GENERAL

The air data system consist of:

Type I, II and III	Type IV	Type V and VI
Pitot-static system	Pitot-static system	Pitot-static system
1 ADC	2 ADCs	2 ADCs
1 Temperature probe	1 Temperature probe	2 Temperature probes

Pressure information to various instruments and systems is provided either directly from the pitot-static system, or indirectly via the air data computer.

Pitot-static system

Four pitot heads are located at the nose section of the aircraft. Three heads provide one pitot and two static outputs each. One head provides one static output only. Pressure information is supplied to various instruments and systems as shown in the functional diagram. To minimize sideslip effects the static ports are cross-connected. A blocked or frozen pitot-static system may affect instrument and system operation.

Temperature probe

Type I, II and III

A temperature probe, located in the LH wing fairing, provides Total Air Temperature (TAT) information to the ADC, the TAT indicator and the engine anti-ice systems.

Type IV

A temperature probe, located in the LH wing fairing, provides Total Air Temperature (TAT) information to ADC 1, the TAT indicator and the engine anti-ice systems.

Type V and VI

Two temperature probes, located in the LH and RH fairing, provide Total Air Temperature (TAT) information to respective ADC. The LH temperature probe also provides TAT information to the TAT indicator and the engine anti-ice systems.

All

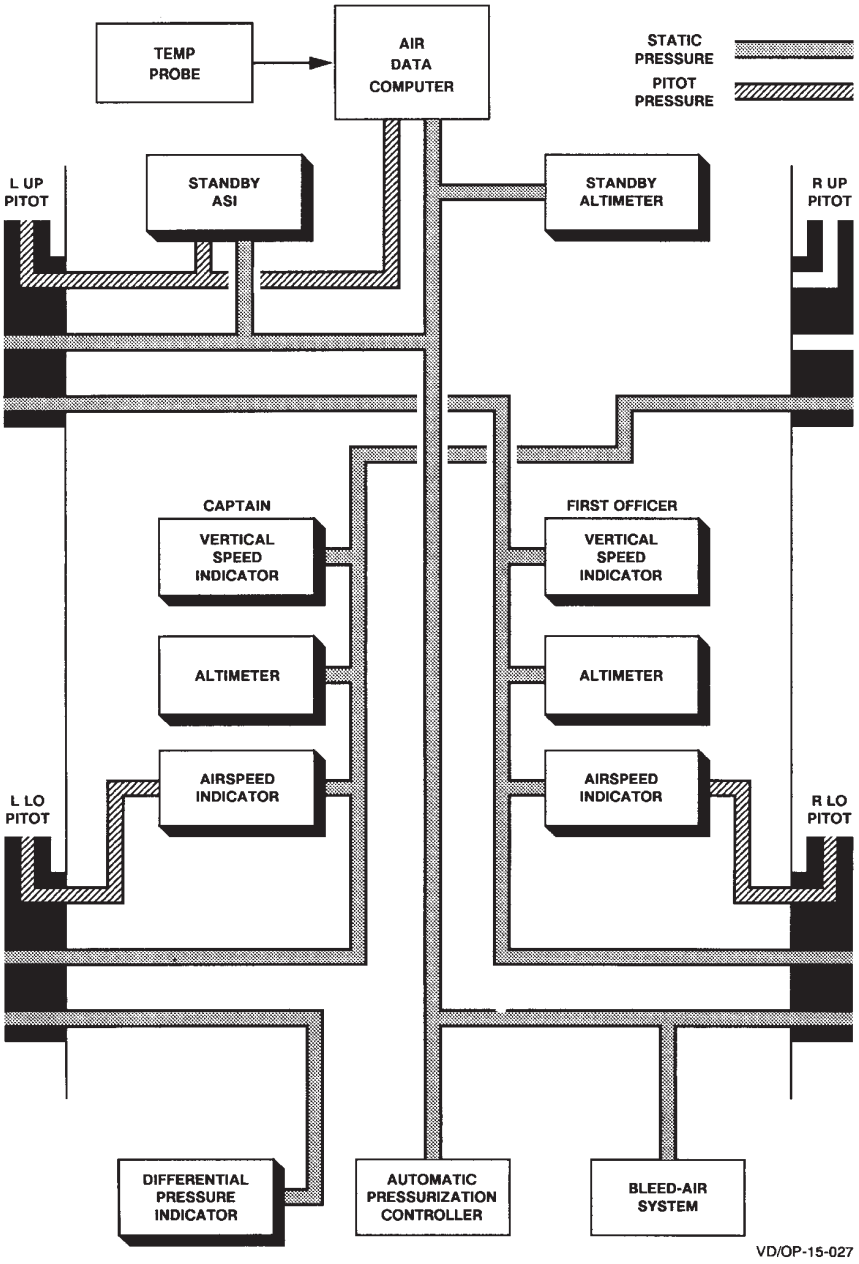
TAT comprises Outside Air Temperature (OAT) plus ram rise. On the ground TAT will be approximately OAT.

Air data computers

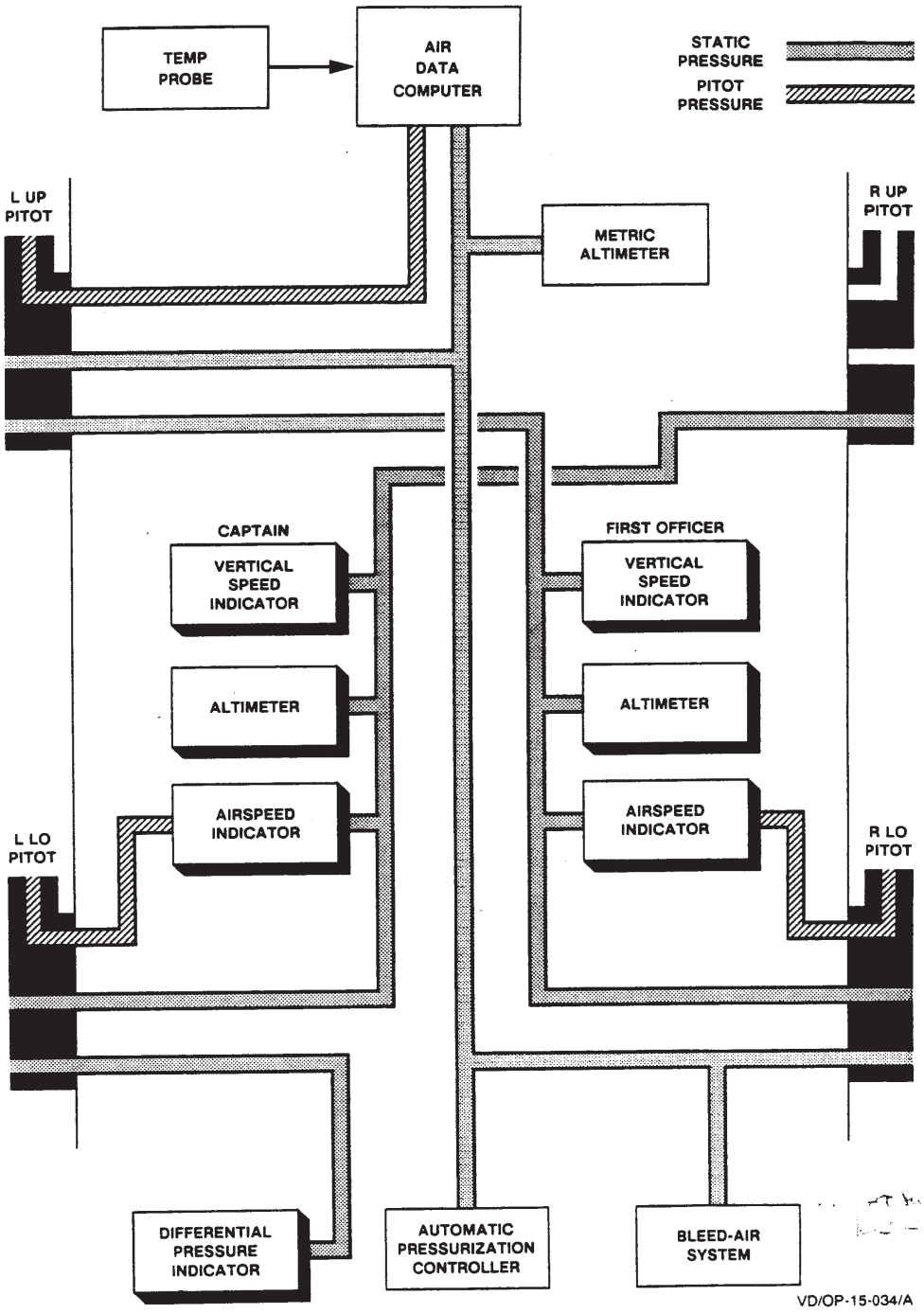
The ADC receives pitot and static pressure from the pitot-static system and converts the pressure into electrical signals to:

Type I, II and III	Type IV	Type V	Type VI
FMS	FMS	FMS	FMS
AFCS	AFCS	AFCS	AFCS
EFIS	EFIS	EFIS	EFIS
Integrated alerting system	Integrated alerting system	Integrated alerting system	Integrated alerting system
TAWS	TAWS	TAWS	TAWS
FDR	FDR	FDR	FDR
AHRS	AHRS	AHRS	AHRS
ATC transponder 2	Both ATC transponders	Both ATC transponders	Both ATC transponders
TCAS	Secondary instruments	Secondary instruments	Secondary instruments
	TCAS	TCAS	TCAS
	LSAS		LSAS
			ERP

