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## 10.1 DESCRIPTION

(See schematic p 13/14)

The flight environment data are provided by three independent air data systems :

- two main systems,
- one standby system.

### MAIN SYSTEMS

Aircraft is equipped with two independent AIR DATA COMPUTERS (ADC). Each computer is supplied with :

- static air pressure provided by its specific static ports,
- total air pressure provided by its specific pitot probe,
- total air temperature provided by its specific TAT probe.

Probes and ports are located on the LH and RH side of the fuselage and are electrically heated.

From this data, each ADC computes :

- pressure altitude,
- vertical speed,
- indicated air speed (IAS),
- true air speed (TAS),
- total air temperature (TAT),
- static air temperature (SAT).

ADC 1 supplies :

- CAPT flight instruments (altimeter, airspeed ind., vertical speed ind.),
- other systems : AHRS 1, FDAU, ATC 1, MFC, GPWS, pressurization, AFCS ATC 1 and ATC 2 through TCAS controller box and TCAS through ATC 1 and ATC 2 (if installed and mode S only).

ADC 2 supplies :

- F/O flight instruments (altimeter, airspeed ind., vertical speed ind.),
- other systems : AHRS 2, FDAU, MFC, pressurization, AFCS, ATC 1 and ATC 2.

*Note : If ATC 2 mode S is installed, ADC 2 supplies TCAS through ATC 1 and ATC 2.*


EEC's, TAT/SAT/TAS indicator and GPS (if installed) are supplied either by ADC 1 or ADC 2 according to ADC selector on capt panel.

### STANDBY SYSTEM

The standby system consist of :

- two static ports,
- a pitot probe.

Standby airspeed ind. and standby altimeter are directly supplied by raw data.

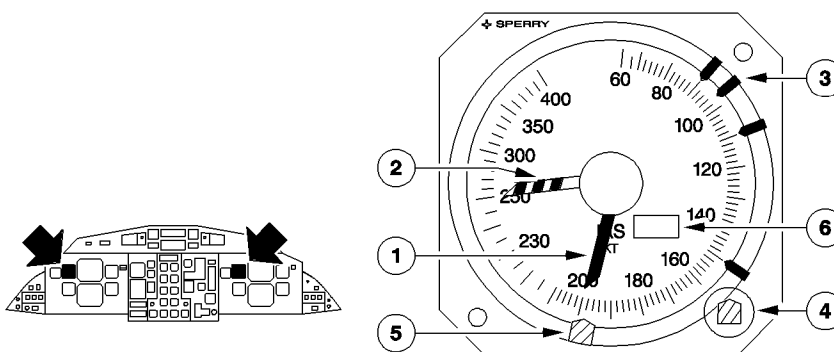
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## 10.2 CONTROLS

### AIRSPEED IND

ROFA-01-10-10-002-A001AA



#### ① Airspeed pointer

IAS is displayed by a pointer on a scale graduated from 60 to 400 kts :  
 in 2 kts increments from 70 to 210 kts,  
 in 5 kts increments from 210 to 250 kts,  
 in 10 kts increments from 250 to 400 kts.

#### ② VMO pointer

The red and white striped pointer indicates the max airspeed computed by the associated ADC which represents VMO/MMO limit. An aural warning (clacker) will be generated by the CCAS if this value is exceeded.

#### ③ Movable indices (BUGS)

The four coloured bugs enable predetermined speeds to be manually set.

#### ④ Speed selector

This knob is used to select a desired speed during a given phase of flight (ie final approach speed). The selected speed is indicated by the speed bug (5) and controls the reference on the EADI FAST/SLOW scale.

#### ⑤ Speed bug

Indicates the selected speed.

#### ⑥ OFF/Red flags

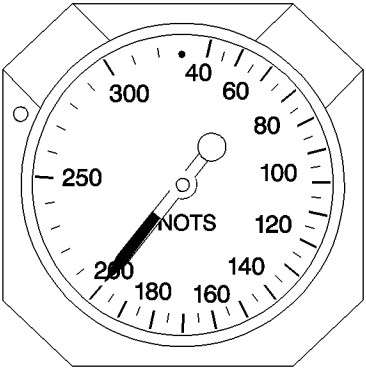
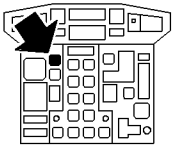
A failure affecting the VMO channel causes the red VMO flag to come into view. A failure affecting the airspeed indicator and the VMO channel causes the red OFF warning flag to come into view.

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**STANDBY AIRSPEED IND**

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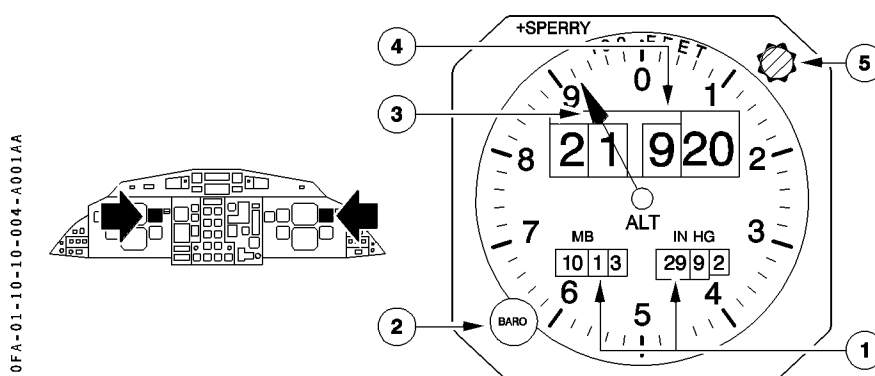


Displays the airspeed as calculated from standby static and standby pitot pressures.  
The scale is graduated from 40 to 320 kt :  
in 5 kt increments from 40 to 200 kt  
in 10 kt increments from 200 to 320 kt

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## ALTIMETERS



### ① MB and INHG counters

Display baroset value in millibars (948 to 1049 mb) and inches Hg (28 to 30.99 in Hg).

### ② BARO knob

Sets the barometric reference in the MB and in the IN HG counters.

### ③ Altitude pointer

One revolution of the pointer represents a 1000 ft altitude change.


### ④ Altitude counter

The digital counter is equipped with four drums indicating in ten thousands, thousands, hundreds and twenties feet increments :

- Black and white flag covers the LH drum (ten thousands) when altitude is between 0 and 9999 ft.
- NEG black flag covers the two LH drums (ten thousands and thousands) when altitude is below 0 feet.
- OFF red flag covers counter in case of ADC failure, indicator failure or power failure.

### ⑤ Altitude alert lt

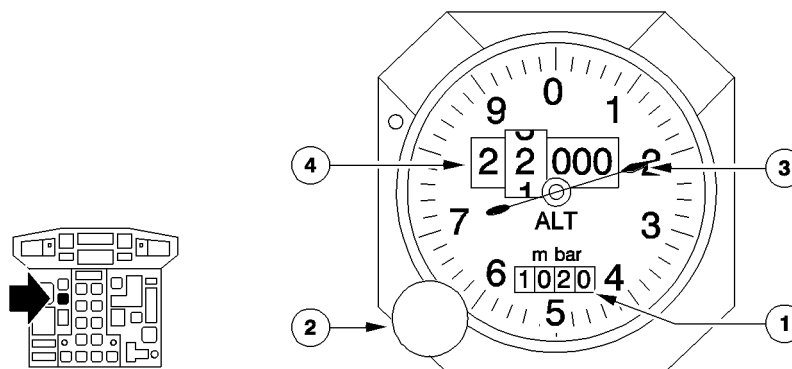
Illuminates amber when altitude alert is triggered.

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## STANDBY ALTIMETER

ROFA-01-10-10-005-A001AA



① *Baro set value is displayed in millibars (875 to 1 050 mb).*

② Baro set knob

Sets barometric reference on mb counter.

③ Altitude pointer


One revolution of pointer represents 1000 ft altitude change.

④ Altitude counter

The digital counter is equipped with three drums indicating ten thousands, thousands and hundreds of feet. A black and white flag marks the LH drum (ten thousands) when altitude is between 0 and 9999 ft. An orange and white flag marks the two LH drums (ten thousands and thousands) when altitude is below 0 ft.

