2.29. NAVIGATION EQUIPMENT

2.29.1 RADIO ALTIMETER SYSTEM

The ALT-4000 Radio Altimeter System consists of a Receiver/Transmitter installed in the nosecone avionics bay and two Receiver/Transmitter Antennas installed on the fuselage bottom.

The Radio Altimeter System provides an AGL height measurement from 2500 feet to touchdown used by the Flight Guidance System (FGS) and displayed on the Primary Flight Displays (PFDs).
The digital radio altitude data are provided to the FGS and PFDs via the IAPS.

Radio altitude, Decision Height (DH), and DH alert are displayed on both the PFDs.
The Decision Height can be set on the REFS Menu through the DCP controls and PFD line select keys.

The system can be checked by means of the SYS TEST rotary switch part of the Central Control Panel located on the Cockpit Instruments Panel.
The functional test is operated by pushing the SYS TEST switch on RAD ALT position.
When the Radio Altimeter system is in test condition, a yellow haloed RA TEST is displayed on the PFD, adjacent to the digital Radio Altimeter readout. If the system is operating properly, the altitude value of 50 feet is displayed on the PFD.

Refer to the Collins "Pro Line 21 Avionics System Operator's Guide, for the Piaggio P.180 Avanti", doc. n. 523-0806484, for details about Radio Altimeter System Operations.

The ALT-4000 Radio Altimeter System is powered by the Right Avionics Dual Feed Bus through the RADIO ALT 3-ampere circuit breaker on the copilot's C/B panel.

2.29.2 WEATHER RADAR SYSTEM

The Weather Radar System RTA-800 consists of a Receiver/Transmitter/ Antenna (RTA) installed in the nosecone avionics bay.
The RTA-800 is a 2-channel, solid-state, X-band color weather radar system (i.e. various colors are used to differentiate between a number of target intensities) that detects and locates weather targets for the purpose of navigating around weather hazards.
The Weather Radar System can also be used to provide ground terrain information.

The weather and map information can be overlaid in most of the PFD/MFD navigation formats. The system displays radar detectable precipitations within 60 degrees on either side of the flight path.

Weather Radar operations are controlled by the DCP through the Radar mode menu selection, RANGE selection knob, TILT knob and GCS pushbutton. The selection of the "RDR" line select key, on the PFDs and MFD, displays the RADAR menu.

Refer to the Collins "Pro Line 21 Avionics System Operator's Guide, for the Piaggio P.180 Avanti", doc. n. 523-0806484, for details about Weather Radar System Operations.

The Weather Radar System is powered by the Right Avionics Dual Feed Bus through the WEATHER RDR 3-ampere circuit breaker on the copilot's C/B panel.

2.29.3 RADIO NAVIGATION SYSTEM

The VHF Radio Navigation System is installed in the nosecone avionics bay and consists of:

– one VOR/ILS/MKR/ADF receiver type NAV-4000 (NAV 1)

– one VOR/ILS/MKR receiver type NAV-4500 (NAV 2).

The NAV 1 Receiver contains VOR/LOC, Glide-Slope, Marker Beacon and ADF receivers in a single package. The NAV 2 Receiver contains VOR/LOC, Glide-Slope and Marker Beacon receivers in a single package.
The VOR signals provide en-route navigation and terminal area guidance.
The ILS LOC/GS signals provide approach and landing guidance data.
The Marker Beacon provide distance to runway data.

All the antennas and diplexers connected to NAV 1 and NAV 2 equipment are installed on the vertical stabilizer.

Control of the radar, navigation sources, bearing pointers, speed and altitude references is performed by the DCPs and PFDs/MFD line select keys. When a DCP function switch is pushed, the PFD shows the appropriate menu. While the menu is in view, the PFD line select keys are active.

The NAV receivers functions are controlled by the Radio Tuning Unit (RTU) and the Control Display Unit (CDU).
Controls include the setting of radio frequencies, beacon codes and operational modes. The CDU and RTU provide control of both on-side and cross-side radios from the pilot or copilot position. Each tuning unit supports full reversionary tuning for the cross-side radios, in case of cross-side tuning unit failure.

Refer to the Collins "Pro Line 21 Avionics System Operator's Guide, for the Piaggio P.180 Avanti", doc. n. 523-0806484, for details about Radio Navigation System Operations.

The #1 Radio Navigation System is powered by the Essential Avionics Bus through the NAV1 3-ampere circuit breaker on the pilot's C/B panel.

