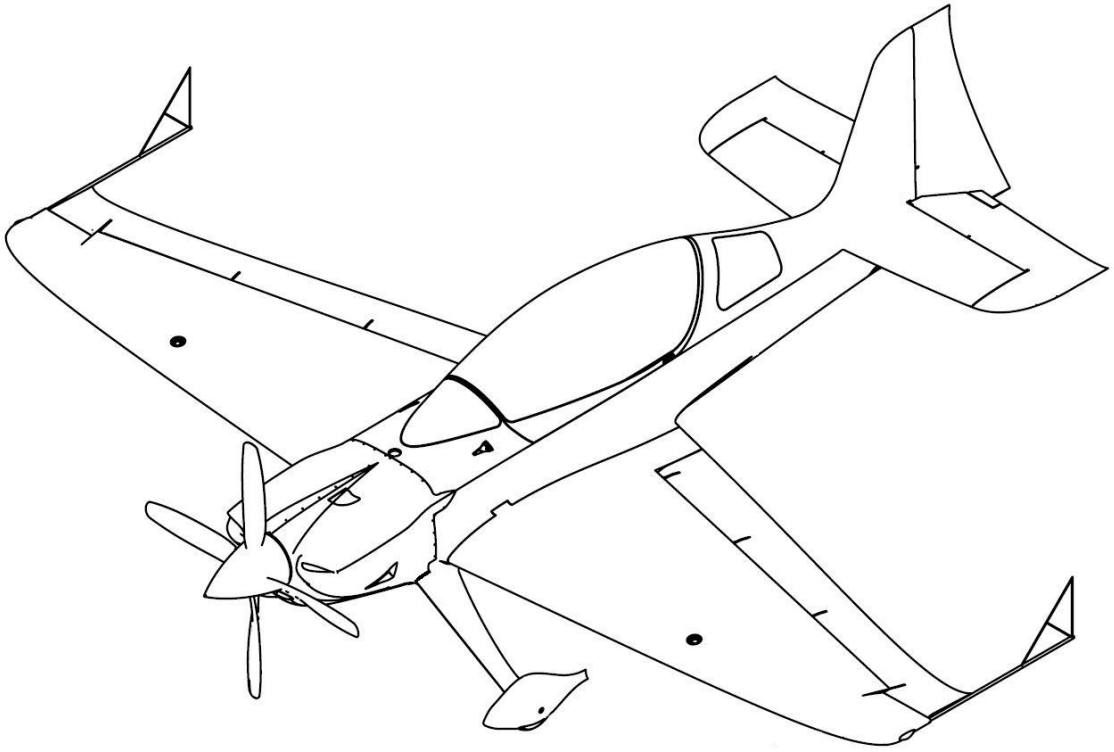
Maintenance Manual GB1 GameBird



This handbook includes the Maintenance Information and Illustrated Parts Catalog for the GB1 GameBird required to be available by 14 CFR and CS-23.

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

Issued to airplane S/N _____

Issued by Type Certificate Holder:
Game Composites LLC
3201 SW I Street, Bentonville, 72712 Arkansas, USA

FAA TCDS A00073CE
EASA TCDS A.610

www.gamecomposites.com

List of Revisions

Revision	Changes	Date
A01	First Issue	March 22, 2019
A02	5-09 amended 31-9, additional Accelerometer type 40-12, GMU location 40-17, additional service step (Fire Sleeve) 51-13 Material Details added	April 24, 2020

Obtaining Revisions

Latest Revisions of Airplane Flight Manual & Supplements, Airplane Maintenance Manual and Service Bulletins are available on the Game Composites website: www.gamecomposites.com.

Table of Contents

Introduction

According to 14 CFR, this Maintenance Manual provides maintenance staff required information for the servicing, maintenance and repair of the GB1 GameBird. It includes: a detailed description of all systems including time limits for components, troubleshooting guidance; removal & installation procedures; inspection and maintenance instructions as well as repair instructions.

This manual is arranged into chapters which are numbered in accordance with ATA100.
For information about a specific system, review the table of contents above to find the relevant chapter number then, where necessary, the first page of each chapter shows a detailed table of contents for that chapter.

In addition to this AMM and any related service bulletins, refer to the following equipment manuals:

Document for	Document Name	Document Number	Source
Airplane	Airplane Flight Manual	AFM-GB1-0000-00-02	www.gamecomposites.com
Standard Practices	Acceptable Methods, Techniques and Practices – Aircraft Inspection and Repair	FAA Advisory Circular AC No: 43.13-1B	www.faa.gov
Engine	Maintenance and Overhaul Manual	LMO-AEIO-580	www.lycoming.com
Propeller	Operation and Installation Manual	E-124	www.mt-propeller.com
Governor	Operation and Installation Manual	E-1048	www.mt-propeller.com
Magnetos	4300/6300 Series Magneto Maintenance & Overhaul Manual	L-1363F	www.unisonpubs.com
Magneto booster	Installation Instructions for SlickSTART magneto booster	SL2-96	http://championaerospace.com
Alternator	Technical Manual for Model No. BC410-H Spline-Drive Alternator	BC410-H_Install (05/03/16)	http://www.bandc.aero
Battery	Odyssey Battery Technical Manual	US-ODY-TM-002 – December 2014	www.odysseybattery.com
Regulator	Technical Manual for model No. LR3C-14 Linear Regulator	LR3C_Install, Rev. B(3/15/16)	http://www.bandc.aero
MFD 1&2	G3X Touch Installation Manual	190-01115-01_AE	www.garmin.com
	Navigation database update downloads	-	https://fly.garmin.com/fly-garmin/
VHF GTR225A	GTR225A TSO Installation Manual	190-01182-02_g	www.garmin.com
	AFM-GB1 Supplement VHF GTR225A	-	www.gamecomposites.com
XPDR GTX345	GTX345 Installation Manual	190-01499-02_07	www.garmin.com
	AFM-GB1 Supplement XPDR GTX345	-	www.gamecomposites.com
Wheels and Brakes	Instructions for continued airworthiness	13046-11	www.groveaircraft.com
Adhesive Nutplates	CBPS-206 Process Specification Adhesive bonding of Nutplates	CBPS-206 Rev. E	http://www.clickbond.com
Seat belts	Instruct. for Cont. Airworthiness	ICA, Initial revision	www.hookerharness.com

All the documents listed above can also be found on https://gamecomposites.com/support/

NOTE: **Only qualified and authorized personnel must carry out maintenance work and inspections (subject to local regulations)**

1. **Before starting work, this maintenance manual and any relevant referenced documents must be read and understood.**
2. **The maintenance must be conducted in accordance with applicable national requirements.**
3. **The warnings, cautions and notes given in this manual must be followed.**

Definition of Warnings, Cautions and Notes

The following definitions apply:

WARNING **An operating procedure, inspection, repair or maintenance practice, which if not correctly followed, could result in personal injury, or loss of life.**

CAUTION **An operating procedure, inspection, repair or maintenance practice, which, if not strictly observed, could result in damage or destruction of equipment.**

NOTE **An operating procedure, inspection, repair or maintenance condition, etc., which is deemed essential to highlight.**

Units and Conversions

Property	Conversions
Length	1 inch = 25.4 mm 1 foot = 0.305 meters = 305 mm 1 meter = 39.4 inches
Volume	1 USG = 3.8 liters =0.83 imperial gallons 1 US quart = 0.95 liters 1 liter = 61 cubic inches
Weight	1 lb. = 0.454 kg
Speed	1 knot = 1.15 mph = 1.85 km/h
Pressure	1 bar = 14.5 psi
Torque	1 Nm = 0.738 ft. lb. = 8.85 in/lb.
Temperature	°F = °C x 1.8 + 32 °C = (°F - 32) / 1.8

- 1 USG of 100LL fuel weighs 6.0 lb.
- 1 liter of 100LL fuel weighs 0.72 kg

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	Centre 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	Kilogrammes
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
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 litres)
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

1 Description

1-01 Certification Category

The GB1 is a two-seat, high performance airplane certified in the aerobatic category in accordance with FAR 23, Amendment 64 and CS-23, Amendment 1.
FAA TCDS A00073CE and EASA TCDS A.610.
Certification is for day, VFR, non-icing conditions.

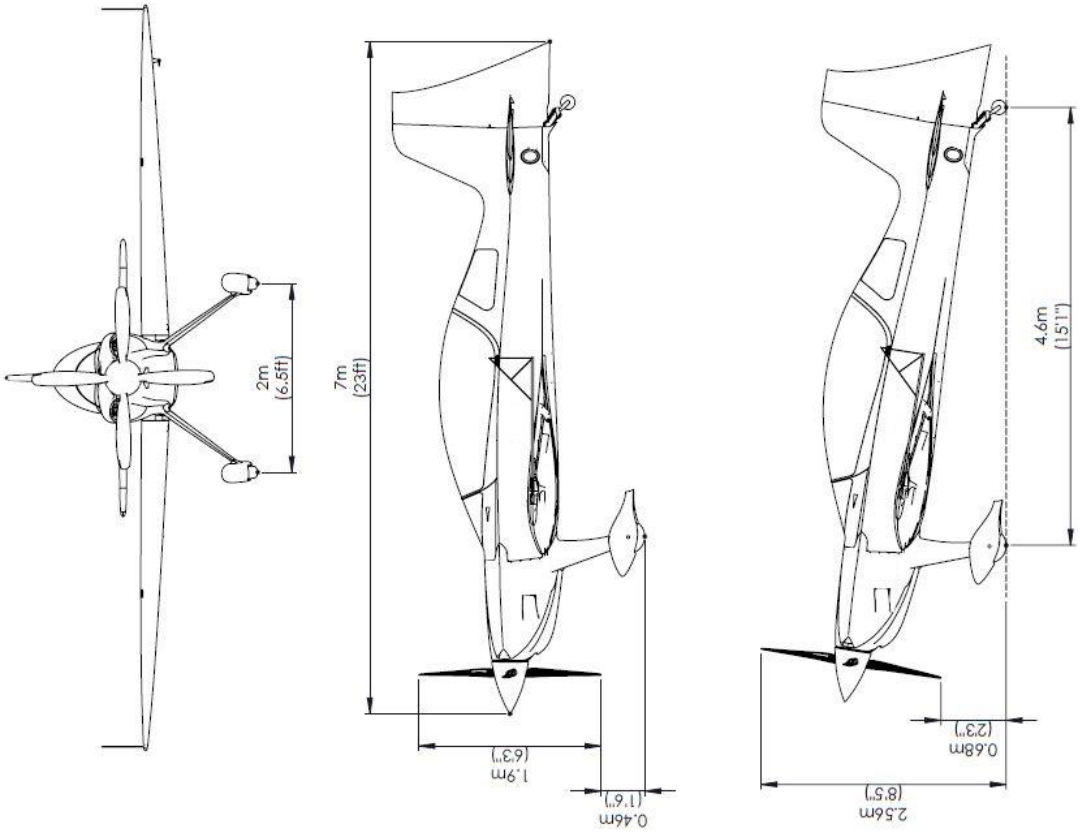
Maintenance, repairs and changes must be done in accordance with local regulations for certified airplanes.

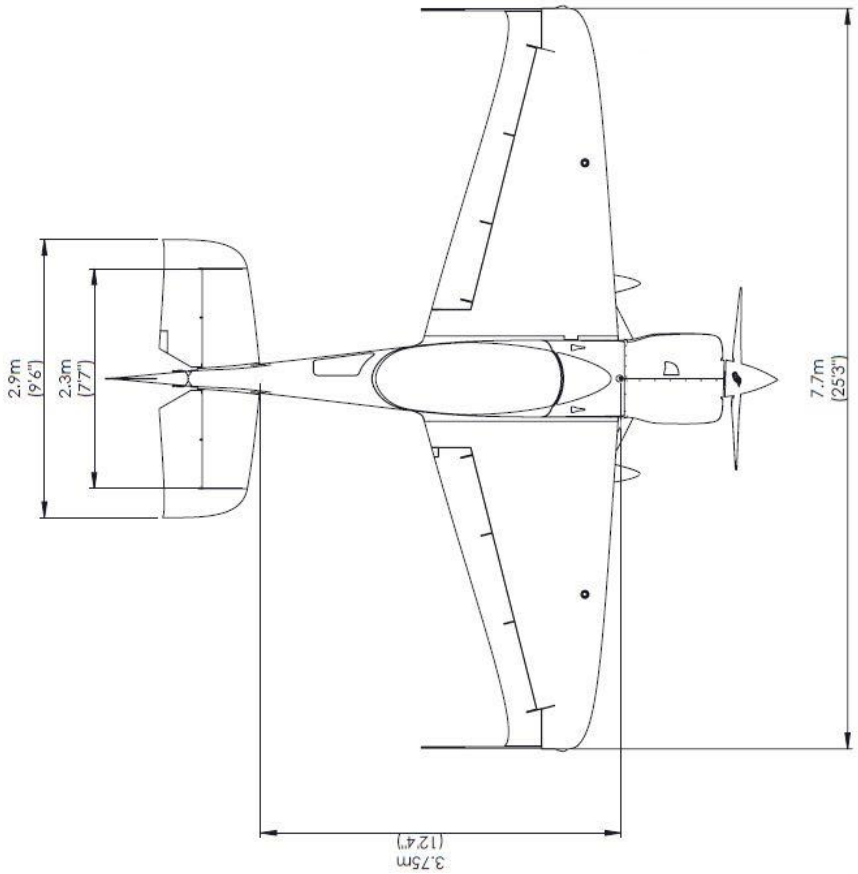
1-02 Manufacturer

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

www.gamecomposites.com

1-03 Overview Drawing





1-04 Description

The GB1 is a conventional low wing monoplane with one front mounted reciprocating engine, driving a constant speed propeller.

The cockpit features two seats in tandem arrangement, with the PIC in the rear.

The landing gear is a fixed conventional tail-wheel arrangement.

The airframe (fuselage, wings, stabilizers and control surfaces) is constructed from wet lay-up composites of carbon fibers and epoxy resin with foam or honeycomb sandwich materials.

The fuselage is a monocoque composite structure with vertical stabilizer and bonded in horizontal stabilizer. The rear fuselage incorporates a chamber for removable ballast.

The seats are integrated fuselage structure composite components.
Seat cushions are part of the occupant protection system and may not be altered or changed.

The canopy consists of a fixed windshield and the main canopy, which is opening to the right-hand side.

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

The Acrotank is a carbon fiber composite assembly, mounted in a carbon fiber composite enclosure.

Mechanical systems include engine mounting; flight control systems (control sticks, rudder pedals; bellcranks); engine mount, landing gear, and the engine intake and exhaust pipes. These are mostly welded steel except for the main aileron and elevator rods which are carbon fiber composites.

1-05 Equipment List

The GB1 is certified to operate in day VFR only, for which the following systems and items of equipment must be installed and operational to perform their intended function:

	Standard / Optional / Not available	Rear Panel	Front Panel
Communication			
VHF transceiver, intercom	O	O	N/A
Electrical Power			
Battery	S		
Alternator	S		
Regulator	S		
External Power Socket	O		
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	O
Altimeter	S	S	O
Accelerometer	S	S	N/A
Annunciator Lights Panel	S	S	N/A
Garmin G3X multi-functional displays showing all functions required by the regulations, plus several others: 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. ATA chapters for these functions are not individually listed.	S	S	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	O	O
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

4 Airworthiness Limitations

4-01 General

This Airworthiness Limitations Section is EASA approved. It specifies inspection and maintenance required according to CS-23 Appendix G, 23.4 unless an alternative program has been EASA approved.

This Airworthiness Limitations Section is FAA approved and specifies maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

This section outlines the maximum replacement and inspection intervals for aircraft components, systems, and structures which require monitoring through scheduled maintenance.

The airplane's operator is responsible to ensure limitations listed in this chapter are not exceeded.

4-02 Operating Time

The replacement of all affected components is required when a limit operating time is reached. Only the composite airframe components listed in section 4-03 below are subject to operating time limitations. Recommended replacement times for other components are provided in section 5-03.

4-03 Life Limited Parts

Replacement of the life limited components listed below must be accomplished not later than the specified period of operation for that component or in accordance with the manufacturer's service data or airworthiness directives.

Life Limit of the composite airframe is 6000 hours.

An extension of these lifetimes may become possible, pending further experience.
Necessary inspections will be published in later revisions of this manual.

4-04 Structure Temperature Limitation

The structure is qualified up to 72°C / 161°F.
Structure temperature is displayed on 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^{O}C (86^{O}F), or
- if the ambient temperature is greater than 30^{O}C (86^{O}F),
  the airplane must be parked out of direct sunlight for at least one hour before flight.

5 Time Limits, Access, Maintenance Checks

5-01 General

This section provides information about time limits and maintenance procedures. It enables licensed personnel to carry out correct inspections on the airplane. The described periodic inspections are minimum requirements for maintaining the airplane in an airworthy condition. If the operation of the airplane requires more frequent maintenance, the time periods may be shortened. The check intervals must not be exceeded without explicit permission of the regulatory authority. Additional checks as well as changes must always be agreed by the regulatory authority.

To maintain the vendor equipment, the vendor equipment manufacturer's manuals must be referred to.
To help maintenance staff, most of the applicable instructions are given in the following check-lists.
The most recent edition of the equipment's inspection manual given by the equipment manufacturer is valid.
It is recommended to check for the latest revision of each referenced document before conducting maintenance.

Additional information may be given by Game Composites through service bulletins and service letters on the company web site and by circulation to known operators. The operator must ensure that all airworthiness directives, service bulletins and any other requirements of the airworthiness authority are completed as required.

5-02 Time Limits

All scheduled maintenance checks must be done within the time limits specified in this manual.
All components not listed in the table below must be inspected as detailed in flight-hours-based checks listed in this manual, then repaired, overhauled or replaced if required.

Item	TBO
Engine and accessories	Overhaul after 1400 hrs of operation. Also refer to Lycoming "SI 1009", see www.Lycoming.com
Magnetos	Overhaul after 500 flight hours of operation and with engine. Refer to Unison Industries Magneto Maintenance and Overhaul Manual. L-1363D, see www.unisonpubs.com
Alternator	Replacement after 1700 hours of operation. Refer to section 24-04 Alternator
Propeller	Overhaul after 6 years or 2400 flight hours. When used for unlimited aerobatic or air display, further disassembly inspection every 800 flight hours is mandatory (refer to MT-propeller Service Bulletin 1 and its supplement, see www.mt-propeller.com
Governor	Overhaul after 6 years

5-03 Recommended Replacement Times

The following list indicates replacement times for other items which are to be replaced other than on Condition. It may be modified by a competent national authority.

Item	Replacement Time
Seat belts	10 years, or service life limit determined by local aviation authority
Hardware, Fasteners	Subject to condition inspection, unless specified otherwise
Self-locking nuts, all types Cotter pins	After being removed
Mounting fasteners for rear instrument panel	Subject to condition inspection

5-04 Introduction

An airworthiness authority may issue Airworthiness Directives, requiring inspections additional to those defined in this manual.

The operator is responsible for compliance with all applicable ADs and periodic inspections.

Pilots operating the airplane should refer to the regulations of the country of registration for information concerning what maintenance may be performed by pilots. Subject to local regulations, all other maintenance on the airplane must be conducted by persons authorized and approved by the Airworthiness Authority of the country of registry.

All maintenance must be conducted in compliance with this manual.

The scheduled maintenance checks at 25, 50, 100- and 1.000-hours intervals are mandatory.

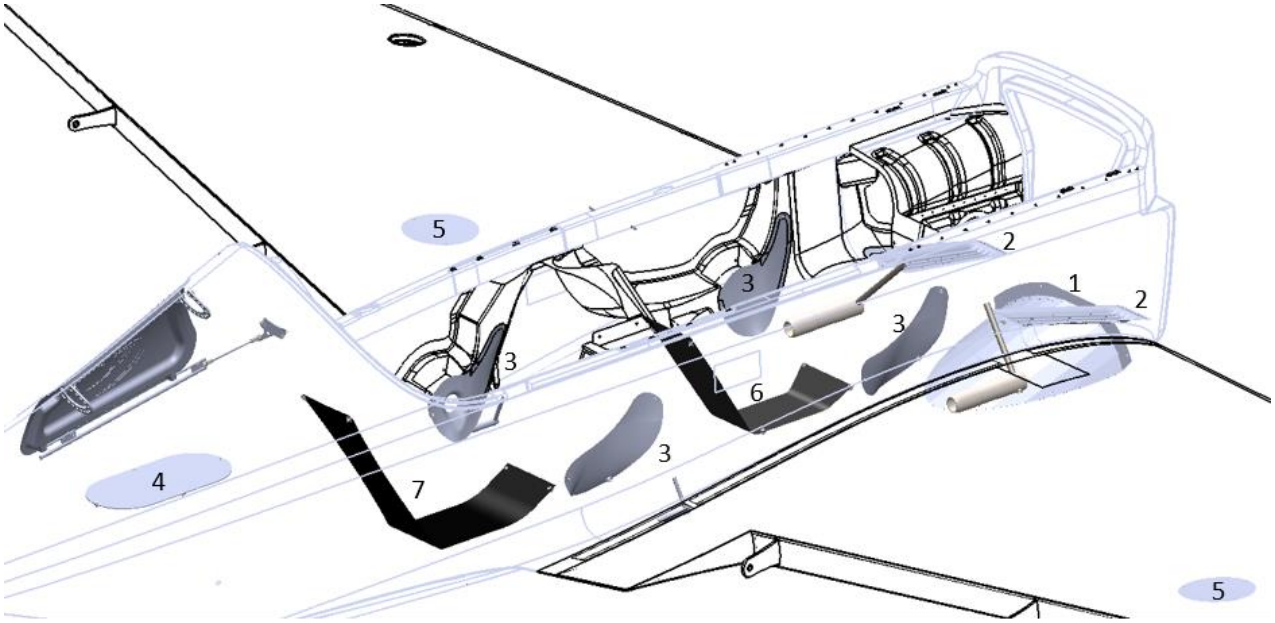
It is recommended to consider, based on condition of the airplane as well as the operating conditions, shortening service and maintenance intervals when operating under abnormal conditions, such as:

- Extreme temperature ranges
- Dusty atmospheric conditions
- High humidity and moisture
- Rough runways
- Any other unusual operating requirements

All items must be conducted by persons authorized and approved by the Airworthiness Authority of the country of registry.

5-05 Access

For inspection, the following panels may be removed or opened as appropriate. Items that have their own chapter in this Manual (for example cowling) are not listed here. The inspection checklists assume that this has been done and does not repeat the instruction to remove and reinstall these panels.



No.	Panel	Mounting Hardware	provides access to:
1	Firewall Belly Panel, fwd bottom fuselage	8 x AN525-832R9	Fuel selector valve, pump Acrotank parts (flop tube & strainer)
2	Foot rest panels (right and left)	1 x AN525-832R9	Battery & regulator (left) Smoke pump (right) Engine mount, lower attachment points **NOTE: Panels will only fit if main bolt handles are in correct position, located in recess.**
3	Side panels (right and left, front and back seat)	3 x AN525-832R9 each	Engine controls (left, front & rear), Electrical parts (rear, left & right) Wing main pins (front, left & right)
4	Baggage bay floor panel	4 x AN525-832R9	Aft fuselage inside, Static Port connections, Magnetometer
5	Under-wing panels (LH & RH)	3 x AN525-832R9 each	Aileron bellcranks
6	Front seat (and seat cushion), front cockpit	4 x AN525-832R9	Rudder & elevator control systems, Inside rear center console (fuel selector, VHF and XPDR), Electrical power distribution blocks & ground bus, pitot-static system
7	Rear seat (and seat cushion), rear cockpit	4 x AN525-832R9	Rudder & elevator control systems

Philips 2 screwdriver is required.

Vulcan Fiber washers under heads of AN525 screws, to be replaced on condition:

Part Number 10038970

Manufacturer: Menzel & Seyfried GmbH
Olchinger Strasse 60
82194 Groebenzell, Germany
www.gummi-menzel.de

5-06 Component Inspections

No.	Items	Inspection Type	Inspection points	Inspection Criteria	Criteria for replacement
1	**Standard Fasteners**	visual	Surface, Coating	worn, chafed	visible dents, permanent deformation
			Thread	clean	abrasion beyond chafing of coating, damaged thread
			Head	Tool fit	permanent deformation, beyond chafing
2	**Click-Bonds (self-locking adhesive-bonded Nutplates)**	function	retaining function	no discernible difference to other self-locking Nutplates	discernible reduction of self-locking function
			attachment	Nutplates must not spin when screw is inserted or removed	when loose, replace
3	**Spherical Bearings**	visual	location	when relevant control is moved, check if cage is moving in seat	when loose in seat, remove, clean both surfaces, and bond back in, using CB200 glue
			play	play in any direction must not exceed 0.5 mm	if max. allowable play is exceeded
4	**Ball Bearings**	function	contamination, damage of components	quiet, smooth motion	unusual noise, irregular motion
		visual	surface quality	check for corrosion, obvious damage	corrosion or damage causes unusual noises or irregular damage, or detachment from seat
5	**Welded steel components**	visual	surface quality	intact surfaces	visible surface deterioration and/or corrosion, visible cracks or permanent deformation in parts or welds
6	**Machined parts (Aluminum, Steel, Stainless Steel, Nylon)**	visual	surface quality	intact surfaces	visible cracks or permanent deformation, elongation or wear in bearing seats or holes resulting in discernible play
7	**Main and auxiliary spar bolts**	visual	surface quality	intact surfaces	visible wear or cracks
8	**Rudder pedal rails**	visual	surface quality	no corrosion, smooth surfaces	corrosion, dents, cracks, permanent deformation
9	**Rudder pedal rollers**	visual	surface quality	no corrosion, smooth surfaces	unusual noise, irregular motion
		function	operation	quiet, smooth motion	unusual noise, irregular motion
10	**Control grips, engine and flight controls**	visual	structure	no cracks along the grain	propagating cracks
11	**Canopy glass**	visual	surface quality	optical quality	affection of pilot's view
			damages, cracks	crack propagation	Cracks shorter than 50 mm / 2'' can be stopped by drilling a 3 mm / 1/8'' hole at the end of the crack. Cracks longer than 50 mm / 2'': glass must be replaced

No.	Items	Inspection Type	Inspection points	Inspection Criteria	Criteria for replacement
12	**Canopy retaining strap**	visual	surface and weave	fraying, bleaching from UV, wear of attachment area	visible frays, visible bleaching / brittleness, wear / elongation around attachment
13	**Control bump stops**	visual	shape and surface	intact surfaces, no cracks	cracked surfaces
14	**Electrical Cables**	visual	insulation surface	intact surfaces, no cracks or chafing	damaged, cracked or chafing, compromising insulation
			crimped ends	intact strands	broken or frayed strands
15	**Cable Connectors**	visual	eyes	intact structure	elongated or cracked
			crimped ends	tight fit of cable	slippage or cracks
16	**Rudder Cables**	visual	eyed ends	clean, undamaged	corrosion, damage or visible elongation
			cables	straight, intact strands	dents, bends, corrosion, frayed / broken strands
17	**Anti-collision and position lights**	visual	LED function	functional	more than 2 LEDs per section dysfunctional
18	**Fuel Vent- and manifold pressure sensor lines**	visual	surface, material	clear, intact surface, elastic when compressed with 2 fingers	discoloring, to opaque; brittle, visible cracks
19	**Pitot-Static lines**	visual	surface, material	clear, intact surface	brittle, visible cracks
20	**Engine Shock Mounts**	visual	external rubber surfaces	intact, matt surface	surface appearance glossy (sign of permanent deformation / overheating), cracks
21	**Titanium Firewall Panels**	visual	general condition	surface quality	cracks around holes, cracks in bends or across surfaces
22	**Carbon Fiber Control rods**	visual	Surface, general condition	Surface is covered in glass fiber; damage will show as white/light marks. Check for any play in the bearing seats towards the surrounding carbon structure.	Visible dents, cracked surface, cracks in structure Any play of the bearing seat towards the surrounding carbon structure
23	**Engine Control Cables**	visual	Surface, general condition	Undamaged surface: no evidence of overheating, no cracks, no fraying. No kinks, free, full range motion	Evidence of overheating, mechanical damage, corrosion

For inspection criteria, refer to 5-06 Component Inspection Table.
For detailed descriptions, refer to the relevant chapters of this Manual.

Depending on country of registration, an appropriate maintenance entry in the aircraft maintenance records might be required, or the relevant pages of this manual may be printed and signed.

5-07 25-Hour Inspection Checklist

NOTE: The 25-hour inspection is not required when the engine is equipped with a spin-on oil filter.

Item	Reference	Initial
Ground run in accordance with AFM section 4.4, 4.6, 4.11, up to 200°F oil Temperature		
Remove cowling	71-02	
Clean & check oil screen (see Lycoming engine manual www.Lycoming.com)		
Reinstall oil screen (see Lycoming engine manual www.Lycoming.com)		
Close oil sump drain	12-08	
Fill in 10 quarts of oil (for oil types see AFM section 2.9)	12-07	
Ground run in accordance with AFM section 4.4, 4.6, 4.11		
Visually inspect for oil leaks		
Re-install cowling	71-02	

5-08 50-Hour Inspection Checklist

Item	Reference	Initials
Engine		
Ground run in accordance with AFM section 4.4, 4.6, 4.11, up to 200°F oil Temperature		
Remove cowling	71-02	
Visually check oil cooler and lines installation for leaks or chafing	79-01	
Visually check connection and routing of oil hoses, check for leaks	79-02	
Clean & check oil screen (see Lycoming engine manual)		
Reinstall oil screen or install new filter (see Lycoming engine manual)		
Close oil sump drain	12-08	
Fill in 10 quarts of oil (for oil types see AFM section 2.9)	12-07	
Visually check air intake tubes for installation, rubber seals in intake air box for correct seat, seat and fasteners on cylinders		
Visually check installation and condition of engine cooling plenum	71-03	
Visually check Mixture control installation	73	
Visually check Propeller control installation	73	
Visually check Throttle control installation	73	
Visually check installation & condition of engine mount & shock mounts	71-03	
Visually check Alternator installation and connection to Shunt	24-04	
Visually check Magneto P-lead connection (refer to 4300/6300 Series Magneto Maintenance & Overhaul Manual see www.unisonpubs.com)		
Visually check Starter installation and connection	24-01	
Visually check Propeller & spinner installation, safety wiring of main fasteners	61	
Visually check Fuel lines installation and connections	28-01	
Visually check installation, condition and fit of exhaust, check for cracks in welds	5-06 78	
Visually check smoke line connections	85-02	
Visually check Christen oil separator installation	79-03	
Visually check Christen gravity valve installation	79-03	
Visually check Breather line installation	79-03	
Visually check Oil lines installation and connections	79-02	
Visually check Installation of EGT & CHT sensors, adjacent cable routings	40-20 40-20	
Check Tire pressures (per placard) and overall condition	11-03	
Visually check brake pads	32-10	
Ground run in accordance with AFM section 4.4, 4.6, 4.11		
Visually inspect for oil leaks		
Re-install cowling	71-02	

Item	Reference	Initials
Canopy		
Lock function and visually check condition of parts and fasteners	52-05	
Visually check canopy glass condition	52-01	
Check freedom of movement, opening and closing canopy	52	
Visually check retaining strap installation and condition	5-06	
Visually check Hinge installation, condition	52-04	
Visually check canopy frame condition	5-06	
Rudder pedals, adjusters and slider assemblies, front and rear, left and right		
Brake function for “hard pedals”	12-10	
Connection of brake lines	12-10	
Unscrew cap of brake fluid reservoir, lift rubber diaphragm, visually check brake fluid levels (right and left aft pedal assemblies). When required add fluid. When complete, put rubber diaphragm back in place and screw cap on tight.	12-10	
Check freedom of motion from stop to stop		
Clean, and visually check condition of rails		
Check condition of roller protectors for contact with the rails (sweepers in contact with rails, ensure functionality)	5-06 27-16	
Check function of pedal adjusters over entire range, check for play of rollers on rail	27-18 27-29	
Check installation and spring force of locating pin: compare right and left for obvious degradation in spring force	27-18 27-29	
Visually check condition of pedal assembly and respective fasteners	5-06	
Visually check cotter pins in master brake cylinder attachment	27-17 27-28	
Check freedom of motion of pedal and master brake cylinder when actuating brake		
Check overall condition of rudder pedal assembly	27-28	
All fasteners secured (check cotter pin or torque seal condition)	27-17 27-28	
Cockpit mounted rudder bellcrank assemblies		
Check freedom of motion over entire range of movement, check for play in bearings	27-23	
Visually check cotter pins through castle nuts	27-22 FWD 27-23 CTR 27-26 AFT	
Check torsional freedom of movement for rod ends	27-20 27-21 27-24 27-25	
Visually check composite structure around mounting bracket for damage	51-01, 27-20	
Check condition and security of rubber stops (one at each front bellcrank)	27-19	
Rudder rods and cables		
Check freedom of motion from stop to stop		

Item	Reference	Initials
Visually check overall condition	5-06 27-16	
Check rudder cable tension 10-12 lbs, adjust if needed	27-16 27-16	
Visually check safety wires in rudder cable turnbuckle (in tail wheel fairing)	27-26	
Torque tube and control sticks (front and rear)		
Check freedom of motion from stop to stop, elevator and aileron		
Visually check aileron rubber stops condition and security (right and left, front cockpit, seat support bulkheads near front end of torque	27-05	
Visually check elevator stops, condition and security (two inside the torque tube, one at each end)		
Visually check fasteners and cotter pins in torque tube assembly and connected control rods	27-05	
Visually check fixing, connectors and routing of PTT cables	27-03 27-04	
Check stick grip installation for firm seat and condition	27-03 27-04	
Fuel selector		
Check function, set to “OFF” position	28-06	
Visually check installation and condition of aft universal joint, connecting rods and mounting bracket	28-07	
Fire Extinguisher		
Secure installation, overall condition, pressure (gauge reading) and weight as labelled. Get serviced / recharged, if weight and / or pressure are below	25-13	
Electrical System		
Installation, routing and fixing	24-01	
Visually check cable routing for chafing, visually check connectors	24-09	
All circuit breakers and switches OFF, Master Switch ON	39-01	
Anti-collision lights ACL switch-circuit breaker ON, ACL & position light function check	5-06 39-01	
Trim circuit breaker ON, Aileron and Elevator trim servos function check Trim position indicator function check	39-01	
MFD1 & EDC circuit breakers ON, check functions (no red X over any) Check for sensible readings:	39-01	
Push ‘test’ button on Annunciator Lights Panel, check for all three LEDs coming alight	39-01	
Avionics master switch-breaker ON	39-01	
MFD2 circuit breaker ON, check functions (no red X over any)	39-01	
AHRS circuit breaker ON, Check OAT and Accelerometer on MFD1 or MFD2. OAT reading approximately ambient temperature.	39-01	
FLUX circuit breaker ON Check attitude indicator and compare CDI indication with compass	39-01	
USB circuit breaker ON, use a USB device to check function of USB supply	39-01	
VHF circuit breaker ON, Radio ON, check coming alight Press each of two PTT buttons and check for “Transmit” sign on display	39-01	
XPDR circuit breaker ON, Select VFR code, Mode C, display	39-01	

Item	Reference	Initials
Avionics master switch-breaker OFF	39-01	
Master Switch OFF	39-01	
Pitot / Static System		
Visually check attachment of pitot tube to wing and static tube to static ports on fuselage, condition of assembly	31-02	
Visually check for blockages of pitot tube and static ports	31-02	
Left hand side console (front and rear cockpit)		
Check installation, condition and function of throttle quadrant and throttle, prop and mixture levers	73-01 73-02	
Check installation and condition of grips	73-01 73-02	
Check installation, condition and function of engine control cable connections, and visible part of cable sleeves	73-02	
Check condition and function of throttle friction control (rear throttle assembly only)	73-02	
Check function and condition of smoke switch (rear throttle lever only)	73-02	
Smoke System		
Visually check smoke pump installation for condition and leaks (in RH foot-well)	85-07	
Visually check smoke oil filler connector (located behind RH landing gear fairing) for installation, condition and leaks	11-03	
Visually check routing and fixing of smoke oil hoses, joints and fittings for condition and leaks	85-02	
Fuselage and cockpit, inside		
Visually check for damages to composite structure and bond lines, check for foreign objects, clean if necessary	51-01	
Wing / fuselage connection		
Visually check both main spar pins in position (secured by foot well covers)	20-09	
Visually check both aux spar pins in and secured	20-09	
Aileron rods, torque tube to bellcranks, left and right		
Check freedom of motion from stop to stop, check for play	27-08	
Visually check overall condition of installation	27-08	
Visually check fasteners and cotter pins	27-08	
Aileron bellcranks, left and right		
Check freedom of motion from stop to stop, check for play in bearings, or bearings towards the bellcrank.	27-10	
Visually check overall condition and installation	27-10	
Visually check fasteners and cotter pins	27-10	
Visually check composite structure and bond lines around bellcrank for damage and overall condition	51-01	
Aileron rods, bellcranks to ailerons, left and right		
Check freedom of motion from stop to stop, check for play	27-09	
Visually check overall condition and installation	27-09	
Visually check fasteners and cotter pins	27-09	

Item	Reference	Initials
Seat belts, front and rear cockpits		
Visually check installation and overall condition of shoulder belts	25-12	
Visually check installation, overall condition and gap (see) of Load Limiters	25-12	
Visually check installation and general condition of lap belts	25-12	
Front lower fuselage		
Visually check fuel pump and installation for loose hardware, connections or	28-08	
Visually check fuel pump electrical connector for correct locking and pin	28-08	
Visually check Acrotank fuel and vent lines for leaks, routing or chafing	28-03	
Visually check installation and condition of Acrotank	28-03	
Visually check installation of fuel bulkhead fitting for chafing or leaks	28-03	
Visually check firewall penetration point of sensor cables and starter cable	28-03	
Visually check battery and regulator installations secure (located in LH footwell)	24-05	
Visually check installation and condition of fuel selector valve	28-05	
Visually check installation and condition of fuel lines connected to fuel selector valve for chafing or leaks	28-02	
Main landing gear, left and right		
Visually check gear leg retaining bolts for installation and safety wiring	32-04	
Visually check installation and condition of fairings	32-02	
Visually check slip marks		
Visually check axle nut, cotter pin	32-11	
Rudder		
Visually check Installation, freedom of motion from stop to stop	27-28	
Visually check Connecting bolts, safety clips	27-30	
Visually check Hinge pin installation, torque seal	27-32	
Elevators		
Visually check Elevator installation, freedom of motion from stop to stop	55-02	
Visually check Hinge pin installation, torque seal	55-02	
Visually check Trim tab installation, freedom of motion from stop to stop	55-03	
Visually check Trim tab hinge pin, safety wiring	55-02	
Visually check Trim rod installation	55-02	
Tail-wheel and spring		
Visually check Tail spring installation and condition	32-06	
Visually check Tail-wheel assembly installation, friction, safety wiring	32-05	
External markings and placards		
Visually check Fireproof identification plate	11-03	
Visually check fuel tank placards (one at each filler neck)	11-03	
Visually check canopy placard	11-03	
Visually check smoke vent placard if system fitted	11-03	
Visually check wing fuel vent placards	11-03	
Visually check Acrotank vent placard	11-03	
Visually check registration present & correct to local regulations	11-03	

5-09 100-Hour Inspection Checklist

Repeat 25- and 50-hour inspections.
In addition, complete the following items:

<table>
<tr><th>Item</th><th>Reference</th><th>Initial</th></tr>
<tr><td>Check metal firewall and surrounding composite structure for damage and cracks</td><td>5-06
51-01</td><td></td></tr>
<tr><td>Visual check of composite structure all over, including behind inspection panels, for damage and cracks</td><td>51-01</td><td></td></tr>
<tr><td>Leak check pitot-static system</td><td>5-06
31-02</td><td></td></tr>
<tr><td>Shoulder belts: Open padding around load limiter
Load Limiters: Visually inspect for correct installation and overall condition
Check gap between vertical flanges to be 6 – 8mm</td><td>25-12</td><td></td></tr>
<tr><td>Check magneto condition and timing (refer to 4300/6300 Series Magneto Maintenance & Overhaul Manual see www.unisonpubs.com)
Adjust timing if necessary (see Lycoming engine manual)</td><td></td><td></td></tr>
<tr><td>Visually check the engine display system for:
Leaks on or around transducers,
Loose fittings (electrical, mechanical, fluids),
Damage to wiring.
All readings and calibration information (including fuel level) should be operating and reading properly as far as may be checked safely in the maintenance environment.</td><td>39-01
39-04</td><td></td></tr>
<tr><td>Run engine until cylinder head and oil temperatures are in the normal range. The test should be completed as soon as practical after shut down.

A differential compression tester is attached to the cylinder via the spark plug hole after the piston is positioned at top dead center of the compression stroke. Compressed air is supplied to the tester and the regulator is adjusted to 80 PSI as air is sent is to the cylinder through the tester. To assure that the piston rings are seated, the propeller is moved slightly back and forth with a rocking motion. The cylinder compression reading is taken from the gauge on the downstream side of the orifice and recorded as “X” psi in the table below.
Pressure readings for all cylinders should be nearly equal.
Lycoming guidance: A difference of 5 psi between cylinders is satisfactory; a difference of 10 to 15 psi indicates an investigation should be made. Unless the pressure difference exceeds 15 psi the investigation does not necessarily mean removal of the cylinder.

A follow-on compression check should be made within the next 10 hours of operation to determine the wear rate. If the pressure reading is below 60 psi or if the wear rate increases rapidly, as indicated by an appreciable decrease in cylinder pressure, removal and overhaul or replacement of the cylinder(s) should be considered.

<table><tr><th>Cylinder</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr><tr><td>Pressure</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td></td><td></td></tr>
<tr><td>Every third check i.e. at 300, 600, etc., flush / clean the inverted oil system.</td><td>79-03</td><td></td></tr>
</table>

5-10 1000-Hour Inspection Checklist

Disassemble the airplane and perform a detailed inspection of all components.
In particular, perform non-destructive Inspection of all composite structure bond lines.

Item	Reference	Initial
Remove, clean, disassemble and check tail-wheel assembly	32-05	
Remove and check elevators and trim tab	55-02 55-03	
Remove and replace fasteners for rear instrument panel attachment	39-01	
Remove and check rudder	55-05	
Remove and check ailerons and trim tab	57-02 57-03	
Check elevator connector assembly	27-02	
Check aft end of elevator push-pull rod	5-06 27-13	
Remove and check wings, mainly attachment point area	5-06 20-07 20-09	
Non-Destructive Inspection of composite parts as defined above	51-01	
Remove, clean, disassemble and check flight control mechanisms	5-06 27	

5-11 Inspection Log

Flight Hours	Date	Name of Approved Maintenance Organization	Name of Certifying Inspector	Initials
25				
50				
75				
100				
125				
150				
175				
200				
225				
250				
275				
300				
325				
350				
375				
400				
425				
450				
475				
500				
525				
550				
575				
600				
625				
650				
675				
700				
725				
750				
775				
800				
825				
850				
875				
900				
925				
950				
975				
1000				

5-12 In-flight Overload

If one of the accelerometers indicates more than the approved loads, contact Game Composites.

5-13 Impacts, Flight or Ground including Bird Strike

Item	Initial
Check upper and exposed areas by visual inspection for unevenness, cracks, delamination or any other evidence of for structural damage per 51-01. Tap-test around any visible damage or known impact area for invisible damage per 51-01. Classify damage according to 51-03 and advise operator of results.	

5-14 Hail Damage

Item	Initial
Check upper and exposed areas by visual inspection for unevenness per 51-01. Tap-test around any visible damage or known impact area for invisible damage per 51-01. Classify damage according to 51-03 and advise operator of results.	
Visually inspect propeller blades, refer to mt-propeller operation and installation manual E-124	

5-15 Hard Landing

Item	Initial
Remove cowlings (71-02), landing gear leg covers & spats / pants (32-02)	
Visually check engine mount, especially around welds, for permanent deformation, cracks, or any other evidence of structural damage per 71-03.	
Visually check landing gear legs for permanent deformation, cracks or any other evidence of structural damage.	
Visually check wheels and axles for permanent deformation, cracks or any other evidence of structural damage.	

5-16 Propeller Strike

Item	Initial
Inspect propeller, refer to mt-propeller operation and installation manual E-124	
Visually check engine mount. For detail descriptions, refer to 71-03 For inspection criteria, refer to 71-03	

5-17 Engine Bay Fire

Item	Initial
Visually check cowling for structural damage (51-01)	
Visually check fuel and oil lines for discoloring or damage	
Visually check wiring (51-01)	
Visually check control cables for damage, check for function	

5-18 Lightning Strike

Item	Initial
Visually inspect strike area for structural damage, tap-test surrounding area for damage (51-01)	
Visually inspect all metal parts (51-01)	
Visually inspect all bearings for pitting, check for increased breakout torque (51-01)	
Visually inspect, and function test all electrical and electronic items	

6 Dimensions and Rigging Information

For Rigging Information see section 27.

For Overview Drawing see section 1-03.

7 Lifting and Supporting

7-01 Lifting

The engine case features two engine hoist lugs, which are accessible with the cowlings removed (see section 71-02), those be used to lift the airplane with a crane (tail-wheel resting on ground).

When a wheel needs to be changed and no hoist is available, one wing tip can be lifted manually.

The tail may be raised with broad straps around the rear fuselage, or when no hoist is available, lifting on the stabilizer.

7-02 Supporting

Supporting the front of the airplane

After lifting the front of the airplane as described above, it may be supported for working underneath. The support should be not less than 100 mm x 500 mm (4 inches x 20 inches) and should be both smooth-edged and padded to protect the airplane from damage. The support should be placed under the main fuselage i.e. not on the cowlings, engine or engine mount.

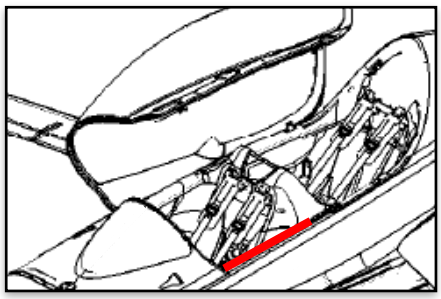
To change a wheel, the same type of support may be used to support one wing about mid-span, underneath the main spar (max curvature / lowest point of the airfoils.

Supporting the tail of the airplane

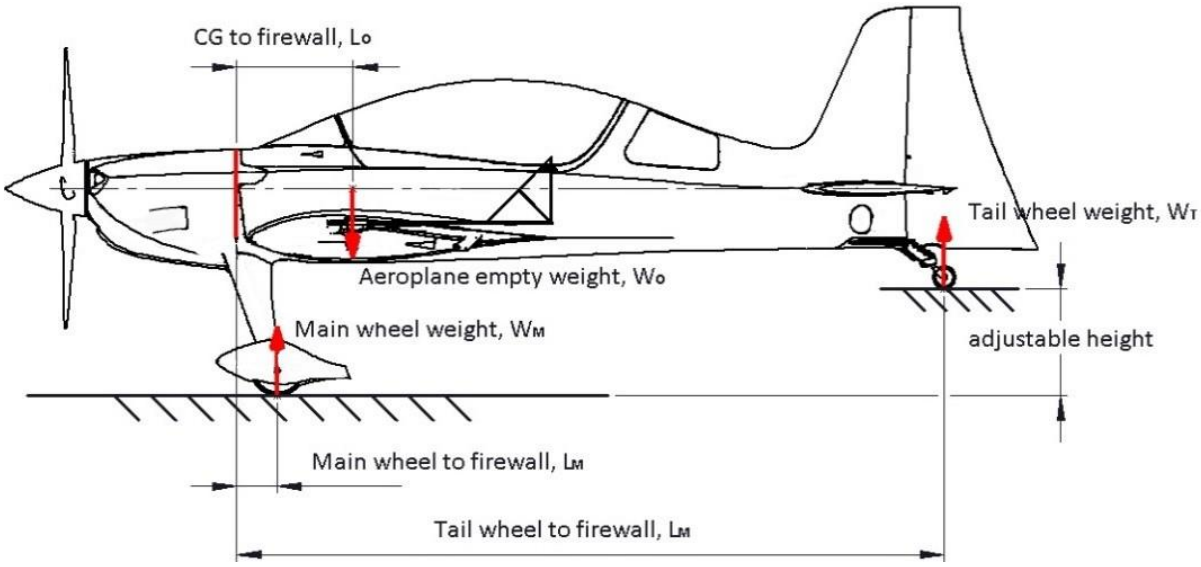
After lifting the rear of the airplane as described in 0, it may be supported for working underneath. Chock the main wheels. The support should be not less than 100 mm x 500 mm (4 inches x 20 inches) and should be both round-edged and padded to protect the airplane from damage.
The support should be placed under the fuselage i.e. not on the rudder.

8 Levelling and Weighing

8-01 Establish Empty Weight & Centre of Gravity



1. Drain all fuel tanks to unusable fuel level (see 12-06)
2. Empty the smoke oil tanks (see 12-06)
3. Remove optional tail ballast (see 41-02)
4. Ensure engine oil and brake fluid levels are correct
5. Ensure that all loose baggage and non-fitted equipment is removed from the airplane
6. Position calibrated scales (capable of minimum 300 kg each) under each wheel
7. Raise and support tail wheel to put airplane in level attitude: use cockpit frame by the side aft of the windshield frame as reference. Place a spirit level in the position as shown in red and adjust tail support to level attitude.



8. Fill in below table and follow formula to obtain empty weight and center of gravity position:

W_{ML}	= weight on Main gear - left:		_____ lb or kg
W_{MR}	= weight on Main gear - right:		_____ lb or kg
W_T	= weight on tail wheel		_____ lb or kg
L_M	= distance from main wheels to firewall		= 10.6 in or 0.27 m
L_T	= distance from tail wheel to firewall		= 198.4 in or 4.81 m
W_M	= weight on main wheels	= W_{ML} + W_{MR}	= _____ lb or kg
W_o	= empty weight	= W_M + W_T	= _____ lb or kg
M_M	= moment of main wheels	= W_M x L_M	= _____ in/lb or kg/m
M_T	= moment of tail wheel	= W_T x L_T	= _____ in/lb or kg/m
M_o	= moment of empty weight CG		
L_o	= empty weight CG, distance to firewall		

$$L_o = \frac{M_o}{W_o} = \frac{M_M + M_T}{W_M + W_T}$$

8-02 Moment Arms

Item	Limitation		Weight		Arm		Moment	
	kg	lb	kg	lb	m	in	Kg/m	Lb/in
Empty weight					0.53	20.9	Weight × Arm	
Front seat	110	242			1.16	45.6	Weight × Arm	
Rear seat	110	242			2.16	85	Weight × Arm	
Fuel, Acrotank	68	150			0.26	10.2	Weight × Arm	
Fuel, left Wing	79	174			0.33	13	Weight × Arm	
Fuel, right Wing	79	174			0.33	13	Weight × Arm	
Smoke tanks total	31	68			1.00	39.4	Weight × Arm	
Baggage bay	15	33			2.50	98.4	Weight × Arm	
Removable Tail Ballast	13.5	30			4.20	136.4	Weight × Arm	
Total			∑(weight)	∑(weight)			∑ (Weight × Arm)	
MTOW			**999**	**2200**				

Qty	Item	Manufacturer	Part No.	Weight		Arm		Required(R) Optional (O) Alternative (A)
				kg	lb	m	in	
1	Propeller	MT Propeller	MTV-14-B-C/C190-130	30.6	67.5	-1.15	-45.3	R
1	Spinner	MT Propeller	P-1369	1.0	2.2	-1.3	-51.1	R
1	Governor	MT Propeller	P-880-41	1.1	2.4	-0.89	-35	R
1	Engine	Lycoming Engines	AEIO-580-B1A	202.3	446	-0.5	-19.7	R
1	Magneto LH	Slick	6393	2.0	4.4	-0.13	-5.1	R
1	Magneto RH	Slick	6350	2.3	5	-0.13	-5.1	R
1	Starter	Sky Tec	31A22104	4.7	10.4	-0.9	-35.4	R
1	Alternator	B&C	SD20	4.4	9.7	-0.1	-3.9	R
1	Voltage Regulator	B&C	LR3C-14	0.25	0.55	0.29	11.4	R
1	Battery	EnerSys	Odyssey Extreme PC535	5.4	11.9	0.34	13.4	R
1	Master Relay	White Rogers	11-03161 (Aircraft Spruce)	0.4	0.9	0.47	18.5	A
1	Start Relay	UNITPOINT	11-03162 (Aircraft Spruce)	0.4	0.9	0.21	8.3	A
1	Smoke Oil Pump	Marco	UP2-P	1.2	2.6	0.32	12.6	O
1	Gascolator	ACS	10585HP	0.1	0.2	0.32	12.6	R
1	Aux. Fuel Pump	Andair	PX375-TC	0.4	0.9	0.23	9	R
1	Engine Data I/O unit	Garmin	GEA 24	0.46	1	0.55	21.6	R
1	Air Data Sensor Unit	Garmin	GSU 25	0.3	0.6	0.55	21.6	R
	Front Panel							
1	Airspeed Indicator	United	8030B.168	0.24	0.5	0.53	20.9	R
1	Altimeter	United	5934PD-3	0.4	0.9	0.53	20.9	R
1	USB Twin Socket	Blue Sea	1016	0.05	0.1	0.61	24	O
1	MFD2	Garmin	GDU 450	1.2	2.6	0.64	25.2	O
	Rear Panel							
1	Airspeed indicator	United	8030B.168	0.22	0.4	1.52	59.8	R
1	Compass	Sirs Navigation	NV2A	0.13	0.3	1.52	59.8	R
1	Altimeter	United	5934PD-3	0.33	0.7	1.52	59.8	R
1	Accelerometer	TL or Falcon	TL-3424 or GM510-3	0.3	0.6	1.52	59.8	R
1	USB Twin Socket	Blue Sea	1016	0.05	0.1	1.7	66.9	O
1	VHF Radio w. Intercom	Garmin	GTR 225A	1.4	3	1.48	58.2	A
1	Transponder w. Encoder	Garmin	GTX 345	1.4	3	1.48	58.2	A
1	CO detector	Guardian Avionics	353-201	0.1	0.2	1.58	62.2	R
1	MFD1	Garmin	GDU 465	2.2	4.8	1.55	61	R
1	GPS Antenna	Garmin	GA 35	0.2	0.4	1.45	57	R
1	Canopy	Game Composites	GB1-5220-00-00	5	11	1.7	66.9	R
1	Wind Shield	Game Composites	GB1-5212-00-00	2	4.4	0.43	16.9	R
1	Sighting Device (each)	Game Composites	GB1-5700-01-00	0.75	1.6	1.3	51.1	O
1	Magnetometer	Garmin	GMU 11	0.13	0.3	3	118.1	R
1	VHF Antenna	DOLBA	BD5	0.15	0.3	4.3	169.3	R
1	Transponder Antenna	RAMI	AV-74	0.02	0.04	3.2	125.9	R
1	Ballast Weight	Game Composites	GB1-4100-10-00	13.5	29.7	4.2	165.4	O
2	Landing / Lights	Whelen	01-0771685-01	0.2	0.4	0.21	9.5	O
1	External Power Support	Cole-Hersee	11041	0.8	1.8	0.25	9.8	O

9 Moving and Towing

With its low weight and the free swiveling tail wheel, two people can easily move the GB1 by hand.
The best area 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.

WARNING: CHECK MAGNETOS OFF!

10 Parking, Mooring, Storage & Return to Service

10-03 Short Term Parking

- If the airplane is parked in the open, secure the wheels with chocks.
- When windy, tie down the airplane using ropes around the tail wheel and at the outer aileron hinges
- Secure control stick with the seat belt.
- If the airplane is parked outdoors, it should 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 airplane is parked outside in good weather, point the nose into wind and chock main wheels
- For longer outdoor parking or in poor weather, use at least engine and canopy covers to reduce the potential for water ingress, animal nesting or surface damage / deterioration
- When exceeding the max structural temperature is expected, minimize exposure to direct sunlight.

