

## PI-1000 / RC-1000 Advanced ATD



### Comprehensive Description of the G1000 Simulated Features and Functionality

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# INTRODUCTION

The Garmin G1000 provides pilots with a dazzling amount of information and capabilities. The ELITE PI-1000 is an advanced aviation training device (AATD) uses the G1000 emulation by Flight 1 Tech which is the most advanced non-OEM product available for G1000 training. ELITE hardware, coupled with the Flight 1 Tech VisPro Instructor /Operator Station (IOS) and Lockheed Martin P3D visual scenery provide the best “benefit-to-cost” ratio for G1000 training available.

It is not a real G1000. It simulates the form and function of the real G1000 avionics suite. It is designed to accurately simulate the features and functions VFR and IFR pilots use most frequently. We think you’ll be surprised at the depth of the simulation and functionality that will allow maximum transfer of training from the AATD to the cockpit. Unlike OEM equipment, we are able to present the option of several aircraft, including 2 light piston twin engine models and at a substantial cost savings over original equipment. The trade-off, however, is the inability to simulate a few characteristics as explained further in this document.

There are many different versions of the real G1000 hardware and software, so what we’ve simulated in this training device may not exactly match what you’re used to. This software is modeled after the Garmin G1000 Cessna Nav III, Diamond and Beech aircraft variations of the G1000 software, with an integrated GFC 700 Automatic Flight Control System (AFCS).

What follows is worth a careful read so you’ll fully understand just how much you can do with this simulation. We’ll follow the same structure the real Garmin *G1000 Pilot’s Guide* does, since you may be familiar with it.

## SYSTEM OVERVIEW

### System Description

The ELITE PI-1000 simulates the G1000 Integrated Flight Deck as installed in Cessna Nav III aircraft (Cessna 172R, 172S, 182T, T182T, 206, and T206) the Diamond DA40, DA42 and Beech Baron G58. Each aircraft configuration features the appropriate V-speeds and Engine Indication System (EIS) layout.

The displays and controls for each of the following Line Replaceable Units (LRUs) are presented:

- GDU 1040B Primary Flight Display (PFD)
- GDU 1040B Primary Flight Display (MFD)
- GMA 1347 Audio System with Integrated Marker Beacon Receiver

The instructor, via the Instructor / Operator Station (IOS), has the ability to manually fail specific components of the G1000 PFD and MFD displays.

## **G1000 Controls**

### **PFD/MFD Controls**

The real functionality of most PFD/MFD controls is simulated:

- NAV Frequency Transfer Key
- Dual NAV Knob
- Heading Knob
- CRS/BARO Knob
- Dual COM Knob
- COM Frequency Transfer Key
- Direct-to Key
- FPL Key
- CLR Key (DFLT MAP)
- Dual FMS Knob
- MENU Key
- PROC Key
- ENT Key
- Dual ALT Knob

*The COM and NAV VOL/ID knobs and the Joystick are not functional.*

The following GFC 700 AFCS controls are simulated:

- AP Key
- HDG Key
- NAV Key
- APR Key
- VS Key
- FLC Key
- FD Key
- ALT Key
- VNV Key
- BC Key
- NOSE UP/NOSE DN Keys

## **Audio Panel Controls**

The real functionality of most Audio Panel controls is simulated:

- COM1 MIC
- COM1
- COM2 MIC
- COM2
- MKR/MUTE
- DME
- NAV1
- ADF
- NAV2
- Reversionary Mode Button

*The COM3 MIC, COM3, PA, TEL, MUSIC, SPKR, HI SENS, AUX, REC, PLAY, INTRCOM, and MAN SQ buttons and the PILOT and PASS*

*knobs are not functional.*

## **Secure Digital (SD) Cards**

*The use of Secure Digital cards for storing databases and software system updates is not simulated.*

The G1000 navigational database can be manually upgraded by purchasing an upgrade from Navigraph.com and Flight1 Aviation Technologies.

G1000 Simulator software updates are available via a button on the main G1000 Simulator interface.

## **System Power-Up**

When the MFD powers up, a simulated power-up screen is displayed.

*PFD initialization is not simulated at this time.*

## **System Operation**

### **Normal Display Operation**

As on the real G1000, the G1000 PFD presents graphical flight instrumentation and the MFD displays a full-color moving map with navigation information, as well as the Engine Indication System (EIS).

### **Reversionary Display Operation**

Reversionary Mode (in which all important flight information is displayed on one display) can be manually activated by pressing the Display Backup button on the Audio Panel. Reversionary Mode is simulated on both the PFD and the MFD. Reversionary Mode is realistically simulated after a display failure.

### **AHRS Operation**

Loss of attitude and heading information, due to failure of the internal Attitude and Heading

Reference System (AHRS) inertial sensors, can be also be simulated via the IOS. When enabled, red 'X' flags display over the corresponding flight instruments.

