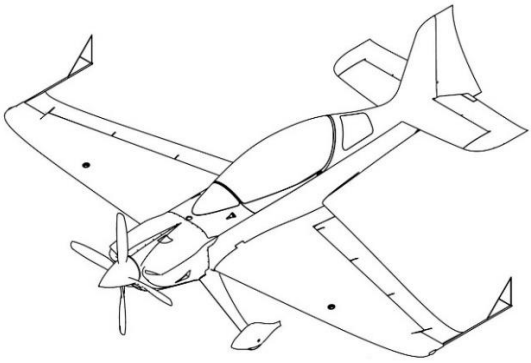
Airplane Flight Manual GB1 GameBird



This Manual includes the material required by EASA and FAA regulations to be furnished to the pilot, plus additional information provided by the manufacturer.

This Manual constitutes the EASA Approved Airplane Flight Manual, and
FAA Approved Airplane Flight Manual for US operations in accordance with FAR 21.29

Document No. AFM-GB1-0000-00-02

Valid for **S/N** 0083

Manufacturer: Game Composites LLC
3201 SW I Street, Bentonville,
72712 Arkansas, USA

www.gamecomposites.com

FAA approved in the acrobatic category based on FAR 23.
This document must be carried in the airplane at all times.
This handbook meets GAMA specification no.1, October 1996
for pilot's operating handbook

FAA TCDS A00073CE EASA TCDS A.610

Revision A03 FAA approved by: _____
For Manager Southwest Flight Test Section, AIR-713
Federal Aviation Administration
Fort Worth, TX 76177

List of Revisions

Revision	Changes	Date
A01	First issue	22 September 2018
A02	Title Page revised 7-17 ASI type revised Various editorial revisions	21 February 2019
A03	Addition of information on Landing Lights, COM Swap Switch, External Power in chapters 2.13, 4.3, 7.3.1, 7.15, added 7.19, removed details in 7.3.1, 7.1.4, Added data in 5.5 and 5.10	08 April 2020

Obtaining Revisions

Actual revisions of Airplane Flight Manual & Supplements, Airplane Maintenance Manual and Service Bulletins are freely available on the Game Composites website.

Table of Contents

Warnings, Cautions and Notes

The following definitions apply:

WARNINGS	**Operating procedures which, if not carefully followed, could result in personal injury or loss of life**
CAUTIONS	**Operating procedures, techniques, etc., which if not carefully followed could result in damage to equipment**
NOTES	**Operating procedures, techniques, etc., which are considered important to emphasise**

Introduction and Notes

This Airplane Flight Manual contains 9 chapters, and includes the material required to be known by the pilot as per:

14 CFR, amendment 62,
and CS-23, amendment 3

This manual also contains supplementary information provided by Game Composites for optional equipment.

This AFM applies only to the S/N printed on the cover.

This AFM is only valid at its latest approved revision which is freely available on the Game Composites website. The operator is responsible for ensuring that the most recent revision is used.

It is the responsibility of the pilot to be familiar with the contents of this AFM including revisions and any relevant supplements.

Pages of this AFM must not be exchanged and no alterations or additions may be made to the approved contents without the approval of either Game Composites Ltd or a relevant airworthiness authority.

Amendments, which affect the airworthiness of the airplane, will be announced in Service Bulletins, issued by the manufacturer Game Composites along with "Airworthiness Directive" (AD) publication by EASA.

1 General

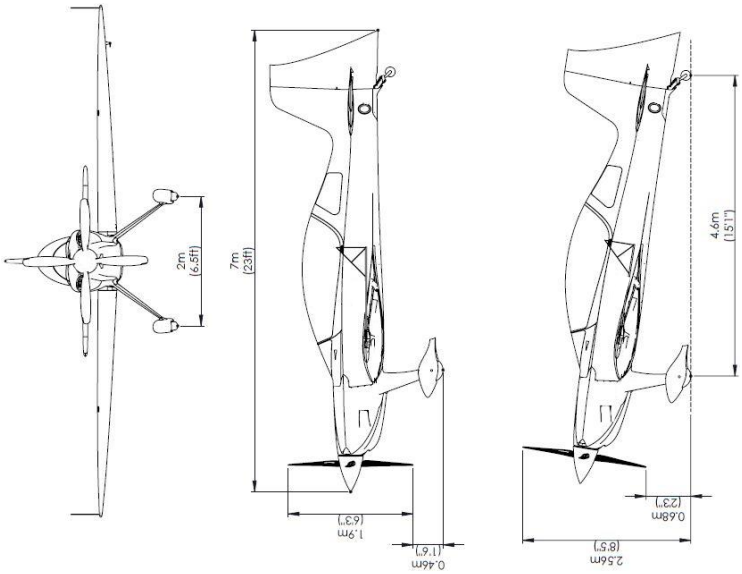
1.1 Description and Category

The GB1 is a two-seat, high performance aerobatic airplane, main structure constructed from carbon and glass fiber composites, epoxy resin and foam or honeycomb sandwich materials.

The GB1 is certified in the aerobatic category in accordance with 14 CFR, amendment 62, and CS-23, amendment 3.

Type certificate data sheet EASA.A.610 and FAA A00073CE.

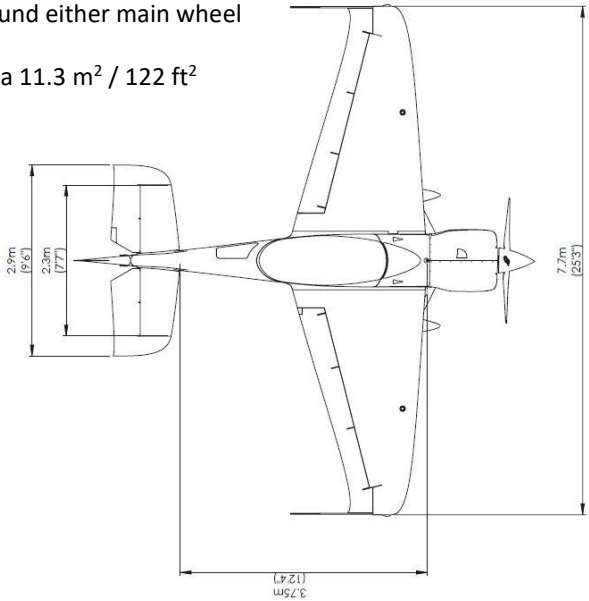
1.2 General Arrangement Drawing



Minimum Turning Radius:
pivot around either main wheel

006

Wing Area 11.3 m^2 / 122 ft^2



1.3 Engine

Type: AEIO 580 B1A
Rated power: 303 hp (225 kW) @ 2600 rpm

Manufacturer: Lycoming Engines, Williamsport, PA 17701, USA

1.4 Propeller

Type: MTV-14 –B-C/C190-130, four blade constant speed, diameter 1900mm (75 inches)

Manufacturer: MT-Propeller Entwicklung GmbH, 94348 Atting, Germany

1.5 Exhaust

Type: GB1-7800-00-00, 2 x 3-in-1

Manufacturer: Sky Dynamics, 1900 Skyway Drive, Moneta, PA 24121, USA

1.6 Fuel

Avgas 100 / 100LL

Acrotank, located in the forward fuselage:	25 Gal (95 liters)
Wings fuel tanks, left and right:	28 Gal (108 liters) each
Total fuel capacity:	81 Gal (311 liters)

1.7 Smoke Oil

Only paraffin-based oil is approved for use in the smoke system,
for example: Fauth FC05 or Aeroshell Smoke Oil.

Tanks of 3.7 Gal (14 liters) each are located in each wing root,
7.4 Gal (28 liters) total capacity.

1.8 Engine Oil

Maximum sump capacity: 16 US quarts
Minimum oil quantity: 8 US quarts

Suggested grades:

Average Ambient Temp.	Mil-L6082 Grades	Mil-22851 Ashless Dispersant Grades
All temperatures	---	SAE 15W50 or 20W50
> 27°C (80°F)	SAE 60	SAE 60
> 16°C (60°F)	SAE 50	SAE 40 or SAE 60
-1°C to 32°C (30°F to 90°F)	SAE 40	SAE 40
-18°C to 21°C (0°F to 70°F)	SAE 30	SAE 30, SE 40 or 20W50
-18°C to 32°C (0°F to 90°F)	SAE 20W50	SAE 20W50 or SAE 15W50
< -12°C (10°F)	SAE 20	SAE 30 or 20W30

1.9 Wing and Power Loadings at MTOW

Wing Loading: 89 kg/m^2 (18 lb/ft^2)
Power Loading: 4.3 kg/kW (7.0 lb/hp)

1.10 Units and Conversions

- 1 Gallon of 100LL fuel weighs 6.0 lb
- 1 liter of 100LL fuel weighs 0.72 kg
- 1 Gallon = 3.8 liters
- 1 lb = 0.454 kg
- 1 metre = 39.4 inches
- 1 foot = 0.305 metres
- 1 knot = 1.85 kilometres per hour

1.11 Glossary of Terms, Abbreviations and Symbols

ACL	Anti-Collision Lights
AD	Airworthiness Directive
AFM	Airplane Flight Manual
ADS-B	Automatic Dependant Surveillance - Broadcast
AHRS	Attitude Heading and Reference System
ADHRS	Air Data and Attitude Heading and Reference System
ALT	Alternator
AMM	Aircraft Maintenance Manual
BAT	Battery
°C	Degrees Celsius
CAS	Crew Alert System
CAS	Calibrated Airspeed
CG	Center of Gravity
CHT	Cylinder Head Temperature
CNS	Communication, Navigation, Surveillance
CO	Carbon monoxide
conn	Connections
dB(A)	A-weighted decibels
DC	Direct Current
EASA	European Aviation Safety Administration
EDC	Engine Data Converter
EGT	Exhaust Gas Temperature
ELT	Emergency Locator Transmitter
°F	Degrees Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
G	Vertical acceleration
GDU	Garmin Display Unit
GPS	Global Positioning System
hp	Horsepower
HSI	Horizontal Situation Indicator
IAS	Indicated Airspeed
ICAO	International Civil Aviation Organization
ISA	International Standard Atmosphere
kg	Kilograms
kW	Kilowatt
l	Liter (0.26 gal)

LE	Leading Edge
lb	Pounds
m	Metres
MAC	Mean Aerodynamic Chord
MFD	Multi-Function Display
mm	Millimetres
MP	Manifold Pressure
MTOW	Maximum take-off weight
NDB	Non-Directional Beacon
°C	Degrees Celsius / Centigrade
°F	Degrees Fahrenheit
OAT	Outside Air Temperature
PIC	Pilot In Command
psi	Pounds per square inch
Qty	Quantity
rpm	Revolutions per minute
SD	Secure Digital (Data Cards)
SN	Serial Number
Gal	US Gallon (3.8 liters)
TAS	True Airspeed
TCDS	Type Certificate Data Sheet
TE	Trailing Edge
TOW	Take Off Weight
VFR	Visual Flight Rules
VHF	Very High Frequency radio
V_{NE}	Never exceed speed
V_{NO}	Maximum structural cruising speed
V_S	Stall speed
V_O	Maximum operating manoeuvring speed
VOR	Very High Frequency Omni-Directional Range
V_x	IAS for best angle of climb
V_y	IAS for best rate of climb
WAAS	Wide Area Augmentation System
XPDR	Transponder

2 Limitations

The limitations in this Section are approved by EASA & FAA.

2.1 Flight Crew Limitations

The minimum crew is one pilot flying from the rear seat only.

The maximum number of occupants is two;
Pilot in command is in the rear seat.

The full seatbelt system must be worn and tight at all times.

2.2 Kinds of Operations

Flying is only allowed under VFR day conditions.

Flight in icing conditions is prohibited.

Areas with risk of lightning should be avoided.

Smoking is prohibited.

2.3 Airspeed Limitations

Item	IAS (kts)	CAS (kts)
V_O Maximum operating manoeuvring speed	**170**	**166**
V_{NO} maximum structural cruising speed	**200**	**196**
V_{NE} never exceed speed	**234**	**230**

NOTE: **The structure is designed for full and rapid aileron deflection up to V_{NE}, with empty wing tanks only!**

2.4 Weight Limitations

Maximum take-off weight MTOW
and maximum landing weight: 999 kg (2200 lbs) *****
Maximum zero wing fuel weight: 880 kg (1940 lbs)

***Limited to 880 kg for aerobatic flights**
(with the wing tanks and baggage empty)

2.5 Center of Gravity Limitations

Reference plane for CG calculations:

Vertical:	firewall, vertical face
Forward Limit:	580 mm (22.8'') = 25% MAC
Aft Limit:	780 mm (31.1'') = 34% MAC

2.6 Maneuver and Load Factor Limitations

- Load factor limits: +/- 10G at TOW up to 880 kg (1940 lb)
  The wing fuel tanks and baggage bay must be empty for aerobatics.

- Load factor limits: +/- 6G at TOW 881 to 999 kg (2200 lb)
  With fuel in the wings, aerobatics and intentional spins are prohibited.

2.7 Altitude Limitation

Maximum operating altitude is 15,000 ft.

2.8 Tire Pressure

Tire pressure must be between 3.5 and 3.8 bar (50 – 55psi)

2.9 Powerplant Limitations

Engine

Lycoming AEIO-580 B1A, 303hp (225kW) @	2600 rpm
Maximum RPM (take-off and continuous):	2600 rpm
Maximum engine oil temperature:	245°F (118°C)
Oil Pressure Ranges:	
Minimum at idle speed:	25 psi (1.7 bar)
Normal operating:	55 to 95 psi (3.8 to 6.5 bar)
During start and take-off:	up to 115 psi (7.9 bar)

CAUTION: **In prolonged knife-edge and zero-g flights, oil pressure may drop, indicated to the pilot an audible, significant reduction of RPM.**
If oil pressure drop during aerobatics is observed, return to level flight.

NOTE: **It is normal for the oil pressure to "flicker" when going from upright to inverted flight.**

Maximum CHT:	465°F (240°C)
Fuel pressure:	
Idle minimum	12 psi
Normal operation	18 - 65 psi

Propeller

MT-Propeller MTV-14-B-C/C190-130, four blade constant speed, diameter 1900mm (75 inches)

Maximum propeller speed (take-off & continuous): 2600 rpm

Fuel

Avgas 100LL or Avgas 100

Acrotank	25 Gal (95 liters)
Unusable fuel Acrotank	0.13 Gal (0.5 liters)
Wings fuel tanks, left and right, each	28 Gal (108 liters)
Unusable fuel each wing tank	0.13 Gal (0.5 liters)
Total capacity, all 3 tanks	82 Gal (311 liters)
Total useable fuel	81 Gal (309 liters)

Oil

Oil contents: 8 to 16 quarts

Suggested grades:

Average Ambient Air Temp.	Mil-L6082 grades	Mil-22851 Ashless dispersant grades
All temperatures	-	SAE 15W50 or 20W50
> 27°C (80°F)	SAE 60	SAE 60
> 16°C (60°F)	SAE 50	SAE 40 or SAE 60
-1°C to 32°C (30°F to 90°F)	SAE 40	SAE 40
-18°C to 21°C (0°F to 70°F	SAE 30	SAE 30, SE 40 or 20W50
-18°C to 32°C (0°F to 90°F)	SAE 20W50	SAE 20W50 or SAE 15W50
< -12°C (10°F)	SAE 20	SAE 30 or 20W30

Single or multi-viscosity aviation grade oils see latest issue of Textron Lycoming S.I. No. 1014.

2.10 Instrument Markings

Airspeed Indicator Markings

Green arc	V_S to V_{NO}	60 to 200 kts
Yellow arc	V_{NO} to V_{NE}	200 to 234 kts
Red line	V_{NE}	234 kts

MFD Markings

	Normal Operation	Caution	Limit
	Green	Yellow	Red
Manifold Pressure	11 to 32 "Hg	-	-
RPM	700 to 2600	-	above 2600
Oil Pressure	55 to 95 psi	25 to 55 psi	below 25 psi
		95 to 115 psi	above 115 psi
Oil Temperature	100 to 245°F	-	below 100°F
			above 245°F
Fuel Pressure	12 to 65 psi	0 to 12 psi	0 psi
Fuel Flow	-	-	-
CHT	200 to 465°F	100 - 200°F	above 465°F
EGT	1100 to 1500°F	-	above 1550°F
Volts	12.4 to 15.5	below 12.4	-
		above 15.5	
Amperes	3 to 40	0 to 3	-
Structure Temperature	-30°C to 72°C	-	below -30°C / 22°F
	22°F to 161°F		above 72°C / 161°F
Fuel Quantity Acrotank	7 to 25 Gal	0 to 7 Gal	Red line at 0
	26 to 95 liters	18 to 26 liters	
Fuel Qty Left Wing	3.4 to 28 Gal	0 to 3.4 Gal	Red line at 0
	13 to 108 liters	0 to 13 liters	
Fuel Qty Right Wing	3.4 to 28 Gal	0 to 3.4 Gal	Red line at 0
	13 to 108 liters	0 to 13 liters	
Accelerometer	±10 G	-	Red line at +10
			Red line at -10

2.11 Structure Temperature

The structure is qualified up to 72°C / 161°F.

Structure temperature is displayed on the MFD1 when powered-up.

Flying with structure temperature above 72°C / 161°F is prohibited.

Should the structure temperature indicating system be inoperable, the airplane may still be flown if:

ambient temperature is less than 30°C (86°F),

or,

if the ambient temperature is greater than 30°C (86°F), the airplane must be parked out of direct sunlight for at least one hour before flight.

NOTE: **It is recommended to minimise repeated exposure of the airframe to temperatures above limitations.**

2.12 Smoke Oil

Only paraffin-based oil is approved for use in the smoke system, for example: Fauth FC05 or Aeroshell Smoke Oil.

- Flash point 200°C (390°F)
- Auto-ignition point >320°C (600°F)

Tanks of 3.7 Gal (14 liters) each are located in each wing root, 7.4 Gal (28 liters) total capacity.

2.13 Kinds of Operation Equipment List

The GB1 may be operated in day VFR only, for which the following systems and items of equipment must be installed and operable for their indicated function:

	Standard / Optional / Not available	Rear Panel	Front Panel
Communication			
VHF transceiver, intercom	O	O	N/A
Electrical Power			
Battery	S		
Alternator	S		
External Power Socket	O		
Regulator	S		
USB 12V Power supply	O	O	O
Flight Control System			
Elevator and aileron trim	S		
Fuel			
Boost pump	S		
Light			
Wingtip Position/ Strobe Lights	S		
Landing / Recognition Lights	O		
Navigation			
Compass	S	S	N/A
Transponder	O_1	O_1	N/A

Cockpit equipment			
Airspeed Indicator	S	S	S
Altimeter	S	S	S
Accelerometer	S	S	N/A
Annunciator Lights	S	S	N/A
MFD1 display: RPM, Man. P, Oil P, Oil T, Fuel P, Fuel quantity (3 tanks) Voltage, Amperes, CHT (6x), EGT (6x), Fuel Flow, Accelerometer, Clock, CO-Monitor, structural temp. indication	S	S	N/A
MFD1 display: Electronic Flight Instruments Own-ship position indication (GPS)	O	O	N/A
MFD2 display: RPM, Man. P, Oil P, Oil T, Fuel P, Fuel quantity (3 tanks) Voltage, Amperes, CHT (6x), EGT (6x), Fuel Flow, Accelerometer, Clock, CO-Monitor, structural temp. indication, Electronic Flight Instruments Own position indication (GPS)	O	N/A	O
MFD2 display: Electronic Flight Instruments Own-ship position indication (GPS)	O	N/A	O

Flight Crew Equipment			
Parachute	O_2	O_2	O_2
Headset / Helmet	O_3	O_3	O_3
Seatbelt system	S	S	S

Safety Equipment			
ELT	O_1	O_1	O_1
Fire Extinguisher	S	S	N/A

1 - check local regulations for required specification

2 - recommended for aerobatics, check local regulations

3 - recommended, and required for use of VHF, if installed

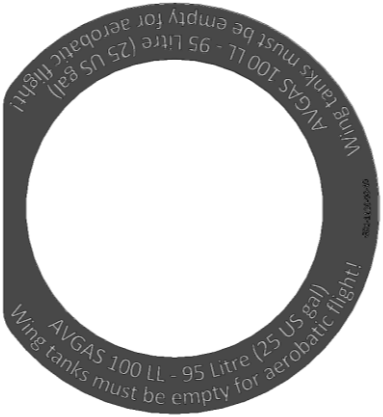
2.14 Placards

GB1-1120-00-06 Placard, Smoke Oil Filler

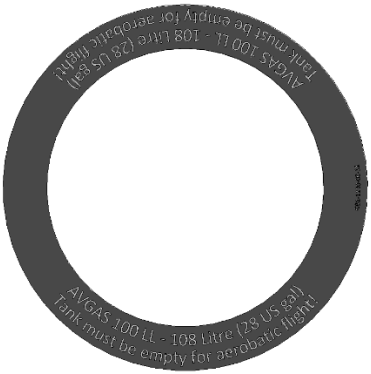
GB1-1120-00-07 Placard, Fuel Tank Drain

GB1-1120-00-08 Placard, Fuel Tank Vent

GB1-1120-00-10 Placard, Acrotank Fuel Filler



GB1-1120-00-11 Placard, Wing Fuel Filler



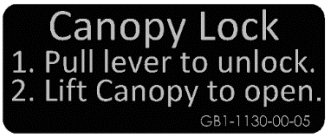
GB1-1120-00-16 Placard, Tire Pressures

GB1-1120-00-17 Placard, Oil Breather

GB1-1120-00-18 Placard, Ballast Weight

GB1-1120-00-20 Placard, Gascolator Drain

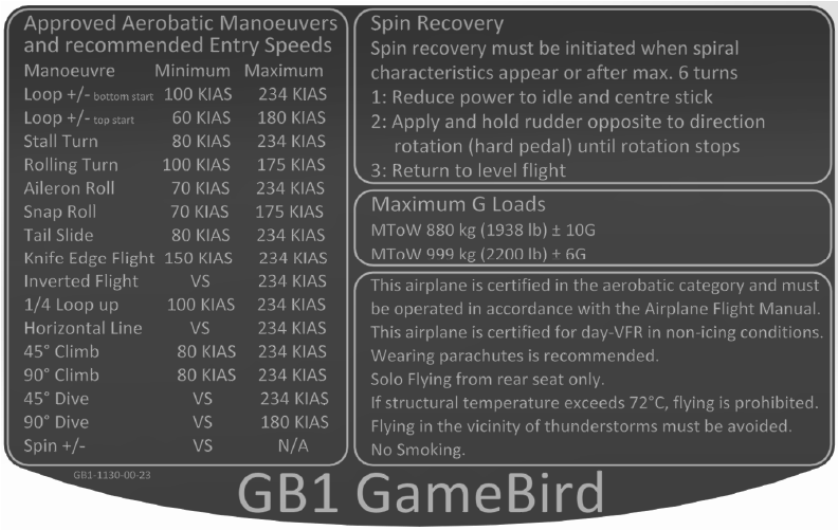
GB1-1130-00-05 Placard, Canopy Lock



GB1-1130-00-06 Placard, Baggage Compartment

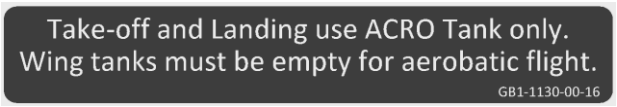
GB1-1130-00-08 Placard, Headset Sockets

GB1-1130-00-09 Instrument Panel Placard



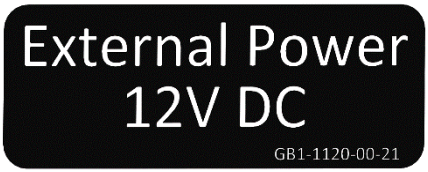
GB1-1130-00-14 Placard, Vo

GB1-1130-00-16 Placard, Wing Tanks Empty



GB1-1130-00-20 Placard, baggage door

GB1-1130-00-21 External Power Socket



GB1-1130-00-25 Recognition / Landing Lights

3 Emergency Procedures

3.1 Introduction

This section contains the checklist and procedures for coping with emergencies that may occur. It must be followed in emergencies to ensure maximum safety for the crew and / or airplane.
Knowledge of these procedures will enable the crew to cope better with an emergency.
The steps should be performed in the listed sequence.
However, these procedures do not restrict the crew from taking any additional action necessary to deal with the emergency.
In any emergency situation, contact should be established with a ground station as soon as possible after completing the initial corrective action.
Include in the first transmission: position, altitude, heading, speed, nature of the emergency and pilot's intentions.
Thereafter, the ground station should be kept informed of the progress of the flight and of any changes or developments in the emergency.

Three basic pilot tasks are applicable to most emergencies:

1. Maintain airplane control
2. Analyse the situation and initiate proper action
3. Land as required, see definitions below

Definitions:

Land Immediately	Consequences of continued flight are potentially catastrophic
Land as soon as possible	Do not continue flight further than necessary to achieve a safe landing at the nearest airfield
Land as soon as practical	Land at the nearest airfield for subsequent convenience

3.2 Warning, Circuit Breakers

Make only one attempt to restore an automatically disconnected power source or to reset or replace an automatically disconnected circuit breaker that affects flight operations or safety.
Each repeated attempt to restore an automatically disconnected power source or the resetting of an automatically disconnected circuit breaker can result in progressively worse effects.

3.3 Airspeeds for Emergency Operation

Stall speed @ MTOW: No audio stall warner is fitted to the GB1. The airplane provides aerodynamic stall warning.	60 kts
Best recommended gliding speed, use for: • Engine failure whether after take-off or in flight • Precautionary landing with engine power	93 kts

3.4 Operational Checklists

3.4.1 Engine Failure during Take-off

When sufficient runway is left:

Brake	AS REQUIRED

When insufficient runway is left:

Brake	AS POSSIBLE
Mixture	CUTOFF
Ignition	OFF
Master switch	OFF

3.4.2 Engine Failure Immediately after Take-off

Maintain airspeed	90 kts
Land ahead	

3.4.3 Engine Restart in Flight

Speed	90 kts or more
Fuel quantities	CHECK
Acrotank	SELECT
Ignition	CHECK BOTH
Electric fuel pump	ON
Mixture	PUSH FULL RICH
Throttle	1/4 OPEN
Starter (if propeller stopped)	ENGAGE
After restart, boost pump	OFF
Mixture	ADJUST AS REQUIRED
If restart fails	BEST GLIDE SPEED 93 kts, EMERGENCY LANDING

3.4.4 Oil System Malfunctions

Low oil pressure:

Oil temperature and pressure	OBSERVE
Annunciator lights	CROSS CHECK
RPM and MP	REDUCE
If Pressure drops below 25 psi	
Suitable Emergency Landing Site	SELECT EMERGENCY LANDING

WARNING: **If oil pressure drops below 25 psi and oil temperature rises, STOP ENGINE (after Emergency Landing Site assured)**

WARNING: **If oil pressure drops to zero, propeller goes to coarse pitch = low RPM = low drag**

High oil temperature:

Oil temperature and pressure	OBSERVE
Annunciator lights	CROSS CHECK
If temperature rises as pressure falls	REDUCE POWER
If possible and safe	INCREASE AIRSPEED
If temperature rises above 245°	
Suitable Emergency Landing Site	SELECT EMERGENCY LANDING

WARNING: **If oil temperature rises above 245°and oil pressure drops, STOP ENGINE (after Emergency Landing Site assured)**

3.4.6 Alternator Failure

Alternator switch	OFF
If consistent with safe flight	REDUCE LOAD

A new and fully charged battery may supply electrical power for:

- Minimum standard flight load (strobes, transponder and radio on, but boost pump OFF) for no more than 1.5 hours.

- As above plus boost pump ON, no more than one hour.

Before next flight	FIX PROBLEM

3.4.7 Electrical Fire

Master switch	OFF
Ventilation	MAXIMUM
If inadequate	CONSIDER JETTISON CANOPY
If fire extinguished	LAND AS SOON AS PRACTICAL
If fire continues	LAND IMMEDIATELY

WARNING: **Execute a landing without delay. The primary consideration is to ensure survival of the occupants!**

NOTE: **If parachutes are worn, consider Bail Out**

3.4.8 Engine Malfunctions

3.4.8.1 High cylinder head temperature

Mixture	PUSH FULL RICH
RPM and MP	REDUCE
Oil Pressure	MONITOR
Flight with reduced power	CONTINUE

3.4.8.2 Sudden loss of power

Mixture	PUSH FULL RICH
Electric fuel pump	ON
Fuel quantities	CHECK
Acrotank	SELECT
Ignition	CHECK BOTH
Propeller control	PUSH FINE (HIGH RPM)

3.4.9 Engine Control Malfunctions

Throttle:

Navigate to nearest airfield	
In safe position for glide	STOP ENGINE, MIXTURE CUTOFF BEST GLIDE SPEED 93 kts, PRECAUTIONARY LANDING

Propeller Control:

Engine parameters	MONITOR
Fuel flow / range	CHECK
Flight plan	ADJUST, if necessary

Mixture Control:

Engine parameters	MONITOR
Fuel flow / range	CHECK
Flight plan	ADJUST, if necessary
In safe position for glide (In case mixture is too lean to keep engine running at lower altitudes)	PRECAUTIONARY LANDING

3.4.9 MFD Malfunctions

NOTE: To assess equipment and function failures, it is recommended to be familiar with the G3X system schematics in section 7.3.3, showing relations and dependencies of system components.

3.4.9.1 Failure of MFD1

Failure indication: dark screen

1.	Standby instruments	Reference
2.	Circuit Breakers 'MFD1'	Check, try to reset
3.	VHF interface	Utilize GTR225
4.	Transponder interface	Utilize GTX345
5.	Engine operation	Monitor Annunciator Lights, Monitor audible cues
6.	Land	As soon as possible

3.4.9.2 Failure of MFD2

Failure indication: dark screen

1.	Standby instruments	Reference
2.	Circuit Breakers 'MFD2'	Check, try to reset

3.4.9.3 Loss of AADHRS

Failure indication: Red X over Electronic Flight Instruments

1.	Standby instruments	Reference
2.	Circuit Breaker 'AHRS'	Check, try to reset

CAUTION: Do not operate in conditions that require an attitude indicator! Airplane is certified for day VFR only.

3.4.9.4 Loss of Magnetometer

Failure indication: Red X over HSI / CDI

1.	Compass	Reference
2.	GPS	Reference
3.	Circuit Breaker 'FLUX'	Check, try to reset

3.4.9.5 Loss of GPS signal

Failure indication: Red X over Attitude and/or Heading Indicator, and/or own ship position, indication 'no 1090' on XPDR display

1.	Compass	Heading Reference
2.	XPDR	CHECK
3.	Circuit Breaker 'XPDR'	Check, try to reset

NOTE: After interruption of GPS signal (exceeding 90° bank and/or pitch for more than 1 second), recovery may take up to one minute.