10-04 Long term storage

- Ensure the main-wheel tires remain inflated
- Consider protecting the engine intake, ventilation ducts, engine bay air exits, etc.
- Consider special measures to preserve the engine.
  Check Lycoming Service Letter L180 on www.lycoming.com
- If the airplane is to be inactive for longer than four weeks, connect a trickle charger to maintain the battery
- At return to service, check that all water has been drained from the three fuel tanks

11 Placards

11-01 General

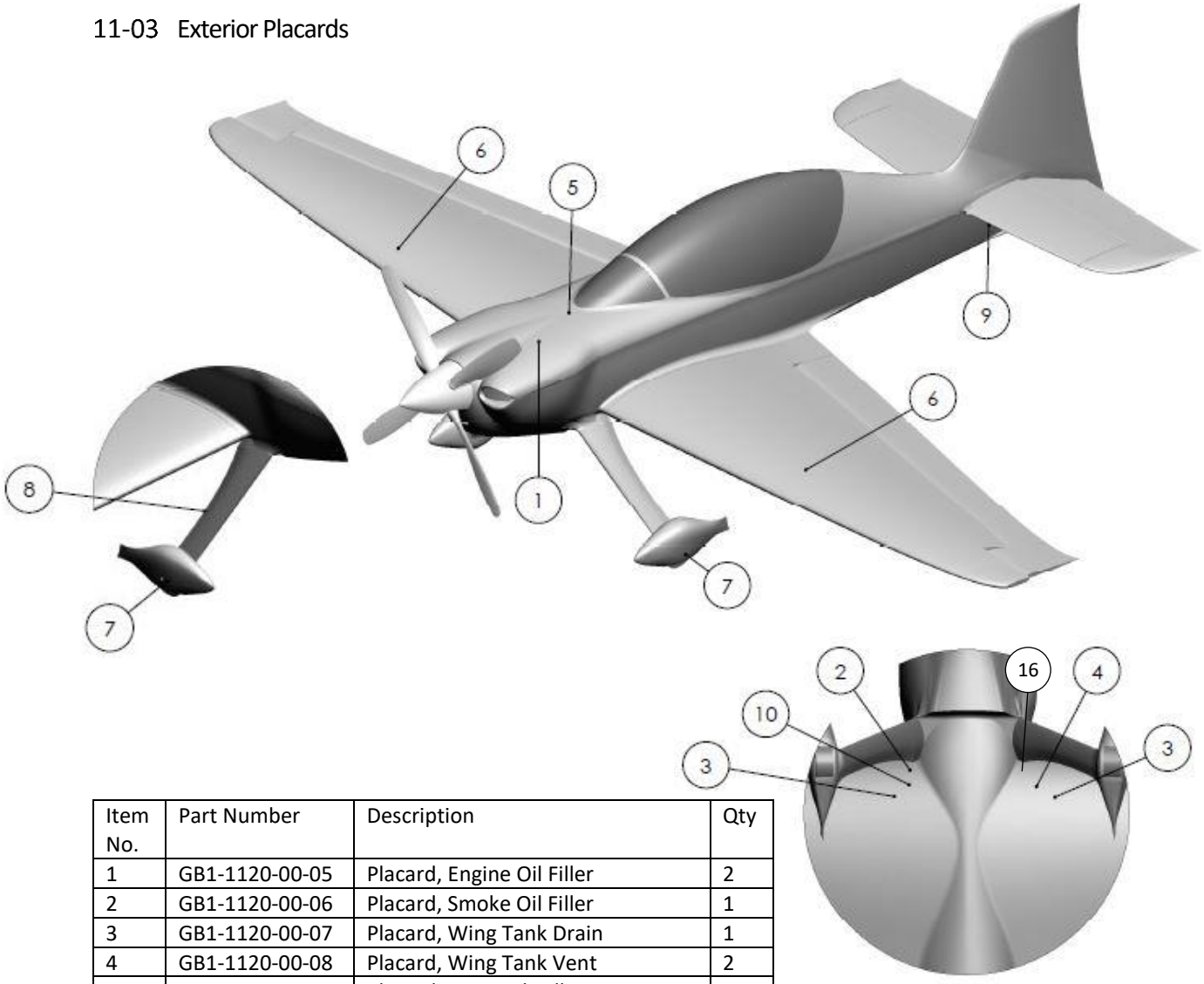
Placards show the function, operation and operating limitations of systems and equipment.
Placards are required and defined by the design regulations. They must not be removed, exchanged or altered unless approved by the airworthiness authority or Approved Design Organization.
Damaged placards and markings must be replaced.
Applicable placards and their locations are also provided in the Airplane Flight Manual.
If ordering replacement placards, specify placard text, placard part number and aircraft serial number.

11-02 Exterior Color Schemes and Markings

No limitations for choice of colors.

The vertical stabilizer must not be painted with any colors containing metal, VHF antenna mounted inside.

11-03 Exterior Placards



Item No.	Part Number	Description	Qty
1	GB1-1120-00-05	Placard, Engine Oil Filler	2
2	GB1-1120-00-06	Placard, Smoke Oil Filler	1
3	GB1-1120-00-07	Placard, Wing Tank Drain	1
4	GB1-1120-00-08	Placard, Wing Tank Vent	2
5	GB1-1120-00-10	Placard, Acrotank Filler	1
6	GB1-1120-00-11	Placard, Wingtank Filler	1
7	GB1-1120-00-16	Placard, Tire Pressure	2
8	GB1-1120-00-17	Placard, Oil Breather	1
9	GB1-1120-00-18	Placard, Ballast Weight	1
10	GB1-1120-00-20	Placard, Gascolator Drain	1
11	GB1-1120-00-21	Placard, External Power	1

1 GB1-1120-00-05 Oil Filler

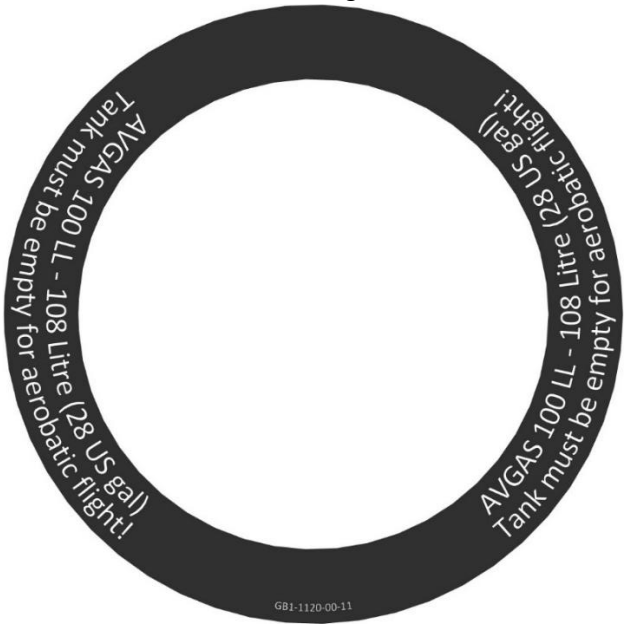
2 GB1-1120-00-06 Smoke Oil Filler

3 GB1-1120-00-07 Wing Tank Drain

4 GB1-1120-00-08 Wing Tank Vent

5 GB1-1120-00-10 Acrotank Filler

6 GB1-1120-00-11 Wing Tank Filler



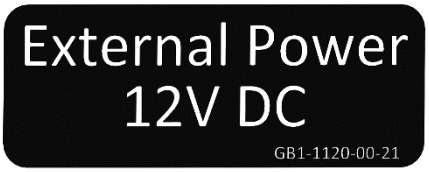
7 GB1-1120-00-16 Tire Pressure

8 GB1-1120-00-17 Oil Breather

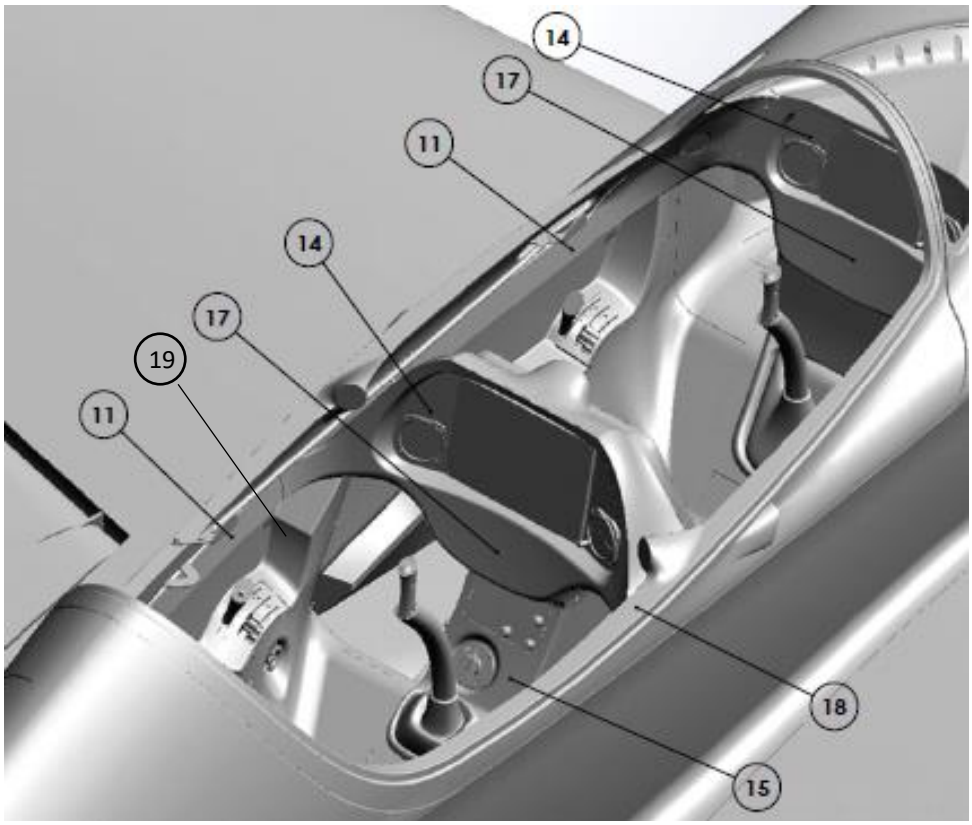
9 GB1-1120-00-18 Ballast Weight 13.5kg

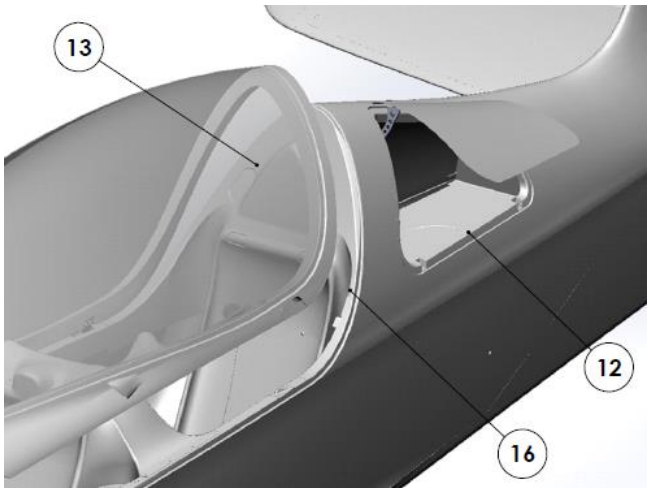
10 GB1-1120-00-20 Gascolator Drain

11 GB1-1120-00-21 External Power



11-04 Interior Placards





Item No.	Part Number	Description	Quantity
11	GB1-1130-00-05	Placard, Canopy Lock	2
12	GB1-1130-00-06	Placard, Baggage Compartment	1
13	GB1-1130-00-08	Placard, Headset Sockets	1
14	GB1-1130-00-14	Placard, V_O	2
15	GB1-1130-00-16	Placard, Wing Tank Empty	1
16	GB1-1130-00-20	Placard, Baggage Lock	1
17	GB1-1130-00-23	Placard, Aerobatics	2
18	GB1-1130-00-24	Placard, Compass Deviation	1
19	GB1-1130-00-25	Placard, Recognition Lights	1

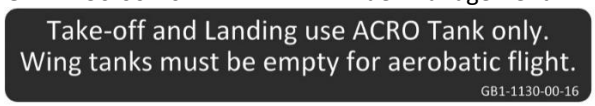
11 GB1-1130-00-05 Canopy Lock

22 GB1-1130-00-06 Baggage Compartment

13 GB1-1130-00-08 Head Set Socket

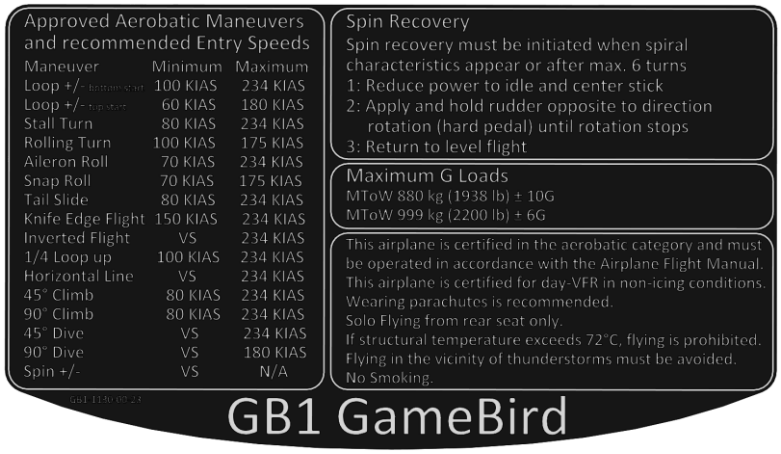
14 GB1-1130-00-14 Vo

15 GB1-1130-00-16 Fuel Management

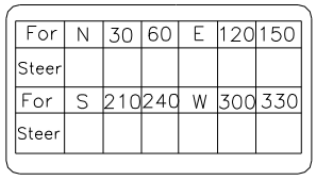


16 GB1-1130-00-20 Baggage Door

17 GB1-1130-00-23 Aerobatic Placard



18 Compass Deviation Card



For	N	30	60	E	120	150
Steer						
For	S	210	240	W	300	330
Steer						

19 Recognition Lights

12 Tools, Servicing, Cleaning

12-01 General

This chapter gives information about the servicing of the airplane. It is recommended to consider shortening service and maintenance intervals when operating under abnormal conditions, such as:

- Extreme temperature ranges
- Dusty atmospheric conditions
- High humidity and moisture
- Rough runways

12-02 Airframe Tools

Qty	Type	Size
1	Phillips screwdriver	No. 1
2		No.2
1	Stubby Phillips screwdriver	No.2
1	Flat blade screwdriver	7/32
1		1/4
1		5/16
1	Phillips instrument screwdrivers	
1	Torque wrench 1/4 drive	24 - 240 in lb
1	Torque wrench 3/8” drive	5 - 100 ft lb
1	Locking wire plier	
1	Long nosed plier	
1	Stub nosed plier	
1	Side cutter	
1	Mallet	
1	Hammer	
1	Bearing Press	
1	Scalpel / razor blade	
1	Compression tester	
1	Magneto timer	
1	Multimeter	
1	Tire inflator	
1	Allen Key set	
1	Allen Key w. T-handle, 8" long	5/32
1	Cotter Pin Extractor	
1	Wrenches Standard	1/4”
1		5/16”
2		11/32”
2		3/8”
2		7/16”
2		1/2”
1		9/6”
2		5/8”
2		11/16”
2		3/4”
1		13/16”
1		7/8”
1		15/16”
1		1”
1		1 1/2"
1	Wrenches Metric	8mm
1		10mm
1	Crowfoot, 3/8” drive	3/4”
1		7/8”
1		15/16”
1		1”

	Sockets Standard	
1	1/4” Drive	1/4”
1		5/16”
1		11/32”
1		3/8”
1		7/16”
1		1/2”
1		9/16”
1	3/8” Drive	1/2”
1		9/16”
1		5/8”
1		11/16”
1		3/4”
1		13/16”
1		7/8”
1		15/16”
1		1”
1		deep reach 7/8”
	Sockets metric	
1	1/4” Drive	5.5mm
1		8mm
1		10mm
1	Ratchet 1/4” Drive	
1	Universal Joint 1/4" drive	
1	Shallow Universal Joint 1/4" drive	7/16
1		1/2
1		9/16
1	1/4” Drive Extension	2" long
1		3" long
1		6" long
1	Ratchet 3/8” Drive	
1	Universal Joint 3/8" drive	
1	3/8” Drive Extension	2" long
1		3" long
1		6" long

12-03 Metric fasteners

Metric fasteners are used in the following components:

- M3 to secure the grips on the control sticks and the throttle, propeller & mixture controls
- M5 to attach the control system elastomeric bump stops
- M6 Bolts with precision shank to attach rollers to pedal sled

12-04 Fuel Drain Checks

The fuel drain checks should be done before starting each day's flying.
Acrotank drain is located on the bottom side of the fuselage in front of the main spar.
Wing tank drains are located on the bottom side of the wing.

- Use a clear container to extract fuel
- Let it settle in the container before visually checking for signs of water or other contamination
- Continue at each valve until free of water and / or contamination

After draining, ensure that each valve is closed and does not leak.
Leaking drain valves have to be replaced.

12-05 Refueling

Each tank has its own refueling point:
One on each wing, and one for the Acrotank, just forward of the windshield.
Use ignition key grip to open and close fuel caps.

WARNING: **Always connect ground cable to either of the exhaust pipes while refueling!**
Do not allow fire, sparks, heat or smoking within 30m / 100ft while refueling!

12-06 Defueling

To defuel the tanks, use containers of appropriate size and pump or siphon the tanks through the three filler ports and by opening the three drain valves.

WARNING: **Ensure that all electrical systems of the airplane are switched OFF while defueling!**
Always connect ground cable to either of the exhaust pipes while defueling!
Do not allow fire, sparks, heat or smoking within 30m / 100ft while defueling!

12-07 Engine Oil Level Check and Top-up

Oil Dipstick on top of engine, accessible via hatch on top of left-hand cowling.

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

12-08 Engine Oil Change Service

See section 12-07 for oil specifications.
As defined in 5-08, the engine oil change service interval is 25 flight hours.

To conduct an oil change:
1 Ground run in accordance with AFM section 4.4, 4.6, 4.11, up to 200°F oil Temperature
2 Remove cowling, refer to 71-02
3 Remove safety wire securing the oil drain plug
4 Place a container of at least 18 US quarts capacity under the plug
5 Unscrew the plug and let the oil drain into the container
6 Remove oil screen housing from engine accessory housing
7 Inspect oil pressure screen for metal particles.
Refer to Lycoming engine manual for assessment criteria and actions
8 Clean the screen in accordance with the Lycoming engine manual
9 Reinstall oil screen housing to the engine accessory housing using a new gasket
10 Reinstall and safety wire drain plug
11 Refill the oil as described in 12-07
12 Ground run in accordance with AFM section 4.4, 4.6, 4.11
13 Visually check for leaks
14 Re-install cowling, refer to 71-02

12-09 Tires and Tire Pressures

The correct tire specification is 5.00-5, 10 plies

Main landing gear tires: 3 - 3.5 bar / 43 - 50 psi

12-10 Brake Fluid Top-up and Bleeding

When pedals start to feel soft, or require pumping to obtain brake action, check the fill state of the master brake cylinder reservoirs on the rear rudder pedal assemblies.

Each reservoir has a clear fluid level inspection point. This inspection point should look red (color of brake fluid).

Total brake fluid capacity (two reservoirs feeding two systems): 0.20 liters (0.21 US quarts).

To service the brake system:
1. Connect a 1/8" ID clear hose to the brake caliper bleeder screw from your brake fluid source
2. Pump the oil can until the hose is full of fluid, with no air bubbles
3. Tightly secure the hose to the bleeder valve, while opening it a quarter turn
4. Unscrew the top reservoir cover and remove the membrane
5. Pump fluid into the system until brake cylinder reservoir is filled app 3 mm / 1/16” below upper rim
6. Tighten the bleeder valve screw, remove the hose, and reseal the reservoir
7. Check that the reservoir is full and that the brake pedal feels hard underfoot when operated
8. If you have a “soft-pedal,” pump the brakes several times. Often, this will fix the problem. If the problem persists, drain the fluid and repeat the above process

CAUTION **Do not get brake fluid on skin or in mouth; it can cause skin irritation and illness!**
Remove spilled brake fluid immediately; it can cause damage to paint and other materials!
Use only Mil-H-5606 red hydraulic fluid!
Never use automotive brake fluid!

12-11 Cleaning, Exterior Surfaces, including lights

The exterior is finished with automotive polyurethane paints:
To clean the airplane, use clean water and an automotive body wash.
Use a leather to dry the surfaces.
The painted surfaces can be treated with a non-silicone car polish and re-polished to high gloss.
Game Composites recommends polishing the entire airplane twice a year.

12-12 Cleaning, canopy and windshield

Material for canopy and windshield is Plexiglas™.
To clean the canopy, use only clean water or products approved for use on Plexiglass, and clean chamois / micro fiber cloth only used for canopy cleaning.

12-13 Cleaning, Interior

Check and if needed clean the interior prior to the first flight of the day to remove dust and foreign objects.

12-14 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**

12-15 Cleaning, Snow and Ice

Do not use sharp objects or de-icing fluids to remove snow or ice, this may cause damage to exterior surfaces and structure.
Use soft brushes to remove loose snow from the surfaces.
If possible, put the airplane in a heated hangar to remove solid ice.
Remove snow and ice as soon as possible to help avoid damage from melting and re-freezing.

20 Standard Practices and Shipping

20-01 General

This chapter contains torque values, description of standard components, fasteners and sealants, as well as instructions for disassembly, shipping and reassembly of the airplane.

20-02 Threaded Fasteners & Torque Values

Always tighten the nut or bolt to the torque shown below unless otherwise stated.
Always use the correct locking device with the nut or bolt.
Discard self-locking nuts after removal, as the friction torque reduces with use.
On all bolt connections, the specific torque and locking method must be observed.
The bolts used for the airplane are AN- Bolts (Army / Navy).

The bolts can be identified by the marking on the bolt head and by the surface treatment.

Standard installation torque values for AN fasteners:

Type	Thread size	Torque value (Nm)	Torque value (ft.lb)
AN3	10-32	1.6	1.2
AN4	1/4-28	7.0	5.2
AN5	5/16-24	13.6	10.0
AN6	3/8-24	28.5	21.0
AN7	7/16-20	38.5	28.0
AN8	1/2-20	54.2	40.0
AN9	9/16-18	91.0	67.0
AN10	5/8-18	125.0	92.0

Special torque values

Location and Item	Torque value (Nm)	Torque value (ft.lb)
Engine to Engine Mount: NAS363-720 (metal stop nut)	55	41
Brake caliper bolt: AN4H-12A	10	7.3
Engine components	See Lycoming Manual	
Propeller components	See MT-Propeller Manual	

20-03 Spherical Bearings

Only one type of spherical bearing (Aurora AWC-4T) and one type of rod end bearing (Aurora ASM-4) are used throughout the control systems. Those bearings are maintenance-free, i.e. do not require lubrication.
If a bearing develops play exceeding 0.5 mm in either direction, it has to be replaced.

Manufacturer: Aurora Bearing Company
Montgomery, Illinois 60538, USA
www.aurorabearings.com

Inspection Criteria:
Replace bearings, if play in any direction exceeds 0.5 mm, in accordance with 5-06 item 3.

Removal of bearings:

A If outer race is loose towards seat, pull or push out using any bolt, or carefully tap out.

B Bearings are secured with Threadlock Loctite 243.
To soften the Threadlock:
1 - heat up an AN3 bolt, using a heat gun, to no more than 200°C/400°F
2 – push the bolt in the bearing, let the heat sink in for 30 seconds
3 – use a plier to pull out the bearing, holding on the bolt

CAUTION: Bearings that have been removed using this method have to be replaced!

CAUTION: Make sure that surrounding composite structure does not overheat, no discernible smell / smoke!
In case of overheating, contact Game Composites!

Installation of bearings:

1. Remove all residue of old Threadlock
2. De-grease surface with solvent
3. Apply a thin film of Threadlock on the bearing seat, and the outer race (contact surface) of the bearing
4. Push bearing in place, using a tube pushing on the outer race of the bearing.

20-04 Adhesive Nutplates

Adhesive Nutplates (Clickbond) are used to locate nuts for fasteners, for example seats and cowling.

Inspection Criteria:
Replace nutplate, if: - Nutplate broken loose
- Self-locking function of nut deteriorates

To replace, follow the manufacturer's instructions, which can be found on www.GameComposites.com

Adhesive Nutplates	Manual Adhesive Dispenser Instructions	CB7200165-B
	Nutplate Installation Instructions	CB7200159-A

20-05 Adhesives and Sealants

Tank Sealant PPG P/S 890 Class B

P/S 890 Class B is an aircraft integral fuel tank sealant, supplied in two-part kits and Semco® cartridges.
It is used to seal access panels of the Wing- and Acrotank, as well as seal and threadlock bulkhead fittings.
It has a service temperature range from - 65°F (-54°C) to 250°F (121°C), with intermittent excursions up to 275°F (135°C). This material is designed for fillet sealing of fuel tanks and other aircraft fuselage sealing applications. The cured sealant maintains excellent elastomeric properties after prolonged exposure to both jet fuel and aviation gas.
P/S 890 Class B is a two-part, manganese dioxide cured polysulfide compound. The uncured material is a low sag, thixotropic paste suitable for application by extrusion gun or spatula. It cures at room temperature to form a resilient sealant having excellent adhesion to common aircraft substrates.

Surface Preparation

Immediately before applying sealant to primed substrates, the surfaces should be cleaned with solvents. Contaminants such as dirt, grease, and/or processing lubricants must be removed prior to sealant application. A progressive cleaning procedure should be employed using appropriate solvents and a new lint-free cloth. (Reclaimed solvents or tissue paper should not be used.)
Always pour solvent on the cloth to avoid contaminating the solvent supply. Wash one small area at a time. It is important that the surface is dried with a second clean cloth prior to the solvent evaporating to prevent the redeposition of contaminants on the substrate.

Application Methods / Tools

Follow the application and mixing instructions printed on the packaging.

General Adhesive Sika Flex or SikaBond

SikaFlex or Sika Bond Construction Adhesive is used to fix for example cables.
It is a gray one-component, durable and flexible exterior polyurethane adhesive.

Surface Preparation

Clean all surfaces. Surface must be sound, clean, dry, free of oil and grease.
Any residue or foreign matters have to be removed.

Application Methods / Tools

Recommended application temperatures: 40 to 100 °F (4 to 38 °C).
Cut plastic tip of nozzle to desired size and puncture airtight seal at base of tip. Force adhesive onto bonding surface. Use as spread, bead or for spot bonding. Components may require support during the cure period.

4. Low temperature and humidity will slow the cure of the sealant
5. Avoid contact with alcohol and other solvent cleaners during cure
6. Since system is moisture-cured, permit sufficient exposure to air
7. Can tend to yellow slightly when exposed to ultraviolet rays
8. Do not use on PVC based material
9. Will not bond to polyethylene, polypropylene, and polystyrene
10. Avoid contact with silicone or high solvent-based sealers / paints

Clickbond Adhesive

CB200 acrylic structural adhesive is a two-part thixotropic paste adhesive capable of bonding a wide variety of metals, engineering thermoplastics, and composites. CB200 cures quickly at room temperature and exhibits excellent environmental and chemical resistance. CB200 is packaged in an 8:1 cartridge and is recommended for installation of Click Bond adhesive-bonded fasteners.

Application Methods / Tools

Follow manufacturer's instructions outlined in 'Manual Adhesive Dispense Instructions CB7200165-B, available at www.gamecomposites.com.

20-06 Flexible Hoses and Hose Fittings

Maintenance or overhaul work of the flexible hoses should be performed in accordance with the hose manufacturer's service information and service bulletins.
Hoses and hose assemblies should be visually checked during each inspection.

Pay attention to:
- Leakage
- Separation of cover or braid of the inner hose
- Hardening or lack of flexibility
- Cracks
- Surface damage from hose clamps or supports

If any damage is found, replace the entire hose assembly.
Obtain a new hose assembly of the correct type, size and length.

Flexible hoses must not be twisted on installation; this could result in lower life times.

When replacing flexible hoses do not reroute the hoses, as this could result in different bend radius.
Bends that are too sharp will reduce the life time of the hose.

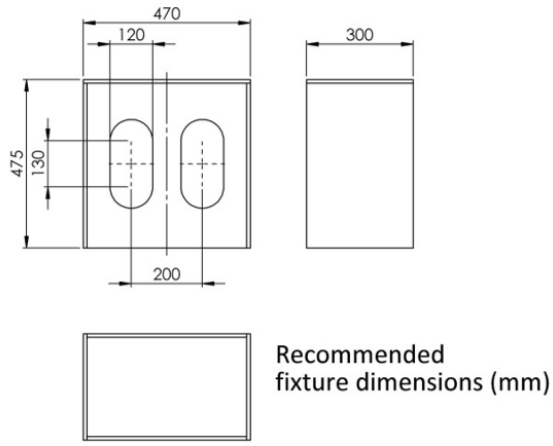
Fire-wall bulkhead fittings are steel, all hose fittings in the oil, fuel, brake and smoke systems are made of aluminum alloy.
Unless otherwise stated, fittings are AN-types.
The dash number following the AN number indicates the suitable hose size in 16th of an inch.
This size measures the inner diameter of the hose.
The material code letter (D) follows the dash number, for example: AN823-10D.

20-07 Disassembly for Shipping

1. Drain all fuel, refer to section 12-06
2. Remove both front foot-well access panels, refer to section 5-05
3. Disconnect battery, refer to section 24-05
4. Remove all four cockpit side panels, refer to sections 25-08, 25-09, 25-10, 25-11
5. Uninstall the front instrument panel, refer to section 39-04
6. Disconnect the aileron rods from the torque tube, refer to section 27-08
7. Remove both auxiliary spar bolts
8. One person on each wing tip to unload the wings (weight to be supported app. 15kg / 35lb)
9. Remove both main spar bolts
10. Pull the wings away from the fuselage, approximately 10 cm / 4'' to disconnect at the wing roots:
    a. Disconnect smoke hoses
    b. Fuel hoses: use 9/16'' wrench to prevent fitting from turning,
       11/16'' wrench to loosen hose connection
    c. Fuel sensor electrical disconnects:
       Depress connector plastic locking tongue before pulling connectors apart
    d. Wingtip light electrical disconnects:
       Depress connector plastic locking tongue before pulling connectors apart
11. Remove and store the wings away from the fuselage, right wing first
12. Remove rudder (if shipping on an airfreight pallet or in a 20ft container), refer to section 0
13. Remove spinner (if shipping on an airfreight pallet or in a 20ft container)
14. Remove elevators, refer to section 55-02
15. Reinstall the front instrument panel, refer to section 39-04
16. It is recommended to tie the fuselage down for shipping at the landing gear, therefore the landing gear fairings have to be removed.

20-08 Crating for shipping

Wing support box drawing:

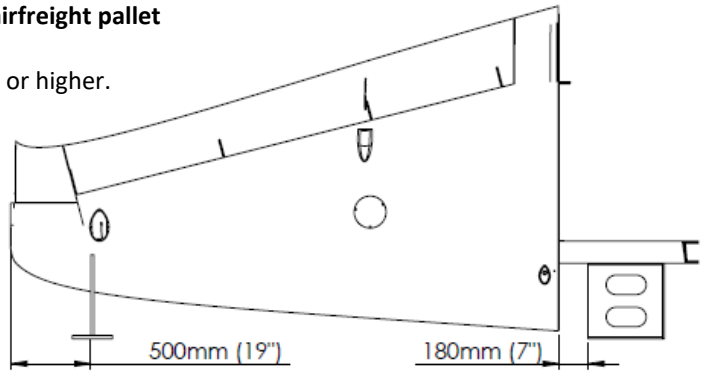


Outer wing support:
Print this page and use outline as a template.
Material should be foam of density no less than 20kg/m^3
Width no less than 100 mm / 4in.

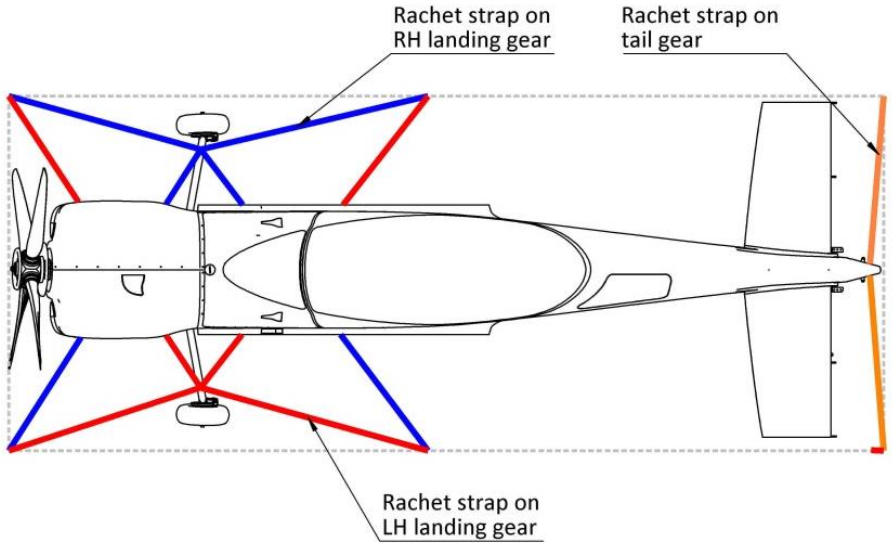
Crating arrangement shown for standard M-6 airfreight pallet

All ratchet straps must be rated 500kg / 1000lbs or higher.

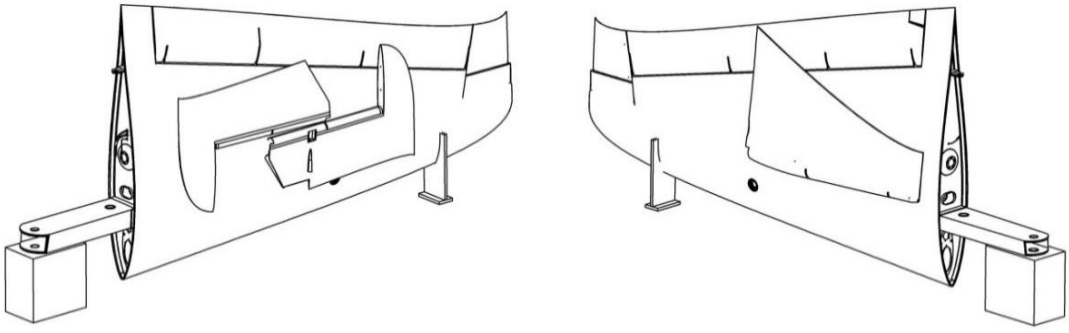
1. Lift wings in position per drawing



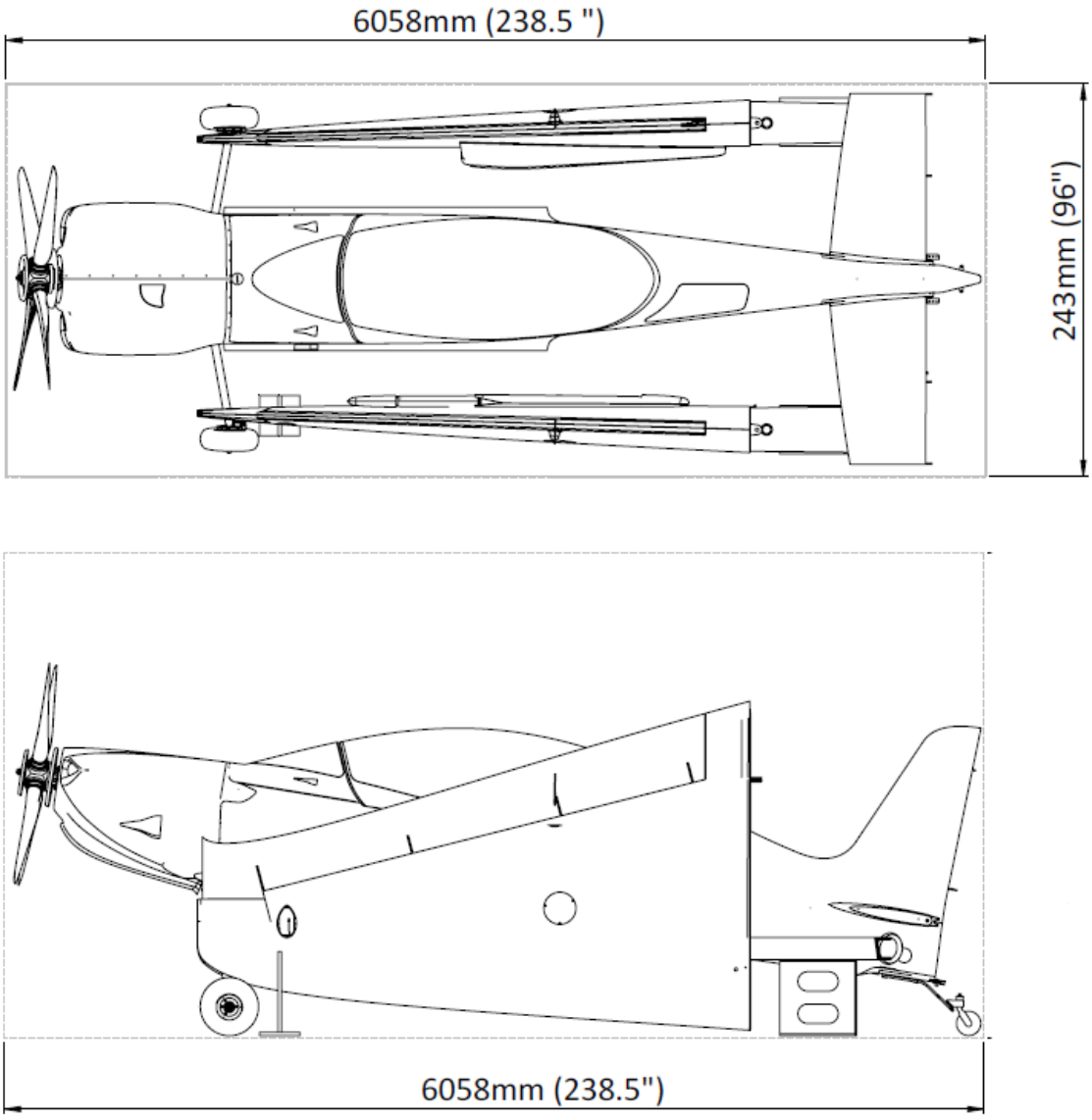
2. Reinstall or securely wrap and tie down in cockpit (using seat belts) loose items
3. Put main- and auxiliary bolts in fuselage positions, secure main bolts
4. Place fuselage in position for shipping
5. Use ratchet straps to hold in place per drawing



6. Reinstall hinge pins back to elevators and rudder
7. Wrap elevators with bubble wrap, then attach and secure them to one of the wings with cling film
8. Wrap rudder with bubble wrap, then attach and secure them to one of the wings with cling film



9. Position wing support fixtures next to fuselage per drawing
10. Use ratchet straps to hold in place per drawing
11. Lift wings in position per drawing
12. Use ratchet straps to hold in place per drawing
13. Wrap landing gear fairings in bubble wrap, position under fuselage, fix with ratchet straps
14. A ShockWatch indicator capable of recording loads greater than 10G, or alternatively, an accelerometer must be rigidly fixed to either main spar stub.


6058mm (238.5 ")
243mm (96")
6058mm (238.5")

20-09 Reassembly after shipping

On receipt, carefully check if airplane or components have moved, shifted of chafed during the transport.
Visually inspect all exterior surfaces, and check Shock Watch indicator.
If 8G are exceeded, or if evidence of larger loads exists, contact Game Composites.

Step	Reference	Signature
1. Install elevators, refer to section 55-02		
2. Install rudder, refer to section 55-05		
3. Install spinner, refer to MT-Propeller Manual E-124		
4. Push in left wing, leave app. 10 cm / 4'' gap to connect at the wing roots:		
a. Smoke hoses: use 9/16'' wrench to prevent fitting from turning, 11/16'' wrench to tighten hose connection		
b. Fuel hoses: use 9/16'' wrench to prevent fitting from turning, 11/16'' wrench to tighten hose connection		
c. Fuel sensor electrical connector		
d. Wingtip light electrical connector		
e. Check O-ring in connector for condition (no cracks, permanent deformation, brittle surface). Connect Dynamic Pressure Quick Disconnect		
5. Push left wing in completely, one person supporting wingtip for alignment (weight to be supported app. 15 kg / 35 lb)		
6. Push in right wing, leave app. 10 cm / 4'' gap to connect at the wing roots:		
a. Smoke hoses: use 9/16'' wrench to prevent fitting from turning, 11/16'' wrench to tighten hose connection		
b. Fuel hoses: use 9/16'' wrench to prevent fitting from turning, 11/16'' wrench to tighten hose connection		
c. Fuel sensor electrical connector		
d. Wingtip light electrical connector		
7. Push right wing in completely, one person supporting wingtip for alignment		
8. Push in main spar bolts, maneuver handles in floor recesses		
9. Push in auxiliary spar bolts, secure with Adel clamps		
10. Connect aileron control rods to torque tube, secure with cotter pins, refer to section 27-80		
11. Check aileron for free and unrestricted movement from stop to stop, and correct cotter pin installation, refer to section 27-80		
12. Connect battery, refer to section 27-80		
13. Switch on Master Switch, check basic electrical functions (MFD1 coming alight, fuel pump audible, wing tip lights coming alight), switch off after test		
14. Install foot rests, check main bolts secure, refer to section 27-80		
15. Install front instrument panel, refer to section 27-80		
16. Install front seat and seat cushion, refer to section 27-80		
17. Install front seat side panels, refer to section 27-80		
18. Install wheel pants, refer to section 27-80		
19. Fill tanks with fuel as for intended use		
20. Visually check fuel connections and drain valves for leaks		
21. Engine ground run per AFM sections 4.4, 4.6 up to 200°F CHT, 4.11		
22. Visual inspection for fluid leaks		
23. Install cowling, refer to section 71-02		
24. Clean entire airplane, all cockpit- and exterior surfaces, refer to section 71-02 to 71-02		
25. Conduct pre-flight inspection in accordance with AFM		

21 Air Conditioning

Each of the four fresh air vents for the occupants receives air from its adjacent air inlet.
2 manually adjustable eyeball air vents are located right and left of each instrument panel.

No regular maintenance is required for the unit.
When damaged, the unit must be replaced.

Type:	AVEO Ball Vent
Manufacturer:	Aveo Engineering, LLC 4863 N.W. Palm Coast Parkway Suite 5 Palm Coast, FL 32137, USA www.aveoengineering.com

22 Autopilot

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23 Communication

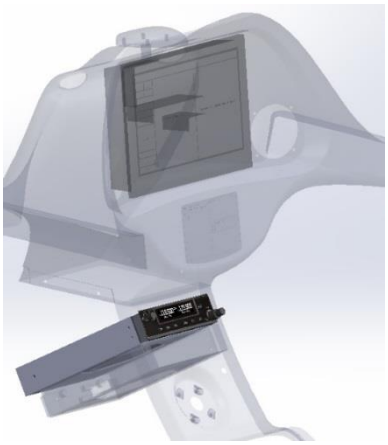
23-01 General

This chapter describes systems, units and components which provide means of internal and external communication within, and between airplanes and ground stations.

23-02 VHF Radio

The speech communication consists of one digitally-tuned integrated VHF communication (COM) transceiver.
Frequency tuning is accomplished by rotating the large and small concentric knobs to select a standby frequency and then transferring the frequency to the active window. The COM frequency display window is at the upper left corner of the transceiver display.
The VHF is connected to MFD1 and MFD2 via a serial bus, providing an additional touch screen interface to utilize the functions.
A momentary switch on the rear throttle grip, connected to MFD1, allows to swap between active and stby frequency.
The transceiver receives all narrow- and wide-band VHF communication transmissions transmitted within a frequency range of 118.000 MHz to 136.975 MHz in 8.33 kHz channel spacing steps (2280 channels).

Electrical power for the VHF operation is provided via the 35A Avionic CB Switch, supplied through the Battery Master (essential bus) and 10A VHF circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.



Location: Centre console of the rear cockpit, mounted in rack with backshell.
Connectors for power, communication with other systems, and antennas are fixed to the backshell. The unit can be removed or replaced without disconnecting any wiring or connectors.

Type: GARMIN GTR 225 airborne VHF with integrated 2-place intercom in compliance with TSO-C169a and TSO-C128a

Manufacturer: Garmin International, Inc
1200 E. 151st Street, Olathe, KS 66062, USA
www.garmin.com

Software Loading

NOTE: **The data contained in the frequency database comes from government agencies. Garmin accurately processes and cross-validates the data, but neither Garmin nor Game Composites cannot guarantee the accuracy and completeness of the data.**

A standard USB flash drive is used to load the frequency database into the GTR 225A. The frequency database is stored internally and the USB flash drive is only used to transfer the database into the unit.

The following equipment is required to perform the update:
- Windows-compatible PC computer (Windows 2000, XP, Vista, or Windows 7 recommended)
- USB 2.0 compatible USB flash drive formatted as FAT32
- External USB cable
- Updated database obtained from the Garmin website

Creating a GTR/GNC Software Loader USB Flash Drive

1. Go to https://dealers.garmin.com/drc/login
2. Download the applicable GTR/GNC software to your PC.
3. Ensure the flash drive is inserted into the USB slot of the PC.
4. Run the downloaded executable file and follow the prompts to create the software loader USB drive.
5. Select finish to complete the process after the card has been created.
6. Remove the flash drive from the USB slot. The GTR/GNC USB loader drive is now ready to use.

Loading Software to the GTR/GNC

To load software to the GTR/GNC, ensure that the unit is powered on in configuration mode.

1. Insert the supplied USB cable into the USB port of the GTR/GNC.
2. Insert the flash drive containing the software update into the other end of the cable.
3. From the CONFIG MODE page, select the software to be updated (System Display, or COM).

Each software item must be separately updated.

4. After update, verify the software updates loaded successfully.

System Display Software Update

1. Turn the outer knob to SYS CONFIGURATION.
2. Turn the inner knob to DISPLAY UPDATE.
3. Press **ENT**.
4. Press **ENT** again.
5. Verify the available display software update is displayed.
6. Press **ENT** again to begin the software update process.

COM Software Update

1. Turn the outer knob to COM CONFIGURATION.
2. Turn the inner knob to COM UPDATE.
3. Press **ENT**.
4. Press **ENT** again.
5. Verify the available COM software update is displayed.
6. Press **ENT** again to begin the software update process.

Load Database

Database updates require the GTR to be in normal mode. Verify the unit's database version to what was downloaded from www.flyGarmin.com.

1. Insert the supplied USB cable into the USB port of the GTR/GNC.
2. Insert the flash drive containing the database update into the other end of the cable.
3. Press **FUNC**.
4. Turn the outer knob to SYS CONFIGURATION.
5. Turn the inner knob to LOAD DATABASE.
6. Press **ENT**.
7. Press **ENT** to begin update.

8. Press **FUNC** to verify database information.
9. Turn the outer knob to SYS CONFIGURATION.
10. Turn the inner knob to DATABASE INFO.
11. Press **ENT**.

No regular maintenance is required for the unit.
For troubleshooting or additional information, refer to:
Garmin GTR 225/GNC 255 TSO Installation Manual, 190-01182-02, Revision G.
For wiring and connection details, refer to section 24-03.

To uninstall the VHF for service:

1. Insert a 3/32" hex drive tool drive tool into the access hole on the unit face.
2. Turn hex drive tool counterclockwise until the hex drive tool stops.
3. Pull the unit from the rack.

To install the VHF unit:

1. Slide it straight in the rack until it stops, approximately 3/8 inch short of the final position.
2. Insert a 3/32" hex drive tool into the access hole at the bottom of the unit face.
3. Turn hex tool clockwise while pressing on the left side of the bezel until the unit is seated in the rack.

NOTE: **Prior to placing the unit in the rack, in order to ensure correct position of the retention mechanism, it may be necessary to insert the hex drive tool into the access hole and turn the drive tool counterclockwise until it completely stops.**

23-03 VHF Antenna

Location:	Bonded inside the right-hand skin of the vertical stabilizer
Type:	Dolba BD05
Manufacturer:	Dolba & Dolba Wallerstrasse 34, 53498 Bad Breisig, Germany www.dolba.de

No regular maintenance is required for the unit. If malfunction is detected, antenna has to be replaced.
VHF Antenna is bonded with Sikaflex to the right-hand skin of the vertical stabilizer
Antenna cable is routed on the right-hand fuselage side, under the baggage floor, between the seat support bulkheads to the transponder socket.
To replace the VHF Antenna:

1. Remove rudder, refer to section 55-05
2. Cut antenna loose, remove from airplane
3. Connect new antenna to antenna cable
4. Maneuver new antenna in place, temporarily fix with masking tape
5. Apply pea-sized dots of Sikaflex similar to original installation; for details, refer to 51-11
6. Let Sikaflex cure overnight
7. Conduct VHF function check as per 23-05
8. Reinstall rudder, refer to section 55-05

Signature

23-04 MIC / PHONE Jacks

To use the radio or intercom, the occupants must wear headphones or helmets.

A pair of MIC/PHONE jacks to connect a headset is installed in each cockpit.

In the front seat, they are located in front of the occupant on the right-hand console, access for service through the front right-hand panel.

In the rear seat, they are located behind the pilot on the right-hand of the headrest area, access for service through the baggage compartment.

- Stereo Headphone Jacks: Switchcraft, 3-Circuit SWC-12B
- Microphone Jack: Switchcraft, 3-Circuit SWC-12B-JJ-033
- Each Jack is mounted with included hardware in an insulator plate Cliff CL1396

Those components are available through Game Composites, or various other vendors.

For wiring and connection details, refer to section 24-03
For troubleshooting information see section 24-11

To access MIC/PHONE jacks for the front seat, remove front RH side panel, refer to section 5-05

To access MIC/PHONE jacks for the rear seat, open baggage door

1- Visually check condition of cables and connectors
2- Visually check if connectors touch each other

To replace either jack:

1- Hold jack by hand, use 9/16” socket to loosen nut
2- Remove washer and nut from airplane
3- Push jack through bulkhead, maneuver clear to access cable terminals
4- Disconnect all cable terminals from jack
5- Remove jack from airplane
6- Connect cable terminals to new jack, refer to section 24-03
7- Push jack in place
8- Install washer
9- Install nut with threadlock, use 9/16” socket to tighten
10- Conduct VHF function check as per 23-02
11- Re-install front RH side panel or close baggage door

Signature

23-05 VHF Check

After maintenance or unit replacement, a flight check is recommended to ensure satisfactory performance.

1. Contact a ground station in close proximity
2. Press the **COM** volume knob to select manual squelch
3. Listen for any unusual electrical noise

If possible, verify the communications capability on both the high, low, and mid bands of the VHF COM band.

It may be required by the governing regulatory agency to verify operation of the VHF at the extents of a ground facility’s service volume (e.g., FAA AC 23-8A).

24 Electric Power including Switches & Breakers

24-01 Electrical System, General

This chapter contains information on DC Generation and Electrical Load Distribution.

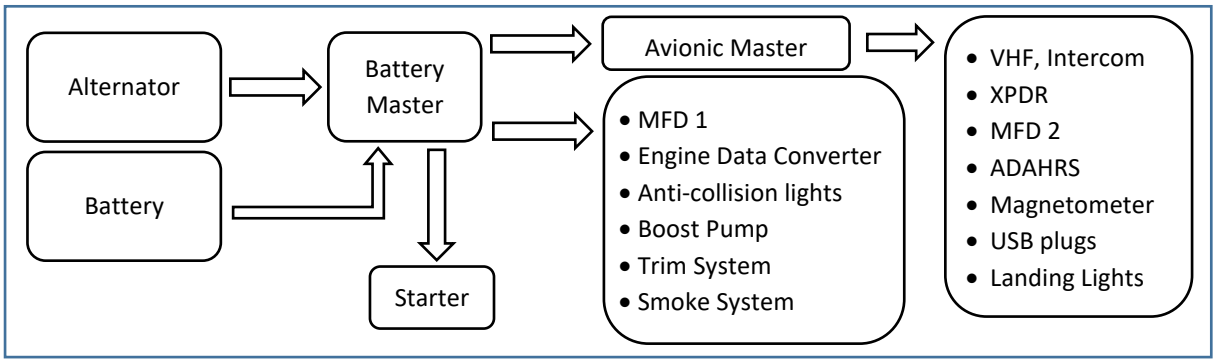
The airplane is equipped with a 14-volt direct current (VDC) electrical system.
The system provides uninterrupted power for avionics, flight instrumentation, lighting, trim system and other electrical devices during normal operation.

The switch panel on the RH side console in the rear cockpit contains Switches for:

- Battery Master / Alternator
- Avionic
- Anti-Collision Lights (ACL)
- Smoke Refill
- Boost Pump

The circuit breaker panel on the RH side console in the rear cockpit contains Circuit Breakers for:

- Field = Alternator Field
- Smoke = Smoke System
- AHRS = GSU 25 ADHRS
- FLUX = GMU 11 Magnetometer
- USB = dual USB charging ports, one in each cockpit
- MFD2 = Multi-Function Display 2, in front cockpit
- XPDR = Transponder
- VHF = VHF
- MFD1 = Multi-Function Display 1, in rear cockpit
- EDC = Engine Data Converter GEA 24
- TRIM = Elevator- and Aileron trim servo and trim position indication system



Overview Electrical System:

The electric system is activated via the Split Master Switch;
left-hand half of the split Master Switch is actuating the Master relay, providing power from the Battery to:

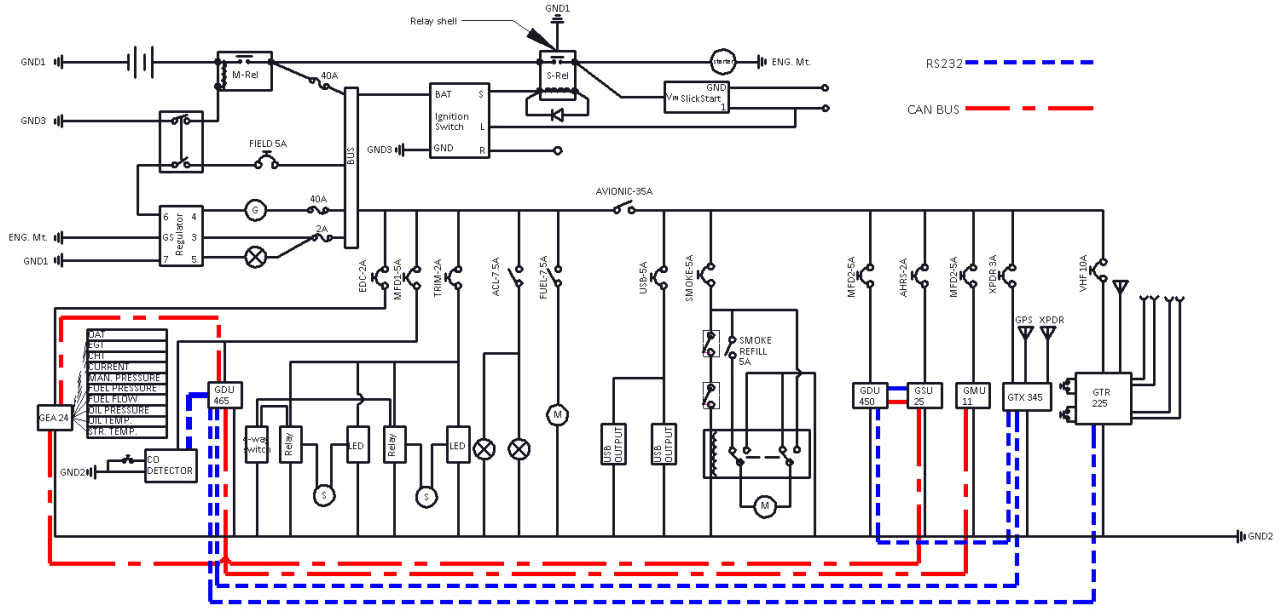
- Starter Relay and Starter via the Keyed ignition switch, with positions for OFF, R, L, BOTH and START.
  In position 'START' the starter is activated and the Slick Start Magneto Booster is energized.
  Positions R grounds the left Magneto, Position L grounds the right Magneto, OFF grounds both Magnetos.
- MFD 1 in the rear cockpit, via MFD1 CB
- Engine Data Converter, via EDC CB
- Anti-Collision Lights, via ACL CB Switch
- Fuel Boost Pump, via BOOST PUMP CB Switch
- Trim System, via TRIM CB
- Power relay for the Smoke pump, via Smoke CB; the smoke system can be filled by moving the Smoke Refill CB Switch in the aft position, reversing the polarity of the smoke pump.

The right half of the split Master Switch (through the Field CB) is switched ON after engine start is complete, exciting the Alternator, controlled by the Voltage Regulator, providing power to avionics, flight instrumentation, lighting, trim system and other electrical devices during normal operation.
The Alternator and Regulator also provide charging power for the battery.
During normal operation, both halves of the split Master Switch are in ON position.

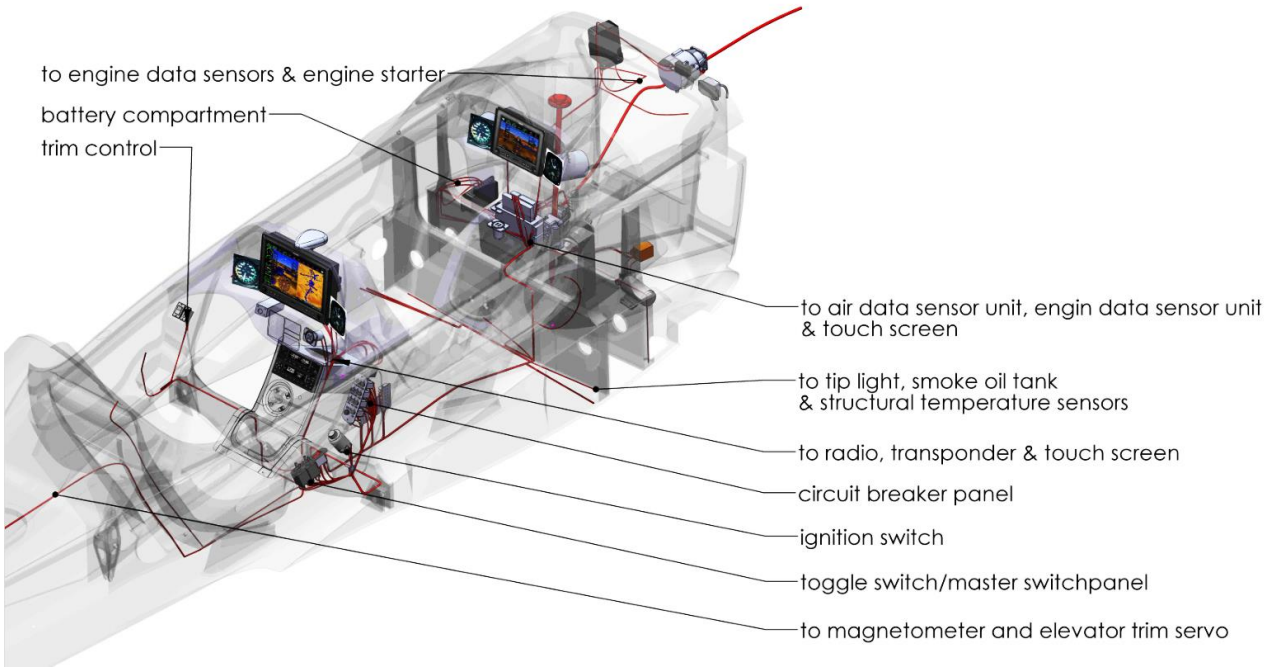
The Avionic CB Switch is energized via the Master Relay, directing power to:

- VHF, via the VHF CB
- Transponder, via the XPDR CB
- MFD2, via the MFD2 CB
- ADHRS, via AHRS CB
- Landing Lights, via Landing Lights CB Switch, located on LH side console in the rear cockpit.
- Magnetometer, via FLUX CB
- USB plugs Blue Sea 1016 (2 Amps @ 5 Volts)., via USB CB

Overview of electric system



Overview of cable routing:



24-02 Electrical Distribution, Switches and Circuit Breakers

Electrical supply from alternator and battery is distributed via switches and circuit-breakers.
All cables are 55A0811 series with PVC –jacket Alpha Wire 1716Sl005

Unless noted otherwise, the controls are in the rear right-hand side console.