*Other AHRS failures, annunciations, and message advisories are not simulated.*

### **G1000 System Annunciations**

Instructors can manually fail individual Line Replaceable Units (LRUs) and other components of the G1000. When failed, appropriate failure flags and/or indications will display on the PFD and MFD to indicate failure of the responsible components.

LRUs and other components that can be failed include:

- GIA 63 Integrated Avionics Unit
- GTX1 and GTX2 Transponders
- GRS 77 AHRS
- GMU 44 Magnetometer
- GDC 74A Air Data Computer
- GFC 700 Automatic Flight Control System
- VHF Comm Radio
- VHF Nav Radio
- DME
- RAIM Availability
- Traffic
- Attitude
- Airspeed
- Vertical Speed
- Heading
- Altitude
- Engine Indicators

## **GPS Receiver Operation**

GPS information collected by the Integrated Avionics Units may be viewed on the AUX - GPS STATUS

page on the MFD. The GPS Status page displays a basic simulation of:

- Satellite constellation diagram
- Satellite signal information status
- GPS receiver status
- RAIM (Receiver Autonomous Integrity Monitoring) Prediction
- SBAS Selection
- GPS Satellite Signal Strengths

RAIM Prediction at the aircraft present position is simulated, and RAIM can be made unavailable via the IOS.

*RAIM Prediction at specific waypoints, WAAS Disabling, and GPS sensor annunciations are not simulated.*

## **Accessing G1000 Functionality**

### **Menus**

The MENU Key, when pressed, displays a context-sensitive list of options related to the currently displayed window/page. Options can be selected using the FMS knob and the ENTER Key.

*Not all menus or options are simulated.*

### **MFD Page Groups**

Information on the MFD is presented on pages which are grouped according to function. The following page groups and pages are simulated:

#### **Map Pages (MAP)**

- Navigation Map
- Traffic Map
- Terrain Proximity

*Stormscope®, Weather Data Link, Terrain-SVS, and TAWS-B pages are not simulated.*

### **Waypoint Pages (WPT)**

- Airport Information Pages
  - Airport Information (INFO-1 softkey)
- Intersection Information
- NDB Information
- VOR Information

*Airport Directory, Departure Information, Arrival Information, Approach Information, Weather Information, and User*

*Waypoint Information pages are not simulated.*

### **Auxiliary Pages (AUX)**

- Trip Planning (in Automatic page mode and Flight Plan mode only)
- Utility (with usable Generic Count Up Timer)
- GPS Status (including RAIM Prediction at present position)
- System Setup (with configurable Time Format, Temperature Display Units, and MFD Data Bar Fields)
- System Status

*SiriusXM Satellite pages and the Video page are not simulated.*

### **Flight Plan Pages (FPL)**

- Active Flight Plan
- Flight Plan Catalog

### **Nearest Pages (NRST)**

- Nearest Airports
- Nearest Intersections
- Nearest NDB
- Nearest VOR

*Nearest User Waypoints, Nearest Frequencies, and Nearest Airspaces pages are not simulated.*

### **Procedure Pages (PROC)**

- Departure Loading
- Arrival Loading
- Approach Loading

### **MFD System Pages**

In the Auxiliary (AUX) Page Group, there are two system pages: System Setup and System Status.

The System Setup Page allows management of various system parameters. Manual configuration of Time Format, Temperature Display Units, and MFD Data Bar Fields are simulated.

The System Status Page, which displays the status and software version numbers for all detected system

LRUs as well as information on all system databases, is simulated.



*IOS Failures only affect the display of relevant data on the PFD and MFD displays. Triggered failures do not affect LRU Status on the System Status page.*

## Display Backlighting

*Automatic and manual adjustment of display backlighting is not simulated.*

# FLIGHT INSTRUMENTS

## Flight Instruments and Supplemental Flight Data

All real G1000 flight instrumentation is simulated. The following flight instruments and supplemental flight data are displayed on the PFD:

- Airspeed Indicator, showing
  - Indicated airspeed
  - True airspeed
  - Trend vector
  - Airspeed awareness ranges
  - V-speed reference flags
- Attitude Indicator with slip/skid indication
- Altimeter (standard or metric values), showing
  - Trend vector
  - Barometric setting
  - Reference altitude
- Vertical Deviation, Glideslope, and Glide path Indicators
- Vertical Speed Indicator (VSI)
- Vertical Navigation (VNV) indications
- Outside air temperature (OAT) (in degrees Celsius or Fahrenheit)
- Horizontal Situation Indicator, showing
  - Turn Rate Indicator
  - Bearing pointers and information windows
  - Navigation source
  - Course Deviation Indicator (CDI) (including flight phase annunciation, OBS scaling, and OBS mode)
  - DME Information Window
- Transponder Mode, Code, and Ident/Reply
- Timer/References Window, showing
  - Generic timer
  - V-speed values (configurable)
  - Barometric Minimum Descent Altitude (MDA)
- Wind data:
  - Wind direction arrows with headwind/tailwind and crosswind components
  - Wind direction arrow and numeric speed
  - Wind direction arrow with numeric True direction and numeric speed

## **PFD Annunciations and Alerting Functions**

### **System Alerting**

The following alerts are simulated on the PFD (along with the associated softkey annunciations and audio alerts):

Warning Alerts (red):

- LOW VOLTS
- OIL PRESSURE

Caution Alerts (yellow):

- LOW FUEL L
- LOW FUEL R
- LOW VACUUM

*System Message Advisories (white) and Safe Operating Annunciations (green) are not simulated.*

### **G1000 System Annunciations**

The only System Annunciations simulated are those related to the failures listed in the “G1000 System Annunciations” sub-section of the “System Overview” section of this document (above).