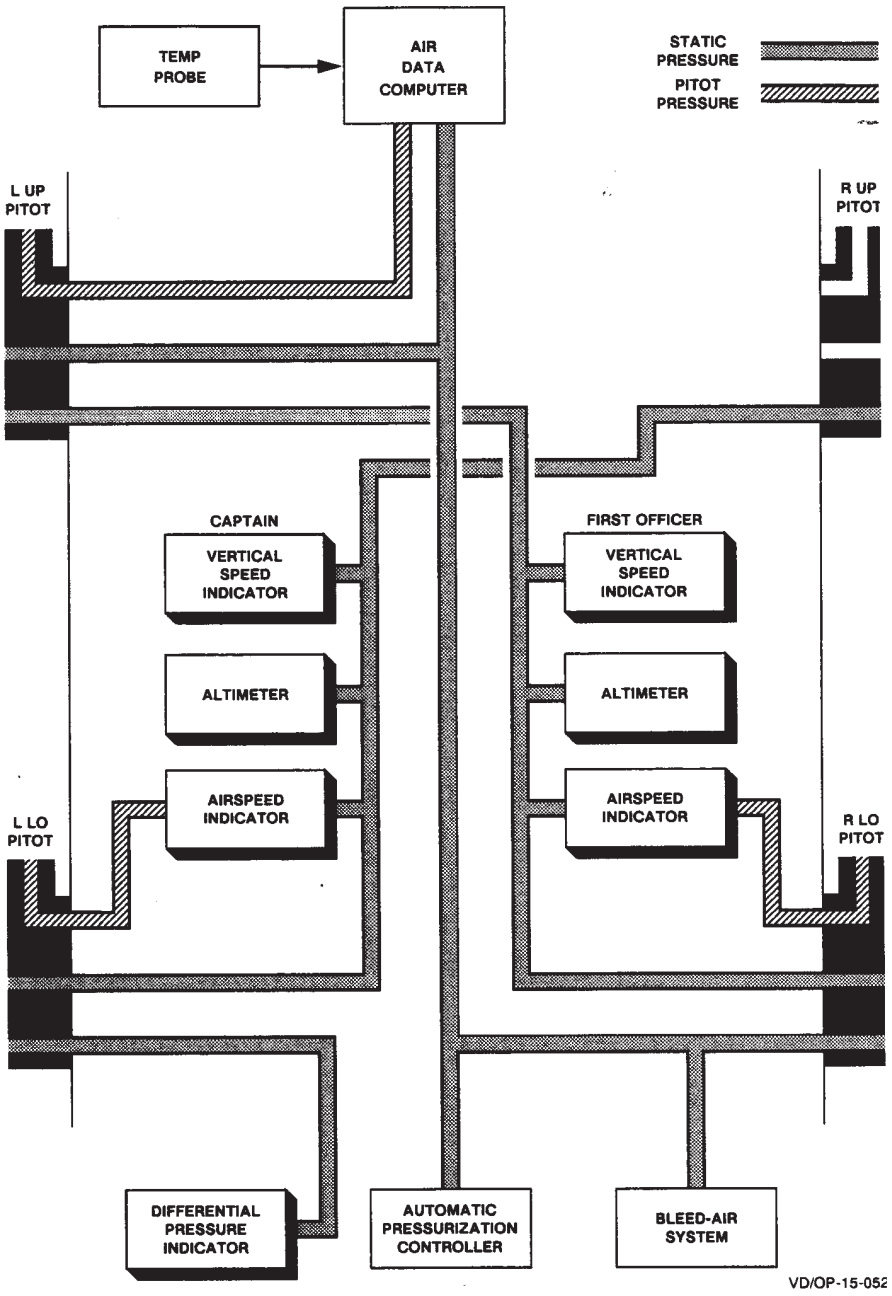
Functional diagram



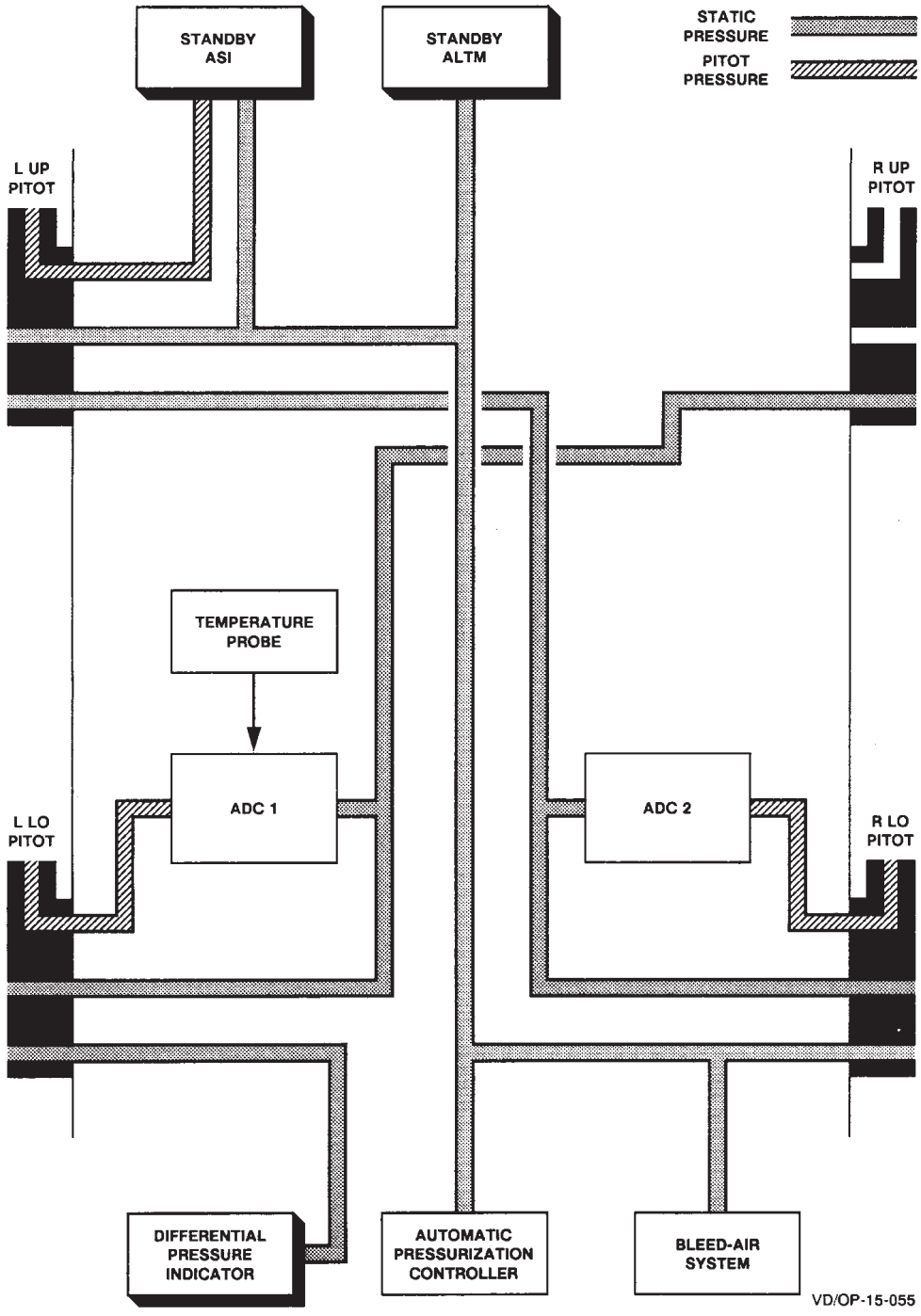
Functional diagram - Type I



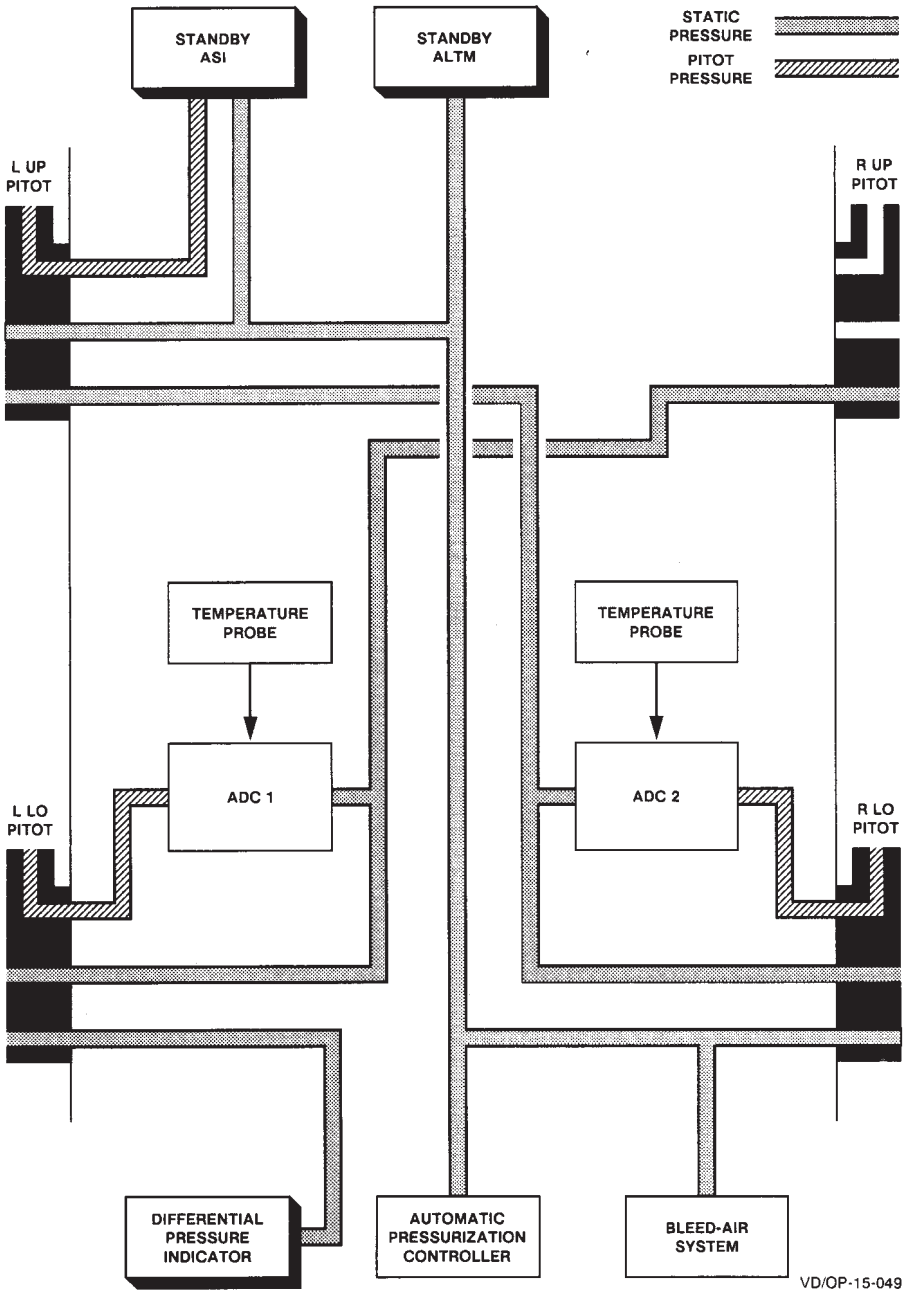
Functional diagram - Type II



Functional diagram - Type III



Functional diagram - Type IV



Functional diagram - Type V and VI

RADIO ALTIMETER

Description

A radio altimeter system, which consists of a dual antenna and a transmitter/receiver unit, provides information for:

- Terrain Awareness and Warning System (TAWS).
- Automatic Flight Control System (AFCS)
- Electronic Flight Instrument System with height information.
- TCAS.

The operating range is from 0 feet up to 2500 feet AGL. No controls are provided for operation of the system.

ATTITUDE AND HEADING REFERENCE SYSTEM

General

The sources of pitch, roll, heading, rate of turn, and acceleration data, are two Attitude and Heading Reference Systems; AHRS 1 and 2. Various flight and navigation systems, as shown in the functional diagram, are supplied with relevant data.

Both AHRS use true airspeed information from the air data computer(s) for optimum accuracy. AHRS operation is automatic upon application of electrical power to the aircraft. In battery-power-only condition, data from AHRS 1 only is available. After power-up, the system performs an automatic alignment sequence.

Heading modes

Type I

Two compass panels, which are installed on the overhead panel, enable the pilot to control heading reference and heading synchronization. The heading output of each AHRS is referenced to actual magnetic heading in the SLAVED mode.

Errors in synchronization between slaved magnetic heading and actual magnetic heading are indicated at the compass panel and navigation display.

Synchronization can be obtained by adjusting the SET HDG control knob depending on the direction of the indicated heading error.

In case the magnetic heading is unreliable a directional gyro (DG) mode can be selected. In this free gyro mode of operation the heading can be adjusted with the SET HDG control knob.