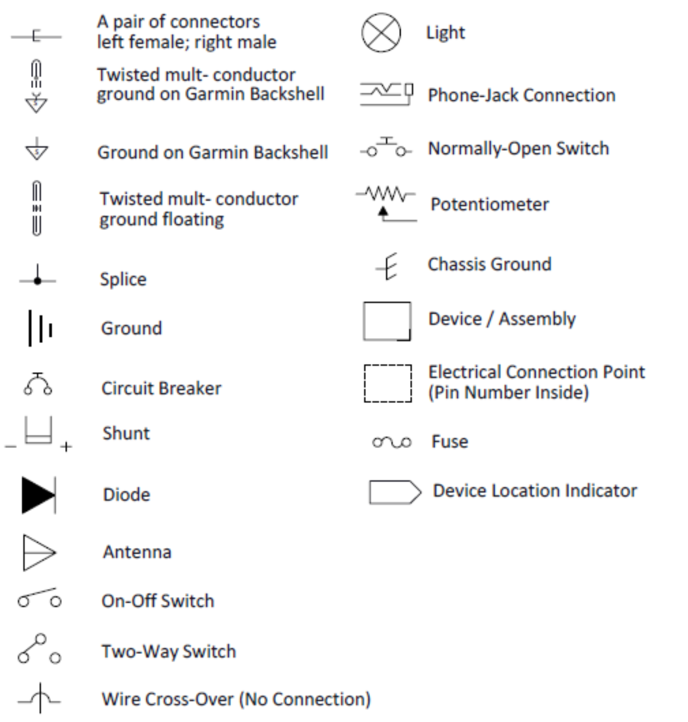
Charging Circuit	Alternator Switch
Battery	
Alternator	Button Circuit Breaker “Field”
Voltage regulator	
Shunt	
Starter Circuit	ACS Products Co., A-510-2 Keyed Ignition Switch
Battery	
Starter Relay	
Starter	
Slick Start	
Main (Essential) Bus	Cessna-type Split Master Switch
Master relay	
Keyed Ignition / Starter switch	
Annunciator Lights	
MFD1	5A Button Circuit Breaker “MFD1”
MFD2	5A Button Circuit Breaker “MFD2”
Engine data converter	2A Button Circuit Breaker “EDC”
G3X, EDC & connected sensors,	
Resistive wing tank float sensors	
Capacitive Acrotank senor	
Anti-collision lights	7.5A Toggle Switch Circuit Breaker “ACL”
Boost fuel pump	7.5A Toggle Switch Circuit Breaker “Boost Pump”
Trim switch, servos and indicators	2A Button Circuit Breaker “Trim”
Smoke system	5A Button Circuit Breaker “Smoke”
Smoke refill	5A Toggle Switch Circuit Breaker “Smoke Refill”
Avionic (Non-Essential) Bus	35A Toggle Circuit Breaker “Avionic”
Transponder with encoder	3A Button Circuit Breaker “XPDR”
Radio with Intercom	10A Button Circuit Breaker “VHF”
Auxiliary power socket	5A Button Circuit Breaker “USB”
Air data sensor unit	2A Button Circuit Breaker “AHRS”
Magnetometer	2A Button Circuit Breaker “FLUX”
Landing Lights, LH side console	5A Toggle Circuit Breaker “Landing Lights”
Button Circuit Breakers:	Klixon, 7274-2 series
Toggle switch Circuit breakers:	Tyco, W31 series
Keyed Ignition / Starter switch:	ACS Products Co., A-510-2 Keyed Ignition Switch
Trim 4-way switch:	Ray Allen ROS-4
Trim position indicators	Ray Allen RP4
Trim servo relays	Ray Allen REL-2
PTT momentary switches:	Bulgin, MP0042/2
COM Swap Switch	Grayhill 30-1
Smoke ON switch:	Cherry SRB22A2FBBNN

24-03 Wiring loom

Phraseology	
Abbreviation	**Meaning**
-	Not Applicable
A	Amps
ANT	Antenna
AWG	American Wire Gauge
B-	Negative Battery Terminal
B+	Battery Positive Terminal
BAT	Battery
Can Term Plug	Garmin Can Terminal Bus Plug
Chassis	Chassis Ground
CHT	Cylinder Head Temperature Sensor
CNTRL	Control
CO	Carbon Monoxide
COM	Communications
EGT	Exhaust Gas Temperature Sensor
ELT	Emergency Location Transmitter
Eng Bolt	Engine Bolt
Field	Field Lug on Alternator
GND	Ground
GPS	Global Positioning System
LH	Left Hand
MAN	Manifold
MIC	Microphone
NC	No Connection
OAT	Outside Air Teperature Sensor
P	Part
P-Lead	Magneto Primary Lead
PWR	Power
PWR	Power
QTY	Quantity
REG	Regulator
RH	Right Hand
Shld	Shielded Wire
22 shld x2	2-Core, 22 gauge Shielded Wire
22 shld x3	3-Core, 22 gauge Shielded Wire
22 shld x4	3-Core, 22 gauge Shielded Wire
STR	Structural
SYS	System
P.P.	Piper Plug

Terminals			
Part Number	**Type**	**Size**	**Rated for Wire**
52267-1	ring	M6	2 AWG
52044-4	ring	M8	2 AWG
35149	ring	#6	12-10 AWG
35108	ring	#8	12-10 AWG
35110	ring	1/4	12-10 AWG
35112	ring	3/8	12-10 AWG
32442	ring	#6	16-14 AWG
31902	ring	#8	16-14 AWG
31906	ring	1/4	16-14 AWG
31885	ring	#6	22-16 AWG
31890	ring	#8	22-16 AWG
36154	ring	#10	22-16 AWG
31894	ring	1/4	22-16 AWG
11-09313	ring	5/16	22-16 AWG
640903-1	Receptacle	6.35×0.81	22-18 AWG
140971-2	Blade	6.35×0.81	16-14 AWG
336-00021-00	Pin	22D	22-24 AWG
336-00022-02	Socket	20	20-22 AWG
336-00024-00	Pin	20	20-22 AWG
11-04447	Coax	-	RG400
11-01802	Coax	-	RG400
11-03992	Coax	-	RG58

Connectors		
Referenced As	**Part Number**	**Description**
02R	02R-JWPF-VSLE-S	2 way JST, male
02T	02T-JWPF-VSLE-S	2 way JST, female
03R	03R-JWPF-VSLE-S	3 way JST, male
03T	03T-JWPF-VSLE-S	3 way JST, female
06R	06R-JWPF-VSLE-D	6 way JST, male
06T	06T-JWPF-VSLE-D	6 way JST, female
0CT	206061-1	Cannon Plug, female
0CR	206060-1	Cannon Plug, male
P4602	P4602	Garmin Connector
P111	P111	Garmin Connector
P241	P241	Garmin Connector
P251	P251	Garmin Connector
P4502	P4502	Garmin Connector
P252	P252	Garmin Connector
Sub-D	Sub-D	Garmin Connector
P2001	P2001	Garmin Connector
P2003	P2003	Garmin Connector
P3251	P3251	Garmin Connector
P243	P243	Garmin Connector
P242	P242	Garmin Connector
P244	P244	Garmin Connector
J Case	HLJC2002G	Fuse Holder



Note: All Garmin Connector Pin Numbers Labeled on the Connector.
See Garmin G3X Installation Manual for questions or concernes.

Revision	Comment	Drawn by	Checked by	Released by	Release date
A01	added landing lights, jump start plug	BD	PS	HOA	13 Mar 2019
A02	added landing lights, jump start plug	BD	PS	HOA	18 Mar 2019
A03	added landing lights, jump start plug	BD	PS	HOA	19 Mar 2019

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS

MATERIAL:
WEIGHT:
SURFACE FINISH AND TREATMENT:
TOLERANCES LINEAR:
TOLERANCES ANGULAR:

SCALE VALID FOR MASTER DRAWING ONLY
DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED:
DRAWING STANDARD:
ISO 128

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Game Composites

TITLE: Wiring Loom Glossary

DWG NO. GB1-2400-00-06

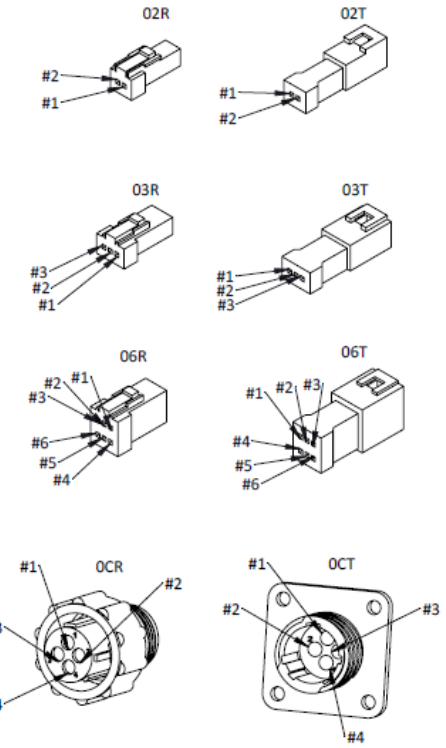
SCALE:5:1 at sheet size 11"x17" SHEET 1 OF 17

Devices		
Device	**Part Number**	**Location**
10 Amp Circuit Breaker	W23X1A1G10	01.1
10A Fuse		
2 Amp Circuit Breaker	W23X1A1G2	01.1
3 Amp Circuit Breaker	W23X1A1G3	01.1
35 Amp Toggle Switch	W31X2M1G35	01.3
4 Way Switch	ROS-4	03.1
40A Fuse		
5 Amp Circuit Breaker	W23X1A1G5	01.1
5 Amp Toggle Switch	W31X2M1G5	01.3
7.5 Amp Toggle Switch	W31X2M1G7.5	01.3
Aileron Servo	T2-10A	-
Alternator	SD-20	14.5
Ammeter Shunt	909-D0000-00	14.4
Battery	Oddessy Extreme 535	12.6, 12.7
CHT Sensor	86253	-
CO Guardian	CO_Guardian	4.4
Communications Antenna	013-00235-00	-
EGT Sensor	86255	-
Elevator Servo	T2-10A	-
ELT	ELT_1000	07.7
ELT Antenna	110-324	-
ELT Switch	RC200	04.6
Fuel Flow Transducer	FT-60	13.4
Fuel Pump	PX375-TC	10.1
Garmin AirData Indication System	GSU25	09.4
Garmin Configuration Module	012-00605-20	-
Garmin Engine Monitor	GEA24	09.1
Garmin Magnetometer	GMU11	02.3
Garmin Outside Air Temperature Sensor	GTP 59	13.5
Garmin Personal Flight Display 1	GDU 465	04.2
Garmin Personal Flight Display 2	GDU 450	09.2
Garmin Transponder	GTX345	04.1
Garmin VHF COM Radio	GTR225A	04.5
Headphone Jack	JJ-033	02.2, 08.1
Ignition Switch	A-510-2 FAA-PMA	01.2
Landing Light	01-0771685-01	-
LED Position Indicator	RP4	03.1
Master Relay	70 111226 5B1	12.1
Magneto	6393 Rev E	14.1, 14.6
Microphone Jack	SWC-12B	02.2, 08.1
Oil Pressure Sensor	PT-100GA	14.7
Oil Temperature Sensor	555-41362	13.2, 14.3
RPM Sensor	T1A9-X	14.2
Servo Relay	REL-2	-
Grayhill Push Button Switch	gh-30-1	03.2

Devices Cont.		
Device	**Part Number**	**Location**
Slick Start	SS1001	13.1
Smoke Pump	UP2-16420212	10.2
Smoke Relay	RM805012	10.3
Split Red Switch	S-1994-1-1	01.3
Starter	149-12LS	11.1
Starter Relay	22735	12.3
Structural Temperature Sensor	PT1000	07.5, 07.6
Terminal Block	SPTGB6	BUS (Essential), Avionic Bus (Non-Essential), GND
Smoke Throttle Switch	SRB22A2FBBNN	03.2
Transponder Antenna	AV74-1	-
USB	Blue_Sea_1016	04.3, 08.2
Voltage Regulator	07-06742	12.2
Wing Fuel Float Sensors	GB1-2852-70-92	10.4, 12.8
Wing Tip Light	Andromeda DayLite	07.1, 07.2

Devices Cont.	
Device	**Part Number**
Astro crimp tool p/n 615717	CT1
TE 59824-1 TETRA-CRIMP TOOL	CT2
JST WC-JWPF CRIMPING PLIERS	CT3
RS 683-1627 COAX CRIMP TOOL.	CT4
DMC GMT232 CRIMP TOOL	CT5
TE CRIMP TOOL 91505-1	CT6

02R:1 Represents Connector 02R, No. 1 in the document. Pin numbers are defined as below.



Note: Garmin Connector Pin Numbers are Scribed on Each Connector.

REVISION	COMMENT	DRAWN BY	CHECKED BY	RELEASED BY	RELEASE DATE
A01	added landing lights, jump start plug	BD	PS	HOA	13 Mar 2019
A02	added landing lights, jump start plug	BD	PS	HOA	18 Mar 2019
A03	added landing lights, jump start plug	BD	PS	HOA	19 Mar 2019

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MATERIAL

WEIGHT

SURFACE FINISH AND TREATMENT

TOLERANCES LINEAR

TOLERANCES ANGULAR

SCALE VALID FOR MASTER DRAWING ONLY DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED: DRAWING STANDARD: ISO 128

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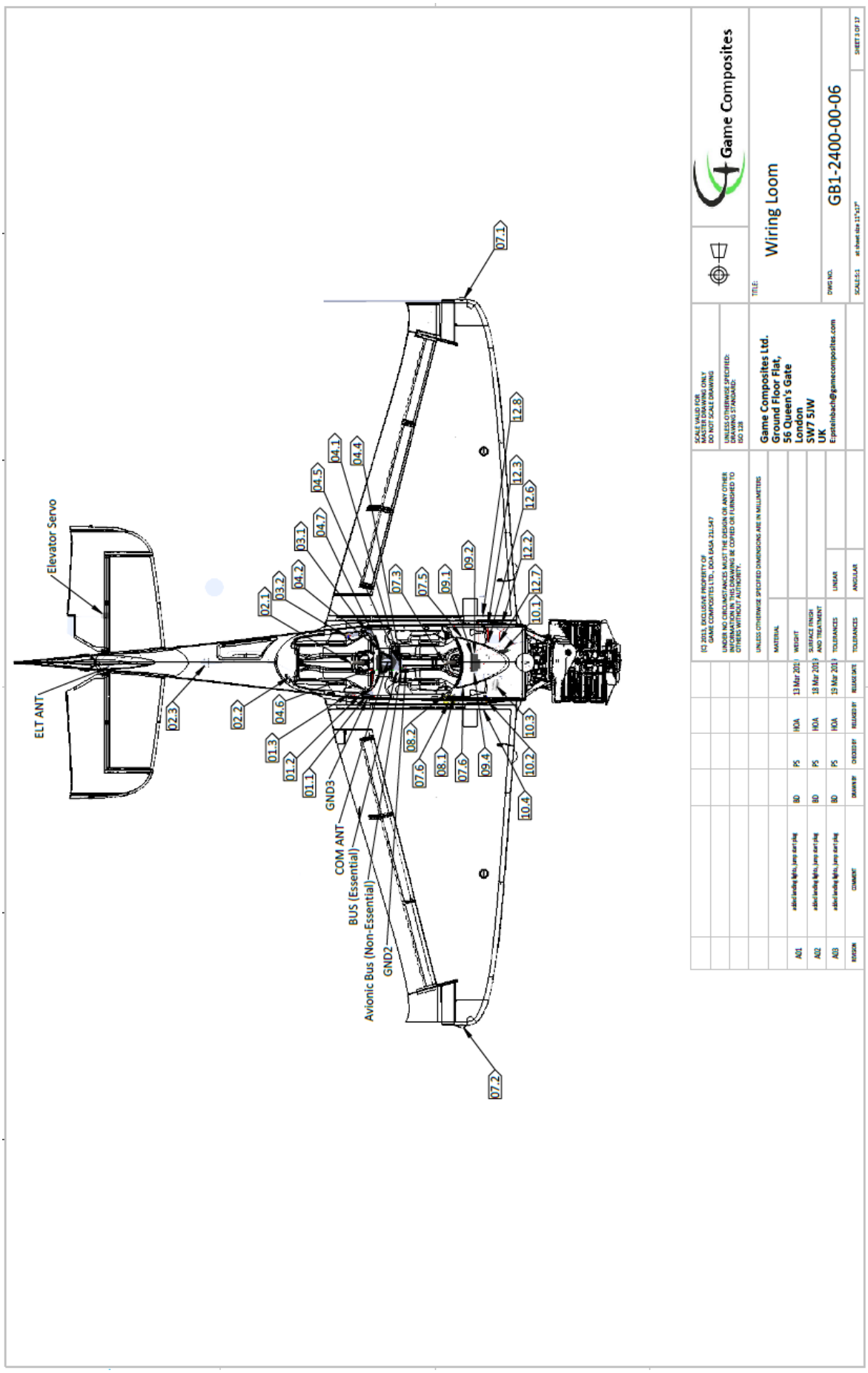
Game Composites

TITLE:

Wiring Loom Glossary

DWG NO. GB1-2400-00-06

SCALE:5:1 at sheet size 11"x17" SHEET 2 OF 17


Elevator Servo
ELT ANT
02.3
02.2
04.6
01.3
01.2
01.1
GND3
COM ANT
BUS (Essential)
Avionic Bus (Non-Essential)
GND2
07.2
08.2
07.6
08.1
07.6
09.4
10.3
10.2
10.4
07.1
12.8
12.3
12.6
12.2
12.7
10.1
09.2
07.3
07.5
09.1
02.1
03.2
04.2
03.1
04.7
04.5
04.1
04.4
Game Composites
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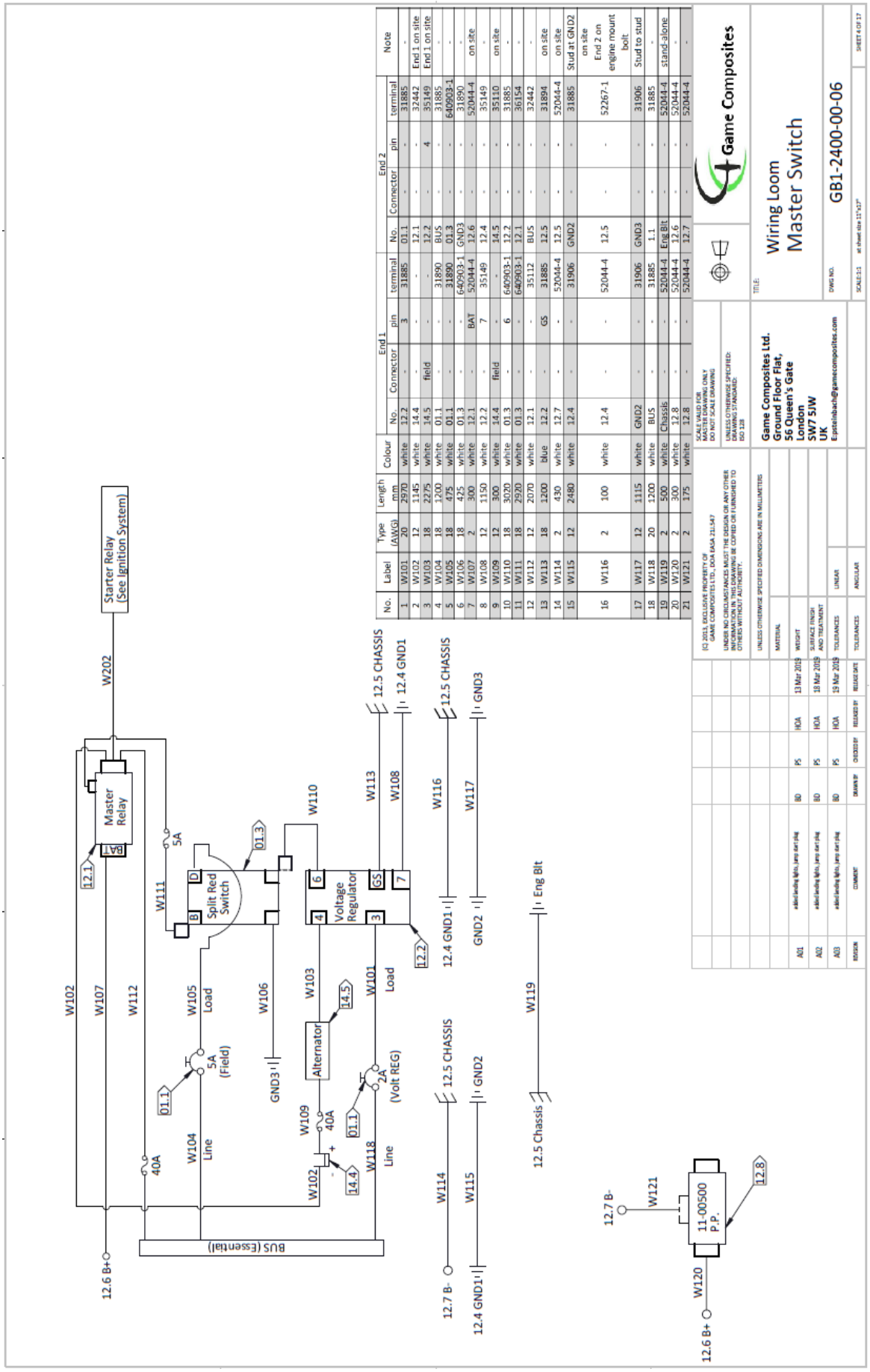


No.	Label	Type (AWG)	Length mm	Colour	End1 No.	End1 Connector	End1 pin	End1 terminal	End2 No.	End2 Connector	End2 pin	End2 terminal	Note
1	W101	20	2970	white	12.2	-	3	31885	01.1	-	-	31885	-
2	W102	12	1145	white	14.4	-	-	-	12.1	-	-	32442	End 1 on site
3	W103	18	2275	white	14.5	field	-	-	12.2	-	4	35149	End 1 on site
4	W104	18	1200	white	01.1	-	-	31890	BUS	-	-	31885	-
5	W105	18	475	white	01.1	-	-	31890	01.3	-	-	640903-1	-
6	W106	18	425	white	01.3	-	-	640903-1	GND3	-	-	31890	-
7	W107	2	300	white	12.1	-	BAT	52044-4	12.6	-	-	52044-4	on site
8	W108	12	1150	white	12.2	-	7	35149	12.4	-	-	35149	-
9	W109	12	300	white	14.4	field	-	-	14.5	-	-	35110	on site
10	W110	18	3020	white	01.3	-	6	640903-1	12.2	-	-	31885	-
11	W111	18	2920	white	01.3	-	-	640903-1	12.1	-	-	36154	-
12	W112	12	2070	white	12.1	-	-	35112	BUS	-	-	32442	-
13	W113	18	1200	blue	12.2	-	GS	31885	12.5	-	-	31894	on site
14	W114	2	430	white	12.7	-	-	52044-4	12.5	-	-	52044-4	on site
15	W115	12	2480	white	12.4	-	-	31906	GND2	-	-	31885	Stud at GND2
16	W116	2	100	white	12.4	-	-	52044-4	12.5	-	-	52267-1	on site End 2 on engine mount bolt
17	W117	12	1115	white	GND2	-	-	31906	GND3	-	-	31906	Stud to stud
18	W118	20	1200	white	BUS	-	-	31885	1.1	-	-	31885	-
19	W119	2	500	white	Chassis	-	-	52044-4	Eng Blt	-	-	52044-4	stand-alone
20	W120	2	300	white	12.8	-	-	52044-4	12.6	-	-	52044-4	-
21	W121	2	175	white	12.8	-	-	52044-4	12.7	-	-	52044-4	-

SCALE VALID FOR MASTER DRAWING ONLY
DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED:
DRAWING STANDARD:
ISO 128

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS

MATERIAL
WEIGHT
SURFACE FINISH AND TREATMENT
TOLERANCES LINEAR
TOLERANCES ANGULAR

Game Composites Ltd.
Ground Floor Flat,
56 Queen's Gate
London
SW7 5JW
UK
E.patelnbach@gamecomposites.com

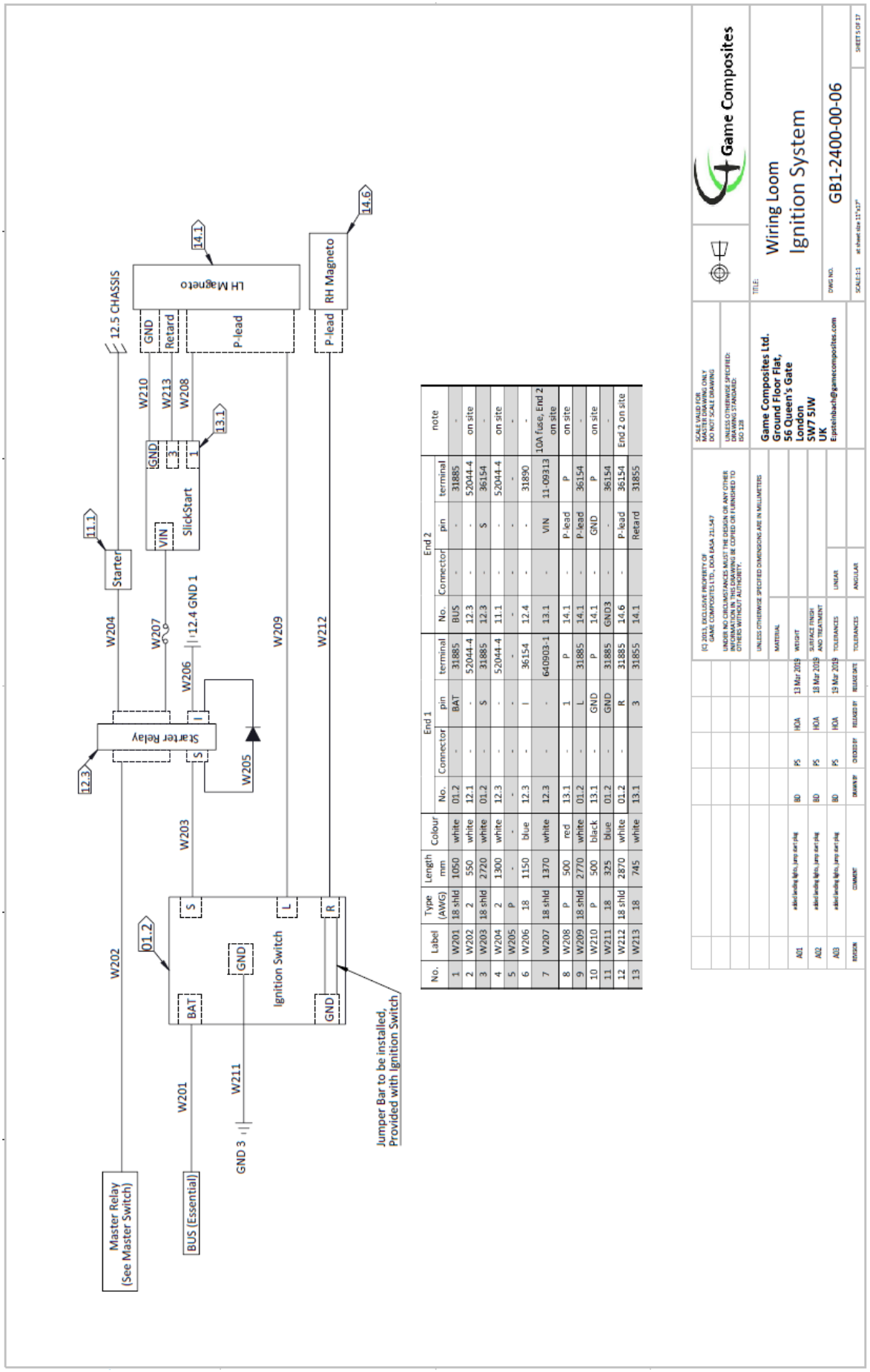
Game Composites

TITLE:
Wiring Loom
Master Switch

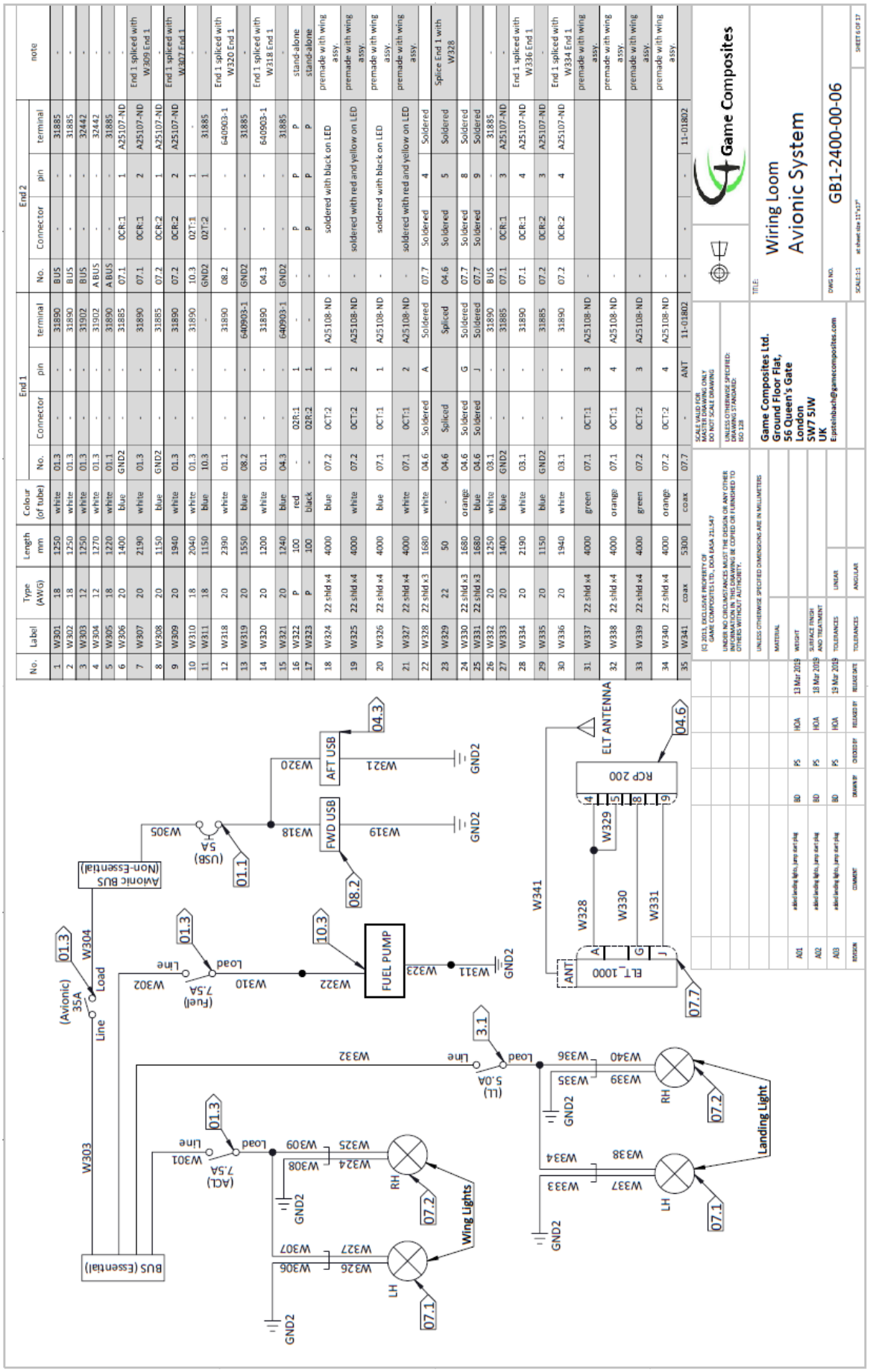
DWG NO. GB1-2400-00-06

A01	added landing lights, jump start plug	BD	PS	HOA	13 Mar 2015	
A02	added landing lights, jump start plug	BD	PS	HOA	18 Mar 2015	
A03	added landing lights, jump start plug	BD	PS	HOA	19 Mar 2015	
ISSUE	COMMENT	DRAWN BY	CHECKED BY	RELEASED BY	RELEASE DATE	

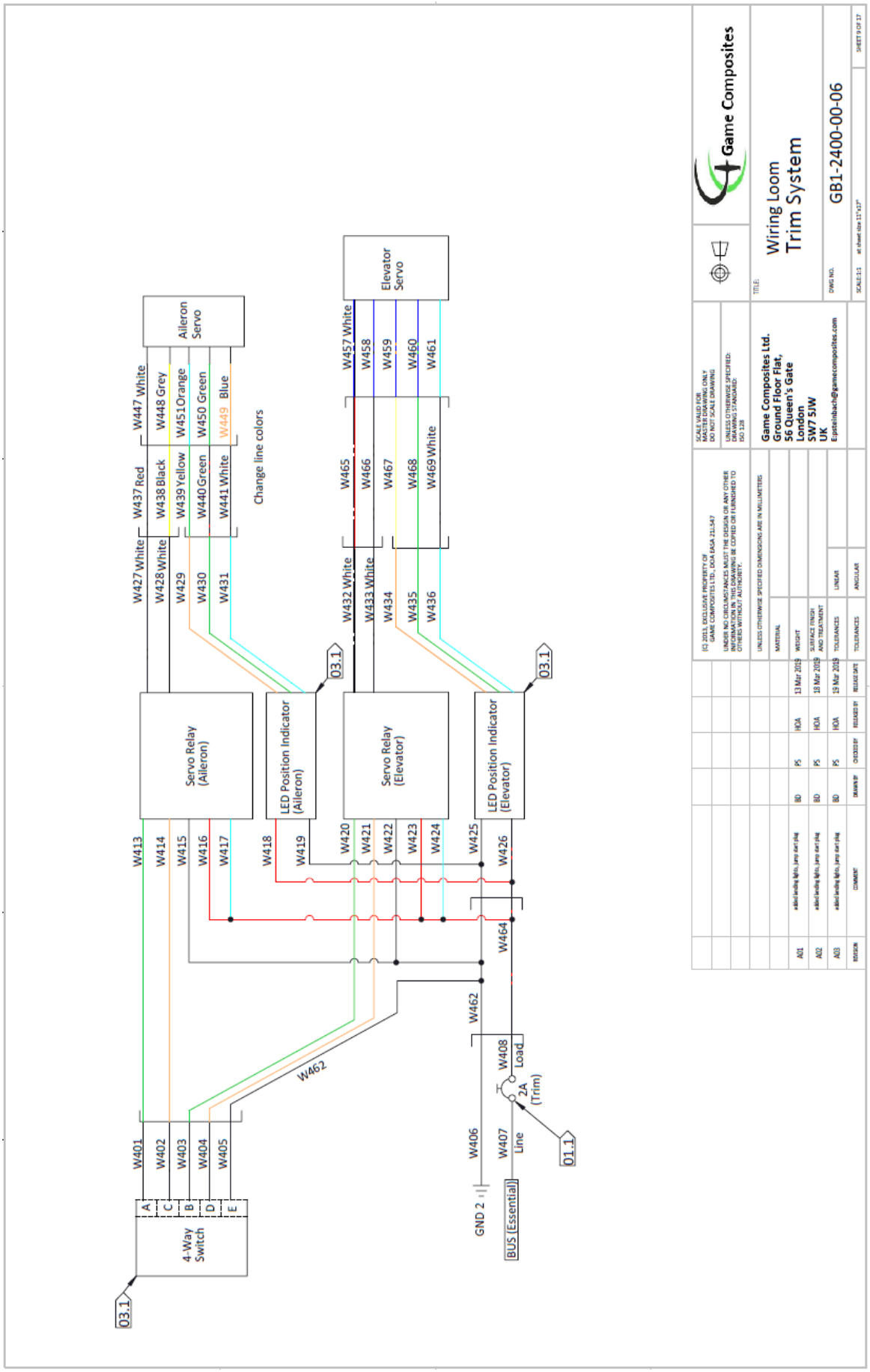
SCALE: 2:1 | A1 sheet size 11"x17" | SHEET 4 OF 17



No.	Label	Type (AWG)	Length mm	Colour	End 1 No.	End 1 Connector	End 1 pin	End 1 terminal	End 2 No.	End 2 Connector	End 2 pin	End 2 terminal	note
1	W201	18 shld	1050	white	01.2	-	BAT	31885	BUS	-	-	31885	-
2	W202	2	550	white	12.1	-	-	52044-4	12.3	-	-	52044-4	on site
3	W203	18 shld	2720	white	01.2	-	S	31885	12.3	-	S	36154	-
4	W204	2	1300	white	12.3	-	-	52044-4	11.1	-	-	52044-4	on site
5	W205	P	-	-	-	-	-	-	-	-	-	-	-
6	W206	18	1150	blue	12.3	-	I	36154	12.4	-	-	31890	-
7	W207	18 shld	1370	white	12.3	-	-	640903-1	13.1	-	VIN	11-09313	10A fuse, End 2 on site
8	W208	P	500	red	13.1	-	1	P	14.1	-	P-lead	P	on site
9	W209	18 shld	2770	white	01.2	-	L	31885	14.1	-	P-lead	36154	-
10	W210	P	500	black	13.1	-	GND	P	14.1	-	GND	P	on site
11	W211	18	325	blue	01.2	-	GND	31885	GND3	-	-	36154	-
12	W212	18 shld	2870	white	01.2	-	R	31885	14.6	-	P-lead	36154	End 2 on site
13	W213	18	745	white	13.1		3	31855	14.1		Retard	31855	

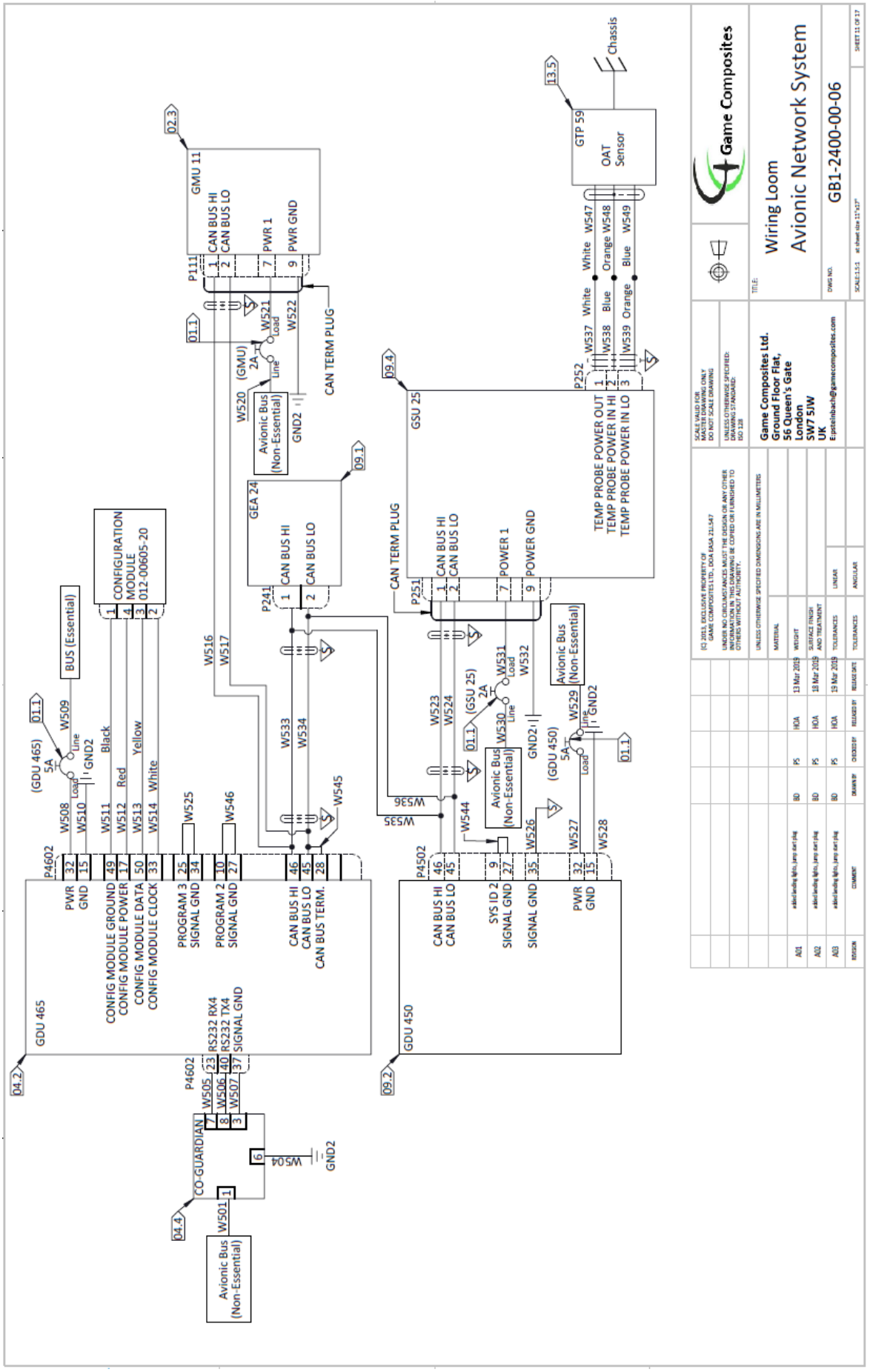


No.	Label	Type (AWG)	Length mm	Colour (of tube)	End 1				End 2				note
					No.	Connector	pin	terminal	No.	Connector	pin	terminal	
1	W301	18	1250	white	01.3	-	-	31890	BUS	-	-	31885	-
2	W302	18	1250	white	01.3	-	-	31890	BUS	-	-	31885	-
3	W303	12	1250	white	01.3	-	-	31902	BUS	-	-	32442	-
4	W304	12	1270	white	01.3	-	-	31902	A BUS	-	-	32442	-
5	W305	18	1220	white	01.1	-	-	31890	A BUS	-	-	31885	-
6	W306	20	1400	blue	GND2	-	-	31885	07.1	OCR:1	1	A25107-ND	-
7	W307	20	2190	white	01.3	-	-	31890	07.1	OCR:1	2	A25107-ND	End 1 spliced with W309 End 1
8	W308	20	1150	blue	GND2	-	-	31885	07.2	OCR:2	1	A25107-ND	-
9	W309	20	1940	white	01.3	-	-	31890	07.2	OCR:2	2	A25107-ND	End 1 spliced with W307 End 1
10	W310	18	2040	white	01.3	-	-	31890	10.3	02T:1	1	-	-
11	W311	18	1150	blue	10.3			-	GND2	02T:2	1	31885	-
12	W318	20	2390	white	01.1	-	-	31890	08.2	-	-	640903-1	End 1 spliced with W320 End 1
13	W319	20	1550	blue	08.2	-	-	640903-1	GND2	-	-	31885	-
14	W320	20	1200	white	01.1	-	-	31890	04.3	-	-	640903-1	End 1 spliced with W318 End 1
15	W321	20	1240	blue	04.3	-	-	640903-1	GND2	-	-	31885	-
16	W322	P	100	red	-	02R:1	1	-	-	P	P	P	stand-alone
17	W323	P	100	black	-	02R:2	1	-	-	P	P	P	stand-alone
18	W324	22 shld x4	4000	blue	07.2	OCT:2	1	A25108-ND	-	soldered with black on LED			premade with wing assy.
19	W325	22 shld x4	4000	white	07.2	OCT:2	2	A25108-ND	-	soldered with red and yellow on LED			premade with wing assy.
20	W326	22 shld x4	4000	blue	07.1	OCT:1	1	A25108-ND	-	soldered with black on LED			premade with wing assy.
21	W327	22 shld x4	4000	white	07.1	OCT:1	2	A25108-ND	-	soldered with red and yellow on LED			premade with wing assy.
22	W328	22 shld x3	1680	white	04.6	Soldered	A	Soldered	07.7	Soldered	4	Soldered	
23	W329	22	50	-	04.6	Spliced		Spliced	04.6	Soldered	5	Soldered	Splice End 1 with W328
24	W330	22 shld x3	1680	orange	04.6	Soldered	G	Soldered	07.7	Soldered	8	Soldered	
25	W331	22 shld x3	1680	blue	04.6	Soldered	J	Soldered	07.7	Soldered	9	Soldered	
26	W332	20	1250	white	03.1	-	-	31890	BUS	-	-	31885	-
27	W333	20	1400	blue	GND2	-	-	31885	07.1	OCR:1	3	A25107-ND	-
28	W334	20	2190	white	03.1	-	-	31890	07.1	OCR:1	4	A25107-ND	End 1 spliced with W336 End 1
29	W335	20	1150	blue	GND2	-	-	31885	07.2	OCR:2	3	A25107-ND	-
30	W336	20	1940	white	03.1	-	-	31890	07.2	OCR:2	4	A25107-ND	End 1 spliced with W334 End 1
31	W337	22 shld x4	4000	green	07.1	OCT:1	3	A25108-ND	-				premade with wing assy.
32	W338	22 shld x4	4000	orange	07.1	OCT:1	4	A25108-ND	-				premade with wing assy.
33	W339	22 shld x4	4000	green	07.2	OCT:2	3	A25108-ND	-				premade with wing assy.
34	W340	22 shld x4	4000	orange	07.2	OCT:2	4	A25108-ND	-				premade with wing assy.
35	W341	coax	5300	coax	07.7	-	ANT	11-01802	-	-	-	11-01802	


Aileron Servo
Elevator Servo
Change line colors
W447 White
W448 Grey
W451 Orange
W450 Green
W449 Blue
W437 Red
W438 Black
W439 Yellow
W440 Green
W441 White
W427 White
W428 White
W429
W430
W431
W457 White
W458
W459
W460
W461
W465
W466
W467
W468
W469 White
W432 White
W433 White
W434
W435
W436
Servo Relay (Aileron)
LED Position Indicator (Aileron)
Servo Relay (Elevator)
LED Position Indicator (Elevator)
03.1
W413
W414
W415
W416
W417
W418
W419
W420
W421
W422
W423
W424
W425
W426
W464
W462
W408
Load
2A
(Trim)
01.1
W406
W407
Line
GND 2
BUS (Essential)
W401
W402
W403
W404
W405
A
C
B
D
E
4-Way Switch
Game Composites
Wiring Loom
Trim System
GB1-2400-00-06
Game Composites Ltd.
Ground Floor Flat,
56 Queen's Gate
London
SW7 5JW
UK
E.pstelnbach@gamecomposites.com

No.	Label	Type (AWG)	Length mm	Colour (of tube)	End 1			End 2			note
					No.	Connector	pin	No.	Connector	pin	Terminal	
1	W401	Cable-5-20-shd	200	white	03.1	06T:1	1	-	-	-	-	stand-alone
2	W402	Cable-5-20-shd	200	yellow	03.1	06T:1	2	-	-	-	-	stand-alone
3	W403	Cable-5-20-shd	200	green	03.1	06T:1	3	-	-	-	-	stand-alone
4	W404	Cable-5-20-shd	200	red	03.1	06T:1	4	-	-	-	-	stand-alone
5	W405	Cable-5-20-shd	200	black	03.1	06T:1	5	-	-	-	-	stand-alone
6	W406	20	2520	blue	03.1	02R:3	1	-	GH02	-	31885	-
7	W407	20	1620	white	01.1	-	-	-	BU5	-	31885	-
8	W408	20	2850	white	01.1		-	-	31890	02R:3	2	-
9	W413	P	-	green	-	06R:1	1	-	31890	03.1	-	stand-alone
10	W414	P	-	orange	-	06R:1	2	-	-	03.1	-	stand-alone
11	W415	P	-	black	-	-	-	-	-	03.1	-	stand-alone
12	W416	P	-	red	-	-	-	-	-	03.1	-	stand-alone
13	W417	P	-	blue	-	-	-	-	-	03.1	-	stand-alone
14	W418	P	-	red	-	-	-	-	-	03.1	-	stand-alone
15	W419	P	-	black	-	-	-	-	-	03.1	-	stand-alone
16	W420	P	-	green	-	-	-	-	-	03.1	-	stand-alone
17	W421	P	-	orange	-	06R:1	3	-	-	03.1	-	stand-alone
18	W422	P	-	black	-	06R:1	4	-	-	03.1	-	stand-alone
19	W423	P	-	red	-	-	-	-	-	03.1	-	stand-alone
20	W424	P	-	blue	-	-	-	-	-	03.1	-	stand-alone
21	W425	P	-	black	-	02T:4	1	-	-	03.1	-	stand-alone
22	W426	P	-	red	-	02T:4	2	-	-	03.1	-	stand-alone

No.	Label	Type (AWG)	Length mm	Colour (of tube)	End 1			End 2			note
					No.	Connector	pin	No.	Connector	pin	Terminal	
23	W427	P	-	white	03.1	-	-	-	02T:5	1	-	stand-alone
24	W428	P	-	white	03.1	-	-	-	02T:5	2	-	stand-alone
25	W429	P	-	orange	03.1	-	-	-	03T:1	1	-	stand-alone
26	W430	P	-	green	03.1	-	-	-	03T:1	2	-	stand-alone
27	W431	P	-	blue	03.1	-	-	-	03T:1	3	-	stand-alone
28	W432	P	-	white	03.1	-	-	-	02T:6	1	-	stand-alone
29	W433	P	-	white	03.1	-	-	-	02T:6	2	-	stand-alone
30	W434	P	-	orange	03.1	-	-	-	03T:2	1	-	stand-alone
31	W435	P	-	green	03.1	-	-	-	03T:2	2	-	stand-alone
32	W436	P	-	blue	03.1	-	-	-	03T:2	3	-	stand-alone
33	W437	Cable-5-20-shd	1000	red	03.1	02R:5	1	-	06T:2	1	-	stand-alone
34	W438	Cable-5-20-shd	1000	black	03.1	02R:5	2	-	06T:2	2	-	stand-alone
35	W439	Cable-5-20-shd	1000	yellow	03.1	03R:1	1	-	06T:2	3	-	stand-alone
36	W440	Cable-5-20-shd	1000	green	03.1	03R:1	2	-	06T:2	4	-	stand-alone
37	W441	Cable-5-20-shd	1000	white	03.1	03R:1	3	-	06T:2	5	-	stand-alone
38	W447	P	-	white	03.1	06R:2	1	-	-	-	solder	Extend servo wires approx 18" using 22G wire a t install. stand-alone
39	W448	P	-	grey	03.1	06R:2	2	-	-	-	solder	
40	W449	P	-	orange	03.1	06R:2	5	-	-	-	solder	
41	W450	P	-	green	03.1	06R:2	4	-	-	-	solder	
42	W451	P	-	blue	03.1	06R:2	3	-	-	-	solder	
43	W457	P	-	white	-	06T:3	1	-	03.1	-	-	
44	W458	P	-	grey	-	06T:3	2	-	03.1	-	-	
45	W459	P	-	orange	-	06T:3	3	-	03.1	-	-	stand-alone
46	W460	P	-	green	-	06T:3	4	-	03.1	-	-	
47	W461	P	-	blue	-	06T:3	5	-	03.1	-	-	
48	W462	20	-	black		06R:1	5	-	03.1	02T:3	1	- End 2 spliced with W425
49	W464	22		white	03.1			-	03.1	02R:4	2	
50	W465	Cable-5-20-shd		red	03.1	02R:6	1	-	-	06R:3	1	
51	W466	Cable-5-20-shd		black	03.1	02R:6	2	-	-	06R:3	2	
52	W467	Cable-5-20-shd		yellow	03.1	03R:2	1	-	-	06R:3	3	
53	W468	Cable-5-20-shd		green	03.1	03R:2	2	-	-	06R:3	4	
54	W469	Cable-5-20-shd		white	03.1	03R:2	3	-	-	06R:3	5	


Game Composites
Wiring Loom
Avionic Network System
GB1-2400-00-06
Game Composites Ltd.
Ground Floor Flat,
56 Queen's Gate
London
SW7 5JW
UK
GDU 465
GDU 450
GMU 11
GEA 24
GSU 25
OAT Sensor
GTP 59
CONFIGURATION MODULE 012-00605-20
CO-GUARDIAN
Avionic Bus (Non-Essential)
BUS (Essential)
CAN TERM PLUG
TEMP PROBE POWER OUT
TEMP PROBE POWER IN HI
TEMP PROBE POWER IN LO
CAN BUS HI
CAN BUS LO
CAN BUS TERM.
PROGRAM 3 SIGNAL GND
PROGRAM 2 SIGNAL GND
CONFIG MODULE GROUND
CONFIG MODULE POWER
CONFIG MODULE DATA
CONFIG MODULE CLOCK
RS232 RX4
RS232 TX4
SIGNAL GND
SYS ID 2
POWER 1
POWER GND
PWR
GND
Chassis

No.	Label	Type (AWG)	Length mm	Colour (of tube)	End 1				End 2				note
					No.	Connector	pin	terminal	No.	Connector	pin	terminal	
1	W501	20	1320	white	04.4	Sub-D	1	-	A BUS	-	-	31885	-
2	W504	20	1340	blue	04.4	Sub-D	6	-	GND2	-	-	31885	-
3	W505	22 shld x3	750	white	04.2	P4602	23	-	04.4	Sub-D	7	-	-
4	W506	22 shld x3	750	orange	04.2	P4602	40	-	04.4	Sub-D	8	-	-
5	W507	22 shld x3	750	blue	04.2	P4602	37	-	04.4	Sub-D	3	-	-
6	W508	20	1450	white	01.1	-	-	31890	04.2	P4602	32	-	-
7	W509	20	1200	white	01.1	-	-	31890	BUS	-	-	31885	-
8	W510	20	1490	blue	04.2	P4602	15	-	GND2	-	-	31885	-
9	W511	P	P	black	04.2	P4602	49	-	04.2	P	P	-	-
10	W512	P	P	red	04.2	P4602	17	-	04.2	P	P	-	-
11	W513	P	P	yellow	04.2	P4602	50	-	04.2	P	P	-	-
12	W514	P	P	white	04.2	P4602	33	-	04.2	P	P	-	-
13	W516	22 shld x2	3150	white	02.3	P111	1	-	04.2	P4602	46	-	-
14	W517	22 shld x2	3150	blue	02.3	P111	2	-	04.2	P4602	45	-	-
15	W519	22	100	white	04.2	P4602	35	-	04.2	-	-	31890	End 2 Shield Block GND
16	W520	20	1220	white	01.1	-	-	31890	A BUS	-	-	31885	-
17	W521	20	2900	white	01.1	-	-	31890	02.3	P111	7	-	-
18	W522	20	2940	blue	02.3	P111	9	-	GND2	-	-	31885	-
19	W523	22 shld x2	650	white	09.2	P4502	46	-	09.4	P251	1	-	-
20	W524	22 shld x2	650	blue	09.2	P4502	45	-	09.4	P251	2	-	-
21	W525	22	100	white	04.2	P4602	25	-	04.2	P4602	34	-	-
22	W526	22	100	white	09.2	P4502	35	-	09.2	-	-	31890	End 2 Shield Block GND

No.	Label	Type (AWG)	Length mm	Colour (of tube)	End 1				End 2				note
					No.	Connector	pin	terminal	No.	Connector	pin	terminal	
23	W527	20	2490	white	01.1	-	-	31890	09.2	P4502	32	-	-
24	W528	20	1650	blue	09.2	P4502	15	-	GND2	-	-	31885	-
25	W529	20	1220	white	01.1	-	-	31890	A BUS	-	-	31885	-
26	W530	20	1220	white	01.1	-	-	31890	A BUS	-	-	31885	-
27	W531	20	2440	white	01.1	-	-	31890	09.4	P251	7	-	-
28	W532	20	1600	blue	09.4	P251	9	-	GND2	-	-	31885	-
29	W533	22 shld x2	2640	white	04.2	P4602	46	-	09.1	P241	1	-	-
30	W534	22 shld x2	2640	blue	04.2	P4602	45	-	09.1	P241	2	-	-
31	W535	22 shld x2	600	white	09.1	P241	1	-	09.2	P251	1	-	-
32	W536	22 shld x2	600	blue	09.1	P241	2	-	09.2	P251	2	-	-
33	W537	22 shld x3	2205	white	09.4	P252	1	-	13.5	-	-	-	end 2 on site
34	W538	22 shld x3	2205	orange	09.4	P252	2	-	13.5	-	-	-	end 2 on site
35	W539	22 shld x3	2205	blue	09.4	P252	3	-	13.5	-	-	-	end 2 on site
36	W544	22	100	blue	09.2	P4502	9	-	09.2	P4502	27	-	-
37	W545	22	100	blue	04.2	P4602	28	-	04.2	P4602	-	-	end 2 spliced with W534
38	W546	22	100	blue	04.2	P4602	10	-	04.2	P4602	27	-	-
39	W547	22 shld x3	P	white	09.4	P252	1	-	13.5	-	-	-	end 1 spliced with W537
40	W548	22 shld x3	P	blue	09.4	P252	2	-	13.5	-	-	-	end 1 spliced with W538
41	W549	22 shld x3	P	orange	09.4	P252	3	-	13.5	-	-	-	end 1 spliced with W539

SCALE VALID FOR MASTER DRAWING ONLY
DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED: DRAWING STANDARD: ISO 128

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS

MATERIAL					
WEIGHT					
SURFACE FINISH AND TREATMENT					
TOLERANCES	LINEAR				
TOLERANCES	ANGULAR				

REVISION	COMMENT	DRAWN BY	CHECKED BY	RELEASED BY	RELEASE DATE
A01	added ending lights, jump start plug	BD	PS	HOA	13 Mar 2019
A02	added ending lights, jump start plug	BD	PS	HOA	18 Mar 2019
A03	added ending lights, jump start plug	BD	PS	HOA	19 Mar 2019

