747-400

Autoflight \rightarrow Autopilot Flight Director System (AFDS) \rightarrow Flight Management System (FMS)

AFDS \rightarrow Mode Control Panel (MCP) \rightarrow 3 Flight Control Computers (FCC) \rightarrow accelerometers, elevators, rudders, ailerons, and actuators for servo actuators

The autoflight system operates as an integral part of the 747-400 flight management system (FMS)

The FMS (Left/Right FMC and 3 CDUs) contains 3 flies section in performance databases which communicate with NAV, VNAV, and performance speed control function to the autoflight system.

Normally the AFDS and AIT are coordinated automatically by the FMS to perform an initial and vertical flight path guidance during cruise and descent (NAV, VNAV and AIT engaged)
Central of the EFDS is the MCP.
Autopilot on MCP and EFDS (CDUs)

Autopilot Flight Director System (AFDS)

A/FNS via three systems -> 3 flight control computers (FCC) and the single mode control (SMC)

The SMC provides
- Flight director
- Altitude alert
- Approach guidance

The 3 FCC -> Left, Center, Right, 3 can work together, respective hydraulically powered actuators is what operate the flight control through 3 separate hydraulic systems.

MCP switches are pulled to select autopilot 1 flight director and 10 glide angle mode.

A flight deck in the lower half of the screen illuminated 4 indicators, the mode has been selected.
Mode engagement is confirmed by flight mode annunciation displayed on the primary flight display (PFD).

All modes can be disengaged by selecting another mode or by disengaging the A/P and returning all flight control modes to \( \text{FLCH} \) (FL).

The exception is clearing an approach after LOC and GS have engaged. In this situation, LOC and GS modes can be disengaged by disengaging the A/P and ensuring both FDs off standby position and off (go around) (TO/GA) switch and engaging the \( \text{TO/GO} \) mode.

Only \( \text{NAV} \), \( \text{NAV} \), LOC and A/P after they have been selected to the active flight mode can be deselected by pushing the mode switch a second time.

Autopilot disengage manually:

Push the autopilot disengage switch located at the center of the control wheel.
Push the autopilot decoupling brake release on the mode control panel (MCP).

ECAM显示器：在巡航和着陆模式时，可以在PFD上显示。

主显示器上FD off 飞机速度70-100节时显示。

Andesland Status - if inflow becomes of the state of the autopilot system for TCS approach
with extended (and yoke retracted)

Land 3 (green)

Land 2 (green)

No Andesland amber.

No LNAV 3 is deployed but LNAV 2 is available.

No AUTOCAN is deployed if you can see and land.

Autothrottle Sys (A/T)
The thrust lever may be manually position by the flight crew without disengaging the A/T. A/T will remain in accordance to configuration except when A/T is engaged in the HOLD position.

A/T can be disconnected manually by pushing autotthrottle disconnect switch, push the A/T diseng. switch to off.

Autothrottle disengaged

- Panel
  - disconnect master FMC (including FMS)
  - not to select master FMS
  - FMS fails
  - Disconnect Thrust Levers in reverse / creep / idle
  - 2 engine fail
  - EEC switch to off mode

Autotthrottle Flaple Engaged (green)

THR REF engaged
THR engaged
SPD N engaged
FDCBr 1
HOLD engaged
And checklist Operations

Takeoff Operations Checklist

The TOGA Takeoff mode disarm for the second flight director secretory to place 
with the aircraft on the ground.

PRDH display FD on the A/P DIS engaged steering 
and TO/GA on the stabilization

FD command bar display at 8° nose up, 
steep lead.

All automatic are disengaged. Takeoff 
flight director only function.

The acceleration of (A/T) is armed during 
peephole.

7/18
Excesses

The autopilot (AP) and on the Flight Director (FD) can be use to fly lateral & vertical break (NAV & VNAV).

Aircraft stall system (AF) can be operated independently of the autopilot or flight director. If not armed, the ailerons will not select speed on the speed selector located on MCP.

Speed Protection

With the aircraft stall protective speed protection is available for all pitch inputs except the vertical speed (V/S) mode.

Speed protection prevents, accelerating maximum operability, gear extended or flap.

FMCS use a 5 hard memory

If an engine fails or engine altitude, the FD will try to maintain cruise altitude.
Approaches

AFDS proceede guidance for multiple A/P peresecion approach (CAV 103 or CAV 102)
full A/P non peresecion approach (CAV 10)

Multiple Autopilot Approacdes

Inducing the approach sccelol motnes the AFDS per for stee stee x localizer cofigur and tuclining

If one autopilot is engaged the other autopilot ace secured when the approach sccelol is perpby

Descend on the localizer pressure to the puring apprach per pitch as accomplishing using, VNAV, YS or ECCPono nukses

VNAV will temomade at Jude stee interception ane pitch steer (CS) will be engaged puhcised for final approach until FLARE mode engaged at 200' AGL

Pudder Center is accomplished sepero A/P syatemonly during a mutlilue A/P approach
Ballast recalculated and program leading
multi-antipilots approach. It proceeds auxiliary calculations. Ballast guidance
Ballast unbalanced when CTS alarm engaged and/or uncorrected available P/R
- Manual
- Replaced the C/O to Multi P/R

Locators on control in maintenance lay A/P control of stick/3 access control sequence
- Manual P/R were disengaged

Single Antipilot Approach

Pushing the locator switch remain the AFDS for locator capture and tracking.

