Garmin Ltd. Or its subsidiaries
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Olathe, KS 66062 USA

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FAA APPROVED

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
GARMIN G1000 INTEGRATED AVIONICS SYSTEM

DIAMOND MODEL DA 40
DIAMOND MODEL DA 40 F
WITH HONEYWELL KAP 140 AUTOPILOT

Reg. No. _____ S/N _____

This Supplement must be attached to the FAA Approved Airplane Flight Manual when the Garmin G1000 Integrated Avionics System is installed in accordance with **STC SA01444WI-D**. The information contained herein supplements the information of the basic Airplane Flight Manual. For Limitations, Procedures and Performance information not contained in this Supplement consult the basic Airplane Flight Manual.

Note: This Airplane Flight Manual Supplement follows the format and content of the Airplane Flight Manual for the Diamond DA 40 for consistency and ease of use.

Robert Murray
ODA STC Unit Administrator
Garmin International
ODA-240087-CE

Date: 9/21/2010

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LOG OF REVISIONS

Revision Number	Page Number(s)	Description	FAA Approved	Date of Approval
1	All	Initial Release	Robert Murray	2/28/2008
2	All	Update SW levels	Robert Murray	4/4/2008
3	All	Update SW levels for non-WAAS configuration	Robert Murray	4/18/2008
4	All	Update SW levels	Robert Murray	9/11/2009
5	All	Revised by Garmin ODA. Correct minor typographical errors and administrative corrections to fuel quantity indication range markings.	See Page 1	See Page 1

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SECTION I
GENERAL

G1000

The G1000 Integrated Avionics System is a fully integrated flight, engine, communication, navigation and surveillance instrumentation system. The system consists of a Primary Flight Display (PFD), Multi-Function Display (MFD), audio panel, Air Data Computer (ADC), Attitude and Heading Reference System (AHRS), engine sensors and processing unit (GEA), and dual integrated avionics units (GIA) each containing VHF communications, VHF navigation, and GPS (Global Positioning System).

GIA 63 units are standard and provide non-WAAS GPS position information in accordance with TSO-C129a class A1. Optional GIA 63W units provide WAAS augmented GPS position. If the optional GIA63W units incorporate GPS software level 3.0 or later, the GPS system meets the requirements of TSO C145a, Class 3.

The primary function of the PFD is to provide attitude, heading, air data, navigation, and alerting information to the pilot. The PFD may also be used for flight planning. The primary function of the MFD is to provide engine information, mapping, terrain information, and flight planning. The audio panel is used for selection of radios for transmitting and listening, intercom functions, and marker beacon functions.

The primary function of the VHF Communication portion of the G1000 is to enable external radio communication. The primary function of the VOR/ILS Receiver portion of the equipment is to receive and demodulate VOR, Localizer, and Glide Slope signals. The primary function of the GPS portion of the system is to acquire signals from the GPS system satellites (and WAAS satellites if so equipped), recover orbital data, make range and Doppler measurements, and process this information in real-time to obtain the user's position, velocity, and time.

If the optional TAWS function is installed in the G1000, the pilot will receive appropriate aural warnings and cautions for terrain and obstacles. The pilot should refer to the DA 40/DA 40F Pilot’s Guide for the terrain warning and caution messages and system information.

Operational Approvals

G1000 GPS NAVIGATION SYSTEM, GIA 63 INSTALLED

GIA 63 units are standard and provide position information in accordance with TSO-C129a class A1. The Garmin G1000 system has been demonstrated capable of, and has been shown to meet the accuracy requirements for the following operations provided it is receiving usable navigation data:

- The G1000 Integrated Avionics system as installed in this aircraft complies with AC 20-138A for navigation within the U.S. National Airspace System using GPS for IFR en-route, terminal area, and non-precision approach operations (including those approaches titled "GPS", "or GPS", and "RNAV (GPS)" approaches).
- The G1000 Integrated Avionics system as installed in this aircraft has been found to comply with the requirements for GPS as a Primary Means of Navigation for oceanic and remote navigation – RNP-10, per FAA AC 20-138A and FAA Order 8400-12A. Both GPS receivers are required to be operating and receiving usable signals except for routes requiring only one Long Range Navigation sensor. This does not constitute operational approval.
- North Atlantic (NAT) Minimum Navigational Performance Specifications (MNPS) Airspace per AC 91-49 and AC 120-33. Both GPS receivers are required to be operating and receiving usable signals except for routes requiring only one Long Range Navigation sensor. This does not constitute operational approval.

NOTE

Each GIA 63 computes an independent navigation solution based on its GPS sensor. The G1000 will use the GPS sensor with the highest signal quality and will automatically revert to the other sensor if the active sensor fails or if the secondary sensor is determined to be more accurate. An "AHRS 1 GPS – " message means that one of the GPSs has failed. Refer to the MFD AUX-GPS STATUS page to determine the state of the GPSs.

- Enroute and Terminal including RNP5/BRNAV and PRNAV (RNP-1) - In accordance with JAA TGL-10 Rev 1, ACJ 20X4, AC 90-96A, and AC 90-100A provided the FMS is receiving usable navigation information from one or more GPS/SBAS receivers.

- The G1000 Integrated Avionics system as installed in this aircraft is eligible for B-RNAV in accordance with AMJ20X2.

- The G1000 Integrated Avionics system as installed in this aircraft is eligible for PRNAV in accordance with PRNAV requirements: JAA Administrative & Guidance Material Section One: General Part 3: Temporary Guidance Leaflets, Leaflet No 10: Airworthiness and Operational Approval for Precession RNAV Operations in Designated European Airspace 7.1 Required Functions.

- Navigation information is referenced to WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conform to WGS-84 or equivalent.

G1000 GPS/SBAS NAVIGATION SYSTEM, GIA 63W INSTALLED, G1000 SYSTEM SW 0321.17OR LATER USING GPS SW 3.0 OR LATER

The Garmin G1000 GPS/SBAS receivers, GIA 63W, incorporating SW version 3.0 or later approved version and GA35 (PN 013-00235-00) antennas are approved under TSO-C145a/TSO-C146a equipment Class 3 and installed in accordance with AC 20-138A. The Garmin G1000 system has been demonstrated capable of, and has been shown to meet the accuracy requirements for the following operations provided it is receiving usable navigation data:

- The G1000 Integrated Avionics system as installed in this aircraft complies with AC 20-138A for navigation using GPS and WAAS (within the coverage of a Space-Based Augmentation System complying with ICAO Annex 10) for IFR en route, terminal area, and non-precision approach operations (including those approaches titled “GPS”, “or GPS”, and “RNAV (GPS)” approaches). The G1000 Integrated Avionics system installed in this aircraft is approved for approach procedures with vertical guidance including “LPV”, “LNAV/VNAV”, and “LNAV + V” within the U.S. National Airspace System.

- The G1000 Integrated Avionics system as installed in this aircraft has been found to comply with the requirements for GPS as a Primary Means of Navigation for oceanic and remote navigation – RNP-10, (per FAA AC 20-138A and FAA Order 8400-12A), when used in conjunction with Garmin WAAS Fault Detection/Exclusion (WFDE) Prediction Program, part number 006-A0154-01 or later approved version with GA35 (PN 013-00235-00) antennas selected. Both GPS/SBAS receivers are required to be operating and receiving usable signals except for routes requiring only one Long Range Navigation (LRN) sensor. This does not constitute an operational approval.

The G1000 WFDE predication program works in combination with the Garmin AT, Inc. Route Planning Software, version 1.2, or later approved version. The route planning and WFDE prediction program can be downloaded from Garmin G1000 website on the Internet. For information on using the WFDE Prediction Program, refer to Garmin WAAS FDE Prediction Program, part number 190-00643-01, 'WFDE Prediction Program Instructions'.

