

	Flight Instruments	I	
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GENERAL

This chapter includes pitot-static system, air data system and basic flight instruments which provide altitude, airspeed, mach, vertical speed, overspeed warning, true airspeed, temperature data, airplane attitude and heading information.

PITOT / STATIC SYSTEM

Two pitot static systems (CAPT and F/O) are available to provide variable pressure inputs to CADC 1 and CADC 2. A third system, auxiliary pitot/alternate static provides inputs to the standby altimeter/airspeed indicator.

A dedicated pitot is provided to supply total pressure to the speed throw rudder limiter bellows. A RAT probe is also provided to supply temperature to CADC 1 and CADC 2 and to thrust rating computer (TRC).

Ice protection by electric heating elements is provided to pitot/static system and to RAT probe. (see chap. 10 Ice & Rain Protection).

CENTRAL AIR DATA COMPUTER (CADC)

Two Central Air Data Computers (CADC) are installed. They provide computed air data outputs of airspeed, Mach, altitude, vertical speed, TAS/SAT and TAT.

TAS/SAT Indicator

The TAS/SAT indicator provides a digital readout of true airspeed, static air, temperature and total air temperature.

Total Air Temperature may be read in the SAT readout by pushing the TAT button provided in the indicator.

OVERSPEED WARNING

The CADC provide inputs to the central aural warning system (CAWS) when maximum operating airspeeds are exceeded.

ATTITUDE HEADING REFERENCE SYSTEM (AHRS)

Three AHRS are installed to provide attitude (pitch and roll) and/or magnetic heading inputs to PFD, ND, RMI, DFGS and VOR receivers.

Each system includes an Attitude Heading Reference Unit (AHRU) and a flux valve sensor; the AHRSU consist of two gyros, three accelerometers, a processor and an input/output module.

AHRS are characterized by three modes of operation: Alignment, normal and Basic.

The alignment is automatically started at system turn-on after any power interruption; its completion requires normally 45 seconds; normal mode of operation is effective after alignment provided both TAS inputs are available; basic mode of operation is automatically entered when one or both TAS inputs are lost and is indicated by specific lights on the annunciators panel.

AHRS accuracy in basic mode is comparable to that provided by conventional vertical gyros.

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STANDBY HORIZON INDICATOR

A standby horizon indicator, with a self-contained gyro, is provided. The indicator is powered by the DC transfer bus and will continue to operate if generator power is lost.

ELECTRONIC FLIGHT INSTRUMENTS SYSTEM

The Electronic Flight Instrument System (EFIS) consists of two display units (DU), a mode select panel (MSP) and a dimming panel. The EFIS replaces the conventional ADI, HIS, radio altimeter and marker beacon light.

For more information concerning EFIS see chap. 15 Navigation System.

DISPLAY UNIT

Two display units, a primary flight display (PFD) and a navigation display (ND), receive display data from the symbol generator (SG). If the ND fails, both PFD and ND information can be displayed in the remaining DU in a compact (CP) mode.

SYMBOL GENERATOR

Two symbol generators integrate the airplane sensors and systems, compute the appropriated display parameters, and transmit data to the display units.

DIMMING PANEL

A dimming panel control display brightness, decision height and selection of compact (CP) mode.