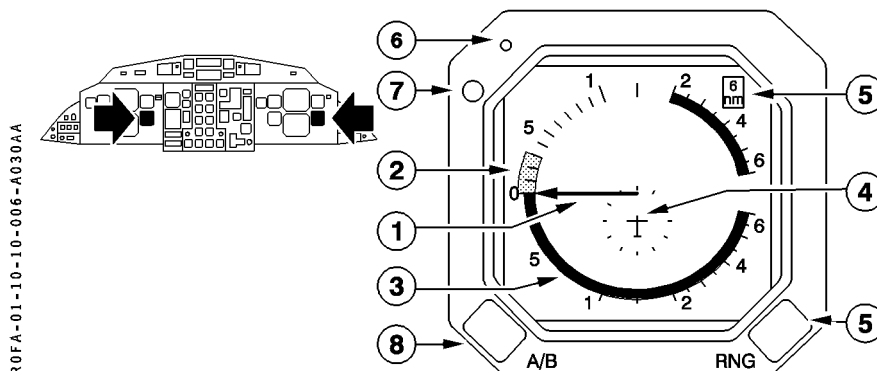
Note : Allowable deviation between normal altimeter indications and between normal and standby altimeter indications :

	FL (ft)	NORM/NORM (ft)	NORM/STBY (ft)
R	0	55	70
R	5.000	60	150
R	10.000	70	200
R			
R			
R	20.000	100	260
R	25.000	120	300


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# **TCAS VERTICAL SPEED INDICATOR (TCAS V<sub>SL</sub>)** (cf. 1.05.20)

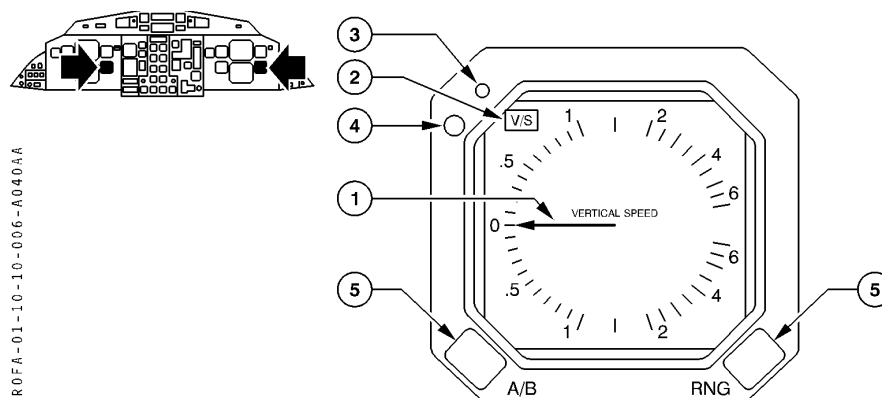


- (1) - Vertical speed pointer  
Indicates rate of climb/descent from 0 to  $\pm 6\,000$  ft/mn.
- (2) - Vertical speed recommended arc (green)  
Green arc indicates vertical speed range to fly in.
- (3) - Vertical speed prohibited arc (red)  
Red arc indicates that pilot is advised to fly out of, or not enter, indicated vertical speed range.
- (4) - Fixed aircraft mock-up  
The fixed aircraft mock-up is surrounded with a 2 mn loop.
- (5) - Display range selection  
The following ranges for the sextant TCAS indicator are recommended :
  - Select the 6 nautical mile range for take-off, low altitude climb, approaches and landings
  - Select the 12 nautical mile range for high altitude cruise. The range selected has no effect on the TCAS system logic used to determine TA's and RA's.
- (6) - Test  
When depressed, indicator will display a test pattern.
- (7) - Light sensor
- (8) - Extended altitude surveillance status  
When selected ABV or BLW
  - ABV viewing of traffic from 2 700 ft below to 9 900 ft above
  - BLW viewing of traffic from 2 700 ft above to 9 900 ft below.
 In normal position, viewing of traffic from 2700 ft below to 2700 ft above.

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### **TCAS VERTICAL SPEED INDICATOR (TCAS FUNCTION NOT AVAILABLE)**



ROFA-01-10-10-006-A040AA

#### **① Vertical speed pointer**

Indicates rate of climb/descent from 0 to  $\pm 6000$  ft/mn.

From 0 to 1000 ft/mn the scale is graduated in 100 ft/mn increments, and from 1000 to 6000 ft/mn in 500 ft/mn increments. Display accuracy is  $\pm 40$  ft/mn.

#### **② Vertical speed flag**

Appears if the indicator is not able to display vertical speed information  
In that case, the vertical speed pointer disappears when V/S flag appears.


#### **③ Test**

When depressed, indicator will display a test pattern.

#### **④ Light sensor**

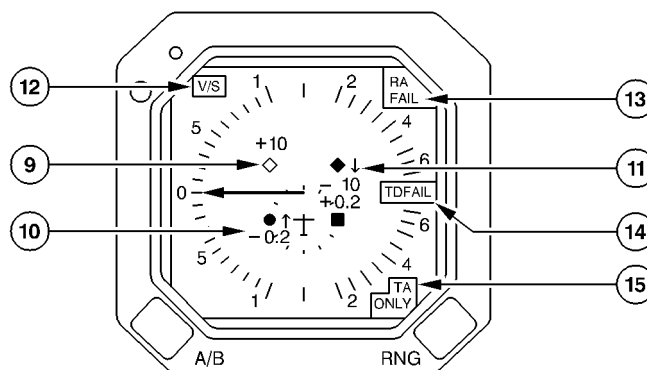
#### **⑤ Not available**



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ROFA-01-10-10-007-A030AA



9 Intruder symbol

- TCAS RA : filled square (red)
  - TCAS TA : filled circle (amber)
  - Proximity : filled diamond (Cyan)
  - Others : blank diamond (Cyan)
- Center of the symbol shows the intruder relative position.

10 Intruder relative altitude

- Value : two digits (color of the associated symbol)
- Unit : ft x 100
- Sign : - positive = the intruder is above  
- negative = the intruder is below

11 Relative vertical speed indicator

- Arrow to the top : intruder climbing
- Arrow to the bottom : intruder descending

12 Vertical speed flag

- Appears if the indicator is not able to display vertical speed information
- In that case, the vertical speed pointer disappears when V/S flag appears.

13 Resolution advisory flag


- Appears only if the indicator is not able to display RA's or vertical speed.

14 Traffic function flag

- If the indicator is not able to display intruder's, "TD FAIL" appears
- or
- when the TCAS is in STBY mode, "TCAS OFF" appears
- or
- in case of TCAS fails, "TCAS FAIL" appears
- or
- in case of self test activation, "TEST" appears.

15 "TA ONLY" indication

- This flag appears if the TCAS is in "TA ONLY" mode.

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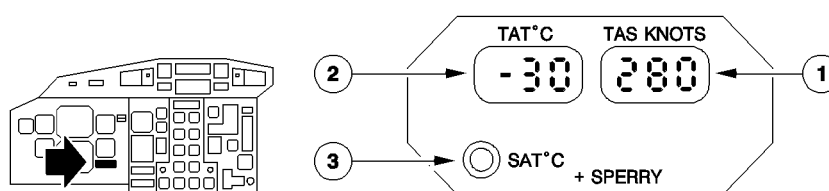
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### TAT-SAT/TAS IND

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TAS, TAT and SAT indications are those computed by the selected ADC.

#### ① TAS ind.

Indicates True Air Speed as three digits from 068 kt to 600 kt. When selected ADC signal is not valid, the ind. displays —.

#### ② TAT ind.

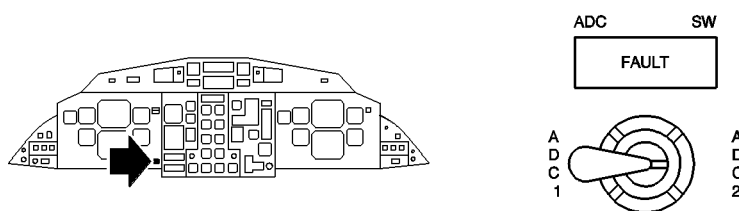
Indicates total Air Temperature in °C as three digits, the first being + or —. When selected ADC signal is not valid, the ind. displays —.

#### ③ SAT pb


When depressed and held, the Static Air Temperature in °C is displayed in the TAT window.

### ADC SW

R0FA-01-10-10-010-B050AA



- ADC sw allows to feed both EEC, TAT/SAT/TAS indicator and GPS (if installed) either from ADC 1 or from ADC 2.
- "FAULT" illuminates if ADC selection does not match switch position.

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### 10.3 ELECTRICAL SUPPLY/SYSTEM MONITORING

#### ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
ADC 1/ADC 2	HOT EMER BAT BUS (Back-up on overhead panel ADC 1/2 HOT) DC EMER BUS (primary on overhead panel ADC 1/2 EMER)	- Nil -
CAPT airspeed ind. and vertical speed ind. TAS/Temperature ind.	- Nil -	26 VAC STBY BUS (on overhead panel ASI VSI ALTM)
CAPT altimeter + recording FDAU	- Nil -	26 VAC STBY BUS (on overhead panel ALTM)
F/O airspeed ind. and vertical speed ind.	- Nil -	26 VAC BUS 2 (on overhead panel ASI VSI)
F/O altimeter	- Nil -	26 VAC BUS 2 (on overhead panel ALTM)
Standby altimeter vibrator	DC BUS 1 (on overhead panel STBY ALTM)	- Nil -

