

# Interpretation of Required Garmin G1000 Integrated Cockpit System Knowledge for ERAU Flight Course Standards

Note: This document was created to provide ERAU flight instructors and students with guidance as to what level of Garmin G1000 system knowledge is required for each flight course and segment, as interpreted by the FAA and ERAU Practical Test Standards. The requirements listed in this document are intended to reflect the MINIMUM level of knowledge a student must possess. Students must use the ERAU designated checklist and ERAU Standard Operating Procedures during all “Stage Checks” and “End of Course Tests”.

## References:

- Garmin G1000 Cockpit Reference Guide for the Cessna Nav III, (March 2007 190-00384-06 Rev. A)
- Garmin G1000 Pilot’s Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)
- Pilot’s Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)

These documents are available for download at: <http://flight.pr.erau.edu/g1000.html>

# FA 121 / Stage 1 Check

## I. PFD/MFD Controls

1. Students must use standard “T” method for inputting information into the G1000 by using center knobs and buttons. This does not include the Range/Pan or FMS controls.

*Refer to sections 1.3 through 1.5 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

2. Students must be able to read and interpret the following displays:

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

### A. Primary Flight Display (PFD):

- 1) Airspeed tape
- 2) Altitude tape
- 3) Attitude indicator
- 4) Vertical Speed indicator
- 5) Heading indicator
- 6) Inclinometer
- 7) COM/NAV frequency boxes
- 8) Message softkey
- 9) All transponder softkey functions

### B. Multi-Function Display (MFD):

- 1) Engine Instruments
- 2) Traffic on Map display

### C. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- 1) Airspeed Indicator
- 2) Attitude Indicator
- 3) Altimeter
- 4) Magnetic Compass

3. Students must identify and interpret any displayed limitations, annunciations and alerting functions.

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

## II. Normal Procedures

1. On the PFD, students must be able to:
  - A. Set COM Frequency on both COM1 and COM2
  - B. Set barometric altimeter setting. (Including Standby Altimeter)
  - C. Set transponder code, ident, manually set to standby, and mode C (ALT) operation
  - D. Set GPS to proceed direct to an airport or navaid
  - E. Acknowledge displayed annunciations and alerts
2. On the MFD, students must be able to:
  - A. Set power for specified phase of flight
  - B. Identify abnormal or missing engine indications
  - C. Identify traffic on both map and traffic displays
  - D. De-clutter map

## III. Operation of Systems

1. G1000 system and component failures:
  - A. Students must have a basic understanding of what backup systems are available in the event of a G1000 system or component failure
2. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- A. Students must describe the basic components and function of the pitot-static system and stand-by flight instruments to include:
  - a. Airspeed Indicator
  - b. Attitude Indicator
  - c. Altimeter
  - d. Magnetic Compass

## IV. Emergency and Abnormal Operations

1. Students must be able to:
  - A. Describe display changes during operations in Reversionary Mode
  - B. Recognize G1000 system and component failures (AHRS, ADC, cooling fan) and the need to conduct a full stop landing
  - C. Identify electrical system malfunctions and possible corrective actions

# FA 121 – Stage 2 Check

## I. PFD/MFD Controls

1. Students must use standard “T” method for inputting information into the G1000 by using center knobs and buttons, including the Range/Pan or FMS controls.

*Refer to sections 1.3 through 1.5 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

2. Students must be able to read and interpret the following displays:

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

### A. Primary Flight Display (PFD):

- 1) Airspeed tape
- 2) Altitude tape
- 3) Attitude indicator
- 4) Vertical Speed indicator
- 5) Heading indicator
- 6) Horizontal Situation Indicator
- 7) Inclinator
- 8) COM/NAV frequency boxes
- 9) Message softkey
- 10) All transponder softkey functions

### B. Multi-Function Display (MFD):

- 1) Engine Instruments
- 2) System and Lean Assist displays
- 3) Traffic on Map display