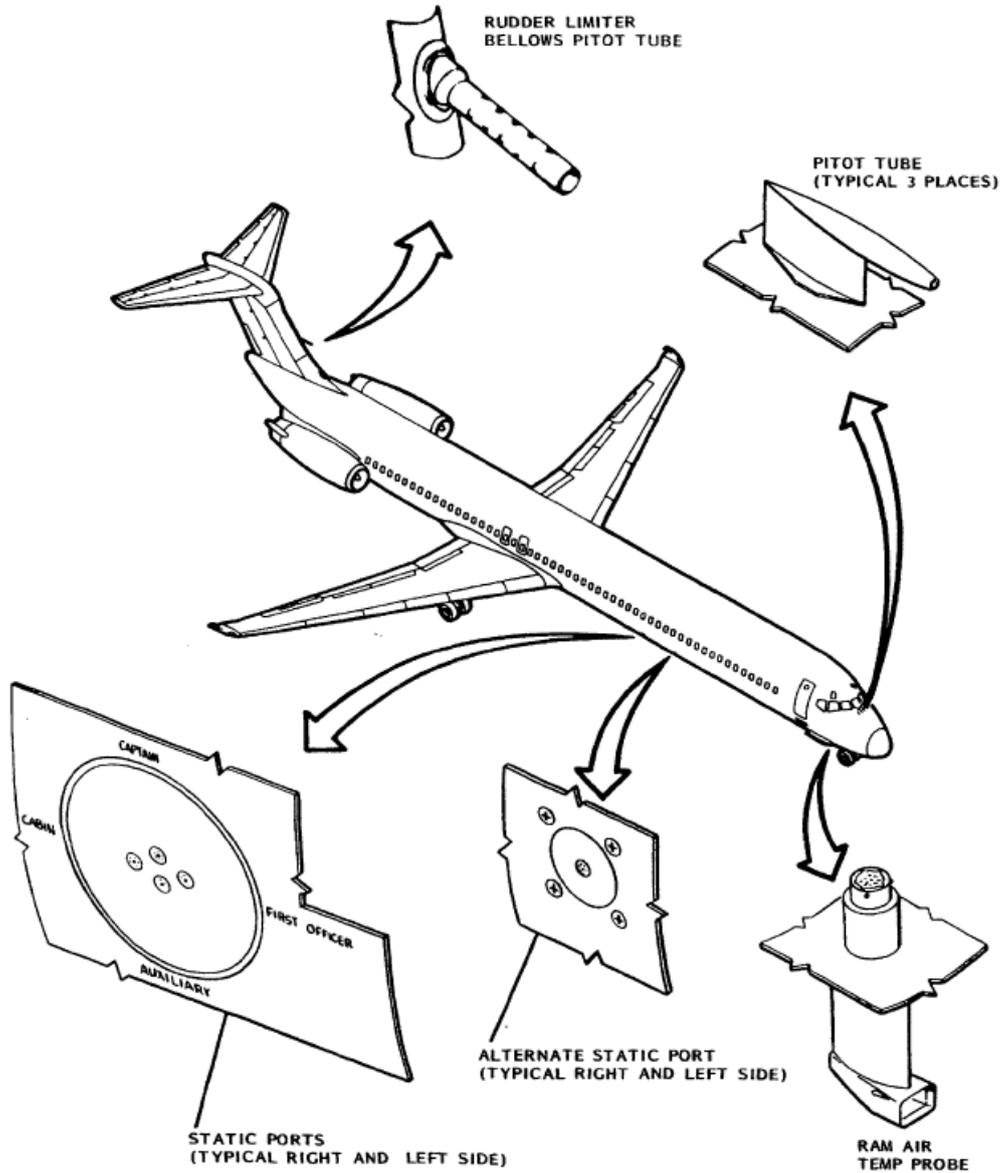
COMPASS SYSTEM

Compass system consist of the ND (Navigation Display) and the RMI (Radio Magnetic Indicator).

CLOCKS

A digital electronic clock is installed.

PITOT/PROBES/STATIC PORTS LOCATION



PITOT STATIC AND CADC SYSTEM



OFF Warning Flag:

Appears when the altimeter fails, or it is not powered.

Altitude Alert Advisory Light:

For more details see chap. 03 Automatic Flight.

BARO Set Knob:

Rotate the knob to change baro pressure value as read in the MB/IN HG readouts.

ALTIMETER



100 Foot Pointer:

Pointer will make a full circle for each 1000ft of altitude gained or lost.



NEG Flag:

Appears when altitude is less than 0 feet.

Altimeter Bugs: Movable pointers. Use the mouse wheel on the upper/lower right part of the instrument frame to position the bugs.

STANDBY ALTIMETER AND AIRSPEED INDICATOR



BARO Set Knob:

Rotate the knob to change baro pressure value as read in the MB/IN HG readouts.

100 Foot Pointer:

Pointer will make a full circle for each 1000ft of altitude gained or lost.

Standby indicated airspeed:

Non-corrected indicated airspeed is read above the airspeed index.

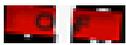


**C/M-1 AND C/M-2
GUSSET PANELS**

STATIC AIR Selector:

NORM: CADC 1/2 receives static pressure from Capt/FO static system.

ALT: CADC 1/2 receives static pressure from alternate system.



MACH/IAS INDICATOR

OFF Warning Flag:

Appears when mach data are unreliable.

Vmo limit:

Reads maximum permissible airspeed as related to altitude.



Airspeed Pointer:

Indicates airspeed on a linear scale.

Airspeed Command Bug (Salmon):

For description refer to chap. 03 Automatic Flight.



Airspeed reference Bugs: Movable pointers. Click on the upper center part of the instrument frame to position the bugs for takeoff, or click on the lower center part of the frame to position the bugs for landing. Click on the center left part of the frame (near the 300 indication) to 'park' the bugs.

A/S Warning Flag:

Appears when airspeed data are unreliable.

**VERTICAL SPEED INDICATOR
(Associated to TCAS System)**



Dimming knob:
Rotates to change the intensity of the display from maximum to OFF.

TAS/SAT INDICATOR

OFF Warning Flag:

Appears when TAS data are unreliable or the instrument is not powered.



TAS Readout:

Indicates true airspeed. The minimum airspeed value displayed is 130.