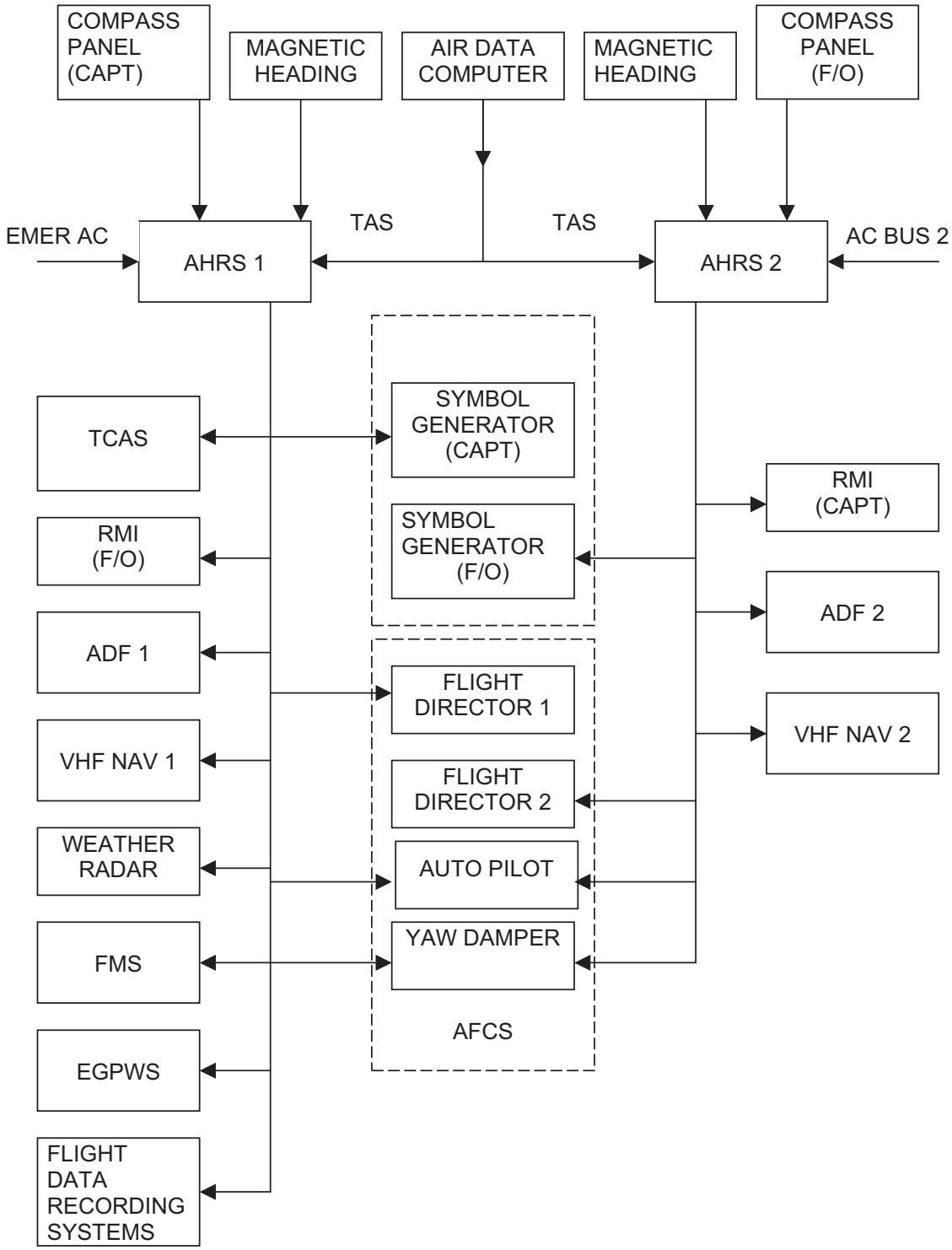
Type II and III

The heading output of each AHRS is referenced to actual magnetic heading. Errors in synchronization between slaved magnetic heading and actual magnetic heading are indicated at the navigation display.

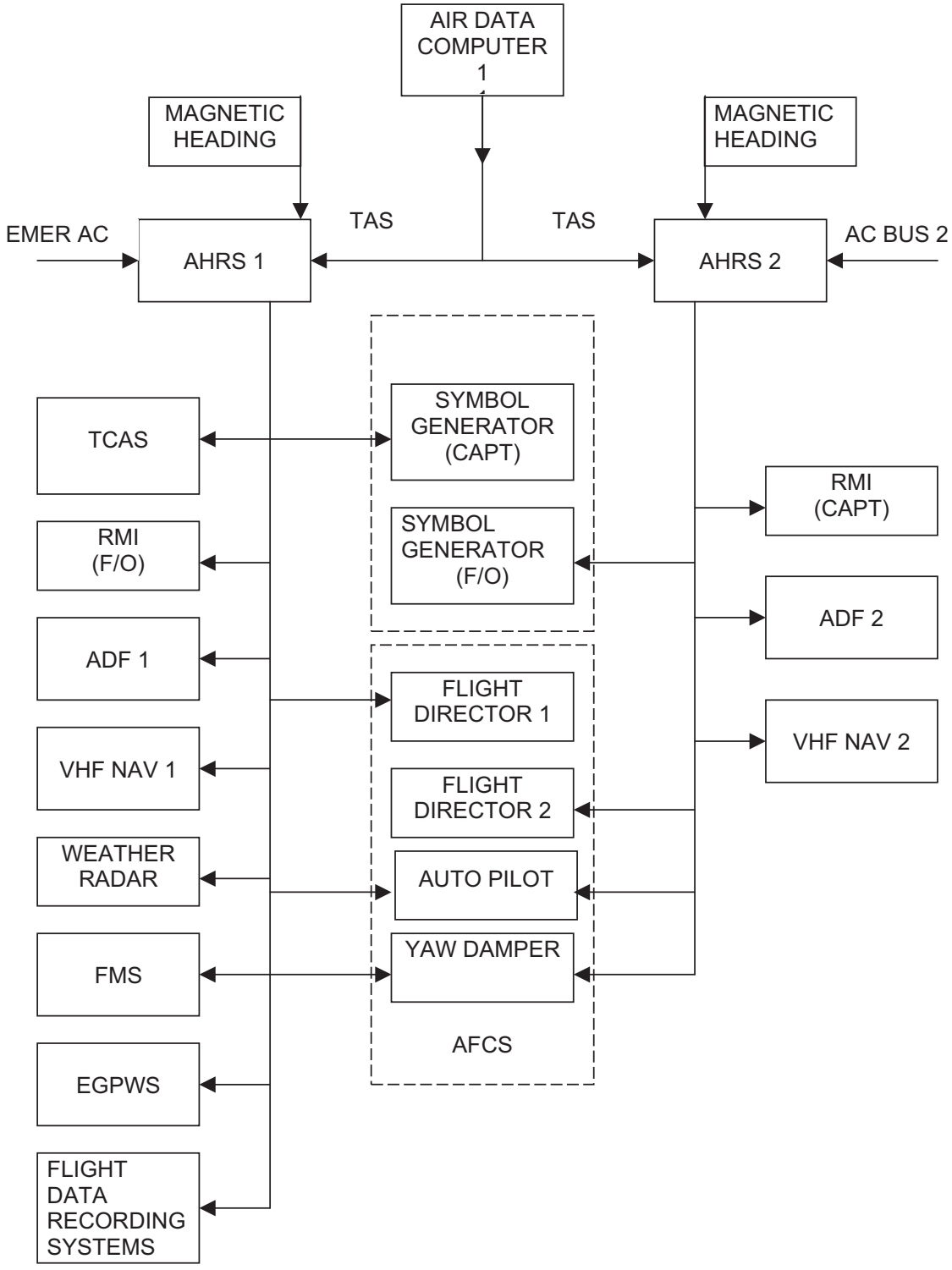
Monitoring

AHRS failures will be annunciated at the relevant EFIS display. A heading failure will also be indicated at the relevant Radio Magnetic Indicator (RMI). Heading, pitch, and roll data from AHRS 1 are compared with data from AHRS 2 by the symbol generators of the Electronic Flight Instrument System (EFIS).
AHRS failures resulting in automatic disconnection of an AFCS channel will be indicated at the AFCS status panel and annunciated by a single chime.
Both AHRS are cooled.
In case of insufficient cooling, the COOL FAN INOP light at the AVIONICS panel illuminates.