- North Atlantic (NAT) Minimum Navigational Performance Specifications (MNPS) Airspace per AC 91-49 and AC 120-33. Both GPS/SBAS receivers are required to be operating and receiving usable signals except for routes requiring only one Long Range Navigation sensor. This does not constitute operational approval.

NOTE

Each GIA 63W computes an independent navigation solution based on its GPS sensor. The G1000 will use the GPS sensor with the highest signal quality and will automatically revert to the other sensor if the active sensor fails or if the secondary sensor is determined to be more accurate. An "AHRS 1 GPS – " message displayed in the ALERTS window means that one of the GPSs has failed. Refer to the MFD AUX-GPS STATUS page to determine the state of the GPSs.

- Enroute and Terminal including RNP5/BRNAV and PRNAV (RNP-1) - In accordance with JAA TGL-10 Rev 1, ACJ 20X4, AC 90-96A, and AC 90-100A provided the FMS is receiving usable navigation information from one or more GPS/SBAS receivers.

- The G1000 Integrated Avionics system as installed in this aircraft is eligible for B-RNAV in accordance with AMJ20X2.

- The G1000 Integrated Avionics system as installed in this aircraft is eligible for PRNAV in accordance with PRNAV requirements: JAA Administrative & Guidance Material Section One: General Part 3: Temporary Guidance Leaflets, Leaflet No 10: Airworthiness and Operational Approval for Precession RNAV Operations in Designated European Airspace 7.1 Required Functions.

Navigation information is referenced to WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conform to WGS-84 or equivalent.

G1000 GPS/SBAS NAVIGATION SYSTEM, GIA 63W INSTALLED, G1000 SYSTEM SW 0369.13 USING GPS SW 2.40

The Garmin G1000 GPS/SBAS receivers, GIA 63W, incorporating SW version 2.40 do not comply with US 14 CFR Part 91, SFAR 97 requirements for TSO-C145a/TSO-C146a equipment. See Limitations Section for requirements to the use GPS for navigation.

The Garmin G1000 system with GPS SW 2.40 has been demonstrated capable of, and has been shown to meet the accuracy requirements for the following operations provided it is receiving usable navigation data:

- The G1000 Integrated Avionics system as installed in this aircraft complies with AC 20-138A for navigation using GPS and WAAS (within the coverage of a Space-Based Augmentation System complying with ICAO Annex 10) for IFR en route, terminal area, and non-precision approach operations (including those approaches titled "GPS", "or GPS", and "RNAV (GPS)" approaches) when used in conjunction with Garmin Prediction Program 006-A0154-01 with the 013-00235-00 antenna selection to confirm the availability of RAIM for the intended en route, terminal, and approach flight in addition to any NOTAMs issued for the approach. The G1000 Integrated Avionics system installed in this aircraft is approved for approach procedures with vertical guidance including "LPV", "LNAV/VNAV", and "LNAV + V" within the U.S. National Airspace System.

- The G1000 Integrated Avionics system as installed in this aircraft has been found to comply with the requirements for GPS as a Primary Means of Navigation for oceanic and remote navigation – RNP-10, (per FAA AC 20-138A and FAA Order 8400-12A), when used in conjunction with Garmin Prediction Program 006-A0154-01 with the 013-00235-00 antenna selection to confirm the availability of RAIM for the intended en route. Both GPS/SBAS receivers are required to be operating and receiving usable signals except for routes requiring only one Long Range Navigation (LRN) sensor. This does not constitute an operational approval.

- North Atlantic (NAT) Minimum Navigational Performance Specifications (MNPS) Airspace per AC 91-49 and AC 120-33. Both GPS/SBAS receivers are required to be operating and receiving usable signals except for routes requiring only one Long Range Navigation sensor. This does not constitute operational approval.

NOTE

Each GIA 63W computes an independent navigation solution based on its GPS sensor. The G1000 will use the GPS sensor with the highest signal quality and will automatically revert to the other sensor if the active sensor fails or if the secondary sensor is determined to be more accurate. An "AHRS 1 GPS – " message displayed in the ALERTS window means that one of the GPSs has failed. Refer to the MFD AUX-GPS STATUS page to determine the state of the GPSs.

- Enroute and Terminal including RNP5/BRNAV and PRNAV (RNP-1) - In accordance with JAA TGL-10 Rev 1, ACJ 20X4, AC 90-96A, and AC 90-100A provided the FMS is receiving usable navigation information from one or more GPS/SBAS receivers.

- The G1000 Integrated Avionics system as installed in this aircraft is eligible for B-RNAV in accordance with AMJ20X2.

- The G1000 Integrated Avionics system as installed in this aircraft is eligible for PRNAV in accordance with PRNAV requirements: JAA Administrative & Guidance Material Section One: General Part 3: Temporary Guidance Leaflets, Leaflet No 10: Airworthiness and Operational Approval for Precession RNAV Operations in Designated European Airspace 7.1 Required Functions.

Navigation information is referenced to WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conform to WGS-84 or equivalent.

ELECTRONIC FLIGHT BAG

The G1000 Integrated Avionics System as installed in this aircraft has been approved as a Hardware Class 3, Software Type C Electronic Flight Bag (EFB) in accordance with AC 120-76A when using current FliteChart or ChartView data. Additional operational approvals may be required.

For operations under part 91, it is suggested that a secondary or back up source of aeronautical information necessary for the flight be available to the pilot in the aircraft. The secondary or backup information may be either traditional paper-based material or displayed electronically. If the source of aeronautical information is in electronic format, operators must determine non-interference with the G1000 system and existing aircraft systems for all flight phases.

SECTION II
LIMITATIONS

2.1 INTRODUCTION

GENERAL LIMITATIONS

1. The Garmin G1000 Cockpit Reference Guide (CRG) must be immediately available to the flight crew. The required CRG is referenced to the System Software Version number. The System Software Version number is displayed at the top right side of the MFD Power-up page.

System Software Version	Garmin G1000 Cockpit Reference Guide (CRG) revision
0321.17	P/N 190-00324-08, Revision A, or later appropriate revision.
0321.18 or 0321.19	P/N 190-00324-09, Revision A, or later appropriate revision.
0321.22	P/N 190-00324-10, Revision A, or later appropriate revision.

2. AHRS Areas of operation:

Flight operations with the G1000 Integrated Avionics installed are prohibited in the following areas due to unsuitability of the magnetic fields near the Earth's poles.

a) North of 72 North latitude at all longitudes.

b) South of 70 South latitude at all longitudes.

c) North of 65 North latitude between longitude 75 W and 120 W. (Northern Canada)

d) North of 70 North latitude between longitude 70 W and 128 W. (Northern Canada)

e) North of 70 North latitude between longitude 85 E and 114 E (Northern Russia)

f) South of 55 South latitude between longitude 120 E and 165 E. (Region south of Australia and New Zealand)

NOTE

The Garmin G1000 system is not designed for use as a polar navigator and operation outside the approved operating area is prohibited. The GRS-77 AHRS internally monitors the magnetic field and will display a

GEO LIMITS system message when the magnetic field becomes unsuitable for AHRS operation. When the AHRS can no longer reliably compute heading, heading information will be removed form the HSI.

3. The fuel quantity, fuel required, and fuel remaining functions of the FMS are supplemental information only and must be verified by the flight crew.

4. The ADF aural identifier must be monitored any time the ADF is used as the primary source of navigation.

G1000 GPS NAVIGATION SYSTEM LIMITATIONS

1. GPS/SBAS based IFR enroute, oceanic, and terminal navigation is prohibited unless the pilot verifies and uses a valid, compatible, and current Aviation database or verifies each waypoint for accuracy by reference to current approved data.

2. "GPS", "or GPS", and "RNAV (GPS)" instrument approaches using the G1000 System are prohibited unless the pilot verifies and uses the current Aviation database. GPS based instrument approaches must be flown in accordance with an approved instrument approach procedure that is loaded from the Aviation database.

