

Excerpts from Textron Aviation Aircraft Operating Manuals

Page 16-7, Chapter 16 – Avionics, Citation CJ4 Operating Manual

“Attitude—Indicator shows cyan over brown with pitch marks aligned in the center and bank indices at the top. The lower portion of the sky pointer is the slip/skid indicator.

The PFD declutters (removes unnecessary information) automatically if pitch exceeds 30° nose up, 20° nose down, or 65° of bank. Only attitude and heading are displayed in the declutter mode. As pitch and/or bank is reduced (5° less than declutter onset), all normal displays return.”

Page 16-15, Chapter 16 – Avionics, Citation CJ4 Operating Manual

“FLIGHT GUIDANCE SYSTEM

The flight guidance system is an integrated flight director, autopilot, and yaw damper (Figure 16-16). All computations are performed by a pair of FGCs. The FGC computes pitch and roll commands for the flight director and can be coupled to the autopilot shown on the PFDs. The pitch and roll commands are based on the active modes.

Mode messages are shown on the PFD if the autopilot is engaged or if the onside flight director is on. Two channels of flight guidance are provided. The primary controls for the flight guidance system are on the FGP. Additional controls consist of yoke-mounted buttons for autopilot synchronization (SYNC), autopilot (AP) disconnect (DISC), and throttle lever go around (GA) buttons.

The system uses lateral navigation signals and vertical inputs to maintain desired courses or tracks (top of the PFD). The flight director window shows which FGC is in control of the command bars and autopilot, whether the autopilot or yaw damper is on, and what lateral and/or vertical commands are active and/or armed and the values for some modes of operation. Pilots should look at this window to determine what mode the aircraft is actively engaged in and what mode has been armed to do in the future...

...FLIGHT GUIDANCE COMPUTER (FGC)

The FGC takes mode selections and NAV information to command the flight director to arm, capture, and track lateral and vertical guidance. If the autopilot is on, the FGC drives the pitch and roll servos. The system powers up with the left side in control and a solid arrow in the flight director window points left. One FGC controls the autopilot and the other controls monitoring capabilities; however, both FGCs must be operating for the autopilot to function. The pilot can manually transfer to the other FGC, when needed, by pressing the AP XFR button on the flight director panel. This action points the solid arrow to the right and removes all flight director modes. The FGC in control also defines which ADC altitude encoder is normally used by the active transponder. When the TO/GA button on either throttle is pushed, both FGCs are active with each driving its

own side command bars. The solid arrow points to the side driving the autopilot; a stick arrow points to the opposite side. When any lateral mode is active, other than APPR LOC, a single solid arrow is displayed. When APPR LOC and GS are active both arrows are shown (both FGCs commanding their own set of bars)...

...FLIGHT GUIDANCE PANEL

The flight guidance panel, on the glareshield, allows the pilot to select manual or autopilot guidance for aircraft control in lateral and/or vertical direction (see Figure 16-16). The flight guidance panel has the following controls and functions:

- *FD button—Displays or removes the FGC on the PFD. Deselecting the FGC (FD off) does not disengage the autopilot and any active and armed modes continue to show and function. If the autopilot is turned on while the flight director is off, basic roll and pitch modes are active with no other mode armed or active. If the autopilot is turned on while flight director modes are active, the command bars move to the aircraft symbol, and then the autopilot attempts to fly the selected modes. This may cause small excursions away from desired course. Always display command bars and have the aircraft symbol near the bars before engaging the autopilot in order to reduce excursions. ...*
- *... YD button—Selects the yaw damper. The yaw damper is automatically selected upon autopilot engagement.*
- *AP XFR button—Transfers flight guidance from one side to another.*
- *AP button—Engages autopilot and yaw damper.*
- *YD/AP DISC bar—Disconnects autopilot and yaw damper.”*



Figure 16-16. Flight Guidance Panel

“Attitude and Turn Coordination

At the center of the PFD is the attitude indication (Figure 16-10). The amber symbol represents the airplane, and the amber bars represent the wingtips. The horizon line is white, with brown (ground) below and blue (sky) above. The horizon line indicates 0° pitch. Pitch lines are at 2.5° intervals above and below the horizon line and are labeled at 10° intervals. Red chevrons indicate extreme pitch at greater than 50° nose-up or 30° nose-down (Figure 16-11). Roll indication is provided by an arc at the top of the display that rotates with the horizon line. The arc has major tick marks at 30° and 60°, and minor tick marks at 10°, 20° and 45°.”