#### SYSTEM MONITORING

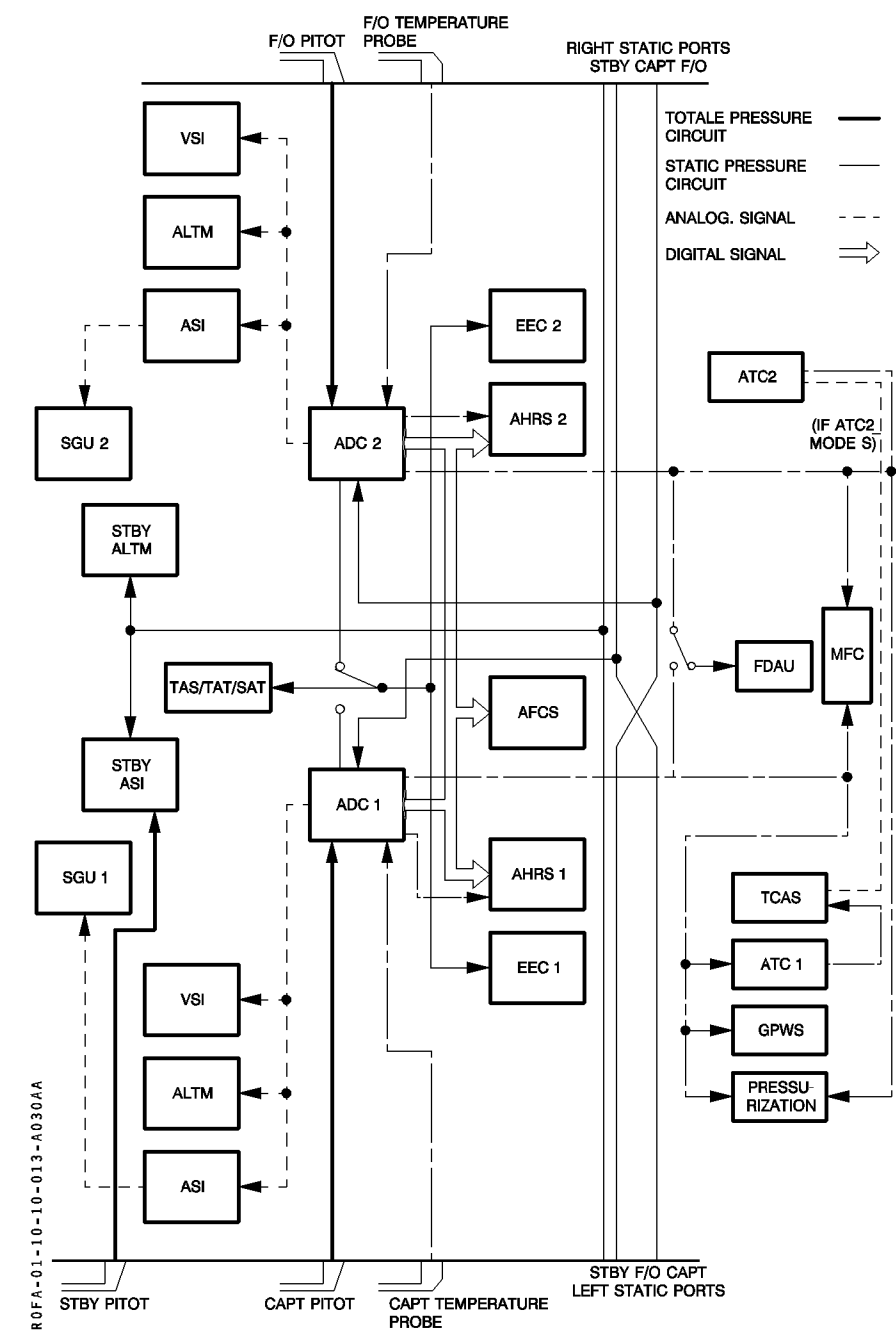
The following conditions are monitored by visual alerts :


- Loss of ADC
  - See ADC FAULT procedure in chapter 2.05.12
- Incorrect ADC switching
  - See ADC SW FAULT procedure in chapter 2.05.12

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10.4 SCHEMATIC



	<b>FLIGHT INSTRUMENTS</b>  ATTITUDE HEADING REFERENCE SYSTEM	1.10.20		
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## 20.1 DESCRIPTION

The attitude and heading data are provided by :

- Two main systems (AHRS)
- Standby instruments

### AHRS

AHRS consists of :

- Two attitude - heading reference units, (AHRU)
- Two flux valves
- One dual remote compensator

Each AHRU includes an inertial measurement unit (IMU), a microprocessor and electronic controls. The IMU components, three gyrometers and three accelerometers are aligned with the aircraft axes as a strapdown system. Earth rotation and gyro drift are computed without requiring heading, latitude or variation insertion.

Each AHRU receives inputs from its associated flux valve.

TAS, fed by both ADC, is used to compute gyro erection.

AHRU sends altitude and heading signals to indicators, AFCS, weather radar and FDAU.


Vertical accuracy remains within  $\pm 1.4^\circ$ , heading accuracy within  $\pm 2^\circ$ .

AHRS 1 supplies :

- SGU 1 (attitude and heading)
- F/O RMI (heading)
- FDAU (attitude - heading)
- Radar (attitude)
- ASCB bus

AHRS 2 supplies :

- SGU 2 (attitude and heading)
- CAPT RMI (heading)
- ASCB bus

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## STANDBY INSTRUMENTS

### STANDBY HORIZON

A stand-by electrical horizon is provided on the central panel.

### STANDBY COMPASS

A retractable standby magnetic compass with internal lighting is provided under glareshield.

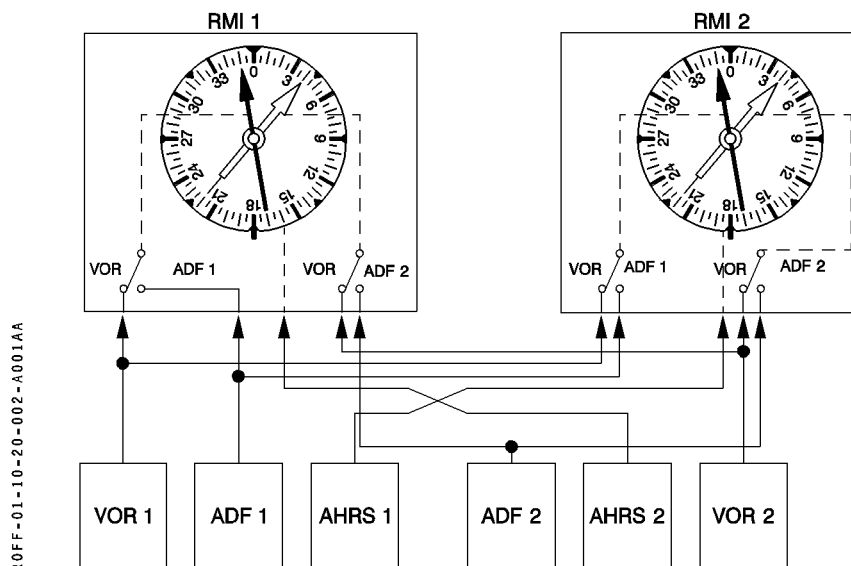
### RADIO MAGNETIC IND (RMI)

An RMI is installed on each pilot's panel coupled to the opposite AHRS. Each includes a compass rose, showing magnetic heading, two pointers with "rabbit ears" switching to present either VOR or ADF bearings.

- In case of RMI internal failure or AHRS supply loss :
  - RED "OFF" flag appears
  - ADF needle displays only relative bearing to station (without indication of magnetic bearing).
  - VOR needle displays magnetic bearing to station on rose card (no metter when the card is frozen). Relative bearing info is lost.


*Note : However, validity of these information should be confirmed.*

- In case of navigation system indication failure or data supply failure, the associated pointers move to 3 o'clock position except the double pointer when ADF is selected (9 o'clock position).



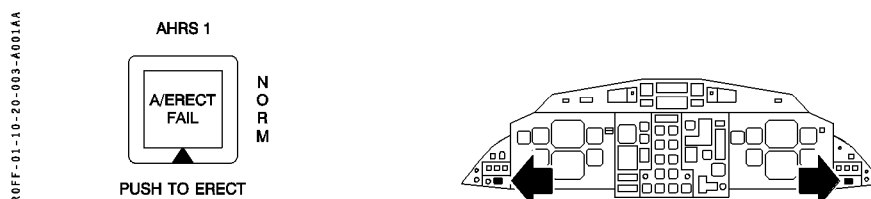
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## 20.2 CONTROLS

### AHRS ERECT PB

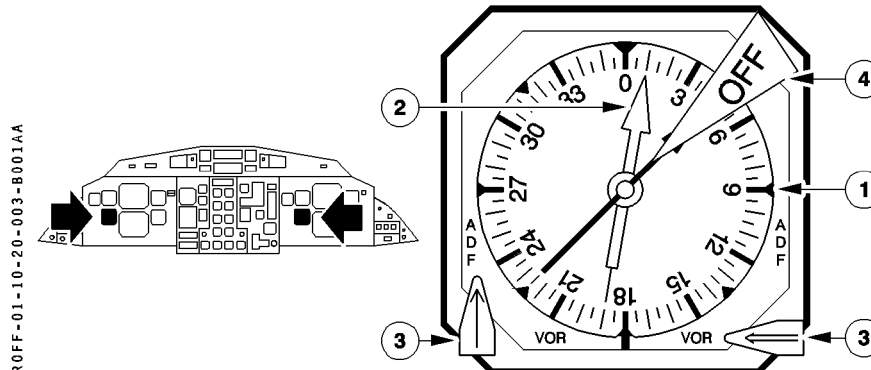


Illuminates amber when the associated AHRS loses the TAS signal from the ADC. The AHRS will continue to operate without auto-erect capability.

If the aircraft is stabilized (unaccelerated level flight) a gyro fast erection may be performed by depressing the associated pb for 15 s.

When released, the pb remains illuminated as long as the TAS signal is lost

### RMI



① Compass card.

Displays heading information on a rotating heading dial graduated in 5 degree increments.

② Bearing pointers


Indicate the magnetic bearing to the station selected by the associated VOR/ADF selector.

③ VOR/ADF selectors

Select the stations (VOR or ADF) associated to the bearing pointers.


④ Red "OFF" flag

Appears in case of RMI internal failure or AHRS supply loss.