3.4.9.6 Loss of Engine Data Converter

Failure indication: Red X over all engine data indicators

1.	Engine operation	Monitor Annunciator Lights, audible cues, engine controls
2.	Circuit Breaker 'EDC'	Check, try to reset
3.	Land	As soon as practical

3.4.9.7 Loss of RPM Indication

Failure indication: Red X over RPM Field

1.	Audible cues	Monitor
2.	Propeller lever	As required
3.	Land	As soon as practical
4.	Propeller lever	Full forward prior to landing

3.4.9.8 Loss of Manifold Pressure Indication

Failure indication: Red X over Manifold Pressure Field

1.	Audible cues	Monitor
2.	Throttle	As necessary
3.	Aircraft performance	Monitor for expected
4.	Land	As soon as practical

3.4.9.9 Loss of Oil Pressure Indication

Failure indication: Red X over Oil Pressure Field

1.	Oil Pressure Caution Light	Monitor
2.	Oil temp, CHT, RPM	Monitor
3.	Land	As soon as possible

3.4.9.10 Loss of Oil Temperature Indication

Failure indication: Red X over Oil Temperature Field

1. Oil Temp Warning Light — Monitor
2. Oil press, CHT, RPM — Monitor
3. Land — As soon as practical

3.4.9.11 Loss of Wing Fuel Indication

Failure indication: Red X over Wing Fuel field

1. Fuel Flow — Monitor
2. if engine stops — Switch Tank
3. Land — within safe range

3.4.9.12 Wingtank Fuel Indication not decreasing

Failure indication: Wing Fuel keeps showing full

1. Switch to other wingtank and check for decrease in indication corresponding to fuel flow.
2. A- If other tank indicates correct, switch back to tank with faulty indication and continue flight, use fuel flow and ground preparation for fuel calculation to continue flight.
   B - If other wingtank has similar issue, land as soon as practical.

3.4.9.13 Rapid drop of Fuel Indications

1. Fuel selector — any other Tank with fuel
2. A - If other tank with fuel is available — As soon as practical
   B – If no other tank with fuel is available — As soon as possible

CAUTION: **If a leak is suspected, the structure may be damaged (for example, from a bird strike). Maneuver carefully!**

3.4.9.14 Loss of Acrotank Fuel Indication

Failure indication: Red X over Acrotank Field

1.	Fuel selector	if available, switch to full tank
2.	Acrotank Low Caution Light	Monitor
3.	Land	As soon as possible

CAUTION: **When Landing on any wingtank is required, sideslip with rudder deflected into direction of selected wingtank only to prevent fuel starvation (fuel pickup near root rib)**
For example, left wingtank selected, left rudder.

NOTE: **Wingtanks are only to be used during cruise and always emptied first. It is safe, even though not recommended, to fly on any wingtank until fuel starvation occurs, then switch to the other wingtank or Acrotank. The engine will restart within less than 7 seconds from the moment of selecting another tank. This method of fuel management provides at least the last known content of the Acrotank in the event of fuel capacity indication failure.**

3.4.9.15 Loss of Fuel Pressure Indication

	Failure indication:	- Red X over Fuel Pressure Field, red flashing CAS message next to HSI - Suspected low fuel pressure
1.	Fuel boost pump	ON
2.	Fuel Flow	Monitor
3.	Engine operation	Monitor
4.	if engine stops	switch to another tank
5.	Land	As soon as practical

NOTE: **Fuel Flow and Fuel Pressure Indications both indicate fuel quantity supplied to the engine and can be cross-referenced.**

3.4.9.16 Loss of Fuel Flow Indication

	Failure indication:	Red X over Fuel Flow Field
1.	Engine operation	Monitor
2.	Fuel Pressure Indication	Monitor
3.	Refer to AFM Section 5.8	Calculate range / endurance

3.4.9.17 Loss or unusual reading of single EGT or CHT

Failure indication: Red X over respective bar

1.	Mag Check	for smooth operation
2.	Adjacent EGT or CHT	Compare
3.	Engine operation	Monitor

NOTE: **A single unusual / unbalanced single EGT readings below 1100 and above 1550 can be considered sensor failures, if the engine runs smoothly (conduct mag check).**

A single unusual / unbalanced CHT reading may indicate a sensor failure, if the engine continues to run smoothly and the oil temperature and oil pressure do not change.

3.4.9.18 Loss of all EGT and/or CHT Indication

Failure indication: Red X over CHT/EGT scanner

1.	Fuel mixture	Adjust for smooth operation
2.	Engine instruments	Monitor
3.	Land	As soon as practical

3.4.9.19 Loss of Volt Indication

Failure indication: Red X over Volt Indication Field, yellow CAS message next to HSI

1.	Amps indication	Monitor If stable, most only indicator error.

3.4.9.20 Loss of Ampere Indication

Failure indication: Red X over Ampere Indication Field, yellow CAS message next to HSI

1.	Volts indication	Monitor If stable, most only indicator error.

3.4.9.21 Terrain Warning

Airplane is day VFR certified only, it is the pilot's responsibility to remain in VMC and not rely on this feature.

1.	Throttle	Full
2.	Prop	Ensure full forward
3.	Climb	V_X 80 kts until clear
4.	Mixture	Adjust for best power

3.4.9.22 Obstacle Warning

Airplane is day VFR certified only, it is the pilot's responsibility to remain in VMC and not rely on this feature.

1.	Throttle	Full
2.	Climb	V_X 80 kts until clear
3.	Prop	Ensure full forward
4.	Mixture	Adjust for best power

3.4.9.23 Descent Rate Warning

Airplane is day VFR certified only, it is the pilot's responsibility to remain in VMC and not rely on this feature.

Descent	Adjust as necessary

3.4.9.24 Traffic Advisory Failure

Indication: NO ADS-B in XPDR Field

1.	Visual Scan	Search for aircraft
2.	External Lights	On
3.	ATC	Query
4.	Maneuver	As necessary

3.5 Emergency Landing without Power

Speed	MAINTAIN 90 kts
Propeller	PULL COARSE PITCH (LOW RPM)
Suitable terrain	SELECT
Fuel selector switch	OFF
Mixture	CUTOFF CHECK
Master switch	OFF
Straps	TIGHTEN

WARNING: **Loss of oil pressure puts the propeller to coarse. Glide ratio control with propeller is not possible if oil pressure is lost!**

NOTE: **Best glide ratio 10 (at coarse / low rpm pitch)**
Propeller fine (pushed) reduces glide ratio to 7

3.6 Precautionary Landing with Power

Proceed as for normal landing.

CAUTION: **If reason for precautionary landing is powerplant related, climb and / or accelerate to get within gliding range of a suitable landing site.**

3.7 Fire on Ground

Fuel selector switch	OFF
Throttle	FULL OPEN
Mixture	PULL CUTOFF
Master switch	OFF
After engine failure, Ignition	OFF
Brakes	APPLY
Airplane	LEAVE IMMEDIATELY

Fire extinguishing: point fire extinguisher towards air inlets!

WARNING: **Do not remove cowling while fire is alight!**

3.8 Engine Fire in Flight

Fuel selector switch	OFF
Mixture	PULL CUTOFF
Master switch	OFF
After engine failure: Ignition	OFF
Throttle	FULL OPEN

IMMEDIATE EMERGENCY LANDING WITHOUT POWER

If fire not out & parachutes are worn, consider:	BAIL OUT

3.9 Icing, Inadvertent Encounter

The airplane is not approved for flight in icing conditions.

In the event of an icing encounter, turn back or change altitude to obtain an outside air temperature that is less conductive to icing.

Plan landing at nearest airfield.

With extremely rapid ice build-up select a suitable "off airport" landing field.

3.10 CO Warning

CO value is displayed on the MFD.
Should either yellow or red warning be displayed:

VENT	FULL OPEN

3.11 Unintentional Spin

3.8.1 Standard spin recovery:

Throttle	IDLE
Elevator and aileron	NEUTRAL
Rudder	AGAINST ROTATION DIRECTION
After rotation stops:	
Rudder	NEUTRAL
Airplane	RECOVER FROM DIVE

3.12 Bail-out (if Parachutes Worn)

Altitude, 1000 ft or more if practical	CHECK
Speed below 100 knots if practical	REDUCE
Mixture	PULL CUTOFF
Canopy	UNLOCK & OPEN
jettison canopy, if required	PUSH FORWARD
Seat belts	OPEN
Airplane	LEAVE
Parachute	OPEN

3.13 Emergency Exit after Roll-Over

Master switch	OFF
Fuel selector	OFF (Pull & Turn)
Seat belts	OPEN
Parachute, if worn	UNDO
Canopy	OPEN

NOTE: **If Canopy cannot be opened, break with shoulder harness buckle.**

WARNING: **Beware of sharp edges of broken canopy!**

3.14 Elevator Control Failure

In the event of elevator control failure, the airplane can be flown using combinations of power and elevator trim.
In this case, trim to the desired speed and use engine power to control horizontal flight or descent.
For landing, trim to 90 kts and establish a shallow descent by careful throttle management.
To flare, gently increase power to break descent rate.
These techniques will result in longer landing distances than normal.
If practical, choose a suitable airfield with long runway and rescue services.

If parachutes are worn & unable to
maintain control of the airplane, consider: BAIL OUT

3.15 Aileron Control Failure

In the event of an aileron control failure, the airplane can be flown using the aileron trim.
It is advisable to reduce the lateral fuel imbalance as much as possible before landing for symmetric efficiency of the trim.

If parachutes are worn & unable to
maintain control of the airplane, consider: BAIL OUT

NOTE: The aircraft does not have positive yaw / roll coupling, it is not possible to control the bank angle with the rudder in case of an aileron control failure.

3.16 Brake Failure

Failure of the brake system will result in a landing run about 50% longer than those published in section 5.9.
Directional control is still provided by the steerable tailwheel.
A runway of appropriate length should be chosen.

3.17 Lightning Strike

If the airplane is struck by a lightning:

Engine / Propeller Vibration	REDUCE RPM
Airspeed	Maintain below 110 kts
Gentle manoeuvring	+0 to +2 G only
Controllability	ASSESS HANDLING
If parachutes are worn & unable to maintain control of the airplane or airplane is on fire, consider:	BAIL OUT

4 Normal Procedures

4.1 Airspeeds for Normal Operation

Operation	IAS kts
Best climb rate (Vy)	90
Best angle of climb (Vx)	80
Cruise climb	90 to 160
Normal approach	90
Approach for short field landing	90

4.2 Checklists and Procedures

This manual contains the checklist and procedures to operate the airplane.
The pilot should be familiar with all procedures contained in this manual, which must be carried on board.
The pilot must comply with the checklists for daily check and inspections.

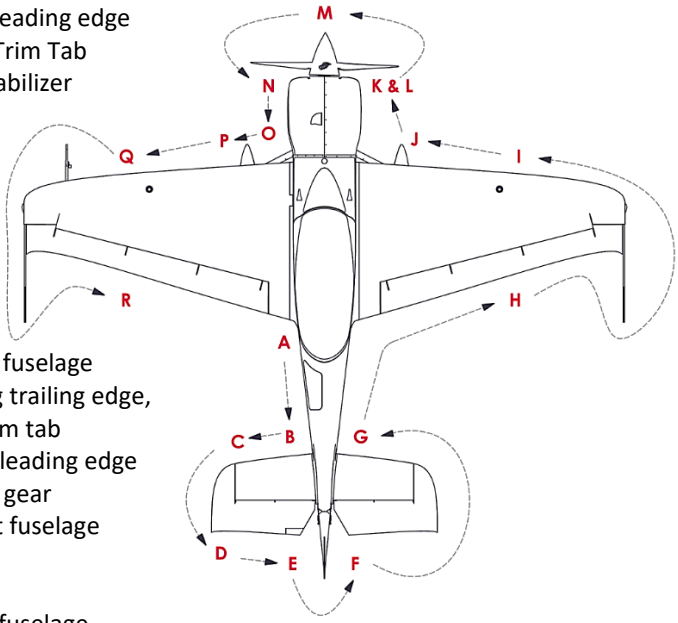
4.3 Pre-flight Inspection

Exterior Inspection Illustration

Visually check the airplane for general condition during walk around.
The airplane should be clean and has to be free from ice and / or snow before flying.

Walk-around Sequence:

A) Cockpit, Canopy
B) Left rear fuselage,
baggage compartment
C) Stabilizer leading edge
D) Elevator, Trim Tab
E) Vertical stabilizer
F) Tail wheel



G) Right rear fuselage
H) Right wing trailing edge,
Aileron trim tab
I) Right wing leading edge
J) Right main gear
K) Right front fuselage
L) Engine
M) Propeller
N) Left front fuselage
O) Canopy
P) Left main gear
Q) Left wing leading edge
R) Left wing trailing edge

Structure Damage

Any visual evidence of damage must be investigated by the tap test described in the AMM. If an impact is known to have happened, it is recommended to tap test the area, even if there is no visible evidence of damage.

Inspection Checklist

A) Cockpit, Canopy	
Canopy	OPEN
Magnetos	OFF
Battery Master Switch	ON
Structure Temperature CAS Message	CHECK
Fuel Quantity Indication	CHECK
Battery Power	CHECK
Battery Master Switch	OFF
Loose objects	CHECK
Rudder pedal rails clean and smooth	CHECK
Fire extinguisher pressure and secure installation	CHECK
Baggage compartment	CHECK
Front seat belts, if flying solo	SECURED
Controls full & free movement	CHECK
Throttle full & free movement	CHECK
Canopy retaining strap	CHECK
Canopy & windshield	CHECK, CLOSE
B) Left rear fuselage	
Fuselage skin to damage	CHECK
Static Port clean	CHECK
C) Stabilizer leading edge	
Stabilizer leading edge and skin for damage	CHECK

D) Elevator

Elevator trailing edge and skin for damage	CHECK
Elevator hinge pins secured	CHECK
Elevator linkage connections	CHECK
Elevator for free movement and play	CHECK
Trim tab for damage, hinges, connections	CHECK

E) Vertical stabilizer

Vertical stabilizer leading edge and skin	CHECK
Rudder trailing edge and skin for damage	CHECK
Rudder hinge pin secured	CHECK
Rudder linkage	CHECK
Rudder for free movement and play	CHECK

F) Tail wheel

General condition of spring	CHECK
Freedom of movement and play	CHECK
Tire for wear and slip mark	CHECK

G) Right rear fuselage

Fuselage skin for damage	CHECK
Static Port clean	CHECK
Ballast secure, if installed	CHECK

H) Right wing trailing edge

Aileron linkage	CHECK
Wing trailing edge and skin for damage	CHECK
Aileron trailing- leading edge and skin for damage	CHECK
Aileron hinges for excessive radial play	CHECK
Freedom of movement and play	CHECK
Aileron Trim Tab for damage, hinges, connections	CHECK
If Sight Gauge is installed, correct orientation & lock	CHECK

I) Right wing leading edge

Wing leading edge and skin for damage	CHECK
Recognition Light and Lenses for damage	CHECK
Fuel cap and fuel contents	CHECK
Right wing tank	DRAIN CHECK

J) Right main gear

Main gear leg for damage	CHECK
Tire condition and wear	CHECK
Tire and wheel slip mark	CHECK

K) Right front fuselage

Fuselage skin for damage	CHECK
Smoke tank vent / overflow port	CLEAR

L) Engine

Cowlings do not need to be removed for pre-flight check, use the openings in the cowling, especially from below.

Oil quantity (via access panel on top of cowling)	CHECK
Engine for leaks	CHECK
Engine mount for cracks	CHECK
Exhaust system for cracks	CHECK
Exhaust system fixtures	CHECK
Oil and fuel system for leaks	CHECK
Cowling and all access secure	CHECK

M) Propeller

Blades for damage	CHECK
Hub for damage and oil leaks	CHECK
Play of blades in hub	CHECK

N) Left front fuselage

Fuselage skin for damage	CHECK
Fuel Quantity in Acrotank with Dipstick	CHECK
External Power Socket for damage	CHECK

O) Canopy and windshield

Frame and transparencies for damage	CHECK

P) Left main gear

Main gear leg for damage	CHECK
Tire condition and wear	CHECK
Tire for wear and slip mark	CHECK

Q) Left wing leading edge

Wing leading edge and skin for damage	CHECK
Recognition Light and Lenses for damage	CHECK
Fuel cap and fuel contents	CHECK
Left wing tank	DRAIN CHECK
Pitot tube for blockage & damage	CHECK

R) Left wing trailing edge

Aileron linkage	CHECK
Wing trailing edge and skin for damage	CHECK
Aileron trailing- leading edge and skin for damage	CHECK
Aileron hinges for excessive radial play	CHECK
Freedom of movement and play	CHECK
If Sight Gauge is installed, correct orientation & lock	CHECK

NOTE: If use of the smoke system is intended, the gap between wing and fuselage is recommended to be sealed with either silicone or appropriate self-adhesive tape to prevent ingestion of smoke into the cockpit.

4.4 Starting and Warm-up

Starting:

Canopy	CLOSED and LOCKED
Seat belts	SECURE
Fuel Selector	ACRO
Battery Master Switch	ON
MFD1, database- and self-check	CONFIRM
Propeller control	PUSH FULL FINE
Mixture	PUSH FULL RICH
Throttle	PUSH FULL OPEN
Electric Fuel Pump for 5 seconds	ON
Throttle	IDLE, CRACK ¼'' OPEN
Mixture	CUTOFF
Brakes	ON
Propeller area	CLEAR, CHECK and CALL
Starter	ENGAGE
When engine fires	FEED IN MIXTURE
1000 RPM with Throttle	ADJUST

Warm-up:

1000 RPM	until oil Temp 100°F
MFD1, fuel quantity for totalizer	RESET, ADD or CONFIRM

4.5 Taxiing

Backstick	APPLY
Brakes	RELEASE

CAUTION: **Due to the ground attitude of the airplane, performing S-turns is advisable to ensure area ahead is clear.**

4.6 Run-up

Canopy	CHECK closed and locked
Seat belts	TIGHT and SECURE
Fuel Selector	ACRO
Fuel quantity	CHECK, min. 7 Gal in ACRO
Bost Pump	ON
Engine parameters	GREEN
Brakes	APPLY
Backstick	APPLY
Propeller Control	PUSH FULL FINE
Throttle	SET 1700 RPM
Magnetos	CHECK Max drop 175 RPM, CHECK Max difference 50 RPM Set BOTH
Propeller Control	CYCLE three time CHECK RPM and corresponding momentary oil pressure drop SET FINE
Throttle	IDLE, check oil pressure SET 1000 RPM
Mixture	PUSH FULL RICH
Trim	SET NEUTRAL
Controls	CHECK FREE and CORRECT

4.7 Take-off

Normal take-off:

Throttle FULL OPEN	
@ 30 knots lift tail wheel	PUSH
@ 80 knots	LIFTOFF
@ 90 knots	CLIMB

Crosswind Take-off:

Throttle	FULL OPEN
RPM max. 2600 rpm	ADJUST
3-point attitude	LIFTOFF
@ 90 knots	CLIMB

WARNING: **No turns below 90 kts!**

4.8 Climb

Take-off power:

RPM	max 2600 rpm
Manifold pressure	AS REQUIRED

Airspeeds:

Requirement	Speed kts
Normal climb	90 - 160
Best rate of climb Vy	90
Best angle of climb Vx	80

NOTE: **During low speed flight with high power settings, yaw to the left will occur.**
This can easily be arrested with right rudder.

4.9 Cruise

Max continuous power:

Recommended max. 2500 rpm	ADJUST
Manifold pressure	AS REQUIRED
Lean Mixture according to EGT or fuel flow	ADJUST

NOTE: **Use Wing tanks before Acrotank**
Switch between right & left Wingtanks every 30 minutes.

4.10 Descent, Go-around and Landing

Descent

Mixture	PUSH FULL RICH
Fuel selector valve	ACRO
Electric fuel pump	ON
RPM	AS REQUIRED
To prevent shock cooling	OBSERVE CHT
Manifold pressure	AS REQUIRED
Airspeed	AS REQUIRED

NOTE: **During a power-off descent with throttle at idle and controls free at 100 kts, the aircraft may show dynamic pitch oscillations. To stop the oscillations, hold the stick.**

Before Landing

Seat belts	TIGHT
Propeller control	PUSH FINE PITCH
Brakes	CHECK
Approach speed	90 knots

WARNING: **No turns below 90 kts!**

Sideslip to keep runway in sight	CONTROL
Three-point attitude with elevator	CONTROL
Glideslope with Throttle	CONTROL

NOTE: **To maintain a steady heading sideslips, the ailerons need to be deflected in the same direction as the rudder.**

Go Around

Throttle	FULL OPEN
Airspeed	90 knots

Normal Landing

Approach speed	80 knots
Three-point attitude	TOUCHDOWN
Brake as required	APPLY

Crosswind Landing

Similar to normal landing

Maximum demonstrated crosswind component for landing	19 knots

Short Field Landing

Similar to normal landing

After Landing

Boost pump	OFF
Backstick	APPLY

4.11 Shutdown

Allow engine to idle for at least 1 minute before shutdown.

Throttle	IDLE
Avionic Switch	OFF
Mixture	PULL CUTOFF
Ignition	OFF
Battery Master Switch	OFF

4.12 Parking

Short Term

Nose in the wind	TURN
Wheels with chocks	SECURE
Control stick with seat belts	SECURE (if windy)

NOTE: **When exceeding the max structure temperature is expected, minimise exposure to direct sunlight.**

Long Term

It is preferable to park the aircraft in a hangar.

Fuel selector switch	OFF
Wheels with chocks	SECURE
Airplane	TIE DOWN
Control stick with seat belts	SECURE

4.13 Aerobatic Maneuvers

Prior to aerobatic flying the airplane must be carefully checked and any loose objects removed or secured.
Solo flying from the rear seat only.
For solo flying, the front seat belt system must be secured.

The occupant's main seat belt (lap belt) must be as tight as possible.

Maneuver	**Minimum Entry speed**	**Maximum Entry Speed**
positive or negative Loop, start at bottom	100 kts	V_{NE}
positive or negative Loop, start at top	60 kts	180 kts
Stall Turn	80 kts	V_{NE}
Rolling turns	100 kts	V_O
Aileron rolls, right and left	70 kts	V_{NE}
Snap rolls, positive and negative, on any line	70 kts	V_O
Tailslide, canopy up or down	80 kts	V_{NE}
Knife Edge Flight, on any line	100 kts	V_{NE}
Horizontal Line, upright or inverted	V_S	V_{NE}
Spins, upright and inverted	V_S	N/A
¼ Loop up, from upright and inverted	80 kts	V_{NE}
45° line up	80 kts	V_{NE}
45° line down	V_S	V_{NE}
Vertical line up	80 kts	V_{NE}
Vertical line down	V_S	180 kts

WARNING: **The high G-loads and roll rates possible in this airplane can overstress and hurt unaware crew members!**

Large and / or abrupt control inputs with either elevator and / or rudder above V_O (175 kts) may impose loads exceeding the structural capability of the airplane.

List of Aerobatic Maneuvers, including Spins

Loop, positive or negative, starting at bottom:
Min. entry speed 100 kts, max entry speed V_{NE}.

Loop, positive or negative, starting at top:
Min. entry speed 60 kts, max entry speed 180 kts.

Stall Turn (Hammerhead)
Preferable direction left rudder, right rudder possible.
Min entry speed from level flight 80 kts, max entry speed V_{NE}.

Rolling turn, in and out, right or left
Min entry speed from level flight 100 kts, max entry speed V_O.

Aileron Roll, left or right, on any line
Min entry speed from level flight 70 kts, max entry speed V_{NE}.
Slower entry speeds in ballistic trajectories (on top of loops) are possible.

Snap roll, positive and negative
Snap rolls must not be flown above V_O.
The input sequence to initiate any snap is:

1 – pitch, for competition 15° incidence
2 – yaw, rudder as required
3 – unload, elevator against initial pitch direction, with simultaneous pro-rotation aileron as required

To stop snap rolls, release rudder and simultaneously center ailerons.
Depending on line and vector, different control positions are required for a clean rotation and stop.

Tail slide, gear down or canopy down:
Min. entry speed from level line 80 kts, Max. entry speed from level line V_{NE}.

Quarter-loop upwards: Recommended minimum entry speed is 80 kts.
If another Maneuver is to follow in the vertical line, more speed is required.

Spins, upright or inverted
Min entry speed zero from vertical up lines, max entry speed V_S.
The GB1 is certified for up to 6 complete turns, with wingtanks empty.

Spins with aft CG (ballast in tail) show slightly more nose-up attitude, in particular during spins with anti-spin aileron, and recovery is slightly slower caused by the tail ballast and resulting moments of inertia.

Standard recovery:

1. anti-spin rudder
2. stick to neutral
3. power off
4. when rotation stops, center rudder,
   recover from resulting dive

NOTE: **Step 3: Power ON during spin recovery will reduce recovery time and altitude loss.**

Alternative recovery method, resulting in minimum altitude loss and nearly immediate stop of rotation:

1. anti-spin rudder
2. aft stick for upright spin, forward stick for inverted spin
3. anti-spin aileron
4. full throttle
5. when rotation stops, accelerate and stabilise level flight

NOTE: **Elevator input before opposite rudder results in an accelerated turn rate!**

Knife edge flight, right or left
Min entry speed from level flight 100 kts, max entry speed V_{NE}.
Do not apply full rudder above V_O.
Oil pressure may flicker or drop during knife edge flight. Apply either positive or negative acceleration if this occurs.

Horizontal line, upright or inverted: Can be flown with any required speed between V_S and V_{NE}.
Duration of inverted flight should not exceed 2 minutes, due to fuel system design.

45° Climbing line: Can be entered and flown with any required speed between 80 kts and V_{NE}.

90° Vertical climbing line: Can be entered with any required speed between 80kts and V_{NE}.

45° Descending line: Can be entered with any required speed between Vs and V_{NE}.
If required, reduce power to prevent exceeding V_{NE}.

90° Vertical descending line: Can be entered with any required speed between 180 kts and V_{NE}.
If required, reduce power to prevent exceeding V_{NE}.

CAUTION: **Duration of uninterrupted inverted flight must not exceed 2 minutes!**

NOTE: **All Maneuvers with high rates of rotation in the pitch- and yaw axis cause high stress to the crankshaft!**
No RPM limitation for gyroscopic Maneuvers, but risk of increased engine wear.

5 Performance

5.1 General

Performance information tables and charts on the following pages are presented to facilitate the planning of flights in detail and with reasonable accuracy under various conditions.

The data in the charts have been computed from actual flight tests with the airplane and engine in good condition and using average piloting techniques.

It should be noted that the performance data presented in the range and endurance charts allow for 30-minute reserve fuel at specified speeds. Some indeterminate variables such as cleanliness of the airplane, air turbulence and other factors may account for variations as high as 10 % or more in range and endurance. Therefore, it is important to utilise all available information to estimate the fuel required for a particular flight.

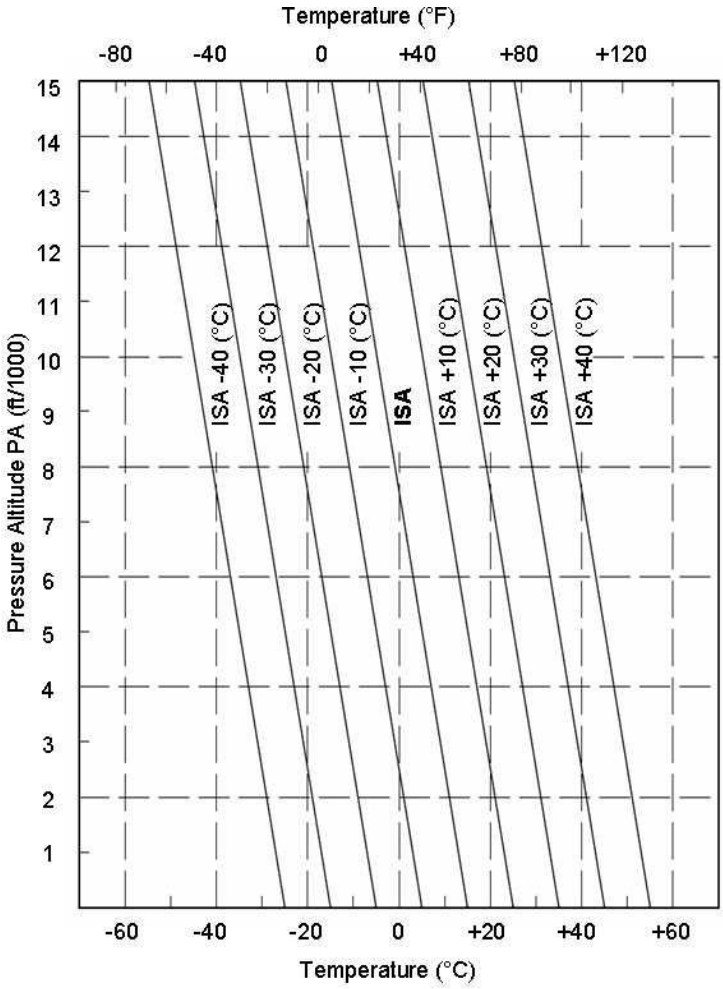
Notes about Performance Charts and Tables

Performance information is presented in tabular or graphical form to illustrate the effect of different variables. Sufficiently detailed information is provided in the tables so that conservative values can be selected and used to determine the particular performance figure with reasonable accuracy. All speeds in this chapter are indicated air speeds IAS unless otherwise stated. The performance figures below are given under following conditions:

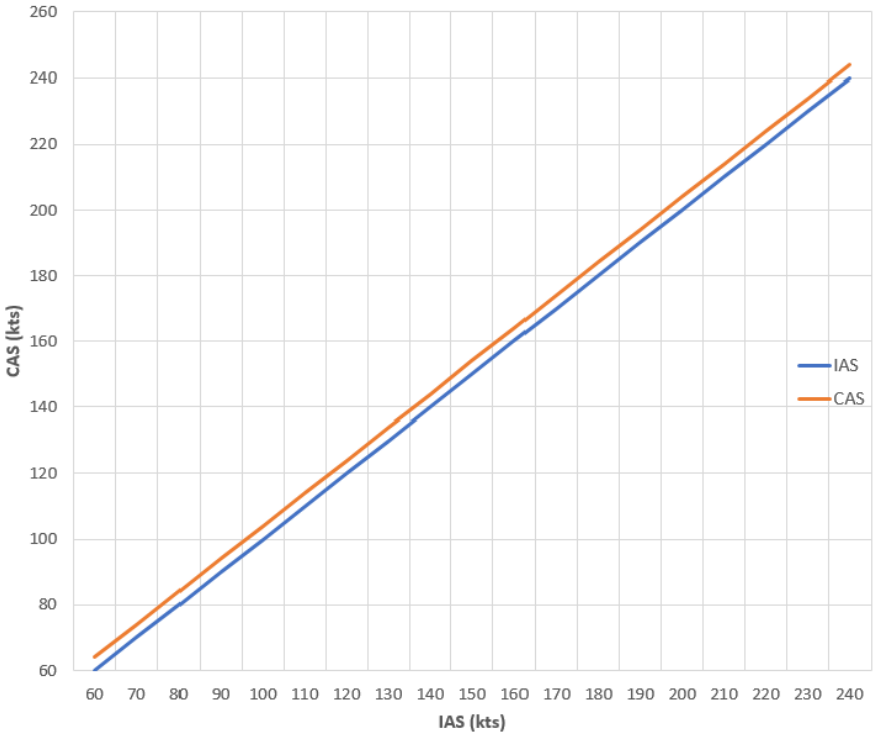
- ToW (999 kg / 2200 lb) unless otherwise stated
- Take-off and landing on hard surface
- No wind
- Standard atmosphere

5.2 ISA Conversion Chart

ISA Conversions of pressure altitude and outside air temperature are shown in the following figure.



5.3 Airspeed Calibration Chart (IAS to CAS)



5.4 Stall Speed, Stall Warning

Power-off stalls, level and turning:
The GB1 provides natural buffeting before the stall, therefore no audio stall warning is fitted.
Stall behaviour is benign; wings can be held or returned to level flight with rudder and ailerons.

Power-off, level flight stall speed at MTOW is 60 kts.
With increased bank angle, the stall speed increases.
At 60° bank, the stall speed at MTOW is 85 kts.