3. Instrument approaches utilizing the GPS receiver must be conducted in the approach mode (LNAV, LNAV+V, L/VNAV, or LPV), and GPS/WAAS integrity monitoring must be available at the Final Approach Fix. If there is not sufficient GPS/WAAS integrity at any time after crossing the Final Approach Fix, a Loss Of Integrity (LOI) will be annunciated on the HSI and the approach mode will be aborted.

4. IFR non-precision approach approval using the GPS/SBAS sensor is limited to published approaches within the U.S. National Airspace System. Approaches to airports in other airspace are not approved unless authorized by the appropriate governing authority.

5. Use of the Garmin G1000 GPS/SBAS receivers to accomplish ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for "or GPS" is not authorized. Use of the G1000 VOR/LOC/GS receivers to fly approaches not approved for "or GPS" requires that VOR/LOC/GS navigation data is selected and presented on the CDI of the pilot flying (i.e. proper CDI source selection).

NOTE

Not all published approaches are in the AVIATION database. The flight crew must ensure that the planned approach is in the database.

6. Use of the G1000 VOR/ILS receiver to fly approaches not approved for GPS requires VOR/ILS navigation data to be present on the display.

7. When conducting missed approach procedures, autopilot coupled operation is prohibited until the pilot has established a course and rate of climb that ensures all altitude and path requirements of the procedure will be met.

8. RNP operations are not authorized except as noted in the Operational Approvals section.

G1000 GPS/SBAS NAVIGATION SYSTEM, GIA 63W INSTALLED, G1000 SYSTEM SW 0369.13 USING GPS SW 2.40

1. The Garmin G1000 GPS/SBAS receivers, GIA 63W, incorporating SW version 2.40 do not comply with US 14 CFR Part 91, SFAR 97 requirements for TSO-C145a/TSO-C146a equipment. The following limitations apply ONLY to the GIA 63W WAAS GPS receivers using GPS SW version 2.40. The following limitations do not apply to GIA 63W incorporating SW version 3.00 or later or to the non-WAAS GIA 63 GPS receivers.

- While flying under IFR, the aircraft must be equipped with an approved and operational alternate means of navigation appropriate to the flight with the exception of oceanic and remote operations.

- For flight planning purposes, if an alternate airport is required, the alternate airport must have an approved instrument approach procedure other than GPS or RNAV that is anticipated to be operational and available at the estimated time of arrival. All equipment required for this procedure must be installed and operational.

- For flight planning purposes, Garmin Prediction Program 006-A0154-01 with the 013-00235-00 antenna selection should be used to confirm the availability of RAIM for the intended flight in accordance with the local aviation authority guidelines for TSO-C129a equipment. WAAS NOTAMs (or their absence) and generic prediction tools do not provide an acceptable indication of the availability for the GIA 63W equipment.

- When flight planning an LNAV/VNAV or LPV approach, operators should use the Garmin Prediction Program 006-A0154-01 with the 013-00235-00 antenna selection in addition to any NOTAMs issued for the approach.

TERRAIN AWARNESS AND WARNING SYSTEM (TAWS) SYSTEM LIMITATIONS

NOTE:
The terrain display is intended to serve as a situational awareness tool only. It may not provide either the accuracy or fidelity, or both, on which to solely base decisions and plan maneuvers to avoid terrain or obstacles.

1. Navigation must not be predicated upon the use of the TAWS, Terrain or Obstacle data displayed by the G1000.
2. Pilots are authorized to deviate from their ATC clearance to the extent necessary to comply with terrain / obstacle warnings from TAWS.
3. The Terrain/Airport/Obstacle databases have an area of coverage as detailed below:

   (a) The Terrain Database has an area of coverage from North 75° Latitude to South 60° Latitude in all longitudes.
   (b) The Airport Terrain Database coverage area includes airports from North 75° Latitude to South 60° Latitude in all longitudes.
   (c) The Obstacle Database coverage area includes the United States and Europe.

   NOTE: The area of coverage may be modified, as additional terrain data sources become available.

4. When replacing or updating the TAWS terrain and obstacle database cards, the following procedure must be conducted:

   - The G1000 system must be turned off.
   - After database card replacement, apply power to the G1000 system to perform a TAWS system test. A successful TAWS system test will result in the aural "TAWS SYSTEM TEST OK" message being played and removal of the "TAWS TEST" annunciator from the PFD and MFD displays. (Note: the cockpit speaker must be ON or a headset worn to hear the TAWS aural message.)
   - Turn the G1000 system off.

5. To avoid unwanted alerts, TAWS must be inhibited when landing at an airport that is not included in the airport database.

TRAFFIC AVOIDANCE SYSTEM LIMITATIONS

Use of the MAP - TRAFFIC MAP to maneuver the airplane for traffic avoidance without outside visual reference is prohibited. The Traffic Information System (TIS) is intended as an aid for the pilot to visually locate traffic. It is the responsibility of the pilot to see and manually maneuver the airplane to avoid other traffic.

SYNTHETIC VISION LIMITATIONS

Use of the Synthetic Vision system display elements alone for aircraft control without reference to the G1000 primary flight instruments or the aircraft standby instruments is prohibited.

Use of the Synthetic Vision system alone for navigation, or obstacle or terrain avoidance is prohibited.

Use of the SVS traffic display alone to avoid other aircraft is prohibited.

DATA LINK WEATHER (XM WEATHER) LIMITATIONS

Datalink weather information displayed by the G1000 system is limited to supplemental use only. XM weather data is not a source of official weather information. Use of the NEXRAD and LTNG (XM Lightning) data on the MAP – NAVIGATION MAP and/or MAP - WEATHER DATA LINK page (XM Weather) for hazardous weather, e.g., thunderstorm penetration is prohibited. NEXRAD, and LTNG information on the MAP - NAVIGATION or MAP – WEATHER DATA LINK page is intended only as an aid to enhance situational awareness of hazardous weather, not penetration. It is the pilot's responsibility to avoid hazardous weather using official weather data sources and the airplane's in-flight weather radar.

Display of XM NEXRAD data is prohibited if XM ICING or XM TURBULENCE are displayed on the MFD MAP- WEATHER DATA LINK page. XM ICING and XM TURBULENCE data must be turned off in order to display XM NEXRAD data.

2.3 AIRSPEED MARKINGS

Marking	IAS	Significance
Red band	20 KIAS – 53 KIAS	Low speed awareness – stall is imminent
Yellow band	53 KIAS – 58 KIAS	Low speed awareness – reduced airspeed margin to stall
White band	58 KIAS – 91 KIAS	Operating range with flaps fully extended
Green band	58 KIAS – 129 KIAS	Normal operating range
Yellow band	129 KIAS – 178 KIAS	Caution range – smooth air only
Red band	178 KIAS and greater	178 KIAS is the maximum speed for all operations

The airspeed indicator is marked in IAS values.

2.5 ENGINE INSTRUMENT MARKINGS

Engine instrument markings and their color code significance are shown in the table below.

NOTE

When an indication lies in the upper or lower prohibited range, the legend for that display will change to the color of the prohibited range and will flash.

Indication	Red arc or bar = Lower prohibited range	Yellow arc or bar = Caution range	Green arc or bar = Normal operating range	Yellow arc or bar = Caution range	Red arc or bar = Upper prohibited range
Manifold Pressure In. – Hg ***Note 1***	--	--	13 – 30	--	--
RPM	--	--	500 – 2700	--	>2700 ***Note 2***
Oil Temp °F	--	--	149 – 230	231 - 245	>245
Cylinder Head Temp °F	--	--	150 – 475	476 – 500	>500
Fuel Press PSI (DA 40) ***Note 3***	0 – 14	--	14 – 35	--	>35
Oil Press PSI	0 – 25	25 - 55	56 – 95	96 - 97	>97
Fuel flow Gal/hr	--	--	1 – 20	--	>20
Voltage Volts	0 – 24.1	24.1 – 25	25.1 – 30	30.1 – 32	>32
Amperage Amps	--	--	2 – 75	--	--
Fuel quantity US gal Standard Tanks	0	>0 – 3	>3 – 17	--	--
Fuel quantity US gal Long Range Tanks	0	>0 – 3	>3 – 16 >19 – 24	--	--

Note 1: Not applicable to DA 40 F. Manifold Pressure gauge is not installed in the DA 40 F.

