q | __________ |
| Power Required/Power Reserve: 6 FT HOVER | (A–4) | ____/_____% MGB Q | ____/_____ |
| 50 FT HOVER (Mission Gross Wt Zero Wind) | (A–5) | ____/_____% MGB Q | ____/_____ |
| Max GW 50 FT HOVER (10% Reserve, Zero Wind) | (A–5) | _________LB | _________________ |
| Single Engine Climb Capability | (A–7) | _________FPM | _________________ |
| Ability to Maintain Level Flight (ECS Off, Cruise Altitude, 30 Minute Power) | (A–9) | ___/___MAX/MIN IAS | ______/___ |
| Flyout Altitude (MAX GW 50 FT Hover Weight, Onscene Conditions) | (A–37) | ______ABSOLUTE ALT LOSS | _____ |
| Landback Altitudes (Low Area of H/V Diagram) | (A–6) | __/____0 KIAS/30 KIAS | ______/____ |
| Min Airspeed to Maintain Level Flight (One Minute Power, MAX GW 50 FT Hover Weight) | (A–42) | _____________KIAS | _____________ |
| Maximum Airspeed (Mission Gross Weight, Cruise Altitude) | (A–10) | ______________KIAS | ____________ |

| | | |
|---|---|---|
| ATIS ___________ | LAND ________ | UCN ______________ |
| WX ___________ | T/OFF ________ | DIST TO SCENE ______ |
| ___________ | LAND ________ | ON SCENE ______ |
| ___________ | T/OFF ________ | ALONGSIDE ______ |
| TEMP/DEWPT ______ | LAND ________ | DPTD SCENE ______ |
| WIND ___________ | T/OFF ________ | HRS ON SCENE ______ |
| ALT ___________ | HRS FLWN ______ | HRS SEARCHED ______ |
| RWY ___________ | FP/CP/IP ______ | SORTIES ______ |

NOTAMS ______________________________________

______________________________________

CLEARANCE ______________________________________

______________________________________

| #/TYPE/COND | SAR INFO |
|---|---|
| PREC ___________ | DATUM ___________ |
| NON–PREC ___________ | CSP ___________ |
| HOISTS ___________ | DESC ___________ |
| MATCH ___________ | ___________ |
| CATCH ___________ | ___________ |
| AUTOS ___________ | ___________ |

GRIPES ______________________________________

______________________________________

______________________________________

*Figure A–43. Takeoff and Destination Data Card*

A-73/(A-74 blank)

CH–6

C.G.T.O. 1H–65A–1

**What this chart represents:** A planning worksheet used to collect field conditions, weight, fuel and performance numbers before takeoff and arrival. For the addon manual, it can inspire a simplified preflight planning checklist for simulator users.

*Source: selected combined PDF page 43; original source listed in the cover/index of the previous selection PDF*