Altitude loss app. 300 ft, after keeping the elevator at the aft stop for 2 seconds from stall to release, with engine in idle.
Application of power during recovery reduces the loss of altitude, if full power is applied, recovery without further altitude loss can be achieved.

Power-on stalls, level land turning:
Nose is approximately 45° high during power-on stall.
Stall is marked by a nose down pitching motion, which can be arrested by aft stick with the nose still app. 30° above the horizon, with nearly no rate of descent.
Controllability is similar to power-off stalls.
Altitude loss for recovery to flying speed again with unchanged power setting after keeping full aft stick for 2 seconds is negligible.
When accelerating out of stall slowly, recovery without any altitude loss can be achieved.

5.5 Take-Off Performance

The listed take-off distances are valid for a hard surface runway, clean airplane and no wind.
For other conditions, use following factors:

Tailwind:

For each 3 kts of tailwind component,
the tabulated distances are increased by 10 %.

Headwind:

10 kts headwind distances are reduced by 15 %
20 kts headwind distances are reduced by 30 %

Runway:

Distances on a dry, hard grass runway are 10 % longer.
For wet, soft or uneven fields, factors must be determined individually by the PiC.

Take-Off Weight 700kg / 1540lb						
Pressure Altitude		Unit	Take-Off Distance			
			ISA	ISA+10	ISA+20	ISA+30
0	take-off-run	Meter	110	120	131	141
		Feet	362	395	429	464
	over 50ft obstacle	Meter	155	169	183	199
		Feet	509	554	602	652
1000	take-off-run	Meter	117	127	138	150
		Feet	384	418	454	492
	over 50ft obstacle	Meter	164	179	194	211
		Feet	539	587	638	691
2000	take-off-run	Meter	124	135	147	159
		Feet	406	443	482	522
	over 50ft obstacle	Meter	174	190	206	224
		Feet	571	622	677	734
3000	take-off-run	Meter	131	143	156	169
		Feet	431	470	511	555
	over 50ft obstacle	Meter	184	201	219	237
		Feet	605	660	718	779
4000	take-off-run	Meter	139	152	165	180
		Feet	457	499	543	589
	over 50ft obstacle	Meter	196	213	232	252
		Feet	642	700	762	827
5000	take-off-run	Meter	148	161	176	191
		Feet	485	529	576	626
	over 50ft obstacle	Meter	208	227	247	268
		Feet	681	744	810	879
6000	take-off-run	Meter	157	171	187	203
		Feet	514	562	613	666
	over 50ft obstacle	Meter	220	241	262	285
		Feet	722	790	860	935
7000	take-off-run	Meter	166	182	198	216
		Feet	546	597	651	708
	over 50ft obstacle	Meter	234	256	279	303
		Feet	767	839	915	994
8000	take-off-run	Meter	177	194	211	230
		Feet	580	635	693	753
	over 50ft obstacle	Meter	248	272	297	323
		Feet	815	892	973	1058
9000	take-off-run	Meter	188	206	225	245
		Feet	617	675	737	802
	over 50ft obstacle	Meter	264	289	316	343
		Feet	866	948	1035	1127
10000	take-off-run	Meter	200	219	239	260
		Feet	656	718	785	854
	over 50ft obstacle	Meter	281	308	336	366
		Feet	921	1009	1102	1200

Take-Off Weight 750kg / 1650lb						
Pressure Altitude		Unit	Take-Off Distance			
			ISA	ISA+10	ISA+20	ISA+30
0	take-off-run	Meter	134	146	158	172
		Feet	440	479	520	563
	over 50ft obstacle	Meter	188	205	223	241
		Feet	617	672	730	791
1000	take-off-run	Meter	142	155	168	182
		Feet	465	507	551	597
	over 50ft obstacle	Meter	199	217	236	256
		Feet	654	712	774	838
2000	take-off-run	Meter	150	164	178	193
		Feet	493	538	584	634
	over 50ft obstacle	Meter	211	230	250	271
		Feet	693	755	821	890
3000	take-off-run	Meter	159	174	189	205
		Feet	523	570	620	673
	over 50ft obstacle	Meter	224	244	266	288
		Feet	734	801	871	945
4000	take-off-run	Meter	169	184	201	218
		Feet	554	605	658	715
	over 50ft obstacle	Meter	237	259	282	306
		Feet	778	850	925	1004
5000	take-off-run	Meter	179	196	213	231
		Feet	588	642	699	759
	over 50ft obstacle	Meter	252	275	299	325
		Feet	826	902	982	1067
6000	take-off-run	Meter	190	208	226	246
		Feet	624	682	743	807
	over 50ft obstacle	Meter	267	292	318	346
		Feet	876	958	1044	1134
7000	take-off-run	Meter	202	221	241	262
		Feet	663	725	790	859
	over 50ft obstacle	Meter	284	310	338	368
		Feet	931	1018	1110	1206
8000	take-off-run	Meter	215	235	256	279
		Feet	704	770	840	914
	over 50ft obstacle	Meter	301	330	360	391
		Feet	989	1082	1180	1284
9000	take-off-run	Meter	228	250	273	297
		Feet	748	819	894	973
	over 50ft obstacle	Meter	320	351	383	417
		Feet	1051	1151	1256	1367
10000	take-off-run	Meter	242	266	290	316
		Feet	795	871	952	1036
	over 50ft obstacle	Meter	340	373	407	444
		Feet	1117	1224	1337	1456

Take-Off Weight 800kg / 1760lb						
Pressure Altitude		Unit	Take-Off Distance			
			ISA	ISA+10	ISA+20	ISA+30
0	take-off-run	Meter	161	175	190	206
		Feet	527	574	623	675
	over 50ft obstacle	Meter	225	246	267	289
		Feet	740	806	875	948
1000	take-off-run	Meter	170	185	201	218
		Feet	557	607	660	715
	over 50ft obstacle	Meter	239	260	283	306
		Feet	783	853	927	1005
2000	take-off-run	Meter	180	196	213	231
		Feet	591	644	700	759
	over 50ft obstacle	Meter	253	276	300	325
		Feet	830	905	983	1066
3000	take-off-run	Meter	191	208	226	246
		Feet	626	683	743	806
	over 50ft obstacle	Meter	268	292	318	345
		Feet	879	959	1044	1132
4000	take-off-run	Meter	202	221	240	261
		Feet	664	725	789	856
	over 50ft obstacle	Meter	284	310	338	367
		Feet	933	1018	1108	1202
5000	take-off-run	Meter	215	235	255	277
		Feet	704	769	838	910
	over 50ft obstacle	Meter	302	329	359	390
		Feet	989	1081	1177	1278
6000	take-off-run	Meter	228	249	271	295
		Feet	748	817	890	967
	over 50ft obstacle	Meter	320	350	381	414
		Feet	1050	1148	1250	1359
7000	take-off-run	Meter	242	265	288	314
		Feet	794	868	946	1029
	over 50ft obstacle	Meter	340	372	405	441
		Feet	1115	1219	1330	1445
8000	take-off-run	Meter	257	281	307	334
		Feet	843	923	1007	1095
	over 50ft obstacle	Meter	361	395	431	469
		Feet	1185	1296	1414	1538
9000	take-off-run	Meter	273	299	327	355
		Feet	896	981	1071	1166
	over 50ft obstacle	Meter	384	420	459	499
		Feet	1259	1378	1505	1638
10000	take-off-run	Meter	290	318	348	378
		Feet	953	1044	1140	1242
	over 50ft obstacle	Meter	408	447	488	532
		Feet	1338	1466	1602	1744

Take-Off Weight 850kg / 1870lb						
Pressure Altitude		Unit	Take-Off Distance			
			ISA	ISA+10	ISA+20	ISA+30
0	take-off-run	Meter	190	207	225	244
		Feet	624	680	738	799
	over 50ft obstacle	Meter	267	291	316	342
		Feet	877	955	1037	1123
1000	take-off-run	Meter	201	219	238	258
		Feet	661	720	782	847
	over 50ft obstacle	Meter	283	308	335	363
		Feet	928	1011	1099	1190
2000	take-off-run	Meter	213	233	253	274
		Feet	700	763	830	900
	over 50ft obstacle	Meter	300	327	355	385
		Feet	983	1072	1165	1264
3000	take-off-run	Meter	226	247	268	291
		Feet	742	809	880	955
	over 50ft obstacle	Meter	318	347	377	409
		Feet	1042	1137	1237	1342
4000	take-off-run	Meter	240	262	285	309
		Feet	787	859	935	1014
	over 50ft obstacle	Meter	337	368	400	434
		Feet	1105	1206	1313	1425
5000	take-off-run	Meter	254	278	303	329
		Feet	835	912	993	1078
	over 50ft obstacle	Meter	357	390	425	462
		Feet	1172	1281	1395	1515
6000	take-off-run	Meter	270	295	322	349
		Feet	886	968	1055	1146
	over 50ft obstacle	Meter	379	415	452	491
		Feet	1244	1360	1482	1610
7000	take-off-run	Meter	287	314	342	372
		Feet	941	1029	1122	1219
	over 50ft obstacle	Meter	403	440	480	522
		Feet	1321	1445	1576	1713
8000	take-off-run	Meter	305	333	364	396
		Feet	999	1094	1193	1298
	over 50ft obstacle	Meter	428	468	511	556
		Feet	1404	1536	1676	1823
9000	take-off-run	Meter	324	354	387	421
		Feet	1062	1163	1269	1382
	over 50ft obstacle	Meter	455	498	543	592
		Feet	1492	1634	1783	1941
10000	take-off-run	Meter	344	377	412	448
		Feet	1129	1237	1351	1471
	over 50ft obstacle	Meter	483	530	579	630
		Feet	1586	1738	1898	2067

Take-Off Weight 900kg / 1985lb						
Pressure Altitude		Unit	Take-Off Distance			
			ISA	ISA+10	ISA+20	ISA+30
0	take-off-run	Meter	223	243	264	286
		Feet	732	798	866	938
	over 50ft obstacle	Meter	314	341	371	402
		Feet	1029	1120	1217	1318
1000	take-off-run	Meter	236	257	280	303
		Feet	775	845	918	995
	over 50ft obstacle	Meter	332	362	393	426
		Feet	1089	1186	1289	1397
2000	take-off-run	Meter	250	273	297	322
		Feet	821	896	974	1056
	over 50ft obstacle	Meter	352	383	417	452
		Feet	1154	1258	1368	1483
3000	take-off-run	Meter	265	290	315	342
		Feet	871	950	1033	1121
	over 50ft obstacle	Meter	373	407	442	480
		Feet	1223	1334	1451	1574
4000	take-off-run	Meter	281	307	334	363
		Feet	923	1008	1097	1190
	over 50ft obstacle	Meter	395	431	470	510
		Feet	1297	1416	1541	1672
5000	take-off-run	Meter	299	326	355	386
		Feet	980	1070	1165	1265
	over 50ft obstacle	Meter	419	458	499	542
		Feet	1376	1503	1637	1777
6000	take-off-run	Meter	317	346	377	410
		Feet	1040	1136	1238	1345
	over 50ft obstacle	Meter	445	486	530	576
		Feet	1460	1596	1739	1890
7000	take-off-run	Meter	336	368	401	436
		Feet	1104	1207	1316	1431
	over 50ft obstacle	Meter	473	517	564	613
		Feet	1551	1696	1849	2010
8000	take-off-run	Meter	357	391	427	464
		Feet	1173	1283	1400	1523
	over 50ft obstacle	Meter	502	549	599	652
		Feet	1647	1803	1967	2139
9000	take-off-run	Meter	380	416	454	494
		Feet	1246	1365	1490	1621
	over 50ft obstacle	Meter	534	584	638	694
		Feet	1751	1917	2093	2277
10000	take-off-run	Meter	404	443	483	526
		Feet	1325	1452	1586	1727
	over 50ft obstacle	Meter	567	622	679	739
		Feet	1861	2039	2227	2426

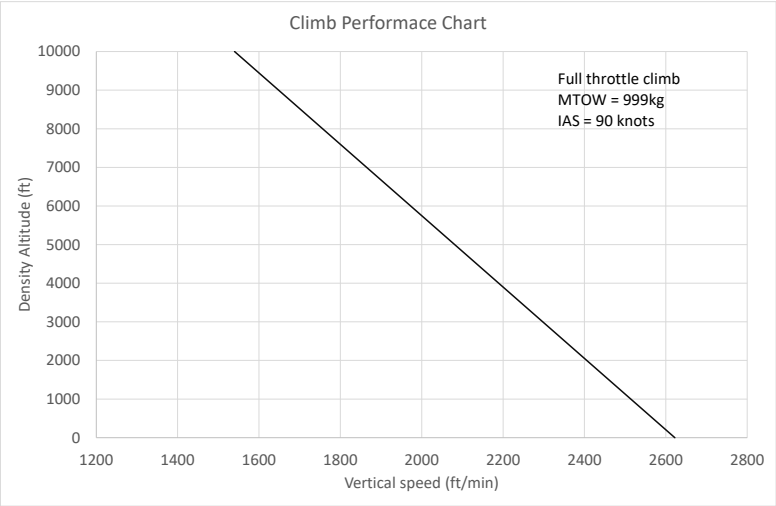
Take-Off Weight 950kg / 2095lb						
Pressure Altitude		Unit	Take-Off Distance			
			ISA	ISA+10	ISA+20	ISA+30
0	take-off-run	Meter	260	283	307	333
		Feet	852	928	1008	1092
	over 50ft obstacle	Meter	365	397	431	467
		Feet	1197	1304	1416	1533
1000	take-off-run	Meter	275	300	325	353
		Feet	902	983	1068	1157
	over 50ft obstacle	Meter	386	421	457	495
		Feet	1267	1380	1500	1625
2000	take-off-run	Meter	291	318	345	374
		Feet	956	1042	1133	1228
	over 50ft obstacle	Meter	409	446	485	526
		Feet	1342	1464	1591	1725
3000	take-off-run	Meter	309	337	366	397
		Feet	1013	1105	1202	1304
	over 50ft obstacle	Meter	434	473	515	558
		Feet	1423	1552	1689	1832
4000	take-off-run	Meter	327	357	389	422
		Feet	1074	1173	1276	1385
	over 50ft obstacle	Meter	460	502	546	593
		Feet	1509	1647	1793	1946
5000	take-off-run	Meter	347	379	413	449
		Feet	1140	1245	1356	1472
	over 50ft obstacle	Meter	488	533	580	630
		Feet	1601	1749	1904	2068
6000	take-off-run	Meter	369	403	439	477
		Feet	1209	1322	1440	1565
	over 50ft obstacle	Meter	518	566	617	670
		Feet	1699	1857	2023	2198
7000	take-off-run	Meter	391	428	467	507
		Feet	1284	1405	1531	1665
	over 50ft obstacle	Meter	550	601	656	713
		Feet	1804	1973	2151	2339
8000	take-off-run	Meter	416	455	496	540
		Feet	1364	1493	1629	1772
	over 50ft obstacle	Meter	584	639	697	759
		Feet	1917	2097	2288	2489
9000	take-off-run	Meter	442	484	528	575
		Feet	1450	1588	1733	1886
	over 50ft obstacle	Meter	621	680	742	808
		Feet	2037	2230	2435	2650
10000	take-off-run	Meter	470	515	562	612
		Feet	1541	1689	1845	2009
	over 50ft obstacle	Meter	660	723	790	860
		Feet	2165	2373	2591	2822

Take-Off weight 999kg / 2200lb						
Pressure Altitude		Unit	Take-Off Distance			
			ISA	ISA +10	ISA +20	ISA +30
0	take-off run	Meter	299	326	354	384
		Feet	981	1070	1161	1260
	over 50ft obstacle	Meter	420	458	498	540
		Feet	1378	1503	1634	1772
1000	take-off run	Meter	317	346	376	409
		Feet	1040	1135	1234	1342
	over 50ft obstacle	Meter	446	486	529	574
		Feet	1463	1594	1736	1883
2000	take-off run	Meter	334	364	396	430
		Feet	1096	1194	1299	1411
	over 50ft obstacle	Meter	469	511	557	604
		Feet	1539	1677	1827	1982
3000	take-off run	Meter	353	386	420	456
		Feet	1158	1266	1378	1496
	over 50ft obstacle	Meter	496	542	590	641
		Feet	1627	1778	1936	2103
4000	take-off run	Meter	374	408	445	483
		Feet	1227	1339	1460	1585
	over 50ft obstacle	Meter	525	573	625	679
		Feet	1722	1880	2051	2228
5000	take-off run	Meter	397	433	472	514
		Feet	1302	1421	1549	1686
	over 50ft obstacle	Meter	557	609	664	722
		Feet	1827	1998	2178	2369
6000	take-off run	Meter	419	459	500	544
		Feet	1375	1506	1640	1785
	over 50ft obstacle	Meter	589	644	705	764
		Feet	1932	2113	2313	2507
7000	take-off run	Meter	446	488	532	580
		Feet	1463	1601	1745	1903
	over 50ft obstacle	Meter	627	685	748	814
		Feet	2057	2247	2454	2671
8000	take-off run	Meter	474	519	566	617
		Feet	1555	1703	1857	2024
	over 50ft obstacle	Meter	666	729	795	866
		Feet	2185	2392	2608	2841
9000	take-off run	Meter	504	552	603	657
		Feet	1654	1811	1978	2156
	over 50ft obstacle	Meter	708	775	847	923
		Feet	2323	2543	2779	3028
10000	take-off run	Meter	535	586	641	698
		Feet	1755	1923	2103	2290
	over 50ft obstacle	Meter	752	824	900	981
		Feet	2467	2703	2953	3219

5.6 Rate of Climb

Speed for best rate of climb (Vy) **90** knots

Speed for best angle of climb (Vx) **80** knots



5.7 Noise

To comply with FAA regulations, the noise level has been determined in accordance with Part 36, Subpart F and Appendix G, Amdt. 36-30.

the 14CFR 36 Noise Limit for 2200lbs MTOW is 78.7 dB(A).

The noise level of the GB1 is 75.0 dB(A).

No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of any airport.

5.8 Cruise Performance

The range, endurance and fuel consumption table below includes 30-min. reserve at the given engine setting.

These values are based on starting with full useable fuel.

Altitude feet	RPM	MP inHG	Fuel Flow gal/h	Fuel Flow L/h	TAS kts	Endurance hrs:min	Range NM
2,000	2000	20	10.5	40	150	6:45	1010
	2300	23	15.8	60	175	4:30	780
	2400	24	17.1	65	185	4:05	770
	2500	full	21.1	80	200	3:20	675
8,000	2000	20	10	38	160	7:05	1130
	2300	23	14.5	55	190	4:55	930
	2400	full	18.4	70	205	3:50	790
12,000	2000	20	9.5	36	180	7:30	1350
	2200	20	14.5	55	195	4:55	950
	2400	full	17.1	65	205	4:10	850

5.9 Glide Performance

The maximum horizontal distance travelled in still air with Propeller Control in minimum drag position is:

9.8 km per 1000 m of altitude
(1.61 nautical miles per 1,000 ft of altitude)

Best glide speed: 93 kts

5.10 Landing Distance

The landing distances listed below are valid for a hard surface runway, clean airplane and no wind.
For other conditions, apply the following factors:

Tailwind:

For each 3 knots tailwind component, distances are increased by 10 %

Headwind:

10 knots headwind distances are reduced by 15 %
20 knots headwind distances are reduced by 30 %

Runway:

Distances on a dry, hard grass runway are 10 % longer.
For wet, soft or uneven fields, factors must be determined individually by the PIC.

Landing Weight 700kg / 1540lb						
Pressure Altitude		Unit	Landing Distance			
			ISA	ISA +10	ISA +20	ISA +30
0	landing run	Meter	167	180	194	208
		Feet	549	592	636	683
	over 50ft obstacle	Meter	251	271	291	312
		Feet	824	888	955	1025
1000	landing run	Meter	173	187	201	216
		Feet	569	614	660	708
	over 50ft obstacle	Meter	260	281	302	324
		Feet	854	921	991	1063
2000	landing run	Meter	180	194	209	224
		Feet	590	636	685	735
	over 50ft obstacle	Meter	270	291	313	336
		Feet	885	955	1028	1104
3000	landing run	Meter	186	201	217	233
		Feet	611	660	711	763
	over 50ft obstacle	Meter	280	302	325	349
		Feet	918	991	1067	1146
4000	landing run	Meter	193	209	225	242
		Feet	634	685	738	793
	over 50ft obstacle	Meter	290	313	338	363
		Feet	952	1028	1107	1190
5000	landing run	Meter	200	217	233	251
		Feet	658	711	766	824
	over 50ft obstacle	Meter	301	325	351	377
		Feet	987	1067	1150	1236
6000	landing run	Meter	208	225	243	261
		Feet	682	738	796	856
	over 50ft obstacle	Meter	312	338	364	392
		Feet	1024	1107	1194	1285
7000	landing run	Meter	216	234	252	271
		Feet	708	766	827	890
	over 50ft obstacle	Meter	324	351	378	407
		Feet	1063	1150	1241	1336
8000	landing run	Meter	224	243	262	282
		Feet	735	796	859	925
	over 50ft obstacle	Meter	336	364	393	423
		Feet	1103	1194	1290	1389
9000	landing run	Meter	233	252	272	293
		Feet	763	827	893	962
	over 50ft obstacle	Meter	349	378	409	440
		Feet	1146	1241	1341	1444
10000	landing run	Meter	242	262	283	305
		Feet	793	859	929	1001
	over 50ft obstacle	Meter	363	393	425	458
		Feet	1190	1290	1394	1503

Landing Weight 750kg / 1650lb						
Pressure Altitude		Unit	Landing Distance			
			ISA	ISA +10	ISA +20	ISA +30
0	landing run	Meter	203	219	235	252
		Feet	666	718	772	828
	over 50ft obstacle	Meter	305	328	353	379
		Feet	1000	1078	1159	1243
1000	landing run	Meter	210	227	244	262
		Feet	690	744	801	859
	over 50ft obstacle	Meter	316	341	366	393
		Feet	1036	1117	1202	1290
2000	landing run	Meter	218	235	253	272
		Feet	715	772	831	892
	over 50ft obstacle	Meter	327	353	380	408
		Feet	1074	1159	1247	1339
3000	landing run	Meter	226	244	263	282
		Feet	742	801	862	926
	over 50ft obstacle	Meter	339	366	394	424
		Feet	1113	1202	1294	1390
4000	landing run	Meter	234	253	273	293
		Feet	769	831	895	962
	over 50ft obstacle	Meter	352	380	409	440
		Feet	1154	1247	1343	1444
5000	landing run	Meter	243	263	283	305
		Feet	798	862	929	999
	over 50ft obstacle	Meter	365	394	425	457
		Feet	1197	1294	1395	1500
6000	landing run	Meter	252	273	294	316
		Feet	828	895	965	1038
	over 50ft obstacle	Meter	379	409	442	475
		Feet	1242	1343	1449	1559
7000	landing run	Meter	262	283	306	329
		Feet	859	929	1003	1079
	over 50ft obstacle	Meter	393	425	459	494
		Feet	1289	1395	1505	1620
8000	landing run	Meter	272	294	318	342
		Feet	892	965	1042	1122
	over 50ft obstacle	Meter	408	442	477	513
		Feet	1339	1449	1564	1685
9000	landing run	Meter	282	306	330	356
		Feet	926	1003	1083	1167
	over 50ft obstacle	Meter	424	459	496	534
		Feet	1390	1506	1626	1752
10000	landing run	Meter	293	318	343	370
		Feet	962	1042	1127	1214
	over 50ft obstacle	Meter	440	477	515	556
		Feet	1444	1565	1691	1823

Landing Weight 800kg / 1760lb						
Pressure Altitude		Unit	Landing Distance			
			ISA	ISA +10	ISA +20	ISA +30
0	landing run	Meter	243	262	282	302
		Feet	798	860	925	992
	over 50ft obstacle	Meter	365	394	423	454
		Feet	1198	1291	1388	1489
1000	landing run	Meter	252	272	292	314
		Feet	827	892	959	1030
	over 50ft obstacle	Meter	378	408	439	471
		Feet	1241	1339	1440	1546
2000	landing run	Meter	261	282	303	326
		Feet	857	925	995	1069
	over 50ft obstacle	Meter	392	423	455	489
		Feet	1286	1388	1494	1604
3000	landing run	Meter	271	292	315	338
		Feet	888	959	1033	1110
	over 50ft obstacle	Meter	407	439	473	508
		Feet	1334	1440	1551	1666
4000	landing run	Meter	281	303	327	351
		Feet	921	995	1072	1152
	over 50ft obstacle	Meter	422	455	491	527
		Feet	1383	1494	1610	1730
5000	landing run	Meter	291	315	339	365
		Feet	956	1033	1113	1197
	over 50ft obstacle	Meter	437	473	509	548
		Feet	1435	1550	1671	1797
6000	landing run	Meter	302	327	352	379
		Feet	992	1072	1156	1244
	over 50ft obstacle	Meter	454	491	529	569
		Feet	1488	1610	1736	1867
7000	landing run	Meter	314	339	366	394
		Feet	1029	1113	1201	1293
	over 50ft obstacle	Meter	471	509	550	592
		Feet	1545	1671	1803	1941
8000	landing run	Meter	326	353	381	410
		Feet	1068	1157	1249	1344
	over 50ft obstacle	Meter	489	529	571	615
		Feet	1604	1736	1874	2018
9000	landing run	Meter	338	366	396	426
		Feet	1109	1202	1298	1398
	over 50ft obstacle	Meter	508	550	594	640
		Feet	1665	1804	1948	2099
10000	landing run	Meter	351	381	411	443
		Feet	1152	1249	1350	1455
	over 50ft obstacle	Meter	527	571	618	666
		Feet	1730	1875	2026	2184

Landing Weight 850kg / 1870lb						
Pressure Altitude		Unit	Landing Distance			
			ISA	ISA +10	ISA +20	ISA +30
0	landing run	Meter	288	311	334	358
		Feet	946	1019	1096	1176
	over 50ft obstacle	Meter	433	466	501	538
		Feet	1419	1530	1645	1765
1000	landing run	Meter	299	322	346	372
		Feet	980	1057	1137	1220
	over 50ft obstacle	Meter	448	483	520	558
		Feet	1471	1586	1706	1831
2000	landing run	Meter	310	334	359	386
		Feet	1016	1096	1179	1266
	over 50ft obstacle	Meter	465	501	540	579
		Feet	1524	1645	1770	1901
3000	landing run	Meter	321	346	373	401
		Feet	1053	1137	1224	1315
	over 50ft obstacle	Meter	482	520	560	602
		Feet	1580	1706	1837	1974
4000	landing run	Meter	333	359	387	416
		Feet	1092	1179	1271	1366
	over 50ft obstacle	Meter	500	540	581	625
		Feet	1639	1770	1907	2050
5000	landing run	Meter	345	373	402	432
		Feet	1133	1224	1319	1419
	over 50ft obstacle	Meter	518	560	604	649
		Feet	1700	1837	1980	2130
6000	landing run	Meter	358	387	418	449
		Feet	1175	1271	1370	1474
	over 50ft obstacle	Meter	538	581	627	674
		Feet	1764	1907	2057	2213
7000	landing run	Meter	372	402	434	467
		Feet	1219	1319	1424	1532
	over 50ft obstacle	Meter	558	604	651	701
		Feet	1831	1981	2137	2300
8000	landing run	Meter	386	418	451	486
		Feet	1266	1370	1480	1593
	over 50ft obstacle	Meter	579	627	677	729
		Feet	1900	2057	2221	2392
9000	landing run	Meter	401	434	469	505
		Feet	1315	1424	1538	1657
	over 50ft obstacle	Meter	601	651	704	758
		Feet	1973	2137	2309	2487
10000	landing run	Meter	416	451	487	525
		Feet	1365	1480	1599	1724
	over 50ft obstacle	Meter	625	677	732	789
		Feet	2050	2221	2401	2588

Landing Weight 900kg / 1985lb						
Pressure Altitude		Unit	Landing Distance			
			ISA	ISA +10	ISA +20	ISA +30
0	landing run	Meter	338	365	392	421
		Feet	1110	1196	1286	1380
	over 50ft obstacle	Meter	508	547	588	631
		Feet	1666	1795	1931	2071
1000	landing run	Meter	350	378	407	436
		Feet	1150	1240	1334	1432
	over 50ft obstacle	Meter	526	567	610	655
		Feet	1726	1861	2003	2149
2000	landing run	Meter	363	392	422	453
		Feet	1192	1286	1384	1486
	over 50ft obstacle	Meter	545	588	633	680
		Feet	1789	1930	2078	2231
3000	landing run	Meter	377	407	438	470
		Feet	1236	1334	1436	1543
	over 50ft obstacle	Meter	565	610	657	706
		Feet	1855	2002	2156	2316
4000	landing run	Meter	391	422	455	488
		Feet	1281	1384	1491	1603
	over 50ft obstacle	Meter	586	633	682	733
		Feet	1923	2078	2238	2406
5000	landing run	Meter	405	438	472	507
		Feet	1329	1436	1548	1665
	over 50ft obstacle	Meter	608	657	708	762
		Feet	1995	2156	2324	2499
6000	landing run	Meter	420	455	490	527
		Feet	1379	1491	1608	1730
	over 50ft obstacle	Meter	631	682	736	792
		Feet	2070	2238	2414	2597
7000	landing run	Meter	436	472	509	548
		Feet	1431	1548	1671	1798
	over 50ft obstacle	Meter	655	708	764	823
		Feet	2148	2324	2508	2699
8000	landing run	Meter	453	490	529	570
		Feet	1486	1608	1736	1870
	over 50ft obstacle	Meter	680	736	794	855
		Feet	2230	2414	2606	2807
9000	landing run	Meter	470	509	550	593
		Feet	1543	1671	1805	1945
	over 50ft obstacle	Meter	706	765	826	890
		Feet	2316	2508	2709	2919
10000	landing run	Meter	488	529	572	617
		Feet	1602	1737	1877	2023
	over 50ft obstacle	Meter	733	795	859	926
		Feet	2405	2607	2817	3037

Landing Weight 950kg / 2095lb						
Pressure Altitude		Unit	Landing Distance			
			ISA	ISA +10	ISA +20	ISA +30
0	landing run	Meter	393	424	456	489
		Feet	1291	1392	1496	1605
	over 50ft obstacle	Meter	591	637	685	734
		Feet	1938	2089	2246	2410
1000	landing run	Meter	408	440	473	508
		Feet	1338	1443	1552	1666
	over 50ft obstacle	Meter	612	660	710	762
		Feet	2008	2166	2330	2501
2000	landing run	Meter	423	456	491	527
		Feet	1387	1496	1610	1729
	over 50ft obstacle	Meter	634	685	737	791
		Feet	2081	2246	2417	2596
3000	landing run	Meter	438	473	509	547
		Feet	1438	1552	1671	1795
	over 50ft obstacle	Meter	658	710	765	821
		Feet	2158	2330	2509	2695
4000	landing run	Meter	454	491	529	568
		Feet	1491	1610	1735	1865
	over 50ft obstacle	Meter	682	737	794	853
		Feet	2238	2417	2604	2799
5000	landing run	Meter	471	509	549	590
		Feet	1546	1671	1801	1937
	over 50ft obstacle	Meter	707	765	824	886
		Feet	2321	2509	2704	2908
6000	landing run	Meter	489	529	570	614
		Feet	1604	1735	1871	2013
	over 50ft obstacle	Meter	734	794	856	921
		Feet	2408	2604	2809	3021
7000	landing run	Meter	508	549	592	638
		Feet	1665	1802	1944	2092
	over 50ft obstacle	Meter	762	824	889	957
		Feet	2499	2704	2918	3141
8000	landing run	Meter	527	570	616	663
		Feet	1728	1871	2020	2175
	over 50ft obstacle	Meter	791	856	924	995
		Feet	2595	2809	3032	3265
9000	landing run	Meter	547	593	640	690
		Feet	1795	1944	2100	2262
	over 50ft obstacle	Meter	821	890	961	1035
		Feet	2694	2918	3152	3396
10000	landing run	Meter	568	616	666	717
		Feet	1864	2021	2184	2354
	over 50ft obstacle	Meter	853	924	999	1077
		Feet	2798	3033	3278	3533

Landing weight 999kg / 2200lb						
Pressure Altitude		Unit	Landing Distance			
			ISA	ISA +10	ISA +20	ISA +30
0	landing run	Meter	453	488	525	563
		Feet	1486	1601	1722	1847
	over 50ft obstacle	Meter	680	733	788	846
		Feet	2231	2405	2585	2776
1000	landing run	Meter	469	506	545	585
		Feet	1539	1660	1788	1919
	over 50ft obstacle	Meter	705	760	818	877
		Feet	2313	2493	2684	2877
2000	landing run	Meter	487	525	565	607
		Feet	1598	1722	1854	1991
	over 50ft obstacle	Meter	730	788	565	607
		Feet	2395	2585	1854	1991
3000	landing run	Meter	504	545	586	630
		Feet	1654	1788	1923	2067
	over 50ft obstacle	Meter	757	817	880	946
		Feet	2484	2680	2887	3104
4000	landing run	Meter	523	565	609	654
		Feet	1716	1854	1998	2146
	over 50ft obstacle	Meter	785	848	914	982
		Feet	2575	2782	2999	3222
5000	landing run	Meter	543	586	632	680
		Feet	1781	1923	2073	2231
	over 50ft obstacle	Meter	814	880	949	1020
		Feet	2671	2887	3114	3346
6000	landing run	Meter	563	609	657	706
		Feet	1847	1998	2156	2316
	over 50ft obstacle	Meter	845	914	986	1060
		Feet	2772	2999	3235	3478
7000	landing run	Meter	584	632	682	734
		Feet	1916	2073	2238	2408
	over 50ft obstacle	Meter	877	949	1024	1102
		Feet	2877	3114	3360	3615
8000	landing run	Meter	607	657	709	763
		Feet	1991	2156	2326	2503
	over 50ft obstacle	Meter	910	986	1064	1146
		Feet	2986	3235	3491	3760
9000	landing run	Meter	630	682	737	794
		Feet	2067	2238	2418	2605
	over 50ft obstacle	Meter	945	1024	1106	1192
		Feet	3100	3360	3629	3911
10000	landing run	Meter	654	709	766	826
		Feet	2146	2326	2513	2710
	over 50ft obstacle	Meter	982	1064	1150	1240
		Feet	3222	3491	3773	4068

6 Weight & Balance, Equipment List

6.1 General

This section describes the procedure for establishing the basic weight and moment of the airplane.