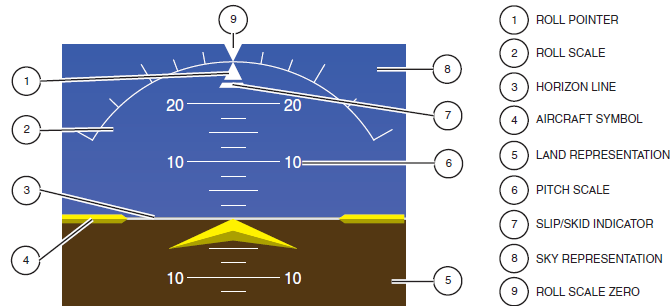


Figure 16-10. Attitude Indication

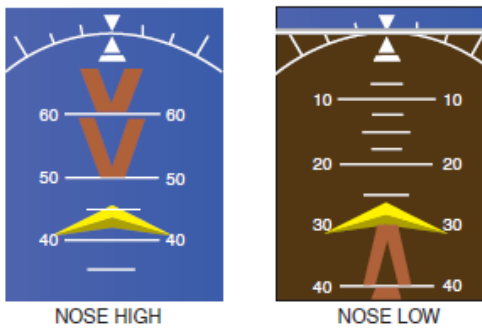


Figure 16-11. Pitch Attitude Warnings

“AUTOMATIC FLIGHTCONTROL SYSTEM DESCRIPTION

The Mustang includes an AFCS that provides flight guidance and automatic flight control.

The automatic flight control system includes three primary functions:

- *Flight director*
- *Autopilot*
- *Yaw damper*
- *Manual electric pitch trim*

The AFCS controller (above the MFD) provides control of these functions, and the PFDs provide necessary indications (Figure 16-36 and Table 16-8). Computers for these functions are in the GIAs and the servos. If either GIA fails, the other GIA performs the FD functions. If both GIAs fail, the AFCS is not operational. The FD and AP follow the same sources of data for AFCS guidance. If AP is engaged, the information is used to control the airplane. If the FD is engaged, the information is used to guide the pilot. The pilot commands AP engagement/disengagement with the AP key on the AFCS controller. Various controls on the yokes and throttles will also disengage the AP. FD can be selected using the FD key.

AFCS indications appear at the top of the PFD below the navigation status box (Figure 16-37). This status box contains information about the current status of the AFCS, including whether FD, AP, or YD are active, which guidance mode the AFCS is currently following, and which target values are being observed.”