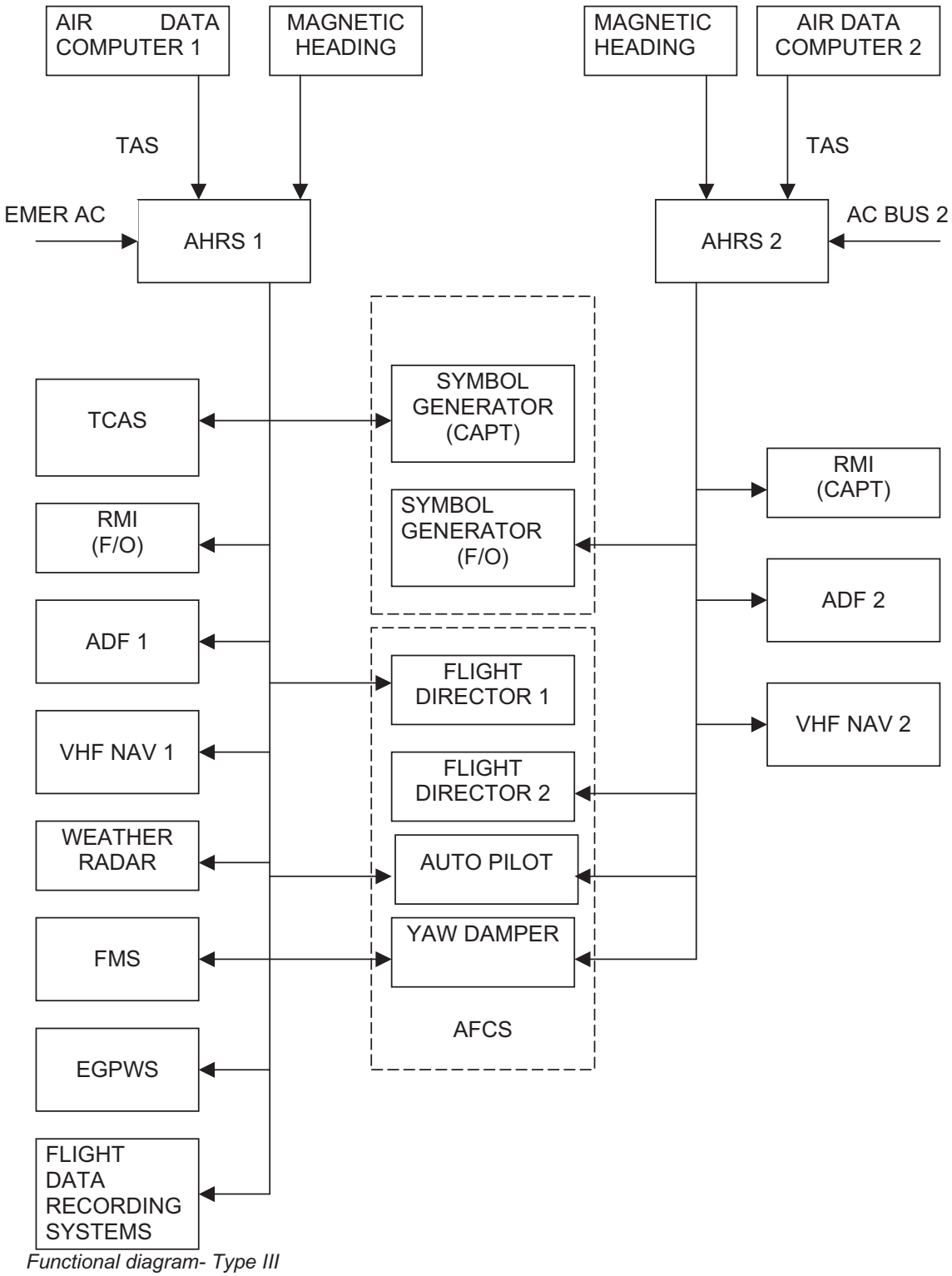
Functional diagram



Functional diagram- Type I

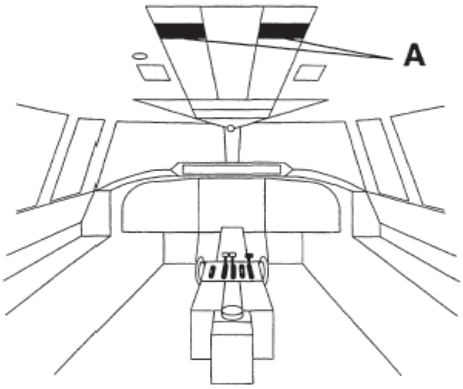


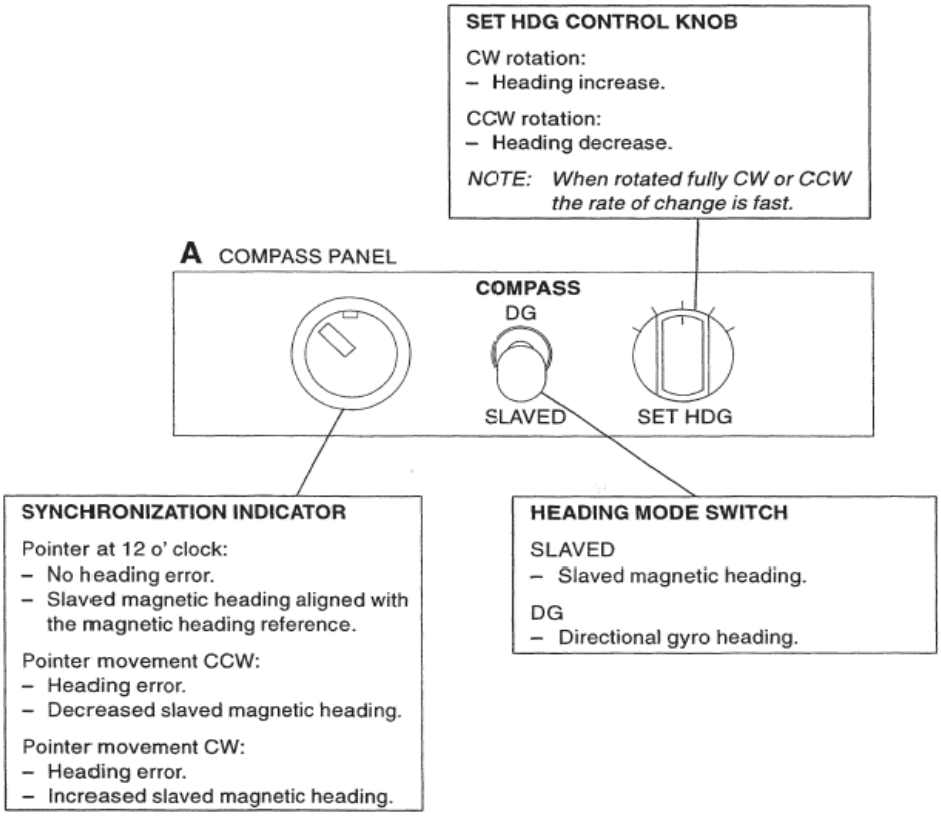
Functional diagram- Type II



Functional diagram- Type III

Controls and indicators





Controls and indicators - Type I

WEATHER RADAR

General

System configuration

The weather radar system provides each pilot with a color display of weather conditions ahead of the aircraft. By selection, the system can also be used for ground mapping. The maximum operation range is 300 nautical miles; the minimum range is 5 nautical miles.

Type I
The system can be controlled and monitored at the weather radar indicator, which is installed at the pedestal. Weather radar information can also be displayed by the by the Electronic Flight Instrument System (EFIS).

Type II
Operation of the system is controlled from a panel installed at the pedestal. Weather radar information is displayed by the Electronic Flight Instrument System (EFIS).

Display features

Radar information can be shown at the Navigation Display (ND) provided MAP or ARC is selected at the EFIS control panel. Both the display range and the azimuth scan can be selected at the weather radar indicator or panel located at the pedestal.

In the weather detection mode, storm intensity and precipitation levels are displayed in green, yellow, red, and magenta in order of progressively stronger returns. In the ground-mapping mode, increasing reflectivity is displayed from cyan, via yellow, to magenta.

Antenna control

The antenna in the nose radome is stabilized in pitch and roll by signals from AHRS 1, so that the picture at the ND is always level with the horizon, even when the aircraft is in a climb, descent, or bank. The stabilization feature can be cancelled; in this case the picture moves along with aircraft attitude. The antenna can be tilted up and down 15 degrees.

Modes

Standby

When the standby mode (STBY) is selected, the antenna is held in a tilt-up position and is neither scanning nor transmitting. The ND range is initially set to 100 nautical miles. Range selection remains possible.

Test

When the test mode is selected initially the radar system needs 45 seconds to warm-up. After warm-up, a test pattern is shown. If the band above 80 NM is missing or broken the system is not serviceable.

WARNING:
- In the test mode the antenna is transmitting.
- Heating and radiation effects of weather radar antenna are hazardous to life.

Weather detection

Weather detection (WX) information can be selected for display when the RADAR selector is in the ON position (Type I) or in the WX position (Type II).

Rain echo attenuation compensation

A Rain echo attenuation Compensation Technique (RCT) can be selected to compensate for attenuation of the radar signal when it passes through a storm. The range in which the radar is no longer calibrated is displayed as a blue field. Any returns detected in this range are displayed as magenta.

Target alert

When Target alert (TGT) is selected, severe weather beyond the selected range can be detected. With a selected range of less than 100 NM, the maximum TGT range is 85 NM. With a selected range of 100 NM, the maximum TGT range is 75 NM. With a selected range of 200 NM, the maximum TGT range is 45 NM. Targets beyond a selected range of 300 NM are no longer detected.

NOTE: The radar is calibrated with the GAIN selector pushed in. The radar is not calibrated when variable gain is used (GAIN selector pulled), but calibration is restored when RCT or TGT is selected.

Ground mapping (type I)

Ground mapping (MAP) information can be selected for presentation when the MODE selector is in the ON position.

In the MAP mode the antenna must be tilted down until the desired amount of terrain is displayed. The degree of down-tilt will depend upon the aircraft altitude and the selected range.

Ground mapping (type II)

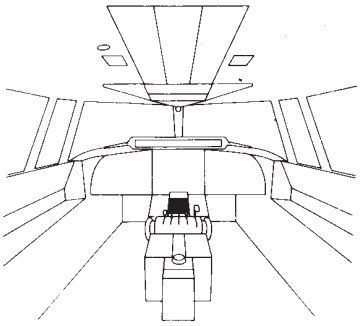
Ground mapping (GMAP) information can be selected for presentation when the RADAR selector is in the GMAP position.

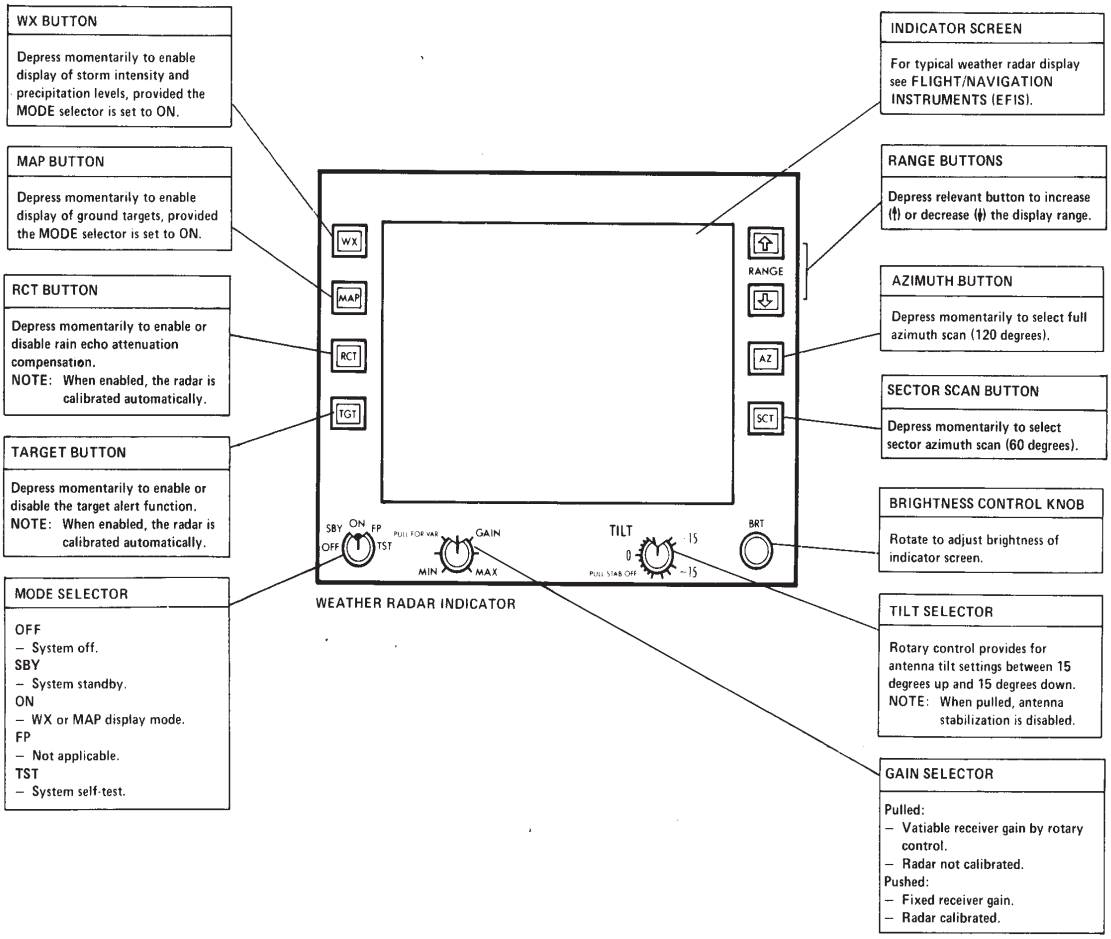
In the GMAP mode the antenna must be tilted down until the desired amount of terrain is displayed. The degree of down-tilt will depend upon the aircraft altitude and the selected range.