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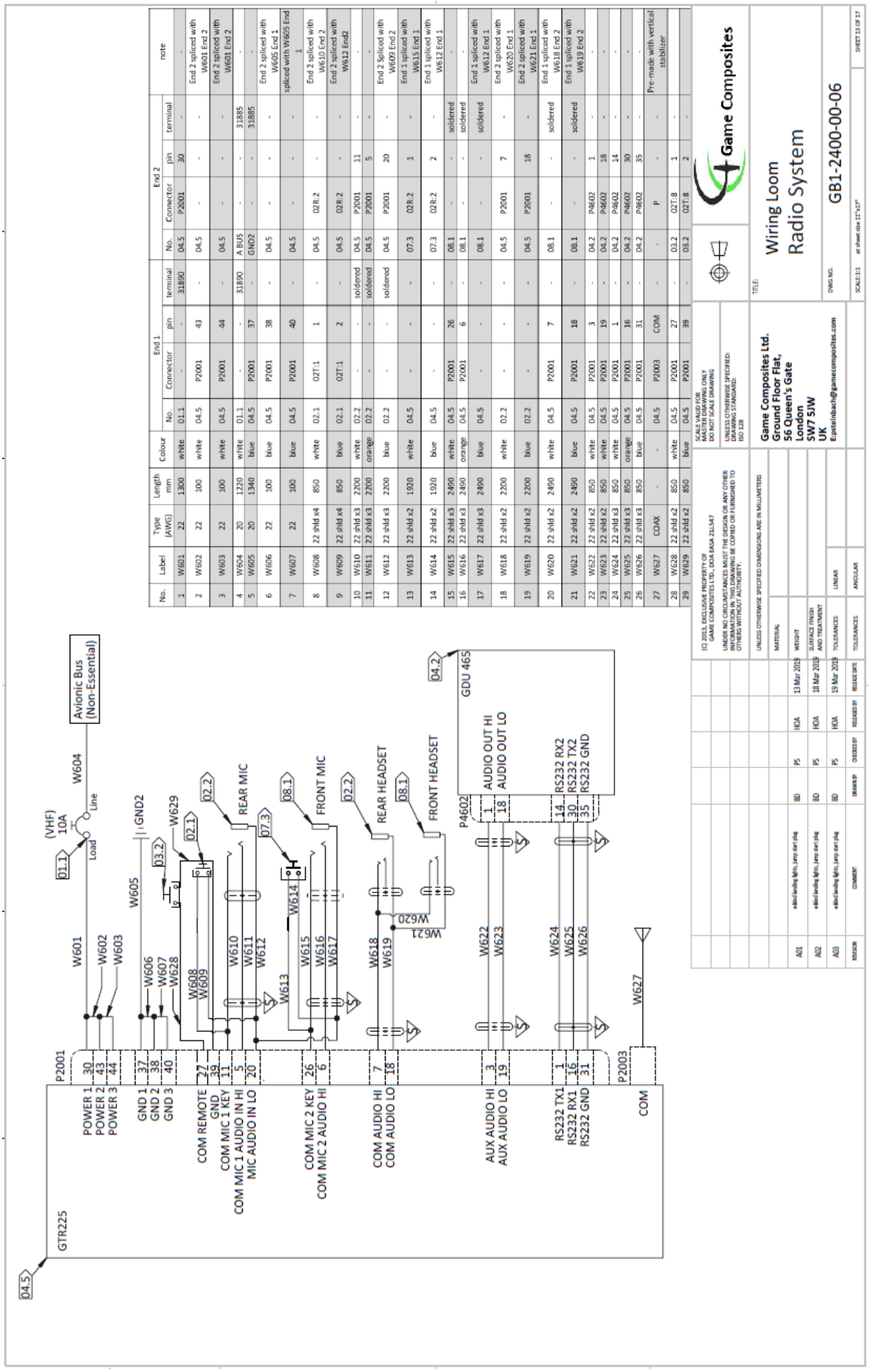
Game Composites

TITLE:
Wiring Loom
Avionic Network System

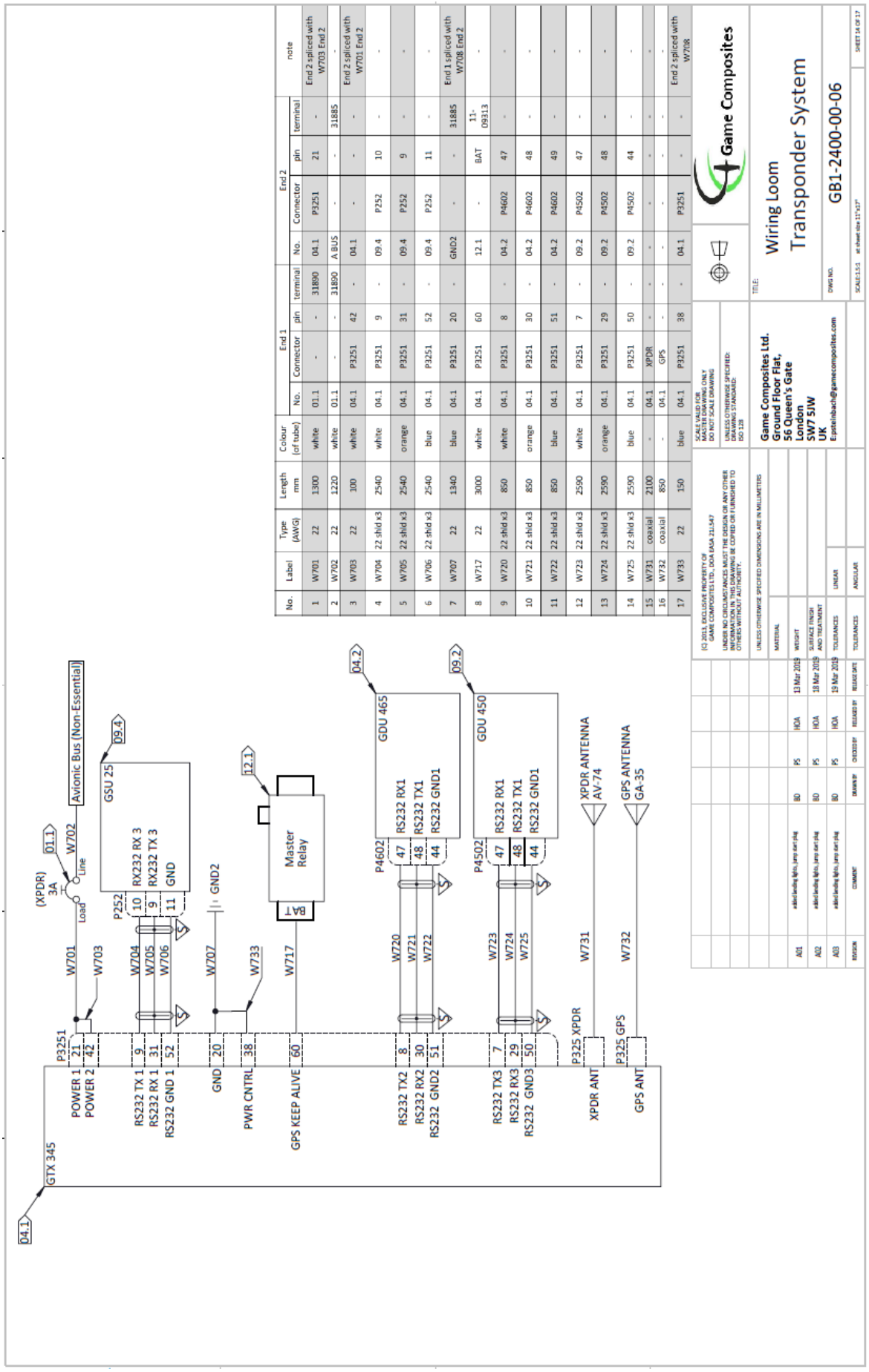
DWG NO. GB1-2400-00-06

SCALE 1:5.5 at sheet size 11"x17"

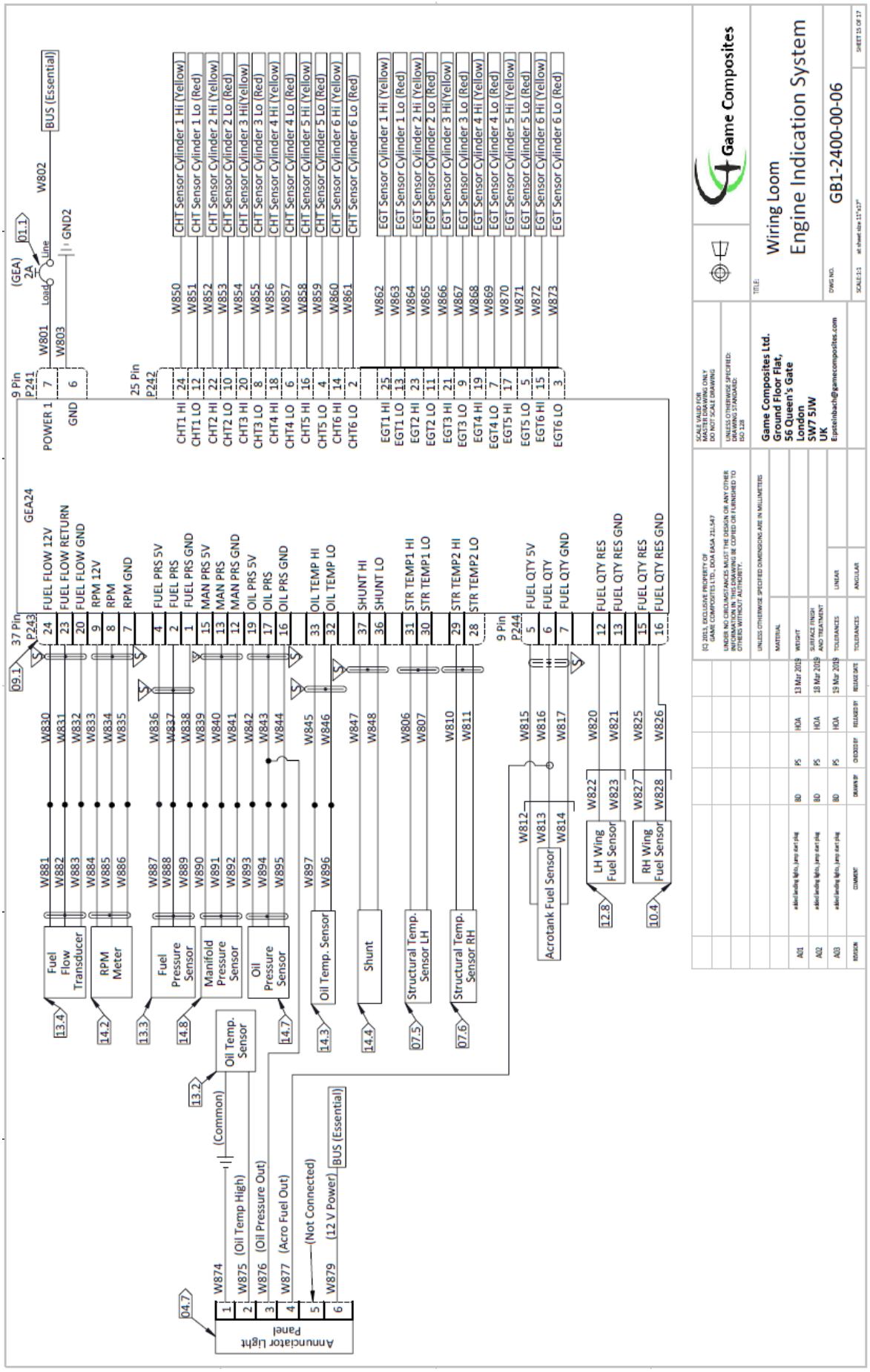
SHEET 12 OF 17



No.	Label	Type (AWG)	Length mm	Colour	End 1 No.	End 1 Connector	End 1 pin	End 1 terminal	End 2 No.	End 2 Connector	End 2 pin	End 2 terminal	note
1	W601	22	1300	white	01.1	-	-	31890	04.5	P2001	30	-	-
2	W602	22	100	white	04.5	P2001	43	-	04.5	-	-	-	End 2 spliced with W601 End 2
3	W603	22	100	white	04.5	P2001	44	-	04.5	-	-	-	End 2 spliced with W601 End 2
4	W604	20	1220	white	01.1	-	-	31890	A BUS	-	-	31885	-
5	W605	20	1340	blue	04.5	P2001	37	-	GND2	-	-	31885	-
6	W606	22	100	blue	04.5	P2001	38	-	04.5	-	-	-	End 2 spliced with W605 End 1
7	W607	22	100	blue	04.5	P2001	40	-	04.5	-	-	-	spliced with W605 End 1
8	W608	22 shld x4	850	white	02.1	O2T:1	1	-	04.5	O2R:2	-	-	End 2 spliced with W610 End 2
9	W609	22 shld x4	850	blue	02.1	O2T:1	2	-	04.5	O2R:2	-	-	End 2 spliced with W612 End2
10	W610	22 shld x3	2200	white	02.2	-	-	soldered	04.5	P2001	11	-	-
11	W611	22 shld x3	2200	orange	02.2	-	-	soldered	04.5	P2001	5	-	-
12	W612	22 shld x3	2200	blue	02.2	-	-	soldered	04.5	P2001	20	-	End 2 Spliced with W609 End 2
13	W613	22 shld x2	1920	white	04.5	-	-	-	07.3	O2R:2	1	-	End 1 spliced with W615 End 1
14	W614	22 shld x2	1920	blue	04.5	-	-	-	07.3	O2R:2	2	-	End 1 spliced with W612 End 1
15	W615	22 shld x3	2490	white	04.5	P2001	26	-	08.1	-	-	soldered	-
16	W616	22 shld x3	2490	orange	04.5	P2001	6	-	08.1	-	-	soldered	-
17	W617	22 shld x3	2490	blue	04.5	-	-	-	08.1	-	-	soldered	End 1 spliced with W612 End 1
18	W618	22 shld x2	2200	white	02.2	-	-	-	04.5	P2001	7	-	End 2 spliced with W620 End 1
19	W619	22 shld x2	2200	blue	02.2	-	-	-	04.5	P2001	18	-	End 2 spliced with W621 End 1
20	W620	22 shld x2	2490	white	04.5	P2001	7	-	08.1	-	-	soldered	End 1 spliced with W618 End 2
21	W621	22 shld x2	2490	blue	04.5	P2001	18	-	08.1	-	-	soldered	End 1 spliced with W619 End 2
22	W622	22 shld x2	850	white	04.5	P2001	3	-	04.2	P4602	1	-	-
23	W623	22 shld x2	850	white	04.5	P2001	19	-	04.2	P4602	18	-	-
24	W624	22 shld x3	850	white	04.5	P2001	1	-	04.2	P4602	14	-	-
25	W625	22 shld x3	850	orange	04.5	P2001	16	-	04.2	P4602	30	-	-
26	W626	22 shld x3	850	blue	04.5	P2001	31	-	04.2	P4602	35	-	-
27	W627	COAX	-	-	04.5	P2003	COM	-	-	P	-	-	Pre-made with vertical stabilizer
28	W628	22 shld x2	850	white	04.5	P2001	27	-	03.2	O2T:8	1	-	-
29	W629	22 shld x2	850	blue	04.5	P2001	39	-	03.2	O2T:8	2	-	-



No.	Label	Type (AWG)	Length mm	Colour (of tube)	End 1 No.	End 1 Connector	End 1 pin	End 1 terminal	End 2 No.	End 2 Connector	End 2 pin	End 2 terminal	note
1	W701	22	1300	white	01.1	-	-	31890	04.1	P3251	21	-	End 2 spliced with W703 End 2
2	W702	22	1220	white	01.1	-	-	31890	A BUS	-	-	31885	-
3	W703	22	100	white	04.1	P3251	42	-	04.1	-	-	-	End 2 spliced with W701 End 2
4	W704	22 shld x3	2540	white	04.1	P3251	9	-	09.4	P252	10	-	-
5	W705	22 shld x3	2540	orange	04.1	P3251	31	-	09.4	P252	9	-	-
6	W706	22 shld x3	2540	blue	04.1	P3251	52	-	09.4	P252	11	-	-
7	W707	22	1340	blue	04.1	P3251	20	-	GND2	-	-	31885	End 1 spliced with W708 End 2
8	W717	22	3000	white	04.1	P3251	60		12.1	-	BAT	11-09313	-
9	W720	22 shld x3	850	white	04.1	P3251	8	-	04.2	P4602	47	-	-
10	W721	22 shld x3	850	orange	04.1	P3251	30	-	04.2	P4602	48	-	-
11	W722	22 shld x3	850	blue	04.1	P3251	51	-	04.2	P4602	49	-	-
12	W723	22 shld x3	2590	white	04.1	P3251	7	-	09.2	P4502	47	-	-
13	W724	22 shld x3	2590	orange	04.1	P3251	29	-	09.2	P4502	48	-	-
14	W725	22 shld x3	2590	blue	04.1	P3251	50	-	09.2	P4502	44	-	-
15	W731	coaxial	2100	-	04.1	XPDR	-	-	-	-	-	-	-
16	W732	coaxial	850	-	04.1	GPS	-	-	-	-	-	-	-
17	W733	22	150	blue	04.1	P3251	38	-	04.1	P3251	-	-	End 2 spliced with W708


Game Composites
Wiring Loom
Engine Indication System
GB1-2400-00-06
Game Composites Ltd.
Ground Floor Flat,
56 Queen's Gate
London
SW7 5JW
UK
Epsteinbach@gamecomposites.com
GEA24
37 Pin P243
9 Pin P241
25 Pin P242
9 Pin P244
FUEL FLOW 12V
FUEL FLOW RETURN
FUEL FLOW GND
RPM 12V
RPM
RPM GND
FUEL PRS 5V
FUEL PRS
FUEL PRS GND
MAN PRS 5V
MAN PRS
MAN PRS GND
OIL PRS 5V
OIL PRS
OIL PRS GND
OIL TEMP HI
OIL TEMP LO
SHUNT HI
SHUNT LO
STR TEMP1 HI
STR TEMP1 LO
STR TEMP2 HI
STR TEMP2 LO
FUEL QTY 5V
FUEL QTY
FUEL QTY GND
FUEL QTY RES
FUEL QTY RES GND
FUEL QTY RES
FUEL QTY RES GND
POWER 1
GND
CHT1 HI
CHT1 LO
CHT2 HI
CHT2 LO
CHT3 HI
CHT3 LO
CHT4 HI
CHT4 LO
CHT5 HI
CHT5 LO
CHT6 HI
CHT6 LO
EGT1 HI
EGT1 LO
EGT2 HI
EGT2 LO
EGT3 HI
EGT3 LO
EGT4 HI
EGT4 LO
EGT5 HI
EGT5 LO
EGT6 HI
EGT6 LO
CHT Sensor Cylinder 1 Hi (Yellow)
CHT Sensor Cylinder 1 Lo (Red)
CHT Sensor Cylinder 2 Hi (Yellow)
CHT Sensor Cylinder 2 Lo (Red)
CHT Sensor Cylinder 3 Hi(Yellow)
CHT Sensor Cylinder 3 Lo (Red)
CHT Sensor Cylinder 4 Hi (Yellow)
CHT Sensor Cylinder 4 Lo (Red)
CHT Sensor Cylinder 5 Hi (Yellow)
CHT Sensor Cylinder 5 Lo (Red)
CHT Sensor Cylinder 6 Hi (Yellow)
CHT Sensor Cylinder 6 Lo (Red)
EGT Sensor Cylinder 1 Hi (Yellow)
EGT Sensor Cylinder 1 Lo (Red)
EGT Sensor Cylinder 2 Hi (Yellow)
EGT Sensor Cylinder 2 Lo (Red)
EGT Sensor Cylinder 3 Hi(Yellow)
EGT Sensor Cylinder 3 Lo (Red)
EGT Sensor Cylinder 4 Hi (Yellow)
EGT Sensor Cylinder 4 Lo (Red)
EGT Sensor Cylinder 5 Hi (Yellow)
EGT Sensor Cylinder 5 Lo (Red)
EGT Sensor Cylinder 6 Hi (Yellow)
EGT Sensor Cylinder 6 Lo (Red)
BUS (Essential)
GND2
(GEA) 2A
Load
Line
Fuel Flow Transducer
RPM Meter
Fuel Pressure Sensor
Manifold Pressure Sensor
Oil Pressure Sensor
Oil Temp. Sensor
Shunt
Structural Temp. Sensor LH
Structural Temp. Sensor RH
Acrotank Fuel Sensor
LH Wing Fuel Sensor
RH Wing Fuel Sensor
Oil Temp. Sensor
(Common)
(Oil Temp High)
(Oil Pressure Out)
(Acro Fuel Out)
(Not Connected)
(12 V Power)
BUS (Essential)
Annunciator Light Panel

No.	Label	Type (AWG)	Length mm	Colour (of tube)	End 1 No.	End 1 Connector	End 1 pin	End 1 terminal	End 2 No.	End 2 Connector	End 2 pin	End 2 terminal	note
1	W801	20	2390	white	01.1	-	-	31890	09.1	P241	7	-	-
2	W802	20	1200	white	01.1	-	-	31890	BUS	-	-	31885	-
3	W803	20	1550	blue	09.1	P241	6	-	GND2	-	-	31885	-
4	W806	22 shld x2	1350	white	07.5	-	-	-	09.1	P244	31	-	-
5	W807	22 shld x2	1350	blue	07.5	-	-	-	09.1	P244	30	-	-
6	W810	22 shld x2	1100	white	07.6	-	-	-	09.1	P244	29	-	-
7	W811	22 shld x2	1100	blue	07.6	-	-	-	09.1	P244	28	-	-
8	W812	P	400	red	-	03R:3	1	-	-	P	P	P	
9	W813	P	400	orang	-	03R:3	3	-	-	P	P	P	stand-alone
10	W814	P	400	black	-	03R:3	2	-	-	P	P	P	
11	W815	22 shld x3	300	white	09.1	P244	5	-	09.1	03T:3	1	-	-
12	W816	22 shld x3	300	orang	09.1	P244	6	-	09.1	03T:3	3	-	-
13	W817	22 shld x3	300	blue	09.1	P244	7	-	09.1	03T:3	2	-	-
14	W820	22 shld x2	1280	white	12.8	OCT:3	1	A25108-ND	09.1	P244	12	-	-
15	W821	22 shld x2	1280	blue	12.8	OCT:3	2	A25108-ND	09.1	P244	13	-	-
16	W822	22 shld x2	200	white	12.8	OCR:3	1	A25107-ND	12.8	P	P	P	-
17	W823	22 shld x2	200	blue	12.8	OCR:3	2	A25107-ND	12.8	P	P	P	-
18	W825	22 shld x2	970	white	10.4	OCT:4	1	A25108-ND	09.1	P244	15	-	-
19	W826	22 shld x2	970	blue	10.4	OCT:4	2	A25108-ND	09.1	P244	16	-	-
20	W827	22 shld x2	200	white	10.4	OCR:4	1	A25107-ND	10.4	P	P	P	-
21	W828	22 shld x2	200	blue	10.4	OCR:4	2	A25107-ND	10.4	P	P	P	-
22	W830	22 shld x3	1155	white	09.1	-	-	-	09.1	P243	24	-	-
23	W831	22 shld x3	1155	orange	09.1	-	-	-	09.1	P243	21	-	-
24	W832	22 shld x3	1155	blue	09.1	-	-	-	09.1	P243	20	-	-
25	W833	22 shld x3	1115	white	14.2	-	-	-	09.1	P243	9	-	-
26	W834	22 shld x3	1115	orange	14.2	-	-	-	09.1	P243	8	-	-
27	W835	22 shld x3	1115	blue	14.2	-	-	-	09.1	P243	7	-	-
28	W836	22 shld x3	1145	white	13.3	-	-	-	09.1	P243	4	-	-
29	W837	22 shld x3	1145	orange	13.3	-	-	-	09.1	P243	2	-	-
30	W838	22 shld x3	1145	blue	13.3	-	-	-	09.1	P243	1	-	-
31	W839	22 shld x3	1505	white	14.8	-	-	-	09.1	P243	15	-	-
32	W840	22 shld x3	1505	orange	14.8	-	-	-	09.1	P243	13	-	-
33	W841	22 shld x3	1505	blue	14.8	-	-	-	09.1	P243	12	-	-
34	W842	22 shld x3	1280	white	14.7	-	-	-	09.1	P243	19	-	-
35	W843	22 shld x3	1280	orange	14.7	-	-	-	09.1	P243	17	-	-
36	W844	22 shld x3	1280	blue	14.7	-	-	-	09.1	P243	16	-	-
37	W845	22 shld x2	1040	white	14.3	-	-	-	09.1	P243	33	-	-
38	W846	22 shld x2	1040	blue	14.3	-	-	-	09.1	P243	32	-	-
39	W847	22 shld x2	1125	white	14.4	-	-	-	09.1	P243	37	-	
40	W848	22 shld x2	1125	blue	14.4	-	-	-	09.1	P243	36	-	
41	W850	type K	2475	yellow	09.1	P242	24	-	-	-	-	-	
42	W851	type K	2475	orange	09.1	P242	12	-	-	-	-	-	
43	W852	type K	1975	yellow	09.1	P242	22	-	-	-	-	-	
44	W853	type K	1975	orange	09.1	P242	10	-	-	-	-	-	
45	W854	type K	2225	yellow	09.1	P242	20	-	-	-	-	-	
46	W855	type K	2225	orange	09.1	P242	8	-	-	-	-	-	stand-alone
47	W856	type K	1825	yellow	09.1	P242	18	-	-	-	-	-	
48	W857	type K	1825	orange	09.1	P242	6	-	-	-	-	-	
49	W858	type K	1875	yellow	09.1	P242	16	-	-	-	-	-	
50	W859	type K	1875	orange	09.1	P242	4	-	-	-	-	-	
51	W860	type K	1675	yellow	09.1	P242	14	-	-	-	-	-	
52	W861	type K	1675	orange	09.1	P242	2	-	-	-	-	-	

No.	Label	Type (AWG)	Length mm	Colour (of tube)	End 1 No.	End 1 Connector	End 1 pin	End 1 terminal	End 2 No.	End 2 Connector	End 2 pin	End 2 terminal	note
53	W862	type K	2475	yellow	09.1	P242	25	-	-	-	-	-	
54	W863	type K	2475	orange	09.1	P242	13	-	-	-	-	-	
55	W864	type K	1975	yellow	09.1	P242	23	-	-	-	-	-	
56	W865	type K	1975	orange	09.1	P242	11	-	-	-	-	-	
57	W866	type K	2225	yellow	09.1	P242	21	-	-	-	-	-	
58	W867	type K	2225	orange	09.1	P242	9	-	-	-	-	-	Stand-Alone
59	W868	type K	1825	yellow	09.1	P242	19	-	-	-	-	-	
60	W869	type K	1825	orange	09.1	P242	7	-	-	-	-	-	
61	W870	type K	1875	yellow	09.1	P242	17	-	-	-	-	-	
62	W871	type K	1875	orange	09.1	P242	5	-	-	-	-	-	
63	W872	type K	1675	yellow	09.1	P242	15	-	-	-	-	-	
64	W873	type K	1675	orange	09.1	P242	3	-	-	-	-	-	
65	W874	22	1180	white	04.7	Soldered	1	-	GND2	-	-	31890	
66	W875	22	2940	white	04.7	Soldered	2	-	13.2	-	-	31890	
67	W876	22	3110	white	04.7	Soldered	3	-	14.7	P243	17	-	Splice with W843
68	W877	22	2330	white	04.7	Soldered	4	-	09.1	P244	6	-	Splice with W816
69	W878	22	NC	white	NC	NC	5	NC	NC	NC	NC	NC	Not Connected
70	W879	22	1100	white	04.7	Soldered	6	-	BUS	-	-	31885	-
72	W881	P	-	red	13.4	P	-	-	13.4	Spliced	-	-	-
73	W882	P	-	white	13.4	P	-	-	13.4	Spliced	-	-	-
74	W883	P	-	black	13.4	P	-	-	13.4	Spliced	-	-	-
75	W884	P	-	orange	14.2	P	-	-	14.2	Spliced	-	-	-
76	W885	P	-	white	14.2	P	-	-	14.2	Spliced	-	-	-
77	W886	P	-	blue	14.2	P	-	-	14.2	Spliced	-	-	-
78	W887	P	-	red	13.3	P	-	-	13.3	Spliced	-	-	-
79	W888	P	-	green	13.3	P	-	-	13.3	Spliced	-	-	-
80	W889	P	-	black	13.3	P	-	-	13.3	Spliced	-	-	-
81	W890	P	-	red	14.8	P	-	-	14.8	Spliced	-	-	-
82	W891	P	-	green	14.8	P	-	-	14.8	Spliced	-	-	-
83	W892	P	-	black	14.8	P	-	-	14.8	Spliced	-	-	-
84	W893	P	-	red	14.7	P	-	-	14.7	Spliced	-	-	-
85	W894	P	-	green	14.7	P	-	-	14.7	Spliced	-	-	-
86	W895	P	-	black	14.7	P	-	-	14.7	Spliced	-	-	-
87	W896	P	-	black	14.3	P	-	-	14.3	Spliced	-	-	-
88	W897	P	-	black	14.3	P	-	-	14.3	Spliced	-	-	-

REVISION	COMMENT	DRAWN BY	CHECKED BY	RELEASED BY	RELEASE DATE
A01	added landing lights, jump start plug	BD	PS	HOA	13 Mar 2019
A02	added landing lights, jump start plug	BD	PS	HOA	18 Mar 2019
A03	added landing lights, jump start plug	BD	PS	HOA	19 Mar 2019

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS

MATERIAL | WEIGHT | SURFACE FINISH AND TREATMENT | TOLERANCES LINEAR | TOLERANCES ANGULAR

SCALE VALID FOR MASTER DRAWING ONLY
DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED: DRAWING STANDARD: ISO 128

Game Composites Ltd.
Ground Floor Flat,
56 Queen's Gate
London
SW7 5JW
UK
E:psteinbach@gamecomposites.com

Game Composites

TITLE: Wiring Loom
Engine Indication System

DWG NO. GB1-2400-00-06

SCALE:1:1 at sheet size 11"x17" | SHEET 16 OF 17

No.	Label	Type (AWG)	Length mm	Colour (of tube)	End 1 No.	End 1 Connector	End 1 pin	End 1 terminal	End 2 No.	End 2 Connector	End 2 pin	End 2 terminal	note
1	W901	20	1220	white	01.1	-	-	31890	A BUS	-	-	31885	-
2	W907	20	1150	white	01.1	-	-	31890	03.2	02R.7	1	-	End 1 spliced with W911 End 2 spliced W911 End 1
3	W908	20	-	white	-	02T.7	1	-	-	-	-	soldered	pre-made with throttle quadrant
4	W909	20	-	white	-	02T.7	2	-	-	-	-	soldered	-
5	W910	20	2665	white	03.2	02R.7	2	-	10.2	-	-	640903-1	-
6	W911	20	2665	white	01.1	-	-	31890	10.2	-	6(34)	640309-1	End 1 spliced with W907
7	W912	20	100	blue	10.2	-	-	640903-1	10.2	-	3(32)	-	End 2 spliced with W916 & W913
8	W913	20	300	blue	10.2	-	-	640903-1	10.2	-	4(14)	-	End 2 spliced with
9	W914	20	300	white	10.2	-	-	640903-1	10.2		9(31)	-	stand-alone
10	W915	20	300	white	10.2	-	-	640903-1	10.2		7(11)	-	
11	W916	20	1875	blue	10.2	-	-	31885	GND2	-	-	31885	End 1 spliced with W912 & W913
12	W917	P	-	black	10.2			-	-	-	-	-	stand-alone
13	W918	P	-	red	10.2			-	-	-	-	-	
14	W919	20	1100	white	01.1			31890	01.3			31890	
15	W920	20	2665	white	01.3			31890	10.2		A(A1)	31890	
16	W921	20	1875	blue	GND2			31890	10.2		B(A2)	31890	

24-04 Alternator

Location:	Engine backside, upper accessory pad
Type:	BC-410-H gear driven DC alternator
Accessories:	B&C adaptor plate VAC-2/6 and B&C gear shaft 72974
Manufacturer:	B&C Specialty Products 123 E. 4th Street POB B, Newton, KS 67114, USA www.bandc.aero

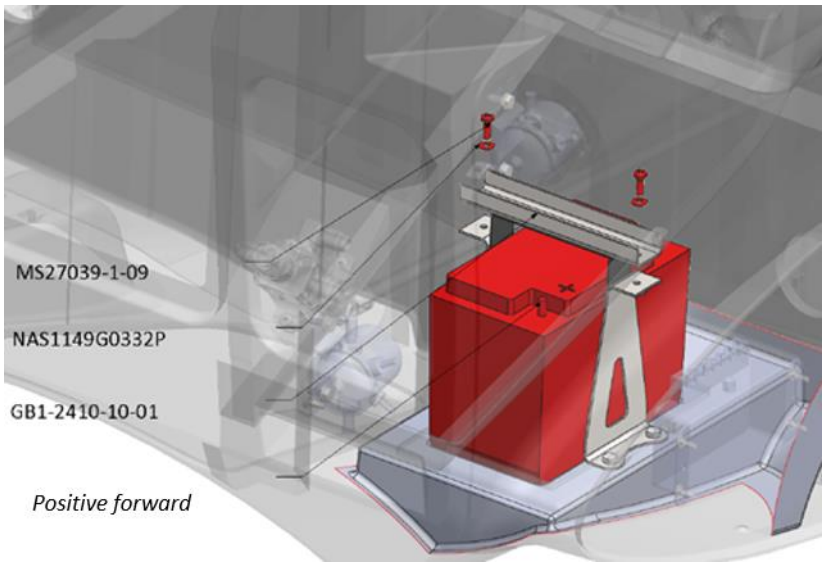
No regular maintenance is required for the unit. If defective, the unit must be replaced.
After no more than 1700hrs of operation, the unit must be replaced.

To service the alternator:

1. Remove connector plug
2. Remove 4 nuts (assembly is mounted on 4 studs, standing out of engine accessory case)
3. Slide alternator off backwards, remove from airplane
4. Slide out gear shaft, remove from airplane
5. Clean all components
6. If found defective, the unit must be replaced
7. Slide gear shaft in place
8. Slide alternator in place, ensure same 'clocked' installation orientation as before
9. Secure with 4 nuts, torque to 70 In-Lbs.
10. Apply torque seal to nuts
11. Plug in connector
12. Perform ground run, in accordance with AFM section 4.4, 4.6, 4.11
    check Ampere meter readouts: 15 amps @ 1400 engine RPM
    30 amps @ 1800 engine RPM

Signature

24-05 Battery



Type:	Odyssey Extreme PC535
Manufacturer:	EnerSys Inc. 2366 Bernville Road, Reading, PA 19605, USA www.odysseybattery.com

No regular maintenance is required for the unit.

The battery is located in the left front footwell.
The battery can be charged while installed.
For more details refer to the Odyssey Battery Technical Manual US-ODY-TM-002, December 2014.

To access the battery:

1. Remove the left-hand foot rest panel, refer to section 5-05
2. Disconnect battery leads
3. Remove battery tie-down
4. With Philips 2 screwdriver, remove fasteners and remove battery tiedown
5. Remove battery from airplane
6. Service or replace battery as required:
   For detailed instructions, refer to the Odyssey Battery Technical Manual
7. Reinstall reversing steps 1 – 5
8. Switch on Battery Master, check voltage and ampere readouts.

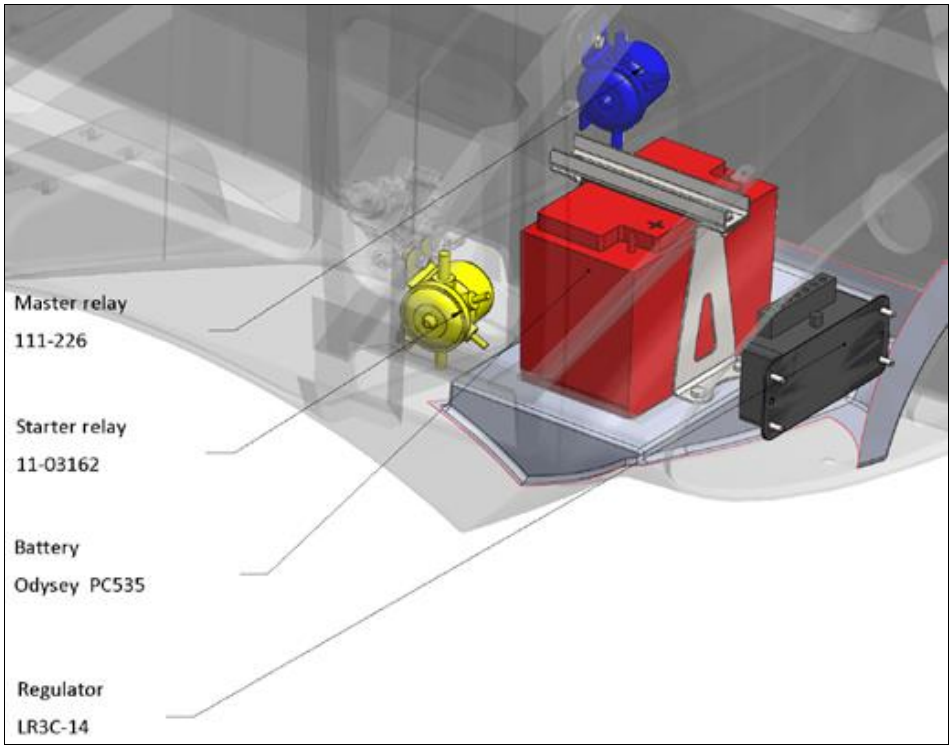
To disconnect battery leads:

1. Use 10mm socket and ratchet to disconnect ground (marked '**-**' on battery)
2. Use 10mm socket and ratchet to disconnect power (marked '**+**' on battery)

To connect battery leads:

1. Use 10mm socket and ratchet
   to connect power cable (marked 'W107') to power battery terminal (marked '**+**')
2. Use 10mm socket and ratchet
   to connect ground cable (marked 'W114') to ground battery terminal (marked '**-**')

For troubleshooting information see section 24-11 below.



24-06 Voltage Regulator

Location: Compartment under the left front leg support, root rib

Type: LR3C-14 Regulator

Manufacturer: B&C Specialty Products
123 E. 4th Street
POB B, Newton, KS 67114, USA
www.bandc.aero

No regular maintenance is required for the unit.

Refer to troubleshooting guide in the Technical Manual for model No. LR3C-14 Linear Regulator.
If required, get service conducted by approved maintenance facility as required.

To service the Voltage Regulator:

1. Remove the left-hand foot rest panel; refer to 5-05
2. Disconnect leads
3. Remove 4 fasteners
4. Remove Voltage Regulator from airplane
5. If required, get service conducted by approved maintenance facility as required.
6. Reinstall reversing steps 1 – 3
7. Perform ground run, in accordance with AFM section 4.4, 4.6, 4.11,
   check Ampere meter readouts: 15 amps @ 1400 engine RPM
   30 amps @ 1800 engine RPM

Signature

For troubleshooting information see section 24-11 below.

24-07 Master Relay

Location: Compartment under the left front leg support, tank support wall, behind Starter Relay

Type: 70-111226-6

Manufacturer: White-Rodgers
8100 West Florissant, PO Box 36922, St. Louis, MO 63136-9022, USA
www.emersonclimate.com

No regular maintenance is required for the unit. When defective, unit must be replaced.

To access the Master Relay:

1. Remove the left-hand foot rest panel; refer to 5-05
2. Disconnect battery
3. Disconnect leads
4. Remove fasteners
5. Remove Master Relay from airplane
6. Replace Master Relay if required
7. Reinstall reversing steps 1 – 4
8. Check for correct assembly
9. Function check: Switch on Battery Master, check if electric system gets activated

Signature

For troubleshooting information see section 24-11 below.

24-08 Starter Relay

Location: Compartment under the left front leg support, tank support wall, in front of Master Relay

Type: SNLS-1351

Manufacturer: UNIPOINT
8F, #105, Sec.2, Tun-Hwa S. Road, Taipei, TAIWAN
www.unipoint.com.tw

No regular maintenance is required for the unit. When defective, unit must be replaced.

To access the Starter Relay:

1. Remove the left-hand foot rest panel; refer to 5-05
2. Disconnect battery
3. Disconnect leads
4. Remove fasteners
5. Remove Starter Relay from airplane
6. Replace Starter Relay as required
7. Reinstall reversing steps 1 – 4
8. Check for correct assembly
9. Function Check:
    a. Battery Master ON
    b. Ensure Mixture is in CUTOFF position
    c. Prop area is CLEAR
    d. Activate starter for less than 2 seconds
    e. Battery Master OFF

Signature

For troubleshooting information see section 24-11 below.

24-09 External Power Socket

The GB1 is equipped with a Piper-Style external power socket, allowing the use of an external power source. Wiring requires the Battery Master Switch to be ON to apply external power.
The power source must be regulated to 12V DC.

The External Power Socket is an option.

Location:	Fuselage underside under the left front leg support, tank support wall,
Type:	11041 Piper Type Socket
Manufacturer:	Cole-Hersee 4 Garret Street Brendale Qld 4500, Australia www.colehersee.com.au

No regular maintenance is required for the unit. When defective, unit must be replaced.

For external power supply, the external power socket is accessible from the outside of the airplane.

To access the External Power Socket for maintenance:

1. Remove the left-hand foot rest panel; refer to 5-05
2. Disconnect battery
3. Disconnect leads
4. Remove fasteners
5. Remove External Power Socket from airplane
6. Replace External Power Socket if required
7. Reinstall reversing steps 1 – 5
8. Check for correct assembly
9. Function check:
    a. Connect 12V external power source to External Power Socket
    b. Switch on Battery Master
    c. On MFD1, check if indicated voltage equals external power source voltage

Signature

For troubleshooting information see section 24-11 below.

24-10 Electrical System Inspection Guide

Wires / wiring harness

1. Check for broken, disconnected or corroded bonding strap and grounding
2. Check for Improper, broken, inadequately supported wiring and conduit and loose connections of terminals. Check conditions of clamps, plastic cable ties and rubber grommets. Clamp retaining screws should be properly secured. Cables in the positions of cable ties should show no sign of damage. Rubber grommets should be securely installed in holes.
3. Ensure wires passing through firewall fairleads are properly sealed with PPG P/S 890 Class B (refer to section 24-03).
4. Check interference between wires and control mechanism, specifically, front rudder pedal adjusters and bellcranks, center rudder bellcranks, and control sticks.
5. If any electrical devices or signals are removed permanently or temperately, ensure that wires left open accordingly are individually dead-ended, tied into a bundle and secured to a permanent structure.
6. Wiring must be replaced with equivalent wire when found to have any of the following defects:
   - Wiring that has been subjected to chafing or fraying, that has been severely damaged, or that primary insulation is suspected of being penetrated.
   - Wiring on which the outer insulation is brittle to the point that slight flexing causes it to crack.
   - Wiring having weather-cracked outer insulation.
   - Wiring that is known to have been exposed to electrolyte or on which the insulation appears to be, or is suspected of being, in an initial stage of deterioration due to the effects of electrolyte.
   - Check wiring that shows evidence of overheating for the cause of the overheating.
   - Wiring on which the insulation has become saturated with engine oil, hydraulic fluid or other lubricant.
   - Shielded wiring on which the metallic shield is frayed and/or corroded. Cleaning agents or preservatives should not be used to minimize the effects of corrosion or deterioration of wire shields.
   - Wiring showing evidence of breaks, cracks, dirt, or moisture in the plastic sleeves placed over wire splices or terminal lugs.
7. When required, wires must be replaced in accordance with wiring diagrams in section 24-03. Choose unshielded wires from table below:

Document	Voltage rating (maximum)	Rated wire temperature (°C)	Insulation Type	Conductor type
MIL-W-22759/1	600	200	Fluoropolymer insulated TFE and TFE coated glass	Silver coated copper
MIL-W-22759/2	600	260	Fluoropolymer insulated TFE and TFE coated glass	Nickel coated copper
MIL-W-22759/3	600	260	Fluoropolymer insulated TFE -glass-TFE	Nickel coated copper
MIL-W-22759/4	600	200	Fluoropolymer insulated TFE -glass-FEP	Silver coated copper
MIL-W-22759/5	600	200	Fluoropolymer insulated extruded TFE	Silver coated copper
MIL-W-22759/6	600	260	Fluoropolymer insulated extruded TFE	Nickel coated copper
MIL-W-22759/7	600	200	Fluoropolymer insulated extruded TFE	Silver coated copper
MIL-W-22759/8	600	260	Fluoropolymer insulated extruded TFE	Nickel coated copper
MIL-W-22759/9	1000	200	Fluoropolymer insulated extruded TFE	Silver coated copper
MIL-W-22759/10	1000	260	Fluoropolymer insulated extruded TFE	Nickel coated copper
MIL-W-22759/13	600	135	Fluoropolymer insulated FEP PVF2	Tin coated copper,
MIL-W-22759/16	600	150	Fluoropolymer insulated extruded ETFE	Tin coated copper,
MIL-W-22759/17	600	150	Fluoropolymer insulated extruded ETFE	Silver coated high strength copper alloy
MIL-W-22759/20	1000	200	Fluoropolymer insulated extruded TFE	Silver coated high strength copper alloy
MIL-W-22759/21	1000	260	Fluoropolymer insulated extruded TFE	Nickel coated high strength copper alloy
MIL-W-22759/34	600	150	Fluoropolymer insulated crosslinked modified ETFE	Tin coated copper
MIL-W-22759/35	600	200	Fluoropolymer insulated crosslinked modified ETFE	Silver coated high strength copper alloy
MIL-W-22759/41	600	200	Fluoropolymer insulated crosslinked modified ETFE	Nickel coated copper
MIL-W-22759/42	600	200	Fluoropolymer insulated crosslinked modified ETFE	Nickel coated high strength copper alloy
MIL-W-22759/43	600	200	Fluoropolymer insulated crosslinked modified ETFE	Silver coated copper
MIL-W-25038/3/2/	600	260	See specification sheet *	See specification sheet
MIL-W-81044/6	600	150	Crosslinked polyalkene	Tin coated copper
MIL-W-81044/7	600	150	Crosslinked polyalkene	Silver coated high strength copper alloy
MIL-W-81044/9	600	150	Crosslinked polyalkene	Tin coated copper
MIL-W-81044/10	600	150	Crosslinked polyalkene	Silver coated high strength copper alloy

Choose shielded wires from the table below:

Document	Voltage rating (maximum)	Rated wire temperature (°C)	Insulation Type	Conductor type
MIL-W-22759/11	600	200	Fluoropolymer insulated extruded TFE	Silver coated copper
MIL-W-22759/12	600	260	Fluoropolymer insulated extruded TFE	Nickel coated copper
MIL-W-22759/14	600	135	Fluoropolymer insulated FEP-PVF2	Tin coated copper
MIL-W-22759/15	600	135	Fluoropolymer insulated FEP-PVF2	Silver plated high strength copper alloy
MIL-W-22759/18	600	150	Fluoropolymer insulated extruded ETFE	Tin coated copper
MIL-W-22759/19	600	150	Fluoropolymer insulated extruded ETFE	Silver coated high strength cop-per alloy
MIL-W-22759/22	600	200	Fluoropolymer insulated extruded TFE	Silver coated high strength cop-per alloy
MIL-W-22759/23	600	260	Fluoropolymer insulated extruded TFE	Nickel coated high strength cop-per alloy
MIL-W-22759/32	600	150	Fluoropolymer insulated crosslinked modified ETFE	Tin coated copper
MIL-W-22759/33	600	200	Fluoropolymer insulated crosslinked modified ETFE	Silver coated high strength cop-per alloy
MIL-W-22759/44	600	200	Fluoropolymer insulated crosslinked modified ETFE	Silver coated copper
MIL-W-22759/45	600	200	Fluoropolymer insulated crosslinked modified ETFE	Nickel coated copper
MIL-W-22759/46	600	200	Fluoropolymer insulated crosslinked modified ETFE	Nickel coated high strength cop-per alloy
MIL-W-81044/12	600	150	Crosslinked polyalkene - PVF2	Tin coated copper
MIL-W-81044/13	600	150	Crosslinked polyalkene - PVF2	Silver coated high strength cop-per alloy
MIL-W-81381/17	600	200	Fluorocarbon polyimide	Silver coated copper
MIL-W-81381/18	600	200	Fluorocarbon polyimide	Nickel coated copper
MIL-W-81381/19	600	200	Fluorocarbon polyimide	Silver coated high strength cop-per alloy
MIL-W-81381/20	600	200	Fluorocarbon polyimide	Nickel coated high strength cop-per alloy
MIL-W-81381/21	600	150	Fluorocarbon polyimide	Tin coated copper

Connectors, terminals and splices

1. Check condition of connectors for security and sign of overheating, causing poor connection between wire(s) and pin(s).
2. Ensure all connectors are fully mated.
3. Check all contact pins are in position, no missing or misaligned pins.
4. List of connectors:
   - Elevator trim servo connector, located between stabilizer and LH elevator
   - Anti-Collision Lights connectors, located between LH wing and fuselage
   - Aileron trim servo connector, located behind RH aft side panel
   - Push To Talk momentary switches, connectors located on the bottom of each control stick
   - Smoke switch, located on the bottom of the rear throttle quadrant assembly
   - Trim control and indication, located behind LH aft side panel
   - OAT sensor connector, located inside top end of LH landing gear leg fairing
5. Visually check condition of splicing of engine sensors.
   Re-crimp as required, including when insulation is damaged.
6. Check sign of loose crimping of terminals. Replace as required.

Terminal blocks and studs

1. Check bus terminal blocks and studs for general condition and security of all attachments and terminals. Terminal blocks that exhibit corrosion, even in limited amounts, should be disassembled and cleaned before reinstallation. Bigfoot studs cannot be removed.
2. Ensure nuts on all studs are tight.
3. Check labels of terminal blocks and Bigfoot studs against wiring diagrams in section 24-03. Replace if legibility becomes questionable.

Grounding

1. Measure resistance between GND1, GND2, GND3 and engine mount. A very small value is expected (in a scale of 10^{-2} Ω)
2. Check all GND studs are free from paint, dirt, oil or corrosion.
3. Only use galvanized or aluminum washers on GND studs.

Fuses/diodes and fuse/diode holders

1. Check security of connections to holders.
2. Inspect for the presence of corrosion and evidence of overheating on fuses/diodes and holders. If evidence of overheating is found, check correct ratings. Replace as required according to the wiring diagrams in section 24-03.

Circuit breakers and toggle switches

1. Replace as required, when frequent tripping is observed.

Battery

1. Battery: manufacturer's recommendation must be followed.
2. Check condition of battery clamps for sign of damage.
3. Inspect battery terminals and quick-disconnect charging plug for evidence of corrosion, pitting, arcing and burns.
4. Clean clamps and terminals as required.

24-11 Electrical System Troubleshooting Guide

Before troubleshooting for any sub-systems or equipment:

1. Ensure the battery is fully charged. Lack of power voltage may result in inaccurate measurement.
2. Turn all switches OFF. Measure the resistance between:
   - Battery negative terminal (-) and ground stud GN1 in battery compartment;
   - Battery negative terminal (-) and ground stud GN2 behind RH rear side console cover;
   - Battery negative terminal (-) and engine case.

   Measurements over 0.5 Ohm would be cause for investigation. In this case, check the engine ground wire, battery ground wire and wire between GN1 and GN2 for loose or contaminated connections, broken conductors or bad crimp joins. If the measurements are less than 0.5 Ohm, any of these 4 points may be used as reference (-) for subsequent measurements.
3. Turn all switches OFF. Measure resistance between BUS1 in the battery compartment and BUS2 behind RH rear side console cover. Measurements should be investigated as above.

Battery

If battery does not provide enough power to start the engine:

Check for shortcut in the aircraft electrical system: Turn all switches to OFF. Fully charge battery. Connect ampere meter in series between stud GN1 or engine case to battery ground (-). Use range not greater than 1 amp.

Any reading other than 0 indicates a drain in the electrical system.

Voltage Regulator

When battery is not charged during normal operation or in case of abnormally high or low charging current:

1. Turn on master switch **BAT** and **ALT**, and circuit breaker **Field**. Measure voltage on battery bus and on pin 6 of the regulator. The voltages should be equal within 0.5V. A difference of greater than 0.5V may be caused by poor contacts in the circuit breaker, or poor crimp joints/loose terminals in the wiring between the bus and pin 6. No voltage on pin 6 will prevent the regulator from operating.
2. Measure voltage on pin 4 of the regulator. The voltage should be approximately 1.2 volt less than that on pin 6. A difference significantly less than 1.2V between pins 4 and 6 may indicate an open field circuit from pin 4 through the alternator ground (-). Voltage differences of several volts could indicate a faulty regulator. Ideal pin 4 voltage is 10.9 to 11.4 on a 12.6-volt bus.
3. Without disconnecting the field connector, measure the field voltage on the alternator. Use a thin probe or small gage wire wrapped around the probe to reach through the connector body and measure the voltage on the male blade coming out of the alternator. It should measure within 0.5V of the measurement on pin 4 of the regulator. A lack of voltage may indicate an open circuit between pin 4 of the regulator and the field terminal. If an open field circuit is suspected, turn system OFF, disconnect alternator field connector, and measurement resistance between the connector and pin 4 of the regulator. Look for near 0 Ohms. Typically, the field resistance of the alternator will be between 3 and 10 Ohms from the male field terminal blade to alternator case.
4. With switches ON, check the voltage between the alternator output post (or B-lead) and ground. It should be battery voltage. If not, check the wiring between the alternator B-lead and the battery positive (+) terminal. Look for loose or contaminated connections, broken wires or an open breaker or fuse.
5. If all of the voltages in the steps above are close to the value specified, the charging system should be operative. If not, check for broken or loose alternator drive.

Master Relay

When no power supply to any part of the electrical system:

1. Turn all switches OFF. Turn on BAT switch and listen for a clicking sound from the master relay.
2. If relay does not click, measure battery voltage to verify battery condition.
3. If battery is operational, measure voltage on the terminal of the relay connected to battery positive (+). The measurement should be equal to the battery voltage. If not, there may be a problem with the cable, crimps or terminal connection.
4. When battery provides sufficient power and connection from battery to the relay is OK, the relay may be damaged.
5. If the relay engages when **BAT** switched on, measure the voltage on the output terminal of the relay. The measurement should equal to the battery voltage. If not, the relay is damaged.

Starter Relay

Insufficient power to crank the engine:

1. Disconnect the relay from the circuit. Measure the resistance between the two bigger terminals with appropriate ohmmeter scale. The ohmmeter should show high reading. If the reading is low, replace the relay.
2. Attach a positive battery jumper to one of the two smaller terminals and a negative battery jumper to the other. The relay should engage (make a click sound). If not, replace the relay.
3. Measure the resistance between the two smaller terminals with the relay engaging. The ohmmeter should show a low reading. If not, replace the relay.
4. After installation, measure the resistance between the ground and the relay case. A very low or 0 reading is expected. If the measurement is high, check the connection of the grounding wire from the relay foot to GND1.

Boost Pump

When the pump does not prime:

1. Turn ON BAT master switch.
   Turn on toggle switch Boost Pump and measure voltage on the power cables of the pump.
   A voltage not lower than 11V is required for the pump to work.
2. Readouts between 11V and 12V may indicate poor connections to the pump.

Anti-collision / Recognition Lights

1. When any light does not work, check connections of the wires on the light.
2. If the connection, wiring or CB switch are not the cause, the light needs to be replaced.

Smoke System

1. Switch on BAT master switch and circuit breaker **Smoke**. Switch on Smoke switch on throttle.
   Measure voltage on power cables on the pump. Check connection conditions if the measurement is significantly lower than battery voltage.
2. While neither of the smoke tanks is full, switch on BAT master switch and toggle switch Smoke Refill.
   Listen for the engaging click of the relay in the smoke pump compartment.
   If the relay does not engage, it may be a defect.

25 Equipment and Furnishings

25-01 Cleaning

All upholstery components are covered with Ultraleather.

- Wipe up spills as soon as possible
- Clean with soap and water or alcohol based cleaner
- Sanitize using (1:5) bleach/water solution
- For stubborn stains, wipe off with isopropyl alcohol as soon as possible
- Thoroughly rinse all solution residue with clean water
- Air dry

25-02 Seat Cushion, rear seat – GB1-2520-01-00

This seat cushion is part of the occupant protection system and may not be changed or modified.
It is fixed to the seat with Velcro and can be removed for cleaning.
For repair instructions, contact Game Composites.

25-03 Seat Cushion, front seat – GB1-2520-02-00

This seat cushion is part of the occupant protection system and may not be changed or modified.
It is fixed to the seat with Velcro and can be removed for cleaning.
For repair instructions, contact Game Composites.

25-04 Side pocket rear seat, left-hand – GB1-2520-13-00

Installed with Sikaflex, the airplane can be safely operated with or without.

25-05 Side pocket rear seat, right-hand - GB1-2520-14-00

Installed with Sikaflex, the airplane can be safely operated with or without.

25-06 Side pocket front seat, left-hand – GB1-2520-11-00

Installed with Sikaflex, the airplane can be safely operated with or without.

25-07 Side pocket front seat, right-hand - GB1-2520-12-00

Installed with Sikaflex, the airplane can be safely operated with or without.