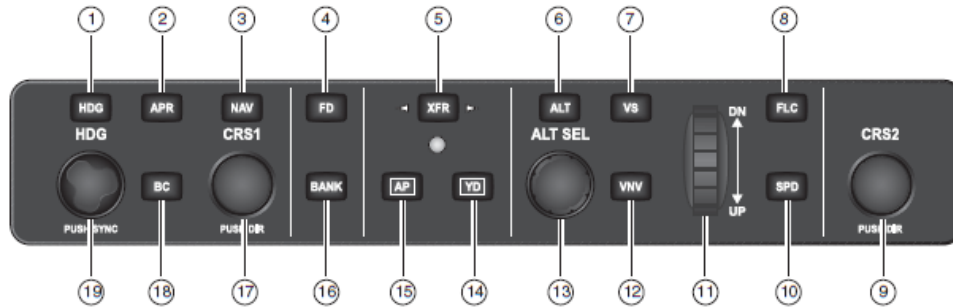


Figure 16-36. AFCS Controller

Table 16-8. AFCS CONTROLLER DESCRIPTIONS

#	CONTROL	DESCRIPTION
1	HDG Key	Selects/deselects Heading Select Mode.
2	APR Key	Selects/deselects Approach Mode.
3	NAV Key	Selects/deselects Navigation Mode.
4	FD Key	Activates/deactivates the flight director only. Pressing once turns on the pilot-side flight director in the default vertical and lateral modes. Pressing again deactivates the flight director and removes the command bars. If the autopilot is engaged, the key is disabled.
5	XFR Key	Transfers between the active flight director and standby flight director.
6	ALT Key	Selects/deselects Altitude Hold Mode.
7	VS Key	Selects/deselects Vertical Speed Mode.
8	FLC Key	Selects/deselects Flight Level Change Mode.
9 and 17	CRS Knobs	Adjusts the Selected Course in 1° increments on the HSI of the corresponding PFD. Press to center the course deviation indicator and return the course pointer directly to the bearing of the active waypoint/station.
10	SPD Key	Toggles Airspeed Reference between IAS and Mach for Flight Level Change Mode.
11	NOSE UP/DN Wheel	Adjusts the reference in Pitch Hold, Vertical Speed, and Flight Level Change Modes.
12	VNV Key	Selects/deselects Vertical Path Tracking Mode for Vertical Navigation flight control.
13	ALT SEL Knob	Controls the Selected Altitude in 100-ft increments (the Baro minimum altitude is also available).
14	YD Key	Engages/disengages the yaw damper.
15	AP Key	Engages/disengages the autopilot.
16	BANK Key	Selects/deselects Low Bank Mode.
18	BC Key	Selects/deselects Backcourse Mode.
19	HDG Knob	Adjusts the Selected Heading and bug in 1° increments on the HSI (both PFDs). Press to synchronize the Selected Heading to the current heading.



Figure 16-37. Automatic Autopilot

“AFCS Status Box on PFD

The AFCS status box indicates the settings and status of active and pending AFCS functions:

- *White—Armed modes*
- *Green—Active modes*
- *Amber (flashing)—Canceled modes*
- *Red (flashing)—Abnormal AP disconnect*

AFCS Controller

The AFCS controller is at the top of the instrument panel, above the MFD. It contains controls

for the FD, AP, YD, and for making associated settings or selections on the PFDs (including target headings, courses, altitudes, vertical speeds, and airspeeds). The pushbutton keys are momentary-contact on/off toggle switches. Most keys and knobs affect both FD and AP functions. However, the FD and AP keys select or deselect all FD and AP operation.

On the right side of most keys on the AFCS controller, small white LEDs indicate when the key is selected on, and the corresponding function is active or enabled (Figures 16-38 and 16-39).”

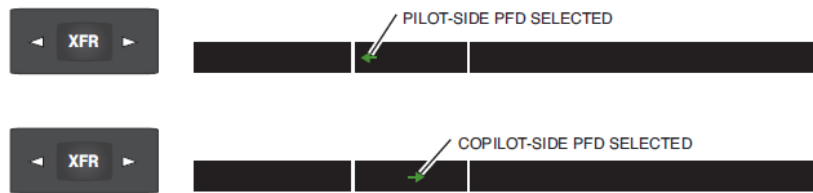


Figure 16-38. AFCS Status Bar

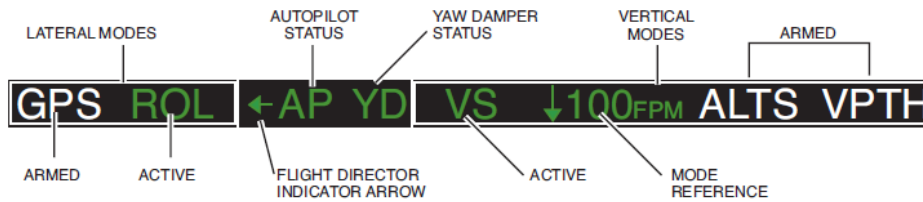


Figure 16-39. AFCS Status Box