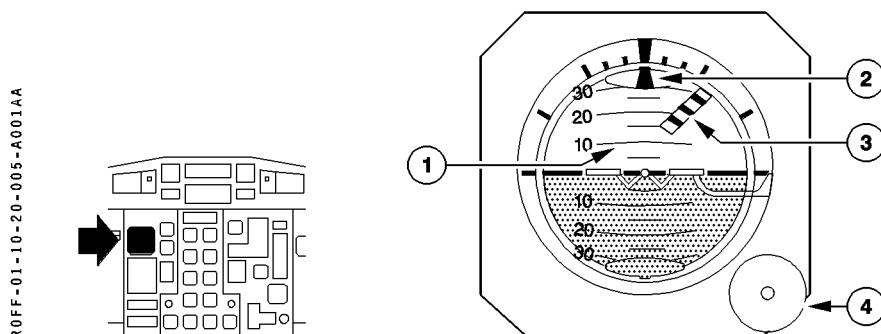
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### **STANDBY HORIZON**



① **Attitude Sphere**

Marked every 5 degrees of pitch axis, to  $\pm 80$  degrees.  
Roll angle is given by a scale marked at 10, 20, 30, 60 and 90 degrees.

② **Aircraft Symbol**

Orange, represents the aircraft position on the attitude sphere.

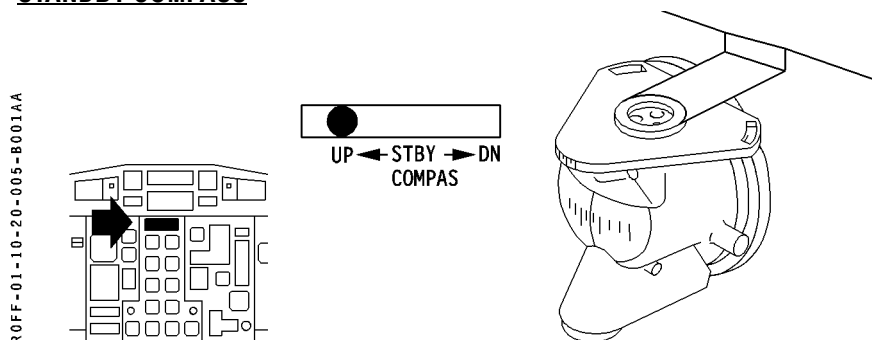
③ **Red/black flag**

Appears when electrical supply is lost, or when gyroscope speed becomes insufficient.


④ **Setting knob**

When pulled, causes a rapid erection if the instrument is powered.

### **STANDBY COMPASS**



Hidden in up position. Compass control should be place on DN for use. The compass rose is graduated in 10 degree increments.

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### 20.3 ELECTRICAL SUPPLY/SYSTEM MONITORING

#### ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
AHRS 1 power supply	DC EMER BUS (on overhead panel NORM)	- Nil -
AHRS 1 aux power supply	DC BUS 2 (on overhead panel AUX)	- Nil -
AHRS 2 power supply	DC BUS 2 (on overhead panel NORM)	- Nil -
AHRS 2 aux power supply in flight	DC BUS 1 (on overhead panel FLT)	- Nil -
AHRS 2 aux power supply on ground	DC EMER BUS (on overhead panel GND)	- Nil -
CAPT RMI	DC BUS 2 (on overhead panel 28 VDC)	26 VAC BUS 2 (on overhead panel 26 VAC)
F/O RMI	DC STBY BUS (on overhead panel 28 VDC)	26 VAC BUS (on overhead panel 26 VAC)
Standby horizon power supply	DC ESS BUS (on overhead panel NORM STBY HORIZON)	- Nil -
Standby horizon aux power supply	HOT EMER BAT BUS (on overhead panel AUX STBY HORIZON)	- Nil -

#### SYSTEM MONITORING

The following conditions are monitored by visual and aura alerts :

- One AHRS loses TAS input from both ADC.
  - See AHRS A/ERECT FAIL procedure in chapter 2.05.12.
- AHRS disagree.
  - See EFIS COMP procedure in chapter 2.05.12.
- Loss of AHRS
  - See AHRS FAIL procedure in chapter 2.05.12.

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### 30.1 DESCRIPTION (See schematic p 17/18)

The EFIS (Electronic Flight Instruments System) is an electronic system which processes data supplied by different sources (AHRS, ASI, Navigation equipment) and displays them on two Cathodic Ray Tubes (CRT) in front of each pilot.

For each pilot, the system consists of :

- Two CRTs located on the front panel
  - Top one is EADI (Electronic Attitude Director Indicator)
  - Bottom one is EHSI (Electronic Horizontal Situation Indicator)
- One ECP (EFIS Control Panel) located on pedestal which enables flight crew to select EFIS modes and screen brightness.
- One SGU (Symbol Generator Unit)
  - Which processes attitude, air and navigation data, and changes them into video signals, sent to EADI and EHSI according to the modes selected by ECP.
- One FD bar command switch on the glareshield panel

The system also comprises, for both pilots :

- One CRS/HDG panel for captain side used to select heading on both EHSI and course on left hand side EHSI.
- One ALT/CRS panel for F/O side used to select altitude on AP/FD system and course on right hand side EHSI.
- One weather Radar Control Panel used to select the range scale on EHSI. In arc mode, weather radar information is displayed on EHSI (see 1.15.50).

### SGU

Each SGU comprises three main parts.

*A – Data input*

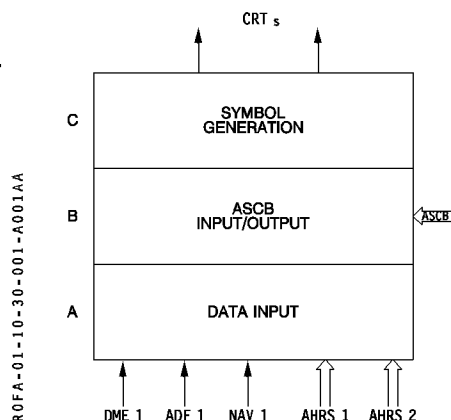
Part acquiring data from attitude, heading and navigation systems.

*B – ASCB Input/Output*

Part sending and receiving data from the ASCB bus, enabling exchange of data with the other pilot's system.

*C – Symbol Generation*

Part generating the picture sent to CRTs.



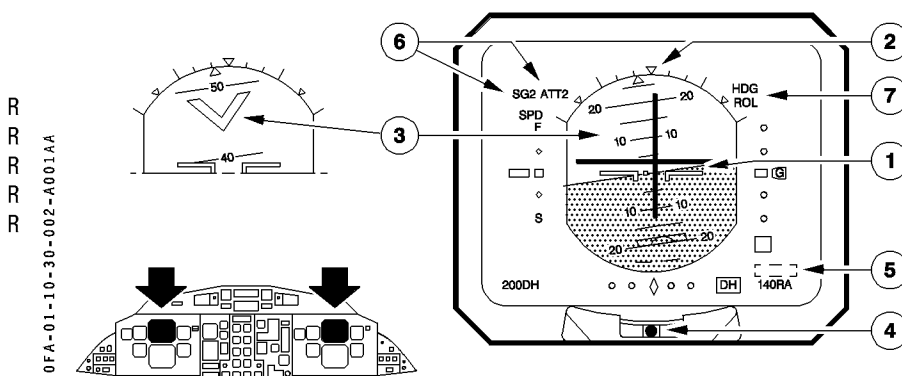
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AB

## 30.2 CONTROLS

### EADI

EADI displays short term information.



① Aircraft Symbol

Fixed symbol of the aircraft. Aircraft pitch and roll attitudes are displayed by the relationship between this symbol and the movable horizon.

FD command bars also move in relation to the aircraft symbol, according to the FD selected mode.

② Roll attitude (white)

Displays actual roll attitude through a movable index and fixed scale reference marks at 0, 10, 20, 30, 45 and 60 degrees.

③ Horizon and pitch scale

Both move with respect to the aircraft symbol to display actual pitch and roll attitude. Sky zone is colored blue, earth zone brown. In case horizon line goes out of view a blue or brown "eyebrow" is displayed in the upper or lower section of the sphere. Pitch scale is white and has reference marks at 5, 10, 15, 20, 30, 40 and 60 degrees nose up, and at 5, 10, 15, 20, 30, 45, and 60 degrees nose down. Above 40° nose up and below 30° nose down, red arrows come into view.

④ Slip indicator

Provides the pilot with an indication of non coordinated flight.

⑤ AP MSG annunciator

See chapter 1.04.10.

⑥ Cross Switching annunciators

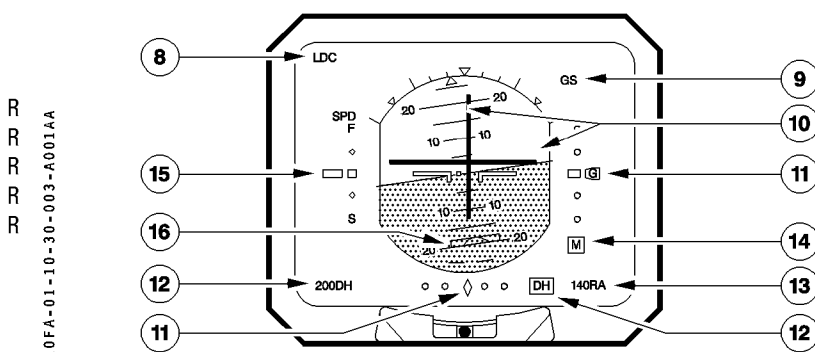
See sources switching panel.

⑦ Cross comparison

See chapter 1.10.30 p 12.

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⑧ Lateral ARM & CAPTURE  
See chapter 1.04.10.

⑨ Vertical ARM 1 CAPTURE  
See chapter 1.04.10

⑩ Flight Director Command bars (magenta)  
Display computed commands to capture and maintain a desired flight path. The commands are satisfied by flying the aircraft symbol to the command bars.