Sample forms are provided for reference.

Procedures for calculating the weight and moment for various operations are also provided.

A comprehensive list of equipment available for this airplane is included.

It is the responsibility of the pilot to ensure that the airplane is loaded within the prescribed limits for each flight.

6.2 Procedure to Establish Empty Weight & CG

A) Drain all fuel tanks to unusable fuel level
B) Empty the smoke tanks
C) Remove ballast weights
D) Ensure engine oil and brake fluid are at correct levels (see AMM)
E) Ensure that all loose items and non-fitted equipment is removed
F) Position calibrated scales (capable of minimum 300 kg / 660 lb each) under each wheel
G) Support tail wheel to put the airplane into level attitude
H) Read each scale and add up to find total airplane weight
Subtract weight of tail support if necessary

Determination of the moment arms:

A) The firewall is the vertical reference plane, use plumb-bob to mark this plane on the ground
B) By using a plumb-bob and marking on the ground:
   a. Draw a reference line parallel with the firewall
   b. Draw a line from middle of right wheel axle to middle of left axle
   c. Mark the tail wheel axle center
   Tail wheel must be aligned straight
C) Measure distance from reference plane to main wheel axles (Arm A), distance from reference plane to tail wheel axle (Arm B)

6.3 Weight and Balance History

Use this table to record additions, deletions and replacements of fixed equipment including repainting and repairs.

Date	Modification	Weight Change	New Weight	Arm for Change	Moment Change	Total Moment	Calculated CG
	Delivery	---		---	---		

6.4 Weight and Balance Charts for Pre-flight Use

Weight and moment calculation sheet

	Weight kg	Arm m	Moment Kg m	Weight lb	Arm in	Moment lb in
Empty weight						
Front seat max 110 kg / 240 lb		1.16			45.6	
Rear seat max 110 kg / 240 lb		2.16			85.0	
Fuel, Acrotank max 68 kg / 150 lb		0.26			10.2	
Fuel, left wing max 79 kg / 174 lb		0.33			13.0	
Fuel, right wing max 79 kg / 174 lb		0.33			13.0	
Smoke tanks total max 31 kg / 68 lb		1.00			39.4	
Baggage bay max 15 kg / 33 lb		2.80			110.3	
Optional Ballast max 14 kg / 31 lb		4.40			173.2	
Total						
MTOW	**999 kg**			**2200 lb**		

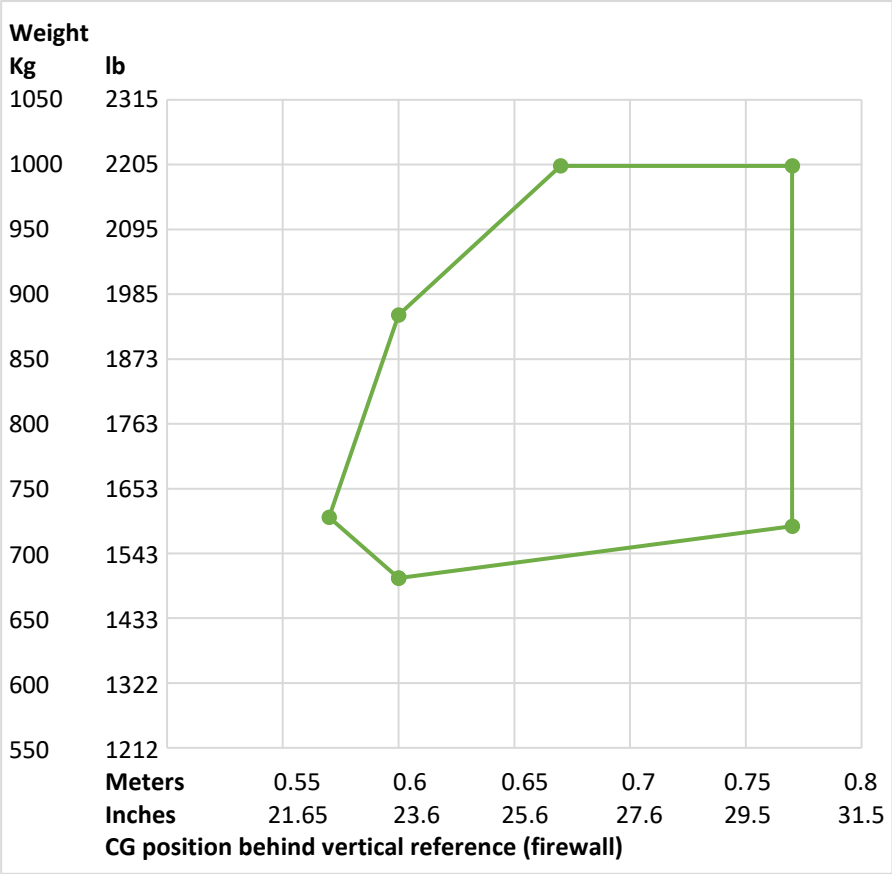
The GB1 GameBird is tested to and the operation range is limited to:

- Forward limit: 580 mm (22.8”), 25 %
- Aft limit: 780 mm (31.1”), 34 %

Parameter	Name	Value
CG position	L_{CG}	As determined by table above
Distance Firewall to LE	L_1	66 mm (2.6”)
Distance LE to TE	L_2	2074 mm (80.5”)
CG as % chord	MAC	$(L_{CG} - L_1) / L_2$

Weight – Resultant Moment Arm Envelope Chart

The following figure shows the allowable weight- and center of gravity envelope for the GB1:



CAUTION: **Weight and CG positions must be considered for both take-off and landing configurations!**

7 Description of Airplane & Systems

General

The GB1 GameBird is a conventional low wing monoplane with one front mounted reciprocating engine driving a constant speed tractor propeller with two seats in a tandem arrangement, PIC in rear seat.
The landing gear is a fixed conventional tail-wheel arrangement.

The GB1 is certified only in the aerobatic category,
for use in day, VFR, non-icing conditions.

The GB1 features no flaps or other lift enhancement devices.

7.1 Airframe

Airframe and control surfaces are made from carbon fiber, impregnated with an epoxy resin.
The composite structure is qualified up to 72°C (161°F).

The fuselage is a monocoque structure with integrated vertical stabilizer and horizontal stabilizer.

The GB1 features a fixed windshield and a one-piece canopy opening to the right-hand side. The canopy may be jettisoned in flight for emergency exit.

The wing is divided into right and left halves, detachable sideways for easy shipping. The wings have integral fuel tanks.

The Acrotank is a composite body, filled with explosion- and slosh suppressing foam and mounted in a carbon fiber composite enclosure.

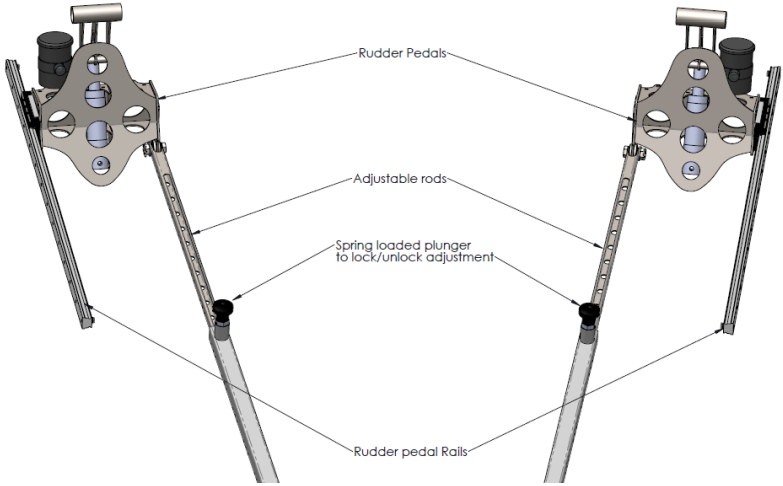
Mechanical systems are largely welded steel. These include engine mount; flight control system parts (rudder pedals; torque tube; bell cranks); and the engine exhaust pipes.

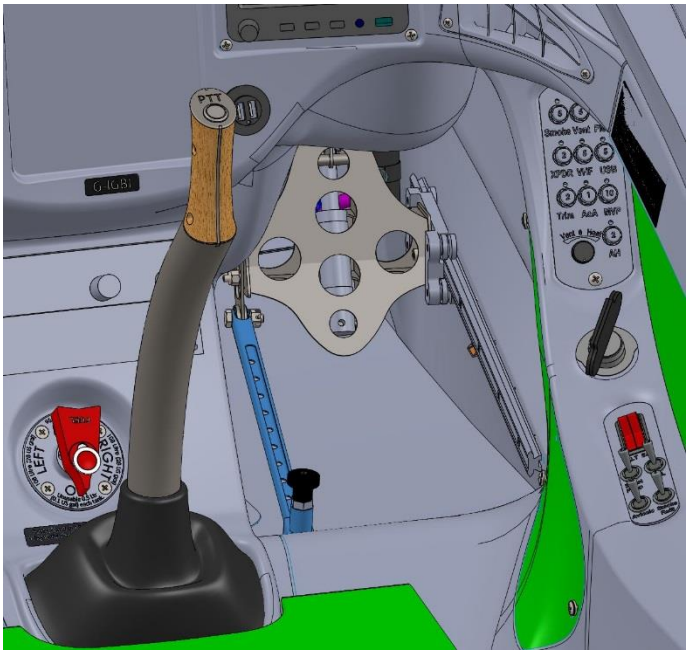
7.2 Flight Controls

Conventional dual, all-mechanical primary controls:
Center control stick, rudder pedals.

Rudder pedals are mechanically adjustable, the seats are fixed.

Both the front and rear rudder pedals are mechanically adjustable.
This is achieved by lengthening or shortening a telescopic rod which runs aft from the inside edge of the pedal.
The rudder pedal adjustment schematic is shown in the image below.
The location of the adjuster rods in the cockpit is shown in the following image.





Adjusting the pedals in either seat is most easily done when seated.

1.- Pull up the spring-loaded locating pin
2.- Push or pull pedal in required position
3.- Make sure locating pin is fully down and locked after release
4 - Repeat process with other pedal, ensuring that the adjustment is symmetric by counting visible adjustment holes.

WARNING: **Check that spring-loaded locating pins are locked, and rudder pedals are symmetrically adjusted before flight!**

Elevator and aileron trim are actuated by electrically driven irreversible worm drives.
The trim control coolie hat switch and position indicators are on the left-hand console in the rear cockpit only.
The direction of movement is indicated by the up / down, left / right indication on the switch.

Engine controls:
Throttle, Propeller and Mixture on left-hand side consoles of both cockpits and mechanically interconnected.
The rear throttle quadrant has a friction adjuster for throttle; turning the adjuster clockwise increases friction, counter clockwise reduces friction.
Prop and mixture controls have spring loaded detents to prevent creep.

Technical details:
Torque tube and control sticks, elevator idler and aileron bellcranks are 4130 steel welded assemblies.
Pushrods from torque tube to aileron bellcrank, and from elevator idler to elevator connector are carbon fiber pushrods.
The rudder is connected to the cockpit rudder pedal system via steel cables.

The control stick and the rudder pedals feature rubber pyramids as elastic deflection limiters / stops.

7.3 Cockpit, Instrument Panels and Instruments

The rear instrument panel is equipped with a 10” screen multi-function display (MFD1), displaying the following functions:

- Engine Monitor with Fuel Capacity Information
- GPS (own position) with moving map and ADS-B in overlay, GPS and ADS-B signals provided by XPDR
- Attitude, Airspeed, Altitude and Heading
- Accelerometer
- Structure temperature
- Interface with VHF, Intercom and XPDR to allow frequency change from both seats

As an option, MFD2 (7” screen multi-function display) can be installed in the front instrument panel.

The following mechanical standby flight instruments are installed:

- Altimeter — both panels
- Airspeed indicator — both panels
- Accelerometer — rear instrument panel
- Magnetic compass — in canopy

An annunciator light panel is installed in the rear instrument panel, providing caution / warning indications for essential engine parameters.

Both panels have a USB power supply socket installed.

7.3.1 Rear Cockpit Overview

The magnetic compass is mounted in the canopy, not shown in this picture.

1	MFD 1 - contains engine and fuel information, moving map with own position indication, electronic flight instruments, VHF and XPDR interface
2	Airspeed Indicator
3	Entry Speed / limitations placard
4	Trim switch and indicators
5	VHF with intercom
6	Transponder with encoder
7	Fuel selector
8	Engine Control Quadrant
9	Accelerometer
10	Altimeter
11	Circuit breaker panel
12	Ignition switch
13	Switch panel
14	Annunciator Lights Panel
15	ELT Remote Panel
16	Landing / Recognition Light CB Switch
17	COM Swap Switch, located on throttle grip

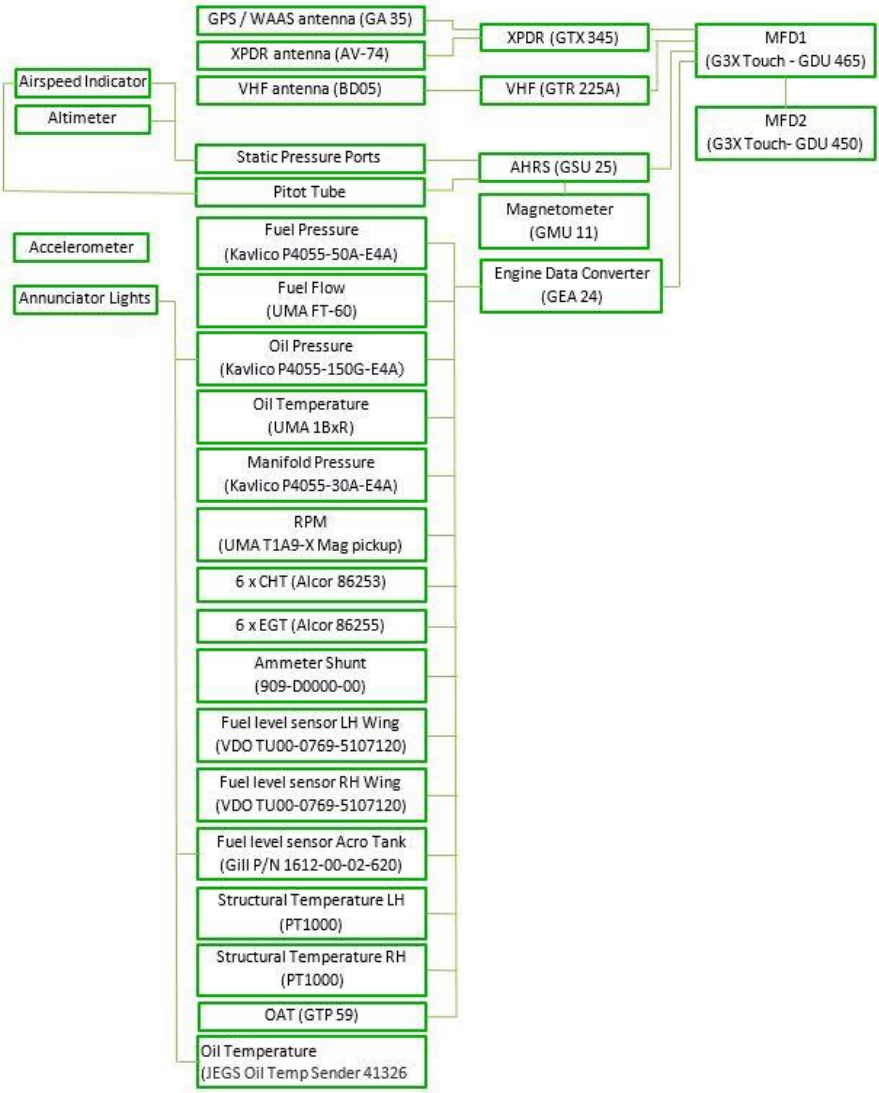
Rear cockpit, right-hand side console

Circuit Breaker Panel	Switch Panel
	

7.3.2 Front Cockpit Overview

1	MFD 2, containing engine and fuel information, moving map with own position indication, electronic flight instruments, VHF and XPDR interface
2	Airspeed Indicator
3	Entry Speed placard
4	Engine Control Quadrant
5	Altimeter
6	Headset sockets

7.3.3 Instrument System Architecture



The system consists of the following items:

Item	Type
MFD 1	G3X Touch - GDU 465, 10.6" Landscape Display
MFD 2	G3X Touch- GDU 450 7" Landscape Display
MFD 1 Install Kit	GDU 465 Install Kit
MFD 2 Install Kit	GDU 450 Install Kit
Magnetometer	GMU 11
Magnetometer. Conn. kit	GMU 11 install Kit
ADAHRS	GSU 25
AHRS Connector kit	GSU 25 Conn Kit
OAT Probe	GTP 59
Engine data converter	GEA 24
EDC Connector kit	GEA 24 Conn kit
RPM sensor	UMA T1A9-X Mag pickup
Fuel Pressure sensor	Kavlico P4055-50A-E4A
Fuel Flow Transducer	Electronics International FT-60
Ammeter Shunt	Shunt, +/-50 mV, 100 amps
6 CHT sensors 1 for ea. cyl.	Alcor 86253
6 EGT sensors, 1 for ea. cyl.	Alcor 86255
Manifold Pres. sensor	Kavlico P4055-30A-E4A
Oil Pressure sensor	Kavlico P4055-150G-E4A
Oil temp. sensor	UMA 1BxR
Annunciator Lights Panel	GB1-7710-00-01
Oil Temp Sensor, Warning	JEGS

7.3.4 MFD Controls

Overview MFD1

Overview MFD2

NRST Key	Press to display Nearest Page for viewing nearest airports, intersections, NDBs, VORs, waypoints, frequencies, and airspaces
Direct-To Key	Press to activate the Direct-To function, enter a destination waypoint and establish direct course to selected destination
MENU Key	Press once to view the Page Menu Press twice to view the Main Menu Press a third time to clear the Main Menu
BACK Key	Press to return to the previous screen

Secure Digital (SD) Data Cards

The G3X Touch data card slot uses Secure Digital (SD) cards. The SD card can be used for software updates, checklist files, flight data logging, exporting Track Logs/User Waypoints, and Importing/Exporting Flight Plans.

NOTE: It is recommended to maintain three SD cards for the G3X system. One SD card should be used exclusively for loading software, another SD card should be used exclusively for loading databases, and a third card should be used exclusively for flight purposes.

NOTE: When flying the G3X system, any SD card(s) used in the GDU(s) should contain only files which are necessary for the flight of the aircraft. Non-essential files may have a negative effect on display performance.

The G3X Touch uses an SD Card for software updates, database updates, MapSource® data, checklist files, Chartview, Flight Data Logging, exporting Track Logs/User Waypoints, importing / exporting Flight Plans and user-downloaded vehicles. Garmin recommends using an 8 GB SanDisk or Toshiba SD Card.

MapSource detailed maps are available from your local Garmin dealer. Refer to the Garmin website (www.garmin.com) for instructions on downloading software updates.

Refer to the latest version.

Installing an SD Card:

1) Insert the SD card in the SD card slot with the card contacts facing down until the card is locks into the spring latch, flush with the adjacent surface.

2) To eject the card, gently press on the SD card to release the spring latch.

Engine and Fuel Indication System

Green bands /arcs on the instruments indicate normal ranges of operation; yellow and red bands /arcs or lines indicate caution and warning, respectively. When operating conditions outside the normal range occur, the corresponding caution readout will display solid yellow, warning readout will flash red.
If sensor data to an instrument becomes invalid or unavailable, a red "X" is displayed across the instrument.

Function	Limitations		
	Green	Yellow	Red
Manifold Pressure	11 to 32 "Hg	-	-
RPM	700 to 2600	-	above 2600
Oil Pressure	55 to 95 psi	25 to 55 psi 95 to 115 psi	below 25 psi above 115 psi
Oil Press. Low Caution Light	-	≤ 55 psi	-
Oil Temp	100 to 245°F	-	below 100°F, above 245°F
Oil Temp High Warning Light	-	-	≥245°F
Fuel Flow	-	-	-
Fuel Qty Acrotank	7 to 25 Gal (95 liters)	0 to 7 Gal (0 to 26 liters)	0
Acrotank Low Caution Light	-	≤ 7 Gal (26 l)	-
Fuel Qty Left Wing	3.4 to 28 Gal (13 – 108 liters)	-	0
Fuel Qty Right Wing	3.4 to 28 Gal (13 to 108 liters)	-	0
CHT	200 to 465°F	100 to 200°F	above 465°F
EGT	1100 to 1550°F	-	above 1550°F

The functions below are displayed only on the engine page.
When any other but the engine page is selected, and operating conditions outside the normal range occur, CAS messages appear right of the HSI.

Structure Temp	-30°C to 72°C -22°F to 161°F	-	below -30°C, above 72°C
Fuel Pressure	12 to 65 psi	0 to 12 psi	65 psi
Volts	12.4 to 15.5	below 12.4 above 15.5	-
Amperes	3 to 40	Below 3	-
Carbon Monoxide	below 50 ppm	-	above 50 ppm

System Power-Up

MFD1 and EDC processing the engine functions are activated by the Battery Master Switch.
AHRS, Magnetometer, XPDR (for GPS / WAAS and ADS-B signals) and MFD2 (if installed) are activated by the Avionic Master Switch.
On startup, the engine page is displayed.

During system initialization, the message 'AHRS ALIGN, KEEP WINGS LEVEL' is shown over the attitude indicator. The AHRS should display valid attitude and heading fields typically within the first minute of power-up.

The AHRS can align itself both while taxiing and during level flight.
The data link weather advisory and current database information are displayed during power-up including valid operating dates, cycle number, and database type. When this information has been reviewed for currency (to ensure that no databases have expired), the pilot is prompted to confirm.

System Annunciations

When one of the units or a function fails, a large red 'X' is typically displayed over the instrument(s) or data experiencing the failure. Upon G3X Touch power-up, certain instruments remain invalid as equipment begins to initialize. All instruments should be operational within one minute of power-up. If any instrument remains flagged, and it is not likely an installation related problem, the MFD must be serviced by an authorized repair facility.

Menus

Press **MENU** once to display a context-sensitive list of options for the page or the dedicated MFD.

Press **MENU** twice to display the Main Menu.
The Page Menu allows the user to access additional features or make setting changes which specifically relate to the currently displayed page. The menu will display 'No Options' when there are no options for the page selected.

Data Entry

Data can be entered by using the touchscreen or the knob. In some instances, such as when entering an identifier, the system tries to predict the desired identifier based on the characters being entered. In this case, if the desired identifier appears, touch **Enter** to confirm the entry without entering the rest of the identifier manually. This can save the pilot from having to enter all the characters of the identifier.

Instead of using character-by-character data entry, touch **Find** to search by recent waypoints, nearest waypoints, flight plan waypoints, user waypoints, name, or city.

Entering data:

1) With the keypad displayed, begin entering data

a) Touch the desired letters
touch **Numeric** to access numbers

b) Touch **Enter**

Or:

a) Touch **Find**

b) Touch **Recent**, **Nearest Airports**, **Flight Plan**, **User**, **Search Name**, or **Search City** Tab

c) Touch desired waypoint from list

Data Entry

Or:

a) Turn the small Knob below the keypad to activate the cursor and enter the first letter and/or number.

b) Turn the large Knob below the keypad to move the cursor to the next character position.

c) Repeat steps 'b' and 'c ', as necessary

d) Touch **Enter** or press the Knob below the keypad.

Page Selection

A page navigation bar is displayed on the lower portion of the MFD.

The right side shows a list of abbreviated names for each of the pages, and the left side shows the name of the current page.

Touch the page navigation bar to select the desired page or turn the large Knob associated with the MFD to cycle through the pages.

Page Navigation

Selecting a main page:

1) Touch the Page Navigation Bar on the MFD

2) Touch the desired page from the Select Page menu

Or:

Turn the large Knob associated with the MFD

Map Page (Map)
Charts Page (Cht)
Traffic Page (TRF)
Waypoint Page (Wpt)
Active Flight Plan Page (FPL)
Weather Page (Wx)
Info Page (Info)
Terrain Page (Ter)
Engine Page (Eng)

NEAREST Pages

The Nearest Pages are selected by pressing the **NRST** Key

Selecting the NRST pages:

1) Touch the **NRST** Key.

2) Touch the Page Navigation Bar.

3) Touch the desired page from the Select Page menu.

Or:

Turn the large Knob associated with the MFD.

The Nearest Pages contain the following information.

APT (Airport)—identifier, bearing, distance, length of the longest runway, and common traffic advisory (CTAF) or tower frequency.

WX (Airport Weather): identifier, bearing, distance, METAR text, and ATIS, AWOS, or ASOS frequency

VOR (VHF Omnidirectional Radio Beacon)—identifier, facility type (symbol), bearing, distance, and frequency

NDB (Non-Directional Beacons)—identifier, facility, type (symbol), bearing, distance, and frequency

INT (Intersection)—identifier, bearing, and distance

VRP (Visual Reporting Point) (Atlantic)—identifier, bearing, and distance

USR (User Waypoints)—name, bearing, and distance

CTY (City)—name, bearing, and distance

ATC (Air Route Traffic Control Center)—bearing, distance, and frequency

FSS (Flight Service Station)—name, bearing, distance, frequency, and VOR (if applicable)

ASPC (Airspace)—name, time to entry (when applicable), and status

GPS receiver status

Internal system checking is performed to ensure the GPS receiver is providing accurate data to the MFDs.

The system is configured to share GPS information with the GTX 345 XPDR. If an MFD is not using its own GPS receiver, the name of the unit providing the data is displayed on the INFO Page.

The GPS Status will display one of the following conditions:

- Autolocate—Receiver is looking for any satellite whose almanac has been collected, which can take up to 5 minutes
- Searching the Sky—Receiver is looking for satellites
- Acquiring Satellites—Receiver is looking for and collecting data from satellites visible at its last known or initialized location, but has not acquired a fix
- 2D GPS Location—At least three satellites have been acquired and a two-dimensional location fix has been calculated. “2D Differential” appears when you are receiving DGPS corrections in 2D mode
- 3D GPS Location—At least four satellites have been acquired and a three-dimensional fix has been calculated. “3D Differential” appears when you are receiving DGPS corrections in 3D mode
- Lost Satellite Reception—the receiver is no longer tracking enough satellites for a 2D or 3D fix

Viewing GPS receiver status information:

Turn the large Knob associated with the MFD to select the Info Page.

Or:

1) Touch the Page Navigation Bar on the MFD.

2) Touch the **Info** Page from the Select Page menu.

New Location

Use 'New Location' menu option on the **Info** Page when GPS Receiver is having trouble finding the satellites it expects to be there.

Entering a new location:

1) From **Info** Page, while unit is searching for satellites, press **MENU** Key

2) Touch **New Location**

3) Touch **Automatic**, **Use Map**, or **Use Identifier**

4) After selecting your approximate position using the map or entering an identifier, touch **Enter**

5) The GPS Receiver will begin a new search based on the location entered

Acquiring Satellites

When the receiver is in the process of acquiring enough satellite signals for navigation, the receiver uses satellite orbital data and last known position to determine the satellites that should be in view. "Acquiring Satellites" is indicated as the solution until a sufficient number of satellites have been acquired for computing a solution. When the receiver is in the process of acquiring a 3D differential GPS solution, "3D GPS Location" is indicated as the solution until the 3D differential fix has finished acquisition.

Satellite Information

Satellites currently in view are shown at their respective positions on a satellite constellation diagram. The outer circle of the constellation diagram represents the horizon, the inner circle represents 45° above the horizon, and the center point shows the position directly overhead. Each satellite is represented by a square containing the Pseudo-Random Noise (PRN) number.

As the GPS receiver locks onto satellites, a signal strength bar is displayed for each satellite in view, with the appropriate satellite PRN number (01-32 or 33-64 for WAAS) below each bar. The progress of satellite acquisition is shown in three stages, as indicated by signal bar appearance:

- No bar—Receiver is looking for the indicated satellite
- Gray bar—Receiver has collected necessary data, satellite can be used
- Green bar—Satellite is being used for the GPS solution

Position

The Position box on the **Info** Page displays latitude, longitude, accuracy (in feet), reference waypoint, type, distance, direction, and bearing.

The current position can be marked as a user waypoint by touching the latitude and longitude button. The reference waypoint is designed to display the current position in relation to a prominent landmark.

The pilot can change the reference waypoint 'Nearest Type' using the 'Change Nearest Type' page menu option.

By default, the Nearest Type is set to 'Automatic', which will display the nearest large airport, enroute VOR, or city (in that order).