TAS Readout:

Indicates the Static Air Temperature



TAT Button:

Push to show Total Air Temperature in the SAT readout.

OFF Warning Flag:

Appears when SAT data are unreliable, or the instrument is not powered.

MAX SPEED TEST WARNING



OVERHEAD PANEL

MAX SPD WARN TEST Switch:

SYS1: (momentary) test C/M 1 overspeed system.

OFF: Spring loaded to this position.

SYS2: (momentary) test C/M 2 overspeed system.



OVERHEAD PANEL

CADC Transfer Selector:

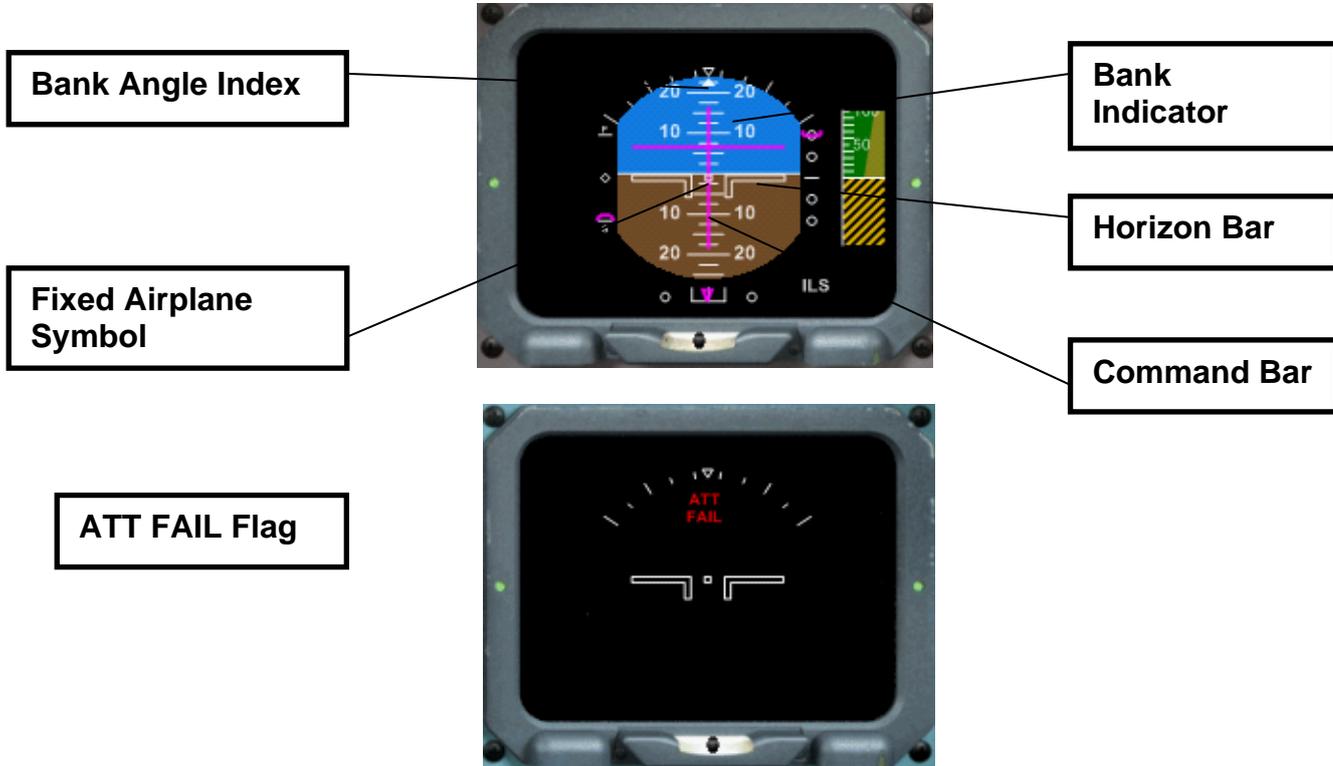
BOTH ON 2: C/M-1's and C/M-2's MACH/IAS, altimeter, vertical speed indicator and TAS/SAT indicator receive data from CADC 2. C/M-2's Baro set knob controls both C/M-1's and C/M-2's altimeters.

NORM: C/M-1's MACH/IAS, altimeter, vertical speed indicator and TAS/SAT indicator receive data from CADC 1. C/M-2's MACH/IAS, altimeter, vertical speed indicator and TAS/SAT indicator receive data from CADC 2.

BOTH ON 1: C/M-1's and C/M-2's MACH/IAS, altimeter, vertical speed indicator and TAS/SAT indicator receive data from CADC 1. C/M-1's Baro set knob controls both C/M-1's and C/M-2's altimeters.