### C. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- 1) Airspeed Indicator
- 2) Attitude Indicator
- 3) Altimeter
- 4) Magnetic Compass

3. Students must identify and interpret any displayed limitations, annunciations and alerting functions.

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

## II. Normal Procedures

1. On the PFD, students must be able to:
  - A. Set COM Frequency on both COM1 and COM2
  - B. Set barometric altimeter setting. (Including Standby Altimeter)
  - C. Set transponder code, ident, manually set to standby, mode A (ON), and mode C (ALT) operation
  - D. Intercepts and tracks a given course, radial or bearing, as appropriate
  - E. Recognizes and describes the indication of station passage, if appropriate
  - F. Acknowledge displayed annunciations and alerts
  
2. On the MFD, students must be able to:
  - A. Set power for specified phase of flight
  - B. Lean engine using lean assist function
  - C. Identify abnormal or missing engine indications
  - D. Identify traffic on both map and traffic displays
  - E. De-clutter map

## III. Operation of Systems

1. Line Replaceable Units (LRUs)

*Refer to sections 1.1 and 1.2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

- A. Students must:
  - a. Name the component
  - b. Describe the data each component provides to the G1000 System
  - c. If failed, what backup systems are available
  
- B. Student is responsible for the descriptive abbreviation and not the reference number (Example: GDU = Garmin Display Unit). Citing the reference number (Example GDU 1040 or 1044B) is not required.
  
- C. Students must be familiar with the G1000 system block diagram shown in Figure 1-1

2. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- A. Students must describe the components and function of the:
  - a. Airspeed Indicator
  - b. Attitude Indicator
  - c. Altimeter
  - d. Magnetic Compass

## **IV. Emergency and Abnormal Operations**

1. Exhibits knowledge of the elements related to the G1000 system and equipment malfunctions
2. Students must be able to:
  - A. Identify electrical system malfunctions and possible corrective actions
  - B. Understand situations which cause the system to switch to and/or when to manually change to Reversionary Mode
  - C. Recognize G1000 system and component failures (AHRS, ADC, cooling fan) and the possible corrective actions

# FA 221 / Stage 1 Check

## I. PFD/MFD Controls

1. Students must use standard “T” method for inputting information into the G1000 by using center knobs and buttons, including the Range/Pan or FMS controls.

*Refer to sections 1.3 through 1.5 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

2. Students must be able to read and interpret the following displays:

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

### A. Primary Flight Display (PFD):

- 1) Airspeed tape
- 2) Altitude tape
- 3) Attitude indicator
- 4) Vertical Speed indicator
- 5) Heading indicator
- 6) Horizontal Situation Indicator
- 7) Inclinometer
- 8) COM/NAV frequency boxes
- 9) Message softkey
- 10) All transponder softkey functions

### B. Multi-Function Display (MFD):

- 1) Engine Instruments
- 2) System and Lean Assist displays
- 3) Traffic on Map display

### C. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- 1) Airspeed Indicator
- 2) Attitude Indicator
- 3) Altimeter
- 4) Magnetic Compass

3. Students must identify and interpret any displayed limitations, annunciations and alerting functions.

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

## II. Intercepting and Tracking

1. Student must demonstrate adequate knowledge of the elements related to intercepting and tracking ground and satellite navigational systems.
2. DME arcs must be demonstrated by any one of three methods determined by the check instructor:
  - A. Using CDI needle to identify required heading while GPS displays direct DME from a VOR.
  - B. Using a bearing needle from a VOR to determine required heading while GPS displays DME from the VOR.
  - C. Flying a DME arc as a component of an approach procedure while using the HSI in GPS mode to navigate.
3. By using GPS navigation, an student must be able to:
  - A. Proceed direct to a GPS waypoint
  - B. Intercept and track a specified course to (or bearing from) a GPS waypoint
  - C. Program and fly a specified flight plan