Note 2: To prevent nuisance alerts during normal takeoffs, the legend "RPM" and digits will not turn red or flash until the RPM exceeds 2780.

Note 3: Fuel Pressure Gauge is optional for DA 40 aircraft.

2.6 WARNING, CAUTION AND STATUS MESSAGES

The following tables show the color and significance of the warning, caution, and advisory messages which may appear on the G1000 displays.

NOTE

The G1000 Cockpit Reference Guide and the G1000 Pilot's Guide contain detailed descriptions of the annunciator system and all warnings, cautions and advisories.

Warning annunciations – Red	
Annunciation	**Cause**
OIL PRES LO	Oil pressure is less than 25 psi
FUEL PRES LO (DA40 Only)	Fuel pressure is less than 14 psi
FUEL PRES HI (DA40 Only)	Fuel pressure is greater than 35 psi
ALTERNATOR	Alternator failure
STARTER ENGD	Operation of the starter without the key in the start position, or failure of the starter motor to disengage from the engine after starting
DOOR OPEN	Front canopy and/or rear door not completely closed and locked
TRIM FAIL	The KAP 140 autopilot pitch trim system has failed
Caution annunciations – Yellow	
Annunciation	**Cause**
PITOT OFF	Pitot heat is not switched on
PITOT FAIL	Fault in the pitot heating system
L FUEL LOW	Fuel quantity in the left tank is less than 3 US gal (±1 US gal)
R FUEL LOW	Fuel quantity in the right tank is less than 3 US gal (±1 US gal)
LOW VOLTS	On-board voltage below 24 volts

Advisory annunciations – White	
Annunciation	**Cause**
PFD FAN FAIL	The cooling fan for the PFD is inoperative.
MFD FAN FAIL	The cooling fan for the MFD is inoperative.
GIA FAN FAIL	The cooling fan for the GIA is inoperative.
NAV Source Changed – Select Desired Autopilot Mode	A navigation system change has occurred that may have caused the KAP 140 autopilot to automatically revert to roll attitude (ROL) mode.

2.13 KINDS OF OPERATION

Minimum operational equipment (serviceable)

Equipment	Number installed	VFR Day	VFR Night	IFR
Primary Flight Display	1	1	1	1
Multi-Function Display	1	1	1	1
Audio panel	1	1	1	1
Air data computer	1	1	1	1
Attitude and Heading Reference System	1	0	1	1
Static dischargers	7	0	0	7
GPS	2	0	1	2

2.14 FUEL

Fuel Quantity: Total fuel quantity:
- Standard Tanks: 2 x 20.6 US gal (approx. 156 liters)
- Long Range Tanks: 2 x 25.5 US gal (approx. 193 liters)

Unusable fuel: 2 x 0.5 US gal (approx. 3.8 liters)

Max. Indicated Fuel Quantity:
- Standard Tanks: 17 US gal per tank
- Long Range Tanks: 24.0 US gal per tank

Max. permissible difference between right and left tank:
- Standard Tanks: 10 US gal (approx. 38 liters)
- Long Range Tanks: 8 US gal (approx. 30.3 liters)

2.15 Limitation Placard

Below the MFD, next to the fuel quantity indication:

Standard Tanks

Fuel qty. Indication: max 17 US gal
Max. difference LH/RH tank: 10 US gal
For use of max. tank capacity see AFM

Long Range Tanks

Fuel qty. Indication: max 24 US gal
Refer to AFM to use entire tank capacity
Max. difference LH/RH tank: 8 US gal

SECTION III
EMERGENCY PROCEDURES

GENERAL

1. If Garmin G1000 GPS navigation information is not available or invalid, utilize remaining operational navigation equipment as required.

2. If the G1000 system reverts to Dead Reckoning mode (indicated by DR displayed on the HSI), the moving map will continue to be displayed. Aircraft position will be based upon the last valid GPS position and estimated by Dead Reckoning methods. Changes in winds aloft can affect the estimated position substantially. Dead Reckoning is only available for 20 minutes in Oceanic and Enroute modes; Terminal and Approach modes do not support DR.

3. If Garmin G1000 GPS navigation information is not available or invalid and the TAWS option is installed, TAWS will not be available. A white 'TAWS N/A' or red 'TAWS FAIL' annunciator will be displayed on the PFD (left of selected altitude) or on the MFD TAWS page (lower right hand corner).

4. If the "GPS NAV LOST" annunciation is displayed the system will flag and no longer provide GPS based navigational guidance. The crew should revert to the G1000 VOR/ILS receivers or an alternate means of navigation other than the G1000 GPS receivers.

5. If the "LOI" (Loss of Integrity) annunciation is displayed in the enroute, oceanic, or terminal phase of flight, continue to navigate using the GPS equipment or revert to an alternate means of navigation other than the G1000 GPS receiver appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using the G1000 VOR/ILS receiver or another IFR-approved navigation system.

6. If the "ABORT APR" or "GPS NAV LOST" annunciation is displayed while on an approach segment, the pilot shall initiate the missed approach.

7. Aircraft equipped with GIA 63W WAAS GPS receivers only: If the "APR DWNGRADE" annunciation is displayed, the pilot shall use LNAV minima.

8. Aircraft equipped with GIA 63 non-WAAS GPS receivers only: If the "RAIM UNAVAIL" annunciation is displayed while on an approach segment, the approach will become inactive and the pilot shall initiate the missed approach. Missed approach course guidance may still be available with 1 nautical mile CDI sensitivity.

9. In an in-flight emergency, depressing and holding the COM transfer button for 2 seconds will tune the emergency frequency of 121.500 MHz. If the display is available, it will also show it in the "Active" frequency window.

10. If the white 'TAWS N/A' status annunciator is displayed on the PFD or MFD TAWS page, the system will no longer provide TAWS alerting or display relative terrain elevations. The crew must maintain compliance with procedures that ensure minimum terrain separation.

11. If the red 'TAWS FAIL' status annunciator is displayed on the PFD or MFD TAWS page, the system will no longer provide TAWS alerting or display relative terrain elevations. The crew must maintain compliance with procedures that ensure minimum terrain separation.

12. The following warnings and cautions appear in various locations on the PFD or MFD.

Annunciation	Cause
AHRS Aligning – Keep Wings Level	Attitude and Heading Reference System is aligning. Keep wings level using standby attitude indicator.
ATTITUDE FAIL	Display system is not receiving attitude reference information from the AHRS; accompanied by the removal of sky/ground presentation and a red X over the attitude area.
AIRSPEED FAIL	Display system is not receiving airspeed input from the air data computer; accompanied by a red X through the airspeed display.
ALTITUDE FAIL	Display system is not receiving altitude input from the air data computer; accompanied by a red X through the altimeter display.
VERT SPEED FAIL	Display system is not receiving vertical speed input from the air data computer; accompanied by a red X through the vertical speed display.
HDG	Display system is not receiving valid heading input from the AHRS; accompanied by a red X through the digital heading display.
Red X	A red X through any display field, such as COM frequencies, NAV frequencies, or engine data, indicates that display field is not receiving valid data.
LOI	GPS integrity is insufficient for the current phase of flight.

3.2.3 ENGINE PROBLEMS IN FLIGHT

(h) High Fuel Flow – (DA 40 only)

Fuel flow in red sector

1. Fuel pressure ..... check for red FUEL PRESS LO message

   - If fuel pressure is low (FUEL PRESS LO message), there is possibly a leak (between the injection system and the injectors). Land at the nearest available airport.
   - If there is no FUEL PRESS LO message, there is no leak; the likely cause is a defective fuel flow indication, which should thus be ignored (the airplane should be serviced). Fuel flow data should be taken from the engine performance table in Chapter 5 of the AFM.