Flight plan (type II)

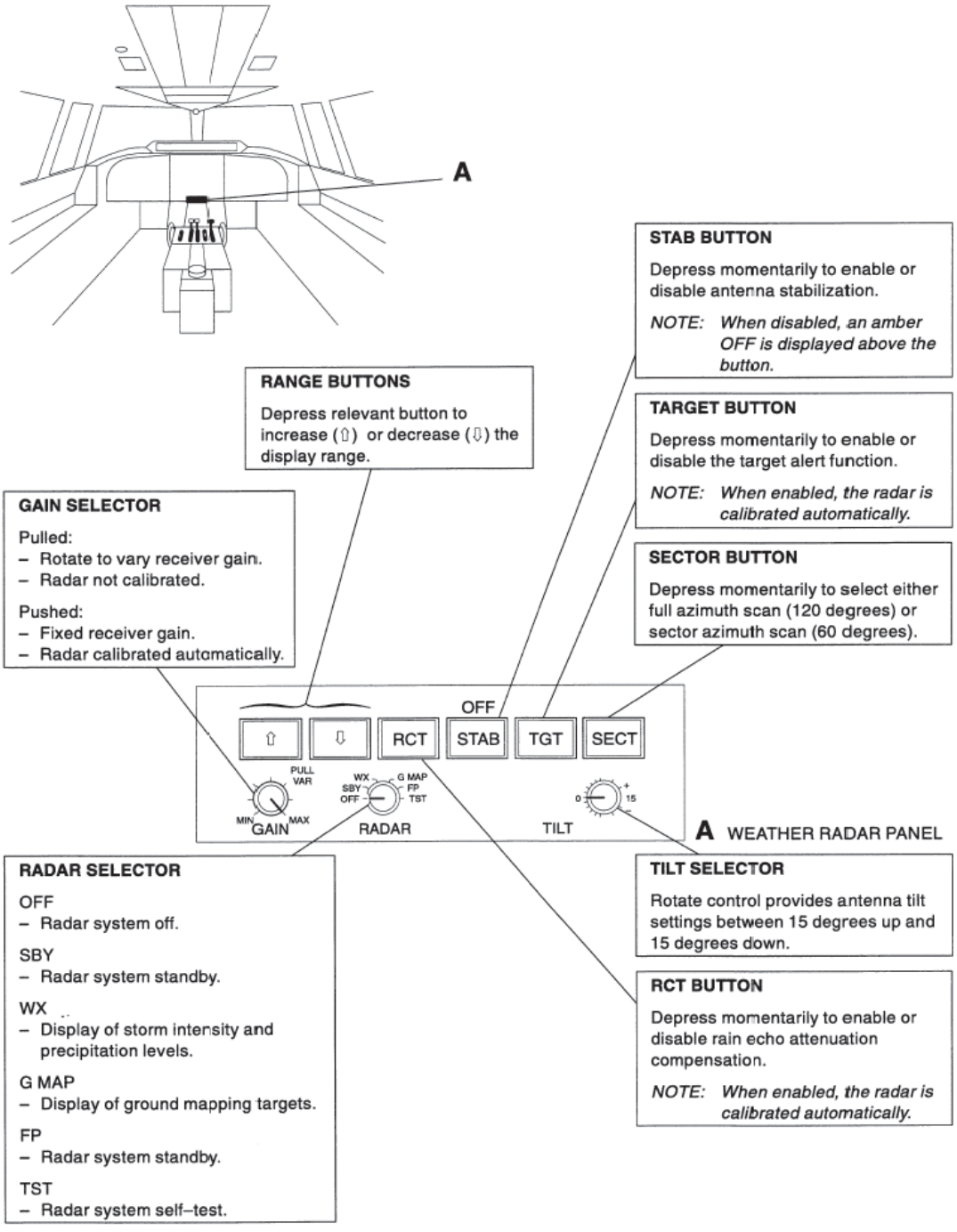
In the Flight Plan (FP) mode the radar system is in standby to permit the display of navigation data at ND. Target alert data can be used in the FP mode.

Controls and indicators





Controls and indicators - Type I



Controls and indicators - Type II

VHF NAV / DME / MARKER BEACON

VHF navigation

Installation

Two VHF navigation systems are installed; both NAV 1 and NAV 2 can be tuned to either a VHF Omni-directional Range (VOR) station or an Instrument Landing System (ILS) station. Each system comprises a control panel, installed in the glare shield panel, and a receiver. The receivers obtain signals from VOR/localizer and glide slope antennas.

VHF Control

The VHF NAV frequency range is from 108.00 MHz to 117.95 MHz. Channel spacing is 50 kHz. When the system is selected ON, both an active and a standby frequency are shown at the NAV control panel. Active and standby frequency can be exchanged by depressing the frequency transfer button. Bearing to or radial from any selected VOR station is numerically displayed instead of the standby frequency when BRG or RAD is selected respectively. When an ILS frequency is used in the BRG or RAD mode, the letters LOC appear instead of the standby frequency. When no signals are received, dashes are shown. When FAIL appears, the system is inoperative. When the system is de-activated (OFF), the last frequencies displayed remain stored.

Outputs

Each receiver provides bearing information for presentation at the Navigation Displays (ND) and at the Radio Magnetic Indicators (RMI). Course deviation is shown at the ND. Glide slope and localizer deviations are displayed at the ND and at the PFD. Course, glide slope, and localizer deviation signals are also fed to the Automatic Flight Control System (AFCS). Audio monitoring of VHF NAV stations can be controlled from the audio panels.

DME

Installation

Slant range distance to a DME equipped VOR/localizer ground station is presented to each pilot at the DME panel and at the Navigation Display (ND). Two stations can be scanned simultaneously. The equipment, which comprises two antennas and two interrogators, transmits interrogation signals and processes the received ground station replies for presentation in nautical miles. If the antenna receives no signals during aircraft maneuvering or when the VHF NAV frequency is being changed, the DME holds the active station in memory for twelve seconds to guarantee an uninterrupted display. Audio monitoring to identify a DME station can be controlled from the audio panels.

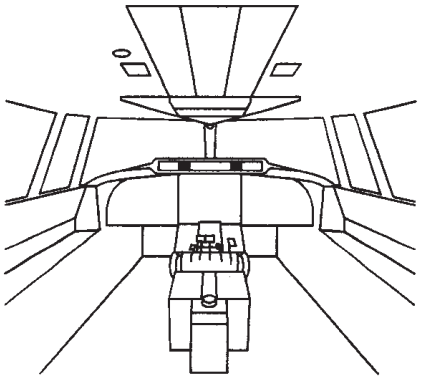
DME Control

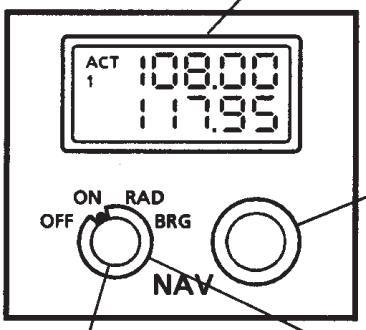
Each DME panel displays distance and ground speed to the selected NAV station. When the TTS button is depressed, the time to the station is shown instead of ground speed. When the hold mode is selected, in which the DME is disconnected from NAV frequency control, the DME holds on to the last tuned frequency and remains active.

Marker beacon

Marker beacon signals, received by a marker beacon antenna, are generated by the NAV receivers. Marker beacon signals are presented visually at the primary flight display, and aurally via the audio integrating system.

Controls and indicators





VHF NAV FREQUENCY DISPLAY

1 (or 2)
- System number.

Upper numerals
- Active frequency (ACT).

Lower numerals
- Standby frequency.
- Bearing to VOR station.
- Radial from VOR station.
- – – – – (dashes)
- No signals received.

LOC
- ILS frequency selected in BRG or RAD mode.

FAIL 1
- Localizer information not available.

FAIL 2
- Glideslope information not available.

FAIL 3 (or 4)
- System failure.

VHF NAV FREQUENCY SELECTOR

Outer knob:
- Tunes frequency in steps of 1 MHz.

Inner knob:
- Tunes frequency in steps of 50 kHz.

VHF NAV FUNCTION SELECTOR

OFF
- System not active.

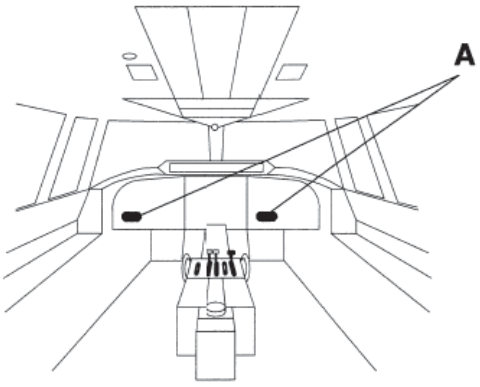
ON
- System active.
- Display of active frequency.
- Display of standby frequncy.

RAD
- System active.
- Display of active frequency.
- Display of:
  - Radial from VOR station, or
  - Dashes when VOR signals are insufficient, or
  - LOC in ILS approach.

BRG
- System active.
- Display of active frequency.
- Display of:
  - Bearing to VOR station, or
  - Dashes when VOR signals are insufficient, or
  - LOC in ILS approach.

FREQUENCY TRANSFER BUTTON

Depress:
- Momentarily to exchange active and standby frequencies.
- 2 seconds to enable direct tuning of active frequency; standby frequency is removed; depress 2 seconds to restore.
- 7 seconds or longer to set active frequency to 108.00 MHz.



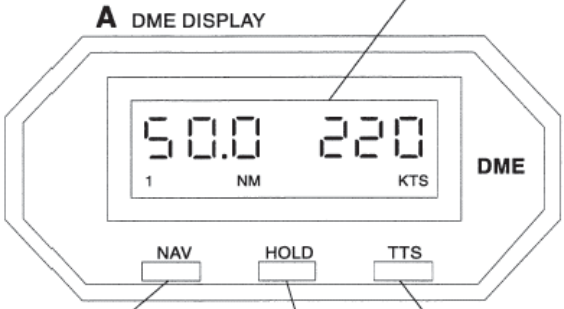
DME DISPLAY

Left numerals:
- Distance display in nautical miles.
- Dashes in the event of insufficient signal.

Right numerals:
- Ground speed in knots.
- Time to station in min/sec.
- Hold frequency.

1 or 2
- Active NAV source.

NOTE: Time to station and the frequency hold mode is not shown here.



NAV BUTTON

Depressed momentarily:
- Exchange of NAV 1 for NAV 2 or vice versa.

TTS BUTTON

Depressed:
- Display of time to station.

HOLD BUTTON

Depressed momentarily:
- DME active at hold frequency.
- Display of hold frequency.
- DME disconnected from NAV frequency control.

Depress momentarily to cancel the hold mode and to restore ground speed display.

ADF

General

Two Automatic Direction Finding (ADF) systems are installed. Each system comprises an antenna, a receiver, and a control panel. Heading reference signals are obtained from AHRS. The systems provide bearing and identification information from selected non-directional radio beacons or broadcast stations. Bearing information from ADF 1 and ADF 2 can be presented at the Navigation Displays (ND) and/or at the Radio Magnetic Indicators (RMI).
Audio monitoring to identify the selected transmitter can be controlled from the audio panels.

Operation

Frequencies

Both an active frequency and a standby frequency are displayed at the control panel. Active and standby frequency can be exchanged by depressing a frequency transfer button. The frequency range for ADF tuning is 190 kHz – 1860 kHz. Fine-tuning is possible in increments of 0.5 kHz.

Modes of operation

Standard direction finding modes which can be selected are ADF, BRG (Bearing) and BFO (Beat Frequency Oscillator). In the bearing mode, the magnetic bearing to the received station is displayed instead of the standby frequency. The frequency transfer button is then disabled. In the BFO mode, a 1000 Hz tone is added to received audio signals from CW stations.

In the antenna mode (ANT), only aural identification signals are obtained. As no bearing information is available, the ND and RMI pointers park at the three o'clock position. Frequency tuning remains possible. When the system is de-activated (OFF), the last selected frequencies remain stored.