## III. Operation of Systems

1. Students must demonstrate adequate knowledge of the Line Replaceable Units (LRUs):

*Refer to sections 1.1 and 1.2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

- A. Students must:
    - a. Name the component
    - b. Describe the data each component provides to the G1000 System
    - c. If failed, what backup systems are available
  - B. Students are responsible for the descriptive abbreviation and not the reference number (Example: GDU = Garmin Display Unit). Citing the reference number (Example GDU 1040 or 1044B) is not required.
  - C. Students must be familiar with the G1000 system block diagram shown in Figure 1-1
2. Student must demonstrate adequate knowledge of the G1000 System Operation:

*Refer to section 1.6 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

3. Students must demonstrate adequate knowledge of the following operations and annunciations:
  - A. Normal Display Operation
  - B. Reversionary Display Operation
  - C. AHRS Operation
  - D. G1000 System Annunciations
  - E. GPS Receiver Operation
4. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- A. Students must describe the components and function of the:
  - a. Airspeed Indicator
  - b. Attitude Indicator
  - c. Altimeter
  - d. Magnetic Compass

# FA 221 / Stage 2 Check

## I. PFD/MFD Controls

1. Students must use standard "T" method for inputting information into the G1000 by using center knobs and buttons, including the Range/Pan or FMS controls.

*Refer to sections 1.3 through 1.5 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

2. Students must be able to read and interpret the following displays:

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

### A. Primary Flight Display (PFD):

- 1) Airspeed tape
- 2) Altitude tape
- 3) Attitude indicator
- 4) Vertical Speed indicator
- 5) Heading indicator
- 6) Horizontal Situation Indicator
- 7) Inclinometer
- 8) COM/NAV frequency boxes
- 9) Message softkey
- 10) All transponder softkey functions

### B. Multi-Function Display (MFD):

- 1) Engine Instruments
- 2) System and Lean Assist displays
- 3) Traffic on Map display

### C. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- 1) Airspeed Indicator
- 2) Attitude Indicator
- 3) Altimeter
- 4) Magnetic Compass

3. Students must identify and interpret any displayed limitations, annunciations and alerting functions.

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

## II. Intercepting and Tracking

1. Student must demonstrate adequate knowledge of the elements related to intercepting and tracking ground and satellite navigational systems.
2. DME arcs must be demonstrated by any one of three methods determined by the check instructor:
  - A. Using CDI needle to identify required heading while GPS displays direct DME from a VOR.
  - B. Using a bearing needle from a VOR to determine required heading while GPS displays DME from the VOR.
  - C. Flying a DME arc as a component of an approach procedure while using the HSI in GPS mode to navigate.
3. By using GPS navigation, an student must be able to:
  - A. Proceed direct to a GPS waypoint
  - B. Intercept and track a specified course to (or bearing from) a GPS waypoint
  - C. Program and fly a specified flight plan

## III. Instrument Approach Procedures

1. Students must demonstrate instrument approach procedures using ground-based and satellite-based navigation:
  - A. Ground-based navigation - GPS navigation may not be used during any portion of an approach except to provide ranging information from the specified navaid. Navigation information (course guidance) must be received through ground-based facilities.
  - B. Satellite-based navigation - GPS navigation must be used to conduct an instrument approach procedure. Demonstration of a GPS approach procedure must include proper loading, activation, and sequence monitoring.