(g) High Fuel Flow – (DA 40 F only)

1. Fuel Quantity .....Check and Monitor
2. Power Setting..... Check

Land as soon as practical. Consider the reduced range and endurance due to possible loss of fuel.

NOTE

Have the airplane inspected before next flight.

3.3.3 SMOKE AND FIRE IN FLIGHT

(b) Electrical fire with smoke in flight

1. Emergency switch ..... ON if installed

CAUTION

Switching OFF the master switch (ALT/BAT) will lead to total loss of all electronic and electric equipment, including the AHRS and attitude display. However, by switching the HORIZON EMERGENCY switch ON, the emergency battery will supply power to the standby attitude gyro (artificial horizon) and the flood light.

In case of extreme smoke development, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

2. Master switch (ALT/BAT) ..... OFF
3. Cabin heat ..... OFF
4. Emergency window(s) ..... OPEN
5. Use standby instruments for airspeed, altitude and attitude reference, if necessary
6. Land at the nearest suitable airport as soon as possible

If electronic or avionics equipment is required for continued flight, the following procedure may be used to isolate the source of the smoke or fumes:

7. BAT (battery) switch ..... ON
8. ESS BUS switch ..... ON

NOTE

This removes power from the main and avionics busses, and disables alternator operation. See the table at the end of this section for the equipment which is still available.

If smoke or fumes decrease:

9. Land at the nearest suitable airport as soon as possible

If smoke or fumes persist:

10. ALT (alternator) switch ..... ON
11. ESS BUS switch ..... OFF
12. BATT and ESS TIE circuit breakers ..... PULL

This removes power from the essential bus and restores power to the main and avionics busses. See the table at the end of this section for the equipment which will still be available.

13. Use standby instruments for attitude, airspeed and altitude
14. Refer to Section 3.7.2 (b) of this Supplement, Alternator Failure
15. Land at the nearest suitable airport as soon as possible

The equipment available on **Essential Bus** only (operating on battery only and the Essential Bus switch selected) is:

Air Data Computer (airspeed, altitude, vertical speed, OAT, TAS)
Attitude and Heading Reference System (attitude, heading)
PFD (in composite mode)
Pitot Heat
Flaps
Com 1
GPS/NAV 1
Transponder
Landing light
Instrument flood lights
Engine instruments
Starter

Refer to the "ESSENTIAL BUS" area of the circuit breaker panel for a quick reference to equipment on the Essential Bus.

Equipment available on the **Main and Avionics Busses** only:

Com 2
GPS/NAV 2
MFD
Electric fuel pump
Instrument lights
Strobe lights
Position lights
Taxi light

Refer to the "MAIN BUS" and "AVIONICS BUS" areas of the circuit breaker panel for a quick reference to equipment on those busses.

3.7.1 ICING

Unintentional flight into icing conditions

1. Leave the icing area (by changing altitude or turning back, in order to reach zones with a higher ambient temperature).
2. Pitot heating ..... ON
3. Cabin heat ..... ON
4. Air distribution lever ..... ▲(UP)
5. RPM ..... increase, in order to prevent ice build-up on the propeller blades
6. Alternate Air (**DA 40 only**) ..... OPEN

6a Carburetor Heat (**DA 40 F only**) ..... HOT

7. Emergency window(s) ..... open if required

CAUTION

Ice build-up increases the stalling speed. If required for safety reasons, engine speeds up to 2700 RPM are permissible without time limit.

8. ATC ..... advise if an emergency is expected

CAUTION

When the pitot heating fails (yellow PITOT FAIL annunciation), and the alternate static valve is installed:

9. Alternate static valve ..... OPEN
10. Emergency window(s) ..... close

3.7.2 FAILURES IN THE ELECTRICAL SYSTEM

(b) Alternator failure

An alternator failure is indicated by a red ALTERNATOR message and an ammeter indication of 0 Amps.

1. Circuit breakers..... Check in
2. ALT (alternator) switch ..... OFF, then ON

If alternator does not come back on line (message extinguishes and ammeter indication greater than zero):

3. ESS BUS switch ..... ON
4. Switch off any non-essential electrical loads.
5. Land within 30 minutes

If PFD attitude information is lost prior to landing:

6. HORIZON EMERGENCY Switch..... ON

CAUTION

The following items are available on the Essential Bus:

- PFD in composite (backup) format
- NAV/COM 1
- GPS 1
- Attitude and Heading Reference System (AHRS)
- Air Data Computer
- Pitot heat
- Engine instruments
- Transponder
- Flood light
- Landing light

Refer to the ESSENTIAL BUS area of the circuit breaker panel for a quick reference to equipment on those busses. These items of equipment can be supplied with power by the battery for at least 30 minutes. During this 30-minute period, the airplane must be landed at a suitable airport. Economical use of electrical equipment, in particular of pitot heat, and switching off equipment that is not needed extends the time during which the other equipment remains available.

For cases in which the battery capacity is not sufficient to reach a suitable airport, an emergency battery is installed to power the standby attitude gyro and floodlight. This battery is switched on with the HORIZON EMERGENCY Switch. It provides power for 1 hour and 30 minutes when the floodlight is switched on.

3.8 AVIONICS EMERGENCIES

3.8.1 PFD OR MFD DISPLAY FAILURE

a) DISPLAY BACKUP button on audio panel…RELEASE (button shall be OUT)

3.8.1.1 AUTOMATIC ENTRY OF DISPLAY REVERSIONARY MODE

If the PFD and MFD have automatically entered reversionary mode, use the following procedure:

a) DISPLAY BACKUP button on audio panel…RELEASE (button shall be OUT)

NOTE

After automatic entry of reversionary mode, it is required to release the DISPLAY BACKUP button on the audio panel (button OUT). With the DISPLAY BACKUP button OUT, if the problem causing the automatic entry of reversionary mode is resolved the system will remain in reversionary mode. A maximum of one attempt to return to normal mode may be made using the following procedure.

b) DISPLAY BACKUP button on audio panel……PUSH (button shall be IN)

- If the system returns to normal mode, leave the DISPLAY BACKUP button in and continue.
- If the system remains in reversionary mode, or abnormal display behavior such as display flashing occurs, then return the DISPLAY BACKUP button to the OUT position.

3.8.2 AHRS FAILURE

NOTE

A failure of the Attitude and Heading Reference System (AHRS) is indicated by removal of the sky/ground presentation and a red X and a yellow "AHRS FAILURE" shown on the PFD. The digital heading presentation will be replaced with a yellow "HDG" and the compass rose digits will be removed. The course pointer will indicate straight up and course may be set using the digital window.

1. Use Standby Attitude Indicator, magnetic compass and Navigation Map
2. Course ..... Set using digital window

3.8.3 AIR DATA COMPUTER (ADC) FAILURE

NOTE

Complete loss of the Air Data Computer is indicated by a red X and yellow text over the airspeed, altimeter, vertical speed, TAS and OAT displays. Some FMS functions, such as true airspeed and wind calculations, will also be lost.

1. Use Standby Airspeed Indicator and Altimeter
2. Land as soon as practical at a suitable airport

3.8.4 ERRONEOUS OR LOSS OF ENGINE AND FUEL DISPLAYS

NOTE

Loss of an engine parameter is indicated by a red X through the data field. Erroneous information may be identified by indications that do not agree with other system information. Erroneous indications may be determined by comparing a display with other displays and other system information.

1. Set power based on throttle lever position, engine noise, and speed.
2. Monitor other indications to determine the health of the engine.
3. Use known power settings from the AFM for approximate fuel flow values.
4. Use other system information, such as annunciator messages, ENGINE SYSTEM page, and AUX – TRIP PLANNING page to safely complete the flight.