Changing the Nearest Type:

1) From the **Info** Page, press the **MENU** Key

2) Touch **Change Nearest Type**

3) Touch **Automatic**, **Airport**, **VOR**, **NDB**, **Intersection**, **City**, or **Waypoint**

Marking Current Location as a Waypoint:

1) From the **Info** Page, touch the latitude and longitude

Or:

1) From the **Info** Page, press the **MENU** Key, and touch **Mark Waypoint**

2) Touch **Yes** on the confirmation dialog box

3) Optionally touch the **Name** field to rename the waypoint

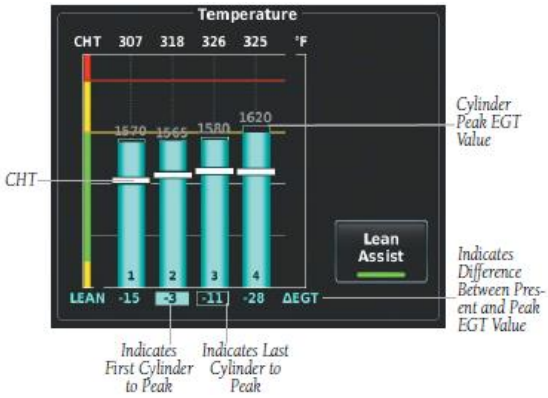
4) Touch **Back**

Lean Assist Mode

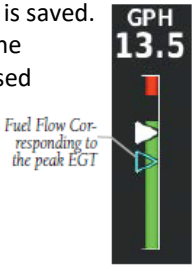
A **Lean Assist** Button is displayed on the **Main** Tab of the Engine Page.

Using Lean Assist Mode:

From **Main** Tab of Eng Page, touch **Lean Assist**. As mixture is leaned, one of the cylinders' exhaust temperature will peak. Continuing to lean will cause each additional cylinder to peak (if applicable) until the last cylinder peaks.
To cancel Lean Assist Mode, touch **Lean Assist** again.
With **Lean Assist** selected, the Lean Assist Mode waits for a cylinder's EGT to reach peak and decrease by at least 7°F. To prevent detection of false peaks, the system waits for a cylinder's EGT to increase by at least 15°F before detecting a peak. In addition, if the cylinder temperature rises above a previously detected peak by more than 100°F, the previous peak is considered false.
When any cylinder peaks, its bar changes from green to blue, and the white EGT number changes to a blue delta number. The blue delta number is the difference between current EGT and peak EGT for each cylinder. The first cylinder to peak is identified with a solid blue box around the delta number, and the last cylinder to peak is identified with a hollow blue box. The outline and grey number above each bar displays the actual peak EGT value.



The fuel flow value detected as the first cylinder peaks is saved. The fuel flow corresponding to peak EGT is drawn on the fuel flow gauge as a hollow blue pointer. This can be used to determine if you are on the rich side of peak (ROP) or the lean side of peak (LOP). Rich of Peak (ROP) if the fuel flow pointer is above the blue triangle, or Lean of Peak (LOP) if the fuel flow pointer is below the blue triangle.



Fuel Calculation

WARNING: **The Fuel Calculator and/or Fuel Range Rings are NOT intended to be relied upon as the primary fuel indicator(s) and does not relieve the pilot from the responsibility of proper flight planning. The calculations do not use the aircraft fuel quantity indicators and are calculated from the last time the fuel was reset.**

Refer to Section 4.25 for information on displaying fuel range rings on Map.

Adjusting the Fuel Remaining or Fuel Used quantity:

1) on ENG Page, touch **Fuel Calculator** Tab

2) Touch '**+**' or '**-**' to adjust quantity

Or: Touch value to enter fuel quantity using the keypad and touch **Enter**

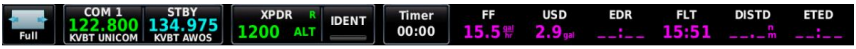
Resetting the Fuel Used to zero:

1) On ENG Page, touch **Fuel Calculator** Tab

2) Touch **Reset**

CNS Interface

The Communication/Navigation/Surveillance (CNS) system includes the VHF and Intercom interface, and Mode S transponder. These functions can be accessed from the boxes that make up the CNS Data Bar located at the top of the MFD.



1- COM – Transfers the standby and active COM frequency
2- STBY – Displays/removes the COM1 STBY page, to enter and transfer COM1 frequencies.
3- XPDR – Displays/removes the Transponder Page, to select transponder functions.
4- IDENT – Initiates the transponder ident function
5- *Configurable Data Field - Timer (example)*
6- *Configurable Data Field – Fuel Flow FF (example)*
7- *Configurable Data Field – Fuel Used USD (example)*
8- *Configurable Data Field – Estimated Distance Remaining EDR (example)*
9- *Configurable Data Field – Flight Time FLT (example)*
10- *Configurable Data Field – Distance Destination DISTD (example)*
11- *Configurable Data Field – Estimated Time to Destination ETED (example)*

Auto-Tuning Frequencies

Frequencies can be automatically tuned from the following:

- Map Page
- Weather Page
- Waypoint Page
- Nearest Airports Page
- Nearest Airport Weather Page
- Nearest VOR Page
- Nearest Airspace Page

Auto-tuning a frequency:

1) Touch the page navigation bar on the MFD

2) Touch **Waypoint**

3) Touch the waypoint identifier field at the top of the page

4) Enter the desired waypoint and touch **Enter**

5) Touch **Freq**

6) Touch the desired frequency to tune

Or:

1) Touch the page navigation bar on the MFD

2) Touch **Map** or **SXM Weather**

3) Touch the desired waypoint or airport on the map

4) Touch the selected waypoint identifier name below the map

5) Touch **Freq**

6) Touch the desired frequency to tune

Or:

1) Press the **NRST** Key

2) Touch the page navigation bar

3) Touch **Airports** or **Airport WX**

4) Touch the desired airport

5) Touch **Freq**

6) Touch the desired frequency to tune

Or:

1) Press the **NRST** Key

2) Touch the page navigation bar

3) Touch **VORs**

4) Touch the desired VOR

5) Touch the frequency button

Or:

1) Press the **NRST** Key

2) Touch the page navigation bar

3) Touch **Airspace**

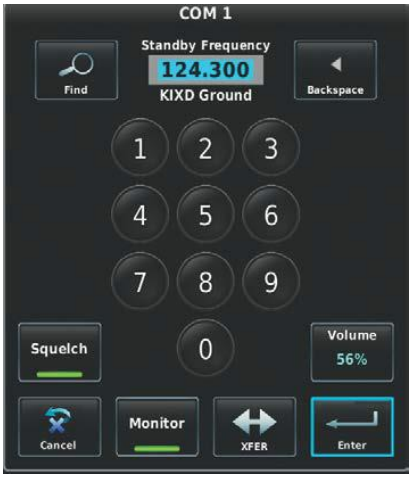
4) Touch the desired airspace

5) Touch **Frequencies**

6) Touch the desired frequency to tune

COM / VHF

The COM Frequency Box is composed of two fields; one active frequency is on the left side and the standby frequency is on the right.
When an audio panel is configured, an active COM frequency displayed in green indicates that the COM transceiver is selected. If an audio panel is not configured in the system, all COM active frequencies are always displayed in green (since the GDU has no knowledge which radio(s) are selected).



Manually tuning a COM frequency:

1) Touch STBY on CNS Audio Bar

2) Enter the frequency using the keypad and touch Enter

Or:

a) Touch Find

b) Touch the Recent, Nearest Airports, Flight Plan, or User Waypoint Tab

c) Touch the frequency or touch Select Frequency....

Or:

a) Touch Find

b) Touch Select an Airport

c) Enter the four-letter ICAO identifier for the desired airport

d) Touch the desired frequency

3) Touch COM1 Field to transfer frequency to Active Field

Adjusting COM Volume:

1) Touch STBY on CNS Audio Bar

2) Touch Volume

3) Touch the slider to adjust the percentage

Monitoring the Standby COM:

1) Touch STBY on CNS Audio Bar

2) Touch Monitor. A green MON is displayed in the Standby Field

Transferring Standby to Active:

From the CNS Audio Bar, touch the COM 1 frequency field.

COM Volume Shortcut

The Data Bar Setup page can enable a COM Volume panel that appears while a COM panel is active. This shortcut panel displays touchscreen controls for volume and toggle on/off squelch for the currently displayed COM radio. The shortcut panel appears on the opposite side of the screen as the COM panel.

COM Radio Volume Level and Squelch Button

Automatic Squelch

Automatic Squelch quiets unwanted static noise when no audio signal is received, while still providing good sensitivity to weak COM signals. To disable Automatic Squelch, touch **STBY** > **Squelch**. When Automatic Squelch is disabled, COM audio reception is always on. Continuous static noise is heard over the headsets and speaker, if selected. Touching **STBY** > **Squelch** again enables Automatic Squelch. When Automatic Squelch is disabled, a green SQ appears next to the COM frequency.

GPS Navigation

The Map Page displays aviation data (e.g., airports, VORs, airways, airspaces), geographic data (e.g., cities, lakes, highways, borders), and topographic data (map shading indicating elevation) to be used for situational awareness only. The Navigation Map can be oriented three different ways: North Up (NORTH UP), Track Up (TRK UP) or Desired Track Up (DTK UP).

An aircraft icon is placed on the Navigation Map at the location corresponding to the calculated present position. The aircraft position and the flight plan legs are accurately based on GPS calculations. The base map upon which these are placed is from a source with less resolution, therefore the relative position of the aircraft to map features is not exact. The leg of the active flight plan currently being flown is shown as a magenta line on the navigation map.

The other legs are shown in white.

The Direct-to Window and the Nearest Pages can be displayed by pressing the corresponding hardkeys.

Compass Arc

NOTE: The compass arc is not available in 'North Up' map orientation.

A compass arc representing the aircraft's ground track, appears by default on the Map Page. The route line represents the course.

Enabling/disabling the Compass Arc:

1) With the Map Page displayed, press **MENU**

2) Touch **Set Up Map**

3) Under 'General' Tab, touch and drag to scroll down to **Compass Arc** field

4) Touch 

5) Touch **On** or **Off**

When using the compass arc on the map display, the heading reference will be shown as a magenta line for several seconds. If a cross wind is present, the airplane symbol will rotate slightly to show the difference between the aircraft's heading and ground track.

Using Map Displays

Map displays are used extensively in the to provide situational awareness in flight. Most maps can display the following information:

- Airports, NAVAIDs, airspaces, airways, land data (highways, cities, lakes, rivers, borders, etc.) with names
- Map Pointer information (distance and bearing to pointer, location of pointer, name, and other pertinent information)
- Map range
- Aircraft icon (representing present position)
- Flight plan legs
- User waypoints
- Track vector
- Topography data

The information in this section applies to the following maps unless otherwise noted:

- All Map Pages (MAP)
- Waypoint Page (WPT)
- All Nearest Pages (NRST)
- Active Flight Plan Page
- Direct-to Window

Map Page Setup

Maps are shown in one of three different orientation options, allowing flexibility in determining aircraft position relative to other items on the map (North Up) or for determining where map items are relative to where the aircraft is going (Track Up), or desired track up (DTK UP).

- North Up aligns the top of the map display to north (default setting)
- Track Up aligns the top of the map display to the current ground track
- Desired Track (DTK) Up aligns top of map display to desired course

NOTE: Map orientation can only be changed on Map Page. Any other pages showing navigation data reflect orientation selected for Map Page.

Changing the Navigation Map orientation:

1) With the Map Page displayed, press the **MENU** Key

2) Touch **Set Up Map**

3) Under 'General' Tab, touch and drag to scroll to the **Orientation**

4) Touch 

5) Touch **North Up**, **Track Up**, or **DTK Up**

Setting the range above which to display North Up orientation:

1) With the Map Page displayed, press the **MENU** Key

2) Touch **Set Up Map**

3) Under 'General' Tab, touch and drag to scroll to **North Up Above**

4) Touch 

5) Touch the desired range

Enabling/disabling North Up orientation on the ground:

1) With the Map Page displayed, press the **MENU** Key

2) Touch **Set Up Map**

3) Under 'General' Tab, touch and drag to scroll to **North Up On Ground**

4) Touch 

5) Touch **On** or **Off**

Airports & Navaids

Airport and NAVAID information can be customized to display a variety of information including: runway extension lines, runway numbers and visual reporting points (VRP). Runway extension lines show runway orientation relative to other landmarks and terrain features and are intended to aid in planning traffic pattern entry and/or departure routing.

Setting up and customizing airports and NAVAIDs for the map page:

1) With the Map Page displayed, press **MENU**

2) Touch **Set Up Map**

3) Touch and drag the tabs left or right to find the desired tab

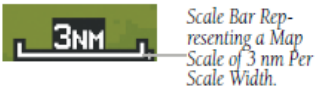
4) Touch the 'Airport' or 'Navaid' Tab

5) Touch the ▼ to display a list of options

6) Touch desired settings for each feature
(on, off, auto, range, text size, etc.)

Map Range

23 different map ranges are available, from 200 feet to 800 nm.
The current range is indicated in the lower right corner of the map.
The scale bar represents the map scale.
To change the map range on any map, use the knob or touch the '+' (decreasing) or the '-' (increasing).



Auto Zoom

Auto Zoom allows to change the map display range to the smallest range clearly showing the active waypoint. Auto Zoom can be overridden by adjusting the range and remains that way until the active waypoint changes, a terrain or traffic alert occurs, or the aircraft takes off.

Enabling/disabling Auto Zoom:

1) With the Map Page displayed, press **MENU**

2) Touch **Set Up Map**

3) Under the 'General' Tab, find the **Autozoom** field

4) Touch

5) Touch **On** or **Off**

Map Panning

Map panning allows the pilot to:

- View parts of the map outside the displayed range without adj. map range
- Highlight and select locations on the map
- Review information for a selected airport, NAVAID or user waypoint
- Designate locations for use in flight planning
- View airspace and airway information

To pan the map, touch and drag the map.
Touch a map feature to get additional information.
The map feature button shows not only the feature name (such as airport designation or waypoint name) but also shows the type (airport, waypoint, etc).
If multiple features are present at the map feature position, a green arrow will appear on the map feature button.
Touch ◀ or ▶ to cycle the list of map features present at that position.

Panning the map:

1) From any map, touch and drag

2) Touch to re-center the map on the aircraft's current position

Reviewing information for a map feature:

1) From any map, touch a map feature

2) If multiple map features are present, touch to cycle through the list

3) Touch the Map Feature button to display additional information.

Fuel Range Ring

WARNING: **The Fuel Calculator and/or Fuel Range Rings are NOT intended to be relied upon as the primary fuel indicator(s), and does not relieve the pilot from the responsibility of proper flight planning. The calculations do not use the aircraft fuel quantity indicators and are calculated from the last time the fuel was reset.**

The Navigation Map can display fuel range rings which show the remaining flight distance. If current fuel endurance is greater than reserve, range-to-empty is shown as a solid green circle and range-to-reserve is a dashed green circle. If current endurance is less than reserve, range-to-empty is shown as a solid yellow circle. Fuel range rings are offset to show the effects of the wind at the current location (e.g., does not account for wind variations throughout the range).

Displaying/removing the fuel range rings and selecting a fuel reserve time:

1) With the Map Page displayed, press **MENU**

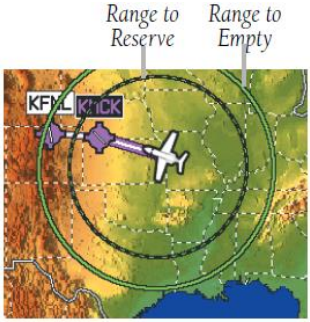
2) Touch **Set Up Map**

3) Touch and drag the tabs left or right to find the desired tab

4) Touch the 'Map' Tab

5) Touch the  in the **Fuel Range (RSV)** field, and touch **On** or **Off**

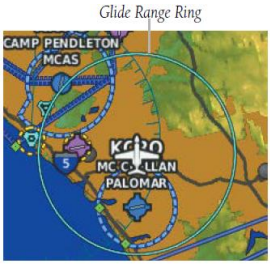
6) Touch '+' or '-' to adjust the fuel range reserve time



Glide Range Ring

NOTE: Many factors, such as winds at various altitudes, terrain, and even pilot actions affect the ability to accurately estimate the gliding range of an aircraft. The displayed Glide Range Ring should not be considered a replacement for in-flight emergency pilot training.

The Glide Range Ring is displayed as a cyan ring around the estimated area that can be reached by the aircraft in the best glide range configuration. The Glide Range Ring fades into view on the map as the aircraft climbs through 500 feet AGL. The range is based on the Best Glide Speed (VG) and Sink Rate (at VG) entered by the pilot. Best Glide and Sink Rate are combined with the aircraft's height (AGL), wind, and bank angle to determine the distance the aircraft can travel.



Navigation Map - Glide Range Ring
(Ideal Descent Profile - No Wind)

Navigation Map - Glide Range Ring
(Ideal Descent Profile - Wind 245° at 25 kts)

When the aircraft is not being flown in an ideal best glide descent, the range of the cyan circle decreases and arrows are displayed depicting how far the aircraft is from an ideal descent profile.

Navigation Map - Glide Range Ring
(NOT Ideal Descent)

Enabling/disabling the Glide Range Ring:

1) With the Map Page displayed, press **MENU**

2) Touch **Set Up Map...**.

3) Touch and drag the tabs left or right to find the desired tab

4) Touch the 'Map' Tab

5) Touch and drag the page up or down to find the **Glide Range Ring** field

6) Touch the ▼ in the **Glide Range Ring** field, and touch **On** or **Off**

Best Airport Bearing Pointer

NOTE: Many factors, such as winds at various altitudes, terrain, and even pilot actions affect the ability to accurately estimate the gliding range of an aircraft. The displayed Glide Range Ring should not be considered a replacement for in-flight emergency pilot training.

The Best Airport Bearing Pointer points to the airport within the Glide Range Ring that is considered the best option for a landing based on the following criteria:

1) The airport must be within glide range as determined by the following:

a) Glide performance (Sink Rate and Best Glide Speed)

b) Aircraft altitude and direction of flight

c) Airport elevation

d) Wind velocity

2) Expected flyover altitude (i.e., airports with 1000' or greater margin take precedence)

3) Hard surface runways (i.e., paved runways take precedence over grass runways)

4) Runway lengths

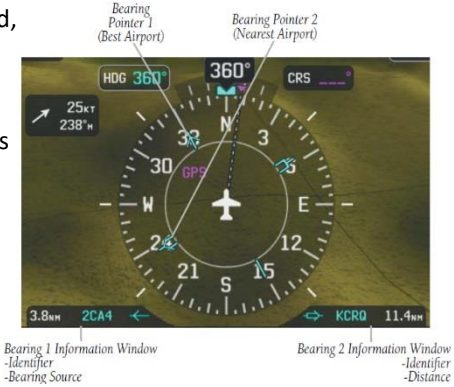
5) Runway alignment with the wind (if known)

Enabling/disabling the Best Airport Bearing Pointer:

1) With the full screen page displayed, press **MENU**

2) Touch next to a bearing pointer to display the bearing pointer options

3) Touch **Best Airport**



Best Airport Line

The Best Airport Line points the same airport that the Best Airport Bearing Pointer points to, but available on MFD and Split Screen Map displays instead of the HSI. The line appears as a series of cyan chevrons between the aircraft marker and the recommended glide-to airport.

Displaying/removing the Best Airport Line:

1) With the Map Page displayed, press **MENU**

2) Touch **Set Up Map**

3) Touch and drag the tabs left or right to find the desired tab

4) Touch the 'Line' Tab

5) In the **Best Airport Line** field, touch **On** or **Off**

Selected Altitude Intercept Arc

The map can display the location along the current track where the aircraft will intercept the selected altitude. The location will be shown as a cyan arc when the aircraft is climbing or descending.

Displaying/removing the selected altitude intercept arc:

1) With the Map Page displayed, press **MENU**

2) Touch **Set Up Map**

3) Touch and drag the tabs left or right to find the desired tab

4) Touch the 'Map' Tab

5) In the **Selected Altitude Intercept Arc** field, touch **On** or **Off**

Measuring Bearing and Distance

Distance and bearing from the aircraft's present position to any point on the viewable navigation map may be calculated using the 'Measure Distance' option from Map Page menu. The distance tool displays a dashed Measurement Line and a Map Pointer to aid in graphically identifying points to measure. Lat/Long, bearing, distance, and elevation data is provided.

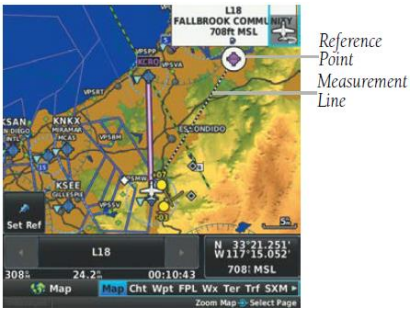
Measuring bearing and distance between any two points:

1) From the Map Page, press **MENU**

2) Touch **Measure Distance**

3) Touch any point on the viewable navigation map

4) If desired, touch **Set Ref** to set a reference point



Topography

Topographic data can be displayed or removed.

Displaying/removing topographic data:

1) From the Map Page, press **MENU**

2) Touch **Topo Shading**

Map Page Traffic

Enabling/disabling traffic on the Map Page:

1) From the Map Page, press **MENU**

2) Touch **Traffic**

Enabling/Disabling Target TrendOverlay:

1) From the Map Page, press **MENU**

2) Touch **Set Up Map**

3) Under the 'Traffic' Tab, touch and drag to scroll to the **TargetTrend** field

4) Touch 

5) Touch **On** or **Off**

Map Declutter

Unwanted items, such as highways, can be removed from the map.

Decluttering the Map Page:

1) From the Map Page, press **MENU**

2) Touch **-1, -2**, or **-3** under **Map Detail**

Map Detail

Map detail changes the amount of detail with respect to the zoom scale.

1) From the Map Page, press **MENU**

2) Touch **Set Up Map**

3) Touch and drag the tabs left or right to find the desired tab

4) Touch the 'General' Tab

5) Touch the  in the **Detail Level** field

6) Touch **Least**, **Less**, **Normal**, **More**, or **Most**

Waypoints

The Waypoint (Wpt) Page provides airport and waypoint information.

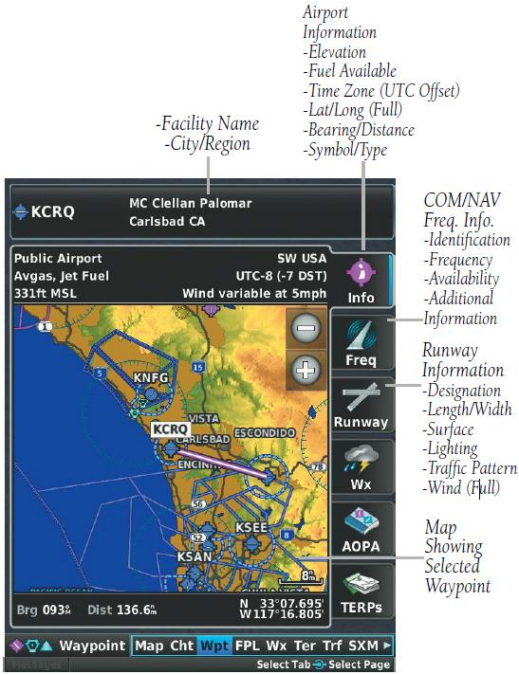
Waypoints are predetermined geographical positions (internal database) or pilot-entered positions, and are used for all phases of flight planning and navigation.

Waypoints can be changed by entering the ICAO identifier, entering the name of the facility, or by entering the city name. As a waypoint identifier, facility name, or location is entered, the G3X Touch's Spell'N'Find™ feature scrolls through the database, displaying those waypoints matching the characters which have been entered up to that point. A direct-to navigation leg to the selected waypoint can be initiated by pressing the Direct-to Key from the Waypoint Page.

The Waypoint Page allows the pilot to review airport information, runway information, frequencies, instrument procedures, airport directory information, and weather information. The pilot can manually enter the identifier or the G3X Touch will choose the most appropriate identifier based on the current position and phase of flight.

The following descriptions and abbreviations are used:

- Usage type: Public, Military, or Private
- Runway surface type: Hard, Turf, Sealed, Gravel, Dirt, Soft, Unknown, or Water
- Runway lighting type: No Lights, Part Time, Full Time, Unknown, or PCL Freq (for pilot-controlled lighting)
- COM Availability: TX (transmit only), RX (receive only), PT (part time), * (additional information available)



Selecting an airport for review by identifier, facility name, or location:

1) From the Waypoint (Wpt) Page, touch the **Info** Tab if necessary

2) Touch the waypoint identifier at the top of the page

3) Enter the waypoint identifier using the keypad and touch **Enter**

Or:

Touch **Find** > **Search Name** > **Search by Facility Name**

Enter the facility name using the keypad and touch **Enter**

Or:

Touch **Find** > **Search City** > **Search by City**

Enter the city name using the keypad and touch **Enter**

If duplicate entries exist for an identifier, a Duplicates Found Window is displayed. Touch the desired option options from the Duplicates Found Window.

Selecting a runway:

1) From the Waypoint (Wpt) Page, touch the **Runway** Tab if necessary

2) Touch the waypoint identifier at the top of the page

3) Enter the waypoint identifier using the keypad and touch **Enter**

4) If necessary, touch the to display additional runways

Touch the desired runway

Viewing additional information for a frequency:

The **Freq** Tab uses the descriptions and abbreviations listed in the following table:

Communication Frequencies			**Navigation Frequencies**
Approach *	Control	Pre-Taxi	ILS
Arrival *	CTA *	Radar	LOC
ASOS	Departure*	Ramp	
ATIS	Gate	Terminal*	
AWOS	Ground	TMA *	
Center	Helicopter	Tower	
Class B *	Multicom	TRSA *	
Class C *	Other	Unico	
Clearance			
* May include Additional Information			

1) With the Waypoint (WPT) Page displayed, touch the **Freq** Tab

2) Touch a frequency denoted with an * to view additional information

3) Touch **Tune**

NEAREST Information

NRST Key gives the pilot quick access to nearest airport, weather, VOR, NDB, intersection, user waypoint, city, ARTCC, FSS, VRPs, and airspace information. If none are available, "None Within 200 NM" is displayed.

Viewing nearest information:

1) Press the **NRST** Key
2) Touch the Page Navigation Bar
3) Touch **Airports**, **Airport WX**, **VORs**, **NDBs**, **Intersections**, **User WPTs**, **Cities**, **ARTCC**, **FSS**, **VRPs**, or **Airspace**
4) Touch the desired option from the list

Nearest Airport Criteria

From the Menu on the Nearest Airports Page the pilot can define the minimum runway length and surface type used when determining the 15 nearest airports to display on the Nearest Airports Page. A minimum runway length and/or surface type can be entered to prevent airports with small runways or runways that are not appropriately surfaced from being displayed. Default settings are 0 feet (or meters) for runway length and "Any" for runway surface type. Private airports and Heliports can also be included.

The Page Menu also allows the pilot to choose between displaying the facility names, city names, bearing, or direction arrows.

Setting nearest airport criteria:

1) With the Nearest Airports Page displayed, press **MENU**
2) Touch  to display the Runway Surface options
3) Touch the desired option
4) Touch the **Min Runway Length** value
5) Enter the desired value using the keypad and touch **Enter**
6) Touch **Private Airport** and/or **Heliports**

Restoring nearest airport criteria defaults:

1) With the Nearest Airports Page displayed, press **MENU**
2) Touch **Set Airport Criteria**
3) Press the **MENU** Key
4) Touch **Restore Default**

Weather Information

Textual weather information can be viewed from the Waypoint Page or the Nearest Airport WX Page.

Selecting airport weather information:

From the Waypoint Page, touch the **Wx** Tab

Or:

From the Nearest Airport WX Page, touch the desired airport and touch the **Wx** Tab.

Intersections

Intersections can be viewed from the Waypoint Page or the Nearest Intersections Page. In addition to displaying a map of the currently selected intersection and surrounding area, the Intersection Information Page displays the region, bearing, distance, latitude, and longitude.

Selecting an intersection:

1) From the Waypoint (Wpt) Page, touch the **Info** Tab if necessary

2) Touch the waypoint identifier at the top of the page

3) Enter the intersection using the keypad and touch **Enter**

Or:

1) Press the **NRST** Key

2) Touch the Page Navigation Bar

3) Touch **Intersections**

4) Touch the desired intersection from the list

NDBs

NDBs can be viewed from the Waypoint Page or the Nearest NDBs Page. In addition to displaying a map of the currently selected NDB and surrounding area, the page displays the region, bearing, distance, latitude, longitude, and frequency.

The Nearest NDB Page can be used to quickly find a NDB close to the flight path. The list only includes NDBs that are within 200nm. If there are no NDBs in the list, text indicating that there are no nearest NDBs is displayed. If there are no nearest NDBs in the list, the information and frequency fields are dashed.

Selecting an NDB:

1) From the Waypoint (Wpt) Page, touch the **Info** Tab if necessary

2) Touch the waypoint identifier at the top of the page

3) Enter the NDB identifier using the keypad and touch **Enter**

Or:

1) Press the **NRST** Key

2) Touch the Page Navigation Bar

3) Touch **NDBs**

4) Touch the desired NDB from the list

VORs

VORs can be viewed from the Waypoint Page or the Nearest VORs Page. In addition to displaying a map of the currently selected VOR and surrounding area, the page displays the region, city, state, bearing, distance, latitude, longitude, frequency, and class (High, Low, or Terminal VOR).

The Nearest VOR Page can be used to quickly find a VOR close to the flight path. The list only includes VORs that are within 200nm. If there are no VORs in the list, text indicating that there are no nearest VORs is displayed. If there are no nearest VORs in the list, the information and frequency fields are dashed.

Localizer information cannot be viewed on the VOR Information Page. If a VOR station is combined with a TACAN station it is listed as a VORTAC on the VOR Information Page and if it includes only DME, it's displayed as VOR-DME.

Selecting a VOR:

1) From the Waypoint (Wpt) Page, touch **Info** Tab if necessary

2) Touch the waypoint identifier at the top of the page

3) Enter the VOR identifier using the keypad and touch **Enter**

Or:

1) Press the **NRST** Key

2) Touch the Page Navigation Bar

3) Touch **VORs**

4) Touch the desired VOR from the list

User Waypoints

Up to 3,000 user-defined waypoints can be stored. Once a waypoint has been created, it can be renamed, deleted, or moved.