⑪ Glideslope and Localizer indication  
– Deviation from ILS glideslope is indicated by an index on a scale which is marked by dots.  
– Deviation from localizer is indicated by an index on a scale which is marked by dots.  
*Note : Indexes and scales are visible only when an ILS frequency is selected on the related NAV control box.*

⑫ DH indication and annunciator  
– Displays the selected decision height in feet (blue), and the "DH" letters in white. When selected DH is set to zero, DH information disappears from EADI. Maximum selectable Decision Height is 990 ft.  
– When aircraft radio-altitude reaches selected decision height + 100 ft, a white box appears near the radio altitude information on EADI. When aircraft radio-altitude becomes lower than selected decision height, the amber "DH" symbol illuminates inside the white box.

⑬ Radio altitude indication  
Displays in blue the radio-altitude and in white the RA letters. When radio- altitude indication is not valid, this information is replaced by amber dashes.  
Range of readable radio-altitude is from — 20 ft to 2500 ft.  
Above 2500 ft, radio altitude information is not displayed. See chapter 1.15.30.

	<b>FLIGHT INSTRUMENTS</b>  EFIS	1.10.30		
		P 4	001	
				DEC 96

AA

⑭ Marker beacon information

A white box appears below the glide slope deviation scale as soon as a LOC frequency is selected on the related NAV control box.

- OUTER MARKER : Detection of the Outer Marker causes a blue "O" to be displayed inside the white box.
- MIDDLE MARKER : Detection of the Middle Marker causes an amber "M" to be displayed inside the white box.
- INNER MARKER : Detection of the Inner Marker causes a white "I" to be displayed inside the white box.

Note : When a VOR frequency is selected, no marker box is visible. However, when a marker beacon is overflown, the marker box and indication appear simultaneously.

⑮ FAST/SLOW indicator

A green scale on left hand side of the EADI indicates the difference between speed selected thanks to the speed bug on the related airspeed ind, and actual aircraft speed. A white index moves up (FAST) or down (SLOW) according to the deviation.

	DEVIATION > + 25 kts : index not visible
_____	+ 25 kts > DEVIATION > + 15 kts : index half visible
F	DEVIATION = + 11 kts
◇	DEVIATION = + 5,5 kts
_____	DEVIATION = 0
◇	DEVIATION = — 5,5 kts
S	DEVIATION = — 11 kts
_____	DEVIATION < — 11 kts : index remains visible

⑯ Runway Symbol

Appears when radio altitude becomes lower than 200 ft, and rises during the final descent to reach the aircraft symbol at zero radio altitude.



	FLIGHT INSTRUMENTS		1.10.30		
			P 5	001	
	EFIS				DEC 96

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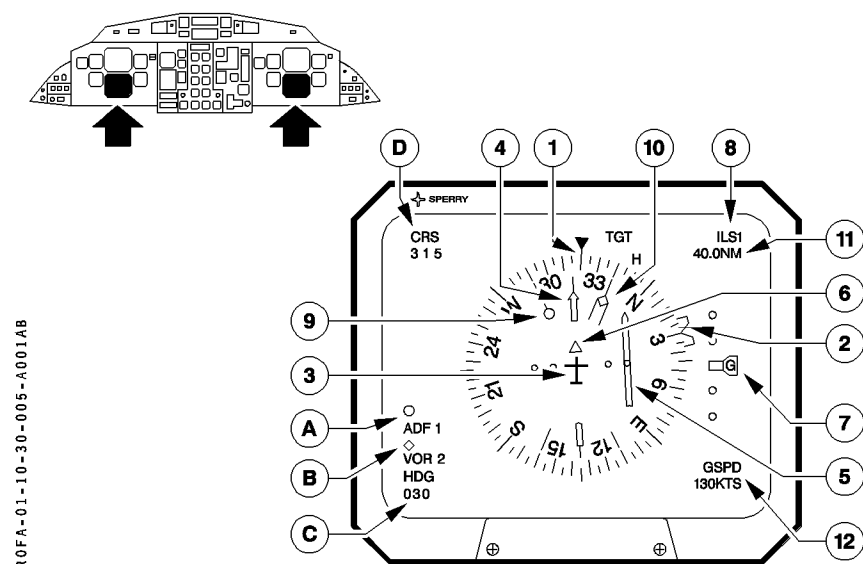
## EHSI

EHSI displays long term information. They can be selected :

- in FULL mode
- in ARC mode

At power up, selected mode is FULL mode.

## FULL MODE



### ① Lubber line (white)

Used to read aircraft magnetic heading on the white heading dial.

### ② Selected heading bug (blue)

Is positioned around the rotating heading dial by the remote HDG knob. Selected heading is also displayed digitally in blue (C).

	<b>FLIGHT INSTRUMENTS</b>  EFIS	1.10.30		
		P 6	001	
				DEC 96

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③ Aircraft symbol (white)

Is a stationnary symbol of the aircraft.

④ Course pointer (yellow)

Indicates the course which is selected for the respective VOR/ ILS. Selected course is also displayed digitally (D) in yellow numbers associated with white CRS letters.

⑤ Course deviation (yellow)

The bar indicates deviation relative to the course pointer. The scale is marked by dots. The aircraft symbol provides the position relative to the intended route.

⑥ TO/FROM annunciator (Magenta)

An arrow head in the EHSI center indicates whether the selected course will take the aircraft to or from the station. The TO-FROM annunciator is not visible during localizer operation.

⑦ Glideslope indication

Deviation from ILS glide slope is indicated by a white index on a green scale which is marked by dots. Index and scale are visible only when an ILS frequency is selected on the related NAV control box.

⑧ NAV source annunciation (white)

Identifies the source which supplies the course deviation. When both pilots are using the same source, the indication becomes amber.

⑨ Blue pointer (0)

Indicates the bearing to a station selected by N° 1 system (VOR 1 or ADF 1). Selection is indicated in (A).

⑩ Green pointer (◇)

Indicates the bearing to a station selected by N° 2 system (VOR 2 or ADF 2). Selection is indicated in (B).

⑪ Distance counter

The distance to the selected VOR/DME station is displayed in blue, with white NM letters. DME "HOLD" function is indicated by an amber "H".

⑫ Ground speed/Time to go annunciator

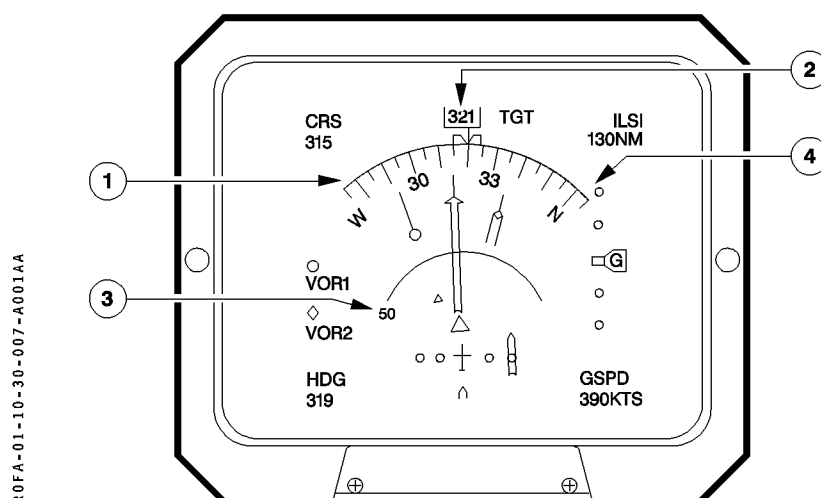
Ground speed or Time to go to the station are displayed in blue numbers and white letters, according to the mode selected on EFIS control box.  
These values are computed as a function of DME distance.

	FLIGHT INSTRUMENTS		1.10.30		
			P 7	001	
	EFIS				DEC 96

AA

## ARC MODE

In ARC mode, EHSI displays normal information, plus the following :



### ① Quadrantal Heading Scale

Heading is displayed on an arc showing 45° either side of the actual heading.

### ② Digital Heading display

Heading is digitally indicated in white on top of the quadrantal heading scale.

### ③ Weather radar annunciator

When the weather radar is in a mode other than OFF, the selected range scale is displayed in white.

### ④ Heading arrow

When heading bug is selected out of the heading scale, a small blue arrow shows the shortest direction to turn to achieve the selected heading. This arrow also appears in composite mode.

*Note : Blue and green pointers are not displayed when bearing to station selected by corresponding VOR or ADF are outside quadrantal heading scale.*

	FLIGHT INSTRUMENTS		1.10.30		
			P 8	001	
	EFIS				DEC 96

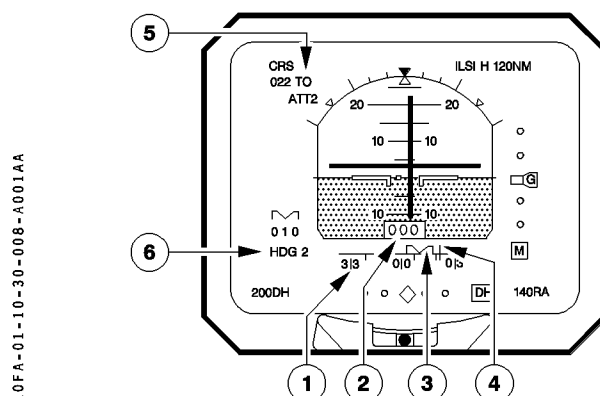
AA

## COMPOSITE MODE

After switching OFF one of the CRTs, following information are retained on the remaining one.