The #2 Radio Navigation System is powered by the Right Avionics Dual Feed Bus through the NAV2 3-ampere circuit breaker on the copilot's C/B panel.

2.29.4 DISTANCE MEASURING EQUIPMENT

The Distance Measuring Equipment (DME) transceiver DME-4000 is a three channels unit that provides position navigation information (distance, time-to-station, ground speed and station identification information).

The DME transceiver, installed in the nosecone avionics bay, is connected to the DME antenna that is located on the lower front fuselage

The DME measures the line-of-sight distance between the aircraft and selected DME ground stations. The DME decodes the station identifier and calculates the rate of closure and time to reach the selected station. DME operates on channels assignment in the range of 962 to 1213 MHz; each channel having an air-to-ground frequency assignment in the range from 1025 to 1150 MHz and a ground-to-air frequency which is either in the range of 962 to 1024 MHz or 1151 to 1213 MHz.

Most DME channel assignments are paired with VOR or ILS facilities and are selected by putting the associated VOR or ILS frequency to the DME. DME frequencies not paired with VOR or ILS facilities are arbitrarily associated with a group of frequencies (133 to 135 MHz) in the VHF communications band.

The DME information are displayed on the PFDs / MFD. DME transceiver control is performed by the Radio Tuning Unit (RTU) or the Control Display Unit (CDU) in conjunction with other navigation subsystems.
The DME audio output is applied to the airplane audio system.

The DME can track up to three stations at a time. DME 1 and 2 channels are normally tuned through the RTU or CDU while channel 3 is always available to the FMS for auto-tuning.
Also, channels 1 and 2 can be set on auto-tuning mode, managed by the FMS.

Except when DME HOLD function is active, DME stations are automatically tuned as NAV (VOR/ILS) co-located stations when a VOR/ILS frequency has been selected.

Refer to the Collins "Pro Line 21 Avionics System Operator's Guide, for the Piaggio P.180 Avanti", doc. n. 523-0806484, for details about DME Operations.

The DME Transceiver is powered by the Right Avionics Dual Feed Bus through the DME1 3-ampere circuit breaker on copilot's C/B panel.

2.29.5 ATC MODE-S TRANSPONDER

A TDR-94D Diversity Mode S Transponder, with Mode-A, Mode-C and Enhanced Mode-S capability, is installed in the nosecone avionics bay.
Two transponder antennas are installed, one on the top and one on the lower side of the fuselage.

Enhanced Mode-S capability allows sending and receiving messages via the interrogation / reply data link.
Identification alphanumeric code as well as flight ID and navigation data are transmitted as defined by Enhanced protocol.

When active, and in flight condition, the TDR-94D Transponder automatically responds to all valid ATC radar interrogations and TCAS / ACAS equipped airplanes interrogations. On ground, the TDR-94D will continue to generate required Mode-S squitters as well as replies to discretely addressed Mode-S interrogations.

The Transponder operation (control and display) is performed by the RTU or by the CDU.

Refer to the Collins "Pro Line 21 Avionics System Operator's Guide, for the Piaggio P.180 Avanti", doc. n. 523-0806484, for details about ATC Transponder Operations.

The Transponder is powered by the Essential Avionics Bus through the XPNDR 1 3-ampere circuit breaker on the copilot's C/B panel.

2.29.6 GLOBAL POSTITIONING SYSTEM

The Global Positioning System (GPS) consists of a GPS-4000A Sensor Unit (Receiver), installed in the nosecone avionics bay, and a GPS Antenna installed on the top of the fuselage.

The GPS-4000A processes the signals received from the antenna to provide various navigation data (three-dimensional position / velocity and time) to the IAPS data concentrator.
The GPS Receiver is mainly used as FMS position sensor.

The GPS receiver control and data display is performed by the Control Display Unit.

Refer to the Collins "Pro Line 21 Avionics System Operator's Guide, for the Piaggio P.180 Avanti", doc. n. 523-0806484, for details about GPS Operations.

The GPS-4000A receiver may be self-tested when the aircraft is on the ground. Access is required to the receiver, to momentarily push the TEST button on the GPS-4000A front panel with power applied to the system. The GPS-4000A front panel LED indicator, LRU STATUS and ANTENNA FAIL, are energized for self-test mode operation only. The above indicators are disabled for all other test operations (power-up and continuous BIT). The self-test takes approximately less than 15 seconds for the GPS-4000A to complete the sequence.

The GPS-4000A Sensor Unit is powered by the Right Avionics Dual Feed Bus through the GPS1 3-ampere circuit breaker on the copilot's C/B panel.