### **Marker Beacon Annunciations**

Marker Beacon Annunciations are fully simulated.

### **Traffic Annunciation**

The G1000 Student Simulator features a robust Traffic Annunciation simulation that works with the AI aircraft generated by the flight simulation. Traffic is displayed symbolically on the PFD Inset Map, the MFD Navigation Map Page, and various other MFD page maps. Refer to the “Hazard Avoidance” section of this document (below) for more details about the Traffic Information Service (TIS) simulation.

### **TAWS Annunciations**

**Terrain Awareness and Warning System (TAWS) obstacle annunciations appear at the top of the PFD to the left of the Altimeter.**

### **Altitude Alerting**

Altitude alerting is simulated:

- Upon passing through 1,000 feet of the selected altitude
- When the aircraft passes within 200 feet of the selected altitude
- After reaching the selected altitude, if the aircraft deviates +/- 200 feet

### **Low Altitude Annunciation**

*A “LOW ALT” annunciation (when the aircraft is low at the FAF on a WAAS approach) is not simulated at this time.*

### **Minimum Descent Altitude/Decision Height Alerting**

MDA and DH can be set in the Timer/Reference Window, and the associated visual annunciations and aural alerts are simulated.

## **Abnormal Operations**

### **Abnormal GPS Conditions**

*Abnormal GPS Conditions are not simulated.*

### **Unusual Attitudes**

Unusual Attitude functionality on the PFD is fully simulated. Red chevrons appear starting at 50 degrees above and 30 degrees below the horizon line. PFD de-cluttering occurs if pitch exceeds +30/-20 degrees or bank exceeds 65 degrees.

## **ENGINE INDICATION SYSTEM (EIS)**

All real Engine Display, Lean Display, and System Display indications are simulated on the MFD Engine Indication System (EIS), and are accessible via softkeys. In manually-activated Reversionary Mode, EIS data is displayed on the left side of the PFD.

### **Engine Display**

The Engine Display shows critical engine and electrical parameters. All real Engine Display gauges, indicators, and readouts are simulated for the aircraft configuration selected in the main interface.

Cessna Nav III aircraft configuration:

- Engine Manifold Pressure Gauge (MAN IN) *Models 182T, T182T, 206H, T206H*
- Tachometer (RPM)
- Fuel Flow Indicator (FFLOW GPH)
- Oil Pressure Indicator (OIL PRES)
- Oil Temperature Indicator (OIL TEMP)
- Cylinder Head Temperature Indicator (CHT) *Models 182T, T182T, 206H, T206H*
- Exhaust Gas Temperature Indicator (EGT) *Normally-aspirated Aircraft*
- Turbine Inlet Temperature Indicator (TIT) *Turbocharged Aircraft*
- Vacuum Pressure Indicator (VAC) *Models 172R and 172S*
- Fuel Quantity Indicator (FUEL QTY GAL)
- Engine Hours (Tach) (ENG HRS) *Models 172R and 172S*
- Voltmeter (M, E BUS VOLTS)

- Ammeter (M, S BATT AMPS)

Diamond DA40 aircraft

configuration:

- Engine Manifold Pressure Gauge (MAN IN HG)
- Tachometer (RPM)
- Fuel Flow Indicator (FUEL FLOW GPH)
- Cylinder Head Temperature Indicator (CHT)
- Oil Temperature Indicator (OIL TEMP)
- Oil Pressure Indicator (OIL PRES)
- Ammeter (AMPS)
- Voltmeter (VOLTS)
- Fuel Quantity Indicator (FUEL QTY GAL)

*The expanded DA40 Engine page is not simulated.*

Diamond DA42 aircraft configuration:

- Engine Load Indicator (LOAD %)
- Tachometer (RPM)
- Fuel Flow Indicator (FUEL FLOW GPH)
- Oil Temperature Indicator (OIL TEMP)
- Oil Pressure Indicator (OIL PRES)
- Coolant Temperature Indicator (COOLANT TEMP)
- Fuel Temperature Indicator (FUEL TEMP)
- Fuel Quantity Indicator (FUEL QTY GAL)

## **Lean Display**

The Lean Display provides information for engine leaning. All real Lean Display gauges, indicators, and readouts (including Cylinder selection) are simulated for the aircraft configuration selected in the main interface.