ATTITUDE SYSTEMS

PRIMARY FLIGHT DISPLAY



For more information on the Primary Flight Display / ADI
Refer to chap. 15 Navigation System

FMA



For more information on the FMA refer to chap. 03 Automatic Flight

ATTITUDE SYSTEM

STANBY HORIZON

Bank Indicator

Pitch Angle Scale:

Indicates pitch attitude in 5 degrees increments up and 10 degrees down.

Fixed Airplane Symbol



Power Off Flag:

Appears when power to indicator is lost or gyro failure.

Caging Pitch Trim Knob:

Push the knob to erect the gyro. Rotate to adjust airplane symbol for line of sight reference against horizon drum.

EFIS

DIMMING PANEL

ND Knob

Outer knob: changes the intensity of the ND display from maximum to off.

Inner knob: changes the intensity of the WX/EGPWS data on the ND display from maximum to off.

When the knobs are in the off (full CCW) position the PFD will display in compact (CP) mode.



DH Knob:

Select the decision height.

PFD Knob:

Changes the intensity of the PFD display from maximum to off.

When the knob is in the off (full CCW) position the ND will display in compact (CP) mode.

COMPACT MODE



Compass
Card

Selected
Heading



**OVERHEAD
PANEL**

AHRS Transfer Selector

L ON AUX: AHRS 3 provides roll and pitch attitude inputs to C/M-1's Primary Flight Display. AHRS 2 provides roll and pitch attitude inputs to C/M-2's PFD.

NORM: AHRS 1 provides roll and pitch attitude inputs to C/M-1's Primary Flight Display. AHRS 2 provides roll and pitch attitude inputs to C/M-2's PFD.

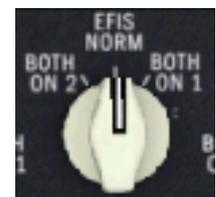
R ON AUX: AHRS 1 provides roll and pitch attitude inputs to C/M-1's Primary Flight Display. AHRS 3 provides roll and pitch attitude inputs to C/M-2's PFD.

EFIS Symbol Generator (SG) Selector

BOTH ON 2: SG-2 provides video for both the Captain's and First Officer's PFD and ND.

NORM: SG-1 provides video for the Captain's PFD and ND. SG-1 provides video for the First Officer's PFD and ND.

BOTH ON 1: SG-1 provides video for both the Captain's and First Officer's PFD and ND.



**OVERHEAD
PANEL**

COMPASS SYSTEM

Existing
Heading

Fixed Airplane
Symbol



Selected
Heading



Compass
Card



HDG FAIL Flag

For more information on the ND/HSI refer to chap. 15 Navigation System

DME-RMI

OFF/HDG Flag:

Appears during AHRS alignment, failure or power off.



DME-RMI



For more information on the DME-RMI refer to chap. 15 Navigation System

STANDBY MAGNETIC COMPASS

Indicates heading of airplane in relation to magnetic north.



OVERHEAD
PANEL

STBY COMP Light Switch

OFF: Lights out.

DIM: Internal and external compass lights on and dimmed.

BRT: Internal and external compass lights illuminated at their maximum intensity.

CLOCK

CHR Button:

First push starts CHR.
Second push holds CHR and third push resets CHR.



GMT Readout:

Indicate GMT.

ET Control Knob:

RESET: reset elapsed time and blanks display.
HLD: holds Elapsed Time displayed.
RUN: Allows Elapsed Time to accumulate time.

ET / CHR Readout:

ET (elapsed Time) displayed in range 00 hours, 00 minutes to 99 hours 59 minutes.

CHR (Chronograph) minutes are displayed numerically, seconds are displayed by sweep-second hand. CHR display has priority over ET.

GMT Control Knob:

RUN: GMT display starts, beginning at 0 seconds.

HOLD: Stops GMT display and holds time.

SS: (Slow Slew) Advances minutes only at rate of one minute per second.

FS: (Fast Slew) Advances hours only at rate of one hour per second.

AIRBORNE INTEGRATED DATA SYSTEM (AIDS)

The control panel of the Flight Recorder is located in the upper part of the overhead panel.

Numerical selectors:

Rotate thumbwheel selectors to set data to enter.

FDAU Status Light:

ON: Indicates failure of Flight Data Acquisition Unit.

DFDR Status Light:

ON: Indicates failure of Digital Flight Data Recorder.



PMR Status Light:

ON: Indicates failure of Performance Maintenance Recorder.

TAPE LOW Status Light:

ON: Indicates PMR recorder tape supply low.

OVERHEAD PANEL

INSERT button:

The information displayed in the numerical selectors is recorded.

EVENT button:

Push to record the beginning of an event.



AFT OVERHEAD PANEL

GND TEST:

Recorder power interlock circuit is bypassed, applying power to Recorder. If Recorder is operating properly FLT RECORDER OFF light will remain off.

NORM:

Recorder operates automatically when an engine is started or when parking brakes is released and either shutoff lever is on.