25-08 Side panel rear seat, left-hand – GB1-2520-15-00

Installed with AN525-832-R9 fasteners (Phillips 2 screwdriver required)

25-09 Side panel rear seat, right-hand - GB1-2520-16-00

Installed with AN525-832-R9 fasteners (Phillips 2 screwdriver required)

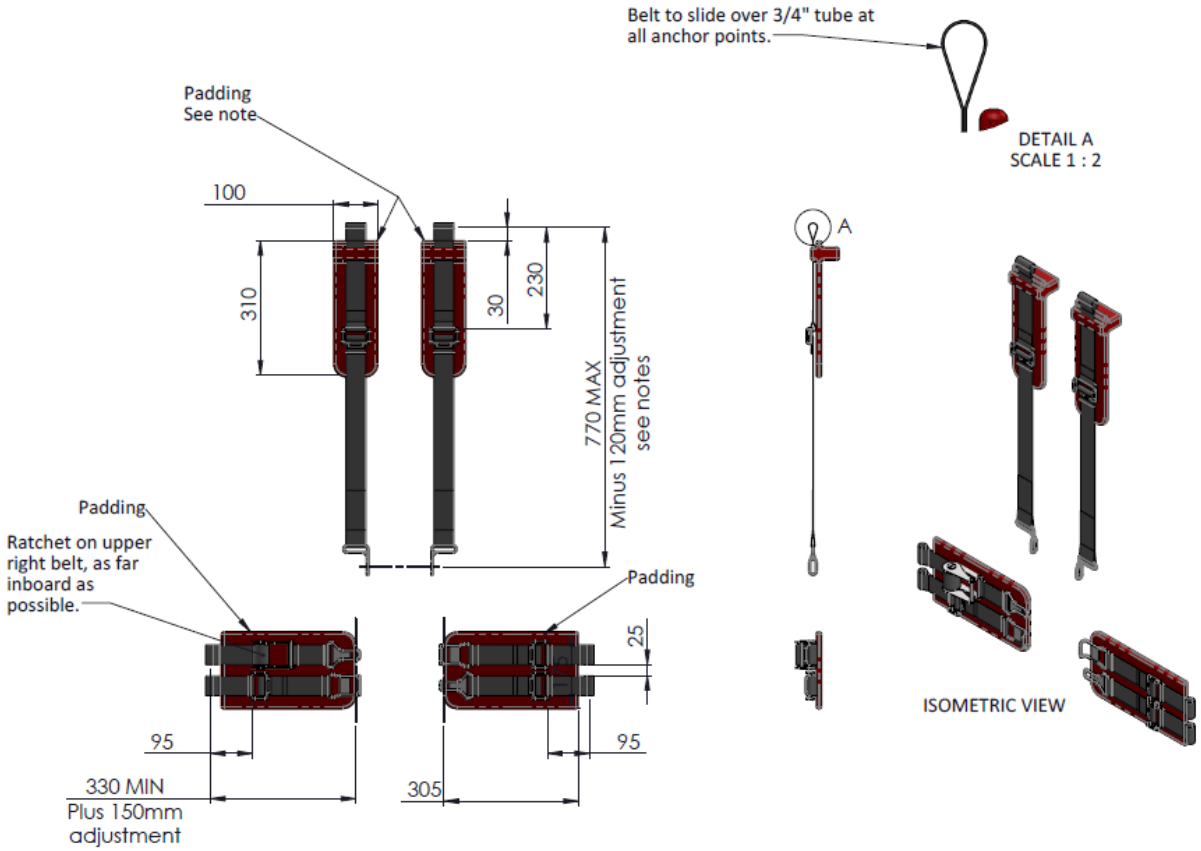
25-10 Side panel front seat, left-hand - GB1-2520-17-00

Installed with AN525-832-R9 fasteners (Phillips 2 screwdriver required)

25-11 Side panel front seat, right-hand - GB1-2520-18-00

Installed with AN525-832-R9 fasteners (Phillips 2 screwdriver required)

25-12 Seat belts – GB1-2500-10-00



Manufacturer Hooker Custom Harness, Inc.
324 East Stephenson St
Freeport, Illinois 61032, USA
www.hookerharness.com

The Equipment Manufacturer recommends replacement / repair of harness systems based upon condition not physical age. Some governing agencies require replacement based upon age regardless of condition (10 years is common).
The main areas of inspection are:

1. **Webbing:**
   - A. Frayed, torn, cut, or fuzzy. Minor fraying is permissible.
   - B. Severe fading or discoloration. This is a sign of ultraviolet (UV) damage. If the exposed area of the webbing is more than 2 shades different than unexposed area, replacement is needed.
   - C. Creased, chafed, or otherwise damaged
   - D. Bunching of webbing due to not pulling straight through hardware
   - E. Chemical exposure or other spotting
2. **Hardware:**
   - A. Corrosion or rust
   - B. Plating missing or flaking off
   - C. Bent
   - D. Inoperable buckles, difficulty latching or unlatching
   - E. Broken lid on lift-latch buckles
   - F. Inoperable springs
   - G. Missing or otherwise damaged components (elastic keepers and pull tabs are not considered as required components)

3. **Stitching:**
   A. Broken or missing stitches
   B. Severe fading or discoloration. (see 1B above)
   C. Inconsistent pattern or thread size. Structural thread size should be the same throughout the entire harness. Irregular patterns or varied sizes may be indicative of field modification.
4. **Labels:**
   A. Missing or damaged
   B. Illegible

If any of the above damage exists the belts should be replaced or repaired.
Repairs must be performed by an authorized facility which must be capable of returning the belts to the original design configuration. In most cases if there is webbing and hardware damage, it will be more economical to replace rather than repair.
Any questions about serviceability of the harnesses should be directed to the original manufacturer for determination.

Rear seat shoulder belt

1. For access to the shoulder belt retaining tube, open the baggage door
2. Remove the two screws at the top of the seat which attach the shoulder belt tube to the fuselage
3. Maneuver the tube to allow the shoulder belt to be slid off
4. Conduct service as required
5. Slide belts through bulkhead opening, over retaining tube
6. Install fasteners to keep retaining tube in place
7. Check for correct assembly

Signature

Lap belt rear seat

1. Through the service panel in the baggage bay floor, remove retainer screw to allow lap belt retaining tube to slide backwards
2. Slide lap belt retaining tube back
3. Remove belt
4. Conduct service as required
5. Slide belts in place, push retaining tube fully in, rotate retaining latch in place
6. Install fastener
7. Check for correct assembly

Signature

Front shoulder belt

1. For the front seat to access the shoulder belt bar, remove the antenna cover from the top of the rear instrument panel
2. Remove the two screws at the top of the seat which attach the shoulder belt tube to the fuselage
3. Maneuver the tube to allow the shoulder belts to be slid off
4. Conduct service as required
5. Slide belts through bulkhead opening, over retaining tube
6. Install fasteners to keep retaining tube in place
7. Reinstall antenna cover
8. Check for correct assembly

Signature

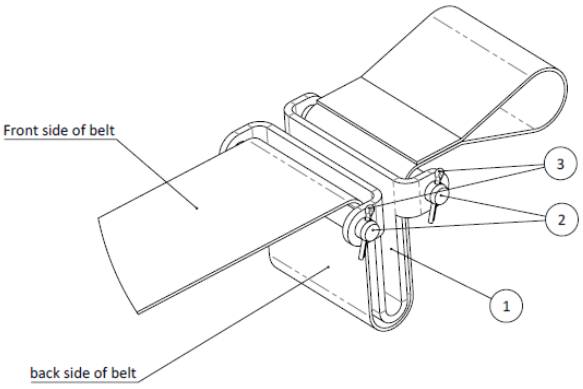
Lap belt front seat

1. Through rear cockpit foot wells, remove AN3 retainer screw to allow retaining tube to slide backwards
2. Slide lap belt retaining tube back
3. Remove belt
4. Conduct service as required
5. Slide belts in place, push retaining tube fully in, rotate retaining latch in place
6. Install fastener
7. Check for correct assembly

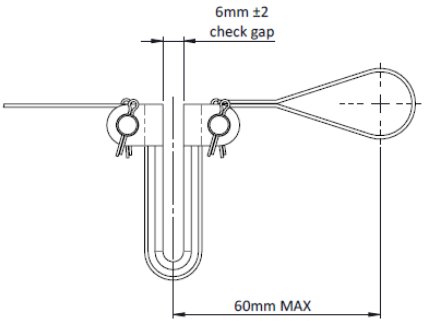
Signature

Load Limiters

(integrated into front and rear shoulder belts)



ITEM NO.	PART NUMBER	DESCRIPTION	Default/Q TY.
1	GB1-2500-20-02	Harness Load LImiter, V plate	2
2	MS20392-3C73	Pin, Clevis, 1/4" OD x 2 9/32"	4
3	MS24665-151	Split Pin 1/16" x 0.5" Lg SS	4



1. Open / remove padding
2. Remove pins
3. Take out Load Limiter, check for overall condition
4. check gap 6 mm, ± 2 mm; When gap is out of tolerance, replace part.
5. To reinstall, reverse steps 1 to 3.
6. Check for correct assembly

Signature

25-13 Fire Extinguisher

Installed in the LH footwell of the rear cockpit,
held in place by a latched fixture.

Type: HG100

Manufacturer: H3R Performance
483 Magnolia Ave., Larkspur, CA94939, USA
www.h3r.com

Handling and maintenance instructions are contained by the label on the fire extinguisher.

27 Flight Controls

27-01 Description

This chapter describes the design, operation and adjustment of the flight control system assemblies.
Refer to the relevant sub-chapters for specific information about each system.
The airplane has conventional mechanical stick and rudder flight control systems.

The rudder pedal assemblies are linear motion, roller-mounted sleds running on rails.
Pedal motion is transmitted by rods via the four pedal bellcranks to a single central bellcrank then by cables to the rear bellcrank.
The rudder pedal positions are individually adjustable via telescopic steel square tubes sliding inside each other and locked in position by spring plungers.
There are four rudder travel stops, one at each front bellcrank and two at center rear bellcrank.
The rudder is mounted to the vertical tail through three hinge points and a single steel hinge pin.
The only adjustable items in the rudder control circuit are the cables via their turnbuckles.

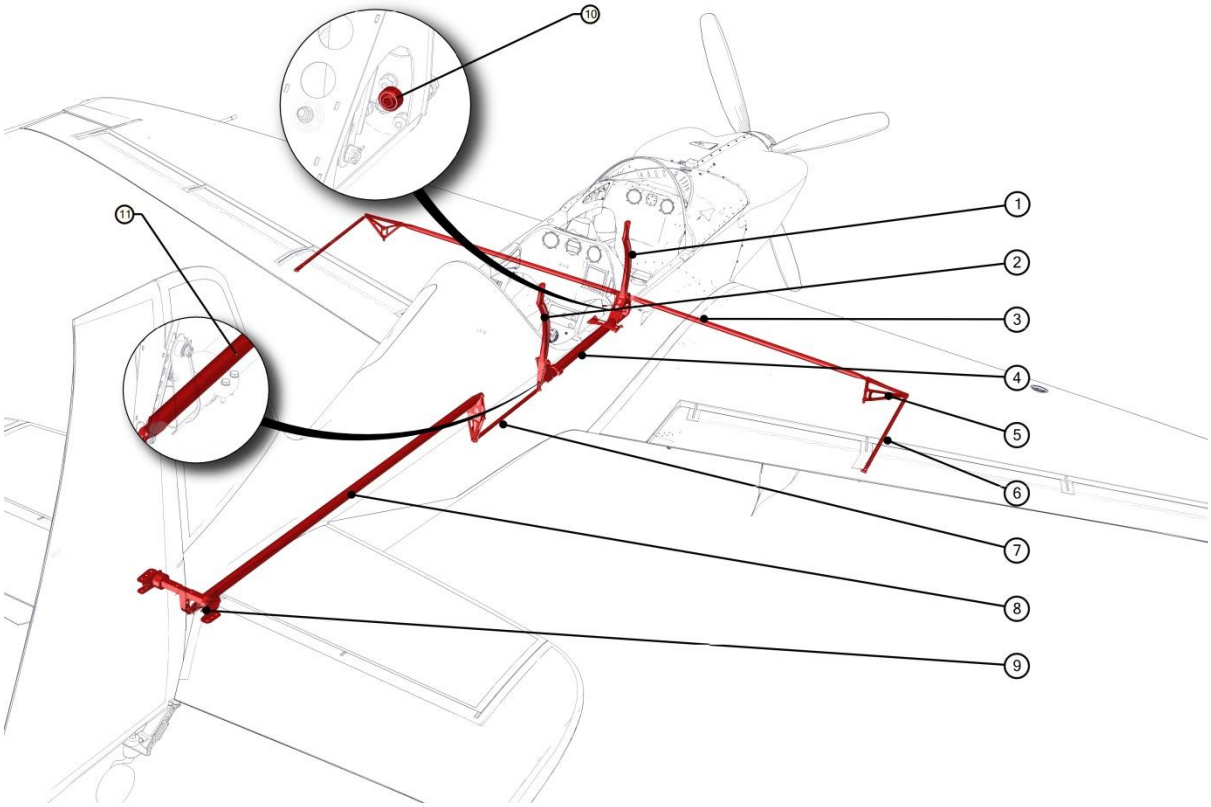
The ailerons are mechanically linked to the control sticks by rods, bellcranks and the torque tube.
Each aileron is mounted to four hinge points by one hinge pin.
Aileron movement is limited through two elastomeric stops mounted on the fuselage structure in the front cockpit so as to limit torque tube rotation.
The only adjustable item in the aileron control circuit are Aileron control rods, bellcrank to aileron - GB1-2717-40-00.

The elevators are operated through the torque tube, 2 push-pull rods, an idler and the elevator connector.
Each elevator is mounted to the horizontal tail through two hinge points and one hinge pin each, the fuselage-mounted elevator connector serves as the inner hinge point.
Each elevator has an integrated mass balance weight bonded in the leading edge of the aerodynamic horn.
The elevator travel stops are located inside the torque tube.
None of the elevator control circuit elements are adjustable.

The elevator and aileron trim tabs are operated by an electric servo each, mounted in the left-hand elevator and right-hand aileron respectively.
They are controlled via a coolie hat switch on the rear cockpit left-hand side console.
Trim position indication is provided via 2 LED displays adjacent to the switch.

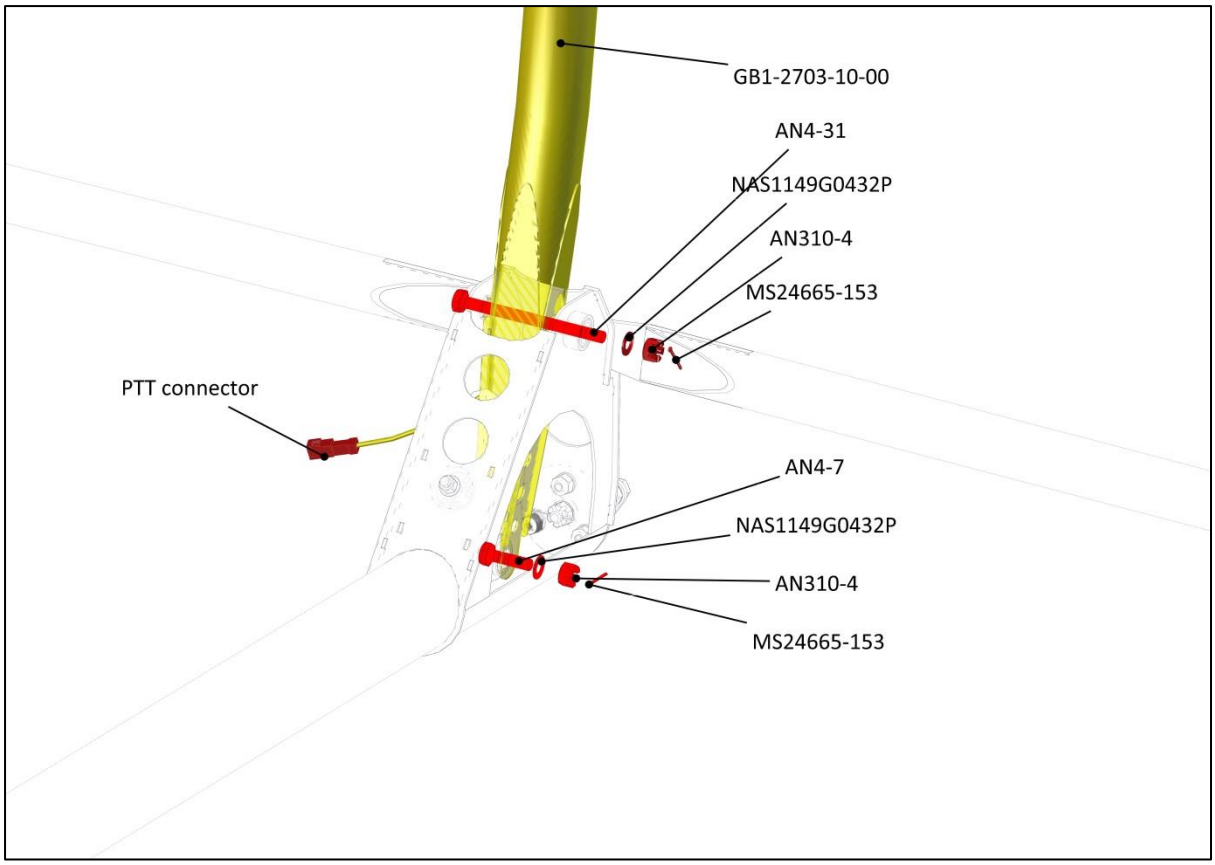
Only one type of spherical bearing (Aurora AWC-4T) and one type of rod end bearing (Aurora ASM-4) are used throughout the control systems. For details, refer to section 20-03.

27-02 Elevator and aileron control system



1	GB1-2703-10-00	Front Control Stick
2	GB1-2703-11-00	Aft Control Stick
3	GB1-2717-23-00	Aileron Control Rod (Torque Tube to Bellcrank)
4	GB1-2717-11-00	Torque Tube
5	GB1-2717-30-00	Aileron Bellcrank
6	GB1-2717-40-00	Aileron Control Rod (Bellcrank to Aileron
7	GB1-2733-20-00	Elevator Control Rod (Torque Tube to Idler)
8	GB1-2733-40-00	Elevator Control Rod (Idler to Bellcrank)
9	GB1-2733-50-00	Elevator Bellcrank
10	GB1-2717-10-01	Torque Tube Front Bearing
11	GB1-2713-10-00	Elevator Control Rod (inside Torque Tube)

27-03 Front Control Stick - GB1-2703-10-00



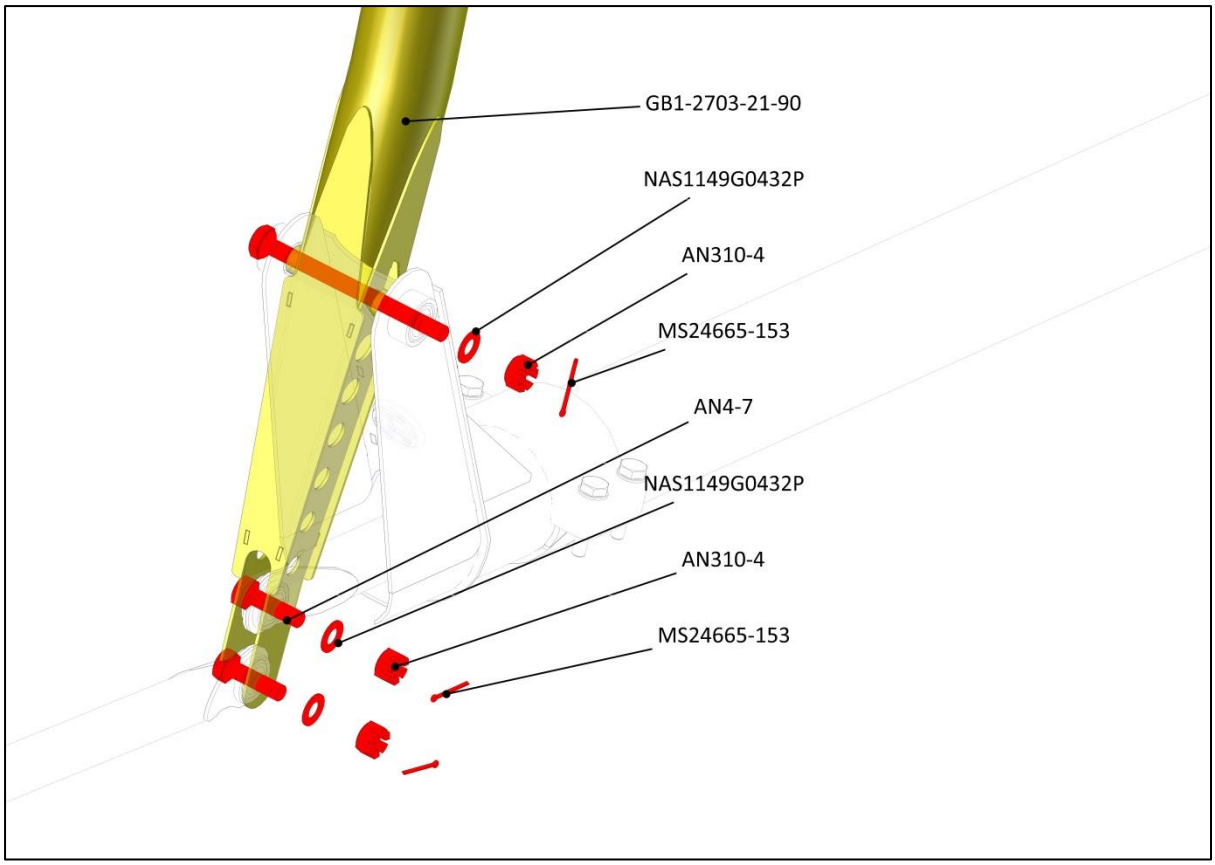
The front control stick is a welded assembly, powder coated for protection, with wooden stick grip halves mounted by M3 fasteners and the PTT momentary switch installed in the top face plate; electric connection from PTT to the VHF is routed through the main tube.

For service or replacement:

1. Remove the front instrument panel
2. Disconnect the PTT connection
3. Remove from the pivot the cotter pin, nut, washer and bolt
4. Disconnect the elevator rod
5. Remove control stick
6. Clean all components
7. Inspect standard fasteners in accordance with 5-06, No.1
8. Inspect welded assembly in accordance with 5-06, No.5
9. Inspect wooden grips and fasteners in accordance with 5-06, No.10
10. Inspect PTT momentary switch for correct installation and function
11. Inspect cables in accordance with 5-06, No.14
12. Reinstall reversing order of steps above
13. Inspect for correct assembly
14. Function Check: Switch on radio, push PTT and check transmit symbol in radio display

Signature

27-04 Aft Control Stick - GB1-2703-11-00

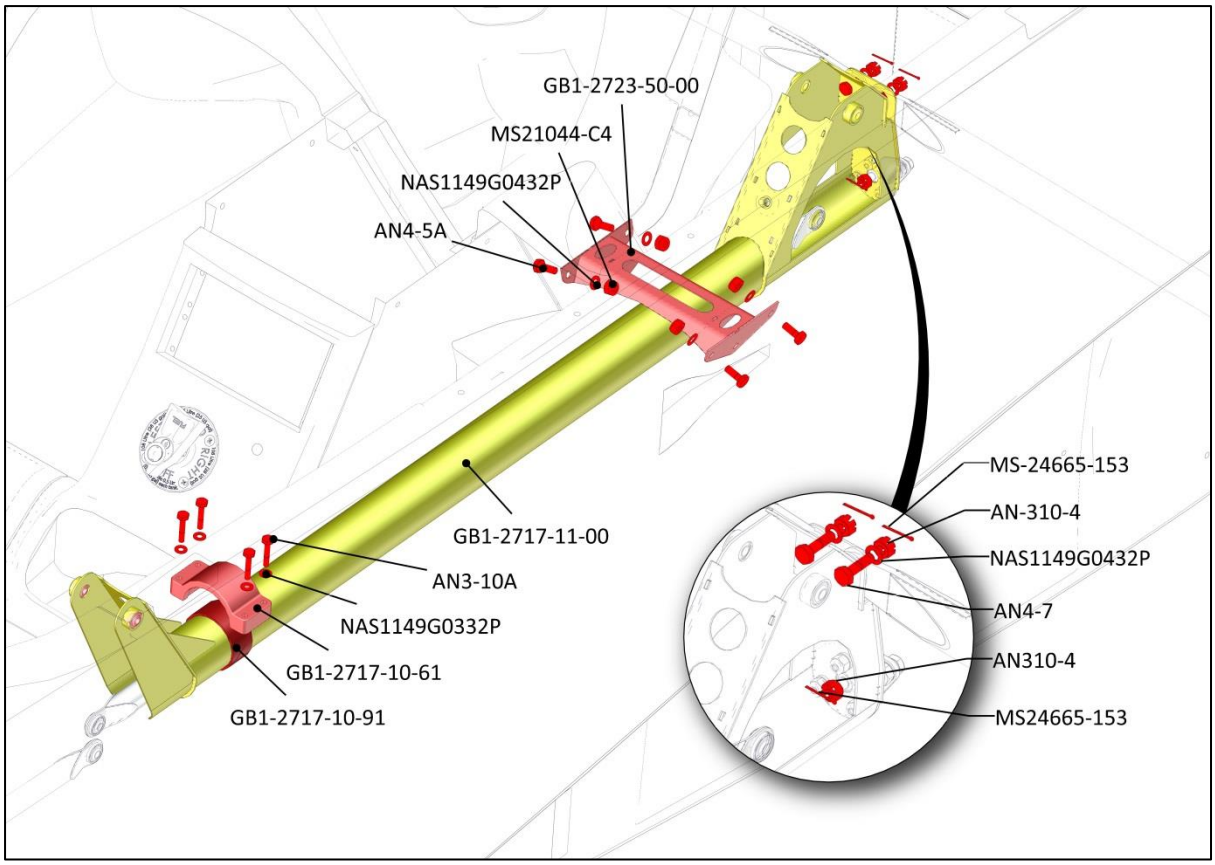


The aft control stick is a welded assembly, powder coated for protection, with wooden stick grip halves mounted by M3 fasteners and the PTT momentary switch installed in the top face plate; electric connection from PTT to the VHF is routed through the main tube.

1. Remove the stick gaiter
2. Disconnect the PTT connection
3. Remove from the pivot the cotter pin, nut, washer and bolt
4. Disconnect the front elevator rod
5. Disconnect the rear elevator rod
6. Remove control stick
7. Clean all components
8. Inspect standard fasteners in accordance with 5-06, No.1
9. Inspect welded assembly in accordance with 5-06, No.5
10. Inspect wooden grips and fasteners in accordance with 5-06, No.10
11. Inspect PTT momentary switch for correct installation and function
12. Inspect cables in accordance with 5-06, No.14
13. Reinstall reversing order of steps above
14. Inspect for correct assembly
15. Function Check: Switch on radio, push PTT and check transmit symbol in radio display

Signature

27-05 Torque Tube - GB1-2717-11-00



In the rear cockpit

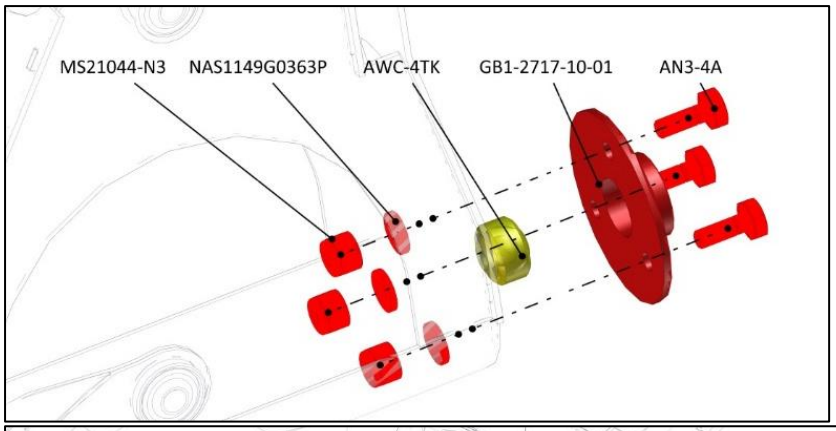
1. Remove the stick as described in section 27-04
2. Remove the radio and transponder
3. Remove the upper bearing cap (four bolts)
4. Disconnect the elevator rod

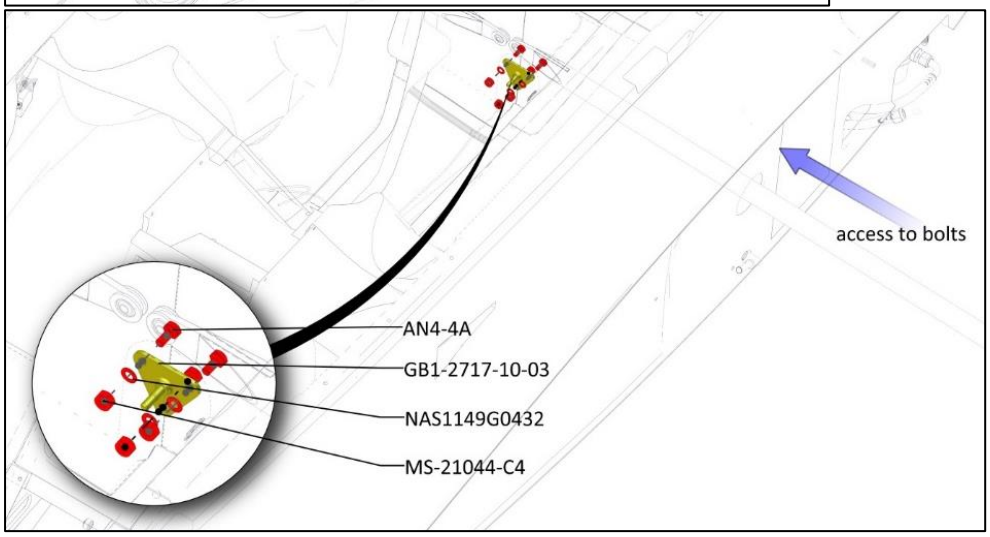
In the front cockpit

1. Remove the front control stick per section 27-03
2. Remove the front seat center panel
3. Disconnect the center rudder bellcranks from the center rudder mount
4. Remove the center rudder mount
5. Disconnect the aileron rods from the torque tube
6. Inside the torque tube, remove the nut retaining the torque tube on its front bearing shaft
7. Uninstall torque tube bracket GB1-2717-10-61
8. Maneuver the tube backwards then upwards and forwards to remove it from the cockpit
9. Clean all components
10. Inspect standard fasteners in accordance with 5-06, No.1
11. Inspect welded assembly in accordance with 5-06, No.5
12. Inspect spherical bearings in accordance with 5-06, No.3
13. To reinstall, reverse steps 1 – 8
14. Check for correct assembly

Signature

27-06 Torque tube front bearing - GB1-2717-10-01





To service the front torque tube bearing, the following items have to be removed:

1. Front seat cushion and panel (4 screws)
2. Wings per section 20-07

In the spar carry-through box:

3. Retain fasteners

In the front cockpit

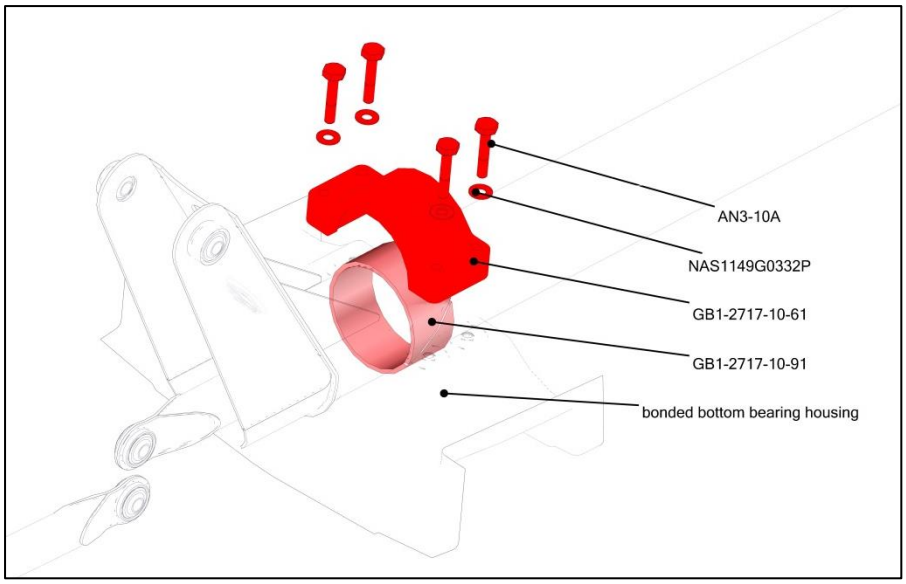
4. Uninstall fasteners through spar carry-through box
5. Slide torque tube backwards
6. Undo cotter pin in front end of torque tube, remove castle nut
7. Remove front torque tube bearing
8. Clean all components
9. Inspect standard fasteners in accordance with 5-06, No.1
10. Inspect machined parts in accordance with 5-06, No.6
11. Move front torque tube bearing in place, reinstall castle nut and secure with cotter pin
12. Move torque tube in position, install fasteners through spar carry-through box

In the spar carry-through box:

13. Retain fasteners
14. To reinstall, reverse steps 1 – 11
15. Check for correct assembly

Signature

27-07 Torque tube aft bearing – GB1-2717-10-05



The aft torque tube bearing consists of the following parts:

1. Bottom bearing housing, composite part bonded between the seat support bulkheads
2. Bearing housing, GB1-2717-10-05
3. Split bushing GB1-2717-10-91

The split bushing is defining the play / breakout torque of the torque tube assembly.

If a 0.3 mm gauge can be inserted in gap, the split bushing has to be changed.

To service the aft torque tube bearing, the following items have to be removed:

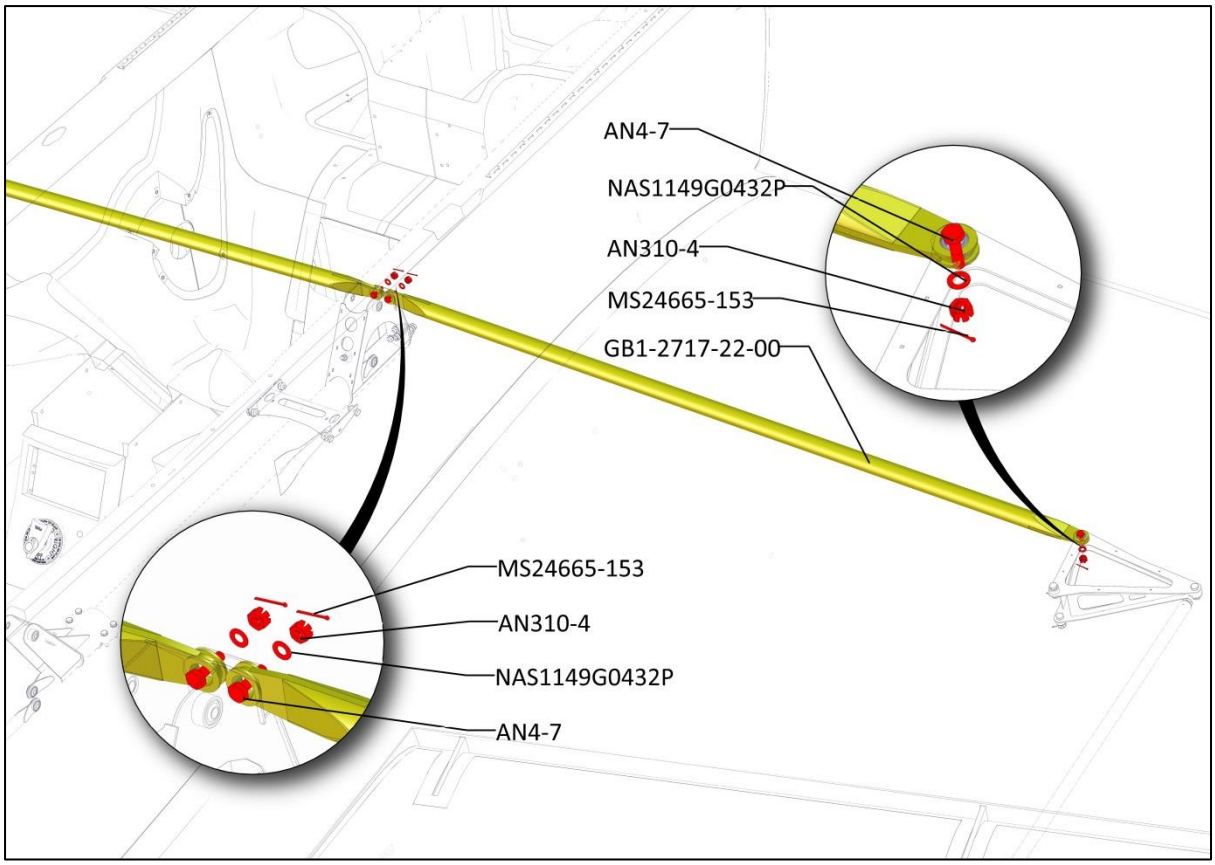
4. Radio and transponder
5. Front seat

In the rear cockpit

6. Use 3/8'' socket to undo and remove fasteners
7. Remove bearing housing
8. Clean all components
9. Inspect standard fasteners in accordance with 5-06, No.1
10. Lift up torque tube, remove split bushing
11. Clean or exchange split bushing
12. To reinstall, reverse steps 1 – 14
    Reinstall bearing housing: Tighten fasteners to an extent where no discernible vertical play can be felt, but breakout torque of the torque tube is as low as possible
13. If required, reinstall front seat, radio and transponder
14. Check for correct assembly

Signature

27-08 Aileron control rods, torque tube to bellcrank - GB1-2717-21-00



Proceed as follows to inspect or service:
In the front cockpit

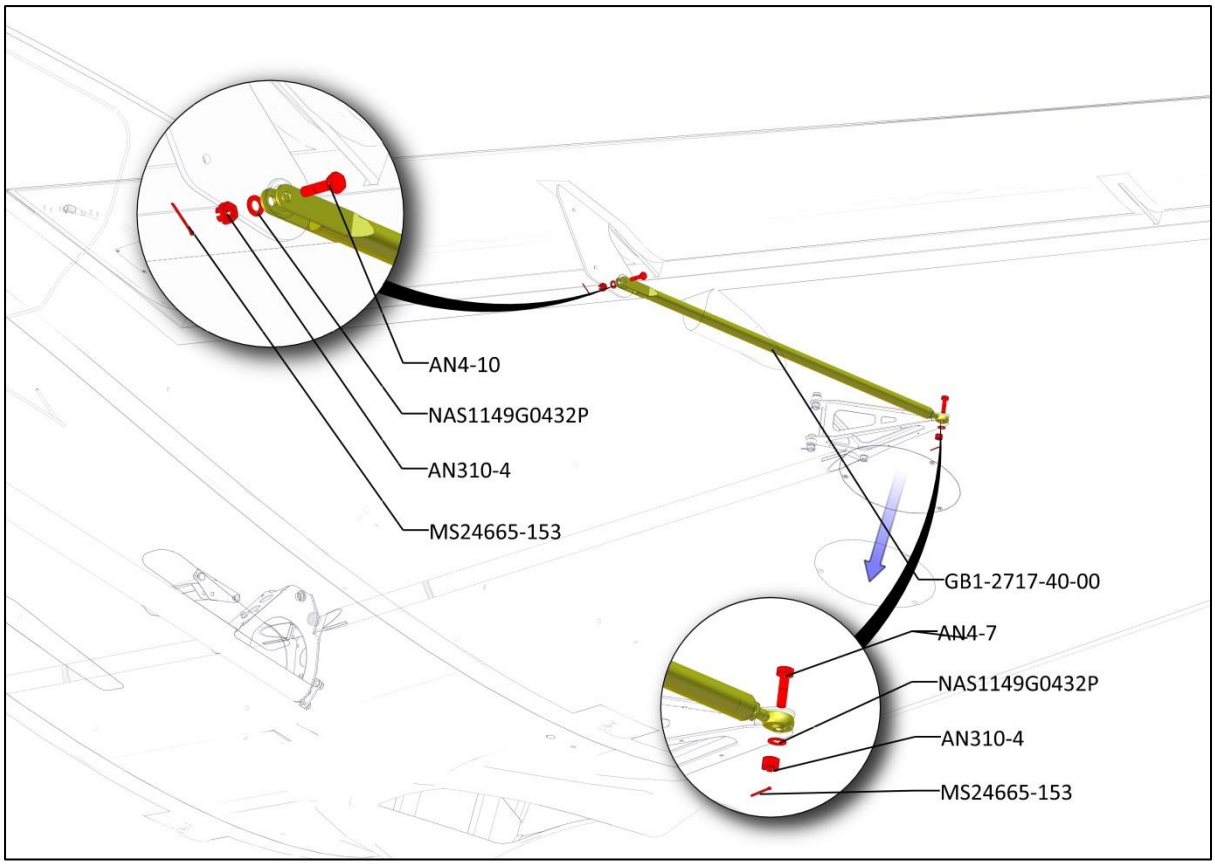
1. Disconnect the aileron rods from the torque tube
2. Remove wing

Underside of the relevant wing

3. Remove the bellcrank access panel
4. Disconnect the rod from the bellcrank
5. Pull the rod out of the wing
6. Clean all components
7. Inspect standard fasteners in accordance with 5-06, No.1
8. Inspect carbon fiber control rods in accordance with 5-06, No.22
9. Inspect spherical bearings in accordance with 5-06, No.3
10. To reinstall, reverse steps 1 - 5
11. Install cotter pins
12. Reinstall wing
13. Check for correct assembly

Signature

27-09 Aileron control rods, bellcrank to aileron - GB1-2717-40-00

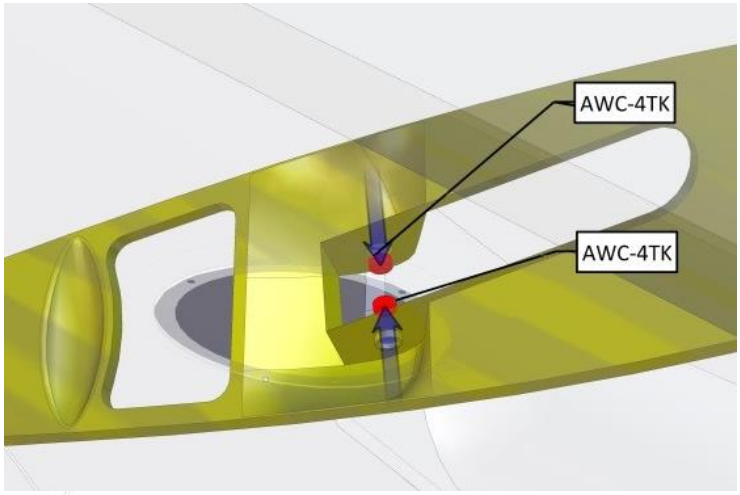


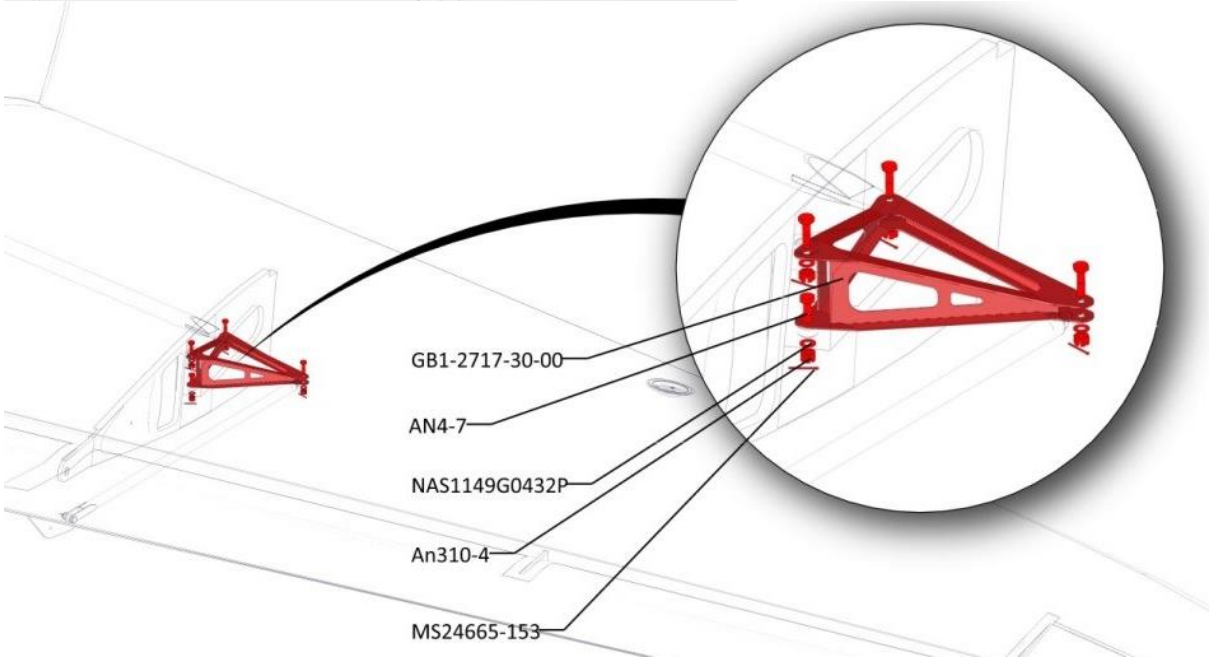
Proceed as follows to inspect or service:
Under the relevant wing:

1. Remove the bellcrank access panel (3 screws each panel)
2. Disconnect the rod from the bellcrank and aileron arms
3. Pull the rod out of the wing
4. Inspect standard fasteners in accordance with 5-06, No.1
5. Inspect control rods in accordance with 5-06, No.5
6. Inspect spherical bearings in accordance with 5-06, No.3
7. To reinstall, reverse steps 1 - 3
8. Install cotter pins
9. Check for correct assembly

Signature

27-10 Aileron Bellcrank and Bearings – GB1-2717-30-00





Proceed as follows to inspect or service:

1. Remove the underwing access panel
2. Disconnect both aileron rods from the bellcrank
3. Remove both pivot bolts and maneuver the bellcrank out of the wing
4. Clean all components
5. Inspect standard fasteners in accordance with 5-06, No.1
6. Inspect control rods in accordance with 5-06, No.5
7. Inspect spherical bearings in accordance with 5-06, No.3
8. To reinstall, clean recess and bearing surface, apply Loctite 270 to bearing race, push bearings in place
9. Reverse steps 1 - 3
10. Install cotter pins
11. Check for correct assembly

Signature

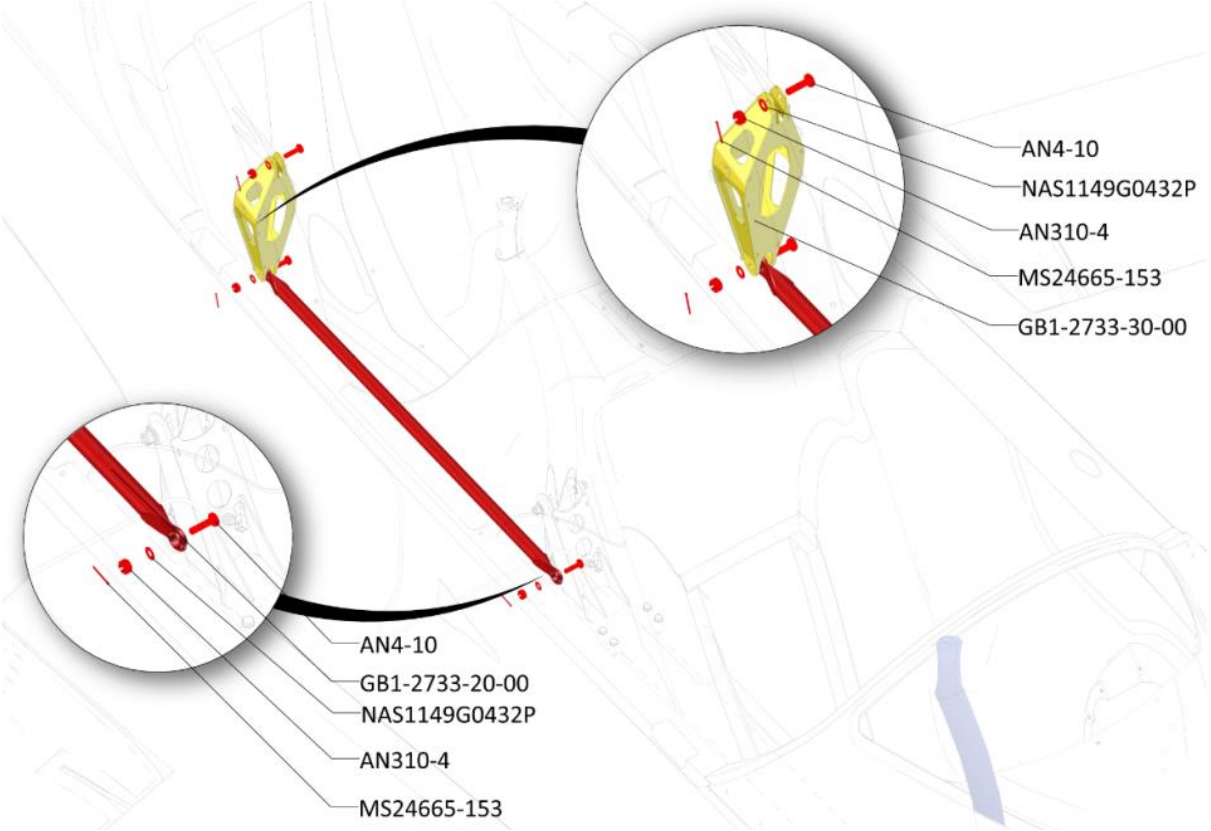
27-11 Elevator control rod, inside torque tube - GB1-2733-10-00

Proceed as follows to inspect or service:

1. Remove aft control stick
2. Disconnect elevator rod from front control stick
3. Pull elevator rod out towards the rear
4. Clean all components
5. Inspect standard fasteners in accordance with 5-06, No.1
6. Inspect control rods in accordance with 5-06, No.5
7. Inspect spherical bearings in accordance with 5-06, No.3
8. To reinstall, maneuver control rod in place
9. Connect to front and aft stick, reinstall fasteners
10. Install cotter pins
11. Check for correct assembly

Signature

27-12 Elevator control rod, Torque Tube to Elevator Idler - GB1-2733-20-00

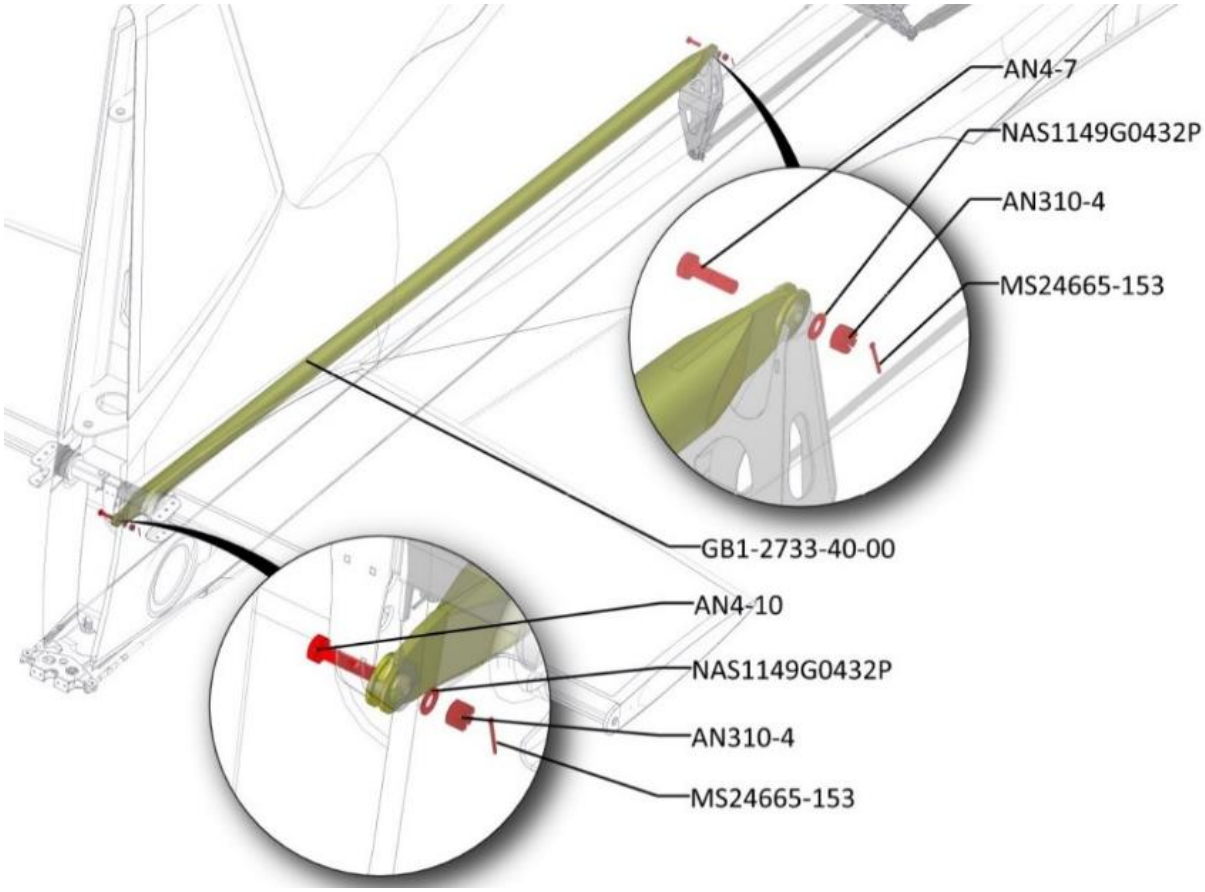


Proceed as follows to inspect or service:

1. Remove the rear seat cushion and panel (4 screws)
2. Disconnect the elevator rod from the stick and the idler then lift it out
3. Clean all components
4. Inspect standard fasteners in accordance with 5-06, No.1
5. Inspect control rods in accordance with 5-06, No.5
6. Inspect spherical bearings in accordance with 5-06, No.3
7. To reinstall, reverse steps 1 and 2
8. Connect to torque tube and Idler, reinstall fasteners
9. Install cotter pins
10. Check for correct assembly

Signature

27-13 Elevator control rod, idler to Elevator Bellcrank - GB1-2733-40-00



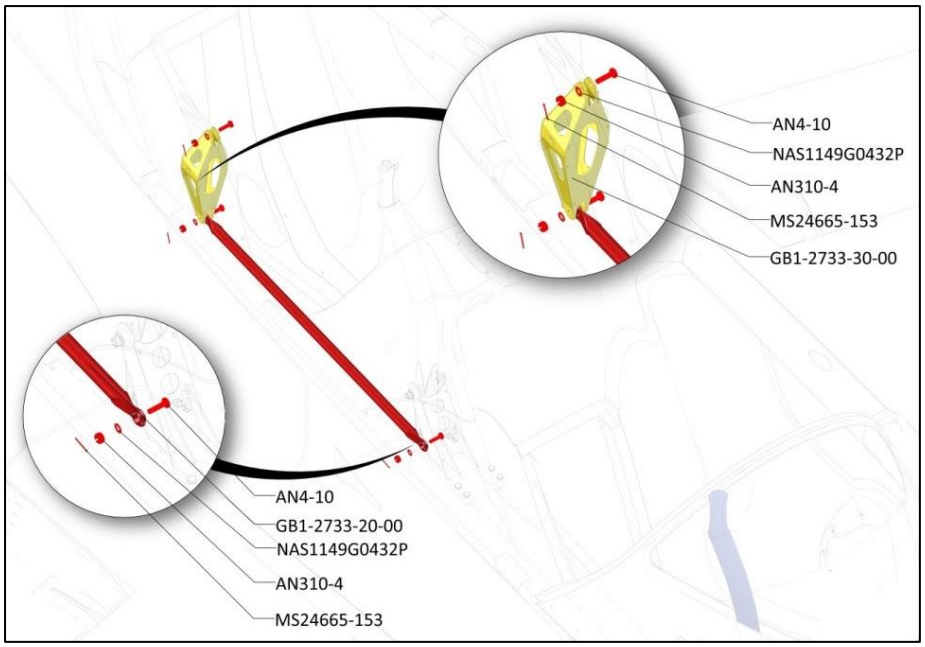
Proceed as follows to inspect or service:

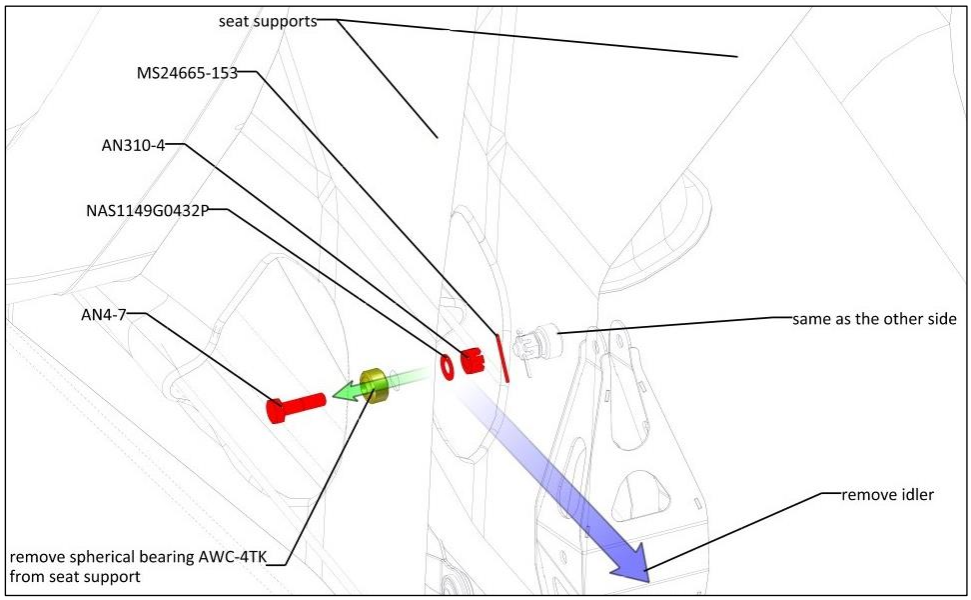
1. Remove the rear seat cushion and panel (4 screws)
2. Disconnect the elevator rod from the idler
3. Remove the rudder as described below
4. Disconnect the elevator rod from the bellcrank and pull it from the fuselage
5. Clean all components
6. Inspect standard fasteners in accordance with 5-06, No.1
7. Inspect carbon fiber control rods in accordance with 5-06, No.22
8. Inspect spherical bearings in accordance with 5-06, No.3
9. To reinstall, reverse steps 2 - 4
10. Install cotter pins
11. Check for correct assembly
12. Reinstall rear seat panel and cushion
13. Reinstall rudder
14. Check for correct assembly