Prevent, on the locator, or very to the central
fix contains the VNAV, V/S and FCC
preselected, or

VNAD not recommended after following FCU
60 descend

Manual missed approach (TOC ahead pressed, no ACP and D as A/7)

Flight deck desk missed approach using FCM (TOC ahead pressed, EF, ST operate)

Automatic missed approach using FCP (TOC ahead pressed, AIP, FD A/T operate)

TOC A stay even if touched

Terminal of TOC ahead

Below 500 ft R/T descend AIP and turn off AF, keep flight deck.

Above 500 ft R/T select a different mode or pitch mode
Altitude Alert System is referenced to the altitude selected in the FCU window on the MCP.

Alerting when approaching and the altitude from the selected altitude.

At 900 ft below the altitude selected in the FMS window on the MCP, a audible alert will be displayed according to the selected altitude entered altitude display on the PFD and audio alert sounds (1s). The alert will be heard around the current altitude display because the FCU is.

At 300ft before the selected altitude lost accuracy of the selected altitude disappear, and the color change white line around the current altitude return to its less bold while color.

Deviation

300ft deviation begins to alert
- Master caution light illuminates
- Digi auditory "ALTN FL WTHR ALERT, current altitude was incorrect"
A 900ft deviation from the selected alti-
accept is returning to within 300ft
Master caution light on if no
EICAS caution is on. A target display of
current altitude was change to while.

Altitude deviation can be set by deactivating
selected altitude on the MCP to an altitude
at least 900ft different than the MCP selected
altitude.

No - when glide slope compliers or gear down and
landing flaps selected.
Controlled by undercenter.

- Speed: Selected Operative only in flight and above 250kt after takeoff.

Not operative when VNAV is on elevator.

Threshold selected only above 250kt after takeoff.

- Thrust levers are illuminated only when an ACT Threshold mode is engaged by pressing the F/A-18 switch.

IAS/MACH:

Indicate - Select the indicated speed display in the window and on the PFD.

Not operative when IAS/MACH window is blank (VNAV engaged).

Push with VNAV engaged: IAS/MACH and airspeed indicator functions selector opens the window displaying the current TAS to get IAS/MACH. Tap get IAS/MACH can be increased if selected speed unrealistic by reselecting the selector.
IAS/MACH select switch

Push alternately IAS/MACH window display between current IAS and current MACH, if within maximum range.

IAS/MACH window

Open

With SPD, FL, V/S or TO/GO mode engaged the window is open.

Closed. UNAV engaged. PMC, determined speed.

Lateral Navigation switch

Per illuminated when selected

UNAV assumed (white, small font) are engaged green (large font) on PED.

Vertical Navigation switch

Push to illuminate when selected.

Flight level change switch

Push to illuminate when selected

FL CH SPD pitch mode will engage in the air and at an altitude above 5000 ft.
Heading: Function of the DSC

- Replace the selected heading
- Also displays on both PEDs

Heading: Select

- Push - Select pageage
- Push and hold for mode

Heading: Limit Select

- Allow selection of five fixed track speed limits
- or an automatic mode

Heading: Hold select

- Push - Select pageage
- Hold for mode change

Automatic engagement: HNC Hold under modular mode
- Engaged while on ACP is engaged in CRNA
- etc
Vertical Speed Select:

Push - Blue illuminates when selected

Automatic engagement: V/S automatically engage as pitch mode active
AP engage
etc

Vertical Speed Select:

UP/DOWN: When become active only after V/S is engaged/pitch mode

Vertical Speed Window:
Blank unless V/S is engaged engage

Altitude Hold select:
Push - Blue illuminates when selected/engaged

Altitude selector:
Rotate - Change the displayed altitude in the altitude window on the PFDs
Push - when VNAV engaged etc
Altitude Ellison, display selected altitude.

Localizer - Push Bar, Illumination when selected/engaged

Approach Switch

Put in Localizer and Select key depressed and radio selected. Pressing before 1200 ft automatic engagement of the autopilot system occurs.

Autothrottle disconnect Switch

TO/GA switch

Airspeed disconnect Switch
EICAS Alert Message... automatic alert appears in precussory EICAS (upper right corner)

Autoflight system alert message: Warning Condition: Aircraft
Communications

- 4 audio panel and 3 radio tuning panel

3 audio panel are on the control stick. The fourth is on the left side of the center console.

3 radio tuning are on the control stick.

3 UHF - 2 VHF radio
3 interphone system

ACARS system facilitates visual and automatic communications.

Requirement for SATCOM communication.
Navigation and control identified, recorded on the secondary audio panel.

Audio Panel
Transmit a secure.

Radio Tuning Panel

During the frequency from the scratch transfer frequency into the secure frequency.
The Coft Reader is normally paired with VHF and HFC.

The secret RTP is a VHF P and HFP.

Center RTP = VHF C.

2. VHF Reader (left) Right (R) Center (C), country, laboratory and RTP.

When ACARS is deployed in the center RTP, the ACARS frequency indicator on the ACARS equipment will be set to the appropriate ACARS frequency for communication. This allows VHF C to be used to communicate ACARS data.

Manually selecting a frequency into the receiver,
primary frequency indication of the VHF Coftic receiver,
ACARS and ACARS normal communication.
N T Rosales

? N T rocall L x R

select

operate by any of 3 R x P

A II amplified modulation

Replies