

GARMIN G1000 ATTITUDE HEADING REFERENCE SYSTEM - DESCRIPTION AND OPERATION

1. General

- A. This section gives a general description and the operation of the Garmin G1000 Attitude Heading and Reference System (AHRS). The AHRS system and magnetometers replace the usual gyroscopic instruments. Components included in the AHRS system are two AHRS units (pilot's and copilot's), and two magnetometer installations, one each installed in the left and right wing.
- B. The G1000 Integrated Avionics System uses different AHRS LRU's based on Airplane Software/Configuration. Make sure to read each section carefully, each software configuration uses some variants of Garmin LRU's which are NOT interchangeable with Garmin Next Generation Software (NXi) versions. Become familiar with the installed software version, refer to Chapter 34, G1000 Integrated Avionics System - Description and Operation. The procedures in this section are typical for the G1000 v.767.XX Family and the G1000 NXi software configuration unless otherwise noted in this document.
- (1) The G1000 Software Version v.767.XX uses the GRS 77 AHRS, GRS 77 AHRS Configuration Module and the GMU 44 LRUs.
 - (2) The G1000 NXi Software uses the GRS 79 AHRS, GRS 79 AHRS Configuration Module and the GMU 44 LRUs.
- C. For an overview of the Garmin G1000 AHRS (Refer to Figure 1).

2. Description

- A. The Garmin GRS 77/79 AHRS and GMU 44 Magnetometer are remote mounted devices that provide flight attitude and heading data for flight instrumentation. The AHRS combines the functions of a vertical gyro and a directional gyro to provide measurements of Roll, Pitch, and Heading Angles. The GRS 77/79 AHRS and GMU 44 magnetometer use solid state sensing technology to combine 3-axis angular rate, linear acceleration, and magnetic field measurements to maintain an electronically stabilized AHRS.
- (1) AHRS 1 and GMU 1 information is defaulted to PFD 1 and AHRS 2 and GMU 2 is defaulted to PFD 2. But, each AHRS and GMU combo can be displayed on either PFD, through the high-speed data bus (HSDB) connecting each of the three Flight Displays, when you push the applicable soft key.
- B. **Garmin GRS 77/79 AHRS**
- (1) There are two AHRS units installed on two separate trays in the cockpit. The AHRS 1 is installed on the copilot's avionics rack. The copilot's avionics rack is found forward of the copilot's door, outboard, under the instrument panel.
 - (2) The AHRS 2 is installed under the floor beneath the co-pilot's seat access panel (232BR).
 - (3) The AHRS 1 and AHRS 2 circuit breakers, found on the Avionics circuit breaker panel, supply 28 Vdc to the AHRS 1 and 2, respectively.
 - (4) The AHRS gives flight attitude and heading data for flight instrumentation. With data available and valid from all sensors, or without the global positioning system (GPS), the AHRS gives valid attitude, angular rate, and acceleration data to the Garmin G1000 Flight Management System, GIA-63W Integrated Avionics Unit and the Primary Flight Display's (PFD 1) and (PFD 2) and the Multi Function Display (MFD).
- C. **Garmin GMU 44 Magnetometer**
- (1) There is one magnetometer installed in each of the airplane wings. The magnetometer units are installed at approximately WS 260.36. The magnetometers are installed on a mount assembly which holds them in a rigid position in the wing.

3. Operation

- A. **Garmin GRS-77/79 AHRS.**
- (1) The AHRS units do the same operation of a vertical gyro and directional gyro to give measurements of roll, pitch, and heading angles. With the use of solid-state sensor technology, the AHRS (with the use of the magnetometers) puts together a 3-axis angular rate, linear acceleration, and magnetic field measurements to make an electronically stabilized AHRS. The AHRS system gives the data that follows in ARINC 429 format:
 - Airplane heading, pitch and roll
 - Airplane yaw, pitch and roll rates
 - Airplane body-axis accelerations
 - Rates of change of heading, pitch and roll
 - Airplane accelerations given in a local-level reference.

- B. The magnetometer gives magnetic data for the operation of the AHRS. The operational voltage range of the AHRS units is from 10 to 33 volts DC. The AHRS units give operational voltage to the magnetometer. The AHRS and magnetometer systems can operate in maneuvers through a range of 360 degrees in bank and pitch. The turn rate limit is 200 degrees per second, but the ARINC 429 angular rate output messages have a limit of 128 degrees per second. Bank error is less than 1.25 degrees through a range of 30 degrees bank, left and right. The pitch error is less than 15 degrees nose up and nose down. Heading is accurate to less than 2 degrees in straight and level flight.

Figure 1 : Sheet 1 :