## IV. Operation of Systems

1. Students must demonstrate adequate knowledge of the Line Replaceable Units (LRUs):

*Refer to sections 1.1 and 1.2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

- A. Students must:
    - d. Name the component
    - e. Describe the data each component provides to the G1000 System
    - f. If failed, what backup systems are available
  - B. Students are responsible for the descriptive abbreviation and not the reference number (Example: GDU = Garmin Display Unit). Citing the reference number (Example GDU 1040 or 1044B) is not required.
  - C. Students must be familiar with the G1000 system block diagram shown in Figure 1-1
2. Student must demonstrate adequate knowledge of the G1000 System Operation:

*Refer to section 1.6 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

3. Students must demonstrate adequate knowledge of the following operations, failures or annunciations:
  - A. Normal Display Operation
  - B. Reversionary Display Operation
  - C. AHRS Operation
  - D. GPS Input Failure
  - E. Magnetometer Failure
  - F. Air Data Input Failure
  - G. G1000 System Annunciations
  - H. GPS Receiver Operation
4. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- A. Students must describe the components and function of the:
  - a. Airspeed Indicator
  - b. Attitude Indicator
  - c. Altimeter
  - d. Magnetic Compass

## **V. Emergency Operations**

1. Students must demonstrate adequate knowledge and ability to conduct an instrument approach procedure with any of the following failures or annunciations:

*Refer to section 1.6 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

- A. PFD Failure
- B. AHRS Failure
- C. Air Data Input Failure
- D. GPS Input/Receiver Failure
- E. Magnetometer Failure
- F. G1000 System Annunciations

# FA 321 / Stage 1 Check

## I. PFD/MFD Controls

1. Students must use standard "T" method for inputting information into the G1000 by using center knobs and buttons, including the Range/Pan or FMS controls.

*Refer to sections 1.3 through 1.5 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

2. Students must be able to read and interpret the following displays:

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

### A. Primary Flight Display (PFD):

- 1) Airspeed tape
- 2) Altitude tape
- 3) Attitude indicator
- 4) Vertical Speed indicator
- 5) Heading indicator
- 6) Horizontal Situation Indicator
- 7) Inclinometer
- 8) COM/NAV frequency boxes
- 9) Message softkey
- 10) All transponder softkey functions

### B. Multi-Function Display (MFD):

- 1) Engine Instruments
- 2) System and Lean Assist displays
- 3) Traffic on Map display

### C. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- 1) Airspeed Indicator
- 2) Attitude Indicator
- 3) Altimeter
- 4) Magnetic Compass

3. Students must identify and interpret any displayed limitations, annunciations and alerting functions.

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

## II. Operation of Systems

1. Students must demonstrate adequate knowledge of the Line Replaceable Units (LRUs):

*Refer to sections 1.1 and 1.2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

- A. Students must:
  - g. Name the component
  - h. Describe the data each component provides to the G1000 System
  - i. If failed, what backup systems are available
- B. Students are responsible for the descriptive abbreviation and not the reference number (Example: GDU = Garmin Display Unit). Citing the reference number (Example GDU 1040 or 1044B) is not required.
- C. Students must be familiar with the G1000 system block diagram shown in Figure 1-1

2. Student must demonstrate adequate knowledge of the G1000 System Operation:

*Refer to section 1.6 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

3. Students must demonstrate adequate knowledge of the following operations, failures or annunciations:

- A. Normal Display Operation
- B. Reversionary Display Operation
- C. AHRS Operation
- D. GPS Input Failure
- E. Magnetometer Failure
- F. Air Data Input Failure
- G. G1000 System Annunciations
- H. GPS Receiver Operation

4. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- A. Students must describe the components and function of the:
  - a. Airspeed Indicator
  - b. Attitude Indicator
  - c. Altimeter
  - d. Magnetic Compass

## III. Emergency Operations

1. Students must demonstrate adequate knowledge and skill with any of the following failures or annunciations:

*Refer to section 1.6 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

- A. PFD Failure
- B. AHRS Failure
- C. Air Data Input Failure
- D. GPS Input/Receiver Failure
- E. Magnetometer Failure
- F. G1000 System Annunciations

# FA 326 / Stage 1 Check

## I. PFD/MFD Controls

1. Students must use standard "T" method for inputting information into the G1000 by using center knobs and buttons, including the Range/Pan or FMS controls.