3.8.5 ERRONEOUS OR LOSS OF WARNING/CAUTION ANNUNCIATORS

NOTE

Loss of an annunciator may be indicated when engine or fuel displays show an abnormal or emergency situation and the annunciator is not present. An erroneous annunciator may be identified when an annunciator appears which does not agree with other displays or system information.

1. If an annunciator appears, treat it as if the condition exists. Refer to the AFM Emergency or Abnormal procedures or the procedures contained in this AFMS.

2. If a display indicates an abnormal condition but no annunciator is present, use other system information, such as engine displays, ENGINE SYSTEM page, GAL REM and FFLOW GPH displays, to determine if the condition exists. If it cannot be determined that the condition does not exist, treat the situation as if the condition exists. Refer to the AFM Emergency or Abnormal procedures or the procedures contained in this AFMS.

SECTION IVA
NORMAL PROCEDURES

NOTE

Readability of the PFD and MFD displays may be degraded when wearing polarized sunglasses.

1. DETAILED OPERATING PROCEDURES

Normal operating procedures for the G1000 are described in the Garmin G1000 Cockpit Reference Guide and the Garmin G1000 Pilot's Guide.

PRE-FLIGHT INSPECTION

I. Cabin check

a) MET, NAV, Mass & CG ..... flight planning complete
b) Airplane documents ..... complete and up-to-date
c) Ignition key ..... pulled out
d) Front canopy & rear door ..... clean, undamaged
e) All electrical equipment ..... OFF
f) Circuit breakers ..... set in (if one has been pulled, check reason)
g) Engine control levers ..... check condition, freedom of movement
Full travel of throttle,
Full Travel of RPM (DA 40 only)
Full Travel of mixture lever
h) Throttle ..... IDLE
i) Mixture control lever ..... LEAN
j) RPM lever (DA 40 only) ..... HIGH RPM
k) Carburetor Heat (DA 40 F only) ..... COLD
l) BAT (battery) switch ..... ON
m) Fuel Quantity ..... check fuel qty. on EIS
check with fuel qty. measuring device

NOTE

FOR STANDARD TANKS, when the fuel quantity indicator reads 17 US gal the correct fuel quantity must be determined with the fuel quantity measuring device. If this measurement is not carried out, the fuel quantity available for flight planning is 17 US gal.

FOR LONG RANGE TANKS, when the fuel indicator reads 16 US gal the correct fuel quantity must be determined with the fuel quantity measuring device. There are 3 US gal of un-gauged fuel from 16 to 19 US gal. If this measurement is not carried out, the fuel quantity available for flight planning is 16 US gal.

n) Position lights, strobe light (ACL's).....check
o) BAT (battery) switch .....OFF
p) Check for loose items .....complete
q) Flight controls and trim..... free to move and correct
r) Baggage .....stowed and secure

NOTE

Refer to DA 40 and DA 40 F AFMs to complete the Walk-around check, visual inspection

BEFORE STARTING ENGINE

1. Preflight inspection.....Complete
2. Rudder pedals ..... Adjusted and locked
3. Passengers..... Instructed
4. Safety Harnesses..... All on and fastened
5. Rear door .....Closed and locked
6. Door lock (if installed)..... Unblocked, key removed
7. Front canopy .....Position 1 or 2 ("cooling gap")
8. Canopy lock (if installed) ..... Unblocked, key removed
9. Parking brake ..... Set
10. Flight controls.....Freedom of movement and proper direction
11. Trim wheel.....T/O
12. Friction device, throttle quadrant.....Adjusted
13. Throttle ..... IDLE
14. Mixture control lever ..... LEAN
15. RPM lever (DA 40 only) .....HIGH RPM
16. Carburetor heat (DA 40 F only)..... COLD
17. Alternate air (DA 40 only).....CLOSED
18. Alternate Static Valve.....CLOSED, if installed
19. Avionics master switch.....OFF
20. Essential Bus switch .....OFF

CAUTION

When the essential bus is switched ON, the battery will not be charged unless the essential tie relay bypass (OAM 40-126) is installed.

21. BAT (battery) switch ..... ON
22. Fuel tank selector ..... on fullest tank

WARNING

Never move the propeller by hand while the ignition is switched on, as it may result in serious personal injury.

Never try to start the engine by hand.

STARTING ENGINE (DA 40 only)

(a) Cold engine

1. Strobe light (ACL) ..... ON
2. Electrical fuel pump ..... ON, note pump noise (=functional check of pump)
3. Throttle ..... 3 cm (1.2 in) forward from IDLE (measured from rear of slot)
4. Mixture control lever ..... RICH for 3 – 5 sec, then LEAN
5. Throttle 1 cm (0.4 in) forward from ..... IDLE (measured from rear of slot)

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

CAUTION

The use of an external pre-heater and external power source is recommended whenever possible, in particular at ambient temperatures below 0°C (32°F), to reduce wear and abuse to the engine and electrical system. Pre-heat will thaw the oil trapped in the oil cooler, which can be congealed in extremely cold temperatures. After a warm-up period of approximately 2 to 5 minutes (depending on the ambient temperature) at 1500 RPM, the engine is ready for takeoff if it accelerates smoothly and the oil pressure is normal and steady.

6. Ignition Switch ..... START

When engine starts:

7. Mixture control lever ..... rapidly move to RICH
8. Oil pressure ..... green arc within 15 sec
9. Electrical fuel pump ..... OFF

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF ENGINE and investigate problem.

10. ALT (alternator) switch ..... ON
11. Ammeter ..... Check
12. Fuel pressure ..... Check no messages illuminated
13. Annunciator section of PFD ..... Check

(b) Warm engine

1. Strobe light (ACL) ..... ON
2. Electrical fuel pump ..... ON, note pump noise (=functional check of pump)
3. Throttle ..... 3 cm (1.2 in) forward from IDLE (measured from rear of slot)
4. Mixture control lever ..... RICH for 1 - 3 sec, then LEAN

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

5. Ignition switch ..... START

When engine starts:

6. Mixture control lever ..... rapidly move to RICH
7. Oil pressure ..... green arc within 15 sec

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF ENGINE and investigate problem.

8. Electrical fuel pump ..... OFF

9. ALT (alternator) switch ..... ON
10. Ammeter ..... Check
11. Fuel pressure ..... Check no messages illuminated

12. Annunciator section of PFD ..... Check

(c) Engine will not start after injection ("flooded engine") Warm engine

1. Strobe light (ACL) ..... ON
2. Electrical fuel pump ..... ON, note pump noise (=Functional check of pump)
3. Mixture control lever ..... LEAN, fully aft
4. Throttle ..... at mid position

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

5. Ignition switch ..... START
6. Throttle ..... pull back towards IDLE when engine starts

When engine starts:

7. Mixture control lever ..... rapidly move to RICH
8. Oil pressure ..... green arc within 15 sec

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF ENGINE and investigate problem.

9. ALT (alternator) switch ..... ON
10. Ammeter ..... Check
11. Fuel pressure ..... Check no messages illuminated
12. Annunciator section of PFD ..... Check

STARTING ENGINE (DA 40 F only)

(a) Cold engine

1. Strobe light (ACL) ..... ON
2. Mixture ..... fully RICH
3. Electrical fuel pump ..... ON, note pump noise (=functional check of pump)
4. Throttle ..... ¼ travel forward from IDLE
5. Prime ..... 1 – 4 seconds (electric pump)

WARNING

Use the primer system to prepare the engine for a starting attempt. Do not use the throttle to pump fuel through the carburetor to the engine for priming since this may lead to carburetor fire. The primer system delivers fuel to the cylinders directly.

CAUTION

The priming system is not intended for operation in flight.

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

CAUTION

The use of an external pre-heater and external power source is recommended whenever possible, in particular at ambient temperatures below 0°C (32°F), to reduce wear and abuse to the engine and electrical system. Pre-heat will thaw the oil trapped in the oil cooler, which can be congealed in extremely cold temperatures. After a warm-up period of approximately 2 to 5 minutes (depending on the ambient temperature) at 1500 RPM, the engine is ready for takeoff if it accelerates smoothly and the oil pressure is normal and steady.