Creating user waypoints:

1) Touch anywhere on the map

2) Touch the Latitude/Longitude Location Button

3) Optionally, touch the **Name** field to enter the new waypoint name and touch **Enter**

4) Touch the default symbol

5) Touch the desired symbol and touch **Enter**

6) If desired touch the **Altitude** value

7) Enter the desired altitude and touch **Enter**

8) If desired touch the Location value

9) Touch the arrows to change the location and touch **Enter**

Marking Current Location as a Waypoint:

1) From the **Info** Page, touch the latitude and longitude

Or:

1) From **Info** Page, press **MENU**, and touch **Mark Waypoint**

2) Touch **Yes** on the confirmation dialog box

3) Optionally touch the **Name** field to rename the waypoint

4) Touch **Back**

Creating a proximity waypoint:

1) Press **MENU** twice

2) Touch User WPT

3) Touch the **Proximity** Tab

4) Press the **Menu** Key

5) Touch New Proximity Waypoint

a) Touch **Use Identifier**

b) Enter the desired identifier using the keypad

Or:

a) Touch **Use Map**

b) Touch anywhere on the map

6) Touch **Enter**

Selecting and viewing nearest user waypoints:

1) Press the **NRST** Key
2) Touch **User WPTs**
3) Touch the desired user waypoint

Editing or renaming a user waypoint:

1) Press the **NRST** Key
2) Touch **User WPTs**
3) Touch the desired user waypoint
4) Press **MENU**
5) Touch **Edit Waypoint**
6) Touch the desired field to edit
7) Make the necessary changes and touch **Enter**

Deleting user waypoints:

1) Press the **NRST** Key
2) Touch **User WPTs**
3) Touch the desired user waypoint.
4) Press the **MENU** Key.
5) Touch **Delete Waypoint**
6) Touch **Yes**

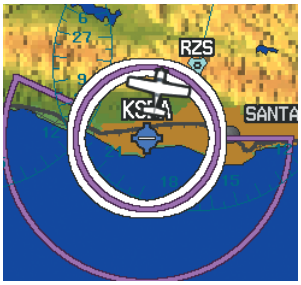
Automatic Waypoint Selection

Automatic waypoint selection is the system's attempt to deduce what Waypoint to display based on the aircraft's location in relation to the departure airport and/or the waypoints in the Flight Plan.
The pilot can override Automatic Waypoint Selection by manually entering a waypoint. The automatic selection will not resume until such time that the manually entered waypoint and the automatically selected waypoint coincide.

Airspace

The Nearest Airspace Page and Airspace Alerts provide information about airspaces and the location of the aircraft in relationship to them. The Nearest Airspace Page can be used to quickly find airspaces close to the flight path.

The Nearest Airspace Page displays the class of airspace, controlling agency, vertical boundaries, and status.



Selecting and viewing nearest airspaces:

1) Press the **NRST** Key

2) Touch the Page Navigation Bar

3) Touch **Airspace**

4) Touch the desired airspace

Airspace Alert Messages

When an airspace alert appears, press the **NRST** Key to automatically show nearby airspace information on the Nearest Airspace Page. This information includes name, time to entry (if applicable), and status.

Four types of status information are available:

- Ahead—Projected to enter the airspace within the next 10 minutes or less
- Near—Within two nautical miles of an airspace but not projected to enter it
- Near & Ahead—Projected to enter the airspace within two nautical miles
- Inside Airspace—Within the boundaries of the airspace

Smart Airspace with Altitude Overlays

Smart Airspace™ integration makes it easier for pilots to identify what airspace lies ahead. This feature conveniently highlights the airspace nearest to the aircraft's current altitude and de-emphasizes non-pertinent airspace so pilots can quickly distinguish their location to the relevant airspace around them.

Additionally, newly incorporated airspace altitude overlays are depicted on the moving map and reduce pilot workload, particularly in congested airspace. With airspace altitude overlays, pilots can easily view airspace maximum and minimum altitudes within the U.S., so it's easier to identify airspace altitude limitations at a glance.

Direct-To Navigation

Direct-to method of navigation, initiated by pressing the **Direct-to** Key is quicker to use than a flight plan when the desire is to navigate to a single point such as a nearby airport.

Once a direct-to is activated, the G3X Touch establishes a point-to-point course line from the present position to the selected direct-to destination. Course guidance is provided until the direct-to is replaced with a new direct-to or flight plan, or cancelled.

Entering a waypoint identifier, facility name, or city as a direct-to destination:

1) Press the **Direct-to** Key. The Direct-to Window is displayed (with the active flight plan waypoint as the default selection or a blank waypoint field if no flight plan is active)

2) Touch the waypoint identifier

3) Enter the waypoint identifier using the keypad and touch **Enter**

Or:

Touch **Find** > **Search Name** > **Search by Facility Name**. Enter the facility name using the keypad and touch **Enter**.

Or:

Touch **Find** > **Search City** > **Search by City**. Enter the city name using the keypad and touch **Enter**.

5) Touch **Activate**

Entering latitude and longitude coordinates as a direct-to destination:

1) Press the **Direct-to** Key.

The Direct-to Window is displayed

2) Press the **MENU** Key

3) Touch **Enter Coordinates**

4) Use the on-screen directional arrows or the knobs to specify coordinates, and touch **Enter**

5) Touch **Activate**

Selecting Recent Waypoints, Nearest Airports, Flight Plan Waypoints, or User Waypoints as a direct-to destination:

1) Press the **Direct-to** Key. The Direct-to Window is displayed (with the active flight plan waypoint as the default selection or a blank waypoint field if no flight plan is active).

2) If an external navigator is configured, touch **FPL Source** > **Internal** from the FPL Page

3) Touch the waypoint identifier

4) Touch **Find**

5) Touch the **Recent** Tab

Or:

Touch the **Nearest Airports** Tab

Or:

Touch the **Flight Plan** Tab

Or:

Touch the **User** Tab

6) Touch the desired waypoint

7) Touch **Activate**

Selecting a waypoint as a direct-to destination using the pointer:

1) Touch anywhere on the map

2) Press the **Direct-to** Key

3) If an external navigator is configured, touch **FPL Source** > **Internal** from the FPL Page

4) Touch **Activate**

Cancelling or resuming a direct-to:

1) Press the **Direct-to** Key

2) If an external navigator is configured, touch **FPL Source** > **Internal** from the FPL Page

3) Touch **Stop Navigation** or **Resume Flight**

OBS Mode

Enabling / Disabling OBS Mode

1) While navigating a flight plan or Direct-to, touch **CRS**

2) Touch **Yes** on the 'Set OBS and hold?' window

3) Enter desired course to/from waypoint using the keypad, touch **Enter**

4) To cancel OBS Mode and return to automatic waypoint sequencing, touch **OBS** on the PFD.

5) Touch **Release OBS Hold**

OR

1) From the Active Flight Plan Page press the **MENU** Key while navigating a flight plan or Direct-to

2) Touch **Set OBS and Hold**

3) Touch **Sync Course** or enter the desired course to/from the waypoint using the keypad and touch **Enter**

4) To cancel OBS Mode and return to automatic waypoint sequencing, press the **MENU** Key

5) Touch **Release Hold**

Flight Planning

NOTE: to add, delete, or change flight plan waypoints with the GTX 345 XPDR as external GPS source is configured, touch **FPL Source** > **Internal** from the Active Flight Plan Page or Direct-to Page. Press the **FPL Source** > **External** to return to the external GPS navigator's flight plan.

NOTE: While navigating using the GTX 345 XPDR as external GPS source, the ability to edit/invert/delete the Active Flight Plan or activate a Saved Flight Plan is disabled.

Flight planning on the G3X Touch consists of building a flight plan by entering waypoints one at a time and inserting approaches as needed. 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.

Up to 50 flight plans with up to 300 waypoints each can be created and stored in memory. One flight plan can be activated at a time and becomes the active flight plan. The active flight plan is erased when the destination is reached and the system is turned off. When storing flight plans with an approach, the G3X Touch uses the waypoint information from the current database to define the waypoints. If the database is changed or updated, the G3X Touch automatically updates the information if the procedure has not been modified. If an approach is no longer available, the procedure is deleted from the affected stored flight plan(s), and an alert is displayed.

Changing the information shown in flight plan data fields:

1) With a flight plan displayed, touch **FPL Source** > **Internal** (Active Flight Plan only).

2) Touch one of the data fields to change

3) Touch the desired data field

Manually switching between internal and external Flight Plan sources

Touch **FPL Source** > **Internal** on the Active Flight Plan Page or the Direct-to Page, to temporarily allow flight planning through the G3X Touch using the internal GPS flight plan.

When manually selecting the internal GPS flight plan, 'INT' is displayed in light blue in the lower left quadrant of the HSI.

Flight Plan Creation

The active flight plan is listed on the Active Flight Plan Page. It is the flight plan to which the G3X Touch is currently providing guidance, and is shown on the navigation maps. Stored flight plans are listed on the Flight Plan List Page, and are available for activation (becomes the active flight plan).

Creating an active flight plan using the G3X Touch:

1) Touch the Page Navigation Bar

2) Touch **Active FPL**

3) If an external navigator is configured, touch **FPL Source** > **Internal**

4) Touch **Add Waypoint**

5) Enter the waypoint using the keypad

Or: Touch **Find** > **Search Name** > **Search by Facility Name**
Enter the facility name using the keypad

Or: Touch **Find** > **Search City** > **Search by City**
Enter the city name using the keypad
Or: Touch **Find** > **Recent** Tab
Or: Touch **Find** > **Nearest Airports** Tab
Or: Touch **Find** > **Flight Plan** Tab
Or: Touch **Find** > **User** Tab
6) Touch **Enter**
7) Repeat steps 4-6 for each additional waypoint

Creating a stored flight plan:

1) Press **MENU** twice
2) Touch **FPL List**
3) Press **MENU**
4) Touch **New Flight Plan**
5) Touch **Add Waypoint**
6) Enter the waypoint using the keypad
Or: Touch **Find** > **Search Name** > **Search by Facility Name**
Enter the facility name using the keypad
Or: Touch **Find** > **Search City** > **Search by City**
Enter the city name using the keypad
Or: Touch **Find** > **Recent** Tab
Or: Touch **Find** > **Nearest Airports** Tab
Or: Touch **Find** > **Flight Plan** Tab
Or: Touch **Find** > **User** Tab
7) Touch **Enter**
8) Repeat steps 4-7 for each additional waypoint
9) The new flight plan is now in the list.

Flight Plan Editing

Adding a waypoint to a flight plan:

1) With a flight plan displayed, touch **FPL Source** > **Internal** (Active Flight Plan only)

2) Touch the point in the flight plan to add the new waypoint
The new waypoint is placed directly in front of the selected waypoint

3) Touch **Insert Waypoint**

4) Enter the waypoint using the keypad

Or: Touch **Find** > **Search Name** > **Search by Facility Name**
Enter the facility name using the keypad

Or: Touch **Find** > **Search City** > **Search by City**
Enter the city name using the keypad

Or: Touch **Find** > **Recent** Tab

Or: Touch **Find** > **Nearest Airports** Tab

Or: Touch **Find** > **Flight Plan** Tab

Or: Touch **Find** > **User** Tab

5) Touch **Enter**

Adding a waypoint to a flight plan using the map:

1) With a flight plan displayed, touch **FPL Source** > **Internal** (Active Flight Plan only)

2) Press **Menu**

3) Touch **Edit on Map**

4) Touch the desired leg on the map

5) With the flight plan leg selected, touch the waypoint to insert. If multiple waypoints are available at the selected location, they are displayed in boxes next to the selected location.

6) Touch **Save**

NOTE: With the fuel flow sensor installed, the user-entered 'Plan Fuel' value is used while on the ground. In the air, the 'Plan Fuel' field is hidden and the fuel calculations are based on the actual measured fuel flow.

Adjusting the Active Flight Plan fuel:

1) From the Active Flight Plan, touch **FPL Source** > **Internal**
2) Touch **Plan Fuel**
3) Enter the desired value using the keypad and touch **Enter**

Adjusting Saved Flight Plan speed and fuel:

1) Press the **MENU** Key twice
2) Touch **FPL List**
3) Touch the desired saved flight plan
4) Touch **Plan Fuel**
5) Enter the desired value using the keypad and touch **Enter**
6) Touch **Plan Speed**
7) Enter the desired value using the keypad and touch **Enter**

Editing the Saved Flight Plan Name:

1) Press the **MENU** Key twice
2) Touch **FPL List**
3) Touch the desired saved flight plan
4) Touch **Edit**
5) Press the **MENU** Key
6) Touch the **Name** field
7) Enter the desired name using the keypad and touch **Enter**

Or:

5) Touch the name field at the top of the window
6) Enter the desired name using the keypad and touch **Enter**

NOTE: The changes made to the active flight plan affect navigation as soon as they are entered. Editing the active flight plan does not affect any saved flight plans. Waypoints in the final approach segment (such as the FAF or MAP) cannot be deleted individually.

Deleting the Active Flight Plan:

1) From the Active Flight Plan, touch **FPL Source** > **Internal**

2) Press the **MENU** Key

3) Touch **Stop Navigation**

Deleting an individual waypoint from the active flight plan:

1) From the Active Flight Plan, touch **FPL Source** > **Internal**

2) Touch the desired waypoint to delete

3) Touch **Remove Waypoint**

4) Touch **Yes**

Electronic Flight Instruments

Increased situational awareness is provided by electronic flight instruments, featuring a horizon, airspeed, attitude, altitude, vertical speed, heading, and course deviation information.

The following flight instruments and supplemental flight data are displayed on the MFD:

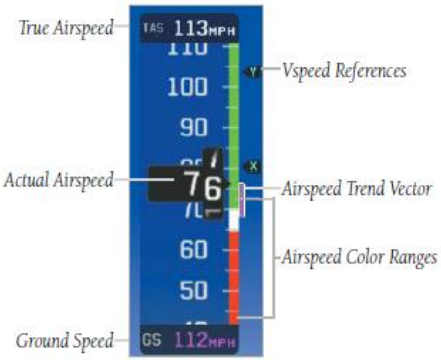
1. True Airspeed (TAS)
2. Airspeed
3. Attitude
4. Pitch
5. Aircraft Symbol
6. VSpeed Reference
7. Slip / Skid
8. Ground Speed (GS)
9. Lateral & Course Deviation
10. Selected Heading
11. Wind Speed
12. Wind Direction
13. Current Track
14. Horizontal Situation Indicator (HSI)
15. Navigation Source
16. Clock (Example LCL, Local)
17. Outside Air Temperature (OAT)
18. Timer
19. CDI Scale
20. Course Deviation Indicator (CDI)
21. Selected Heading Bug
22. Selected Course
23. Altimeter Barometric Setting
24. Selected Altitude Bug
25. Altimeter
26. Vertical Speed (VSI)
27. Flight Director
28. Reference Altitude
29. Zero Pitch Line

Airspeed Indicator

The Airspeed Indicator displays airspeed on a rolling number gauge using a moving tape. The true airspeed (TAS) is displayed in knots above the Airspeed Indicator. The numeric labels and major tick marks on the moving tape are marked at intervals of 10 knots. Speed indication starts at 30 knots, with 60 knots of airspeed viewable at any time. The actual airspeed is displayed inside the black pointer. The pointer remains black until reaching never-exceed speed (V_{NE}), at which point it turns red.

A color-coded (red, white, green, yellow, and red speed range strip is located on the moving tape. The colors denote normal operating range, caution range, and never-exceed speed (VNE). A red range is also present for low speed awareness.

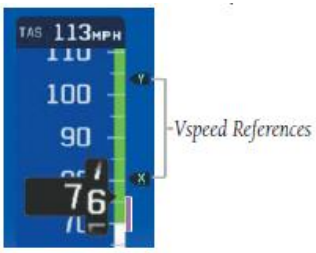
The Airspeed Trend Vector is a vertical, magenta line, extending up or down on the airspeed scale, shown to the right of the color-coded speed range strip. The end of the trend vector corresponds to the predicted airspeed in 6 seconds if the current rate of acceleration is maintained. If the trend vector crosses VNE, the text of the actual airspeed readout changes to yellow. The trend vector is absent if the speed remains constant or if any data needed to calculate airspeed is not available due to a system failure.



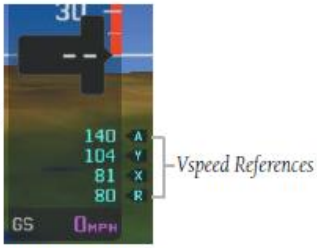
Airspeed Indicator

VSpeed Reference

Vspeed references including VNE, Vno, Vso, Va, Vx, Vy, are configured.
When airspeed is present, the Vspeeds are also displayed at their respective locations to the right of the airspeed scale, otherwise the Vspeeds are displayed at the bottom of the airspeed indicator.



Vspeed References
(with airspeed)



Vspeed References
(without airspeed)

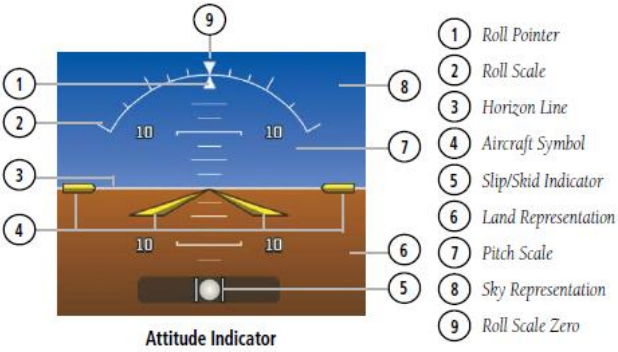
Attitude Indicator

Attitude information is displayed over a virtual blue sky and brown ground with a white horizon line. The Attitude Indicator displays the pitch (indicated by the yellow symbolic aircraft on the pitch scale), roll, and slip/skid information.

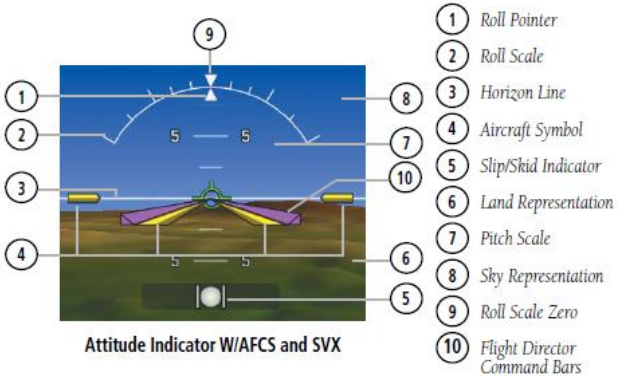
The horizon line is part of the pitch scale. Pitch markings occur at 2.5˚ intervals through all pitch ranges.

The inverted white triangle indicates zero on the roll scale. Major tick marks at 30˚ and 60˚ and minor tick marks at 10˚, 20˚, and 45˚ are shown to the left and right of the zero. Angle of bank is indicated by the position of the pointer on the roll scale.

Slip/skid is indicated by the location of the ball.



Attitude Indicator



Attitude Indicator W/AFCS and SVX

Pitch Attitude Offset

The Pitch attitude offset function allows the yellow aircraft symbol on the attitude indicator to be adjusted up or down much like the aircraft on a mechanical attitude indicator.

The pitch attitude can be adjusted as much as +/- 2.5°

Changing the PFD Pitch Attitude Offset:

1) With the full screen PFD displayed, press the **MENU** Key

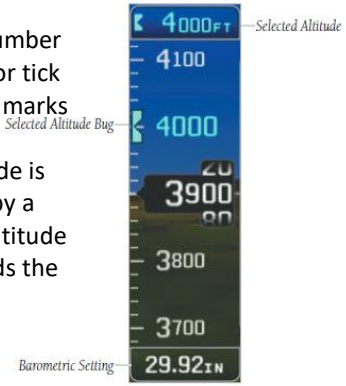
2) Touch **More Options**

3) Touch the **Pitch Offset** value

4) Enter desired pitch offset using the keypad and touch **Enter**

Altimeter

The Altimeter displays altitude values on a rolling number gauge using a moving tape. Numeric labels and major tick marks are shown at intervals of 100 feet. Minor tick marks are at intervals of 20 feet. The current altitude is displayed in the black pointer. The Selected Altitude is displayed above the Altimeter in the box indicated by a selection bug symbol. A bug corresponding to this altitude is shown on the tape; if the Selected Altitude exceeds the range shown on the tape, the bug appears at the corresponding edge of the tape.



Altimeter

Barometric Pressure

The barometric pressure setting is displayed below the Altimeter in inches of mercury (in Hg) or hectopascals (hPa) when metric units are selected.

Selecting the altimeter barometric pressure setting:

Turn the large right Knob to set the barometric pressure.

Or:

1) Touch the Barometric Pressure on the MFD

2) Touch the **Set For Field** button if aircraft is on the ground

Or:

3) Touch the **Set To Standard** button if aircraft is in the air

Or:

4) Enter the desired pressure using the keypad and touch **Enter**

Setting the selected altitude:

Turn the large Knob to set the Selected Altitude in 100-ft increments.

Or:

1) Touch the Selected Altitude

2) Enter the desired altitude using the keypad and touch **Enter**

Syncing to the current altitude:

1) Touch the Selected Altitude

2) Touch **Set to Current** and touch **Enter**

NOTE: Set to Current is only available when aircraft is on ground.

Syncing to the local barometric pressure setting:

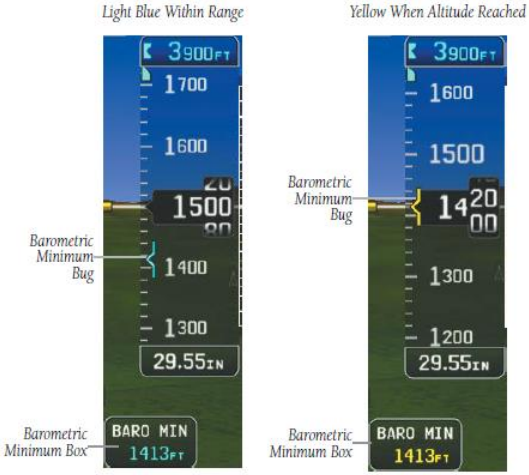
1) From the MFD Page, press the **BARO** Softkey

2) While stationary on the ground, press and hold the **FMS** Joystick

3) Verify indicated altitude matches local field elevation.

Barometric Minimum Alert

For altitude awareness, a barometric Minimum Descent Altitude (MDA) or Decision Height (DH) can be set by the user and is reset when the power is cycled. Once the user-defined altitude is within the range of the tape, a light blue bug appears at the reference altitude on the Altimeter. Once the aircraft reaches the user-defined MDA/ DH, the bug and text turn yellow and the aural alert, "Minimums - Minimums", is heard.



Barometric Minimum Visual Annunciations

Setting the barometric minimum alert bug:

1) With the full screen MFD displayed, press the **MENU** Key

2) Touch **Set...** in the Minimums Field

3) Enter the minimum altitude using the keypad and touch **Enter**

Turning the minimums alert tone on/off:

1) Press the **MENU** Key twice

2) Touch **Setup** > **Sound**

3) Touch **On** or **Off** in the Minimums Alert field

Altitude Alerting

The Altitude Alerting function provides the pilot with visual and aural alerts when approaching the Selected Altitude. Whenever the Selected Altitude is changed, the Altitude Alert is reset. The following will occur when approaching the Selected Altitude:

- Passing within 1000 feet of the Selected Altitude, the Selected Altitude (shown above the Altimeter) flashes for 5 seconds and an aural tone is generated.
- When the aircraft passes within 200 ft of the Selected Altitude, the Selected Altitude flashes for 5 seconds and an aural tone is generated to indicate that the aircraft is approaching the selected altitude.
- After reaching the Selected Altitude, if the pilot flies outside the deviation band (±200 Feet of the Selected Altitude), the Selected Altitude changes to yellow text on a black background, flashes for 5 seconds, and an aural tone is generated.

Altitude Alerting Visual Annunciation

Turning the altitude alert tone on/off:

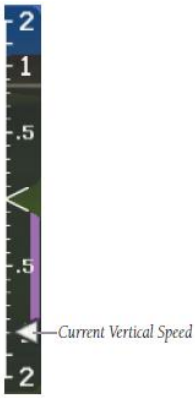
1) Press the **MENU** Key twice

2) Touch **Setup** > **Sound**

3) Touch **On** or **Off** in the Altitude Alert field

Vertical Speed Indicator

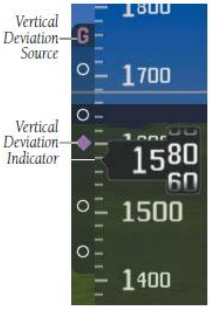
The Vertical Speed Indicator displays the aircraft vertical speed using a non-moving tape labelled at 500, 1000 and 2000 fpm with minor tick marks every 100 feet up to 1000 fpm.
The current vertical speed is displayed using a white arrow along the tape.



Vertical Speed Indicator

Glidepath – GPS source

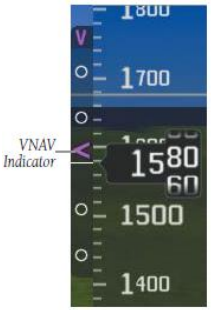
The Vertical Deviation (Glidepath) Indicator (VDI) also appears to the left of the altimeter during a GPS approach. The glidepath is analogous to the glideslope for GPS approaches supporting WAAS vertical guidance (LNAV+V, L/VNAV, LPV).
The Glidepath Indicator appears on the G3X Touch as a magenta diamond. If the approach type downgrades past the final approach fix (FAF),
"NO GP" is annunciated.



Vertical Deviation Indicator (Glidepath-GPS Source)

VNAV Indicator

No external navigation source is required to receive VNAV indications. When the VNAV profile is defined, the pilot is informed of the progress by message alerts. A magenta chevron (VNAV Indicator) to the left of the altimeter on the Vertical Deviation Scale shows the VNAV profile, and a magenta chevron (Required Vertical Speed Indicator (RVSI)) on the Vertical Speed Indicator indicates the required vertical speed to reach the target altitude.



VNAV Indicator

Horizontal Situation Indicator (HSI)

The HSI displays a rotating compass card in a heading-up orientation at the bottom of the page. Letters indicate the cardinal points and numeric labels occur every 30˚. Major tick marks are at 10˚ intervals and minor tick marks at 5˚ intervals. The current track is represented on the HSI by a magenta triangle and dashed line. The HSI also presents course deviation, bearing, and navigation source information.

The Selected Heading is shown to the left of the HSI

The light blue bug on the compass rose corresponds to the Selected Heading.

Adjusting the selected heading:

Turn the small left Knob associated to adjust the selected heading

Or:

1) Touch the selected heading on the PFD

2) Enter the desired heading using the keypad and touch **Enter**

Syncing to the current heading:

1) Touch the selected heading on the MFD

2) Touch **Set To Current** and touch **Enter**

1- Course Deviation & To/From Ind.
2- Selected Heading
3- Current Heading
4- Turn Rate Indicator
5- Nav Source
6- Course Deviation Ind. (CDI)
7- Rotating Compass Rose
8- Selected Heading Bug
9- Aircraft Symbol
10-To/From Indicator
11-Lateral Deviation Scale

12- Bearing Pointers and Information Windows

13- Two bearing pointers and associated information can be displayed on the HSI: for GPS sources, and nearest airports. The bearing pointers are light blue and are single-line (Bearing Pointer 1) or double-line (Bearing Pointer 2). A pointer symbol is shown in the information windows to indicate the navigation source. The bearing pointers never override the CDI and are visually separated from the CDI by a white ring (shown when the bearing pointers are selected but not necessarily visible due to data unavailability).

14- When a bearing pointer is displayed, its associated information window is also displayed. The Bearing Information Windows are displayed at the lower sides of the HSI. The following information may be displayed in the Bearing Information Windows:

15- • Bearing source (GPS)

16- • Pointer icon (single lined or double lined)

17- • Waypoint identifier (GPS)

18- • GPS-derived great circle distance to bearing source

19- With the GPS as the bearing source, the active waypoint identifier is displayed.

20- The bearing pointer is removed from the HSI and “NO DATA” is displayed in the information window if an active waypoint is not selected.

HSI with Bearing Pointers

HSI Orientation

The HSI may be configured to provide directional information in either 'Heading' or 'Auto Trk/Hdg' "Track-up" modes.

Heading Mode orients the HSI to display aircraft heading in a conventional manner with heading shown at the top of the compass card as indicated by the lubber line.

In 'Auto Trk/Hdg' "Track-up" mode, the aircraft symbol and lubber line move to indicate heading and wind correction while ground track in shown at the top of the compass card.

In 'Auto Trk/Hdg' the HSI will remain heading-based when the aircraft is on the ground or when the autopilot is in HDG mode.

Changing HSI orientation:

1) With the full screen PFD displayed, press the **MENU** Key

2) Touch **More Options**

3) Touch **HSI Orientation** field to display options

4) Touch **Heading** or **Auto Trk/Hdg**

Course Deviation Indicator (CDI)

The HSI contains a Course Deviation Indicator (CDI), with a Course Pointer, To/From Indicator, and a sliding deviation bar and scale. The course pointer is a single line arrow (GPS) which points in the direction of the set course. The To/From arrow rotates with the course pointer and is displayed when the GPS signal is received.

The CDI moves left or right from the course pointer along a lateral deviation scale to display aircraft position relative to the course. If the course deviation data is not valid, the CDI is not displayed.

Another Lateral Deviation Scale and combination Course Deviation and To/From Indicator is located below the slip/skid indicator.

Magenta colour indicates GPS as the navigation source.

The full-scale limits for the CDI are defined by a GPS-derived distance when coupled to GPS. If the CDI exceeds the maximum deviation on the scale (two dots) while coupled to GPS, the cross-track error (XTK) is displayed below the white aircraft symbol.

Turn Rate Indicator

The Turn Rate Indicator is located above the HSI.

Tick marks to the left and right of the displayed heading denote standard turn rates (3°/sec).

A magenta Turn Rate Trend Vector shows the current turn rate.

The end of the trend vector gives the heading predicted in 6 seconds, based on the present turn rate.

A standard-rate turn is shown on the indicator by the trend vector stopping at the standard turn rate tick mark, corresponding to a predicted heading of 18˚ from the current heading.

At rates greater than 4°/sec, an arrowhead appears at the end of the magenta trend vector and the prediction is no longer valid.

Turn Rate Indicator

OBS Mode

Enabling Omni-bearing Selector (OBS) Mode suspends the automatic sequencing of waypoints in a GPS flight plan, but retains the current “active-to” waypoint as the navigation reference even after passing the waypoint. ‘OBS’ is annunciated left of the aircraft symbol when OBS Mode is selected.

While OBS Mode is enabled, a course line is drawn through the “active-to” waypoint on the moving map. If desired, the course to/from the waypoint can now be adjusted. When OBS Mode is disabled, the GPS flight plan returns to normal operation with automatic sequencing of waypoints, following the course set in OBS Mode. The flight path on the moving map retains the modified course line.

Enabling/disabling OBS Mode (without external GPS navigator):

1) While navigating a flight plan or Direct-to, touch **CRS**

2) Touch **Yes** on the 'Set OBS and hold?' window

3) Enter desired course to/from waypoint using the keypad and touch **Enter**

4) To cancel OBS Mode and return to auto waypoint sequencing, touch **OBS**

5) Touch **Release OBS Hold**

OR

1) From the Active Flight Plan Page, press the **MENU** Key

2) Touch **Set OBS and Hold**

3) Touch **Sync Course** or enter desired course to/from waypoint using the keypad and touch **Enter**

4) To cancel OBS Mode and return to auto waypoint sequencing, press **MENU**

5) Touch **Release Hold**

Accelerometer (G-Meter)

Whenever the G load on the airplane exceeds +2.1G or below -0.5G, the HSI is temporarily replaced with a large graphical G-meter.
To remove the G-meter, touch the displayed **G-meter**.
Regardless of the current G load, the HSI can be replaced with a G-meter by changing the 'G METER' setting on the PFD setup page.
The G-meter will be displayed until the setting is changed to auto or the power is cycled.
Small white triangles are used to indicate the minimum and maximum recorded G loads.
When in the auto display mode, the G-meter will automatically be displayed when an unusual attitude is sensed (i.e., greater than +/- 65° roll or +30°/-20° pitch).

G-meter

Manually displaying the G-meter:

1) With the full screen PFD displayed, press the **MENU** Key

2) Touch **More Options...**.

3) Touch in the **G Meter** group to display the G-meter options

4) Touch **On (No HSI)**

Resetting the G-meter minimum and maximum markers:

1) With the full screen PFD displayed, press the **MENU** Key

2) Touch **Reset G Meter**

Outside Air Temperature

Outside Air Temperature (OAT) is displayed in Fahrenheit (°F) or Celsius (°C).

