# G1000 ENGINE INDICATING AND CREW ALERTING SYSTEM (EICAS) - DESCRIPTION AND OPERATION

## 1. General

A. This section gives a description and the operation for the Garmin G1000 Engine Indicating and Crew Alerting System (EICAS) for Airplanes 20800500 and On, Airplanes 208B2000 and On. The line replaceable units (LRU's) maintenance procedures related to the EICAS are found as follows:

- Chapter 22 Garmin GMC 710 AFCS Controller - Removal/Installation.
- Chapter 23 Garmin GMA 1347/1360D Audio System - Removal/Installation
- Chapter 34 Garmin Display Unit - Removal/Installation
- Chapter 34 Garmin G1000 GIA 63W/64W Integrated Avionics Unit - Removal/Installation
- Chapter 77 GEA 71/71B Engine/Airframe Unit - Maintenance Practices.

B. The GEA 71/71B Engine/Airframe Unit and the GIA 63W/64W Garmin Integrated Avionics Units are installed on the avionics shelf forward of the instrument panel. They receive signals from the engine and system sensors or switches and supply the data to the Garmin Display Units that show on the Engine Indicating System (EIS) or as a CAS message.

C. The GMA 1347/1360D is installed in the instrument panel between the Primary Flight Display (PFD) PFD1 and the MultiFunction Display (MFD). It amplifies aural alerts or tones for Crew Alert System (CAS) message annunciation, the overspeed and fire detect warning horn audio through the cockpit speakers and headsets. The GMA 1347/1360D Audio System also inhibits the Cabin PA system during CAS message aural annunciation.

D. The GMC 710 Aircraft Flight Control System (AFCS) is installed above the MFD and provides commands for the AFCS, course and heading controls.

## 2. Description

A. The Engine Indicating System (EIS), EIS ENGINE Page displays all parameters that have an exceedance associated with them (operating in a caution or warning range). As well as, other critical engine, fuel and electrical indicators including optional systems such as TKS Anti-Ice. EIS ENGINE Page parameters are shown are as follows (Refer to Figure 1).

(1) Torque Indicator:

(a) The Engine Torque Indicator is shown at the top of the Engine display page. It uses a round dial gauge (style) with white a pointer and a numeric readout to show torque in ft-lbs.

(2) ITT Indicator:

(a) The ITT Indicator shows the gas temperature between the compressor and power turbines. It is shown directly beneath the engine torque and uses a round dial gauge with white a pointer and a numeric readout.

(3) Gas generator RPM Indicator (NG):

(a) The Gas Generator RPM Indicator shows the percent of gas generator RPM based on 100% at 37,468 RPM. It is found below the ITT indicator and uses a round dial gauge with a white pointer and a numeric readout.

(4) Propeller RPM Indicator (NP):

(a) Propeller RPM is shown below the gas generator RPM. It is shown numerically.

(5) Oil Pressure Indicator:

(a) The Oil Pressure Indicator shows oil pressure in pounds per square inch. It is found directly below propeller RPM. It uses a straight slider with a white pointer and indicates numerically.

(6) Oil Temperature Indicator:

(a) The Oil Temperature Indicator shows oil temperature in degrees Celsius. It is found directly below Oil Pressure. It is uses a straight slider with a white pointer and indicates numerically.

(7) Fuel Quantity Indicator:

(a) The Fuel Quantity Indicator shows fuel in pounds (separately for left and right wing tanks). It is found directly beneath the Oil Temperature Indicator. It is shown using two parallel (vertical) slider gauges with green pointers.

(8) Fuel Flow Indicator:

(a) The Fuel Flow Indicator shows the fuel consumption of the engine in lbs. per hour. It is found below the Fuel Quantity Indicator slider gauges.

(9) Battery Amp Indicator:

(a) The Battery Amp Indicator shows battery current in amps. It is found below Fuel Flow Indicator and it indicates

numerically. A negative Amp display indicates battery discharge and a positive Amp display indicates battery charging.

(10) Bus Volts Indicator:

(a) The Bus Volts Indicator shows bus voltage in volts. It is found below the Battery Amps Indicator. It indicates numerically.

(11) Anti-Ice Gallons Indicator (If Configured With TKS Anti-Ice Option) :

(a) Anti-Ice Gallons Indicator is found below the Bus Volts indicator. It is shown numerically as gallons of fluid remaining.

(12) Propeller Amps Indicator (If Configured With Prop Heat Option) :

(a) Propeller Amps Indicator is found below Bus Volts. System current (in Amps) is shown numerically.

B. The System Page is used by the Garmin G1000 system to display a different set of parameters (however, the first four are the same as the ENGINE Page). Additionally, the G1000 can Auto Switch the EIS display pages. Auto Switching is initiated when the SYSTEM Page automatically changes to the ENGINE Page (the default page) if exceedance of a parameter occurs while the SYSTEM Page is displayed. System page parameters shown are as follows (Refer to Figure 2).

(1) Torque Indicator:

(a) Same as ENGINE Page.

(2) ITT Indicator:

(a) Same as ENGINE Page.

(3) Gas generator RPM Indicator (NG):

(a) Same as ENGINE Page.

(4) Propeller RPM Indicator (NP):

(a) Same as ENGINE Page.

(5) Fuel Quantity Indicator:

(a) The Fuel Quantity Indicator is shown fuel in pounds (separately for left and right wing tanks). It is found directly beneath the propeller RPM indicator and shown numerically.

(6) Fuel Flow Indicator:

(a) The Fuel Flow Indicator displays the fuel consumption of the engine in lbs per hour on the SYSTEM page and is found below the Fuel Quantity Indicator display - it is shown numerically.