6. Starter ..... engage

When engine starts:

7. Oil pressure.....green arc within 15 sec
8. Throttle .....set 1000 RPM
9. Electrical fuel pump..... OFF

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF THE ENGINE and investigate problem.

10. ALT (alternator) switch ..... ON
11. Ammeter .....Check
12. Annunciator section of PFD .....Check

(b) Warm engine

1. Strobe light (ACL)..... ON
2. Mixture .....fully RICH
3. Electrical fuel pump.....ON, note pump noise (=functional check of pump)
4. Throttle .....¼ travel forward from IDLE

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

5. Starter..... engage

When engine starts:

6. Oil pressure.....green arc within 15 sec
7. Throttle .....set 1000 RPM
8. Electrical fuel pump..... OFF

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF THE ENGINE and investigate problem.

9. ALT (alternator) switch ..... ON
10. Ammeter .....Check
11. Annunciator section of PFD .....Check

(c) Engine will not start after priming ("flooded engine")

1. Strobe light (ACL) ..... ON
2. Electrical fuel pump ..... OFF
3. Mixture ..... LEAN, fully aft
4. Throttle ..... MAX PWR

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

5. Starter ..... engage

When engine starts:

6. Throttle ..... pull back towards IDLE when engine fires
7. Oil pressure ..... green arc within 15 sec

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF THE ENGINE and investigate problem.

8. Throttle ..... set 1000 RPM
9. ALT (alternator) switch ..... ON
10. Ammeter ..... Check
11. Annunciator section of PFD ..... Check

BEFORE TAXIING

1. Avionics master switch ..... ON
2. Electrical equipment ..... On as required
3. Flaps ..... UP – T/O – LDG – T/O (indicator and visual check)
4. Flight instruments and avionics ..... set, test function, as required (set both altimeters)
5. Flood light ..... ON, test function, as required
6. Ammeter ..... check, if required increase RPM
7. Fuel tank selector ..... change tanks confirm that engine also runs on other tank (at least 1 minute at 1500 RPM)
8. Pitot heating ..... ON, test function (no yellow PITOT FAIL annunciation)
9. Pitot heating ..... OFF if not required (yellow PITOT OFF annunciation)
10. Strobe lights (ACLs) ..... check ON test function, as required
11. Position lights, landing and taxi lights ..... ON, test function, as required

CAUTION

When taxiing at close range to other aircraft, or during night flight in clouds, fog or haze, the strobe lights should be switched OFF. The position lights must always be switched ON during night flight.

12. Throttle ..... check, 600 to 800 RPM

BEFORE TAKE-OFF

1. Position airplane into wind if possible
2. Parking brake ..... set
3. Safety harnesses ..... on and fastened
4. Rear door ..... check closed and locked
5. Front canopy ..... closed and locked

CAUTION

When operating the canopy, pilots / operators must ensure that there are no obstructions between the canopy and the mating frame, for example seat belts, clothing, etc. When operating the locking handle do NOT apply undue force. A slight downward pressure on the canopy may be required to ease the handle operation.

6. Door warning light (DOOR OPEN) ..... Check no messages illuminated
7. Fuel tank selector ..... fullest tank
8. Engine instruments ..... in green sector
9. Circuit breakers ..... pressed in
10. Fuel pressure ..... Check no messages illuminated
11. Electric fuel pump ..... ON
12. Mixture control lever ..... RICH (below 5000 ft)

NOTE

At a density altitude of 5000 ft or above or at high ambient temperatures, a fully rich mixture can cause rough running of the engine or a loss of performance. The mixture should be set for smooth running engine.

13. Flaps ..... check T/O
14. Trim ..... check T/O
15. Flight controls ..... free movement, correct sense
16. Throttle ..... 2000 RPM (DA 40)
    1800 RPM (DA 40 F)
17. Magneto check ..... L-BOTH-R-BOTH
    Max. RPM drop .....175 RPM
    Max. difference .....50 RPM

CAUTION

The lack of an RPM drop suggests a faulty ground or incorrect ignition timing. In case of doubt the magneto check can be repeated with a leaner mixture, in order to confirm a problem. Even when running on only one magneto the engine should not run unduly roughly.

18. RPM lever (DA 40 only) ..... pull back until a drop of max. 500 RPM is reached – HIGH RPM; Cycle 3 times

18a Carburetor Heat (DA 40 F only)..... check function
18b Throttle (DA 40 F only)..... MAX PWR, minimum 2200 RPM

NOTE (DA 40 F only)

The result of the ground check at full throttle depends on a number of environmental factors, e.g. temperature, ambient air pressure and in particular head or tailwind components. Headwind will cause a higher RPM than tailwind.

19. Throttle..... set 1000 RPM
20. Carburetor Heat (DA 40 F only)..... check COLD
21. Alternate Air (DA 40 only)..... check CLOSED
22. Flight Plan..... entered
23. Altimeter setting..... checked/set (G1000 and standby altimeter)
24. G1000 and autopilot altitude preselectors..... set
25. Radios ..... set and checked
26. Transponder ..... code set
27. Standby attitude gyro ..... erect and no flag
28. Parking brake ..... release
29. Landing light..... ON as required

Missed Approach

(See KAP 140 flight manual supplement for additional information)

a. ... AP DISC Switch ..... PRESS to disengage AP
b. ... MISSED APPROACH ..... EXECUTE
c. ... AP Button – After airplane is in trim and climb established .... PRESS (for autopilot operation if desired).
d. ... G1000 HDG bug ..... Set to missed approach heading
e. ... Autopilot HDG switch..... PRESS
f. .... G1000 Missed Approach..... ACTIVATED
g. ... Autopilot NAV switch..... PRESS (After missed approach path has been verified)

NOTE

If engaged, the autopilot must be operated in HDG mode until the pilot has verified that the autopilot programming will result in the required climb and tracking of the missed approach path. If tracking the ILS course outbound as part

of the missed approach procedure is desired, use the autopilot NAV mode to prevent inadvertent GS coupling.

AFTER TAKEOFF – TAWS NORMAL PROCEDURES
(If Optional TAWS system is installed)

TAWS CAUTION

When a TAWS CAUTION occurs, take positive corrective action until the alert ceases. Stop descending or initiate either a climb or a turn, or both, as necessary, based on analysis of all available instruments and information.

TAWS WARNING

If a TAWS WARNING occurs, immediately initiate and continue a climb that will provide maximum terrain clearance, or any similar approved vertical terrain escape maneuver, until all alerts cease. Only vertical maneuvers are recommended, unless either operating in visual meteorological conditions (VMC), or the pilot determines, based on all available information, that turning in addition to the escape maneuver is the safest course of action, or both.

TAWS INHIBIT

The TAWS Forward Looking Terrain Avoidance (FLTA) and Premature Descent Alerts (PDA) functions may be inhibited to stop alerting for acceptable flight conditions (such as below glideslope maneuvers). For detailed operating instructions regarding the G1000 TAWS Option, refer to the Garmin DA 40/DA 40F Pilot's Guide.

4B.3 FAILURES IN THE ELECTRICAL SYSTEM

(a) Low voltage caution (LOW VOLTS)

This caution is indicated when the normal on-board (bus) voltage (28V) drops below 24V.

Possible reasons are:

-A fault in the power supply

-RPM is too low

(i) Low voltage on the ground:

1. Engine speed.....1200 RPM
2. Electrical equipment .....OFF
3. Ammeter and voltmeter .....check

If the caution message does not extinguish, and the ammeter legend flashes and reads zero, discontinue the flight.

(ii) Low voltage caution during flight:

1. Electrical equipment .....OFF if not needed
2. Ammeter and Voltmeter .....check

If the caution message does not go out, and the ammeter legend flashes and reads zero, follow procedure 3.7.2(b) – Alternator Failure, in this Supplement.