Cessna Nav III aircraft configuration:

- Engine Manifold Pressure Gauge (MAN IN) *Models 182T, T182T, 206H, T206H*
- Tachometer (RPM)
- Fuel Flow (FFLOW GPH)
- Exhaust Gas Temperature Bar Graph (EGT °F)
- Cylinder Head Temperature Bar Graph (CHT)
- Fuel Quantity Indicator (FUEL QTY GAL)

*Lean Assist is not fully simulated at this time.*

Diamond DA40 aircraft configuration:

- Engine Manifold Pressure Gauge (MAN IN HG)
- Tachometer (RPM)
- Fuel Flow (FFLOW GPH)

- Exhaust Gas Temperature Bar Graph (EGT °F)
- Cylinder Head Temperature Bar Graph (CHT °F)

*Lean Assist is not fully simulated at this time.*

## S y s t e m Display

The System Display shows critical engine, fuel, and electrical parameters. All real System Display gauges, indicators, and readouts (including fuel calculations) are simulated for the aircraft configuration selected in the interface.

Cessna Nav III aircraft configuration:

- Engine Manifold Pressure Gauge (MAN IN) *Models 182T, T182T, 206H, T206H*
- Tachometer (RPM)
- Oil Pressure (OIL PSI)
- Oil Temperature (OIL °F)
- Engine Hours (Tach) (ENG HRS) *Models 182T, T182T, 206H, T206H*
- Vacuum Pressure Indicator (VAC) *Models 182T, T182T, 206H, T206H*
- Fuel Flow (FFLOW GPH)
- Calculated Fuel Used (GAL USED)
- Set Fuel Remaining (GAL REM)
- Fuel Quantity Indicator (FUEL QTY GAL)
- Voltmeter (M, E BUS VOLTS)
- Ammeter (M, S BATT AMPS)

Diamond DA40 aircraft

configuration:

- Engine Manifold Pressure Gauge (MAN IN HG)
- Tachometer (RPM)
- Oil Temperature (OIL °F) and Oil Pressure (OIL PSI)
- Voltmeter (VOLTS) and Ammeter (AMPS)
- Fuel Flow (FFLOW GPH)
- Fuel Pressure (FPRESS PSI)
- Set Fuel Remaining (GAL REM)
- Calculated Fuel Used (GAL USED)
- Calculated Endurance (ENDUR)
- Calculated Range (RANGE NM)
- Total Time in Service (TTL TIME IN

SVC) Diamond DA42 aircraft configuration:

- Engine Load Indicator (LOAD %)
- Tachometer (RPM)



- Voltmeter (VOLTS)
- Ammeter (AMPS)
- Gearbox Temperature Indicator (GEARBOX °C)
- Coolant Temperature Indicator (COOLANT °C)
- Oil Temperature Indicator (OIL °C)
- Oil Pressure Indicator (OIL BAR)
- Deice Fluid Indicator (DEICE FLUID) (*Optional*)

## **Fuel Display**

The Diamond DA40 and DA42 aircraft configurations also feature a Fuel Display. All real Fuel Display gauges, indicators, and readouts (including fuel calculations) are simulated.

Diamond DA42 aircraft configuration:

- Engine Load Indicator (LOAD %)
- Tachometer (RPM)
- Fuel Quantity Indicator (FUEL GAL)
- Fuel Flow Indicator (FUEL GPH)
- Fuel Temperature Indicator (FUEL °C)
- Set Fuel Remaining (GAL REM)
- Calculated Fuel Used (GAL USED)
- Calculated Endurance (ENDUR)
- Calculated Range (RANGE NM)
- Total Time in Service (TTL TIME IN SVC)

# **AUDIO PANEL AND CNS**

## **Overview**

The Communication/Navigation/Surveillance (CNS) system includes the Audio Panel, communication radios, navigation radios, and Mode S transponder. Most Audio Panel and CNS elements are simulated, within the limits of the flight simulation.

## **COM Operation**

Most communications radio functionality is simulated, and works with the air traffic control feature. Features simulated include:

- COM transceiver selection and activation
- Manual tuning and auto-tuning from both the PFD and MFD
- 25-kHz frequency spacing

*Transmit/Receive indications, 8.33-kHz frequency spacing, automatic squelch, and volume control, are not simulated.*

## **NAV Operation**

Most navigation radio functionality is simulated, including:

- NAV radio selection and activation via the PFD CDI Softkey
- NAV radio audio monitoring
- VOR/LOC ID, manual tuning and auto-tuning from both the PFD and MFD
- Marker beacon receiver indications and audio

*Volume control is not simulated.*

## **GTX 33 Mode S Transponder**

Most transponder features are simulated, and work with the Air Traffic Control feature. Features simulated include:

- Transponder Mode Selection (Ground, Standby, Manual On, Manual and Auto Altitude)
- Reply Status
- Transponder code entry via softkeys
- VFR Code
- Ident

*Entry of a transponder code using the PFD FMS knob, and Flight ID Reporting are not simulated.*

## **Additional Audio Panel Functions**

*Audio panel power-up, Speaker, Intercom, Intercom Volume and Squelch, PA System, Clearance Recorder and Player, and entertainment inputs are not simulated.*

# **FLIGHT MANAGEMENT**

## **Introduction**

The information to successfully navigate the aircraft using the GPS sensors is displayed on the PFD and the MFD. Most of the flight management features of the real G1000 is simulated.