Changing the outside air temperature setting:

1) Press the **MENU** Key twice to display the Main Menu

2) Touch **Setup** > **Units**

3) Touch **Air Temperature** field to display options

4) Touch **Fahrenheit (°F)** or **Celsius (°C)**

Wind Data

Wind direction/speed or headwind/Crosswind information can be displayed in a window to the upper left of the HSI. When the window is selected for display, but wind information is invalid or unavailable, the window displays “No Wind Data”.

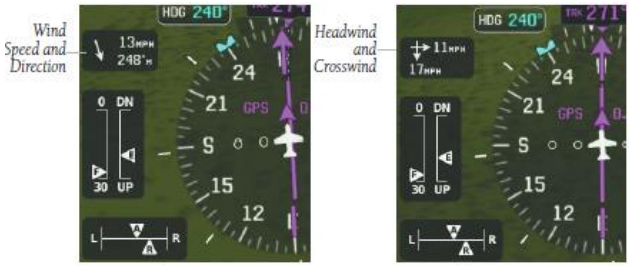
Showing/hiding wind data:

1) From the full-screen PFD, press the **MENU** Key

2) Touch **More Options**

3) Touch in the **Wind Vector** field to display the Air Temperature options

4) Touch **Speed/Dir** or **Head/X-wind**



User Timer

Stopwatch for measuring arbitrary periods of time, separately from the Flight Timer. The User Timer can be accessed from the Main Menu and will appear at the Status Bar, labelled 'TMR'. Additionally, the User Timer can be optionally configured to appear in the Data Bar at the top of all screens.

Using the User Timer:

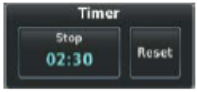
1) From any screen, press the **MENU** key twice

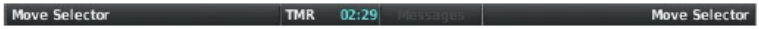
2) Touch **User Timer**

OR: Touch **TMR** field, if present, in Status Bar at bottom of display

OR: Touch the **Timer** field, if present, in Data Bar at top of display

Touch **Start** to start the Timer. While the Timer is running, the Start button becomes a **Stop** button which pauses the Timer. **Reset** will set the Timer to zero and stop the Timer. Pressing the **Back** Key to close the User Timer box will not interrupt the Timer.





User Timer on Status Bar

Adding User Timer to Data Bar:

1) From any screen, press the **MENU** key twice

2) Touch **Setup**

3) Touch **Data Bar**

4) Find User Timer Button in the list. Touch combo box to set User Timer to **Show On Left**, **Show On Right**, or **Hide**

5) Touch **Timer** button on the Data Bar to access User Timer dialog box

User Timer on Data Bar

Vertical Navigation (VNAV)

CAUTION: VNAV is only a VFR navigation aid, not intended for instrument approaches!

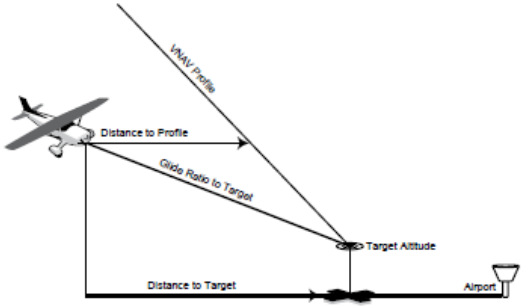
The Vertical Navigation Page provides settings for the vertical navigation feature. These settings create a three-dimensional profile from the present location and altitude to a final (target) altitude at a specified location.

When the VNAV profile is defined, the pilot is informed of the progress by message alerts. A magenta chevron (VNAV Indicator) to the left of the altimeter on the Vertical Deviation Scale shows the VNAV profile, and a magenta chevron (Required Vertical Speed Indicator (RVSI)) on the Vertical Speed Indicator indicates the required vertical speed to reach the target altitude.

The Vertical Navigation feature is only available when navigating a Direct-to or flight plan, and the ground speed is greater than 35 knots.

One minute prior to the initial descent point the “Approaching VNAV Profile” message appears and the ‘Estimated Time to VNAV’ (on Active Flight Plan Page) goes blank. The descent angle locks to prevent changes in speed from altering the profile. The VNAV feature does not account for any changes in ground speed that occur during the transition from level flight to descent.

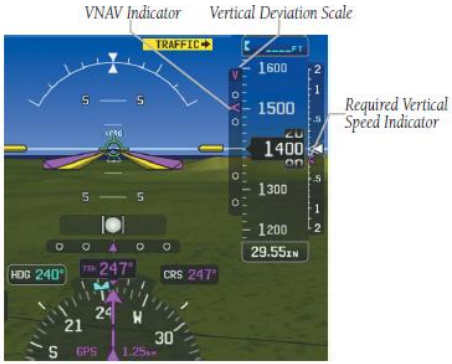
At 200 ft above the target altitude, the “Approaching Target Altitude” message appears, and the VNAV indicator disappears from the MFD.



Visual Representation of VNAV

Using the VNAV Feature

The magenta VNAV Indicator appears on the MFD.
A message appears when approaching the VNAV Profile.
When the VNAV Indicator is in the vertical center of the Vertical Deviation Scale, the aircraft is on the VNAV Profile.



Configuring a VNAV profile:

1) Press the **MENU** Key twice
2) Touch **VNAV**
3) Touch the **Waypoint** field and choose the desired VNAV waypoint
4) Touch the **Profile** value
5) Enter the desired descent rate in fpm using the keypad and touch **Enter**
6) Touch the **Altitude** value
7) Enter the desired altitude using the keypad and touch **Enter**
8) Touch **Above WPT** or **MSL**
9) Touch the By value
10) Enter the desired miles using the keypad and touch **Enter**
11) Touch **Before** or **After**
12) Touch **On** or **Off** to enable or disable VNAV Messages

- Waypoint—Enter any waypoint along the currently active route as reference waypoint. The reference waypoint defines the target location.
- Profile—Enter the descent rate.
- Altitude—Enter the desired reference waypoint altitude. Select 'Above Waypoint' to use field elevation for airports in the navigation database or 'MSL' to specify an exact MSL altitude target.
- By—Enter target location with settings of distance 'Before' or 'After' reference waypoint. To set target location at reference waypoint, enter distance zero.
- VNAV Messages—Select 'On' or 'Off' to enable/disable VNAV alert messages.

Hazard Avoidance

Weather

Data from the selected weather source will apply to all weather shown on the Map Page, Waypoint Page, Weather Page, Nearest Page, and configurable data fields.

Switching Weather Sources:

1) Press the **MENU** Key twice

2) Touch **Setup** > **Weather**

3) Touch the Weather Data Source.

4) Touch **Auto** or **GDL FIS-B**

Or

1) From the Weather Page, press the **MENU** Key

2) Touch **Data Source**

3) Touch **Auto** or **GDL FIS-B**

NOTE: Data Link Weather is only available in the USA.

Each time the system powers-up, the pilot is prompted to acknowledge a Data link weather advisory, Touch **Press To Accept**.

WARNING: Do not use data link weather information for manoeuvring in, near, or around areas of hazardous weather. Information contained within data link weather products may not accurately depict current weather conditions.
WARNING: Do not use the indicated data link weather product age to determine the age of the weather information shown by the data link weather product. Due to time delays inherent in gathering and processing weather data for data link transmission, the weather information shown by the data link weather product may be significantly older than the indicated weather product age.

Data Link Weather Products can be displayed on the Map Page and individually on the Weather (Wx) Page.

NEXRAD

NEXRAD (NEXt-generation RADar), is a network of multiple high-resolution Doppler radar sites that are operated by the National Weather Service (NWS). NEXRAD data provides centralized meteorological information for the continental United States and selected overseas locations. The maximum range of a single NEXRAD radar site is 250 nm. In addition to a wide array of services, the NEXRAD network provides important information about severe weather and air traffic safety.

NEXRAD data is not real-time. The lapsed time between collection, processing, and dissemination of NEXRAD images can be significant and may not reflect the current radar synopsis. Due to the inherent delays and the relative age of the data, it should be used for long-range planning purposes only. Never use NEXRAD data or any radar data to penetrate hazardous weather. Rather, use it in an early-warning capacity of pre-departure and enroute evaluation.

Composite data from all the NEXRAD radar sites in the United States is shown. This data is composed of the maximum reflectivity from the individual radar sweeps. The display of the information is color-coded to indicate the weather severity level.

The display of radar coverage is always active when NEXRAD is selected. Areas where NEXRAD radar coverage is not currently available or is not being collected are indicated in greyish-purple. Radar capability exists in these areas, but it is not active or is off-line.

NEXRAD Abnormalities

There are possible abnormalities regarding displayed NEXRAD images.

Some, but not all, of those include:

- Ground clutter
- Strobes and spurious radar data
- Sun strobes, when the radar antenna points directly at the sun
- Military aircraft deploy metallic dust (chaff) which can cause alterations in radar scans
- Interference from buildings or mountains, which may cause shadows

NEXRAD Limitations

Certain limitations exist regarding the NEXRAD radar displays. Some, but not all, are listed for the user's awareness:

- NEXRAD base reflectivity does not provide sufficient information to determine cloud layers or precipitation characteristics (hail vs. rain). For example, it is not possible to distinguish between wet snow, wet hail, and rain.
- NEXRAD base reflectivity is sampled at the minimum antenna elevation angle. An individual NEXRAD site cannot depict high altitude storms at close ranges, and has no information about storms directly over the site.
- Radar coverage only extends to 55°N.
- Any precipitation displayed between 52°N and 55°N is unknown.

Reflectivity

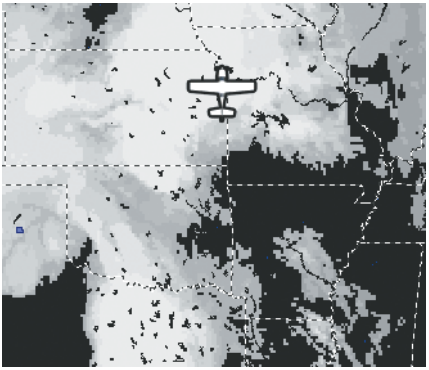
Reflectivity is the amount of transmitted power returned to the radar receiver. Colors on the NEXRAD display directly correlate to the level of detected reflectivity. Reflectivity as it relates to hazardous weather can be very complex. The role of radar is essentially to detect moisture in the atmosphere. Simply put, certain types of weather reflect radar better than others. The intensity of a radar reflection is not necessarily an indication of the weather hazard level. For instance, wet hail returns a strong radar reflection, while dry hail does not. Both wet and dry hail can be extremely hazardous. The different NEXRAD echo intensities are measured in decibels (dB) relative to reflectivity (Z). NEXRAD measures the radar reflectivity ratio, or the energy reflected back to the radar receiver (designated by the letter Z). The value of Z increases as the returned signal strength increases.

NEXRAD Intensity

Colors are used to identify the different NEXRAD echo intensities (reflectivity) measured in dBZ (decibels of Z). "Reflectivity" (designated by the letter Z) is the amount of transmitted power returned to the radar receiver. The dBZ values increase as returned signal strength increases. Precipitation intensity is displayed using colors corresponding to the dBZ values.

Satellite Mosaic

Satellite Mosaic displays infrared composite images of cloud cover taken by geostationary weather satellites. The Satellite Mosaic provides up to seven levels of cloud cover.



Echo Tops

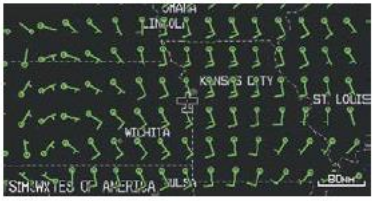
Echo Tops are derived from NEXRAD radar and indicate the highest altitude at which precipitation is falling. Echo Tops at or above the altitude you select are displayed, in 5,000-foot increments up to 70,000 ft. Echo Tops can be helpful in determining the severity of thunderstorms.

Winds Aloft

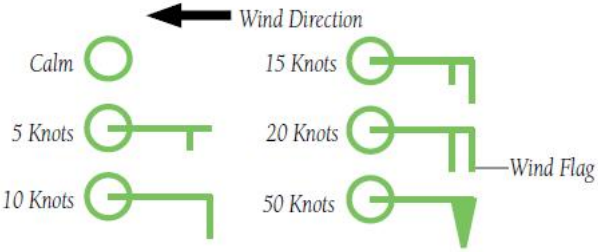
Winds Aloft data shows the forecasted wind speed and direction at the surface and at selected altitudes. Altitudes can be displayed in 3,000-foot increments up to 42,000 feet MSL.

Winds Aloft are displayed using wind barbs or a wind streamline depending on the selected range. The wind barbs indicate wind speed and direction. The wind streamline indicates wind direction with arrows.

The wind barbs always point in the direction that the wind is coming from. The wind speed is depicted using flags at the end of the wind barb. A short wind flag is 5 knots, a long wind flag is 10 knots, and a triangle flag is 50 knots.



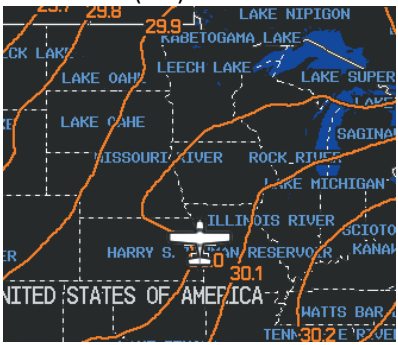
Winds Aloft Data



Winds Barbs

Surface Pressure

This feature displays pressure isobars and pressure centers. The isobars connect points of equal pressure. Pressure readings can help determine weather and wind conditions. High pressure areas are generally associated with fair weather. Low pressure areas are generally associated with clouds and the chance of precipitation. Isobars that are packed closely together show a strong pressure gradient. Strong gradients are associated with areas of stronger winds. Pressure units can be displayed in Millibars (mb) and Inches of Mercury (in).



Lightning

Lightning data shows the approximate location of cloud-to-ground lightning strikes. A strike icon represents a strike that has occurred within a two-kilometre region and within the last seven minutes. The exact location of the lightning strike is not displayed.

Storm Cells

The Storm Cells feature displays storms as well as the storm's projected path in the immediate future.
The direction of the storm is displays by an arrow (at a range of 20 nm or less). The tip of the arrow indicates where the storm should be in 15 minutes. Critical information about the storm cell (tops and intensity) can be viewed by touching the storm cell.

METARs and TAFs

NOTE: METAR information is only displayed within the installed aviation database service area.

METAR (METeorological Aerodrome Report) is an international code used for reporting weather observations. METARs are updated hourly or as needed. METARs typically contain information about the temperature, dewpoint, wind, precipitation, cloud cover, cloud heights, visibility, and barometric pressure. They can also contain information on precipitation amounts, lightning, and other critical data. If METAR data is available for an airport, a color-coded flag is shown next to the airport.

TAF (Terminal Area Forecast) is the standard format for 24-hour weather forecasts. TAFs may contain some of the same code as METAR data. It typically forecasts significant weather changes, temporary changes, probable changes, and expected changes in weather conditions.

METAR and TAF text data is displayed on the Map Page and the Weather (WX) Page. An abbreviated version can be viewed by touching the METAR flag. Touching the identifier name displays additional information.
The METAR flag color is determined by the information in the METAR text.

VFR (ceiling greater than 3000 feet AGL and visibility greater than 5 miles)

Marginal VFR (ceiling 1000-3000 feet AGL and/or visibility 3-5 miles)

IFR (ceiling 500 to below 1000 feet AGL and/or visibility 1 mile to less than 3 miles)

Low IFR (ceiling below 500 feet AGL or visibility less than 1 mile)

METAR text does not contain adequate information to determine flight conditions

AIRMETS

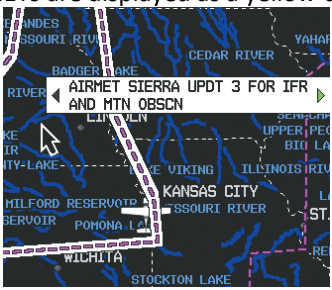
An AIRMET (AIRmen's Meteorological Information) can be especially helpful for pilots of light aircraft that have limited flight capability or instrumentation. An AIRMET must affect or be forecast to affect an area of at least 3,000 square miles at any one time. AIRMETs are routinely issued for six-hour periods and are amended as necessary due to changing weather conditions. AIRMETs are displayed as coloured, dashed lines.

SIGMETs

A SIGMET (SIGnificant METeorological Information) advises of weather that is potentially hazardous to all aircraft. In the contiguous United States, the following items are covered: severe icing, severe or extreme turbulence, volcanic ash, dust storms, and sandstorms that lower visibility to less than three statute miles.

A Convective SIGMET is issued for the following conditions: thunderstorms, isolated severe thunderstorms, embedded thunderstorms, hail at the surface, and tornadoes.

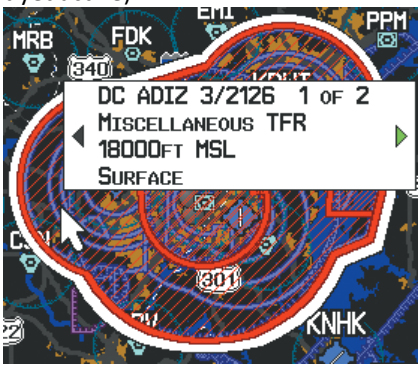
A SIGMET is widespread and must affect or be forecast to affect an area of at least 3,000 square miles. SIGMETs are displayed as a yellow-dashed line.



Temporary Flight Restrictions (TFR)

NOTE: Do not rely solely upon data link services to provide Temporary Flight Restriction (TFR) information. Always confirm TFR information through official sources such as Flight Service Stations or Air Traffic Control.

Temporary Flight Restrictions, or TFRs, temporarily restrict all aircraft from entering the selected airspace unless a waiver has been issued. TFRs are routinely issued for activities such as sporting events, dignitary visits, military depots, and forest fires. TFRs are represented as an area highlighted by red (active) or yellow (not yet active).

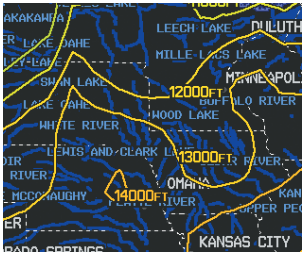


PIREPs

Pilot Weather Reports (PIREPs) provide timely weather information for a particular route of flight. When significant weather conditions are reported or forecast, Air Traffic Control (ATC) facilities are required to solicit PIREPs. A PIREP may contain unforecasted adverse weather conditions, such as low in-flight visibility, icing conditions, wind shear, and turbulence. PIREPs are issued as either Routine (UA) (blue) or Urgent (UUA) (yellow).

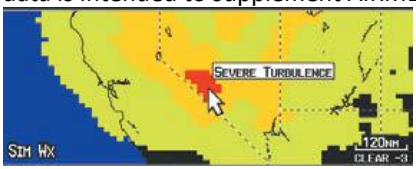
Freezing Levels

Freezing Level shows contours for the lowest forecast altitude where icing conditions are likely to occur.



Turbulence Forecast

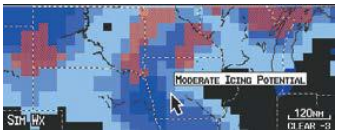
Turbulence data identifies the potential for erratic movement of high-altitude air mass associated winds. Turbulence is classified as light, moderate, severe, or extreme. Turbulence data is intended to supplement AIRMETs and SIGMETs.



Icing Forecast (CIP& SLD)

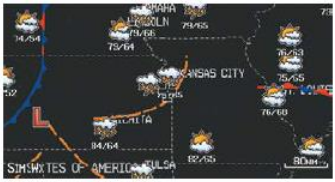
Current Icing Product (CIP) data shows a graphical view of the current icing environment. Icing severity is displayed in four categories: light, moderate, severe, and extreme (not specific to aircraft type). The CIP product is not a forecast, but a representation of the current conditions at the time of the analysis.

Supercooled Large Droplet (SLD) icing conditions are characterized by the presence of relatively large, super cooled water droplets indicative of freezing drizzle and freezing rain aloft. SLD threat areas are depicted as magenta dots over the CIP colors.



Forecast

Forecast information is available for current and forecast weather conditions. Forecasts are available for intervals of 12, 24, 36, and 48 hours.



Forecast Data

Forecast Legend

Terrain

WARNING: Do not use Terrain information for primary terrain avoidance. Terrain information is intended only to enhance situational awareness.

NOTE: Terrain data is not displayed when the aircraft is outside the installed terrain database coverage area.

NOTE: Terrain depicted in the Profile View is always "ahead" of the aircraft, and will change as ground track changes.

The Terrain Page displays altitudes of terrain and obstructions relative to the aircraft position and altitude with reference to a database that may contain inaccuracies. Terrain and obstructions are shown only if they are in the database. Terrain and obstacle information should be used as an aid to situational awareness. They should never be used to navigate or maneuver around terrain.

Not all obstructions may be available in the terrain and obstacle database. No terrain and obstacle information are shown without a valid 3-D GPS position.

The GPS receiver provides the horizontal position and altitude of the aircraft. Aircraft GPS altitude is derived from satellite position. GPS altitude is then converted to a mean sea level (MSL)-based altitude (GPS-MSL altitude) and is used to determine terrain and obstacle proximity. GPS-MSL altitude accuracy is affected by satellite geometry, but is not subject to variations in pressure and temperature that normally affect pressure altitude sensors. GPS-MSL altitude does not require local altimeter settings to determine MSL altitude. It is a widely-used MSL altitude source.

Terrain and obstacle databases are referenced to MSL. Using the GPS position and altitude, the Terrain feature portrays a 2-D picture of the surrounding terrain and obstacles relative to the position and altitude of the aircraft. GPS position and GPS-MSL altitude are used to calculate and predict the aircraft's flight path in relation to the surrounding terrain and obstacles. In this way, the pilot can view predicted dangerous terrain and obstacle conditions.
Alert windows appear on all pages (except the Terrain (Ter) Page) to inform the pilot of proximity to the terrain and obstacles, as well as an unsafe descent rate. These alerts depend on user-defined parameters in the Terrain Page setup.

Synthetic Vision

Terrain is integrated within Synthetic Vision (when active) to provide land contours (colors are consistent with those of the topographical map display), large water features, towers, obstacles over 200' AGL, as well as visual and auditory alerts to indicate the presence of terrain and obstacle threats relevant to the projected flight path. Synthetic Vision terrain information is displayed in red and yellow shading on the PFD.

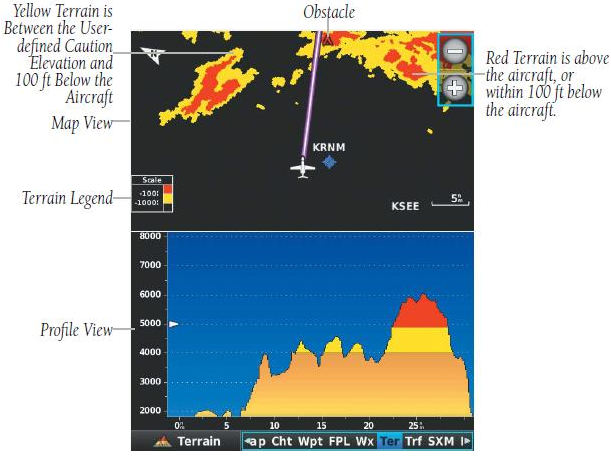
Terrain Information

The areas of the terrain shaded red are predicted to be within 100 feet below or above the aircraft. The yellow terrain areas are between the user-defined Caution Elevation and 100 feet below the aircraft. By default, the Caution Elevation is 1,000 feet; therefore, the areas in yellow are between 1,000 feet and 100 feet below the aircraft. The black areas are further than the Caution Elevation. A projected point of impact is marked with an "X" symbol.

Enabling/Disabling Terrain Shading on the Map Page:
From the Map Page, press **MENU**, then touch **TERRAIN**

Terrain Views

Two views are displayed on the Terrain (Ter) Page: Map View, and Profile View.



Obstacle Information

Obstacles are shown on the Terrain Page at or below the map range of 12 nm. Obstacles are also shown on the Map Page when the map range is set to 3 nm or below.

Standard aeronautical chart symbols are used for lighted or unlighted obstacles taller than 200 feet Above Ground Level (AGL). Refer to the Obstacle Icons legend below.

Each obstacle is labelled with the altitude of the top of the obstacle, or Mean Sea Level (MSL).

Each obstacle also lists, in parentheses, the actual height of the obstacle, or Above Ground Level (AGL).

Unlighted Obstacle		Lighted Obstacle		Potential Impact Points	Obstacle Location
< 1000' AGL	> 1000' AGL	< 1000' AGL	> 1000' AGL		
					WARNING: Red obstacle is above or within 100' below current aircraft altitude
					CAUTION: Yellow obstacle is between 100' and 1000' (default) below current aircraft altitude

Terrain Settings

Use the terrain settings to set levels for terrain alerts as well as obstacles in or near your flight path.
Caution Elevation—alert is shown if the terrain or obstacle is within the default Caution Elevation or user-defined Caution Elevation.

Look Ahead Time—Determines the maximum time when an alert annunciation occurs. For example, if 120 seconds is selected, alert is shown up to 120 seconds before you reach the terrain or obstacle.

Alert Sensitivity—The three Alert Sensitivity settings (Terrain, Obstacle, and Descent Rate) determine what level of alerts are annunciated. Default setting is 'High' sensitivity, which annunciates all red and yellow alerts at the time set in Look Ahead Time. 'Medium' sensitivity annunciates all of the red and the highest priority of yellow alerts. 'Low' only annunciates red alerts. 'Off' disables the alert.

Accessing the terrain settings:

1) From the Terrain Page, press the **MENU** Key

2) Touch **Caution Elevation** and touch **500ft Below**, **750ft Below**, or **1000ft Below**.

Or: Touch **Look Ahead Time** and touch **60 Seconds**, **90 Seconds**, or **120 Seconds**.

Or: Touch **Terrain**, **Obstacles**, or **Descent Rate** and touch **Off**, **Low**, **Medium**, or **High**.

Or: Touch **Alerts** to toggle between **Enabled** and **Inhibited**.

Or: Touch **Profile View** to toggle on and off.

Terrain Alerts

Terrain, Obstacle, and Descent Rate Alerts are issued when flight conditions meet parameters that are set within the software algorithms. Terrain alerts typically employ a CAUTION or a WARNING alert severity level, or both. When an alert is issued, visual annunciations are displayed and aural alerts are simultaneously issued. When the aircraft descends through 500 feet above the destination airport an audible “Five Hundred” altitude reminder occurs.

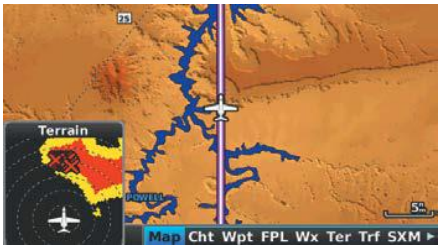
If the Terrain Page is not displayed, a pop-up alert appears in the lower left corner of the page. The Range Rings on the pop-up alert are spaced every whole mile/kilometer/ nautical mile. Touch the alert to acknowledge the pop-up and/or aural alert.

Terrain and obstacle annunciations appear on the PFD in the upper left corner of the Attitude Indicator. Arrows are depicted on the terrain and obstacle annunciations if terrain is outside the Synthetic Vision field of view.

Enabling/Disabling terrain alerts:

1) From the Terrain Page, press the **MENU** Key

2) Touch **Alerts** to toggle between **Enabled** and **Inhibited**



Traffic

Traffic Source

The system receives ADS-B information via the GTX 345 Mode S Transponder. The traffic system status is shown in the upper right corner of the Map Page.

System Status	Traffic Icon
Operating	
No Traffic Data Available	

If a Traffic Icon is not displayed, check the Map Page range and/or the Traffic Display Range on the Map Set Up menu.

Traffic Symbols

Traffic is shown according to TCAS symbology, graphically shown on the Traffic Page (Optional), Map Page, and in the Traffic Warning Window.

A Proximity Advisory (PA) indicates that the intruding aircraft is within ±1200 feet and is within a 5nm range, but is still not considered a threat.
A Traffic Advisory (TA) symbol appears as a solid yellow circle. All other traffic within range is shown as a hollow white diamond. Altitude deviation from own aircraft altitude is shown above the target symbol if traffic is above own aircraft altitude, and below the symbol if they are below own aircraft altitude. Altitude trend is shown as an up arrow (>+500 ft/min), down arrow (<-500 ft/min), or no symbol if less than 500 ft/ min rate in either direction.

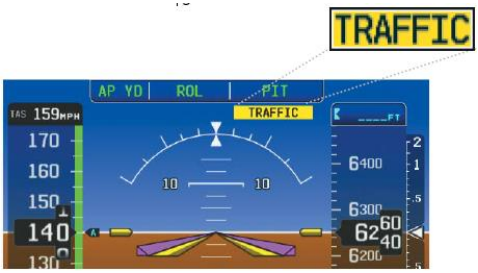
TIS-A Symbol	Description
	Non-Threat Traffic
	Proximity Advisory (PA)
	Traffic Advisory (TA)

Traffic Annunciation

Traffic is displayed symbolically on the Map Page, and the Traffic Warning Window (Inset Map) in the lower left corner of the GDU 46X MFD display.

When a traffic advisory (TA) is detected, the following automatically occur:

- The Traffic Warning Window (Inset Map) is enabled and displays traffic (GDU 46X Only).
- A flashing black-on-yellow 'TRAFFIC' annunciation will appear in the upper right corner of the Attitude Indicator for five seconds and remains displayed until no TAs are detected in the area.
- A single "Traffic" voice alert is generated



Arrows are depicted on the traffic message if traffic is outside the Synthetic Vision field of view. The arrow points in the direction of the traffic.

Traffic Warning Window

When a traffic threat is imminent, the Traffic Warning Window is shown. The Traffic Warning Window shows a small pop-up map in the lower left corner. The Range Rings on the pop-up alert are spaced every whole mile/kilometre/nautical mile.

Traffic Ground Track

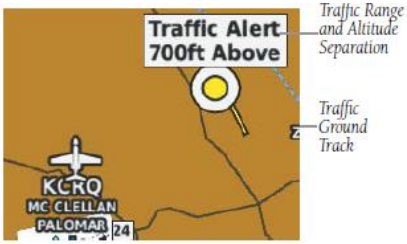
Traffic ground track is indicated on the G3X Touch screen by a "target track vector," a short line shown in 45-degree increments, extending in the direction of target movement.

Displaying Traffic Data

Traffic is displayed by default on the Map Page and the Traffic Warning Window. Traffic information is also displayed on the PFD when Synthetic Vision is enabled. See the 'Additional Features' Section for more information.

Displaying Traffic information:

Touch the traffic on the map to display range and altitude separation information.



Enabling/disabling traffic data on the Map Page:

1) From the Map Page, press the **MENU** Key

2) Touch **Traffic**

Enabling/disabling traffic on the Synthetic Vision display:

1) Touch the HSI or Attitude Indicator

2) Touch **More Options**

3) Touch and drag to scroll down

4) Touch **Traffic** to deselect it

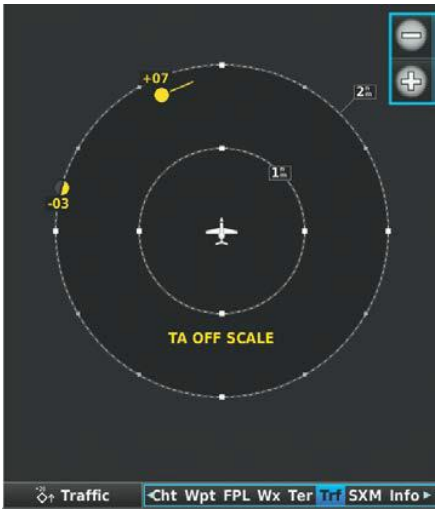
Dedicated Traffic Page (TRF)

Disabling/Enabling the traffic alerts:

NOTE: Traffic alerts are reset to 'enabled' on the next power cycle.