Signature

Signature

27-14 Elevator Idler - GB1-2733-30-00



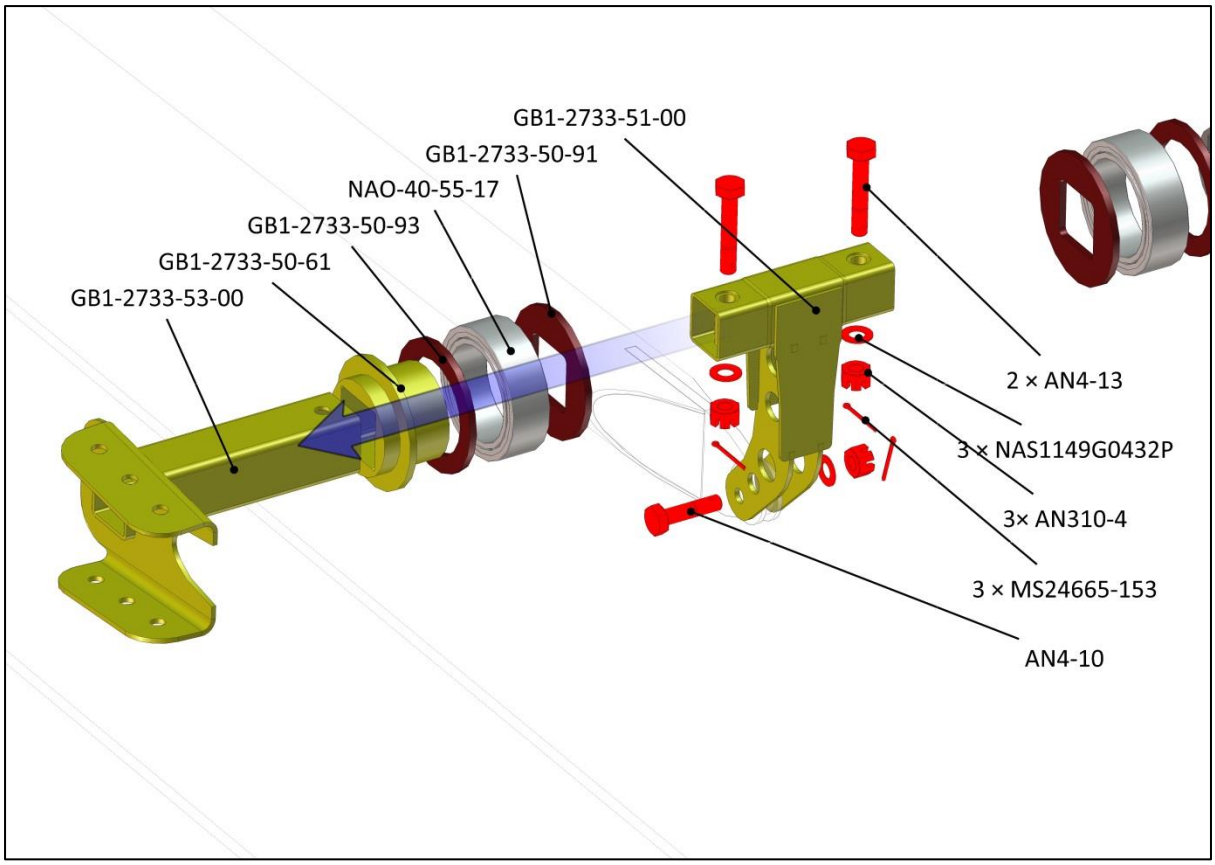


Proceed as follows to inspect or service:

1. Remove the rear seat cushion and panel (4 screws)
2. Remove baggage floor inspection panel
3. Disconnect both elevator rods from the Elevator Idler
4. Remove pivot fasteners
5. Remove Elevator Idler
6. Inspect standard fasteners in accordance with 5-06, No.1
7. Inspect control rods in accordance with 5-06, No.5
8. Inspect spherical bearings in accordance with 5-06, No.3
9. To reinstall, clean recess and bearing surface, apply Loctite 270 to bearing race, push bearings in place
10. To reinstall, reverse steps 3 - 5
11. Install cotter pins
12. Connect both elevator push rods
13. Check for correct assembly
14. Reinstall baggage floor inspection panel
15. Reinstall rear seat panel and cushion

Signature

27-15 Elevator Bellcrank – GB1-2733-50-00



Proceed as follows to inspect or service:

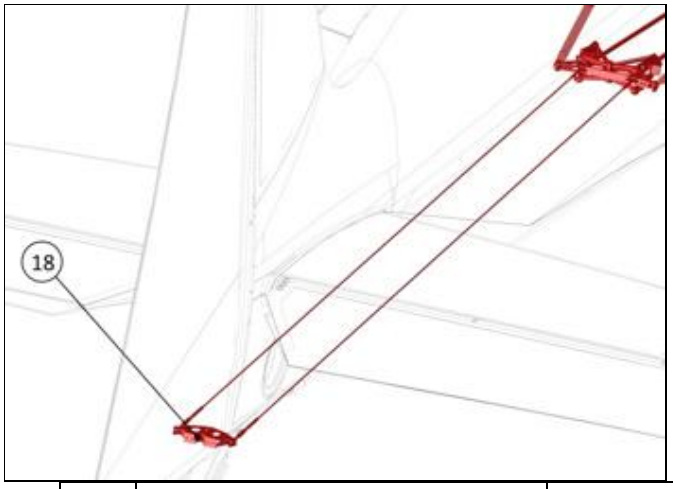
1. Remove rudder
2. Remove elevators
3. Disconnect elevator push rod
4. Remove both vertical fasteners
5. Slide outboard parts out
6. Remove center section
7. Remove bearing bosses and bearings
8. Clean all components
9. Inspect standard fasteners in accordance with 5-06, No.1
10. Inspect center section and outboard parts in accordance with 5-06, No.5
11. Inspect needle bearings in accordance with 5-06, No.4
12. Inspect bosses in accordance with 5-06, No.6
13. To reinstall, reverse steps 3 - 7
14. Install both vertical fasteners
15. Connect elevator push rod
16. Check for correct assembly
17. Reinstall elevators, apply torque seal to hinge head
18. Check for correct assembly
19. Reinstall rudder
20. Check for correct assembly

Signature

Signature

Signature

27-16 Rudder control system – GB1-2723-00-00

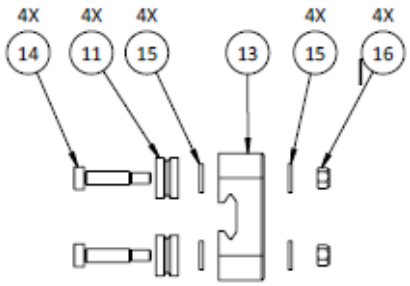


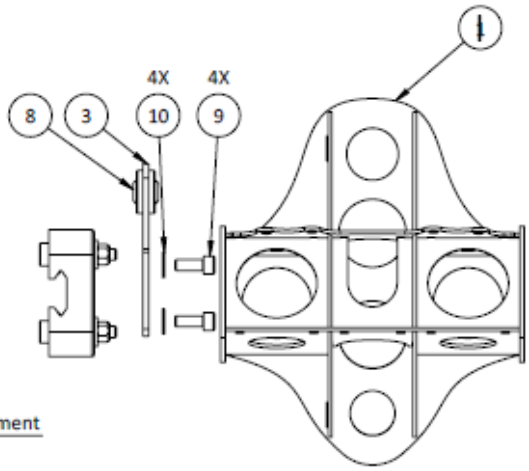
1	GB1-2723-11-00	Rudder Pedal Front LH
2	GB1-2723-12-00	Rudder Pedal Front RH
3	GB1-2723-13-00	Rudder Pedal Aft LH
4	GB1-2723-14-00	Rudder Pedal Aft RH
5	GB1-2723-21-00	Rudder Pedal Adjuster, front
6	GB1-2723-25-00	Rudder Pedal Adjuster, aft
7	GB1-2723-31-00	Rudder Bellcrank, forward
8	GB1-2723-41-00	Rudder Interconnecting Rod, front LH
9	GB1-2723-42-00	Rudder Interconnecting Rod, front RH
10	GB1-2723-43-00	Rudder Interconnecting Rod, aft LH
11	GB1-2723-44-00	Rudder Interconnecting Rod, aft RH
12	GB1-2723-50-00	Rudder Centre Mount
13	GB1-2723-61-00	Rudder Bellcrank, center
14	GB1-2723-70-00	Rudder Control Mount
15	GB1-2723-80-00	Rudder Bellcrank, center
16	GB1-2723-80-91	Rudder Cable
17	GB1-2723-80-92	Rudder Cable
18	GB1-2723-90-00	Rudder Bellcrank, aft

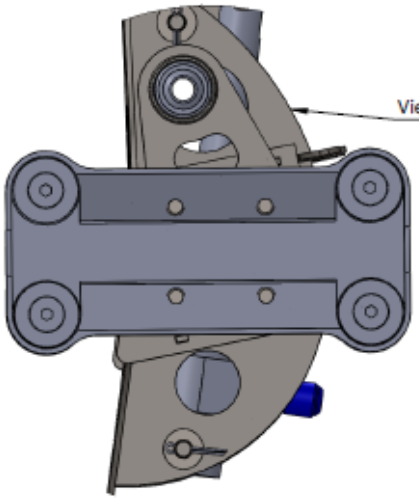
27-17 Rudder pedal assembly, front seat – GB1-2722-00-00

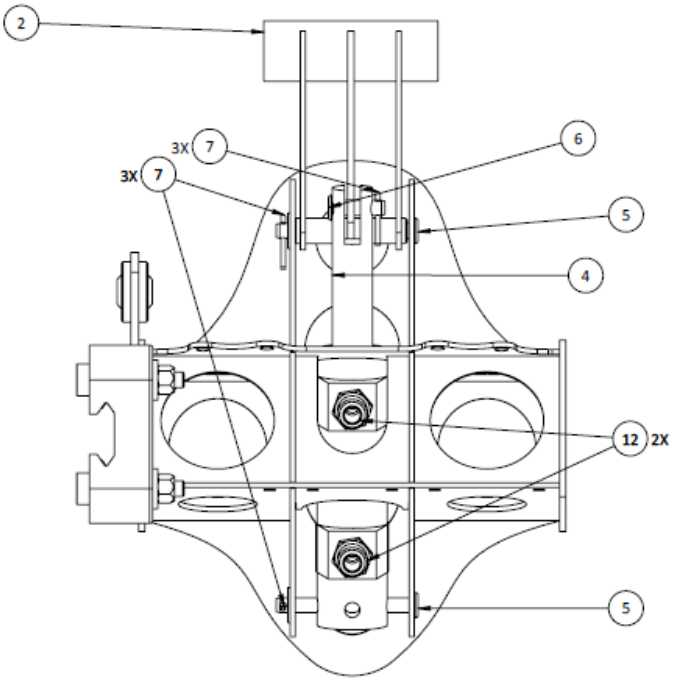
Front seat, LH pedal assembly

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GB1-2723-16-00	W/Assy Pedal, Rudder	1
2	GB1-2723-17-00	W/Assy Pedal, Brake	1
3	GB1-2723-18-00	W/Assy Plate, Bearing Mtg	1
4	672-1	Master Cylinder, Brake	1
5	MS20392-2C51	Pin, Clevis, 3/16" OD x 1-19/32"	2
6	MS20392-2C17	Pin, Clevis, 3/16" OD x 17/32"	1
7	MS24665-151	Split Pin 1/16" x 0.5" Lg SS	3
8	AWC-4TK	Bearing, Spherical, Wide	1
9	NAS1351-3-8P	Screw CapSktHd 10-32UNFx0.5CPS	4
10	NAS1149G0363P	Washer Plain #10 x .032 THK CPS	6
11	LJ18CDRNS	J18 Thru Conc Dbl Row Brng	4
12	AN816-3D	Union, Tube OD 3/16, UN 3/8, NPT 1/8	2
13	GB1-2723-20-63	Carriage, Pedal Slide	1
14	07534-06X20	Shoulder Screws	4
15	NAS1149G0463P	Washer Plain 1/4 ID x .063" CPS	8
16	Nut_M5_Nyloc	Nut, M5, Nyloc, DIN985_A2	4









Allowable play of slider on rails: No more than 4 mm vertical movement of pedal assembly, measured with a ruler between cockpit floor and lowest point of rudder pedal. When maximum allowable play is exceeded, slider GB1-2723-20-63 must be exchanged.

To service either front rudder pedal assembly:

1. Remove brake line, catch spilled brake fluid, cap off brake lines
2. Remove disconnect pedal adjuster
3. Pull back until free of rails, remove assembly from airplane
4. Clean all components
5. Inspect standard fasteners in accordance with 5-06, No.1
6. Inspect slider in accordance with 5-06, No.6
7. Inspect spherical bearings in accordance with 5-06, No.3
8. Inspect rollers in accordance with 5-06, No.9
9. Inspect welded assemblies in accordance with 5-06, No.5
10. Master brake cylinders have to be replaced in case of malfunction
11. To reinstall, reverse steps 1 – 4
12. Bleed brakes in accordance with section 12-10
13. Brake check (hard pedals)
14. Check for correct assembly

Signature

To replace either rail:

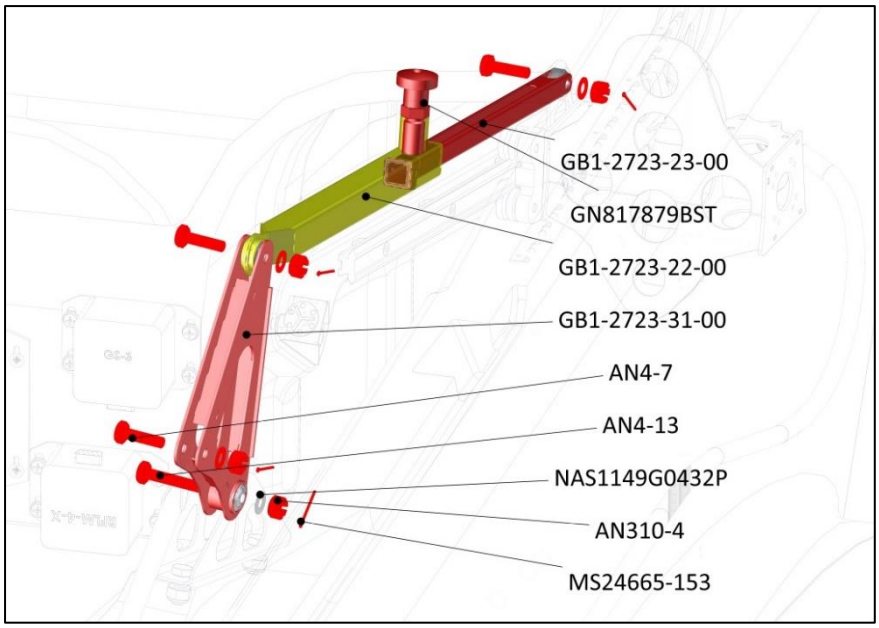
1. Remove cowling
2. Uninstall windshield
3. Uninstall Acrotank
4. Remove rail fasteners
5. Slide pedal assembly off rail
6. Remove rail from airplane
7. To install new rail, reverse steps 1 – 4
8. Check for correct installation of rail
9. Reinstall Acrotank
10. Check for correct installation
11. Reinstall windshield
12. Check for correct installation
13. Install cowling

Signature

Signature

Signature

27-18 Rudder pedal adjusters, front seat – GB1-2723-21-00



Proceed as follows to inspect or service:

1. Remove front instrument panel
2. Disconnect fasteners on both ends
3. Remove from airplane
4. Remove spring loaded locating pin
5. Slide components apart
6. Clean all components
7. Inspect standard fasteners in accordance with 5-06, No.1
8. Inspect welded assemblies in accordance with 5-06, No.5
9. Inspect spherical bearings in accordance with 5-06, No.3
10. Check spring loaded locating pin for spring force of no less than 100g. Replace if less.
11. To reinstall, reverse steps 1 – 5
12. Check for correct installation
13. Reinstall front instrument panel
14. Check for correct installation

Signature

Signature

27-19 Rudder bellcrank, forward – GB1-2723-31-00

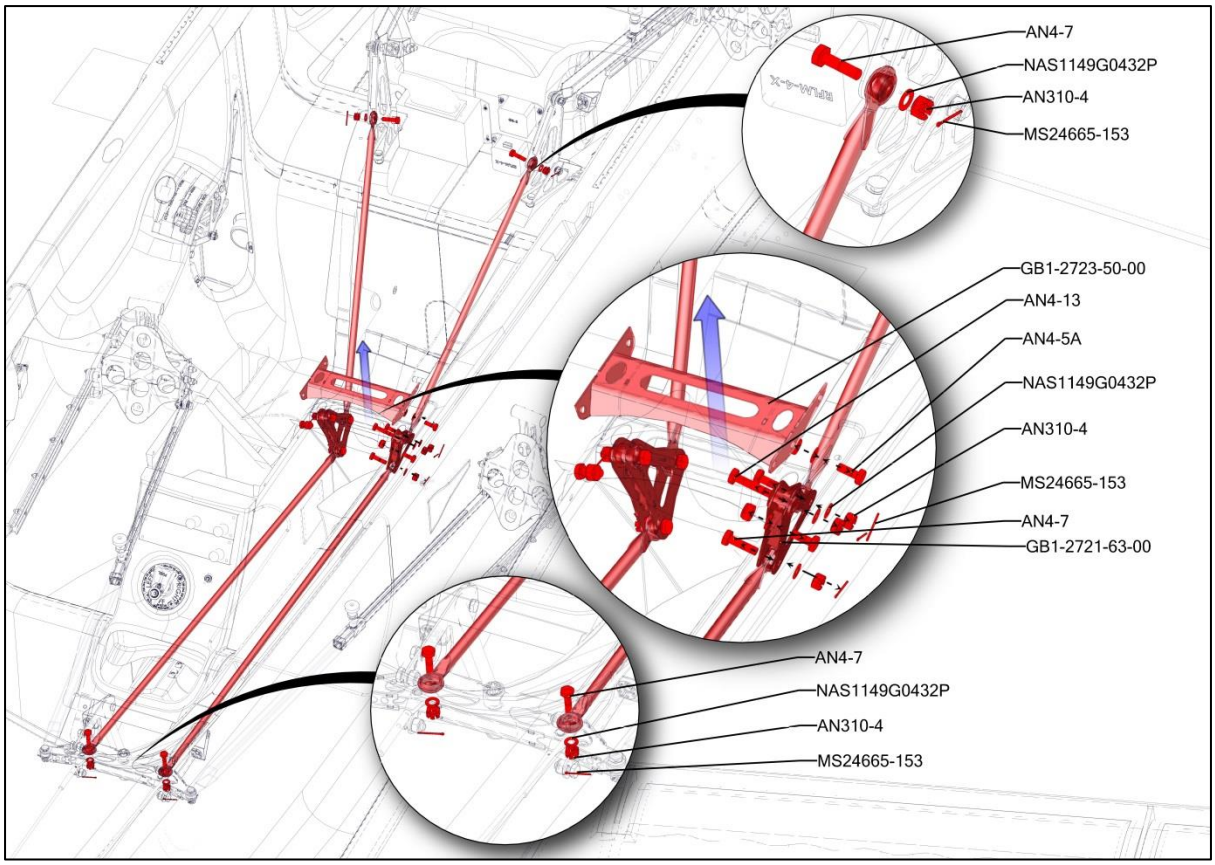
Proceed as follows to inspect or service:

1. Remove front instrument panel
2. Disconnect pedal adjuster
3. Disconnect interconnecting rod
4. Remove pivot fastener
5. Remove bellcrank
6. Clean all components
7. Inspect standard fasteners in accordance with 5-06, No.1
8. Inspect welded assemblies in accordance with 5-06, No.5
9. Inspect spherical bearings in accordance with 5-06, No.3
10. To reinstall, reverse steps 1 – 5
11. Install cotter pins
12. Check for correct installation
13. Reinstall front instrument panel
14. Check for correct installation

Signature

Signature

27-20 Rudder interconnecting rod, front right – GB1-2723-42-00



To service:

1. Remove front instrument panel
2. Remove front seat
3. Remove fasteners on both ends
4. Remove interconnecting rod
5. Remove bellcrank
6. Clean all components
7. Inspect standard fasteners in accordance with 5-06, No.1
8. Inspect welded assemblies in accordance with 5-06, No.5
9. Inspect spherical bearings in accordance with 5-06, No.3
10. To reinstall, reverse steps 1 – 4
11. Install cotter pins
12. Check for correct installation
13. Reinstall front instrument panel
14. Check for correct installation
15. Install front seat

Signature

Signature

27-21 Rudder interconnecting rods, front left – GB1-2723-41-00

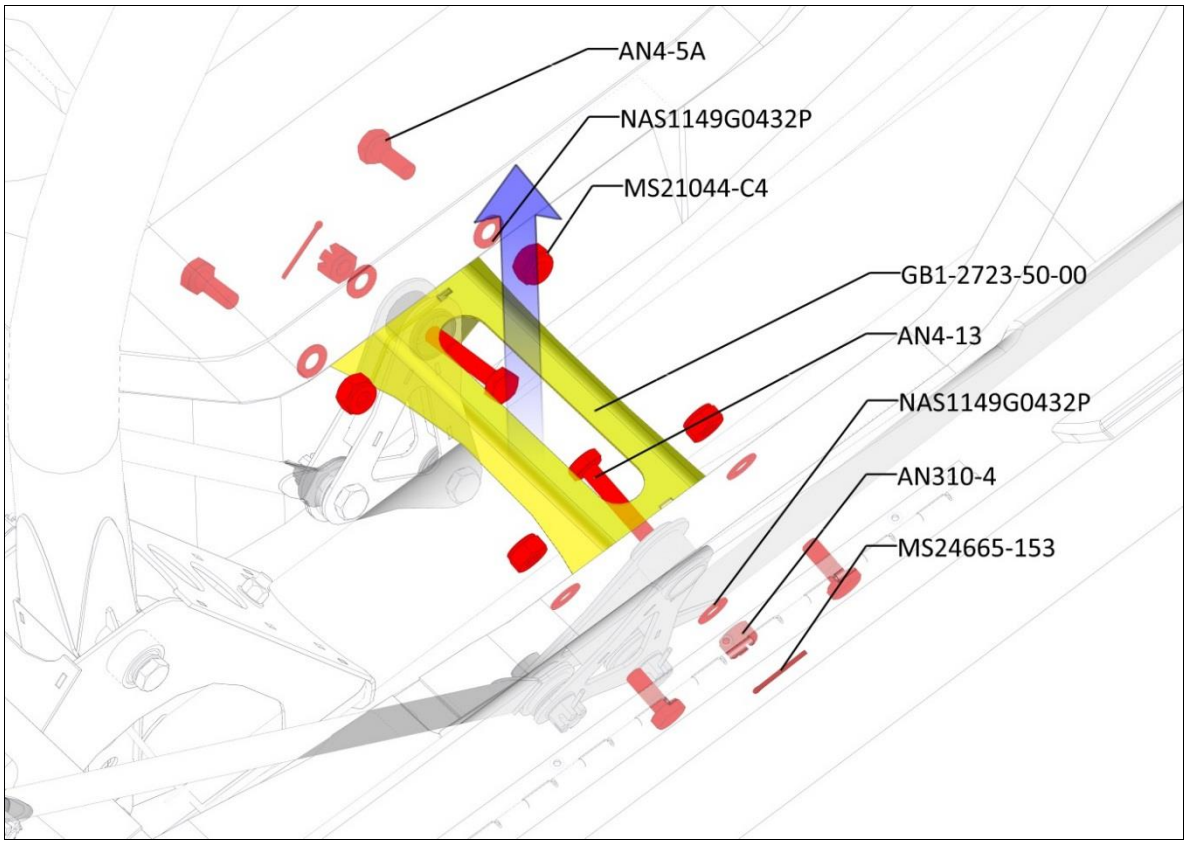
To service:

1. Similar to rudder interconnecting rod, front right, see above
2. Check for correct installation
3. Reinstall front instrument panel
4. Check for correct installation

Signature

Signature

27-22 Rudder bellcrank mount, center – GB1-2723-50-00

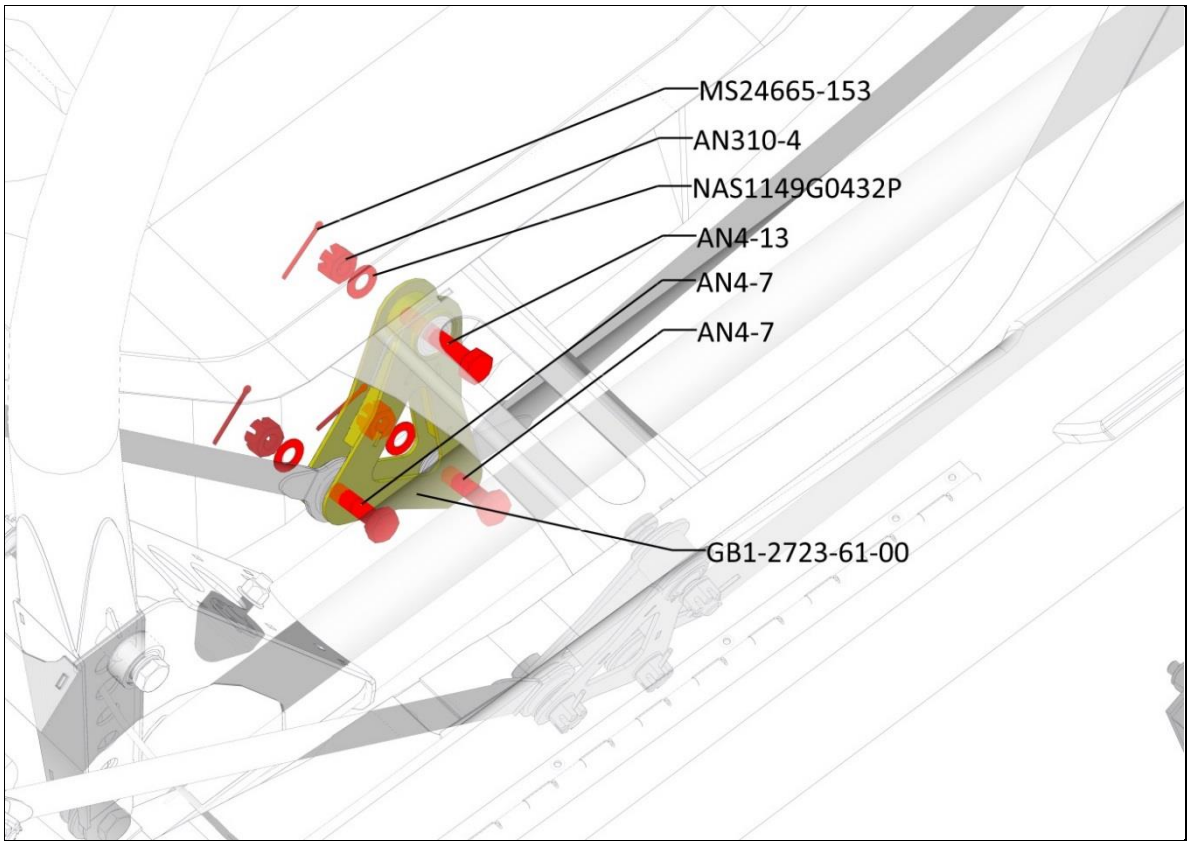


To service center rudder bellcrank mount:

1. Remove front seat
2. Remove pivot fasteners of center rudder bellcrank
3. Remove locating fasteners
4. Remove bellcrank
5. Clean all components
6. Inspect standard fasteners in accordance with 5-06, No.1
7. Inspect welded assemblies in accordance with 5-06, No.5
8. To reinstall, reverse steps 1 – 4
9. Install cotter pins
10. Check for correct installation

Signature

27-23 Rudder bellcranks, center – GB1-2723-61-00

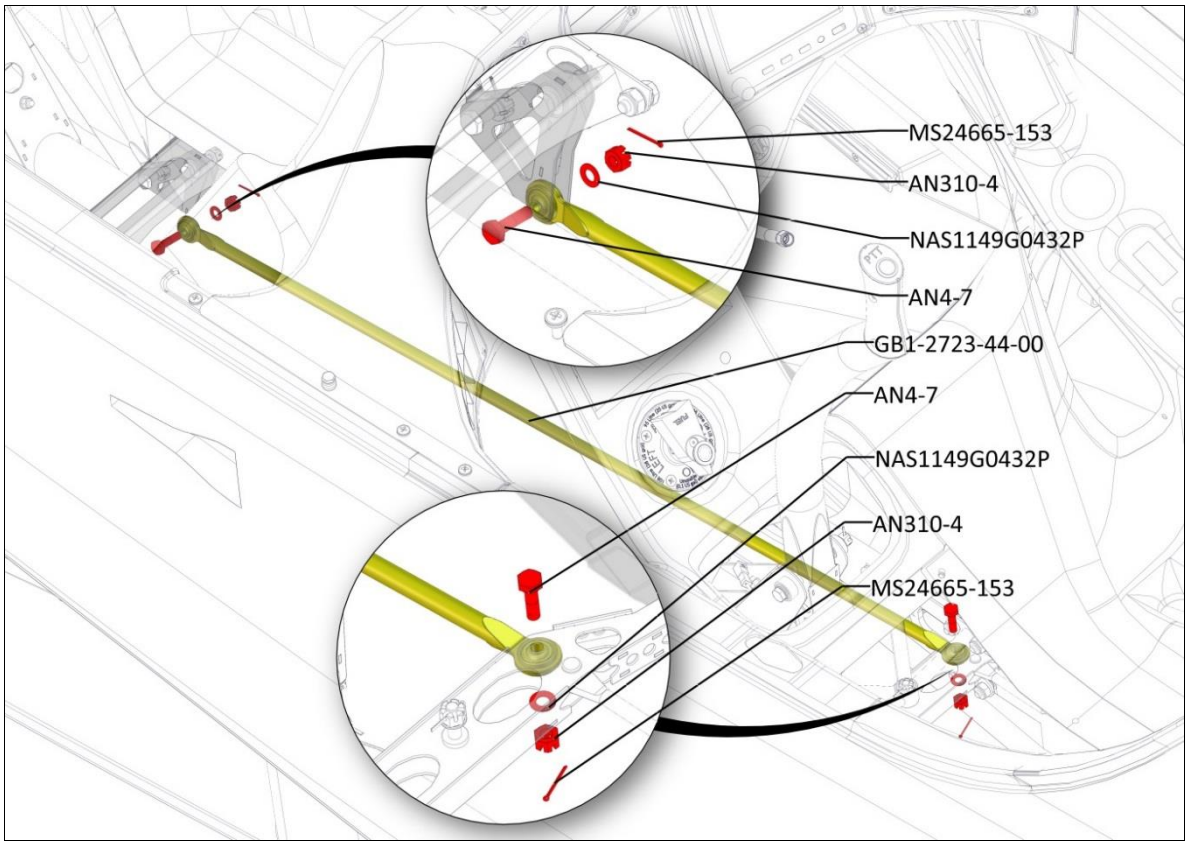


To service either center rudder bellcrank:

1. Remove front seat
2. Disconnect from interconnecting rods
3. Remove pivot fastener
4. Remove bellcrank from airplane
5. Clean assembly
6. Remove bellcrank
7. Clean all components
8. Inspect standard fasteners in accordance with 5-06, No.1
9. Inspect welded assemblies in accordance with 5-06, No.5
10. Inspect spherical bearings in accordance with 5-06, No.3
11. To reinstall, reverse steps 1 – 4
12. Install cotter pins
13. Check for correct installation

Signature

27-24 Rudder interconnecting rods, rear right – GB1-2723-44-00



To service right rudder interconnecting rod:

1. Remove front and rear seat cushions and panels (6 screws front, 4 screws rear)
2. Remove fasteners on both ends
3. Remove interconnecting rod
4. Remove bellcrank
5. Clean all components
6. Inspect standard fasteners in accordance with 5-06, No.1
7. Inspect welded assemblies in accordance with 5-06, No.5
8. Inspect spherical bearings in accordance with 5-06, No.3
9. To reinstall, reverse steps 1 – 3
10. Install cotter pins
11. Check for correct installation

Signature

27-25 Rudder interconnecting rods, rear left – GB1-2723-43-00

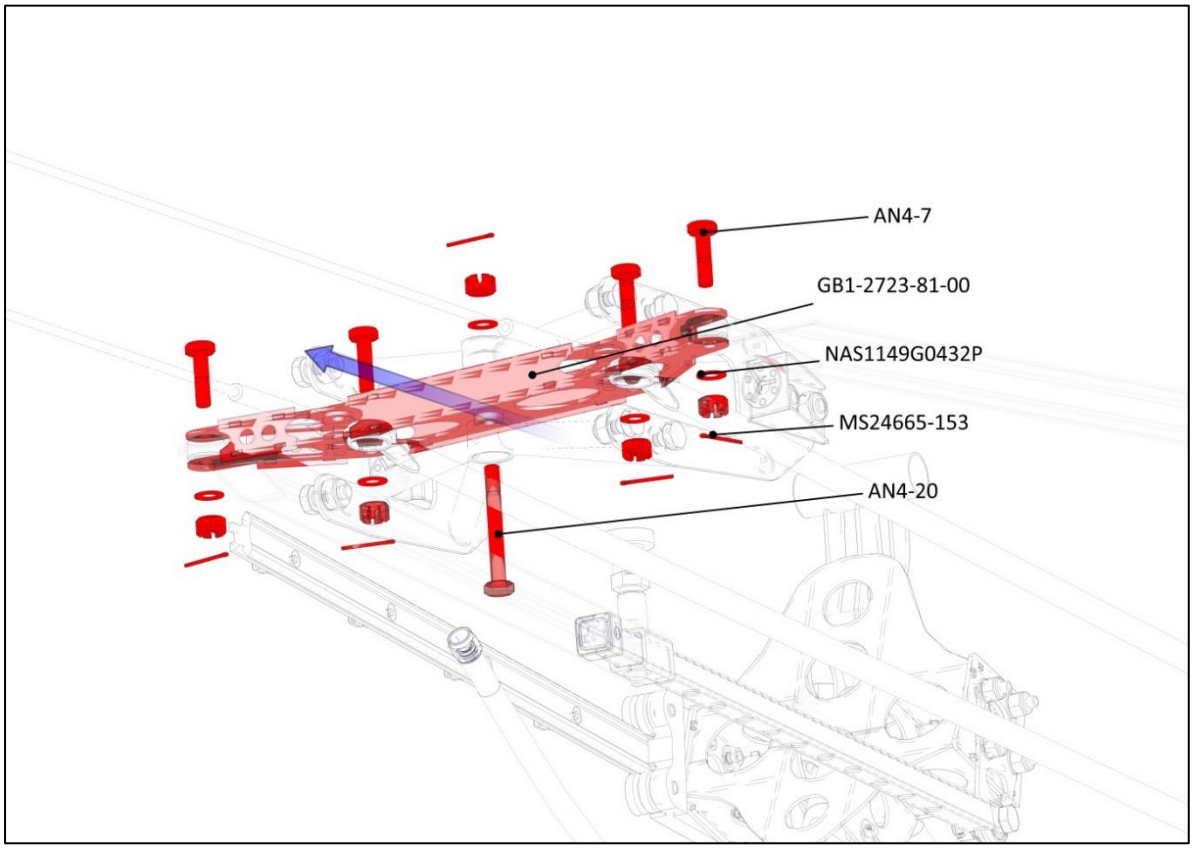
To service left rudder interconnecting rod:

1. Similar to right rudder interconnecting rod, see above
2. Check for correct installation

Signature

27-26 Rudder bellcrank assembly, aft

27-26

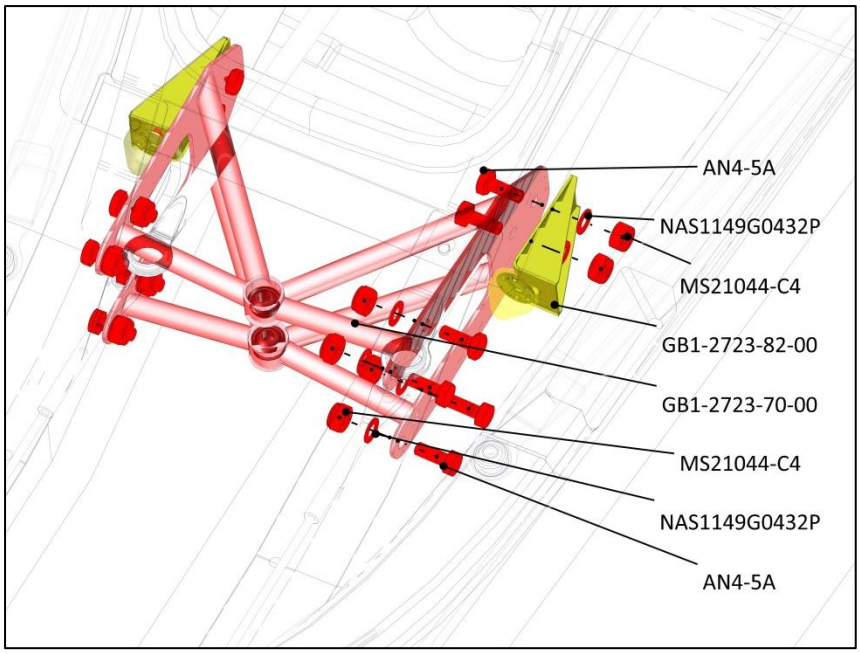


To service aft rudder bellcrank-GB1-2723-81-00:

1. Remove rear seat cushion and panel (4 screws)
2. Disconnect interconnecting rods to front pedals
3. Remove pivot fastener
4. Slide either side, disconnect rudder cables and rear pedal adjusters
5. Remove from airplane
6. Remove bellcrank
7. Clean all components
8. Inspect standard fasteners in accordance with 5-06, No.1
9. Inspect welded assemblies in accordance with 5-06, No.5
10. To reinstall, reverse steps 1 – 5
11. Check for correct installation

Signature

27-27 Rudder Control Mount

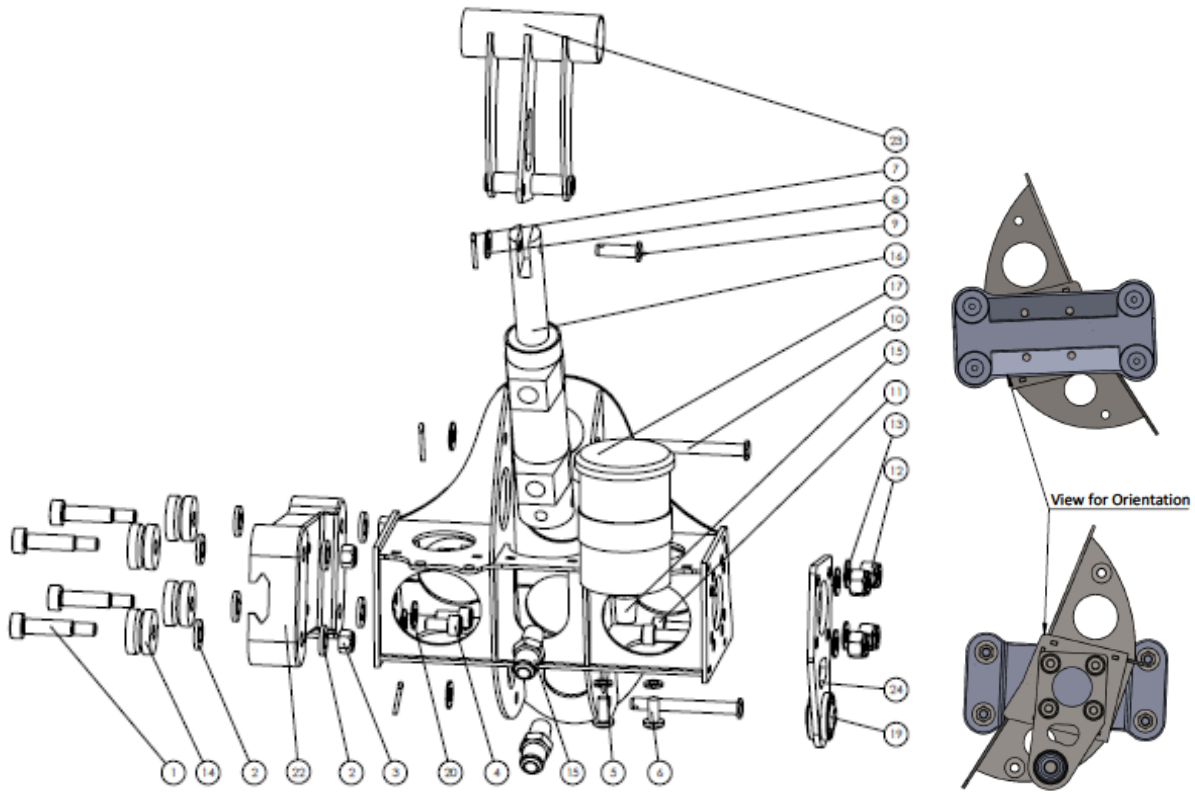


To service aft rudder bellcrank mount-GB1-2723-70-00:

1. Remove rear seat cushion and panel (4 screws)
2. Remove aft rudder bellcrank
3. Remove locating fasteners
4. slide forward, remove from airplane
5. Remove bellcrank
6. Clean all components
7. Inspect standard fasteners in accordance with 5-06, No.1
8. Inspect welded assemblies in accordance with 5-06, No.5
9. Inspect spherical bearings in accordance with 5-06, No.3
10. Inspect control bump stops in accordance with 5-06, No.13
11. To reinstall, reverse steps 1 – 5
12. Check for correct installation

Signature

27-28 Rudder pedal assembly, rear seat



	Part No.	Description
1	07534-06X 20 mm	M5 shoulder screw
2	Wsh_M6_Pln_Ss	M6 plain washer ISO 7089 stainless
3	Nut_M5_Nyloc	Nut, M5, Nyloc, DIN985_A2
4	NAS1351-3-6P	Screw Cap Skt Hd 10-32 UNF x 0.375 CPS
5	MS35338-42	#8 spring washer
6	MS35206-242	#8 screw, 0.375”
7	MS24665-151	Cotter pin 1/16" x 0.5" Lg SS
8	NAS1149G0332P	Washer Plain #10 x .032 THK CPS
9	MS20392-2C17	Pin, Clevis, 3/16" OD x 17/32"
10	MS20392-2C51	Pin, Clevis, 3/16" OD x 1-19/32"
11	NAS1351-3-10P	Screw Cap Skt Hd 10-32UNFx0.625CPS
12	MS21044-N3	Nut Nyloc #10-32 UNF CPS
13	NAS1149G0332P	Washer Plain #10 x .032 THK CPS
14	LJ18CDRNS	J18 Thru Concentric Double Row Bearing
15	AN816-3D	Union, Tube OD 3/16, UN 3/8, NPT 1/8
16	672-1	Grove Piston, brake master cylinder
17	067-069	Grove brake fluid reservoir
18	AN822-3D	Elbow, 90, 1/8 NPT, 3/16 OD Tube
19	AWC-4TK	Spherical bearing, wide
20	GB1-2723-20-63	Carriage, Pedal Slide
21	GB1-2723-17-00	Brake actuator
22	GB1-2723-18-00	Bearing mounting plate

To service either rear pedal assembly:

1. Remove brake line, catch spilled brake fluid, cap off brake lines
2. Remove disconnect pedal adjuster
3. Remove upper rollers
4. Remove assembly from airplane
5. Clean all components
6. Inspect standard fasteners in accordance with 5-06, No.1
7. Inspect welded assemblies in accordance with 5-06, No.5
8. Inspect spherical bearings in accordance with 5-06, No.3
9. Inspect rollers in accordance with 5-06, No.9
10. Master brake cylinders have to be replaced in case of malfunction.
11. To reinstall, reverse steps 1 – 4
12. Bleed brakes in accordance with section 12-10
13. Brake check (hard pedals)
14. Check for correct installation

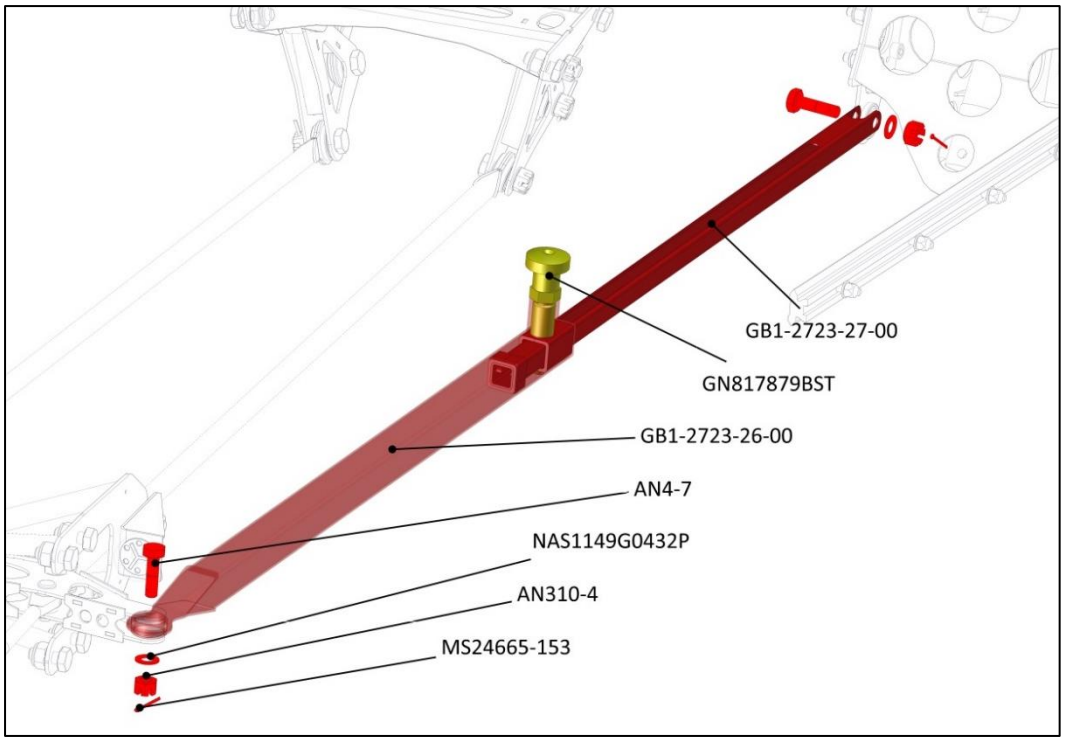
Signature

To replace either rail:

15. Remove rail fasteners
16. Slide pedal assembly off rail
17. Remove rail from airplane
18. To install new rail, reverse steps 1 – 3
19. Check for correct installation

Signature

27-29 Rudder pedal adjusters, rear seat – GB1-2723-25-00

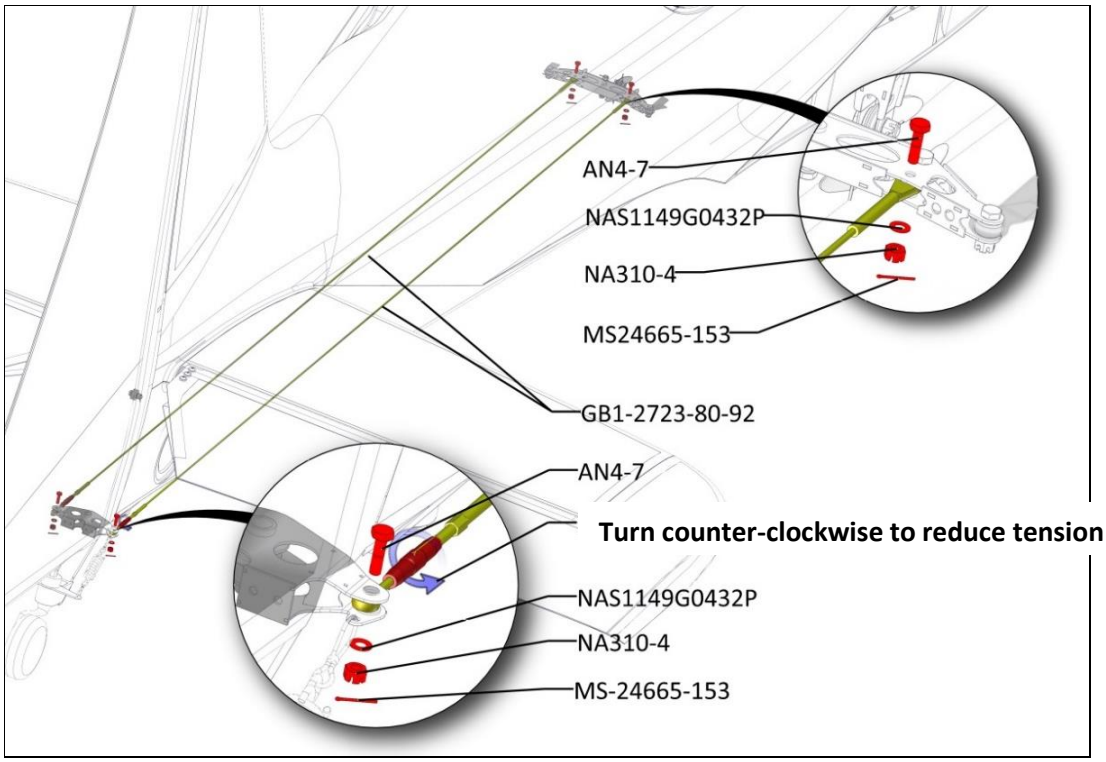


To service either rear seat pedal adjuster:

1. Remove rear seat cushion and panel (4 screws)
2. Remove pivot fastener of aft bellcrank
3. Disconnect fasteners on both ends
4. Remove from airplane
5. Remove spring loaded locating pin
6. Slide components apart
7. Clean all components
8. Inspect standard fasteners in accordance with 5-06, No.1
9. Inspect welded assemblies in accordance with 5-06, No.5
10. Inspect spherical bearings in accordance with 5-06, No.3
11. Inspect spacers in accordance with 5-06, No.6
12. Check spring loaded locating pin for spring force of no less than 50 g. Replace if less.
13. To reinstall, reverse steps 1 – 6
14. Check for correct installation

Signature

27-30 Rudder Cable, RH – GB1-2723-80-91



To service the RH rudder cable:

1. Remove rear seat cushion and panel, refer to section 5-05
2. Disconnect the cable from the center bellcrank
3. Remove tail fairing
4. Release rudder cable tension by unscrewing turnbuckle at the aft end of the RH control cable
5. Disconnect cables from rudder bellcrank
6. Pull cable out of fuselage without kinking / tight bends
7. Clean all components
8. Inspect standard fasteners in accordance with 5-06, No.1
9. Inspect spherical bearings in accordance with 5-06, No.14
10. to install new ones: connect the new cable to the old cable and pull the new one in place.
11. Connect both ends, install cotter pins
12. To adjust rudder cable tension:
    a. Center rudder pedals by blocking rudder pedals in equal distance to bulkhead, using JIG-GB1-2723-80-00 (shown in green), refer to drawing in section 5-05.
    Flat / rear end of the jig sits against aux spar bulkhead, radius in front end engages with socket for locking pin on the pedal adjusters.

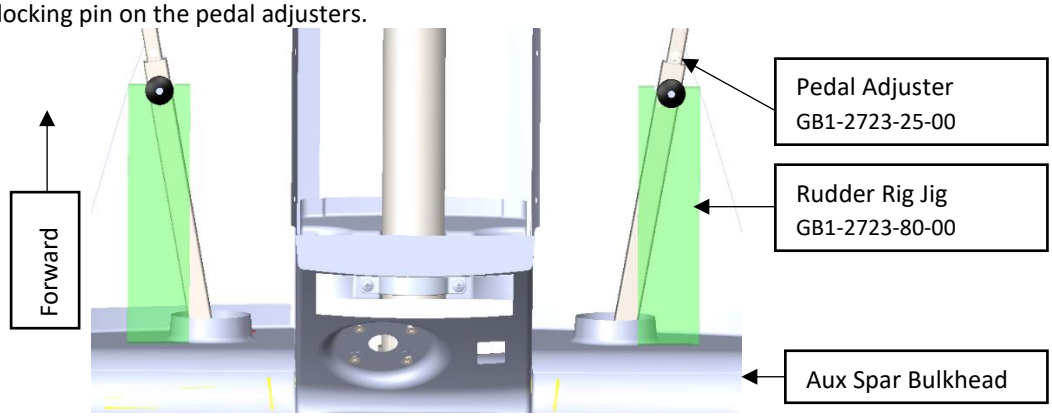


Illustration shows top view of rear cockpit section

b. with turnbuckle to 10-12 pounds using a Tensiometer
c. Visually check rudder centered

13. Secure turnbuckle
14. Check for correct installation
15. Install tail fairing

NOTE: If threads in composite to locate the tail fairing are stripped, refer to section 5-06

16. Install rear seat panel and cushion

Signature

27-31 Rudder Cable, LH – GB1-2723-80-92

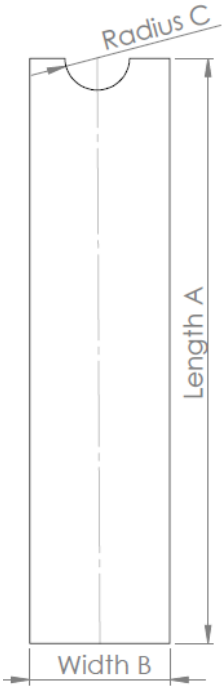
To service the LH rudder cable:

1. Similar to RH rudder cable, see above
2. Check for correct installation
3. Install tail fairing
4. Install rear seat

Signature

27-32 Rudder Rig Jig JIG-GB1-2723-80-00

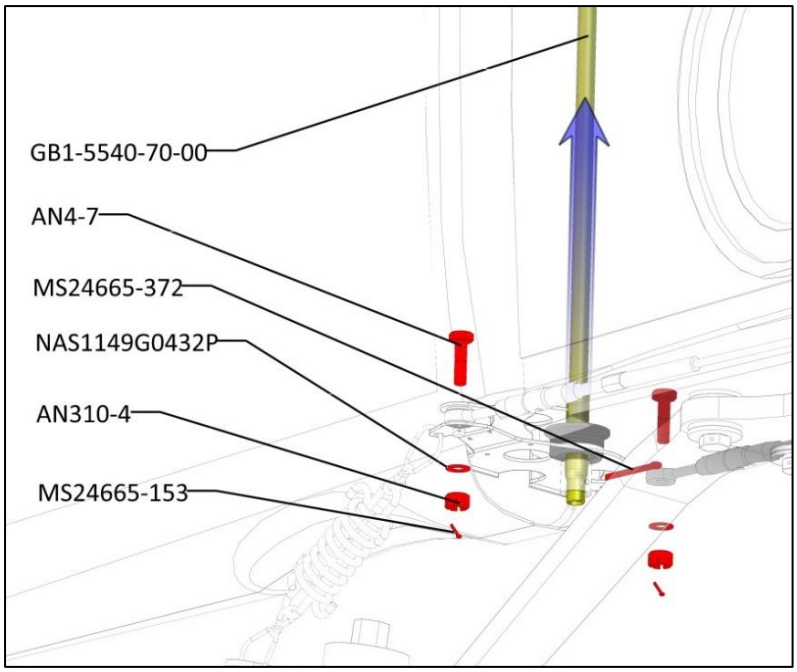
2 Jigs are required to conduct the rudder cable rigging procedure described in section 5-05.
Jigs can be ordered from Game Composites,
or fabricated from 19mm / ¾" plywood or MDF,
To drawing as shown.