(7) Fuel Totalizer Indicator:

(a) The Fuel Totalizer Indicator shows pounds remaining (based on system&#65533;s fuel flow consumption rate and the fuel quantity value input by the operator). The indicator also shows pounds used, based on the consumption rate mentioned above (extended over time). Both values are shown numerically.

(8) Generator Amps Indicator:

(a) The Generator Amps Indicator is found below the Fuel Totalizer with the amps value shown numerically.

(9) Alternator Amps Indicator:

(a) Alternator Amps Indicator is shown below Generator Amps with the value shown numerically.

(10) Battery Amps Indicator:

(a) The Battery Amps Indicator is shown below Alternator Amps with the value displayed numerically.

(11) Bus Volts Indicator:

(a) The Bus Volts Indicator is displayed below Battery Amps with the value shown numerically.

(12) The Anti-Ice Gallons Indicator (If Configured With TKS Anti-Ice Option) :

(a) The Anti-Ice Gallons Indicator is found below Bus Volts and indicates numerically as gallons of fluid remaining.

(13) The Anti-Ice Hours Remaining Indicator (If Configured With TKS Anti-Ice Option) :

(a) The Anti-Ice Hours Remaining Indicator is found below Anti-Ice Gallons and is shown numerically as hours of fluid remaining.

(14) Propeller Amps Indicator (If Configured With Prop Heat Option) :

(a) Propeller Amps Indicator is found below Bus Volts. System current (in Amps) is shown numerically.

C. Crew Alerting System (CAS) consists of advisory, caution, and warning Annunciation messages as well as Alert (text style) messages. Due to space limits, a maximum of 12 CAS annunciation messages are visible (at the same time ) in the annunciation window. Should more messages require display, a scrolling feature allows viewing (Alert messages are not limited in number (Refer to Figure 3).

**NOTE: The CAS messages can be shown with small differences because of software version loaded to the G1000 system.**

## 3. Operation

A. Engine indicating system (EIS) data is shown in normal mode on the left side of the MFD in a single column using two display formats. The data is accessed when the Engine and System Softkeys on the MFD are pushed. In reversionary mode, EIS data is shown on the left side of any operating display. Digital and Analog (style) parameter display indicate with amber or red (flashing) backgrounds to indicate a caution or warning (exceedance) condition (Refer to, Figure 4).

B. Crew alert system CAS messages are shown in the form of advisory, cautionary, warning alerts, and system failures and process statuses (CAS messages are displayed on PFD's in normal and reversionary modes: MFD in reversionary mode only). CAS messages are triggered by external signals or combinations of signals and are grouped by criticality in the CAS display regions known as the Annunciation Window and Alerts window . Messages are acknowledged by pressing the ALERTS softkey.

C. Annunciation Messages (Refer to Figure 5).

(1) Message colors are based on the urgency of the message and the recommended or required flight crew actions. They are sorted by criticality (warnings above cautions which are above advisories) and then by order of appearance (most recent messages on top within the respective color region).

(2) Warning messages - Indicate the need for immediate crew action and are shown in red. They trigger a continuous aural chime until the message is acknowledged by pushing the ALERTS softkey (right side, bottom of display).

(3) Caution messages - Indicate the need for possible future corrective action and are shown in amber and trigger a single aural chime.

(4) Advisory messages - Are shown in white and do not trigger an aural chime.

(5) Whenever a CAS Annunciation message appears, the ALERTS softkey changes name and color to match the condition of message. After acknowledgement, the softkey name returns to steady state white, ALERTS display.

D. Alert Messages (Refer to Figure 5).

(1) CAS Alert messages only appear in the Alerts Window. Message notification is through the ALERTS softkey name changing to ADVISORY (in reverse color video).

(2) Alerts Window display (for viewing Alert message) is activated when the ADVISORY softkey is pushed to acknowledge message notification. Alert messages do not trigger an aural chime.

E. Scrollbar Function.

(1) The scrollbar is found on right side of the CAS message annunciation window.

(2) The scrollbar allows the flight crew to scroll through messages using (CAS) softkeys (lower left, on PFD's).

(3) The scrollbar also aids the flight crew to determine how many messages have been triggered and where in the sorting order displayed messages shows.

F. Alerts Window.

(1) Red warning messages stay at the top of the CAS annunciation window and are not affected by scrolling.

(2) Amber caution messages can move out of view. If an amber message has been scrolled off or if there are too many messages to display all active amber messages, the scrollbar track changes color.

(3) If the flight crew uses the softkeys to scroll down on the list, the scrollbar slider remains in the position it was left in for approximately 45 seconds or until a new amber message is triggered, at which time it will reset back to the top so that top list messages are displayed.

(a) White advisory messages can also move out of view. A new off-screen white message can be viewed by scrolling, but the scrollbar does not automatically reposition itself for the message to be seen.

(4) The softkey buttons for CAS scrolling are only available if the scrollbar is showing. If the scrollbar slider is at the top or bottom of the list, continued scrolling in that direction is unavailable and the designated softkey is grayed out.

G. Reversionary Mode (Refer to, Figure 6).

(1) Reversionary is a mode of operation where all important flight information is presented identically on at least one of the remaining displays in PFD format and it also includes engine parameters on left side of the display.

(2) Reversionary mode is based upon automatic fault monitoring and internal switching detection.

(3) This mode can also be manually activated when you push the dedicated DISPLAY BACKUP (red) button at the bottom of the GMA 1347/1360D audio panel. If you push the button again the reversionary mode deactivates.