1) From the Traffic (TRF) Page, press the **MENU** Key

2) Touch **Alerts** to toggle between **Inhibit** and **Enable**



Databases

The following databases are available depending on the unit (Americas, Atlantic, or Pacific). See the Additional Feature section for information on Airport Directories, FliteCharts®, and SafeTaxi®. See the Hazard Avoidance section for information on Obstacles and Terrain.

Database	Americas	Atlantic	Pacific
Worldwide Basemap	+	+	+
Airport Directory (AOPA or AC-U-KWIK)	+	+	+
Navigation Database, Jeppesen® or AeroNav (US only)	+	+	+
FliteCharts®	+	+	
SafeTaxi®	+	+	
Obstacle	+	+	
Terrain	+	+	+
VFR Sectionals	+	+	
IFR Charts	+	+	

Basemap

The basemap database contains data for the topography and land features, such as river, lakes, and towns. It is updated only periodically, with no set schedule. There is no expiration date.

Airport Directory Database

The AOPA Airport Directory provides data on airports and heliports throughout the U.S. and it is updated on a 56-day cycle. Detailed information for over 5,300 U.S. airports, along with the names and phone numbers of thousands of FBOs can be viewed. This service allows the pilot to plan an overnight, choose fuel stops, find ground transportation, etc. Optional airport directory databases such as AC-U-KWIK are also supported. AC-U-KWIK provides complete listings of FBOs, charter companies, fuel suppliers, ground transportation, maintenance and catering services at public airports across the world.

Navigation Database

The internal navigation database provides location and facility information for thousands of airports, VORs, NDBs, and more. Updates to the navigation database are available every 28 days online (www.fly.garmin.com). Two navigation database products are available: the Jeppesen Navigation Database, which is sourced by Jeppesen, and the US VFR Navigation Database sourced by AeroNav Products, a division of the FAA.

NOTE: Although the Jeppesen Navigation Database and the US VFR Navigation Database contain much of the same information, pilots may notice differences in behavior, nearest list functionality, direct-to functionality, and map page display due to data content variations. The US VFR Navigation Database, by AeroNav Products, does not contain any approach data.

- *Airport—identifier, facility name, city/state/country, latitude/longitude, field elevation, available fuel types, runway designations and layout, runway surface, runway length, runway width, runway lighting, communication frequencies, and published approaches (Jeppesen Navigation Database only).
- Weather frequencies associated with an airport (ASOS, ATIS, AWOS)
- *VORs—identifier, facility name, city/state/country, location (latitude/longitude), frequency, service volume (high, low, terminal), and type (such as VOR-DME, TACAN, and VORTAC).
- *NDBs—identifier, facility name, city/state/country, location (latitude/longitude), and frequency.
- Intersections—identifier, nearest VOR, radial and distance from nearest VOR, location (latitude/longitude), and region/country.
- ARTCC—Air Route Traffic Control Centers.
- Airspace—boundaries (Class B, Class C, Control Zones, SUAs, and MOAs), controlling agency, and vertical boundaries.
- FSS—Flight Service Stations.

* Symbols used for NDBs, VORs, and airports is consistent with those used on a sectional chart.

NOTE: After performing a navigation database update, verify all flight plan(s) (routes) are current. If there is an obsolete aviation point in a saved route, the route is locked and unusable. A new route with current navigation database points will need to be created.

Flitecharts database contains procedure charts for the United States only. This database is updated on a 28-day cycle.

Chartview database is revised every 14 days. Charts are still viewable during a period that extends from the cycle expiration date to the disables date. ChartView is disabled 70 days after the expiration date and is no longer available for viewing.

The ChartView database is always on the SD Card and is not copied to the GDU's internal memory.

Safetaxi database contains detailed airport diagrams for selected airports. These diagrams aid in following ground control instructions by accurately displaying the aircraft position on the map in relation to taxiways, ramps, runways, terminals, and services. This database is updated on a 56-day cycle.

Obstacle database contains data for obstacles, such as towers, that pose a potential hazard to aircraft. Obstacles 200 feet and higher are included in the obstacle database. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database. This database is updated on a 56-day cycle.

Terrain database is updated periodically and has no expiration date.

NOTE: The data contained in the terrain and obstacle databases comes from government agencies. Garmin processes and cross-validates the data, but accuracy and completeness of the data cannot be guaranteed.

Backlight Intensity (Display Brightness)

The Backlight Intensity (display brightness) can be set to 'Manual', 'Light Bus', or 'Photo Cell'. With 'Manual' selected, the pilot can manually adjust the desired backlight intensity. After each power cycle the Backlight Intensity is set to the default, which is configurable. Refer to the G3X Touch Installation Manual for more information.

Screenshot

Saving a Screenshot to the SD Card

1) Navigate to the desired screen.
2) Press and hold MENU Key, Screenshot saved to card' message will appear.

Screen Cleaning

Cleaning the display:

1) Press the MENU Key twice.
2) Touch Tools > Screen Cleaning.
3) Clean screen with a clean, lint-free cloth (such as the Garmin cleaning cloth). Avoid any chemical cleaners or solvents that can damage plastic components.
4) Per the on-screen instructions, press the MENU Key to swap sides of the display, or press the BACK Key to return to Tools.

7.4 Directional Control on ground

The tail-wheel is steerable via the rudder pedals.
The main-wheels are steerable via differential braking.
Minimum turn radius is achieved by locking one wheel and pivoting around it.

Tailwheel articulation beyond the steering limits causes the steering to become disengaged, allowing free castoring.
This feature allows to Maneuver the airplane backwards or do tight turns.

7.5 Landing Gear (wheels, brakes and suspension)

The main gear legs are individual steel leaf-springs, sleeved into the engine mount.
The main-wheels are fitted with independent unassisted hydraulic brakes (magnesium callipers) controlled from the rudder pedals.
No parking brake is fitted as standard.

One brake fluid reservoir is fitted to each rear pedal.

7.6 Baggage Compartment

A fully enclosed baggage compartment is provided in the upper fuselage behind the cockpit.
It can be accessed via the baggage door on the left side of the fuselage, which can be locked and unlocked with the canopy open only.
The canopy cannot be closed with the baggage door lock in unlocked position.

The baggage compartment must be empty for aerobatics.

Maximum mass in baggage compartment for ferry flights is 15 kg (33lb).

CAUTION: **The maximum mass in the baggage compartment as shown on placard must not be exceeded!**

NOTE: **Any baggage compartment contents must be included in the weight & balance calculation for each flight!**

7.7 Seats and Seat belt system

Seats

Except for their center panels which are removable for maintenance, the seats are fixed mouldings in the fuselage structure.
Adjustment for different sized pilots is in the rudder pedal systems and various size cushions.

WARNING: **The shock absorbing seat cushions are part of the emergency landing occupant protection system and may not be changed for non-Game Composites items!**

Seat belts

Seat belts are provided for both occupants and must be used in flight.
For redundancy during aerobatics, double lap belts are installed.
The primary belt features a ratchet, which can be used to tighten the belt for aerobatics.
The shoulder belts should be latched into the primary lap belt.
The shoulder belts must not be tightened to an extent where they pull the lap belt buckles up.

NOTE: **The flight crew should familiarise themselves with the correct use on these seat belt systems.**

7.8 Canopy including Emergency Exit Procedures

The only access to the cockpit is via the canopy, which swings open to the right-hand side, access is from the left side of the fuselage.

For emergency exit in flight unlock canopy and push open.
In most situations with flying speed, the hinges will break and the canopy will detach from the aircraft.
During a spin with no forward speed, pushing the canopy forward while opening will slide the hinges off their pins and the canopy will fall off.

In the event of a roll-over which prevents the canopy from opening sufficiently, it can be broken with the harness buckle.

NOTE: In the event of an off-airfield or water landing, consider jettisoning the canopy before touchdown.

7.9 Control Gust Lock

The control stick can be secured with the lap belt.

7.10 Engine

Engine General

Lycoming AEIO 580 B1A, six-cylinder, horizontally opposed,
normally aspirated, air cooled, direct drive

Rated power: 303hp (225kW) @ 2600rpm

The power plant installation includes the following accessories from Lycoming:

- Main fuel pump (mechanical)
- Fuel Injector: Bendix RSA-10AD1
- Magnetos: One Slick 6350 and one Slick 6393
- Starter: Skytec inline option
- Oil Screen

The power plant installation includes the following non-Lycoming accessories:

- Alternator: B&C SD-20 (37 Amp peak capacity).
- Voltage regulator: B&C LR3C 14V-4A
- Auxiliary Fuel pump (electrical): Andair PX375-TC
- Oil cooler: Airflow Systems AS-2008X
- Christen Inverted Oil System Aviat Aircraft

Oil System

Christen aerobatic system, manufactured by Aviat, supplied by Lycoming.
Oil cooler is mounted on the left-hand side of the engine mounting frame with a NACA type inlet on the left-hand side of the cowling.
Oil level is checked by a dipstick through an access hatch on top of the left-hand cowling half.

Intake, Ignition and Fuel Injection Systems

Engine air intake is in the front of the cowling.

The airplane has no capability for flight into known icing.
Should the intake become blocked, the intake duct allows warm air into the intake via alternate paths through the side of the intake duct inside the cowling. No pilot action is required.

Game Composite intake pipes replace the Lycoming pipes.
The ignition and fuel injection systems are conventional and supplied with the engine by Lycoming.

Exhaust System

One 3-into-1 manifold assembly on each side.
Game Composites design with provision for EGT sensors, cabin heater (RH side) and smoke-oil injection (both sides).

Engine Installation and Cooling

The engine is attached to the steel tube engine mount via four shock mounts.

The engine mount is attached to the fuselage at four points with five bolts into the side of the fuselage at each attachment.

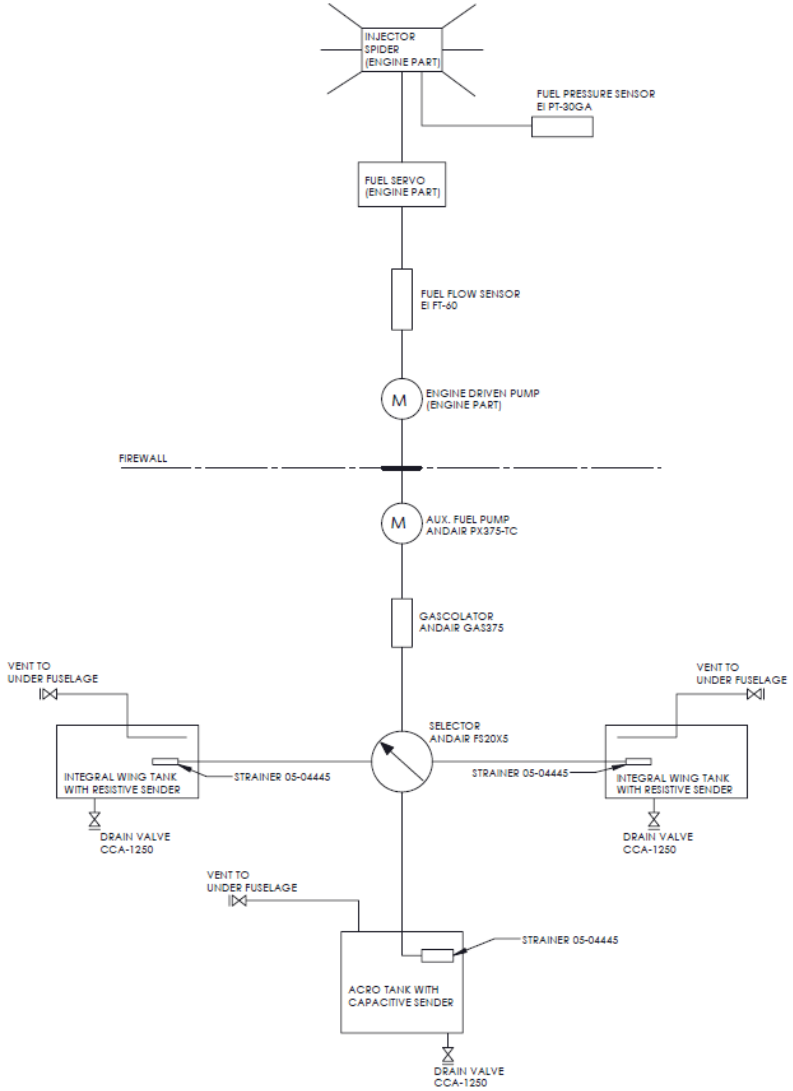
The cowling is separated in left and right halves; both are carbon fiber / glass fiber reinforced composites with self-extinguishing coating and heat-shield panels on their inside surfaces.

7.11 Propeller

The airplane is equipped with a propeller, spinner and governor from MT Propeller Entwicklung GmbH.
The propeller model is MTV-14 –B-C/C190-130 which is a four-blade type of 1900mm (75 inch) diameter.
The blades are made from a mix of wood and fiber reinforced composite.

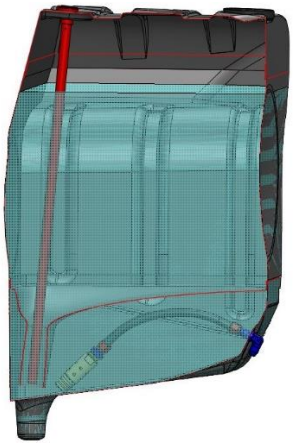
The hydro-mechanical propeller governor maintains the selected RPM and prevents over-speeding.
If oil pressure is lost completely, the propeller moves to coarse pitch due to its installed counter weights.
If the propeller speed control cable breaks or detaches, the spring-loaded lever of the governor moves to fine pitch (high RPM).

7.10 Fuel System

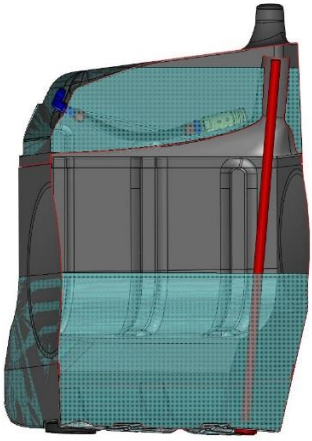


The fuel system consists of two separate wing tanks and the Acrotank in the forward fuselage.
The Acrotank must be used for take-off, aerobatics, descent and landing.
Its useable capacity is 95 liters (25 Gal).
The Wing Tanks must be empty for aerobatics, see section 2.6.
The total useable volume of all three tanks is 81 US gallons (311 liters)

The Acrotank features a separated 'header' volume with 2.3 US gallons (9 Liters) capacity, which is gravity-fed during positive load, and features a stand pipe to prevent draining in negative loading.
Fuel is picked up through a flop tube (flexible hose with a bob weight at the pick-up end) designed to maintain fuel flow to the engine during aerobatic Maneuvers.
Due to the limited amount of fuel available in the header, maximum engine running time inverted at full power is 3 minutes.
If fuel starvation occurs during inverted flight, refill for engine restart takes approximately 7 seconds.
it is recommended not to fly inverted for more than 2 minutes continuously.
The Acrotank is shown below in upright and inverted position.



Upright



Inverted

The Wing Tanks vent outlets are located on the bottom of the fuselage near the leading-edge wing roots.

The Acrotank vent is located aft of the right-hand landing gear leg fairing.

Each tank has a drain valve. The three drain points are located under the center part of the airplane and are marked with placards.
Strainers are installed at the pickup points of each tank, and a Gascolator is located aft of the right-hand landing gear leg fairing.

In addition to the mechanically driven fuel pump on the engine, an electrically driven auxiliary fuel pump is installed. It is used for priming before engine start. The auxiliary pump is able to supply the engine at full power should the engine driven pump fail. It can also be used as a boost pump.

The wing tanks have float-type level sensors;
The Acrotank features a capacitive sensor.
Fuel tank contents should be verified visually before each flight.

The mechanically actuated fuel selector valve is mounted below the main tank and behind the firewall.
A linkage with universal joints connects the selector switch in the rear center console and the valve.
To select a tank, turn the red handle 90° (LEFT/ RIGHT) or 180° (ACRO) so that it points towards the tank in use.
To cut off the fuel supply, lift the knob and simultaneously turn the handle until it faces downward (OFF).

7.11 Electrical System

The electrical system is a conventional 12 Volt DC system.
Components:

- Battery (Lead, solid)
- Gear driven alternator
- Voltage Regulator
- Starter motor
- Starter relay
- External Power Socket
- Auxiliary Fuel Pump
- Master relay
- Smoke Pump
- Combined Anti-collision and position lights
- Landing / Recognition Lights
- Master / Alternator split switch, rear right-hand side console
- Switches and breakers, rear right-hand side console
- Ignition / starter switch, rear right-hand side console
- Elevator trim servo and position sensor in the left-hand rear elevator, aileron trim servo and position sensor in the right-hand aileron;
  Trim coolie hat switch and position displays are in the rear left-hand side console.
- VHF with intercom, rear center console
- Transponder with encoder, rear center console
- MFD1 in rear instrument panel, displaying:
    - Engine and fuel information
    - Navigation with own-ship position indication
    - Electronic flight instruments
- MFD2 in front instrument panel (optional), displaying:
    - Engine and fuel information
    - Navigation with own-ship position indication
    - Electronic flight instruments
- Twin USB socket in each instrument panel,
  5 Volts DC, max. 2 Amps each.

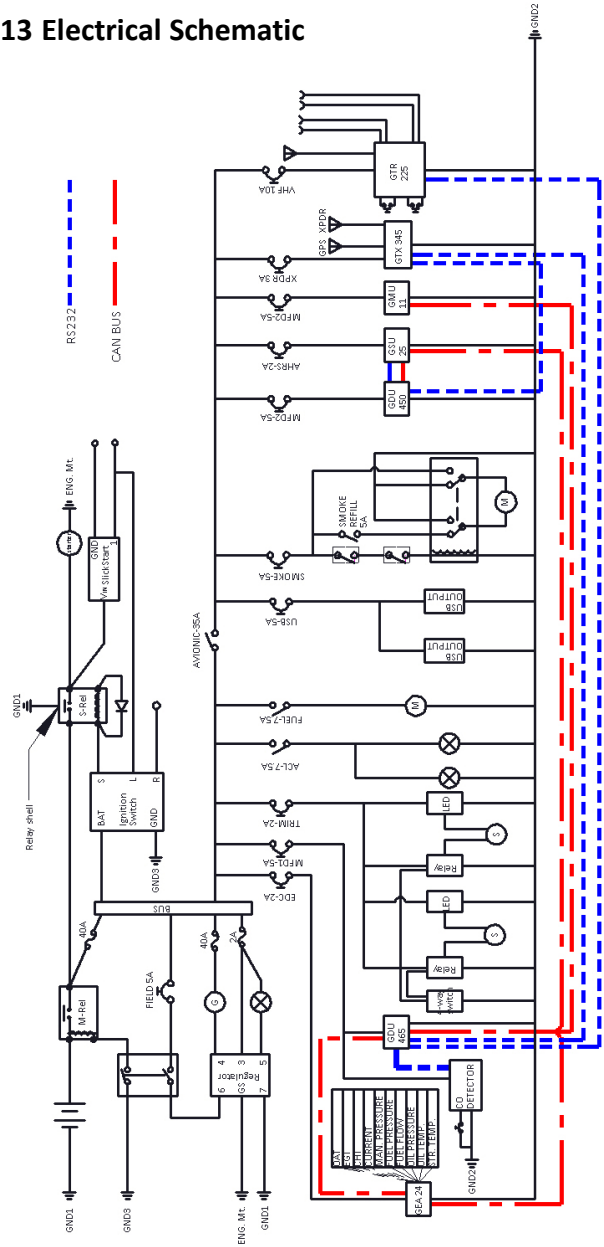
7.12 List of circuit breakers

The circuit breakers, from the Tyco W31 and Klixon 7274 series are:

System	Amps	Type	Name on Panel
Alternator Switch	5	Button CB	Field
MFD1	5	Button CB	MFD1
MFD2	5	Button CB	MFD2
Engine data processing unit	2	Button CB	EDC
Air data sensor unit	2	Button CB	AHRS
Magnetometer	2	Button CB	FLUX
Trim Motor	2	Button CB	Trim
Transponder	3	Button CB	XPDR
VHF / Intercom	10	Button CB	VHF
User Power Socket	10	Button CB	USB
Smoke Pump	5	Button CB	Smoke
Smoke Pump	5	Toggle CB	Smoke refill
Anti-Collision Lights	7.5	Toggle CB	ACL
Fuel Pump	7.5	Toggle CB	Boost pump
Avionic Master	35	Toggle CB	Avionic
Landing / Recognition Lights	5	Toggle CB	Landing Lights

The Slick Start Ignition Assist under the cowling features a 5 amp in-line fuse, which is not accessible from the cockpit.

7.13 Electrical Schematic



7.14 Pitot-static System

Pitot-static system is connected to the altimeters, airspeed indicators, Air Data Computing unit and altitude encoder of the XPDR.
Dynamic pressure sensing is via a pitot tube under the LH wingtip.
Static pressure sensing is via static ports on each aft fuselage side.

7.15 Communications Equipment

Operating instructions for the VHF and XPDR are contained in supplements.

To use the VHF or intercom, the occupants must wear headphones or suitably equipped helmets.

PTT (Push to talk) momentary switches are installed on top of front and rear control stick.

Rear cockpit throttle grip has a momentary switch installed to swap active and standby frequency.

A pair of MIC-PHONE plugs to connect a headset is installed in each cockpit. In the front cockpit, they are located in front of the occupant on the right-hand console while in the rear they are located behind the pilot on the right-hand of the headrest area.

7.16 Removable Ballast

Removable ballast weight GB1-4100-10-00, 13.5 kg (30 lbs) may be fitted in the ballast chamber on the left-hand side of the fuselage, under the horizontal stabilizer, to allow CG adjustment.

Ballast Installation

1. Insert ballast weight into chamber in the left-hand side of the fuselage, push until surfaces are flush.
2. Spin on and hand-tighten wingnut on opposite side of fuselage.
3. Insert safety pin through wingnut and hole in standoff bolt.

Ballast removal

1. Remove safety pin
2. Remove wingnut
3. Push ballast weight out of chamber

When the airplane is flown without ballast, the chamber may be left open, or closed with ballast cover GB1-4100-11-00.

CAUTION: **Installed tail ballast significantly shifts the center of gravity aft and reduces longitudinal stability!**

7.17 Smoke System

For display flying, a smoke generating system is installed.

- Tanks of 3.7 Gal (14 liters) each are located in each wing root, 7.4 Gal (28 liters) total capacity.
- To arm the system, push the button CB marked “Smoke”.
- To switch Smoke on and off, using the switch on the throttle lever. Smoke is generated by injected oil vaporising in the exhausts.

Filling

The tanks are filled from a single point under the lower forward fuselage, which is identified with a placard.

To fill the system:

1. Obtain a filler hose made of approximately 900 mm (3 feet) of 9 mm (3/8 inch) ID hose with fitting Timmer L-ST7-9-MS
2. Click the fitting into the push connector in the fuselage and immerse the other end of the hose in the smoke oil container
3. Push SMOKE Circuit breaker in
4. Switch the Smoke Refill switch to ON
5. Move the smoke switch on the throttle to ON, the pump will draw oil into the two tanks.
6. When pump sound changes, switch smoke switch on the throttle to OFF
7. Switch the SMOKE REFILL switch to OFF
8. Remove the hose

Draining

Place container(s) with a total capacity of at least 38 liters (10 Gal) to catch oil from both exhaust pipes.

1. Battery Master switch ON
2. SMOKE circuit breaker pushed in.
3. SMOKE switch ON

When no more smoke oil flows out of the exhaust:

4. SMOKE switch OFF
5. Battery Master switch OFF

7.18 Demisting and Ventilation

Each of the four fresh eyeball air vents for the occupants receives air from its adjacent air inlets. Each vent is controlled manually and individually.
The right-hand front intake also provides air to the de-fog vents at the base of the windshield.

The CO monitor is set to give a yellow warning at 25ppm and red at 75ppm. Should either warning occur:

AEROBATICS	STOP
VENT	OPEN

7.19 External Power

The GB1 is equipped with a Piper-Style external power socket, located on the fuselage underside, behind the LH landing gear.

The external power source must be regulated to 12/14V DC.

To activate the external power, the Battery Master Switch must be ON.

WARNING: **If external power is used for engine start, the person removing the external power cable after startup must be briefed to stay clear of the propeller!**

8 Handling, Service and Maintenance

8.1 Introduction

a) Correspondence with Game Composites must include the airplane's serial number.
b) Airplane Maintenance Manual and Service Bulletins are available on the Game Composites web site.

8.2 Inspection Intervals

In addition to the annual inspection, the AMM requires inspections every 25 flight hours with larger inspections every 50, 100 and 1000 hours. Regulators may require other inspections by the issuing of Airworthiness Directives. The operator is responsible for compliance with all applicable airworthiness directives and periodic inspections.

8.3 Changes or Repairs

The GB1 is a type certified airplane. Changes, repairs and maintenance must be done in accordance with local regulations for certified airplanes. Information regarding maintenance and approved repairs is contained in the maintenance manual.

8.4 Servicing

In addition to the inspection intervals mentioned above, information about the correct oils and fuels for servicing is in chapters 2 and 7 of this manual.

8.5 Ground Handling, Levelling and Lifting

Because of its low weight and the free swivelling tail wheel, two people can easily move the airplane by hand.

The best place to push is the leading edge of the wings while the best place to pull is the propeller close to the roots of the blades (check master switch and magnetos are all off before doing this).

If the airplane is parked in the open, secure the wheels with chocks.
No parking brake is fitted as standard.
When windy, tie down the airplane using ropes around the tail wheel and at the outer aileron hinges.

NOTE: **Use nylon or other soft ropes, not to damage the hinges.**

CAUTION: **After the airplane was tied down during a storm or other conditions inducing high loads to the tie downs, inspect the structure around the tie down points for damages!**

The control stick can be secured with the seatbelt.
If the airplane is parked outdoors, it must be protected against the effects of weather, the degree of protection depending on severity of the weather conditions and the expected duration of the parking.
When the airplane is parked in good weather conditions, point the nose into the wind and chock the main wheels.
For longer outdoor parking or in poor weather, consider using engine and canopy covers to reduce the potential for rain ingress or animal nesting.

To level the airplane, raise the tail wheel until either the fuselage reference line (firewall) is vertical or the baggage floor is horizontal.

To lift the front of the airplane with a crane, either the two lugs on top of the engine, or the engine mount can be used. (Tailwheel resting on ground).

8.6 Cleaning and Protection

To clean the airplane, use clean water and an automotive body wash.
Use a leather or microfiber cloth to dry the surfaces.
To clean the canopy, use only clean water and clean lint free microfiber cloth.

NOTE: **Never attempt to clean the canopy or windshield glass with dry or dirty cloths, sponges or paper, and never use fuel, alcohol, acetone or other solvents!**

Cleaning the MFD screens

Clean screen with a clean, lint-free cloth (such as the Garmin cleaning cloth). Avoid any chemical cleaners or solvents that can damage plastic components.

NOTE: **Make sure that no dust or grit accumulates at the bottom of the display glass. The displays use infrared beams for touch detection, this makes it very important to keep the screen clean, especially along the edges**

8.7 Long Term Storage

During long term storage:

- Ensure the main-wheel Tires remain inflated to 3.5 bar / 50 psi.
- Consider protecting the engine intake, ventilation ducts, engine bay air exits, etc. from access by birds and small animals.
- Consider preserving the engine. Lycoming Service Letter “L180”, refer to latest issue freely available on the Lycoming web site.

At the end of storage, whether indoors or out and regardless of whether the fuel fillers were covered, take particular care to ensure that all water has been drained from the three fuel tanks.

- If the airplane is to be inactive for longer than four weeks, use a trickle charger to sustain the battery charge.

8.8 Pilot Conducted Maintenance

Pilots should refer to local regulations for what maintenance may be performed by pilots. All work must be done in compliance with the appropriate manual.

Updating MFD databases

The G3X Touch navigation database updates can be obtained by visiting the 'flyGarmin' website (www.fly.garmin.com). The 'flyGarmin' website requires the unit's System ID. This allows the data to be encrypted with the unit's unique System ID when copied to the SD Card.

NOTE: The databases are stored internally on each GDU. When updating a system with multiple GDUs, each GDU will need to be updated individually using the same SD card.

Obtaining the System ID:

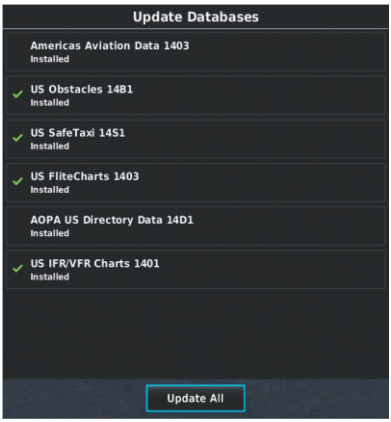
1) Press the **MENU** Key twice to access the Main Menu.
2) Touch the **Tools** Button.
3) Touch the **Database Information** Button. The Database Information Page is displayed. Scroll down if necessary, to see the System ID.

Equipment required to perform the update:

- Windows-compatible PC (Windows XP or newer)
- Verbatim 96504 SD Card Reader or equivalent
- Updated database obtained from https://fly.garmin.com/fly-garmin/
- SD Card, 8 GB recommended
  (Garmin recommends SanDisk or Toshiba SD cards)

1) After the data has been copied to the SD Card, insert the SD card in the SD card slot of the display.
2) Power on the display. The Update Databases Page is displayed.
A green checkbox indicates that the database installed on the G3X Touch is up to date.

An empty checkbox indicates that the database on the SD card is more current and should be installed.



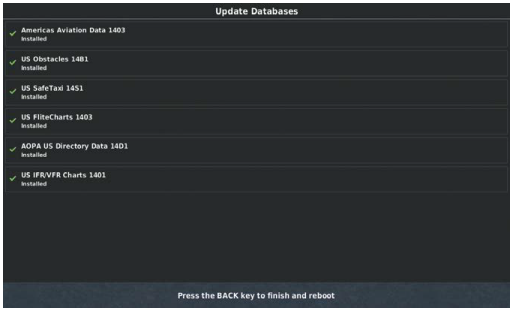
3) Touch the **Update All** Button. The database status is updated.

Or: Touch a single database and press the **Update** Button.

The selected database status is updated.

4) Press the **BACK** Key. Once the database(s) have been successfully updated,

the SD Card can be removed from the unit.



5) Repeat steps 1-4 for the remaining GDUs if applicable.

Reloading G3X Touch Databases:

1) Insert the SD card containing the data to be reloaded in the MFD.
2) Power on the display.
3) Press the **MENU** Key twice to open the Main Menu.
4) Touch **Tools.**
5) Touch Database Information.
6) Press the **MENU** Key.
7) Touch **Update Databases**. The database status is updated.

9 List of Supplements

AFM-GB1-supplement-VHF and intercom GTR 225A

AFM-GB1-supplement-Transponder GTX 345

AFM-GB1-supplement for ELT AF INTEGRA

AFM-GB1-supplement Single Seat Canopy