### **Navigation Status Box**

As on the real G1000, the Navigation Status Box located at the top of the PFD contains two fields that display: the active flight plan leg or flight plan annunciations, and distance and bearing to the next waypoint or flight plan annunciations.

The Navigation Status Box located at the top of the MFD contains four data fields that can be configured on the AUX - SYSTEM SETUP Page.

*Configuration of the MFD Navigation Status Box data fields to display Endurance, Enroute Safe Altitude, Fuel On Board, Fuel Over Destination, Minimum Safe Altitude, Track Angle Error, or Vertical Speed Required is not simulated.*

## **Using Map Displays**

Some of the most useful features of the G1000 are its many map displays. In the G1000 Student

Simulator, the following maps are simulated:

- PFD Inset Map
- MFD Navigation Page Map
- MFD Waypoint Pages Map
- MFD Nearest Pages Map
- MFD Active Flight Plan Page Map
- MFD Trip Planning Page Map (Automatic page mode only)

### **Map Orientation**

By default, all maps are displayed using a North Up (NORTH UP) orientation. PFD and MFD maps can individually be changed to Heading Up (HDG UP), Track Up (TRK UP), or Desired Track Up (DTK UP) orientations via the main interface.

### **Map Range**

As on the real G1000, all maps feature 28 different ranges, from 500 feet to 2000 NM.

### **Auto Zoom**

*Auto zoom, which allows the G1000 to change the map display range to the smallest range clearly showing the active waypoint, is not simulated.*

### **Map Panning and Measuring Bearing and Distance**

*Map panning, and measuring bearing and distance using the G1000 Joystick, is not simulated.*

### **Topography**

As on the real G1000, all navigation maps can display various shades of topography colors representing land elevation. Topographic data can be displayed or removed using the TOPO Softkey. A Topographic Scale can be toggled on and off on the “Options 2” tab of the main G1000 Student Simulator interface.

*Configuring the topographic data using the Map Setup Menu is not simulated at this time.*

### **Map Symbols**

Symbols displayed on the maps

include: Land symbols

- Highways and roads
- Railroads
- Large Cities (>200,000)
- Medium Cities (>50,000)
- Small Cities (>5,000)
- States and Provinces
- Rivers and Lakes

Aviation symbols

- Active Flight Plan Leg
- Non-active Flight Plan Legs
- Active Flight plan Waypoint
- Large Airports
- Medium Airports
- Small Airports
- Intersections
- NDB
- VOR
- Class B Airspace/TMA
- Class C Airspace/TCA
- Class D Airspace
- Restricted Areas
- MOAs
- Other/ADIZs

*Display of Latitude/Longitude, minor roads and non-major highways, User Waypoints, Taxiways, Runway Extensions, and TFRs are not simulated at this time.*

*Configuring map symbols using the Map Setup Menu is not simulated.*

### **Map De-clutter**

Like on the real G1000, four levels of map de-clutter are available that remove progressively more information from the map.

### **Airways**

Low Altitude and High Altitude Airways can be toggled on and off using the AIRWAYS softkey on the Map page of the MFD. Low Altitude Airways are drawn in gray and High Altitude Airways are drawn in green. Airway waypoints (VORs, NDBs and Intersections) are also displayed.

*Toggling airways using the MENU key, and selecting an airway range using the Map Setup menu is not simulated.*

### **Track Vector**

Like on the real G1000, the Navigation Map can display a track vector that shows the projected position of the aircraft in 60 seconds (including up to 90 degrees of a turn). The Track Vector can be toggled on and off on the “Options 2” tab of the main G1000 Student Simulator interface.

*Selection of additional look-ahead times using the Map Setup Menu is not simulated.*

### **Wind Vector**

*Display of a Wind Vector on the MFD Navigation Map is not simulated at this time.*

### **Nav Range Ring**

The Nav Range Ring shows the ground track on a rotating compass card. The range is determined by the map range. The Nav Range Ring can be toggled on and off on the “Options 2” tab of the main G1000 Student Simulator interface.

## **Fuel Range Ring**

The Fuel Range Ring shows the range of the aircraft given the current fuel state. A dashed green circle indicates the selected range to reserve fuel. A solid green circle indicates the total endurance range. If only reserve fuel remains, the range is indicated by a solid yellow circle. The Fuel Range Ring can be toggled on and off on the “Options 2” tab of the main interface. The amount of fuel remaining must be manually set on the G1000 Engine System page.

## **Field of View (SVS)**

*Display of the boundaries of the PFD Synthetic Vision System (SVS) lateral field of view on the MFD Navigation Map is not available, as the SVS is not simulated.*

## **Waypoints**

Information is available for Airport, Intersection, NDB, and VOR waypoints. On all MFD Waypoints pages, waypoints can be selected by entering the ICAO identifier. If duplicate entries exist for an identifier, a Duplicate Waypoints Window is displayed. Frequency auto-tuning and Direct-to Navigation is possible directly from these pages.