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>– From EADI</li> <li>– Attitude data</li> <li>– VOR/LOC and glide slope deviation</li> <li>– Marker beacon information</li> <li>– Radio altitude and decision height</li> <li>– FD bars</li> <li>– Attitude and heading source annunciator</li> </ul> | <ul style="list-style-type: none"> <li>– From EHSI</li> <li>– Selected heading</li> <li>– Heading information (with digital display)</li> <li>– Selected course</li> <li>– VOR/LOC and glide deviation</li> <li>– NAV source annunciation</li> <li>– VOR/DME distance (only)</li> <li>– TO/FROM indication</li> </ul> |
|--|---|

Information is displayed in the same way as in the normal configuration, except :



- ① Heading Scale  
Is linearly displayed at the bottom of attitude indicator.
- ② Heading digital display  
Is located between attitude indicator and heading scale.
- ③ Selected heading bug  
Is located on linear heading scale. This bug is replaced by a small arrow when selected out of the scale.
- ④ Selected course pointer  
Is represented by a small arrow above the linear heading scale.
- ⑤ TO/FROM indicator  
Is written in letters beside the selected course.
- ⑥ Heading source cross-switching annunciator  
Is located under selected heading indicator.

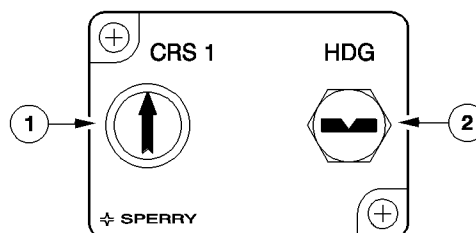
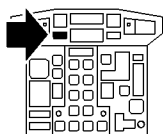
Note : When heading bug is selected out of the heading scale a small blue arrow shows the shortest direction to turn to achieve the selected heading.

 <b>ATR 72</b> <b>F.C.O.M.</b>	<b>FLIGHT INSTRUMENTS</b>		1.10.30		
			P 9	001	
	EFIS				DEC 96

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### CRS1/HDG PANEL

R0FA-01-10-30-009-A001AA



#### ① CRS 1 knob

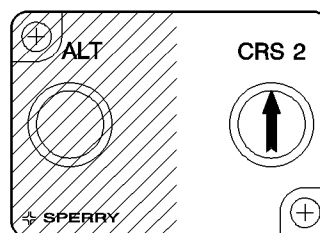
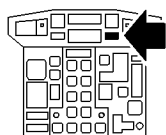
Selects course on CAPT EHSI.

#### ② HDG knob

Selects heading on both EHSI.

### ALT/CRS 2 PANEL

R0FA-01-10-30-009-B001AA

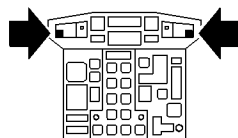


#### CRS 2 knob

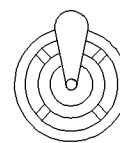
Selects course on F/O EHSI.

### FD BARS SW

R0FA-01-10-30-009-C001AA



FD BARS



OFF

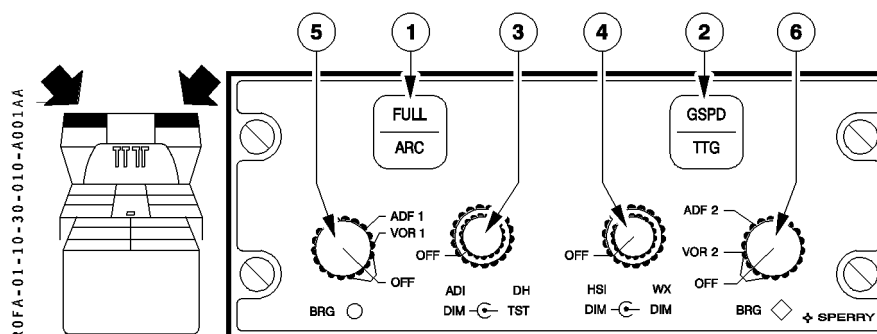
FD BARS  
OFF

The FD bars are operative and in view in accordance with FD logic.  
The FD bars are deactivated and out of view.

	FLIGHT INSTRUMENTS		1.10.30		
			P 10	001	
	EFIS				DEC 97

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### EFIS CONTROL PANEL (ECP)



#### ① FULL/ARC pb

Repetitive action on this pb alternately selects FULL mode and ARC mode on EHSI. At power up, FULL mode is automatically displayed.

#### ② GSPD/TTG pb

Repetitive actions on this pb alternately selects Groundspeed (GSPD) and Time to go (TTG) on EHSI display. At power up, Groundspeed is displayed. This pb is inoperative in composite mode.

#### ③ ADI/DIM/DH/TST knobs

- Outer knob (ADI DIM) is used to select EADI ON/OFF and to set brightness. Automatic setting is also performed when ambient brightness changes.
- Inner knob (DH TST) is used to set decision height from - 10 to 990 ft. Depressing it enables a test of the EFIS system and radio altimeter :
  - . EFIS test is performed only on ground, all failure messages appear on EFIS.
  - . Radio altimeter test is performed in flight as well as on ground. RA indication displays 100 ft on EADI.

R  
R  
R

**CAUTION** : In flight, the RA test provides the radar with altitude information which trigger undue GPWS alerts.

#### ④ HSI/DIM/WX/DIM knobs

- Outer knob (HSI DIM) is used to select EHSI ON/OFF and to set brightness. Automatic setting is also performed when ambient brightness changes.
- Inner knob (WX DIM) is used to select ON/OFF weather radar traces, and to set average brightness in relation to other traces.

#### ⑤ N° 1 BRG (0) selector

To select blue bearing pointer to VOR 1 or to ADF 1. On OFF position, blue pointer disappears from EHSI.

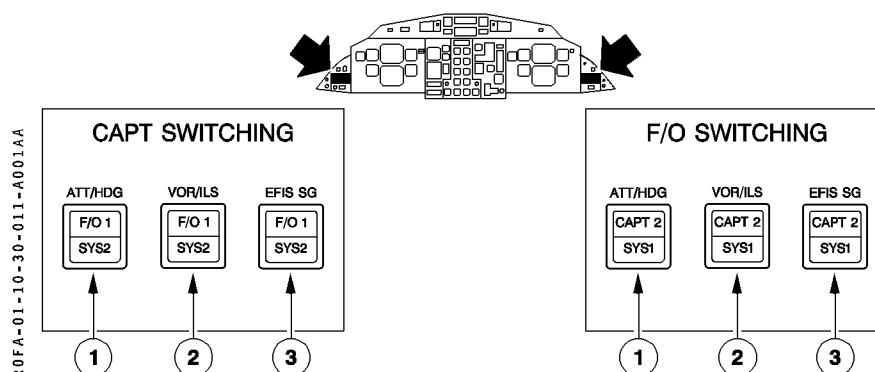
#### ⑥ N° 2 BRG (◇) selector

To select green bearing pointer to VOR 2 or to ADF 2. On OFF position, green pointer disappears from EHSI.

 <b>ATR 72</b> <b>F.C.O.M.</b>	<b>FLIGHT INSTRUMENTS</b>		1.10.30		
			P 11	001	
	EFIS				DEC 96

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## SOURCES SWITCHING PANEL



Each pilot may use a source switching panel to face a system failure (ATTITUDE/HEADING, VOR/ILS, SGU) by connecting his screens to the other side source. Connection is indicated. Priority is always given to the captain.

### ① ATT/HDG Pb

Enables to use AHRS 2 (or AHRS 1) information.

When captain pb is depressed "SYS 2" illuminates white on CAPT pb, "CAPT 2" illuminates green on F/O pb.

On both EADI, amber annunciators remind both pilots that they are using the same AHRS source (ATT2 and HDG2).

### ② VOR/ILS pb

Enables to use VOR/ILS 2 (or VOR/ILS 1) information.

Respective annunciator (VOR 2, ILS 2 or VOR 1, ILS 1) illuminates amber on EHSI. When captain pb is depressed, "SYS 2" illuminates white on CAPT pb, "CAPT 2" illuminates green on F/O pb.

### ③ SGU pb

Enable to use SGU 2 (or SGU 1) information.

When captain pb is depressed, "SYS 2" illuminates white on CAPT pb, "CAPT 2" illuminates green on F/O pb.

On both EADIs, amber SG2 (or SG1) illuminates top of the FAST/SLOW scale.

	FLIGHT INSTRUMENTS		1.10.30		
			P 12	001	
	EFIS				DEC 96

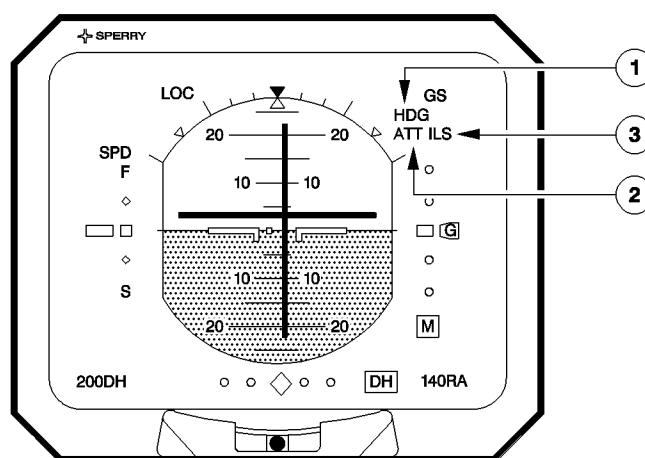
AA

## EADI/EHSI ALERTS

### COMPARISON MESSAGES

Both AHRS and both ILS information are monitored by SGUs. Caution messages are displayed in case of disagreement and "EFIS COMP" amber alert and single chime are generated at the same time by the CCAS.