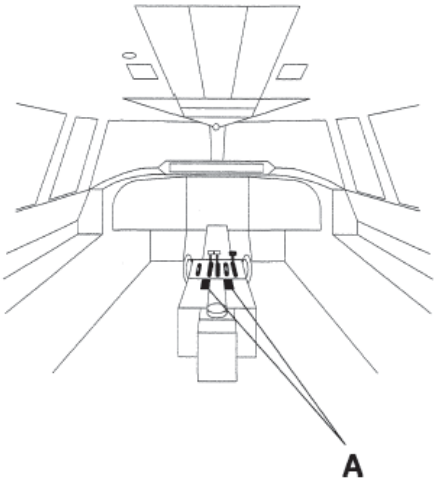
System test

Each system can be tested. During this self-test (TST), the relevant control panel displays PAUSE first, followed by a letter-number combination meant for maintenance purposes. The ND and RMI pointers park at the three o'clock position. When the tuning select button is depressed during TST, both ND and RMI pointers, as well as the control panel display, indicate relative station bearing.

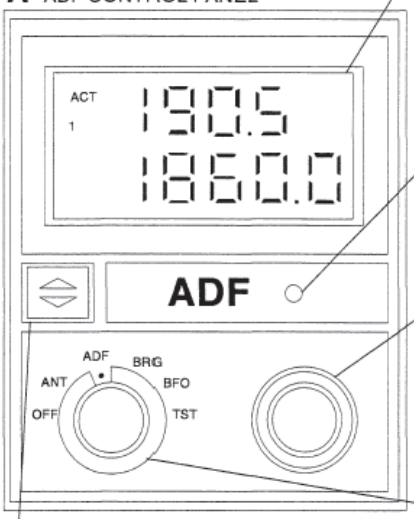
Failure annunciation

The system is inoperative when FAIL is displayed. Dashes appear when no signals are received. There are no annunciators installed in the flight deck other than those at the ADF control panel.

Controls and indicators



A ADF CONTROL PANEL



ADF FREQUENCY DISPLAY

1 or 2
- System number.

Upper numerals
- Active frequency (ACT).

Lower numerals
- Standby frequency.
- Magnetic bearing.
- Relative bearing.

FAIL
- System failure.

– – – – – (dashes)
- No signals received.

PAUSE/L....
- System test mode.

TUNING SELECT BUTTON

Depressed momentarily:
- Alternates between tuning in steps of 1 kHz and steps of 0.5 kHz.
- Displays relative bearing during test.

ADF FREQUENCY SELECTOR

Outer knob:
- Tunes frequency in steps of 100 kHz.

Inner knob:
- Tunes frequency in steps of 1 kHz or steps of 0.5 kHz.

ADF FUNCTION SELECTOR

OFF
- System not active.

ANT
- Aural identification only.

ADF
- Direction finding mode.

BRG
- Direction finding mode.
- Display of magnetic bearing to selected station.

BFO
- Direction finding mode.
- Aural identification possible of CW stations.

TST
- System test.

FREQUENCY TRANSFER BUTTON

Depress:
- Momentarily to exchange active and standby frequencies.
- 2 seconds to enable direct tuning of active frequency; standby frequency is removed; depress 2 seconds to restore.
- 7 seconds or longer to set active frequency to 100 kHz.

ATC TRANSPONDER AND TCAS

General

Two Air Traffic Control (ATC) mode S transponders and a Traffic Alert and Collision Avoidance System (TCAS) are installed. The transponder transmits replies when interrogated by ATC stations or TCAS equipped aircraft. About once every second the transponder transmits a beacon signal for traffic collision avoidance purposes. TCAS provides traffic information to the Traffic Advisory/Vertical Speed Indicator (TA/VSI) and aural advisories via the audio management system to ensure safe vertical separation from other aircraft. ATC and TCAS functions are available via the transponder panel located at the pedestal.

ATC Transponder

Transponder 1 or 2 can be selected via the ATC transponder select switch. The selected transponder is activated via the function selector.

Type I

Three modes of operation are available:

- Mode A
  With the function selector in ALT OFF, the transponder when interrogated, will reply with an ATC code only.
- Mode C
  With the function selector in ALT ON, the transponder when interrogated, will reply with an ATC code and the aircraft altitude.
- Mode S
  With the function selector in ALT ON, ALT OFF, TA or TA/RA the transponder, when discretely addressed by mode S or TCAS interrogators, will reply with the unique address code assigned to the particular aircraft and with ATC or traffic collision avoidance information. With the function selector in ALT OFF the reply will not contain the aircraft altitude.

Type II

Three modes of operation are available:

- Mode A
  With the function selector in ALT RPTG OFF, the transponder, when interrogated, will reply with an ATC code only.
- Mode C
  With the function selector in XPNDR, the transponder, when interrogated, will reply with an ATC code and the aircraft altitude.
- Mode S
  With the function selector in ALT RPTG OFF, XPNDR, TA ONLY or TA/RA, the transponder, when discretely addressed by mode S or TCAS interrogators, will reply with the unique address code assigned to the particular aircraft and with ATC or TCAS information. With the function selector in ALT OFF, the reply will not contain the aircraft altitude.

All
Mode A and mode C replies are inhibited while the aircraft is on the ground.

Via the ATC identification (IDENT) button, identification information can be included in the reply to a ground station.

The ATC code can be set via the ATC code selectors. A new code can also be set when the transponder is selected standby (SBY).

Altitude information is obtained from the captain's altimeter for transponder 1 and from the ADC for transponder 2. With the ATC transponder select switch the active transponder can be selected. The non-selected transponder is placed in standby mode.

TCAS

The aircraft is equipped with a Traffic alert and Collision Avoidance System (TCAS). TCAS detects the presence of nearby aircraft that reply to the beacon signal or that transmits a beacon signal them selves.

TCAS then interrogates the detected aircraft to determine their range, bearing and altitude. Multiple aircraft encounters will be resolved. TCAS can track up to 45 aircrafts and display up to 12 aircrafts on the TA/RA VSI display.

On the control panel a TCAS range selector is provided to select the TA/RA VSI display range limits.

Surrounding traffic will be tracked independently of these range and altitude selection to a maximum surveillance range of 40 NM with a vertical range of 9900 feet above or below the aircraft.

TCAS computes the closure rate and relative position of the detected aircraft to divide them in four categories:
- Resolution Advisory (RA) traffic.
- Traffic Advisory (TA) traffic.
- Proximate Traffic.
- Other Traffic.

TCAS will not classify an aircraft as RA traffic if its reply does not contain altitude information.

RA and TA advisories will be displayed on the TA/RA VSI display. Functions of the display are available via the TCAS control panel. Two modes of operation are available: TA/RA and TA Only. With the function selector in TA/RA, TCAS can classify an aircraft as RA, TA, Proximate- or Other Traffic.

For aircraft equipped with type I

With the FL pushbutton momentarily pushed the relative altitude indications on the TA/RA VSI display change to absolute flight level indications for 15 seconds when the aircraft is above FL 180. Also the aircrafts own absolute flight level is displayed in the upper left corner of the TA/RA VSI display.
The ABOVE/BELOW switch is used to select the display altitude limits for non-threat traffic on the TA/RA VSI display to a higher or lower altitude.

Resolution advisory (RA) traffic

If traffic is predicted to get too close within approx 15-35 seconds, depending on altitude, it is considered a collision threat.

TCAS will issue an RA to ensure safe vertical separation from the traffic. An RA consists of both an aural advisory and, on the TA/VSI display, collision avoidance guidance, to either change or maintain the present vertical speed. If the threat aircraft is also equipped with TCAS, it will receive an RA in the opposite direction. RA's are presented until the traffic is no longer considered a collision threat and the aural advisory 'CLEAR OF CONFLICT' is issued.

Two types of RA's can be issued:
- Corrective RA's.
- Preventive RA's.

Corrective RA

A corrective RA is issued to change the vertical path of the aircraft. It consists of:
- An aural advisory.
- A restrictive red band and a green 'fly to' area on the TA/VSI vertical speed scale.

The following aural advisories are associated with a corrective RA:
- 'CLIMB' (2x), or 'DESCEND' (2x).
- 'CLIMB, CROSSING CLIMB' (2x) or 'DESCEND, CROSSING DESCENT' (2x)
- 'ADJUST VERTICAL SPEED, ADJUST'.

Advisories to descend are inhibited below approximately 1100 feet radio altitude.

The following aural advisories are issued if the initial RA does not result in sufficient vertical separation:
- 'INCREASE CLIMB' (2x), or 'INCREASE DESCENT' (2x).
- 'CLIMB, CLIMB NOW' (2x), or 'DESCENT, DESCENT NOW' (2x)

The 'INCREASE CLIMB' RA is inhibited when gear or flaps are extended. The 'INCREASE DESCENT' RA is inhibited below 1450 feet radio altitude.

Preventive RA

A preventive RA is issued to maintain the present vertical speed. It consists of:

- An aural advisory.
- Restrictive red band(s) on the TA/VSI vertical speed scale.

The following aural advisories are associated with a preventive RA:

- 'MONITOR VERTICAL SPEED'.
- 'MAINTAIN VERTICAL SPEED, MAINTAIN'.
- 'MAINTAIN VERTICAL SPEED, CROSSING MAINTAIN'.

On the TA/VSI display, RA traffic is displayed as a solid red square. If no bearing data is available, RA data are displayed in the red in the lower part of the TA/VSI display, just below the aircraft symbol. When RA traffic is present which cannot be displayed because its range exceeds the selected display range, a 'half' RA symbol is displayed at the edge of the TA/VSI display.

Aural and visual RA's are inhibited below 900 feet radio altitude during descent and below 1100 feet radio altitude during climb. Aural RA's are inhibited in case of ground proximity warnings, except GPWS mode 6.

Traffic advisory (TA) traffic

If traffic is predicted to get too close within 20-48 seconds (20 seconds when in the TA Only mode) depending on altitude it is considered a potential collision threat.

TCAS will issue a TA to alert the pilot for a possible evasive maneuver and to assist in establishing visual contact with the traffic.

The TA consists of the aural advisory 'TRAFFIC-TRAFFIC'. On the TA/RA VSI display TA traffic is displayed as a solid yellow dot.

If no bearing data is available, TA data are displayed in yellow in the lower part of the TA/RA VSI display, just below the aircraft symbol. When TA traffic is present which cannot be displayed at the correct position because its range exceeds the selected display range, a 'half' TA symbol is displayed at the edge of the TA/VSI display.

Aural TA's are inhibited below 400 feet radio altitude during descent and below 600 feet radio altitude during climb, except by GPWS mode 6.

Proximate traffic

TCAS classifies non-threat traffic within 6 NM horizontal and 1200 feet vertical range as Proximate Traffic. On the TA/VSI display Proximate Traffic is displayed as a solid white diamond.

Other traffic

TCAS classifies non-threat traffic outside the Proximate Traffic range as Other Traffic. On the TA/RA VSI display Other Traffic is displayed as an open white diamond.

When flying below approximately 1700 feet radio altitude, TCAS displays all aircraft on the ground as non-threat other Traffic.

TCAS considers an aircraft on the ground when it reports an altitude below approximately 380 feet.

NOTE: Aircraft considered being on the ground can never cause Proximate Traffic, TA or RA indications.

System test

Type I

On the ground, a 12 second test of the transponder and TCAS functions is initiated with the function selector one second in the spring loaded TEST position. The TA/RA VSI display shows a test pattern and a yellow TEST annunciation. The test will result in an aural message.