## **Airports**

Information is available for every airport in the updatable worldwide Navigraph navigation database. Like in the real G1000, after engine startup, the Airport Information Page defaults to the airport where the aircraft is located. After a flight plan has been loaded, the Airport Information Page defaults to the destination airport.

On all Airport Information pages, airports can be selected by entering the ICAO identifier, facility name, or location name. If duplicate entries exist for an identifier, a Duplicate Waypoints Window is displayed. Frequency auto-tuning and Direct-to Navigation is possible directly from these pages.

The MFD Airport Information pages feature most of the information available on the real G1000 pages.

*Fuel Availability, UTC Offset, Lighting Availability, and AOPA Directory information are not displayed in the simulation. The PFD Airport Information Window features most of the information in the real G1000 window. City, UTC Offset, and Region are not displayed in the simulation at this time.*

The MFD Nearest Airport page simulates most real functionality, including displaying a line to the nearest airport on the Navigation Map.

The Nearest Airports window on the PFD displays most real G1000 information.

## **Intersections**

The Intersection Information and Nearest Intersection pages feature most of the information on the real G1000 pages.

*Nearest VOR and Reference VOR information is not displayed in the simulation.*

## **NDBs**

The NDB Information and Nearest NDB pages feature most of the information on the real G1000 pages.

*NDB Type and Nearest Airport information is not displayed in the simulation.*

## **VORs**

The VOR Information and Nearest VOR pages feature most of the information on the real G1000 pages.

*VOR Class, Magnetic Variation, and Nearest Airport Information are not displayed in the simulation.*

## **User Waypoints**

*User-created waypoints and their associated pages are not simulated.*

## **Airspaces**

The following types of airspaces are displayed on maps: Class B/TMA, Class C/TCA, Class D, Restricted, and MOA (Military).

*Other, Air Defense Interdiction Zone (ADIZ), and Temporary Flight Restriction (TFR) airspace is not displayed in the simulation. The Nearest Airspaces Page on the MFD and Airspace Alerts on the PFD are not simulated.*

## **Direct-to Navigation**

Most real G1000 Direct-to functionality is simulated in both the MFD and PFD Direct-to Windows, including setting VNV Altitude at Arrival, and selecting an active flight plan waypoint as a Direct-To destination.

*Selection of a RECENT, USER or AIRWAY waypoint as a Direct-to destination; selecting a manual Direct-to course; selection of a waypoint as a Direct-to destination using the Joystick pointer; and setting an along-track VNV offset are not simulated.*

## **Flight Planning**

As on the real G1000, a flight plan is built by entering waypoints one at a time, adding waypoints along airways, and inserting departures, arrivals, or approaches as needed. Flight planning information can be entered from either the MFD or PFD. The flight plan is displayed on maps using different line widths, colors, and types, based on the type of leg and the segment of the flight plan currently being flown (departure, enroute, arrival, approach, or missed approach).

### **Flight Plan Creation**

As on the real G1000, flight plans can be created via the:

- Active Flight Plan page on the MFD
- Active Flight Plan Window on the PFD
- Flight Plan Catalog page on the MFD

*Importing and exporting flight plans to/from an SD card is not simulated.*

### **Adding Waypoints to an Existing Flight Plan**

Waypoints can be added to the active flight plan, in front of existing waypoints.



*Creating and adding user waypoints to the existing flight plan using the Joystick pointer, and adding waypoints to stored flight plans, is not simulated.*

### **Adding Airways to a Flight Plan**

Airways can be added to the active flight plan if there is a waypoint in the flight plan that is part of the desired airway and is not part of an arrival or approach procedure.

### **Adding Procedures to a Stored Flight Plan**

*Adding procedures to a stored flight plan is not simulated.*

### **Flight Plan Storage**

As on the real G1000, up to 99 flight plans can be stored. An active flight plan can be stored from the

Active Flight Plan page (MFD) or the Active Flight plan Window (PFD) using the MENU key.

The active flight plan is erased when the G1000 Student Simulator software is restarted or when another flight plan is activated. Details about each stored flight plan can be viewed on the Flight Plan Catalog

Page and on the Stored Flight Plan Page.

Flight plans are stored in the Flight Plan Catalog in the order created, and can be individually deleted.