ROFA-001-10-30-012-A001AA



#### ① Heading Comparison Caution Message

When the two AHRS are in disagreement of 6° or more and bank angle below 6°, amber HDG message is displayed. If bank greater than 6° alarm threshold becomes 12°.

#### ② Attitude Comparison Caution Message

When the two AHRS disagree (6 degrees or more) on pitch information, amber PIT message is displayed.

When the two AHRS disagree (6 degrees or more) on roll information, amber ROL message is displayed.

When the two AHRS disagree on both pitch and roll information, amber ATT message is displayed.

#### ③ ILS comparison Caution Messages

When the two ILS disagree (0.6 degree or more) on LOC information, amber LOC message is displayed.

When the two ILS disagree (0.2 degree or more) on Glide slope information, amber GS message is displayed.

When the two ILS disagree on both localizer and glide slope information, amber ILS message is displayed.



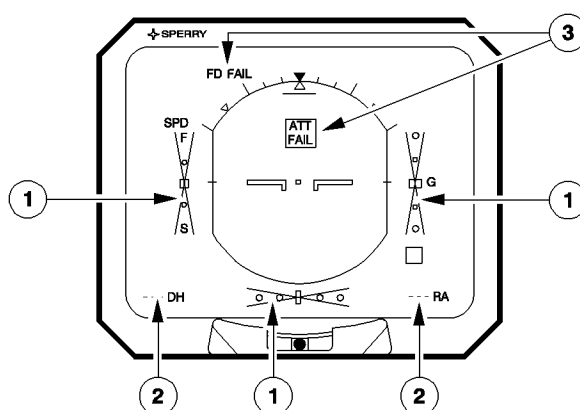
	FLIGHT INSTRUMENTS		1.10.30		
			P 13	001	
	EFIS				DEC 96

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## SOURCE FAILURE ALERTS

In case of a source failure, the associated information immediatly disappear from both CRTs. Failure message is displayed instead.

ROFA-01-10-30-013-A001AA

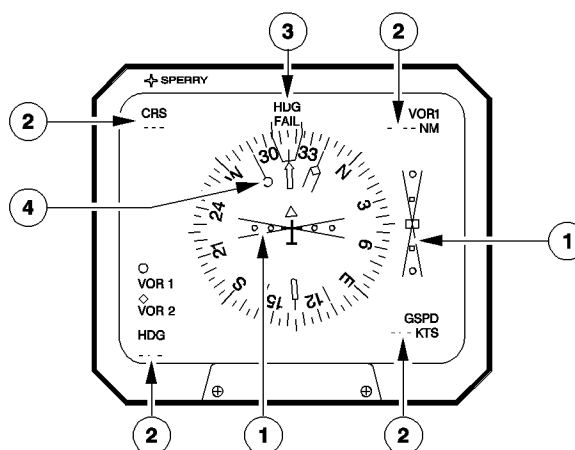


- ① *Information displayed on scales*  
A red cross appears on the scale, indexes disappear.
- ② *Information digitally displayed*  
Amber dashes replace the lost information.
- ③ *Other information*  
Red message is displayed to advise the crew of the information loss.

## EHSI SOURCE FAILURE ALERT

In case of a source failure, the associated information immediatly disappears from both CRTs. Failure message is displayed instead.

ROFA-01-10-30-013-B001AA



	<b>FLIGHT INSTRUMENTS</b>  EFIS	1.10.30		
		P 14	001	
				DEC 96

AA

① Information displayed on scales

A red cross appears on the scale, indexes disappear.

② Information digitally displayed

Amber dashes replace the lost information.

③ Other information

Red message is displayed to advise the crew of the information loss.

④ Pointers

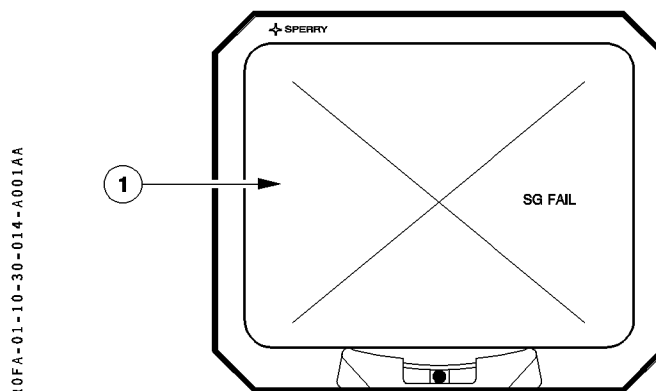
In case of associated NAV source failure, pointer disappears, no flag is visible.

**SGU FAILURE ALERT**

Depending on to the failed part of the SGU (see page 1), a failure message is possibly displayed.

① "A" or "B" part failure, part C still operative

All information disappears from both EADI and EHSI. On both CRTs, a red cross appears, with a red "SG FAIL" message.



Note : In case of "A" or "B" part loss, data only acquired by one SGU (DME, ADF, NAV) will be lost and remain unrecoverable on the other pilot's system.

② "C" part inoperative


Both CRTs are dark without any failure message.

 <b>ATR 72</b> <b>F.C.O.M.</b>	<b>FLIGHT INSTRUMENTS</b>  EFIS	1.10.30		
		P 15/16	070	
				JUN 97

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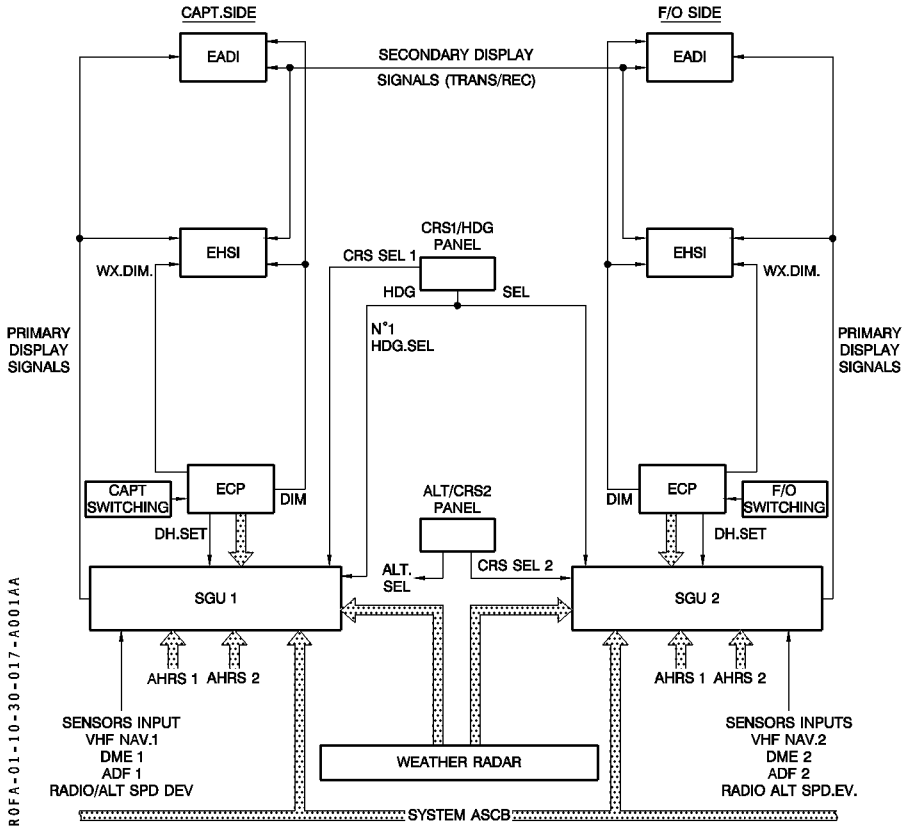
### 30.3 ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
SGU 1 Power supply	} DC STBY BUS (on overhead panel EFIS SG 1)	- Nil -
ALT switching indication		
CAPT EADI		- Nil -
CAPT EHSI	DC STBY BUS (on overhead panel EHSI)	- Nil -
SGU 1 NAV Reference CRS1/HDG panel RMI 2	} - Nil -	26 VAC STBY BUS (on overhead panel RMI)
SGU 2 power supply		- Nil -
ALT switching indication		
F/O EADI	DC BUS 2 (on overhead panel EADI)	- Nil -
F/O EHSI	DC BUS 2 (on overhead panel EHSI)	- Nil -
SGU 2 NAV Reference ALT/CRS 2 panel CRS1/HDG panel (HDG 2 reference) RMI 1	} - Nil -	26 VAC BUS 2 (on overhead panel RMI)

 <b>ATR 72</b> <b>F.C.O.M.</b>	<b>FLIGHT INSTRUMENTS</b>		1.10.30		
			P 17/18	001	
	EFIS				DEC 96

AA

30.4 SCHEMATIC



	<b>FLIGHT INSTRUMENTS</b>  <b>CLOCKS</b>	1.10.40		
		P 1	001	
				DEC 96

AA

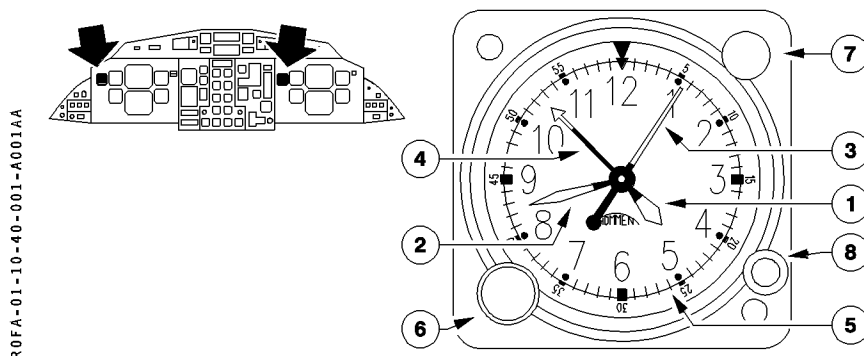
#### 40.1 DESCRIPTION

Each pilot is provided with an electronic clock. The clocks display :


- time
- elapsed time
- chronometer information

For each clock, an internal battery maintains the time counter function when the aircraft is deenergized.