*Refer to sections 1.3 through 1.5 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

2. Students must be able to read and interpret the following displays:

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

### A. Primary Flight Display (PFD):

- 1) Airspeed tape
- 2) Altitude tape
- 3) Attitude indicator
- 4) Vertical Speed indicator
- 5) Heading indicator
- 6) Horizontal Situation Indicator
- 7) Inclinator
- 8) COM/NAV frequency boxes
- 9) Message softkey
- 10) All transponder softkey functions

### B. Multi-Function Display (MFD):

- 1) Engine Instruments
- 2) System and Lean Assist displays
- 3) Traffic on Map display

### C. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- 1) Airspeed Indicator
- 2) Attitude Indicator
- 3) Altimeter
- 4) Magnetic Compass

3. Students must identify and interpret any displayed limitations, annunciations and alerting functions.

*Refer to section 2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

## II. Intercepting and Tracking

1. Student must demonstrate adequate knowledge of the elements related to intercepting and tracking ground and satellite navigational systems.
2. DME arcs must be demonstrated by any one of three methods determined by the check instructor:
  - A. Using CDI needle to identify required heading while GPS displays direct DME from a VOR.
  - B. Using a bearing needle from a VOR to determine required heading while GPS displays DME from the VOR.
  - C. Flying a DME arc as a component of an approach procedure while using the HSI in GPS mode to navigate.
3. By using GPS navigation, an student must be able to:
  - A. Proceed direct to a GPS waypoint
  - B. Intercept and track a specified course to (or bearing from) a GPS waypoint
  - C. Program and fly a specified flight plan

## III. Instrument Approach Procedures

1. Students must demonstrate instrument approach procedures using ground-based and satellite-based navigation:
  - A. Ground-based navigation - GPS navigation may not be used during any portion of an approach except to provide ranging information from the specified navaid. Navigation information (course guidance) must be received through ground-based facilities.
  - B. Satellite-based navigation - GPS navigation must be used to conduct an instrument approach procedure. Demonstration of a GPS approach procedure must include proper loading, activation, and sequence monitoring.

## IV. Operation of Systems

1. Students must demonstrate adequate knowledge of the Line Replaceable Units (LRUs):

*Refer to sections 1.1 and 1.2 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

- A. Students must:
    - a. Name the component
    - b. Describe the data each component provides to the G1000 System
    - c. If failed, what backup systems are available
  - B. Students are responsible for the descriptive abbreviation and not the reference number (Example: GDU = Garmin Display Unit). Citing the reference number (Example GDU 1040 or 1044B) is not required.
  - C. Students must be familiar with the G1000 system block diagram shown in Figure 1-1
2. Student must demonstrate adequate knowledge of the G1000 System Operation:

*Refer to section 1.6 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

3. Students must demonstrate adequate knowledge of the following operations, failures or annunciations:
  - A. Normal Display Operation
  - B. Reversionary Display Operation
  - C. AHRS Operation
  - D. GPS Input Failure
  - E. Magnetometer Failure
  - F. Air Data Input Failure
  - G. G1000 System Annunciations
  - H. GPS Receiver Operation
4. Stand-by Flight Instruments

*Refer to Chapter 6 of the Pilot's Handbook of Aeronautical Knowledge FAA-H-8083-25, (2003)*

- A. Students must describe the components and function of the:
  - a. Airspeed Indicator
  - b. Attitude Indicator
  - c. Altimeter
  - d. Magnetic Compass

## **V. Emergency Operations**

1. Students must demonstrate adequate knowledge and ability to conduct an instrument approach procedure with any of the following failures or annunciations:

*Refer to section 1.6 of the Garmin G1000 Pilot's Guide for Cessna Nav III, (March 2007 190-00498-02 Rev. A)*

- A. PFD Failure
- B. AHRS Failure
- C. Air Data Input Failure
- D. GPS Input/Receiver Failure
- E. Magnetometer Failure
- F. G1000 System Annunciations