*Alphanumeric sorting based on flight plan name, inverting a stored flight plan, copying a stored flight plan, and editing a stored flight plan is not simulated.*

*Display of the selected stored flight plan on the Flight Plan Catalog page map is not simulated.*

### **Flight Plan Editing**

The active flight plan can be edited via the Active Flight Plan page (MFD) or the Active Flight Plan

Window (PFD), and the edits made affect navigation as soon as they are entered. You can:

- Delete the active flight plan using the MENU key
- Delete flight plan items using the CLR key
- Delete an entire arrival or approach from the PFD Active Flight Plan Window using the CLR key
- Delete an individual waypoint using the CLR key

*Deleting an entire airway from an active flight plan, and deleting an individual waypoint, an entire airway, or an entire procedure from a stored flight plan, is not simulated.*

*Changing the comment (name) of an active or stored flight plan is not simulated.*

### **Along Track Offsets**

*Along track offsets are not simulated.*

### **Parallel Track**

*Parallel track is not simulated.*

### **Activating a Flight Plan Leg**

A highlighted leg can be made the “active leg” (the flight plan leg which is currently used for



navigation guidance) via the MENU key.

### **Inverting a Flight Plan**

An active flight plan may be inverted (reversed) for navigation back to the original departure point using the MENU key.

*Inverting a stored flight plan is not simulated.*

### **Flight Plan Views**

*Flight plan views (leg-to-leg vs. cumulative distance, wide and narrow views, and collapsing airways) are not simulated.*

### **Closest Point of FPL**

*Creation of a new user waypoint along the flight plan at the location closest to a chosen reference waypoint is not simulated.*

## **Vertical Navigation**

Vertical guidance based on specified altitudes at waypoints in the active flight plan, or VNV Direct-to, is simulated, and both manual and autopilot-coupled guidance (VPTH) are supported.

*VNV along-track offsets are not simulated at this time.*

### **Altitude Constraints**

Altitude constraints associated with lateral waypoints can be manually entered, or are automatically entered for procedures (from the published “Cross as” altitudes in the navigation database). Altitude constraints can be followed using Vertical Path Tracking Mode (VPTH).

## **Procedures**

The simulation of G1000 Procedures functionality is comprehensive. Departure, Arrival, and Approach procedures can be added and removed from active flight plans using the PROC key.

### **Departures**

Departures procedures can be loaded into the active flight plan using the PROC key.

*Viewing available departures on the Airport Information page using the DP softkey is not simulated.*

### **Arrivals**

Arrival procedures can be loaded into the active flight plan using the PROC key, and removed by highlighting the header in the Active Flight plan (on the PFD) and pressing the CLR key.

*Viewing available arrivals on the Airport Information page using the STAR softkey is not simulated.*

### **Approaches**

Non-precision and precision approaches can be loaded into an active flight plan, activated, or activated as “Vector-to-Final,” using the PROC key. Approaches can be removed by highlighting the header in the Active Flight plan (on the PFD) and pressing the CLR key. Missed approach procedures are simulated, including Course to Altitude (CA) legs and manually activating a missed approach via the PROC MENU (or by manually activating the next leg).

*The LD APR softkey on the Nearest Airport page, and the ability to view available approaches on the Airport Info page using the APR softkey, are not simulated.*

## T r i p Planning

Automatic Page and Flight Plan Modes are simulated, and trip planning information, fuel information, and other information for a specified flight plan or flight plan leg based on automatic data is displayed on the AUX - TRIP PLANNING page of the MFD. Weight planning is also available, based on fuel sensor data and the active flight plan (to estimate remaining fuel).

*Manual entry of data via Manual Page and Waypoints mode is not simulated.*

## R A I M Prediction

RAIM (Receiver Autonomous Integrity Monitoring) Prediction at the aircraft present position is simulated on the AUX-GPS STATUS page. RAIM can be made unavailable via the IOS.

*RAIM Prediction at a selected waypoint and WAAS Disabling are not simulated.*

## A b n o r m a l Operation

*Reversion to Dead Reckoning (DR) Mode in Enroute (ENR) or Oceanic (OCN) phases of flights is not simulated.*

## **H A Z A R D** **AVOIDANCE**

## X M S a t e l l i t e Weather

*Optional subscription-based XM Satellite Weather services are not simulated.*

## W X - 5 0 0 Stormscope

*An optional WXC-500 Stormscope is not simulated.*

# **Terrain and Obstacle**

## **Proximity**

Red and yellow obstacle icons (<1000' AGL and >1000' AGL) are displayed on the:

- PDF Inset Map
- Navigation Map page
- Terrain Proximity page
- Trip Planning page
- Flight plan page

The display and color of an obstacle icon is dependent on the aircraft height above the obstacle.

## **Terrain-SVS**

*Terrain-SVS is not simulated.*

## **TAWS-B**

Three TAWS-B Aural Alerts and annunciations are simulated:

- Excessive Descent Rate Caution: “TERRAIN” and “Sink Rate”
- Excessive Descent Rate Warning: “PULL UP” and “Pull Up”
- Altitude Callout “500” (just aural alert): “Five Hundred”
- Reduced Required Obstacle Clearance Caution: “TERRAIN” and “Caution, Obstacle; Caution, Obstacle”)

*Forward Looking Terrain Avoidance, Premature Descent Alerting, the Negative Climb Rate After Takeoff Alert (“Don’t Sink”), and the dedicated TAWS-B page are not simulated at this time.*

## **Traffic Information Service (TIS)**

Basic Traffic Information Service (TIS) functionality is simulated, to help you detect and avoid aircraft generated by the flight simulation. Traffic Advisory symbols, vectors, altitude differences, and altitude trends are displayed on the:

- PFD Inset Map
- Navigation Page Map
- Traffic Map Page
- Trip Planning Page
- Nearest Pages
- Active Flight Plan Page

TIS Alerts simulated include:

- Aural “Traffic”
- “TRAFFIC” annunciation on PFD

Additionally, the PFD Inset Map auto-displays when a Traffic Advisory is detected.