#### 40.2 CONTROLS



- ① Hours pointer (time)
- ② Minutes pointer (time)
- ③ Second pointer (chrono)  
Pointer makes one revolution per minute when chronometer is activated.
- ④ Minutes pointer (chrono)  
Pointer makes one revolution per hour when chronometer is activated.
- ⑤ Revolving bezel  
Indicates elapsed time from start mark.
- ⑥ Time knob  
Pull then rotate knob to set time.
- ⑦ Chronometer pb  
Depress once to start  
once to stop  
once to reset
- ⑧ Revolving bezel knob  
Rotate knob to set start mark with revolving bezel.

	<b>FLIGHT INSTRUMENTS</b>  CLOCKS	1.10.40		
		P 2	001	
				DEC 96

AA

#### 40.3 ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
CAPT clock	DC EMER BUS (on overhead panel CAPT)	– Nil –
F/O clock	DC BUS 2 (on overhead panel F/O)	– Nil –

---

	FLIGHT INSTRUMENTS	1.10.50		
		P 1	001	
	FLIGHT RECORDERS			SEP 04

AA

#### 50.1 DESCRIPTION

The aircraft is equipped with :

- a Cockpit Voice Recorder, CVR, and
- a Digital Flight Data Recorder, DFDR.

The recorders are automatically energized as soon as the aircraft is on its own electrical supply and are switched OFF automatically TeN minutes after engines cut. When the aircraft is on external power, recorders are OFF until one engine is started. They can be energized by selecting ON the RCDR pushbutton, and deenergized by pushing the RESET pushbutton.

Each recorder is equipped with an underwater acoustic beacon which is used to locate the recorder in the event of an aircraft accident over the sea. The beacons actuate immediately after immersion. They should transmit a signal on 37.5 kHz for 30 days. The detection range is 3.5 km (4,000 yards).

#### CVR

All crew communications transmitted through the RCAU are recorded.

In addition, a CVR microphone, located below the overhead panel, acquires cockpit conversation and aural alerts for recording. Cabin crew announcements are also recorded.

- R Only the last 30 minutes (or 120 minutes, depending on version) are retained. All recording may be erased by pressing ERASE pushbutton provided the aircraft is on ground and the parking break is set.

#### DFDR

Various aircraft parameters are sent to a Flight Data Acquisition Unit (FDAU) which converts them into digital data.

The FDAU also receives data from a Flight Data Entry Panel (FDEP) located on the pedestal.

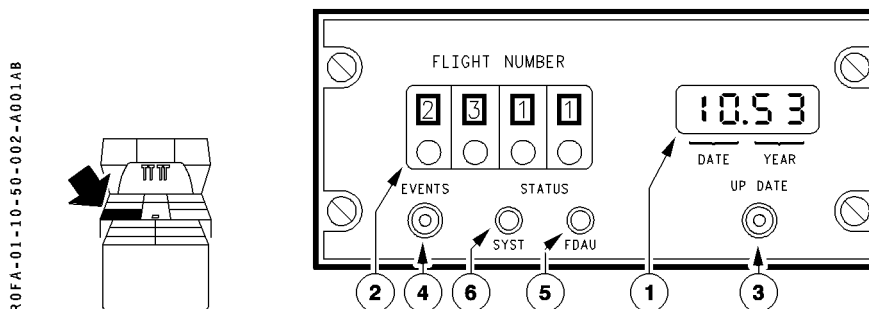
The data are recorded by the DFDR which stores them on a magnetic tape. The 25 last hours of flight are retained.

 <b>ATR 72</b> <b>F.C.O.M.</b>	<b>FLIGHT INSTRUMENTS</b>		1.10.50		
	<b>FLIGHT RECORDERS</b>		P 2	001	
					JUL 00

AA

## 50.2 CONTROLS

### FLIGHT DATA ENTRY PANEL (FDEP)



①

#### Data display

Date and time may be displayed and selected through the UPDATE pb ③ (successive pressures) and the Data entry panel ② (except when 8 and 9 position of its first left thumbwheel is selected).

②

#### Data entry panel

Enables (through 4 thumbwheels) to insert different data : hour, minutes, month, day, year, flight number and maintenance data.

③

#### UPDATE pb

Data displayed are updated as following :

- first left thumbwheel of Data entry panel must be on 9 position.

- First sequence : hours and minutes

- UPDATE pb depressed, the display flashes

- insert hour and minutes on data entry panel

- UPDATE pb depressed, correction is taken into account and is displayed for 5 seconds. The following sequence must be initiated during these 5 seconds.

- Second sequence : month and day

Repeat first sequence and insert month and day.

- Third sequence : year.

Repeat first sequence and insert year.

*Note : Once data are inserted, reset the flight number on data entry panel.*

④

#### Events pb

When momentarily depressed, the tape records are marked to identify a special event.

⑤

#### STATUS FDAU light

Illuminates amber when the FDAU is failed.

⑥

#### STATUS SYST light

Illuminates amber when :

R - the DFDR is failed, or

R - the DFDR or QAR (if installed) electrical power is lost, or

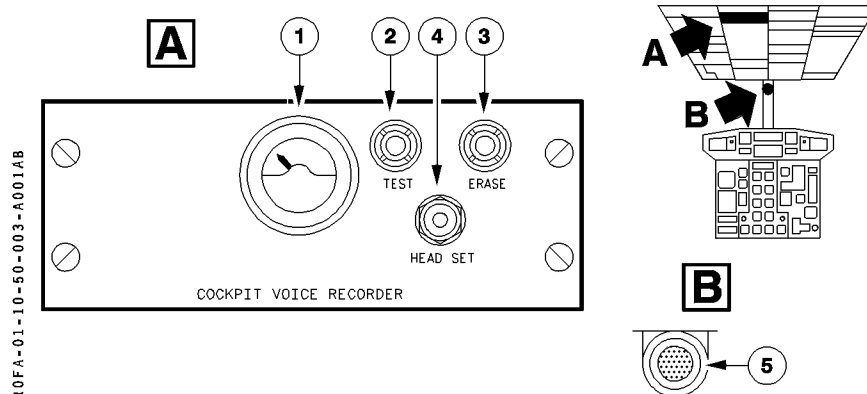
R - QAR (if installed) 80% full.



 <b>ATR 72</b> <b>F.C.O.M.</b>	<b>FLIGHT INSTRUMENTS</b>		1.10.50		
	<b>FLIGHT RECORDERS</b>		P 3	001	
					DEC 96

AA

### COCKPIT VOICE RECORDER PANEL



① Monitor ind.

For test only. Movement of pointer in the white band indicates all channels are operative.

② TEST pb

When depressed and held, the test circuit is activated :

- the pointer moves to a location between graduations 8 and 10
- if a headset is plugged into the jack, the 600Hz signal will be heard.

③ ERASE pb

Provides fast erasure of tape recordings when the landing gear shock absorbers are compressed and parking brake is set (depress for 2 seconds to completely erase). During erasure, a 400 Hz audio signal can be heard in the headset.

④ HEADSET jack

When headset is plugged into the jack :

- cockpit sounds picked up by the microphone are audible
- test tone is audible when TEST pb is depressed
- erase tone is audible when ERASE pb is depressed

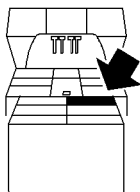
⑤ Microphone

Picks up cockpit conversations and alert sounds.

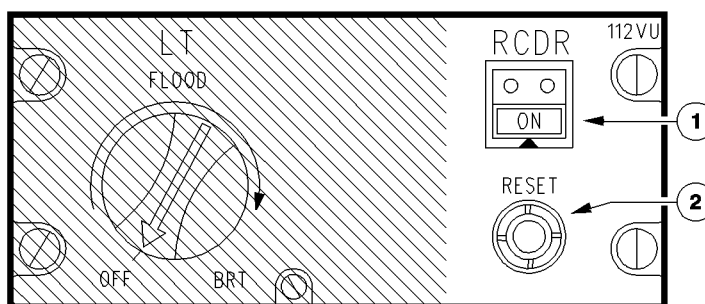
	<b>FLIGHT INSTRUMENTS</b>  <b>FLIGHT RECORDERS</b>	1.10.50		
		P 4	050	
				JUL 00

AA

#### **RECORD PANEL**



ROFA-01-10-50-004-A050AA



#### ① RCDR pb

When depressed, both cockpit voice recorder and digital flight data recorder are energized (manual mode). ON It illuminates blue.

#### ② RESET pb

When depressed, inhibits recording in the manual mode.

### **50.3 ELECTRICAL SUPPLY**

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
FDAU power supply	DC EMER BUS (on overhead panel FDAU DFDR)	115 VAC STBY BUS (on overhead panel DFDR)
DFDR power supply		
Recorder synchronizer	– Nil –	26 VAC STBY BUS (on overhead panel SYNC)