(iii) Low voltage caution during landing:

-Follow (i) after landing

SECTION V
PERFORMANCE

No change.

SECTION VI
WEIGHT AND BALANCE

See current weight and balance data.

SECTION VII
SYSTEM DESCRIPTIONS

G1000 SYSTEM

The Garmin G1000 Integrated Avionics System consists of a Primary Flight Display (PFD), a Multi-Function Display (MFD), an Audio Panel, and Attitude and Heading Reference System (AHRS), an Air Data Computer (ADC), and the sensors and computers to process flight and engine information for display to the pilot. The system contains dual GPS receivers, dual VOR/ILS receivers, dual VHF communications transceivers, a transponder, and an integrated annunciation system to alert the pilot of certain abnormal conditions. Optional equipment includes an Automatic Direction Finder (ADF) receiver, and Distance Measuring Equipment (DME),.

The GPS receivers will either be non–WAAS capable (if GIA 63 units are installed) or WAAS capable (if GIA 63W units are installed).

The Primary Flight Display (PFD) typically displays airspeed, attitude, altitude, and heading information in a traditional format. Slip information is shown as a trapezoid under the bank pointer. One width of the trapezoid is equal to a one ball width slip. Rate of turn information is shown on the scale above the compass rose; full scale deflection is equal to a standard rate turn. The following controls are available on the PFD (clockwise from top right):

- Communications frequency volume and squelch knob
- Communications frequency set knobs
- Communications frequency transfer button
- Altimeter setting knob (baro set)
- Course knob
- Map range knob and cursor control
- FMS control buttons and knob
- PFD softkey buttons, including master warning/caution acknowledgement
- Altitude reference set knob
- Heading bug control
- Navigation frequency transfer button
- Navigation frequency set knobs
- Navigation frequency volume and Identifier knob

The PFD displays the crew alerting (annunciator) system. When a warning or caution message is received, a warning or caution annunciator will flash on the PFD, accompanied by an aural tone. A warning is accompanied by a repeating tone, and a caution is accompanied by a single tone. Acknowledging the alert will cancel the tone and flashing and provide a text description of the message. Refer to the Emergency or Abnormal Procedures Sections of the AFM or this Supplement for the appropriate procedure to follow for each message.

Advisory messages related to G1000 system status are shown in white and are accompanied by a white flashing ADVISORY alert. Refer to the G1000 Pilot's Guide and Cockpit Reference Guide for descriptions of the messages and recommended actions (if applicable).

Trend vectors are shown on the airspeed and altimeter displays as a magenta line predicting 6 seconds at the current rate. The turn rate indicator also functions as a trend indicator on the compass scale.

The PFD can be displayed in a composite format for emergency use by releasing the red DISPLAY BACKUP button at the bottom of the audio panel. (Manual display backup mode is engaged when the button on the audio panel is OUT) In the composite mode, the full crew alerting function remains.

The Multi-Function Display (MFD) typically displays engine data, maps, terrain, traffic and topography displays, and flight planning and progress information. The display unit is identical to the PFD and contains the same controls as previously listed.

The audio panel contains traditional transmitter and receiver selectors, as well as an integral intercom and marker beacon system. The marker beacon lights appear on the PFD to the left of the top end of the altitude tape. In addition, a clearance recorder records the last 2 ½ minutes of received audio. Lights above the selections indicate what selections are active. Releasing the red DISPLAY BACKUP button on the audio panel (button OUT) causes both the PFD and MFD to display a composite mode.

The Attitude and Heading Reference System (AHRS) uses GPS, rate sensors, air data, and magnetic variation to determine pitch and roll attitude, sideslip and heading. Operation is possible in a degraded mode if the system loses any of these inputs. Status messages alert the crew of the loss of any of these inputs. The AHRS will align while the aircraft is in motion, but will align more quickly if the wings are kept level during the alignment process.

The Air Data Computer (ADC) provides airspeed, altitude, vertical speed, and air temperature to the display system. In addition to the primary displays, this information is used by the FMS and Traffic Information System (TIS) systems.

Engine instruments are displayed on the MFD. Discrete engine sensor information is processed by the Garmin Engine Airframe (GEA) sub-system. When an engine sensor indicates a value outside the normal operating range, the legend will turn yellow for caution range, and turn red and flash for warning range.

G1000/KAP 140 INTERFACE

The G1000 system provides heading and course information, lateral and vertical navigation flags and both lateral and vertical course deviation signals to the KAP 140 autopilot. When course deviation signals are available from the G1000, the KAP 140 may be coupled to those signals as described in the autopilot documentation.

When navigation changes on the G1000 cause the KAP 140 autopilot to automatically revert to ROL mode, the G1000 system will provide a message to alert the pilot to verify that the autopilot mode is as desired.

The G1000 system controls and displays affecting KAP 140 autopilot operation are;

- PFD mounted CDI selector button
- PFD/MFD mounted heading select knob (HDG)
- PFD/MFD mounted course select knob (CRS)
- Course Deviation Indicator (CDI) and flag
- Vertical Deviation Indicator (GS/VPTH) and flag

No altitude information or altitude preselect settings are exchanged between the autopilot and the G1000 system. Altitude and barometric setting entries must be made separately on the G1000 and KAP 140 autopilot systems as appropriate.

When passing the missed approach point (MAP) on an instrument approach, the aircraft should either be hand flown or the autopilot operated in HDG mode until the appropriate missed approach path and climb has been established. Before re-engaging the autopilot, the pilot must carefully assure that the autopilot programming will result in a turn in the correct direction and the required climb.

Refer to the appropriate KAP 140 autopilot Airplane Flight Manual or Airplane Flight Manual Supplement for information and procedures for the KAP 140 autopilot.

7.10 FUEL SYSTEM

Fuel Quantity Indication

Each fuel tank has a capacity probe that ascertains fuel quantity in that tank. Standard Tank configurations have two fuel probes, one in each wing. Long Range Tank configurations have four fuel probes, two in each wing, an outboard tank and an inboard tank. When the fuel quantity indicator reads zero, only unusable fuel remains in the tank. Usable capacity of each tank for the Standard Tank configuration is 20 US gal (76 liters). Usable capacity of an outboard and inboard tank for the Long Range Tank configuration is 24 US gal (91 liters).

Fuel quantity:

Fuel quantity indicating for the Standard Tank configuration functions as described in the DA 40 AFM. Also, refer to the 'G1000 Pilot's Guide for the Diamond DA 40' for additional information about the functionality of the G1000's fuel quantity gauge.

For the Long Range Tank configuration, dual pointers on a linear scale, a top pointer for the left fuel quantity and a bottom pointer for the right fuel quantity indicate fuel quantity. The fuel quantity gauge is marked in five gallon increments starting at zero to 25 US gal. The break in the green band between 16 and 19 US gal shows the un-gauged portion of the fuel tanks usable fuel.

When a fuel tank is completely full, the quantity pointer will indicate 24 US gallons. As fuel is consumed from the tank, the pointer will move to the left. Once there is no more measurable fuel in the outboard tank, the pointer migrates over a 30 second period to the 16 US gal position. The pointer will remain at 16 US gallons while the un-gauged fuel quantity is consumed. Once the quantity of fuel remaining in the inboard tank is less than 16 gallons, the pointer will begin moving left towards zero. When either pointer enters the amber portion of the scale, the pointer and the gauge title, 'FUEL QTY GAL', will turn amber. When either pointer enters the red portion of the gauge, the pointer will turn red, and the gauge title, 'FUEL QTY GAL', will turn red and flash continuously in inverse video. When the fuel quantity in either tank falls below approximately 3 gallons, a message (L FUEL LOW or R FUEL LOW) will be presented on the PFD along with an alert tone. When the fuel quantity in the tanks is low, fuel movement during taxiing turns may cause the low fuel warnings to be presented.