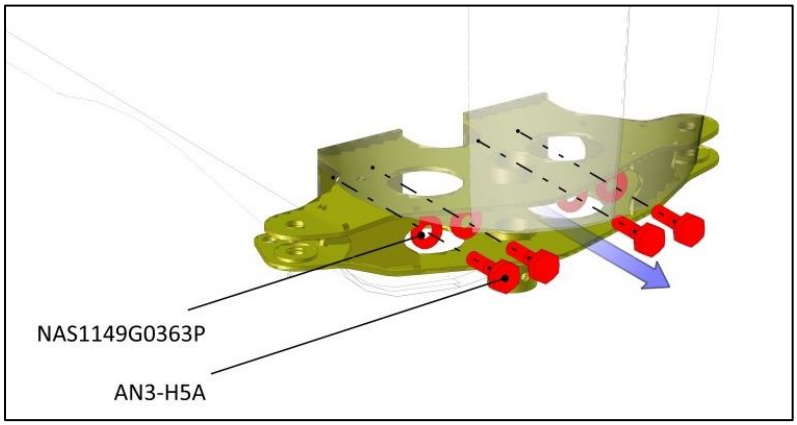


Dimensions:

Length A:	210mm, ±2mm / 8.26", ±0.1"
Width B:	50mm, ±5mm / 2", ±0.2"
Radius C:	12mm, ±2mm / ½" ±0.1"

27-33 Rudder Bellcrank – GB1-2723-90-00





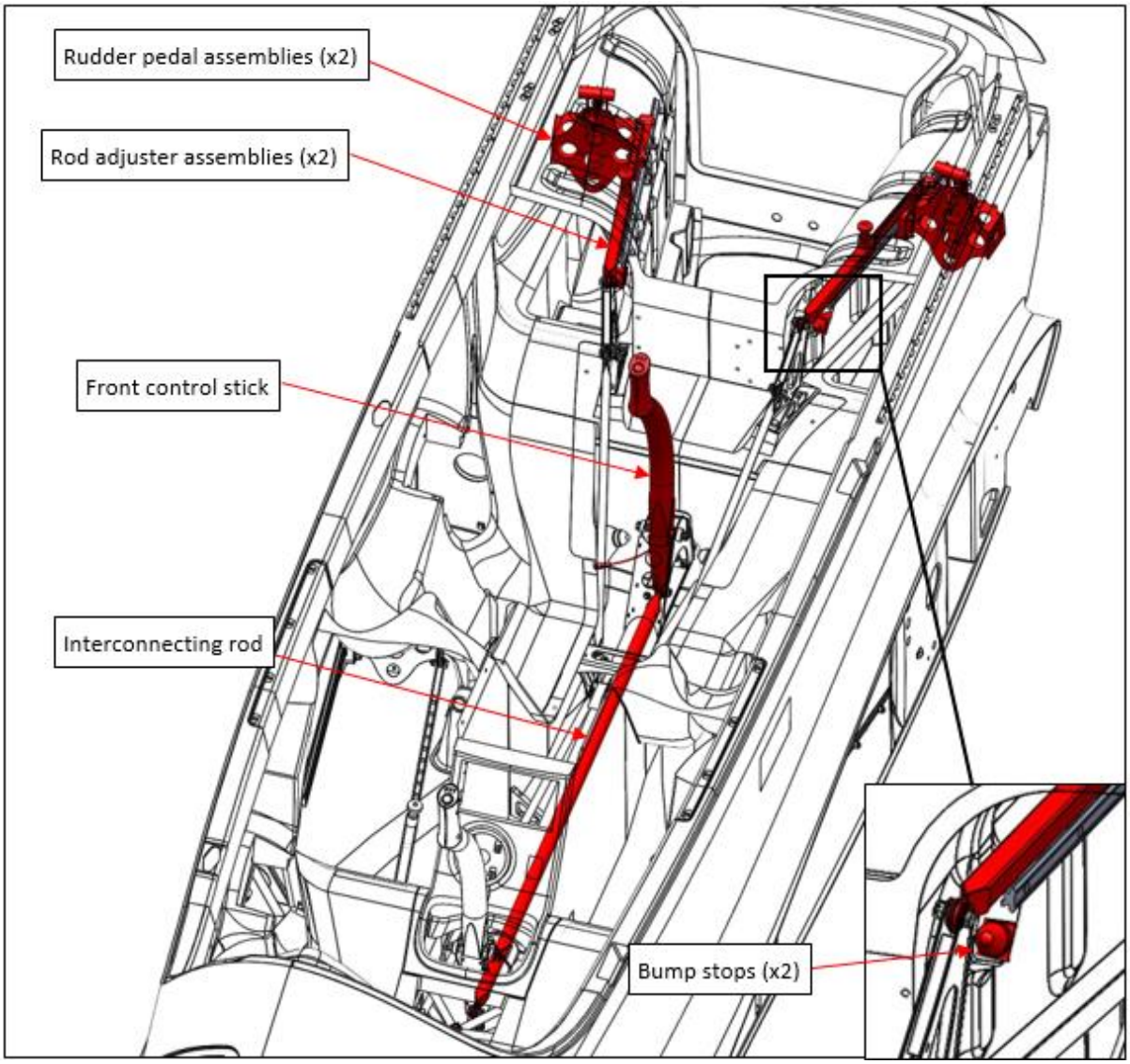
To service the rudder bellcrank:

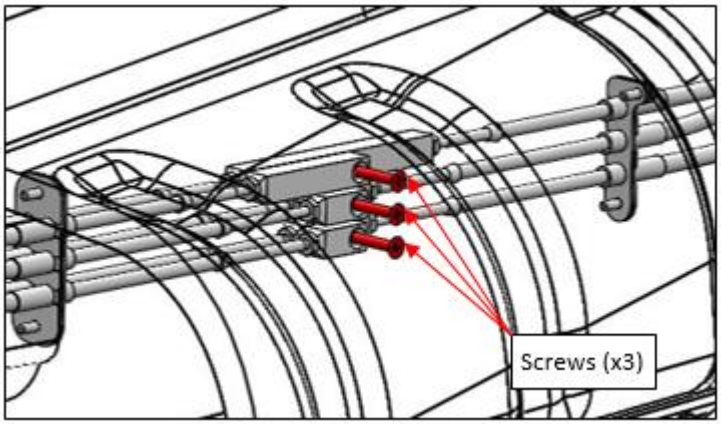
1. Remove Rudder
2. Remove fasteners
3. Remove bellcrank from Rudder
4. Clean all components
5. Inspect standard fasteners in accordance with 5-06, No.1
6. Inspect spherical bearings in accordance with 5-06, No.14
7. To reinstall, reverse steps 1 – 3, use Loctite 270 to secure fasteners
8. Check for correct installation

Signature

27-70 Uninstall Front Seat Flight Controls

The front seat flight controls can be uninstalled to conduct flights with passengers, or reduce weight for competition flying.
The dual-control configuration can be restored with reference to section 27-80.





Uninstall front control stick

1. Remove both seat cushions and seat panels (6 screws front panel, 4 screws rear)
2. Remove baggage bay access panel
3. Disconnect front control stick PTT connector
4. Remove fasteners, remove front control stick
5. Remove fasteners from aft control stick
6. Disconnect interconnecting rod from both control sticks
7. Remove interconnecting rod through baggage bay access hatch
8. Install fasteners for aft control stick
9. Install cotter pins
10. Install both seat panels and seat cushions
11. Install baggage bay access panel

Signature

Uninstall Front Rudder Pedals

1. Remove front seat cushion and seat panel (6 screws)
2. Remove front instrument panel
3. Remove both bump stop assemblies
4. Reinstall fasteners for bump stop assemblies to seal nutplates
5. Disconnect both front pedal adjusters from bellcranks
6. Slide pedals aft, disconnect brake lines from firewall and lines connecting aft- and front pedals from front brake cylinders
7. Remove pedal assemblies from airplane
8. Connect brake line from rear pedals to firewall
9. Bleed brakes in accordance with section 12-10
10. Install front instrument panel
12. Install front seat cushion and seat panel

Signature

Disconnect Front Seat Engine Controls

1. Remove screws connecting aluminum blocks for front & aft control cables

Signature

27-80 Reinstall Front Seat Flight Controls

Reinstall Front Control Stick

1. Remove both seat cushions and seat panels (6 screws front panel, 4 screws rear)
2. Remove baggage bay access panel
3. Remove fasteners from aft control stick
4. Locate interconnecting rod through the baggage bay access hatch
5. Install fasteners in aft control stick
6. Install cotter pins
7. Locate front control stick
8. Install fasteners in front control stick
9. Install cotter pins

Signature

10. Connect front control stick PTT connector
11. Install both seat panels and seat cushions

Signature

13. Install baggage bay access panel

Reinstall Front Rudder Pedals

1. Remove front seat cushion and seat panel (6 screws)
2. Remove front instrument panel
3. Remove fasteners for bump stop assemblies
4. Disconnect brake line from rear pedals to firewall
5. Locate pedal assemblies in airplane
6. Connect brake lines to firewall and lines connecting aft and front pedals to bottom port of front brake cylinders
7. Slide pedal assemblies on rails
8. Connect both front pedal adjusters to bellcranks
9. Install cotter pins

Signature

10. Install both bump stop assemblies
11. Bleed brakes in accordance with section 12-10
12. Install front instrument panel
13. Install front seat cushion and seat panel

Signature

Reconnect Front Seat Engine Controls

1. Set front and aft engine control levers to identical positions
2. Install screws, secure with torque seal

Signature

28 Fuel System

Warning: **Observe the following instructions to reduce hazards during all work on the fuel system:**

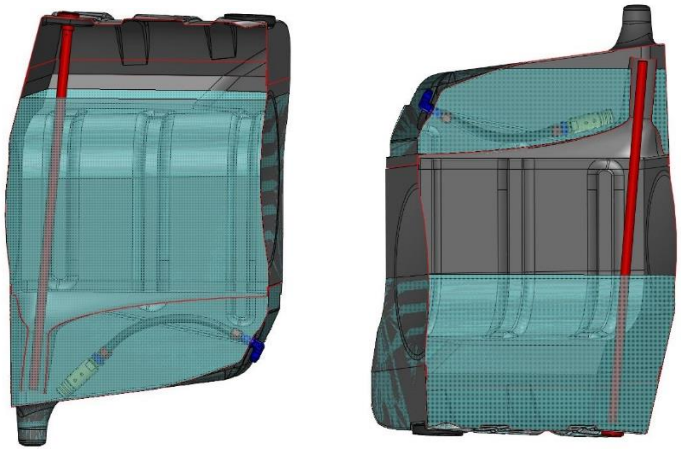
- **Only personnel working on the airplane should be allowed in the immediate area around the airplane**
- **When a fuel tank is opened for repair, ensure good ventilation**
- **When draining fuel, assure that appropriate containers are available and of the correct size**

28-01 Fuel System General

The fuel system consists of two separate wing tanks and the Acrotank in the forward fuselage.
Only the use of Avgas 100 / 100LL is permitted.

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

The composite Acrotank features a separated 'header' volume with 2.3 US gallons (9 Litres) capacity, which is gravity-fed during positive load, and features a stand pipe to prevent draining in negative loading.
The main section of the Acrotank is filled with an explosion and slosh suppressing foam.
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 manoeuvres.
The Acrotank is shown below in upright and inverted positions.



Upright Inverted

The wing tanks are sealed sections of the composite wing structure (wet wings), with fuel pickups, vent line and fuel sensor located in the root rib. Those components are accessible when the wing is removed from the fuselage.
The wing tank 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.

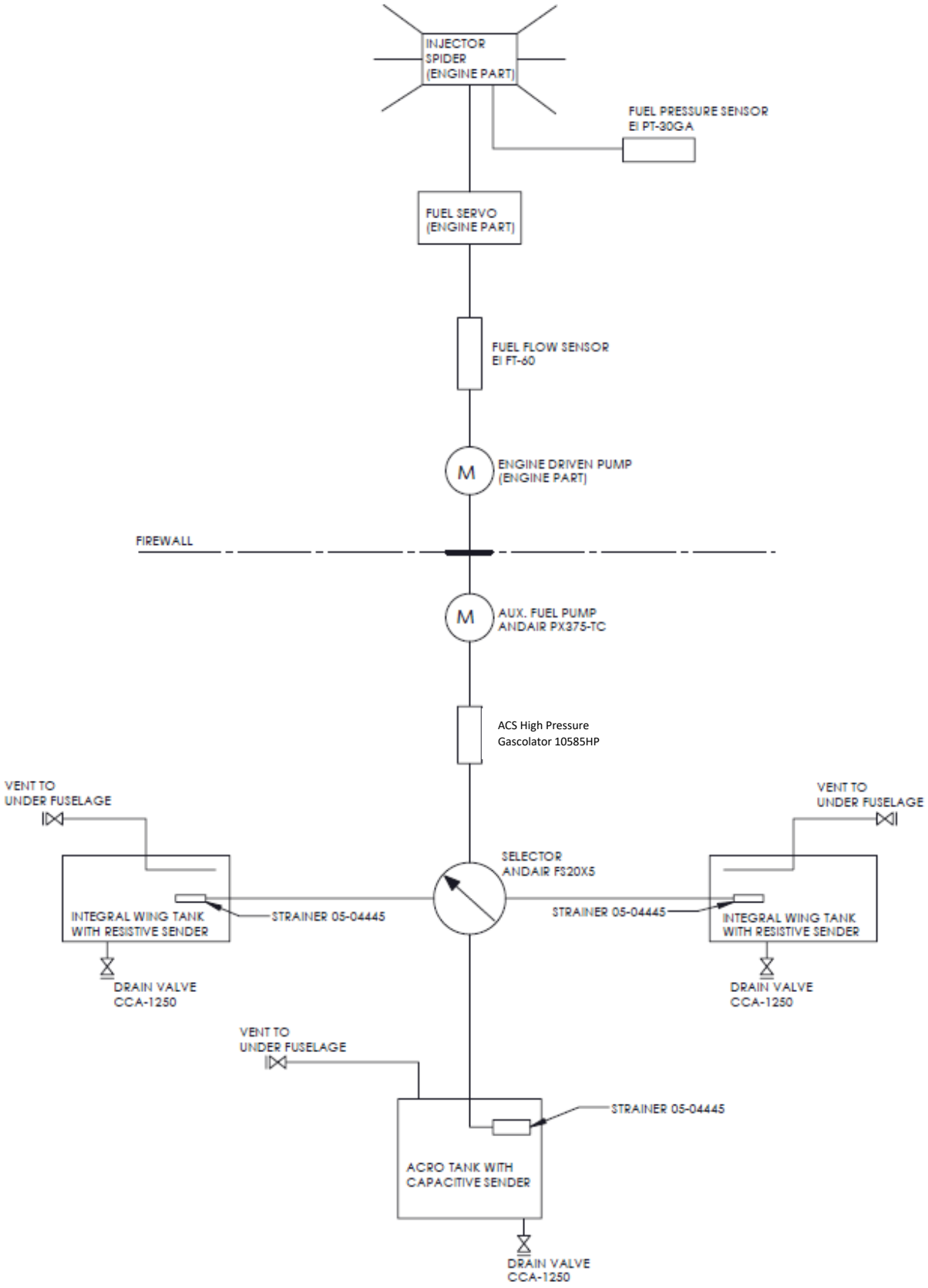
Each tank has a drain valve. The three drain points are located under the centre part of the airplane and are marked with placards.
Strainers are installed at the pickup points of each tank, and a Gascolator is located aft of the right-hand landing gear leg fairing.

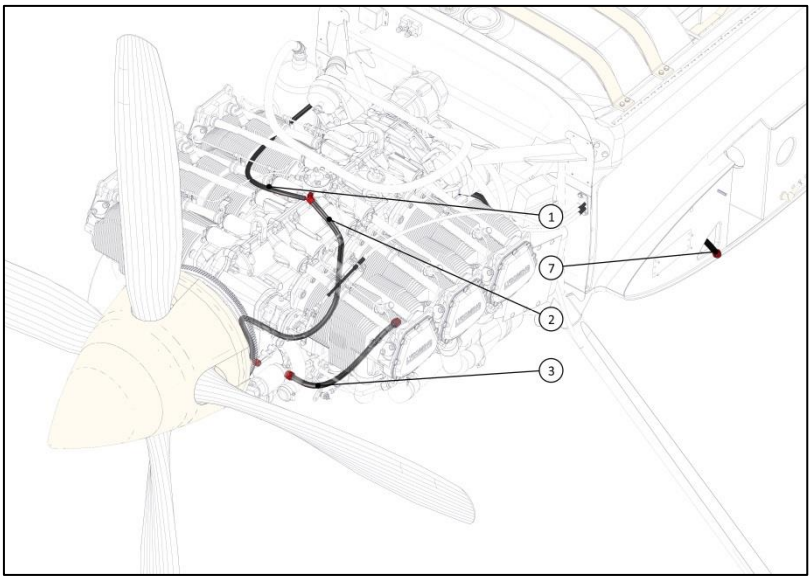
In addition to the mechanically driven fuel pump on the engine, an electrically driven auxiliary fuel pump is installed. It is used for priming before engine start. The auxiliary pump is able to supply the engine at full power should the engine driven pump fail. It can also be used as a boost pump.

The wing tanks have float-type level sensors; Acrotank features a capacitive sensor.

The mechanically actuated fuel selector valve is mounted below the main tank and behind the firewall.
Torque-tubes with universal joints connects the selector switch in the rear centre console to 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).

28-02 System Schematic

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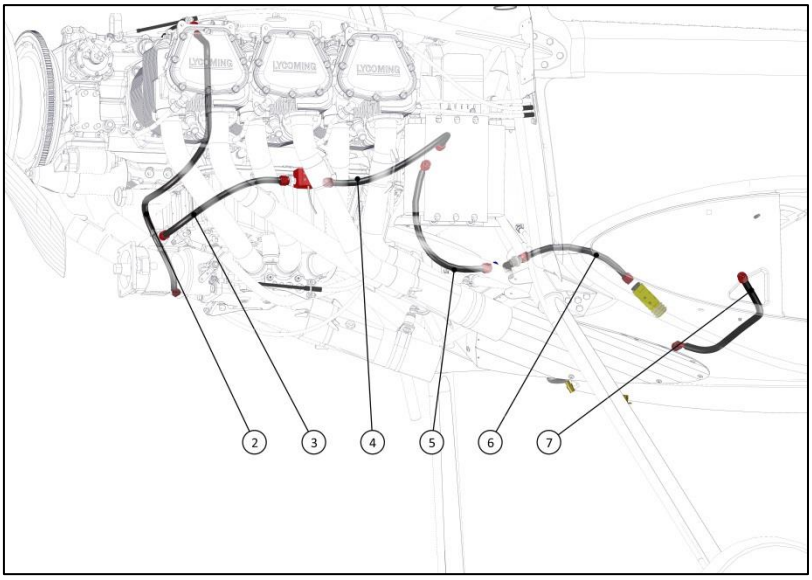
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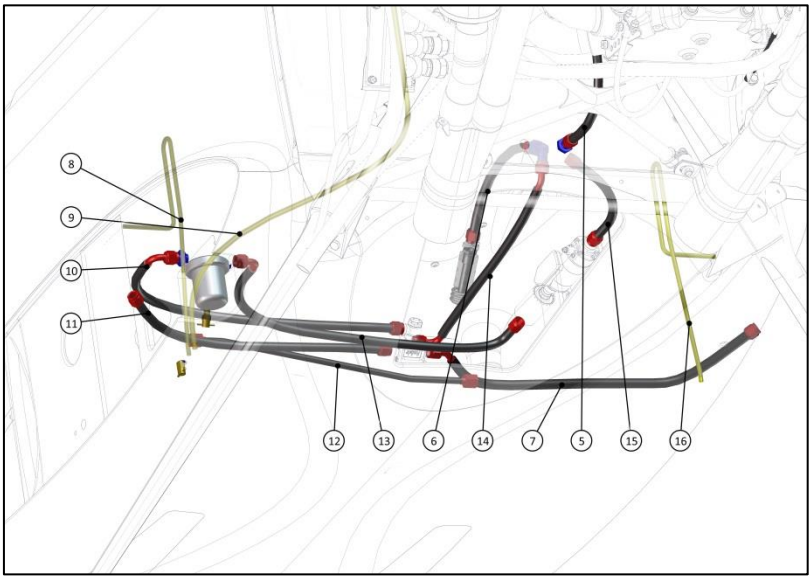
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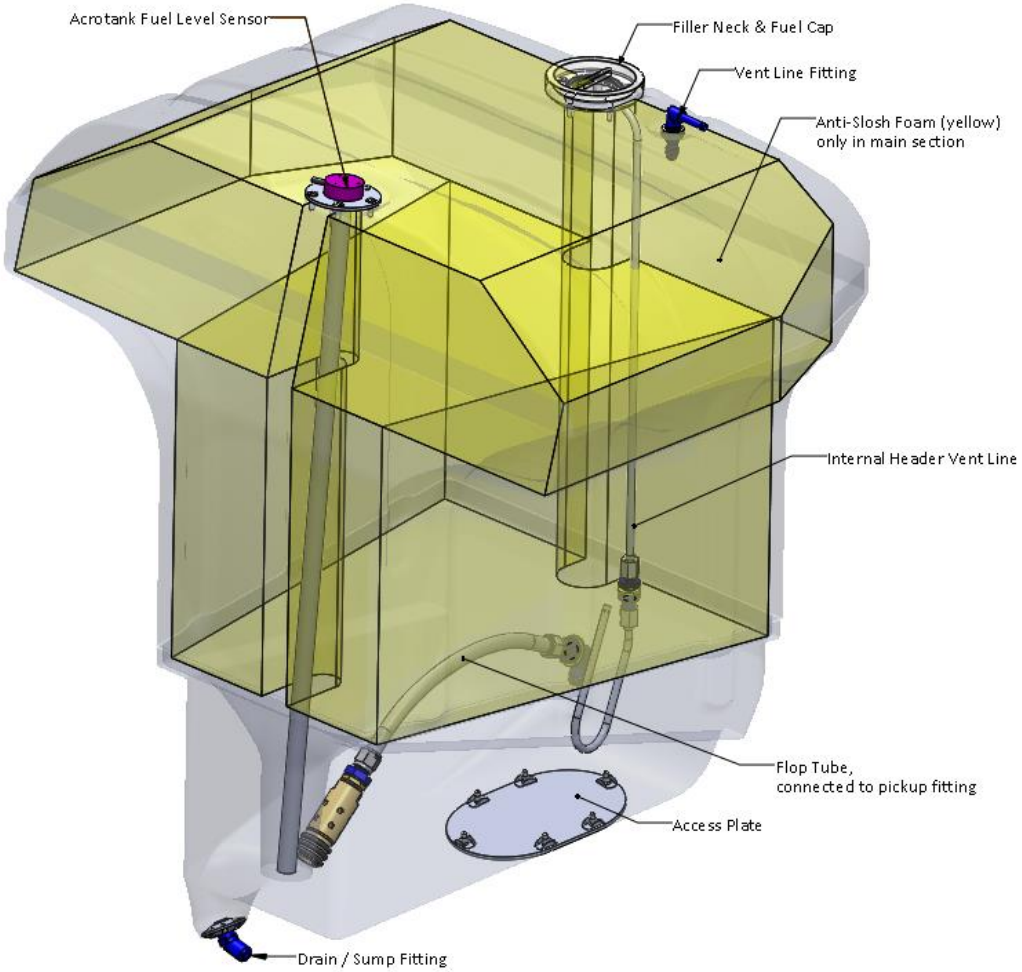
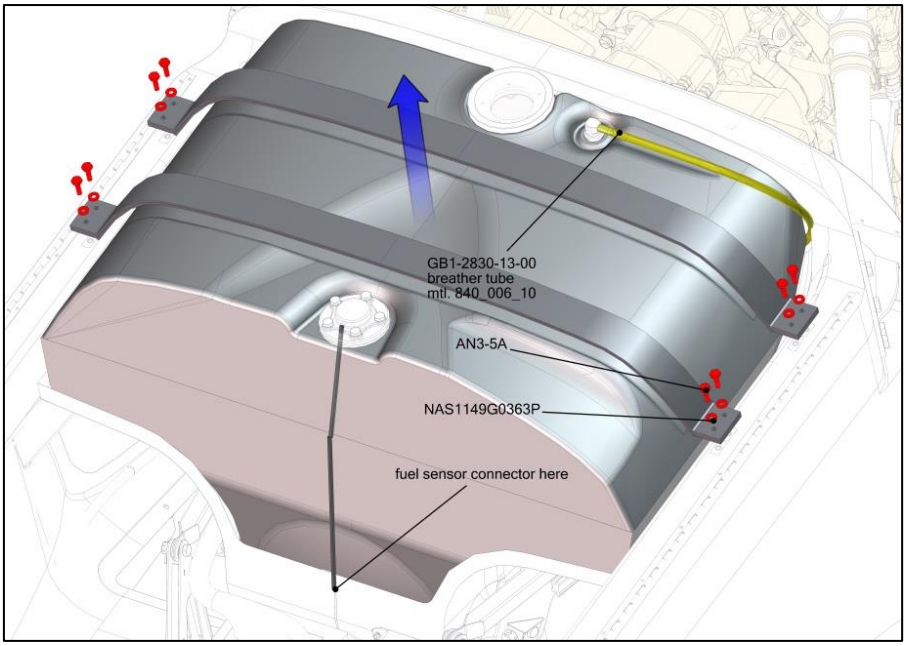
16

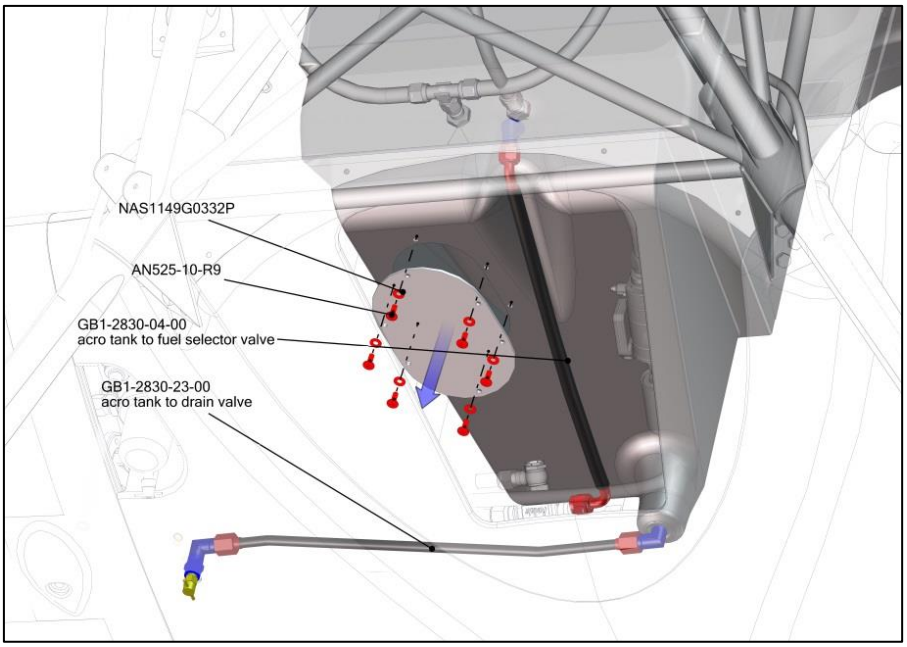
No.	GC Part No.	Type	Mfr. No.	Fitting 1	Fitting 2	Length (mm)
1	GB1-2830-31-00	Stratoflex 101-3	101005-3CR-0274	413524-3-3CR	413527-3-3CR	700
2	GB1-2830-10-00	Stratoflex 101-4	101005-4CR-0302	413524-4-4CR	413517-4-4CR	768
3	GB1-2830-09-00	Stratoflex 101-6	101001-6CR-0127	413524-6-6CR	413524-6-6CR	328
4	GB1-2830-08-00	Stratoflex 101-6	101001-6CR-0147	413524-6-6CR	413524-6-6CR	378
5	GB1-2830-07-00	Stratoflex 101-6	101005-6CR-0130	413524-6-6CR	413517-6-6CR	331
6	GB1-2830-03-00	Stratoflex 3175-6	3175001-6CR-0096	418624-6-6CR	418624-6-6CR	247
7	GB1-2830-01-00	Stratoflex 3175-6	3175003-6CR-0235	418624-6-6CR	418626-6-6CR	600
8	GB1-2830-16-00	5052-O Aluminum tubing	Aircraft Spruce 03-39250	N/A	N/A	570
9	GB1-2830-13-00	PVC hose 6 mm / ¼" ID 8 mm 5/16" OD	N/A	N/A	N/A	1500
10	GB1-2830-05-00	Stratoflex 3175-6	3175005-6CR-0206	418264-6-6CR	418628-6CR	527
11	GB1-2830-02-00	Stratoflex 3175-6	3175001-6CR-0186	418624-6-6CR	418624-6CR	476
12	GB1-2830-23-00	5052-O Aluminum tubing	Aircraft Spruce 0339550	AN818-6D AN819-6D	AN818-6D AN819-6D	410
13	GB1-2830-11-00	Stratoflex 3175-6	3175005-6CR-0234	418624-6-6CR	418628-6-6CR	597
14	GB1-2830-04-00	Stratoflex 3175-6	3175062D0162C090	418626-6-6CR	418628-6-6CR	412
15	GB1-2830-06-00	Stratoflex 3175-6	3175001-6CR-0070	418624-6-6CR	418624-6-6CR	175
16	GB1-2830-15-00	5052-O Aluminum tubing	Aircraft Spruce 03-39250	N/A	N/A	570

28-03 Acrotank – GB1-2810-00-00

Overview





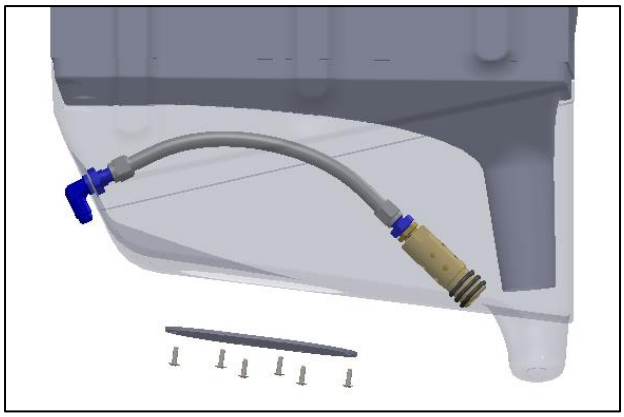


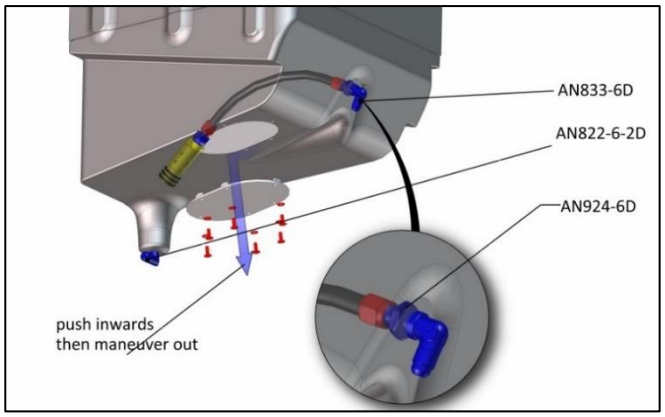
Servicing the Acrotank

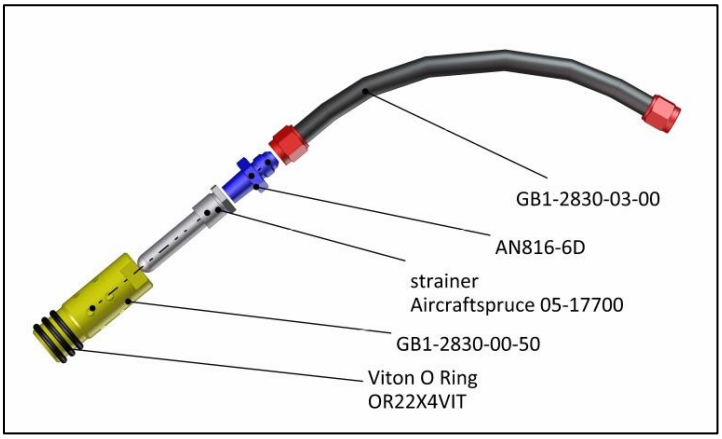
1 Move fuel selector to OFF
2 Remove the cowling; refer to section71-02
3 Remove front instrument panel; refer to section 39-04
4 Remove the windshield assembly; refer to section 52-02
5 Remove the firewall belly panel; refer to section 5-05
6 Empty the tank as described in section 12-06
7 Disconnect the connector from the tank to the fuel selector valve
8 Disconnect the vent hose from the tank
9 Disconnect sump line to drain valve
10 Unplug the electrical connector of the level sensor
11 Remove the retaining straps
12 Lift the tank out of the fuselage
13 Check tank outside surface for discoloring (blue from Avgas), i.e. indication of leaks
If leaks are detected, contact Game Composites.
14 Check for signs of mechanical damage
15 Check thread of filler neck and fuel cap for damage
16 In the fuselage compartment, check for signs of wear or chafing at the contact surfaces, i.e. self-adhesive rubber strips.
If required, remove residue of damaged strips and replace
17 Check clear vent lines for overall condition, routing and contamination, replace if needed
18 Position the tank in fuselage
19 Reinstall the retaining straps
20 Reconnect fuel pickup line
21 Reconnect drain line
22 Reconnect vent line
23 Reconnect electric connection of level sensor
24 Check for correct installation
25 Visually check for Leaks
26 Reinstall windshield assembly; refer to section 52-02
27 Reinstall front instrument panel; refer to section 39-04
28 Reinstall firewall belly panel; refer to section 5-05
29 Reinstall cowling; refer to section71-02

Signature

28-04 Acrotank Flop Tube





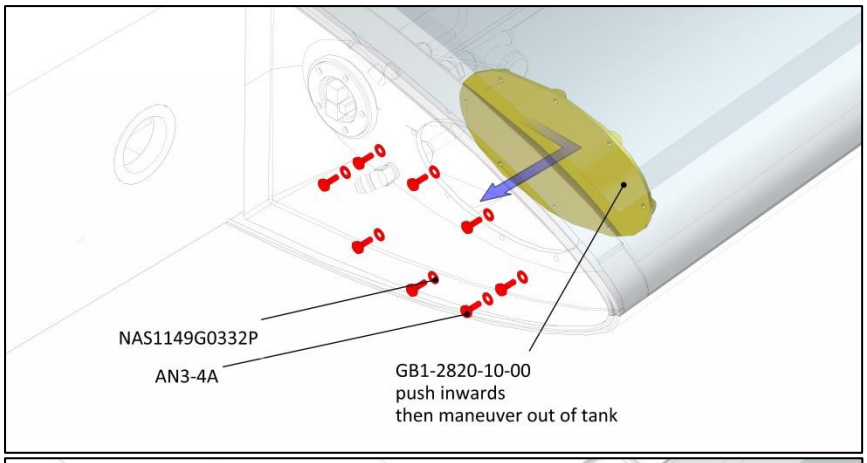


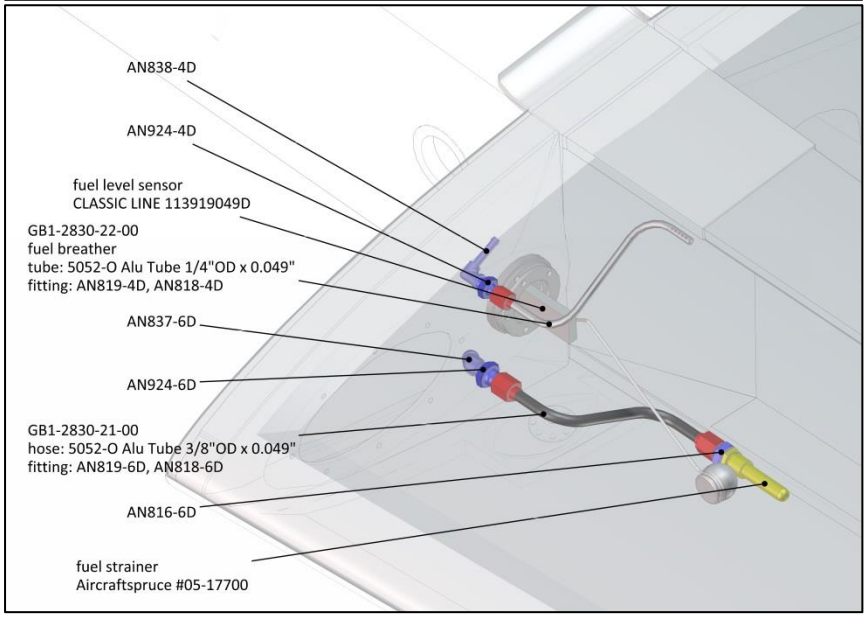
Inspect Flop Tube

1 Drain all fuel from the Acrotank
2 Remove firewall belly panel; refer to section 5-05
3 Remove fasteners of Acrotank bottom inspection panel
4 Use a scalpel to cut sealant
5 Push inspection panel outboard to release, then maneuver out of the tank
6 Remove sealer residue from both sealing surfaces
7 Reach inside the tank to unscrew the flop tube from its fitting
8 Check bob weight and strainer for cleanliness, overall condition and correct installation
9 Check condition of O-rings around bob weight; if brittle or cracked, replace
10 Check flexible hose for overall condition
11 Exchange parts as required
12 Reinstall Flop Tube
13 Reinstall access panel, use PR1440 to seal panel
14 Check for correct installation
15 Visually check for leaks
16 Reinstall firewall belly panel

Signature

28-05 Wing tanks





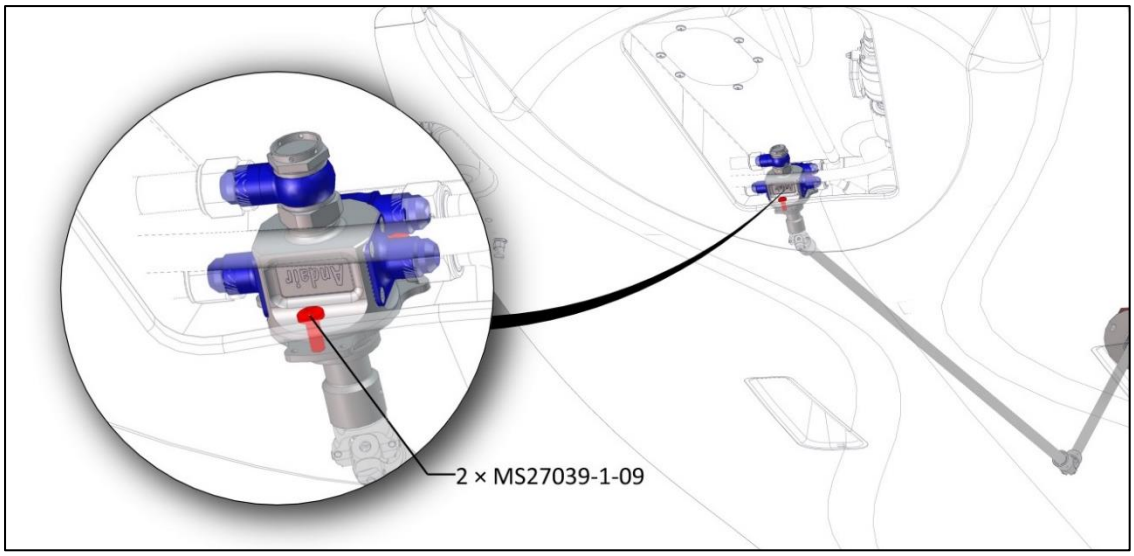
The outer bay of the wing tanks can be visually inspected through the filler neck.
The root rib contains an inspection panel, and fuel pickup, vent line and fuel sensor.
If an inspection of the root side bay is required, remove the wings, per 20-07.

Inspect Wing Tanks

1. Remove fasteners of inspection panel
2. Use a scalpel to cut sealant
3. Push inspection panel outboard to release, then maneuver out of the tank
4. Remove sealer residue from both sealing surfaces
5. Check pickup line, bulkhead fitting and strainer for correct installation, cleanliness and overall condition
6. Check for contamination in fuel tank
7. Check vent line, bulkhead fitting and strainer for correct installation, cleanliness and overall condition
8. Check fuel sensor for free motion, float for general condition and installation
9. To close the tank, reverse steps 1-3, use PR1440 to seal inspection panel
10. Check for correct installation
11. Fill tank with fuel, observe for leaks over a 3hr period.
    If no leaks, drain fuel before reassembling airplane per section 12-06.

Signature

28-05 Selector Valve



Type: Andair EFS20b5-MTM

Manufacturer: Andair Ltd.
Unit 1, Dunsbury Business Park, Fulflood Road, Havant, PO9 5AX, UK
www.andair.co.uk

The units do not require regular maintenance. If defective, the units must be replaced.

To service the selector valve:

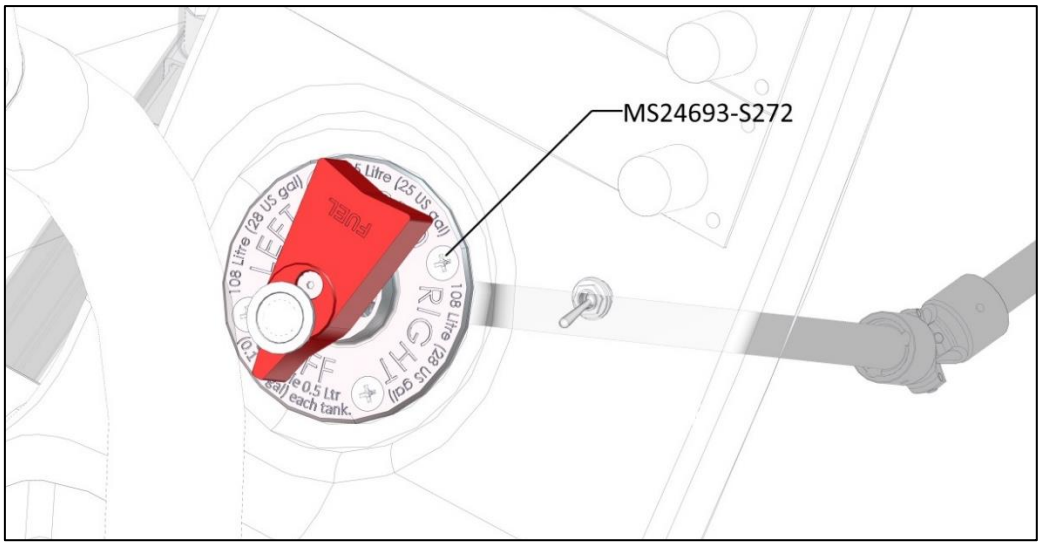
1 Drain all fuel, refer to section 12-06
2 Remove the firewall belly panel
3 Disconnect all fuel hoses at the selector valve
4 Remove the fasteners holding the valve on its seat, then pull valve off the universal joint
5 Service selector valve as required
6 To reinstall, reverse steps 1 – 4

NOTE: torque rods have a non-symmetric groove pattern and fit in only one position

Signature

7. Check for correct installation and function
8. Reinstall belly panel

28-06 Selector Switch



Type: Andair EFS20b5-MTM

Manufacturer: Andair Ltd.
Unit 1, Dunsbury Business Park, Fulflood Road, Havant, PO9 5AX, UK
www.andair.co.uk

The units do not require regular maintenance. If defective, the units must be replaced.

To service the selector switch:

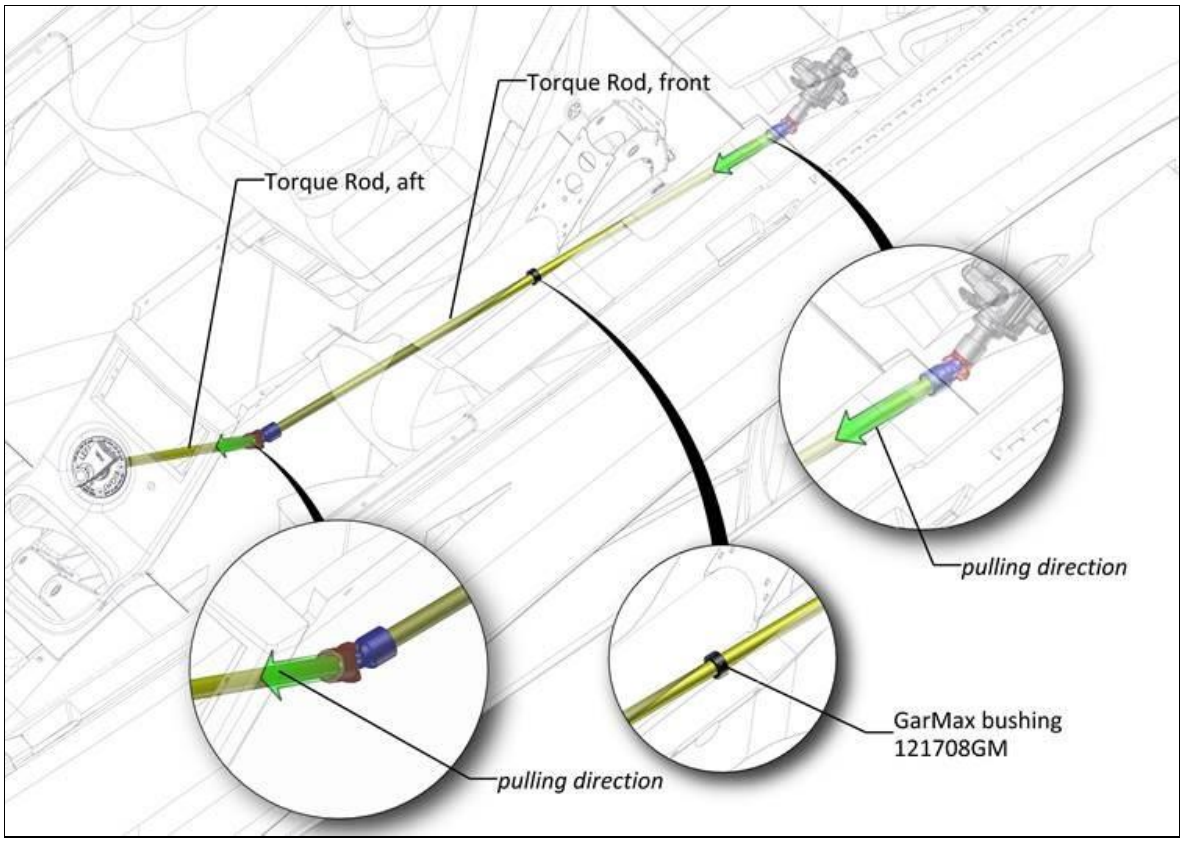
1. Remove the four fasteners on the faceplate, pull the selector switch out
2. Service selector switch as required
3. Maneuver in position

NOTE: Torque rods have a non-symmetric groove pattern and fit in only one position

4. Reinstall fasteners in selector switch face plate
5. Check for correct installation

Signature

28-07 Fuel Control Torque Rod and Universal Joint



Type: Torque Rod, aft: Andair ET, length 810 mm
Torque Rod, aft: Andair ET, length 382 mm
Universal Joint: Andair UJV

Manufacturer: Andair Ltd.
Unit 1, Dunsbury Business Park, Fulflood Road, Havant, PO9 5AX, UK
www.andair.co.uk

The units do not require regular maintenance. If defective, the units must be replaced.

To service the torque rods or universal joints:

1. Uninstall selector switch
2. Uninstall front seat
3. Pull out rear torque rod, maneuver outside, clean and inspect for overall condition
4. Pull universal joint off backwards, clean and inspect for overall condition
5. Pull front torque rod backwards, maneuver outside, clean and inspect for overall condition
6. Inspect guide bushing for overall condition, cracks or deterioration
7. To reinstall, maneuver front torque rod in position, slide through guide bushing and into fuel selector valve
   NOTE: torque rods have a non-symmetric groove pattern and fit in only one position
8. maneuver rear Torque Rod in position, slide selector switch on
   NOTE: torque rods have a non-symmetric groove pattern and fit in only one position
9. Reinstall fasteners in selector switch face plate
10. Check for correct installation

Signature

28-08 Boost Pump

Type: Andair PX375-TC

Manufacturer: Andair Ltd.
Unit 1, Dunsbury Business Park, Fulflood Road,
Havant, PO9 5AX, UK
www.andair.co.uk

The unit does not require regular maintenance. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03.

To service the boost pump:

1 Position the fuel selector switch to OFF
2 Remove the firewall belly panel; refer to section 5-05
3 Disconnect the fuel lines on pump; catch spilt fuel into a container of appropriate size
4 Unplug electrical connections
5 Remove fuel pump from its mounting brackets using a 2.5 mm Allen Key
6 If malfunction is detected, pump must be replaced
7 Reinstall pump on mounting brackets using a 2.5 mm Allen Key
8 Connect fuel lines
9 Plug in electrical connection
10 Conduct function test:
    a. Fuel Selector Switch to ACRO
    b. Battery Master ON
    c. BOOST PUMP switch ON
    d. Observe fuel pressure indication rising
    e. All switches OFF
11 Visually check for fuel leaks
12 Reinstall firewall belly panel; refer to section 5-05

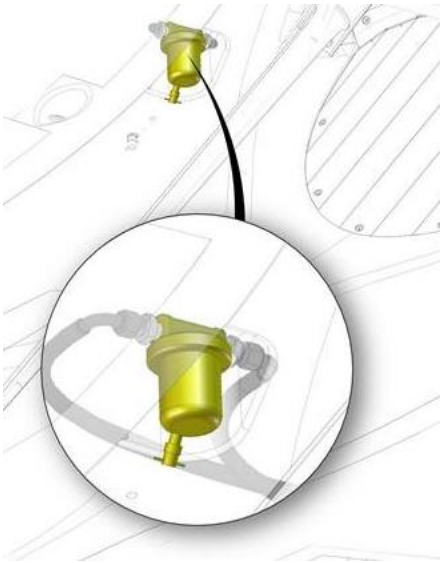
Signature

For troubleshooting information see section 24-11.

28-09 Gascolator

Type: ACS High Pressure Gascolator 10585HP

Manufacturer: ACS Products
1585 Copper Drive, Lake Havasu City,
AZ 86403, USA
www.acsproducts.com



To clean the Gascolator:

1 Fuel selector switch to OFF
2 Remove the lock wire; unscrew the body
3 Pull out the filter
4 Clean the filter in fresh fuel, check for contamination in the filter housing
5 Reassemble in reverse order, secure with Lockwire
6 Fuel selector switch to ACRO, flood system
7 Visually check for fuel leaks
8 Wire lock

28-10 Acrotank Fuel Level Sensor

For illustration, refer to section 28-03.

The Acrotank fuel level sensor is a capacitive unit, the head is mounted in the top of the Acrotank, the sensing tube protrudes through the main section through the stand pipe into the bottom of the header tank.
5 VDC electrical power is provided from the Engine Data Converter GEA 24, supplied through the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Type: Gill 4223-00-3SN-620-D

Manufacturer: Gill Sensors & Controls Limited
Unit 600 Ampress Park, Lymington
Hampshire, SO41 8LW UK
www.gillsc.com

The unit does not require regular maintenance.
If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

To service the Acrotank fuel level sensor:

1 Remove cowling, refer to 71-02
2 Remove windshield, refer to 52-02
3 Disconnect electrical connector
4 Remove fasteners
5 Pull sensor unit out of tank
6 Service or replace as required
7 To reinstall, reverse steps 1-5; in addition:
8 If required, replace gasket (delivered with new unit
9 Switch ON Battery Master
10 check indication on MFD1
11 Switch Battery Master OFF
12 Reinstall windshield, refer to 52-02
13 Reinstall cowling, refer to 71-02

28-11 Wingtank Fuel Level Sensor

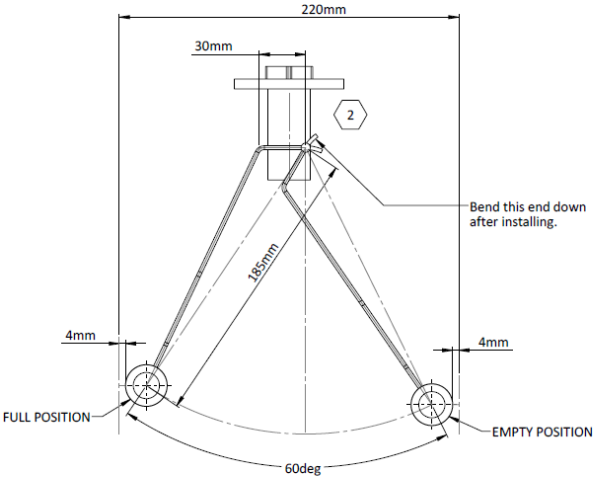
The wingtank fuel level sensors are resistive float types, the head is mounted in the root rib of each wing tank, the arm with the float protrudes into the wing tank.
5 VDC electrical power is provided from the Engine Data Converter GEA 24, supplied through the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

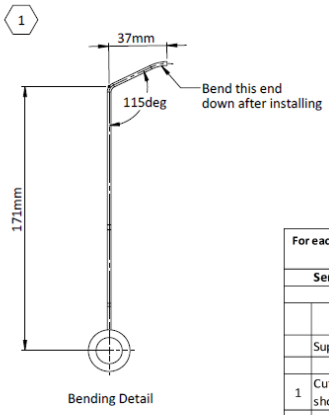
Type: VDO TU00-0769-5107120

Manufacturer: VDO
Check local VDO website for product support,

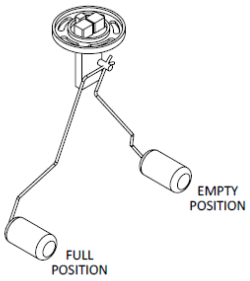
The unit does not require regular maintenance.
If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03





Bending Detail



ISOMETRIC VIEW
SCALE 1 : 3

For each step listed below follow applicable procedures of SP-GB1-5100-00-01. Always refer to latest revision.			
Serial Number (refer to work order)			
Date of Manufacturing			
	Parts	Worker Initials	Insp. Initials
	Supplier Ref: 226-163		
	Modify & Assembly		
1	Cut and Bend float arm to dimensions shown on sheet 2		
2	Install modified float arm in body of Sender. Secure with Loctite 270 on the thread of screw.		
	Inspection		

31 Mechanical Flight Instruments & pitot-static system

31-01 General

This section describes systems which sense environmental conditions and display them to the pilot; including pitot-static system and the standard flight instruments:

Altimeter	(both panels), refer to section 31-08
Airspeed indicator	(both panels), refer to section 31-07
Magnetic compass	(rear cockpit, suspended from canopy, refer to section 31-10
Accelerometer	(rear instrument panel), refer to section 31-09
ADHRS GSU25	aft bulkhead of Acrotank compartment, refer to section 40-13

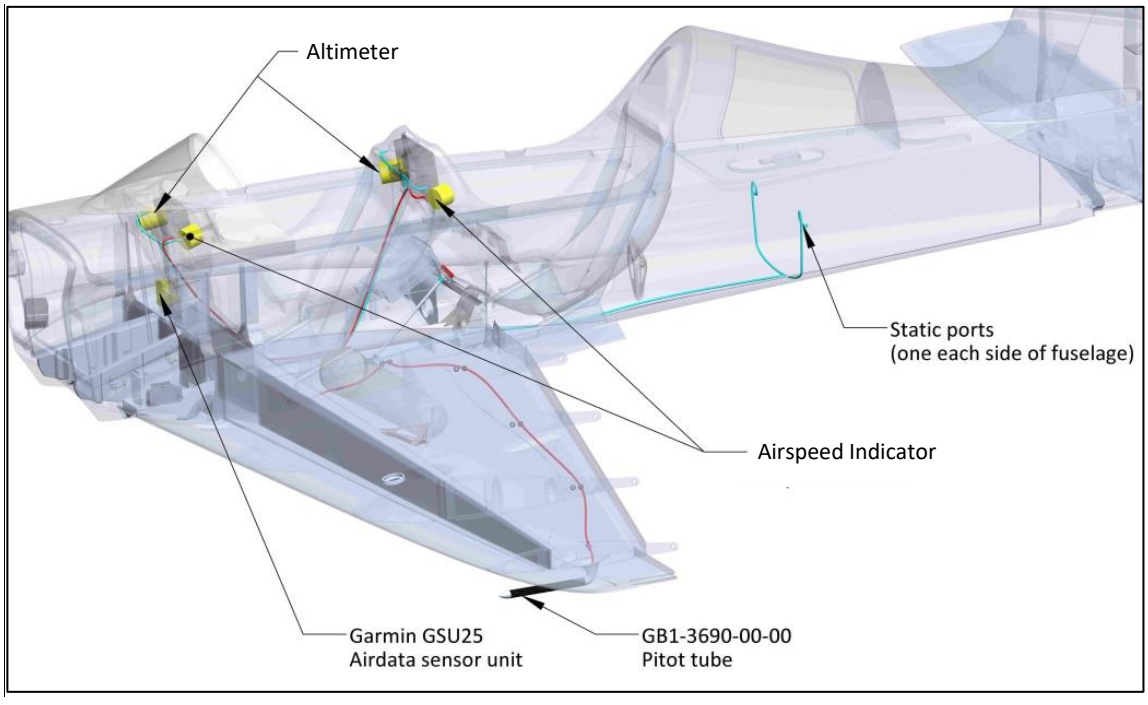
Mounting fastener types for instruments:

Screws:	MS35214-31	Screw Pan Head #6-32UNCx1.0 Brass
	MS35214-42	Screw Pan Head #8-32UNCx0.5 Brass
Clips:	MS33737-15C	Inst. Mounting Nut .375in (for 0.375” bezel)
	MS33737-16C	Inst. Mounting Nut +.375in (for bezels more than 0.375”)

31-02 Pitot-Static System Overview

The pitot system uses a composite fairing with an aluminum tube as pitot tube, connected via PVC hoses and connectors to the dynamic pressure ports of both airspeed indicators and the GSU 25 ADHRS unit.
To drain water, a T-connector is installed at the lowest point of the system (in ground attitude) under the front seat panel. The pitot line has a quick disconnect installed at the LH root rib, to simplify disassembly and reassembly.

The static system features 2 static ports on the side of the fuselage, connected via PVC hoses and connectors to the static pressure ports of the airspeed indicators, altimeters, altitude encoder and GSU 25 ADHRS.
The lines loop upwards from the static ports, preventing water intrusion.
To drain water from the system, the T-connector connecting both static ports can be opened.



To clean the lines, disconnect all ends of each line (instrument- and air data probe side), use compressed air to remove fluids or other contamination. Inspect as required in accordance with section 5-06 item 19.

CAUTION: **Never blow air through a line with an instrument connected, this will cause serious damage to the instrument!**

31-03 Pitot and Static Plumbing

PVC Hose

Type: PVC hose 6 mm / ¼" ID, 8 mm 5/16" OD
Source: Game Composites

Connectors

Connection hose to airspeed indicator, altimeter and ADHRS GSU25:

Nylon Elbow 1/4" tube to 1/8" pipe, PN 0711-153
Source: Game Composites

Nylon Adapter 1/4" tube to 1/8" pipe, PN 0701-151
Source: Game Composites

Connectors for tubing:

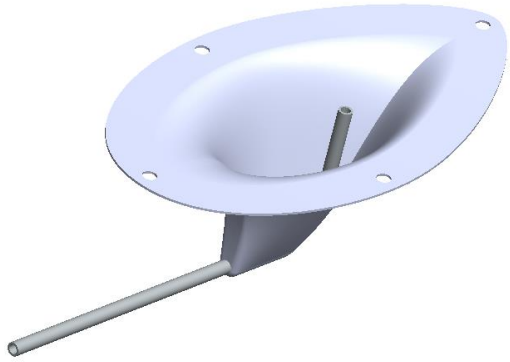
Nylon Tee 1/4" tube, PN 0716-015
Source: Game Composites

Quick disconnect, both sides, PN05-01037
Source: Game Composites

To clean the lines, disconnect all ends of each line (instrument- and air data probe side), use compressed air to remove fluids or other contamination. Inspect as required in accordance with section 5-06 item 19.

31-04 Pitot Tube Assembly GB1-3690-31-00

The pitot tube assembly is mounted to the underside of the LH wingtip with 4 AN525-832R9 fasteners.



To service or replace the unit:

1. Remove AN525-832R9
2. Remove hose clamp
3. Slide off hose
4. Check for contamination in the pitot tube
5. Check overall condition for damage, permanent deformation or cracks
6. Clean, repair or replace as required
7. Reinstall reversing steps 3 - 1

31-05 Pitot-Static Test

The following procedure describes testing of the pitot-static system and connected instruments and devices.
Perform this test any time an instrument, pitot tube, fitting, line, or pitot tube is disconnected.
Exception: Use of quick disconnect.