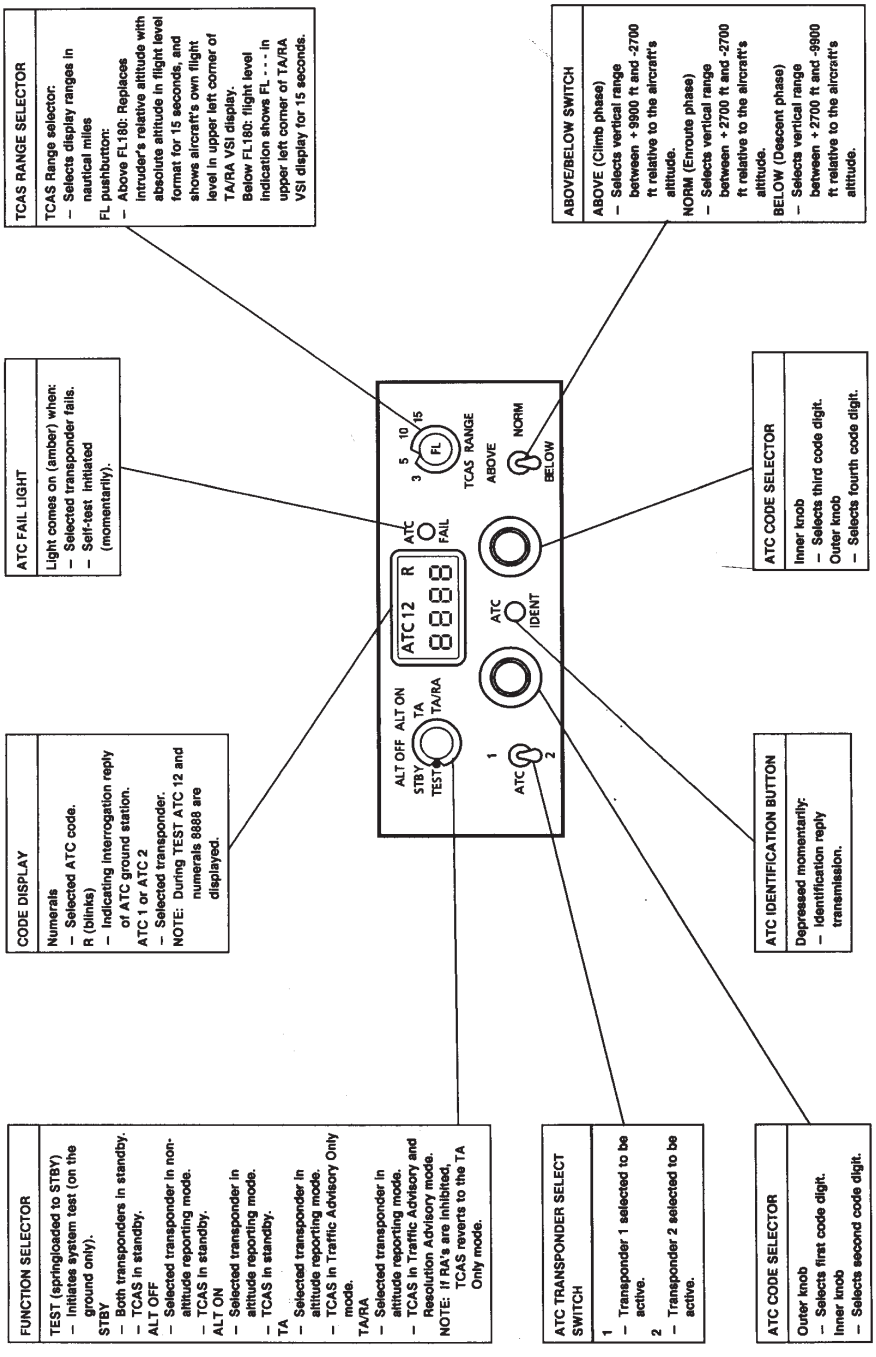
Type II

On the ground, a test of the transponder and TCAS functions is initiated with the test button momentarily pushed. The test starts with an aural TCAS test message.

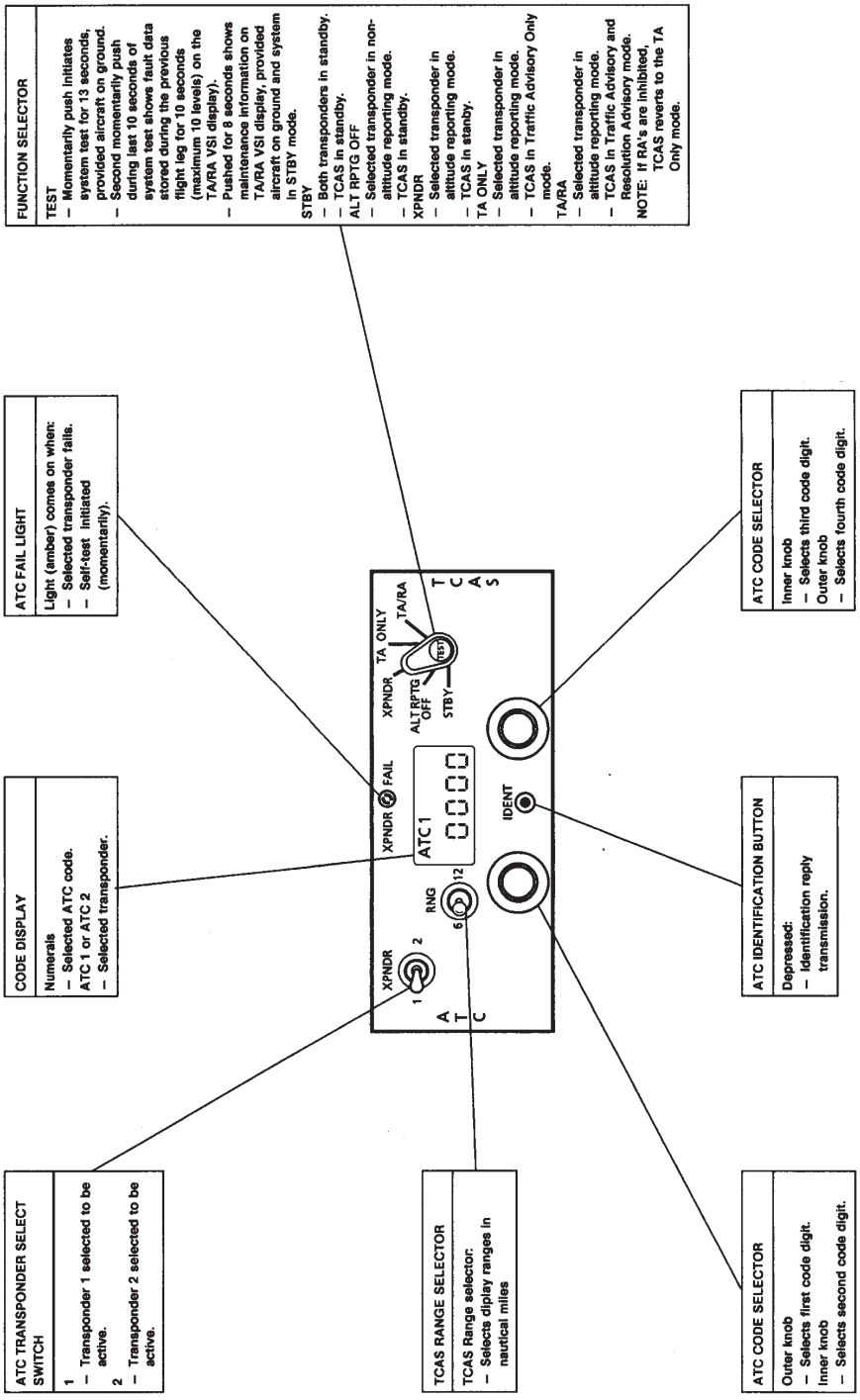
The TA/VSI display shows a test pattern, and a yellow TCAS TEST annunciation. The test will result in an aural message.

A second momentarily push during the last 10 seconds of the system test shows fault data stored during the previous flight leg on the TA/RA VSI display. When the test button is pushed for 8 seconds maintenance information is shown on the TA/VSI display, provided the aircraft is on the ground and TCAS is in standby mode.

Controls and indicators



Controls and indicators - Type I



Controls and indicators - Type II

TCAS symbols on display

The following symbols and data tags are used for display of TCAS on the VSI:

- The threat level is indicated by a symbol (◊ ● ■ ◆).
- The relative altitude is indicated by a numeral, in hundreds of feet above (+) or below (-).
- An arrow indicates a rate of climb (↑) or descent (↓) of 500 feet per minute or more.

Threat Level	Symbol (color)	Explanation
Resolution Advisory (RA)	+01 ■ ↓ (red)	Intruder within 15-35 seconds before entering the collision area. Example: Intruder is 100 ft above and descending at a rate of at least 500 ft/min.
Resolution Advisory (RA) No bearing data	RA 3.6 +04 ↓ (red)	Distance and relative altitude displayed in case of an RA without bearing information available. Example: Intruder at 3.6 NM and 400 ft above, descending at a rate of at least 500 ft/min.
Traffic Advisory (TA)	00 ● (amber)	Intruder within 20-48 seconds before entering the collision area. Example: Intruder is at same altitude and nor climbing or descending or climbing/descending at less than 500 ft/min.
Traffic Advisory (TA) No bearing data	TA 6.8 -11 (amber)	Distance and relative altitude displayed in case of a TA without bearing information available. Example: Intruder at 6.8 NM and 1100 ft below and nor climbing or descending or climbing/descending at less than 500 ft/min.
Proximate Traffic	◆ ↑ -12 blue (cyan)	Traffic within 6 NM and 1200 ft vertically. Example: Intruder is at 1200 ft below and climbing at a rate of at least 500 ft/min.
Other Traffic	+27 ◇ ↓ blue (cyan)	Any traffic that is outside the Proximate Traffic range, but within 2700 ft vertically. Example: Traffic is 2700 ft above and descending at a rate of at least 500 ft/min.

FLIGHT DATA RECORDING SYSTEM

General

The aircraft is equipped with a flight data recording system, which consists of a flight data recorder, and a flight data acquisition unit.

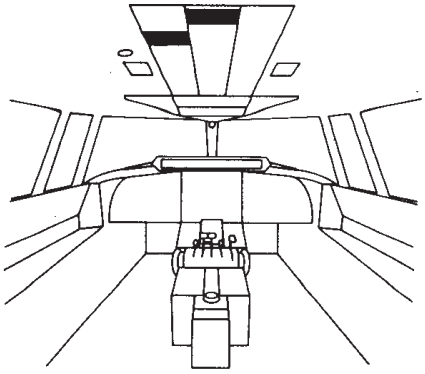
The acquisition unit converts input signals, received from various systems such as power plant, flight controls, air data computer, and automatic flight control system, for recording.