## **Traffic Advisory System (TAS)**

*The Mode S transponder-based Traffic Advisory System is not simulated.*

## **ADS-B Traffic**

*The GDL 90 data link radio-based Automatic Dependent Surveillance-Broadcast (ADS-B) Traffic function is not simulated.*

# AUTOMATIC FLIGHT CONTROL SYSTEM

The G1000 Student Simulator includes an integrated Garmin GFC 700 digital Automatic Flight Control System (AFCS) that realistically simulates the Flight Director and Autopilot. Flight Director Command bars and AFCS status are displayed on the PFD.

*AFCS Status Alerts and Overspeed Protection are not simulated.*

*Vertical modes simulated include:*

- Pitch Hold Mode (PIT)
- Selected Altitude Capture Mode (ALTS)
- Altitude Hold Mode (ALT)
- Vertical Speed Mode (VS)
- Flight Level Change Mode (FLC)
- Vertical Navigation Modes (VPTH, ALTV)
- Glidepath Mode (GP) (WAAS Only)
- Glideslope Mode (GS)
- Go Around Mode (GA)

*Pressing the GA key command engages the flight director in a wings-level, pitch-up attitude, allowing the execution of a missed approach or a go around.*

*Automatic activation of the missed approach when the selected navigation source is GPS or when the navigation source is*

*VOR/LOC and a valid frequency has been tuned is not simulated at this time.*

*Lateral modes simulated include:*

- Roll Hold Mode (ROL)
- Heading Select Mode (HDG)
- Navigation Modes (GPS, VOR, LOC, BC)
- Approach Modes (GPS, VAPP, LOC)

*Control Wheel Steering (CWS) is not simulated.*

# ADDITIONAL FEATURES

*The following additional G1000 features are not simulated:*

- Synthetic Vision System (SVS)(Optional)
- SafeTaxi® diagrams
- ChartView and FliteCharts® electronic charts (Optional)
- AOPA Airport Directory

- XM Radio entertainment (Optional)
- Scheduler
- Electronic Checklists (Optional)
- Flight Data Logging
- Auxiliary Video (Optional)

## ABNORMAL OPERATION

### Reversionary Mode

Reversionary Mode (in which all important flight information is displayed on one display) can be manually activated by pressing the Display Backup button on the Audio Panel. Reversionary Mode is simulated on both the PFD and the MFD.

The instructor, via the IOS, can realistically simulate the switch to Reversionary Mode after a display failure, and present students with challenging scenarios that test their ability to deal with failures when they're least likely to be able to handle them.

## G1000 FAILURES

### Recognize, Interpret, and Respond to G1000 Failures

The instructor, via the IOS, can execute spontaneous G1000 specific realistic failures.





VISPRO, the native IOS for P3D based simulation, lets you control the simulation's environment, change the weather, reposition the student's aircraft, and trigger malfunctions ... all in real time as the simulation is running. It gives you professional-quality tools for monitoring, instruction, and analysis.



The G1000 Failures selection, allows the instructor to fail the following Line Replaceable Units (LRUs) and individual components:

- GIA 63 Integrated Avionics Unit



- GTX1 and GTX2 Transponders
- GRS 77 AHRS
- GMU 44 Magnetometer
- GDC 74A Air Data Computer
- GFC 700 Automatic Flight Control System

Additional failures include:

- VHF Comm Radio
- VHF Nav Radio
- DME
- RAIM Availability
- Traffic
- Attitude
- Airspeed
- Vertical Speed
- Heading
- Altitude
- Engine Indicators

### Reversionary Mode

A unique feature is the ability to realistically simulate the automatic switch to Reversionary Mode after a display failure.



In the airplane, you can only simulate Reversionary Mode by manually dimming one display, and manually switching both displays to Reversionary Mode by pressing the red Display Backup button on the audio panel. What the student sees (the primary flight instruments and engine data on both displays) is realistic, but manually setting up Reversionary Mode like this provides a far less realistic training experience than generating a spontaneous display failure from VISPRO.

The G1000 Failures allows students to experience what it's actually like to experience an in-flight

display failure. Failures don't always occur in cruise, when it's easy to deal with them. With the G1000 Failures, you can present students with challenging scenarios that test their ability to deal with failures when they're least likely to be able to handle them.

### Standby Instruments

To enable students to practice safely flying the simulation without reference to the glass displays at all, an ISIS (integrated standby instrument system) consisting of Airspeed Indicator, Attitude Indicator, and Altimeter are provided.