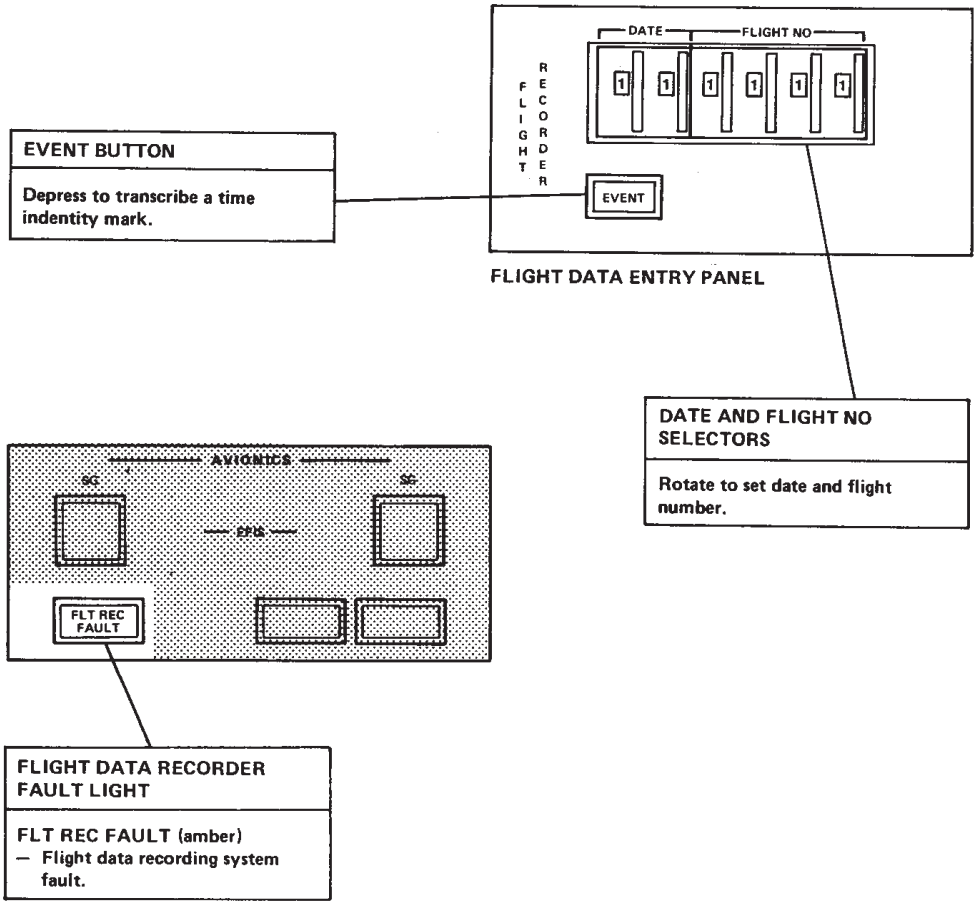
The recorder is housed in a sealed, fire-resistant container, and is equipped with an underwater locator beacon. On the ground, the system operates when either FUEL lever is opened. In flight the system is always in operation. In case of a failure an alert will be presented.

For aircraft equipped with a flight data entry panel

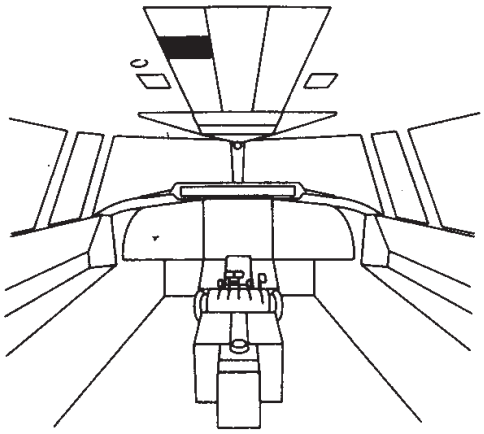
The flight data entry panel has controls for loading the date, the flight number, and time identity marks into the system.

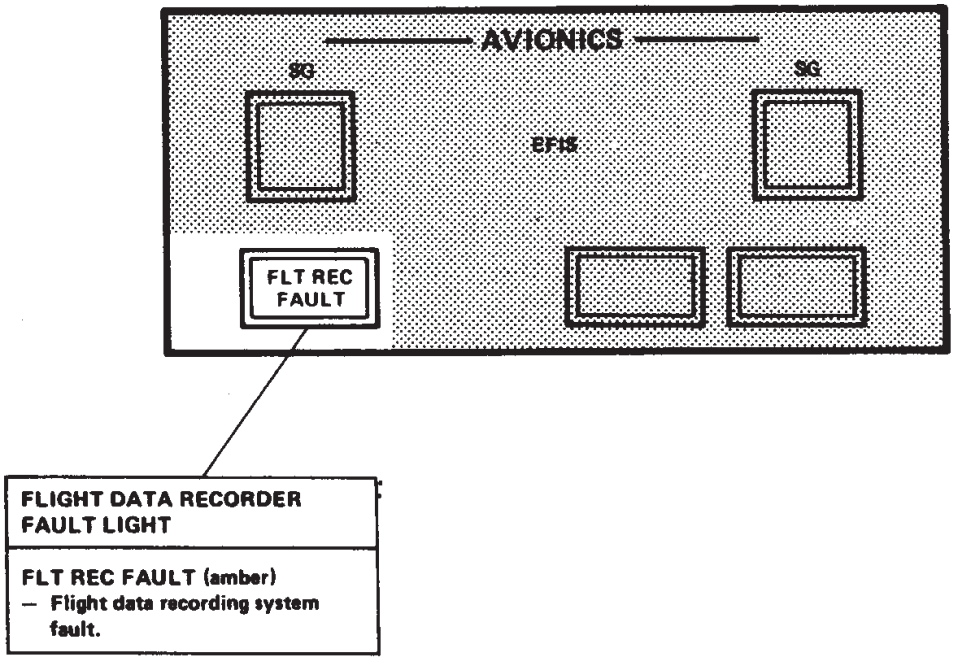
Controls and indicators





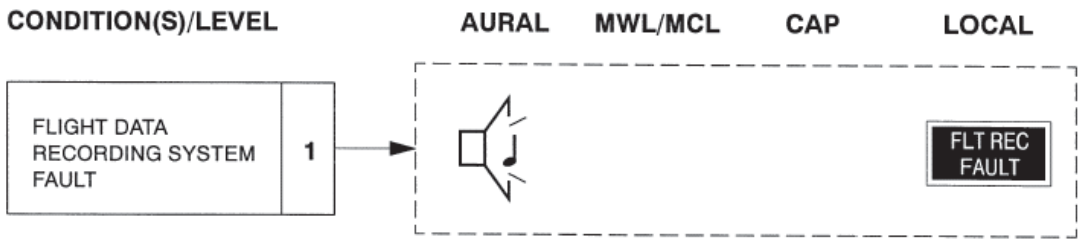
Controls and indicators - For aircraft equipped with a flight data entry panel





Controls and indicators - For aircraft NOT equipped with a flight data entry panel

Alerts


CONDITION(S)/LEVEL
AURAL
MWL/MCL
CAP
LOCAL
FLIGHT DATA RECORDING SYSTEM FAULT
1
FLT REC FAULT

SYSTEM OPERATION

AHRS alignment

Ground alignment requires the aircraft to remain stationary for 45 seconds after power–up.
In the air, alignment takes three minutes during which the aircraft should fly straight and level.

Single source symbol generator (SG)

When, after an SG 1 fault, both left and right EFIS are supplied by SG 2 (SG 1 alternate) the following applies:

- EFIS 1 is a copy of EFIS 2.
- VOR 1 (NAV 1) and ADF 1 bearing only on RMI.
- DME 1 on DME indicator only.
- No FD 1.
- No AHRS 1 except for comparison.

If SG 2 is fault read 2 for 1.

PFD/ND transfer

For normal operation the PF should not transfer the PFD/ND or use composite mode.

NAV display selection

NAV 1 should only be used on LH EFIS and NAV 2 on RH EFIS, unless a NAV set has failed.

DME display selection

Before selection of DME HOLD check present display is from DME 1 or DME 2 (NAV 1 or NAV 2).

TCAS flight procedures

General
Intruders must have operating transponders to be visible to TCAS.
Intruders with non-altitude reporting transponders will not generate Resolution Advisories.

NOTE: TCAS may command maneuvers which, under conditions of low speed, high drag and low excess thrust, may significantly reduce the stall margin or may even result in a stall warning. However, a TCAS maneuver shall not be continued beyond the point of stick shaker activation.
Conditions where this may occur include:

- Bank angle in excess of 15 deg.
- Operation at airports above 5300 feet MSL, temperatures outside of ISA ± 10 deg C (± 50 deg F), airspeeds below normal operating airspeeds, and buffet margins less than 0.25 g.
- Engine out.

Do not initiate evasive maneuvers using information from the traffic display only or upon receiving a TA only without visual contact with the traffic.
Traffic displays and advisories are intended for assistance in visually locating the traffic but lack the flight path trends necessary for use in evasive maneuvering.
However, while climbing or descending, modest changes in vertical speed based on traffic display information is not considered evasive maneuvering.
Compliance with an RA is necessary unless it is considered not safe to do so, or unless the pilot has better information about the cause of the RA and can maintain safe separation (e.g. visual acquisition of and safe separation from a nearby aircraft, obvious TCAS system failure, etc.).

CAUTION: ONCE AN RA HAS BEEN ISSUED, SAFE SEPARATION COULD BE COMPROMISED IF CURRENT VERTICAL SPEED IS CHANGED, EXCEPT AS NECESSARY TO COMPLY WITH THE RA. THIS IS BECAUSE TCAS II – TO – TCAS II COORDINATION MAY BE IN PROGRESS WITH THE INTRUDER AIRCRAFT, AND ANY CHANGE IN VERTICAL SPEED THAT DOES NOT COMPLY WITH THE RA MAY NEGATE THE EFFECTIVENESS OF THE OTHER AIRCRAFT'S COMPLIANCE WITH THE RA.

NOTE: The consequences of not following an RA may result in additional RA's in which aural alert and visual annunciations may not agree with each other.

Evasive maneuvering following a "CLIMB" RA while flying at FL 250 will result in temporarily exceeding the maximum certified flight altitude.
To assure safe separation, evasive maneuvering of approximately .25g must be initiated within approximately 5 sec after the initial RA and within approximately 2.5 sec if an additional, corrective RA (e.g. increase/ decrease, approximately .25 g incremental, or reverse vertical speed, approximately .5 g) is issued.

In case of an RA, the search for the conflicting traffic should, if meteorological conditions permit, include a visual scan of the airspace into which the pilot's own aircraft might maneuver.
Evasive maneuvering must be limited to the minimum required to comply with the RA.

Excessive responses to RA's are not desirable or appropriate because of other potential traffic and ATC consequences. Form level flight, proper response to an RA typically results in an overall altitude deviation of 300 to 500 feet in order to successfully resolve a traffic conflict.
If a ""CLIMB" RA is issued while in the landing configuration, initiate a normal go-around procedure.

NOTE: Initiating the go-around procedure of a "CLIMB" RA does not mandate a missed approach. It is intended to assure the airplane is properly configured for the expected maneuver. In most cases, the TCAS event will be resolved with only minor deviation to the intended flight path and sufficient time and altitude will exist to recover safely to the desired flight path.

The "TA only" mode should only be used to prevent RA's when intentionally operating close to other aircraft such as to closely spaced parallel runways, or if operating single engine.

The "TA/RA' mode should be selected just prior to take-off, and "STBY" mode or (if installed) "OFF" should be selected after clearing runway following landing.

Procedure

In case an RA commands evasive maneuvering, the following procedure applies:

- If engaged, disconnect AP.
- Manually establish climb or descent at the rate indicated by the green area on the vertical speed scale.
-

NOTE: As result of the TCAS maneuver the altitude exit alert may come on.

- Do not use the AP or FD V/S mode to acquire the desired vertical speed, because AFCS response to V/S selections is too slow to provide adequate TCAS response.
- Do not change the selected FMP altitude.

Recovery when "CLEAR OF CONFLICT":

- Quickly manually return towards the applicable ATC clearance unless otherwise directed by ATC.
- Select AP on. The AP will engage in either the V/S mode, maintaining the vertical speed at engagement, or in ALT capture (this requires the ASEL mode to be armed), depending on the situation.