A calibrated pitot-static tester is required.
This procedure is written for the Laversab Model 6300, adjust procedure per available tester.

1. Connect the aircraft adapters and hoses to the pitot tube and static ports.
   Do not yet connect the hoses to the tester.
2. Set both altimeters to "Standard", 29.92 inHg or 1013.25 mbar.
3. Turn on the tester and check the Leak Timers to 1 minute.
4. Set the Static Rate target to 6.000 ft/min.
5. Set the Pitot Rate target to 200kts.
6. Open the Pitot and Static ports on the tester to ambient and perform the Self-Test of the tester.
   Pitot and Static Vent valves must be closed.
7. Connect the hoses to the tester. Perform the Go-To-Ground function using the GND key.
   Wait for the targets to be achieved.
8. If targets are not achieved, or if Actual values are fluctuating, the Pitot or Static system is open / leaking and is unable to achieve the targets. Turn Off tester and fix problem before proceeding.
9. Once the tester is very stable in Control mode at Ground, set the Pitot target to 100 knots and GO.

10. When Pitot achieves 100 knots, wait for 30 seconds, then put ONLY Pitot into Leak mode, leaving Static in Control mode.
11. If Pitot has a significant leak (more than 5 knots/min.) then first try and find leak while Pitot is in Leak mode. If all airspeed is lost while searching for the leak, cancel out of the Leak screen and go back to Step 10. Then continue to search for leak. Before disconnecting any hoses, first:
    a. Go To Ground
    b. Turn Off the tester
    c. Then disconnect hoses or adapters.
12. Only after the Pitot system is leak-tight (leak less than 5 knots/min), proceed to the next step.
13. Leave the Pitot target at 100 knots and set the Static target to 3000 feet above Ground. Both Pitot and Static outputs should be in Control mode. Press GO.
14. When both Pitot and Static targets have been achieved, wait for 30 seconds, then put ONLY Static into Leak mode, leaving Pitot in Control mode.
15. If Static system has a significant leak (more than 100 feet/min.) first try and find the leak while the tester is in the Leak screen. If significant altitude is lost while searching for the leak, cancel out of the Leak screen and go back to Step 14, then continue to search for the leak.
    Before disconnecting any hoses, first:
    a. Go to Ground
    b. Turn Off the tester
    c. Then disconnect hoses or adapters.
16. Only after the Static system is leak-tight (leak less than 100 feet/min), proceed to the next step
17. With Pitot and Static systems reasonably leak-tight, start checking airplane instruments:
    - Set tester target altitude to 15.000 ft
    - Set tester rate of climb / descent to 6.000 ft/min
    - Set tester to 1-minute hold at 15.000 ft. Altitude must not decrease more than 20ft.
    - Set tester target airspeed 240 kts
    - Set tester rate of airspeed increase / decrease to 150 kts/min
    - Set tester to 1-minute hold at 240 kts. Airspeed must not decrease more than 5kts.
    - Switch airplane Battery Master ON
    - Switch airplane Avionic Master ON
    - Activate tester program
    - observe indications of both mechanical airspeed indicators and altimeters, airspeed indication and altitude indication on MFD1 and MFD2 (if installed) to correspond with tester indications.

Caution: During the tests, do not put either Pitot or Static output in MEASURE mode unless the aircraft is at "Ground". Use only the Control and Leak modes.

18. After finishing the last point of the test procedure, press GND to perform the Go-to-Ground function. The targets will get set to 20 knots and "Ground" altitude.
19. After the targets have been achieved, turn Off the tester.
20. Turn airplane Avionic Master Switch and Battery Master Switch OFF
21. Disconnect the hoses from the tester.
22. Disconnect the aircraft adapters and hoses from the pitot tube and static ports.

31-06 Troubleshooting

Trouble – Pitot-Static	Probable Cause	Remedy
Crosscheck reveals erroneous altimeter indication	Leaks in pitot- and / or static line	Check lines for leaks.
Incorrect or sluggish response of all devices connected to the pitot-static system	Leak or obstructions in static line	Repair or replace line, remove obstruction
Low or sluggish airspeed indication, altimeter normal	Pitot tube deformed, leak or obstruction in pitot line	Check pitot tube assembly for condition
		Repair or replace damaged component

Trouble – Airspeed Indicator	Probable Cause	Remedy
Pointer reacts sluggish, low indication	Leaks in instrument case	Repair or replace instrument
	Obstruction in pitot line	Check lines for leaks and / or moisture
Pointer oscillates	Moisture in static line	Blow out lines
	Leak in pitot and / or static line	Repair or replace line
	Leaking or ruptured diaphragm	Repair or replace instrument
Pointer vibrates	Excessive vibration caused by loose mounting screws.	Tighten mounting screws
	Excessive pitot tube vibration	Tighten clamps and connections

Trouble – Altimeter	Probable Cause	Remedy
Erroneous indication	Moisture in static line	Check lines for leaks and / or moisture, repair and / or blow out lines
Altimeter indicates high	Leak in static system	Inspect/ repair system
Excessive oscillation	Defective instrument	Repair or replace instrument

NOTE: **After any repair / replacement to any component of the pitot-static system or instrument connected to the pitot-static system, conduct pitot-static test per section 31-05.**

31-07 Airspeed Indicator

Type: 8030B.168

Manufacturer: United Instruments
3625 N Comotara St, Wichita, KS 67226
www.unitedinst.com

Scale 0-260 knots

Markings:

Green arc	55 to 200 knots	(V_S 54 knots to V_{NO} 200 knots)
Yellow arc	200 to 234 knots	(V_{NO} 200 knots to V_{NE} 234 knots)
Red line	234 knots	(V_{NE} 234 knots)

The airspeed indicator does not require regular maintenance. When defective, get service conducted at approved facility.

To service the airspeed indicator in the rear instrument panel:

1. Remove GPS antenna and cover
2. Remove screws on the instrument face
3. Maneuver ASI out of instrument panel
4. Pull off pressure connections
5. Get service conducted by approved maintenance facility as required
6. To reinstall, reconnect static and dynamic pressure tubes - tubes and instrument ports are marked ‘s’ / static and ‘p’ / pitot
7. Maneuver instrument into position
8. Reinstall 4 screws
9. Check for correct installation
10. If required, reinstall cover and GPS antenna; refer to section 34-04
11. Conduct leak check; refer to section 31-05

Signature

To service the altimeter in the front instrument panel:

1. Uninstall front instrument panel, refer to section 39-04
2. Disconnect static pressure tube
3. Remove screws on the instrument face
4. Remove altimeter out of instrument panel
5. Get service conducted by approved maintenance facility as required
6. To reinstall, attach with 4 instrument screws
7. Reconnect static pressure tube
8. If required, reinstall front instrument panel, refer to section 39-04
9. Conduct pitot-static test, refer to section 31-05

Signature

31-08 Altimeter

Type:	5934PD-3
Manufacturer:	United Instruments 3625 N Comotara St, Wichita, KS 67226 www.unitedinst.com
Range:	0 – 1.000 – 20.000ft 0-1000 feet large pointer outer scale 0-20000 feet small pointer inner scale

Features 2 Kollsman windows, one in Millibar, one in In.Hg.

The altimeter does not require regular maintenance. When defective, obtain service at approved facility.

To service the altimeter in the rear instrument panel:

1. Remove headrest, refer to section 39-03
2. Remove fasteners
3. Maneuver altimeter out of instrument panel
4. Disconnect static pressure tube
5. Get service conducted by approved maintenance facility as required
6. To reinstall, reconnect static pressure tube
7. Maneuver instrument into position
8. Reinstall 4 screws
9. If required, reinstall headrest, refer to section 39-03
10. Conduct pitot-static test, refer to section 31-05

To service the altimeter in the front instrument panel:

10. Uninstall front instrument panel, refer to section 39-04
11. Disconnect static pressure tube
12. Remove screws on the instrument face
13. Remove altimeter out of instrument panel
14. Get service conducted by approved maintenance facility as required
15. To reinstall, attach with 4 instrument screws
16. Reconnect static pressure tube
17. If required, reinstall front instrument panel, refer to section 39-04 Signature
18. Conduct pitot-static test, refer to section 31-05

31-09 Accelerometer

Type: GM510-2

Manufacturer: Wultrad Inc. / Falcon Gauge
950 Rand Rd. Suite 119, Wauconda, IL 60084, USA
www.falcongauge.com

Range: +10 / -5G

Unit does not require regular maintenance. When defective, it must be replaced.

To service the accelerometer in the rear instrument panel:

1. Remove headrest, refer to section 39-03
2. Remove screws on the instrument face
3. Maneuver accelerometer out of instrument panel
4. If malfunction is detected, unit has to be replaced
5. Before installing an accelerometer, ensure to turn the lock on the backside in 'unlocked' position
6. To reinstall, maneuver instrument into position
7. Reinstall 4 screws
8. If required, reinstall headrest, refer to section 39-03

Troubleshooting / Inspection:
Uninstalled:

1- Remove instrument from instrument panel
2- Check locking knob is in 'unlocked' position
3- Shake once to offset the pointers
4- Hold instrument with face perpendicular to the ground,
Push setting knob to reset the pointers.
All three pointers should point at 1G.

If any of the pointers is out by more than 1G, the unit has to be replaced.

Installed:

1. Push setting knob to reset the pointers
2. All three pointers should point at 1G.

If any of the pointers is out by more than 1G, the unit has to be replaced.

Type: TL-3424

Manufacturer: TL Electronic, Airport, Building 125,
Hradec Kralove 503 41, Czech Republic
http://www.tl-elektronic.com

Range: +15 / -15G, ±0.1G Accuracy

Unit does not require regular maintenance. When defective, it must be replaced.

To service the accelerometer in the rear instrument panel:

1. Remove headrest, refer to section 39-03
2. Remove screws on the instrument face
3. Maneuver accelerometer out of instrument panel
4. Disconnect power supply plug
5. If malfunction is detected, unit has to be replaced
6. To reinstall, connect power supply plug and maneuver instrument into position
7. Reinstall 4 screws
8. If required, reinstall headrest, refer to section 39-03

Troubleshooting / Inspection, installed:

1. Switch ON Battery Master
2. Check ACC indication: should be 1.0 G.

If indication on in ground attitude is out by more than 0.5 G in either direction, the unit has to be replaced.

31-10 Magnetic Heading Indicator

Type Sirs Navigator, unlit

Manufacturer: Sirs Navigation Ltd.
Compass House, Bowes Estate
Wrotham Road, Meopham, Kent, DA13 0QB, UK
www.sirs.co.uk

Tool required: Sirs Corrector Key

Compensation Procedure:

This can be conducted either in the three point- or the flight attitude.
Before your compass can be adjusted the aircraft must be capable of being aligned to both the East /West axis and North/South axis.
The use of another compass outside the aircraft, or a GPS to determine the cardinal points is advised.

Correction East / West (B Coefficient)

1. Align the aircraft facing East, insert the Corrector Key provided, into the left-hand hole at the front of the compass, rotate the key in either direction so that the East point is directly under the Index line.
2. Align the aircraft facing West and check that the West Point is under the Index line.
   Any error may be corrected by readjusting to remove HALF the error shown.

Correction North / South (C Coefficient)

1. Align the aircraft facing North, insert the Corrector Key into the right-hand hole at the front of the compass, rotate the key in either direction so that the North point is directly under the Index line.
2. Align the aircraft facing South and check that the South point is under the Index Line.
   Any error may be corrected by readjusting to remove HALF the error shown.

Repeat this procedure until the errors are minimized.

Record deviations in a deviation table, which has to be attached to the canopy frame:

For	N	30	60	E	120	150
Steer						
For	S	210	240	W	300	330
Steer						

32 Landing Gear including Wheels and Brakes

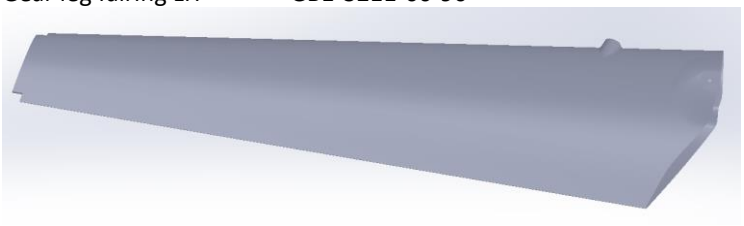
32-01 Landing Gear General

The main landing gear consists of 2 individual steel gear legs, which sleeve into bushed tubes on either side of the engine mount close to the fire-wall.
Axles are bolted to the bottom flange, onto which the main wheels are mounted.
Hydraulic brakes are fitted to each wheel.
The landing gear features non-structural composite fairings.

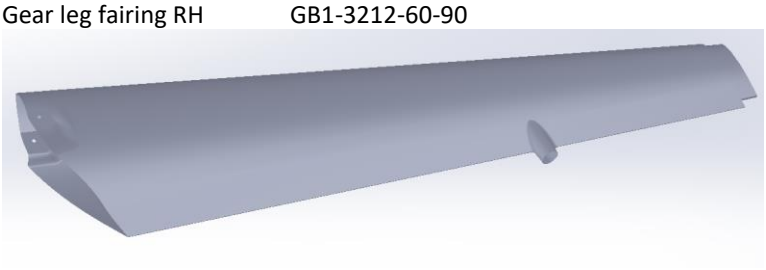
32-02 Landing Gear Fairings

Each main gear leg-wheel assembly is covered by a set of non-structural composite fairings.
Inspection of composite structures is described in section 51-01.
Repair of composite structures is described in sections 51-05 to 51-08.

Gear leg fairing LH GB1-3211-60-90



Gear leg fairing RH GB1-3212-60-90



Wheel pant LH GB1-3211-40-90

Wheel pant RH GB1-3212-40-90

Brake Cover LH GB1-3211-50-90

Brake Cover RH GB1-3212-50-90

To service the wheels & brakes assembly, the wheel pants and brake covers have to be removed.

Removing either or both Wheel pants

1. Use Philips 2 screwdriver to remove fasteners around brake cover
2. Remove brake cover
3. Use 7’16’’ wrench to remove fastener from axle stand-off
4. Remove wheel pant

Re-install either or both Wheel pants

1. Move wheel pant in position
2. Use 7’16’’ wrench to install fastener to axle stand-off
3. Use Philips 2 screwdriver to install fasteners around brake cover

Removing either or both Leg Fairings

1. Remove cowling per 71-02
2. Use razor to cut trailing edge sealant open
3. Use 7’16’’ wrench to remove bottom fastener from axle stand-off
4. Use 3/8’’ wrench to remove fasteners from engine mount brackets
5. Slide fairing off forward

Re-install either or both Leg Fairings

1. Slide fairing over engine mount brackets and axle standoff
2. Use 3/8’’ wrench to install fasteners from engine mount brackets
3. Use 7’16’’ wrench to install bottom fastener in axle stand-off
4. Clean bonding area of trailing edge, apply Sikaflex sealant, hold in position with masking tape until dry.
5. If needed, reinstall cowling per section 71-02

32-03 Main Gear Leg left-hand – GB1-3211-60-01

See 32-04 below

32-04 Main Gear Leg right-hand – GB1-3211-60-02

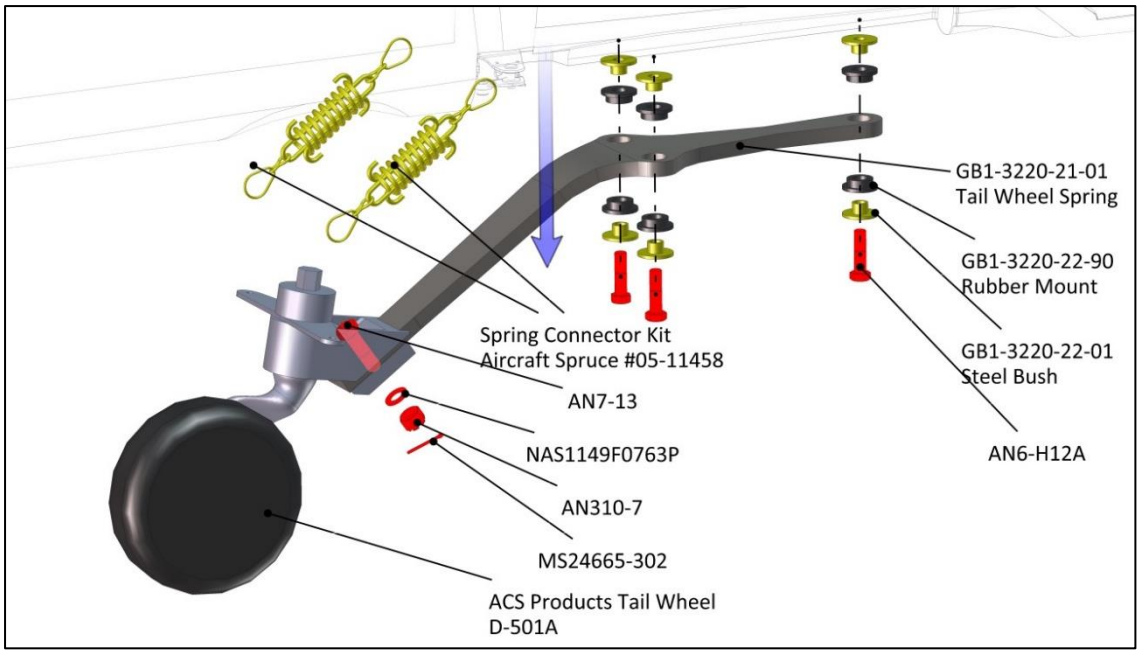
Depending on the work to be done, each main gear leg may be removed either with or without the wheels and brakes attached.

The landing gear legs do not require regular maintenance. If damaged or defective, units have to be replaced.

1. Remove the engine cowlings as described in section 71-02
2. Lift and support the front of the airplane as described in section 0
3. Remove the landing gear fairings, wheels and axles as described above
4. To avoid disconnecting the hydraulic brake line, slide brake caliper assembly off the torque plate
5. For the right leg, detach the oil breather line
6. Use a 5/8'' wrench to remove the leg retaining bolt in the top of the leg
7. Slide gear leg out of engine mount sleeves
8. Clean all components
9. Inspect standard fasteners in accordance with 5-06, No.1
10. Inspect landing gear legs in accordance with 5-06, No.6
11. Re-assembly is the reverse process, in addition:
    a. Secure the fasteners with lock wire
    b. If the brake hydraulics were disconnected, fill and bleed the brakes as described in section 12-10
12. Check for correct installation

Signature

32-05 Tailwheel General



A single tail-wheel with solid tire is pivot mounted to the tailwheel leaf spring.
The tail spring is mounted to the fuselage through three rubber bushings.

The tail-wheel is steered by compression springs connected via carabine clips to lugs on the rudder bracket.

The tailwheel components do not require regular maintenance.
If damaged or defective, units have to be replaced.

32-06 Tailwheel spring – GB1-3220-21-01

1. Jack up the tail of the airplane as described in 7-02
2. Use 5/8'' wrench to remove Tailwheel assembly retaining bolt
3. Remove tail fairing
4. Disconnect linkage chains
5. Remove lock wire
6. Use 9/16'' wrench to remove the 3 retaining bolts
7. Remove tail spring
8. Push stainless steel bushings out of rubber bushings
9. Remove rubber bushings
10. Clean all components
11. Inspect standard fasteners in accordance with 5-06, No.1
12. Inspect landing gear legs in accordance with 5-06, No.6
13. Assemble rubber bushings and sleeves into tail spring
14. Mount tail spring to airplane
15. Torque retaining bolts to 100"/lbs. / 10Nm
16. Lockwire all bolts
17. Reinstall tailwheel assembly
18. Check for correct installation
19. Reinstall tail fairing
20. Lower the airplane to the ground

Signature

32-07 Tailwheel

Type: D-501A

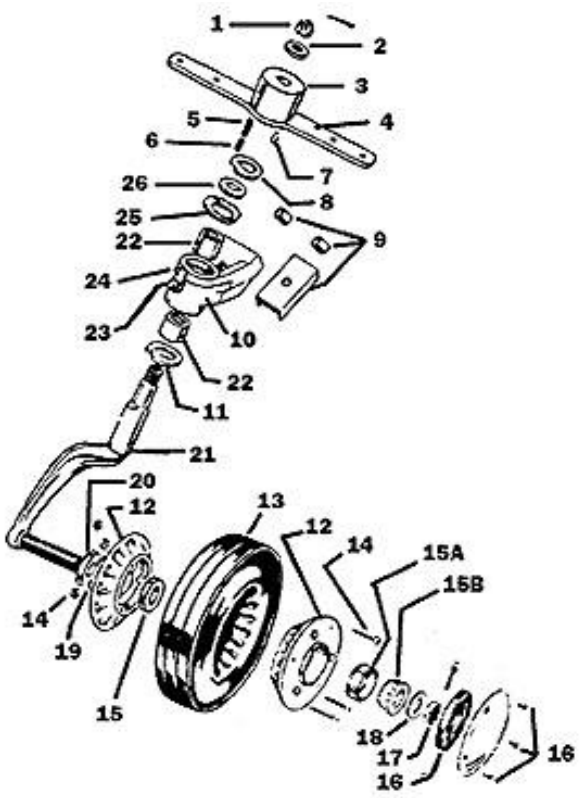
Manufacturer: ACS Products
1585 Copper Drive, Lake Havasu City, AZ 86403, USA
www.acsproducts.co

The tailwheel components do not require regular maintenance.
If damaged or defective, units have to be replaced.

1. Jack up the tail of the airplane as described in 7-02
2. Remove wheel cap
3. Remove cotter pin
4. Remove wheel nut
5. Slide wheel off axle
6. Clean and inspect axle for nicks, excessive corrosion and damage
7. Slide on new wheel
8. Install axle nut, hand-tighten until resistance is felt
9. Loosen the axle nut only enough so that the wheel runs free, or with very little drag
10. Install cotter pin
11. Reinstall wheel cap
12. Check for correct installation
13. Lower the airplane to the ground

Signature

Parts may be replaced, see exploded view below:



1. Castle Nut
2. Washer
3. Driving Cap
4. Wheel Arm
5. Plunger Spring
6. Plunger Pin
7. Arm Driving Pin
8. Driving Washer
9. Attaching Bracket Spacer
10. Attaching Bracket
11. Powder Metal Washer
12. Wheel Hub
13. Tire; 6x2 solid
14. Wheel Bolt
    Wheel Nut
15. A. Bearing Cup
    B. Bearing Cone
16. Wheel Hub Cap;
    Felt Washer
17. Wheel Nut
18. Thrust Washer
19. Kloser Spacer
20. Garlock Seal
21. Axle & Arm
22. Torrington Bearing
23. Grease Fitting
24. Cam Locating Pin
25. Cam Washer
26. Driving Washer Spacer

32-08 Brake Pads

Type:	Grove	066-111
	Rapco	RA66-111
	Cleveland	66-111

Manufacturer: Grove Aircraft
1800 Joe Crosson Drive, El Cajon, CA 92020, USA
www.groveaircraft.com

or Parker Aircraft Wheel & Brake
1160 Centre Road, Avon, OH 44011, USA
www.parker.com

or RAPCO Inc.
445 Cardinal Lane, Hartland, WI 53029, USA
http://www.rapcoinc.com

The brake pads can be inspected and replaced without raising the aircraft or removing the wheel.

Remove Brake Pads

1 Remove back plate attaching bolts and remove back plate assembly.
2 Slide brake caliper out of torque plate assembly.
3 Slide press plate assembly off of torque pins.
4 Remove old linings by removing the rivets with a small drift punch or 1/8" diameter drill.
Use care to prevent elongating the holes in the back plate or press plate.
De-burr the holes after drilling if necessary.

Install New Brake Pads

1 Clean back plate and press plate surfaces before installing new linings.
2 Inspect back plate and press plate for excessive corrosion, visible damage, or excessive warpage.
Straighten or replace press plate if warped in excess of 0.010".
3 Rivet new linings onto back plate and press plate using rivet tool #824 or equivalent.
Refer to Grove parts manual for proper linings and rivets.
Small cracks in the tubular rivets are allowed after forming, providing that no cracks extend beyond the crest of the rounding.
No more than two cracks in any 90-degree segment and no more than three cracks are acceptable.
4 Check to ensure that pads are tight to the back plate and press plate, and free of any movement.
5 Check for correct installation Signature

Reinstallation of Back Plate and Press Plate assemblies

1 Clean brake cylinder and piston and push piston back into cylinder
2 Clean torque pins and lightly lubricate with a dry film such as silicon spray. Grease will attract dirt and cause excessive wear on the torque pins and press plate
3 Slide press plate onto torque pins and install brake caliper assembly onto torque plate
4 Position back plate between tire and brake disc. Install and tighten attaching bolts and washers using the torque value found on the caliper label
5 Lockwire the back plate attaching bolts
6 If brake lines were disconnected, bleed the brakes Signature
7 Check for correct installation

Break-in Procedure

Organic Brake Linings

1. Taxi aircraft for 500 yards with the engine operating at 1000-1200 RPM's while applying sufficient brake pedal force to keep the taxi speed between 4 and 9 knots.
2. Allow the brakes to cool for 10 to 15 minutes.
3. Apply brakes and run the aircraft engines at a high RPM.
4. If brakes hold aircraft stationary, break-in is complete.
5. If brakes don't hold the aircraft stationary, repeat steps 1 through 3.

Metallic Brake Linings:

1. Complete two consecutive full stop brake application with aircraft in motion from 30 to 35 knots. DO NOT allow the brake discs to cool between stops.
2. Allow the brakes to cool for 10 to 15 minutes.
3. Apply brakes and run the aircraft engines at a high RPM.
4. If brakes hold aircraft stationary, break-in is complete.
5. If brakes don't hold the aircraft stationary, repeat steps 1 through 3.

32-09 Brake Calipers

Type: 33-8M

Manufacturer: Grove Aircraft
1800 Joe Crosson Drive, El Cajon, CA 92020, USA
www.groveaircraft.com

The brake calipers can be inspected, maintained and repaired without raising the aircraft or removing the wheel. Removal of the wheel is not necessary unless the torque plate is to be removed. Disassembly should be done on a clean, cushioned flat surface to prevent nicks, scratches, and gouges to the brake.

Remove:

1. Remove the rear landing gear fairings per section 32-02
2. Drain the fluid from the brake system by opening the bleeder fitting and pumping the brake pedal until the system is dry. Collect the discharged fluid and dispose of properly.
3. Disconnect brake line from brake caliper.
   Cap brake line to prevent foreign material to enter.
4. Remove back plate
5. Remove the piston from the caliper body. This can be done by injecting compressed air through the brake line fitting, cover the piston and caliper with a rag and/or place face down on a soft surface.
   CAUTION: Care must be taken to ensure that the piston does not exit at high velocity!
6. Remove the O-Ring from the piston. It is recommended that new O-Rings be installed.
   If the old O-Rings are to be re-used, care must be taken to ensure that they are not damaged during removal or re-installation.
   If the O-Ring is brittle, nicked, scratched or has flat surfaces, it must be replaced.
   CAUTION: Use only approved O-Rings that are compatible with aircraft brake fluid!
7. If removal of the torque plate is required, remove torque plate, and wheel

Inspection and Repair:

1 Visually inspect cylinder for cracks, nick, corrosion, or other damage.
Cracks around the torque pins will cause replacement.

2 Inspect the caliper torque pins for excessive wear, proper tightness, cracks in the caliper body or other damage. Cracks in caliper body or loose torque pins will cause replacement.

3 Inspect the piston bore and piston for contamination, corrosion and scratches. Light nicks and scratches can be removed by polishing. Care must be taken not to damage the protective coating which will result in increased corrosion. Deep nicks or scratches will cause replacement.

4 Inspect back plate and press plate for excessive corrosion, visible damage, or excessive warpage which is cause for rejection of the part. Straighten or replace press plate if warped in excess of 0.010”.

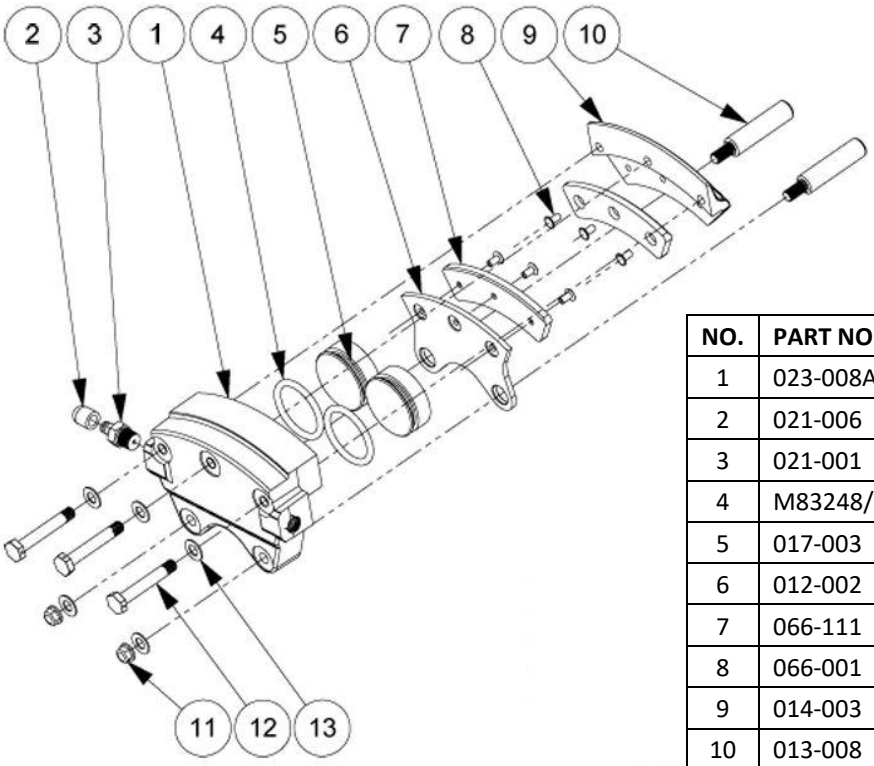
5 Inspect the torque plate for corrosion and cracks. Excessive corrosion or cracks will cause replacement.

Reinstall:

1. Clean the brake parts, with the exception of the O-Rings and linings, in solvent and air dry.
2. Carefully install a new O-Ring, or serviceable O-Ring, on the piston using aircraft hydraulic fluid, Dow 55M O-Ring Lubricant or equivalent.
3. Lightly coat the piston bore with aircraft hydraulic fluid, Dow 55M O-Ring Lubricant or equivalent, and carefully place the piston into the caliper. The side of the piston with the O-ring closest to the surface goes in first. Insert it until the top of the piston is flush with the caliper body.
4. Slide the caliper assembly onto the torque plate on the aircraft.
5. Install the back plate, torque the back-plate bolts with 70’’/lbs. and safety-wire.
6. Reconnect the brake lines, bleed the brake system.
7. If the torque plate was removed, reinstall in its original, clocked position.
8. Check for correct installation

Signature

32-10 Brake assembly, drawing and parts list



NO.	PART NO	DESCRIPTION	QTY
1	023-008A/M	Caliper Body	1
2	021-006	Bleeder Cap	1
3	021-001	Bleeder Assy	1
4	M83248/1-217	O-Ring (Viton)	2
5	017-003	Piston	2
6	012-002	Press Plate	1
7	066-111	Brake Pad	2
8	066-001	Rivet	6
9	014-003	Back Plate	1
10	013-008	Torque Pin	2
11	MS21042-4	Nut	2
12	AN4H-16A	Bolt	3
13	AN960-416L	Washer	5

32-11 Axle

Type: 5013

Manufacturer: Grove Aircraft
1800 Joe Crosson Drive, El Cajon, CA 92020, USA
www.groveaircraft.com

To service an axle:

1. Remove the landing gear fairing, wheel assembly and caliper assembly as described above
2. Remove the four bolts which secure the axle to the leg
3. Remove axle and torque plate
4. Clean and inspect contact surfaces of gear leg for excessive corrosion or cracks
5. Assemble axle, mount torque plate in its original, clocked position
6. Torque bolts with 70’’/lbs.
7. Lockwire bolts
8. Check for correct installation

Signature

32-12 Main Wheel assembly

Type: 58-1M

Manufacturer: Grove Aircraft
1800 Joe Crosson Drive, El Cajon, CA 92020, USA
www.groveaircraft.com

Wheel assembly removal:

1. Remove landing gear fairings as in section 32-02
2. Jack up the aircraft as described in section 7-02
3. Remove brake caliper back plates. It is not necessary to disconnect the brake line.
4. Deflate the tire by depressing the valve stem plunger until no more air escapes

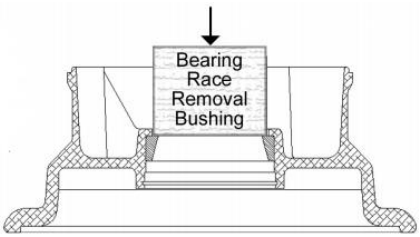
CAUTION: Do not attempt to remove valve stem core, loosen the axle nut, or disassemble the wheel halves until all tire pressure has been released.

5. Remove the valve stem core
6. Remove the axle cotter pin and axle nut
7. Carefully slide the wheel assembly off of the axle

Disassembly of Wheel:

1. Place the wheel assembly on a suitable working surface.
   Care must be taken to prevent damage to the wheel such as scratches and/or nicks which will destroy the corrosion resistant protection of the wheel.
2. Separate the tire beads from the wheel halves using a tire bead breaker or other suitable tool.
   Do not pry between the tire and wheel flange as damage to tire and/or wheel may occur.
3. Remove the nuts, washers and bolts that hold the wheel halves together
4. Separate and remove the brake disc from the inner wheel half.
5. Separate each wheel half from the tire using care to not damage the inner tube or its valve stem.
6. Remove the retaining snap rings, washers, felt grease seals and wheel bearings using care to prevent damage to the wheel or bearings.

Inspection and Repair:



1. Inspect the bearing races for scoring, corrosion, signs of overheating or other physical damage. Loose bearing races are cause for rejection of the wheel half. If replacement of the race is necessary carefully press it out using a press and properly sized bushings as illustrated.
2. Visually inspect each wheel half for cracks, nicks, corrosion or other damage. Particular attention should be paid to the tire bead seat area. Obvious cracks and severe corrosion are cause for rejection of the part. A further inspection using the dye penetrant method should be performed on any part whose serviceability is questionable. Small nicks, scratches and pits may be blended out and polished with fine (400 grit) sandpaper and then painted and/or treated for corrosion resistance.
3. Clean the wheel bearings in a suitable solvent and air dry using compressed air being careful to not allow the compressed air to spin the bearings.
4. Inspect the bearings for pitting, cracks, evidence of overheating, or excessive corrosion, any of which is cause for rejection of the part.
5. Inspect the felt grease seals. Excessively worn, hardened or contaminated seals are cause for replacement. Serviceable seals should be cleaned in solvent, air dried, and set aside in a clean, protected environment until required for reassembly.
6. Inspect the felt seal retaining washers and snap rings for distortion, excessive corrosion or other physical damage which is cause for rejection.

7. Inspect wheel tie bolts for cracks, bending, thread damage, or excessive corrosion, any of which is cause for rejection.
   The tie bolts are subjected to fatigue type loads and should be replaced whenever there is any question as to their serviceability.
8. Test the wheel tie bolt nuts by installing them onto the bolts. If the nut can be turned by hand past the self-locking section, it must be replaced.
9. Inspect brake disc for excessive wear, scoring, or corrosion, cracks, warpage, or other physical damage which is cause for rejection of the part. Replace the disc if the disc thickness has worn more than 0.025" from new.
   These dimensions can be found by visiting www.groveaircraft.com
   Minor corrosion and surface irregularities can be blended using 220 grit sandpaper
   Any corrosion on the non-braking part of the disc should be removed and then painted and/or treated for corrosion resistance

Reassembly of Wheel

Reassembly of the wheel is basically the reverse of the disassembly process. Assemble the wheel on a clean, flat surface being careful to not nick, scratch, or damage the protective finish of the wheel

Reinstall the Bearing Races

Conduct if applicable. Heating the wheel and/or cooling the bearing race is of minimal benefit in the installation process

1. Clean the wheel bearing race bore and apply a thin coat of wheel bearing grease
2. Place the bearing race in the wheel bore, being careful to ensure that it is aligned properly and not cocked
3. Place the wheel half in the press as shown in the following figure being sure to support the wheel half at the bottom of the bearing seat. Failure to do this may result in breakage of the wheel casting if too much force is applied
4. Press the bearing race into the wheel until it is fully seated
5. Remove the wheel from the press and visually check to see that the race is fully seated and that it is tight in the wheel

Mount Tire on Wheel

1. Ensure that the wheel is clean and dry. Particular attention should be paid to the bead area to ensure that it is clean, dry and free of grease or other contamination which may cause the tire to spin on the wheel as the brakes are applied.
2. Replacement tires: 5.00-5 10-ply
   Rated Load: 2150 lbs.
   Rated Speed: 120 MPH
   Replacement tube: 5.00-5 tubes with 90° valves
   Insert the inner tube into the tire. Align the red dot on the tire (its lightest point) with the white or yellow dot on the tube (its heaviest point). If the tube does not have a white dot, align the red dot on the tire with the valve stem of the tube. In order to allow the tube to move freely within the tire, it is recommended that you coat the tube and inner part of the tire with talc powder.
3. Inflate the inner tube to approximately 10 psi, allowing it to take the shape of the tire
   Deflate the tube to the point that it just retains its shape.
4. Place the tire and tube onto the outer wheel half carefully inserting the valve stem through the hole in the wheel half.
5. Insert the inner wheel half into the tire with the tie bolt holes aligned and using care not to pinch the inner tube.
6. Place the wheel and tire assembly on a flat working surface with the inner side of the wheel facing up. Install the brake disc in the inner wheel half and align the bolt holes with the wheel half. Insert the tie bolts through the brake disc and wheel.
7. Rotate the wheel from the working surface in order to be able to attach the nuts to the tie bolts
   Hand-tighten a nut with washer on each of the tie bolts. Care should be taken to ensure that the wheel halves are in contact with each other and not pinching the inner tube.

8. Torque the tie bolt nuts to 90 inch-pounds for 1/4".
   Observe the amount of torque required to turn the nut due to the locking friction of the nut and add this to torque requirements to get the proper torque wrench reading.
9. Repack the bearings using MIL-G-81322 grease such as Aeroshell 22 or Mobil 28.
   You may also use the newer Mobil SHC 100, but because it is not compatible with other wheel grease, the bearings and races must be thoroughly cleaned before application.
10. With the wheel on a flat working surface, insert a wheel bearing. Lightly coat the bearing race with bearing grease before installing the bearing.
11. Install the washers, felt grease seal and retention snap ring. A light coat of light weight oil on the felt grease seal is recommended.
12. Turn the wheel over and repeat steps 10 and 11.
13. Place the wheel in a protective enclosure and inflate to 3.5 bar / 50 psi.

32-13 Reinstalling Wheel

1. Inspect the axle to ensure that it is clean, dry and in serviceable condition.
2. Slide the wheel onto the axle with the brake disc side inboard.
3. Install axle nut and hand tighten ensuring that that inboard wheel bearing is fully seated on the axle.
4. While slowly rotating the wheel, tighten the axle nut until resistance to turning is felt. Care must be taken to ensure that the valve stem is not damaged during this process.
5. Loosen the axle nut only enough so that the wheel runs free, or with very little drag.
6. Align the axle nut to the nearest cotter pin alignment in the axle. If you need to move the nut for alignment, first try to tighten it. If the wheel still moves with little or no resistance, use that alignment. If there is significant resistance to rotation, loosen the nut to the next hole.
7. Install a new cotter pin. One end of the cotter pin should fold out and bend over the end of the axle to its center. The other end should be bent back toward the wheel and shortened if necessary, to avoid contact with the wheel.

CAUTION: Extreme care must be taken to ensure that the cotter pin does not interfere with the valve stem or other parts of the wheel when the wheel is rotated!

8. Reinstall the brake caliper backing plate. Torque the bolts to the value indicated on the label of the brake caliper and safety wire.
9. Rotate the wheel to ensure that it is secure and rotates freely.
10. Lower the airplane to the ground
11. Reinstall landing gear fairings and cowling as needed

33 Lights

33-10 Anti-Collision Lights

The airplane is equipped with anti-collision strobe / position light assemblies mounted to the plane outboard surface of each wing tip. Each assembly consists of:

- Navigation lights, red (LH wing) or green (RH wing), 6 LEDs.
- Anti-collision strobe light, 21 LEDs.
- White position tai lights, 5 LEDs.

Type: Andromeda Daylite, AVE-ADSSYWR-D01

Manufacturer: Aveo Engineering Group, s.r.o.
Pribram Airport, Drasov 202,
261 01 Drasov, Czech Republic
www.aveoengineering.com

All functions of the anti-collision strobe / position light lights are controlled through one 7.5A ACL circuit breaker switch on the Switch Panel in the rear cockpit, 12VDC is provided via the Avionics (Non-essential) Bus.

Shielded 4-core AWG22 wire is routed from the CB switch to the wing root ribs, quick-disconnect 4-terminal cannon plugs are installed aft of the aileron control rod cut-out. The cables are routed rubber grommets through the aft wing ribs up to the light assemblies.

For wiring and connection details, refer to section 24-03

No regular maintenance is required for the units.
The external surfaces of the lights may be polished with an automotive cleaner wax and/or a liquid polishing compound. An electric buffing machine with a lamb's wool cover may be used for deeper cleaning and polishing. Do not use petroleum-based product to clean the lights.

The airplane is certified for day VFR only.
Subject to local regulations, the non-flashing red-green-white elements are not required to be functional.
If 6 or more LEDs in the strobe unit are defective, the unit has to be replaced.

Troubleshooting:

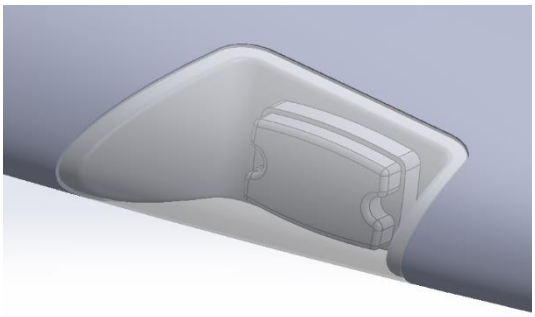
Trouble – Anti-Collision Lights	Probable Cause	Remedy
One or both units inoperative	Cables damaged	Repair or replace cables
	Connectors damaged or contaminated	Clean or replace connectors, refer to section 24-03 and 24-03 for access
	CB switch or connections / terminals damaged	Replace CB switch
		Replace terminals
	No power	Check power on avionic bus

For additional troubleshooting information see section 24-11.

To replace either Anti-Collision Light:

1. Remove fasteners
2. Use blade to cut through Sikaflex adhesive / seal, pull off anti-collision light, disconnect cable
3. Connect new anti-collision light, ensure correct color: red on LH wingtip, green on RH wingtip
4. Apply thin bead of Sikaflex around contact area; for details, refer to 51-11
5. Use fasteners to mount anti-collision light to wingtip
6. Remove excessive Sikaflex
7. Let Sikaflex cure overnight
8. Conduct function check:
    a. Battery Master ON
    b. ACL Switch ON
    c. Lights Function visually check
    CAUTION: To prevent eye injury, wear welding goggles to check LEDs!
    d. ACL Switch and Battery Master OFF

33-20 Landing Lights



The GB1 is equipped with landing / recognition light units are mounted in recesses in each wing-tip, covered by clear polycarbonate lenses GB1-3320-20-00.

Landing lights are an option.

The airplane is certified for day VFR only; the recognition lights are not required to be functional.

Type: Whelen 7168501
P/N 01-0771685-01

Manufacturer: Whelen Engineering Company, Inc.
51 Winthrop Road, Chester, CT 06412-0684, USA
http://www.whelen.com

The landing / recognition light lights are controlled through one 5A ACL circuit breaker switch in the LH side console forward of the throttle in the rear cockpit, 12VDC is provided via the Avionics (Non-essential) Bus.

Shielded 4-core AWG22 wire is routed from the CB switch to the wing root ribs, quick-disconnect 4-terminal cannon plugs are installed aft of the aileron control rod cut-out. The cables are routed rubber grommets through the aft wing ribs up to the light assemblies.
The light assemblies are mounted in the recess with 2 AN525-832R12 fasteners.

For wiring and connection details, refer to section 24-03.

No regular maintenance is required for the units.
If malfunction is detected, the defective unit has to be replaced.

The lenses are polycarbonate, only use water and a clean cloth for cleaning.

The airplane is certified for day VFR only, the units are not required to be functional.
If 3 or more LEDs are defective, the unit should be replaced.

Troubleshooting:

Trouble – Landing Lights	**Probable Cause**	**Remedy**
One or both units inoperative	Cables damaged	Repair or replace cables
	Connectors damaged or contaminated	Clean or replace connectors, refer to section 24-03 and 24-03 for access
	CB switch or connections / terminals damaged	Replace CB switch
		Replace terminals
	No power	Check power on avionic bus

For additional troubleshooting information see section 24-11.

To replace either recognition Light:

1. Remove clear lens (remove self-tapping screws)
2. Remove fasteners
3. Pull off recognition light
4. Disconnect cable
5. Connect new recognition light
6. Use fasteners to mount recognition light in recess
7. Install clear lens
   NOTE: If threads in composite to locate the lenses are stripped, refer to section 5-06
8. Conduct function check:
   a. Battery Master ON
   b. ACL Switch ON
   c. Lights Function visually check
   d. Landing Lights Switch and Battery Master OFF

34 Navigation

34-01 Dependent Position Determining

This section covers that portion of the system which provides information to determine position from sources which are mainly dependent on ground installations. This includes the transponder, GPS and its WAAS GPS / transponder antennas.

34-02 Transponder

Capabilities

Transponder

The transponder receives interrogations from a ground-based secondary radar transmitter and transmits the airplane's identification to the Air Traffic Control Center via Mode A transmissions and altitude information via Mode C. In addition, the GTX also sends a unique aircraft address via Mode S to enhance the tracking capabilities of ATC and other Mode S transponder equipped aircraft. The transponder can be used by the pilot in the rear seat via its standard interface, or by either crew member via a touchscreen interface on MFD1 and MFD2. If the communication between the MFDs and the transponder fails, it can still be used through its standard interface. Inputs on standard interface override touchscreen inputs.

ADS-B Out

The GTX 345 include ADS-B Out capabilities.

ADS-B In

For all ADS-B In data reception capabilities, the GTX 345 includes receivers for both the UAT and the 1090 MHz frequency bands. The GTX 345 receives ADS-B transmissions from other ADS-B Out equipped aircraft, ADS-R, and TIS-B information from ground stations. Traffic information received from these transmissions is displayed on MFD1 and MFD2.

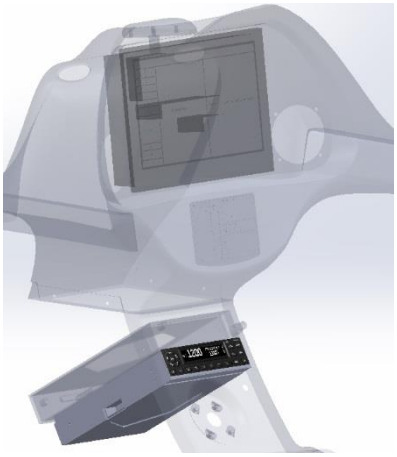
FIS-B

The GTX 345 receives FIS-B information from UAT ground stations in the United States. A direct line-of sight between the ground station and aircraft is necessary to receive FIS-B data. The data is not available at ground level in some locations. The GTX 345 supplies the data via a serial bus to the MFD1 and MFD2, which can show: NOTAM (includes TFRs), AIRMET, SIGMET, SUA, METAR, TAFs, PIREP, Winds/Temps Aloft, Regional NEXRAD, CONUS NEXRAD

GPS

The transponder provides the GPS signal for navigation to MFD1 and MFD2.

Electrical power for the XPDR operation is provided via the 35A Avionic CB Switch, supplied through the Battery Master (essential bus) and 3A XPDR circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.



Location:	Centre console of the rear cockpit
Type:	GARMIN GTX 345 transponder with integrated encoder, in compliance with TSO-C166b
Manufacturer:	Garmin International Inc. 1200 E. 151st Street, Olathe, KS 66062, USA www.garmin.com

For troubleshooting or additional information, refer to:
Garmin GTX 345 TSO Installation Manual, 190-01499-02, Revision 7.

For wiring and connection details, refer to section 24-03.

To uninstall the XPDR for service:

1. Insert a 3/32" hex drive tool drive tool into the access hole on the unit face.
2. Turn hex drive tool counterclockwise until the hex drive tool stops.
3. Pull the unit from the rack.

To install the XPDR unit:

1. Slide it straight in the rack until it stops, approximately 3/8 inch short of the final position.
2. Insert a 3/32" hex drive tool into the access hole at the bottom of the unit face.
3. Turn hex tool clockwise while pressing on the left side of the bezel until the unit is seated in the rack.

NOTE: **Prior to placing the unit in the rack, in order to ensure correct position of the retention mechanism, it may be necessary to insert the hex drive tool into the access hole and turn the drive tool counterclockwise until it completely stops.**

NOTE: **After uninstallation or installation of a new unit and subsequent programming, a data correspondence test in accordance with regulations applicable in country of registration must be conducted.**
In the US, refer to Appendix F to Part 43 – ATC Transponder Tests and Inspection.

XPDR Programming

A new or overhauled unit requires programming to communicate with MFD1 and MFD2.
To enter configuration mode:

- switch airplane Battery Master switch ON
- push and hold ENT on the XPDR and switch airplane avionic master switch ON
- Push **FUNC** to cycle through the group pages
- Push **8** or **9** to scroll up or down on the page without an active field selected
- Push **CRSR** to access items on the page
- Push **8** or **9** to cycle through the selections of an item on the page
- Push **ENT** to move within the page with a field highlighted or to accept setting
- Push **CLR** to move to previous selection on the page
- Push **FUNC** to exit the page
- Push and hold **OFF** until the unit powers off to exit configuration mode

Page 1: AUDIO		
TRAFFIC ALERT: MESSAGE		
Page 2: INTERFACES		
RS-232	INPUT:	XPDR FMT1
CH1	OUTPUT:	XPDR FMT1
RS-232	INPUT:	CONNEXT FMT1
CH2	OUTPUT:	CONNEXT FMT1
RS-232	INPUT:	CONNEXT FMT1
CH3	OUTPUT:	CONNEXT FMT1
RS-232	INPUT:	OFF
CH4	OUTPUT:	OFF
RS422 OUTPUT:		OFF
A429 IN FORMAT:		OFF
CH1, SPEED:		N/A
A429 OUTPUT:		OFF
HDSB INTERFACE:		G500/600
PRESENT:		NO
DISCRETE IN AUD:		MUTE
PIN:		NONE

Page 3: UNITS		
FISB PROCESSING		ENABLED
INSTALLATION ID:		1
VFR:		as required in country of registration
RESTORE PAGES ON POWER-UP:		NO
Page 5: SENSOR		
OAT SENSOR INSTALLED:		NO
ALTITUDE SOURCE 1:		RS2321
ALTITUDE SOURCE 2:		NONE
GPS 1 SRC:		INTERNAL
INTEGRITY:		1E-7
LAT OFFSET:		0 MT
LON OFFSET:		2 MT
INTERNAL ALTITUDE ENCODER INSTALLED:		NO
CEILING:		N/A
TEST POINTS:		N/A
INTERNAL AHRS ORIENTATION:		
CONNECTIONS:		FORWARD
VENT:		L WING
YAW:		0 DEGREES
INTERNAL AHRS CALIBRATION:		
OFFSETS: UNCALIBRATED		PITCH: 0
Page 7: ADS-B		
ACFT CATEGORY:		SMALL
ACFT MAX A/S:		<=300 KT
AIRCRAFT LENGTH:		<=15 mt
AIRCRAFT WIDTH:		<=23 mt
1090ES OUT CONTROL:		PILOT SET
UAT OUT RMT CONTROL:		N/A
1090ES IN CAPABLE:		YES
UAT IN CAPABLE:		YES
ADSB-IN PROCESSING:		ENABLED
AIRCRAFT TAIL NUMBER:		enter flight test callsign
ADDRESS:		Enter registration / callsign
ALLOW PILOT TO EDIT FLIGHT ID:		NO
DEFAULT FLIGHT ID: TAIL:		Enter registration / callsign
FLIGHT ID PREFIX: NONE		N/A
DISCRETE INPUT STATE:		
STANDBY:		ID SELECT
SQUAT N/C		ALT DATA N/C
RS232	CH1	IAS: 0.00mt
	CH2	STS: ONLINE
A429 CH1		N/A
GPS:		
SOURCE 1:		LAT
SOURCE 2:		OFF
HDSDB G500/600		NOT CONFIGURED
GTN		NOT CONFIGURED
TRAFFIC ALERT:		MESSAGE
ALTITUDE ALERT:		OFF

34-03 Transponder Antenna

Location: Underside of fuselage, under baggage compartment
Type: RAMI AV-74
Manufacturer: RAMI
14500 168th Avenue, P.O. Box 858, Grand Haven, MI 49417, USA
www.rami.com

No regular maintenance is required for the unit. If malfunction is detected, antenna must be replaced.

For wiring and connection details, refer to section 24-03.

To service the Transponder Antenna:

1. Remove access panel in baggage compartment and disconnect antenna BNC connector, refer to 5-05
2. Remove the four nuts holding the antenna in place, remove antenna
3. If malfunction is detected, antenna has to be replaced
4. To reinstall or install a new antenna, reverse steps 1 and 2
   NOTE: Install new seal provided with antenna
5. Conduct data correspondence test

Signature

NOTE: After uninstallation or installation of a new unit and subsequent programming, a data correspondence test in accordance with regulations applicable in country of registration must be conducted.
In the US, refer to Appendix F to Part 43 – ATC Transponder Tests and Inspection.

34-04 GPS Antenna

Location: Inside headrest on top of rear instrument panel
Type: GARMIN GA 35 GPS/WAAS
Manufacturer: Garmin International Inc.
1200 E. 151st Street, Olathe, KS 66062, USA
www.garmin.com

No regular maintenance is required for the unit. If malfunction is detected, antenna must be replaced.

For wiring and connection details, refer to section 24-03.

To service the GPS Antenna:

1. Remove headrest and disconnect antenna BNC connector, refer to 39-03
2. Remove the fasteners holding the antenna in place, remove antenna
3. Remove old seal
4. To reinstall or install a new antenna, reverse steps 1 and 2,
5. Install seal provided with new antenna between antenna and fuselage
6. Check for correct installation, GPS function check:
   - Position airplane outside, no less than 20ft clear of any buildings
   - Switch Battery Master ON
   - Switch Avionic Master ON
   - XPDR on STBY, ON or ALT
   - On MFD1, select INFO page and check for acquisition of satellite reception
   - Switch Avionic Master, Battery Master OFF

Signature

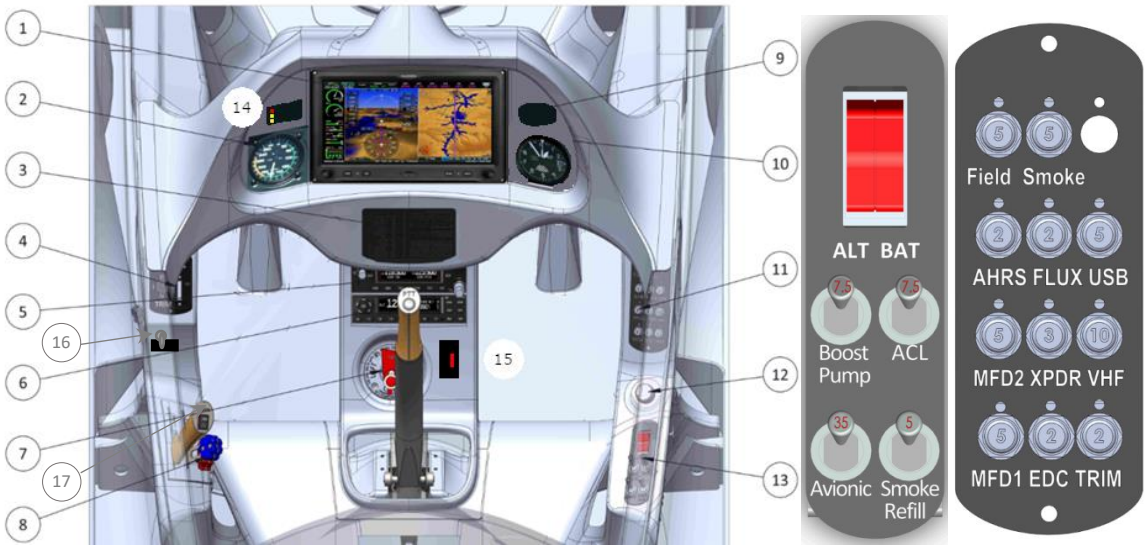
Signature

39 Instrument Panels

39-01 Instrument Panels, General

This chapter describes the instrument panels and their installation in the airplane.
Both instrument panels and the headrest on the rear instrument panel are composite structures.
For inspection or repair of composite structures refer to chapter 51.

Rear Cockpit Instrument and Circuit Breaker / Switch Panels



Note: The magnetic compass is fixed to the top of 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	Garmin GDU 465
2	Airspeed Indicator	United 8030B.168
3	Entry Speed / limitations placard	GB1-1130-00-23
4	Trim switch and indicators	Ray Allen ROS-4 4-way switch, RP4 indicators
5	VHF with intercom	Garmin GTR 225A
6	Transponder with encoder	Garmin GTX 345
7	Fuel selector	Andair EFS20b5-MTM-GC
8	Engine Control Quadrant	GB1-7611-00-00
9	Accelerometer	Falcon Gauge GM510-2 or TL-3424
10	Altimeter	United 5934PD-3
11	Circuit breaker panel	GB1-2400-00-01
12	Ignition switch	ACS A-510-2
13	Switch panel	GB1-2400-00-02
14	Annunciator Lights Panel	GB1-2400-00-
15	ELT Remote Panel	Kannad RC200
16	Landing / Recognition Light CB Switch	Tyco, W31, 5A
17	COM Swap Switch	Grayhill 30-1

39-02 Rear Instrument Panel GB1-3910-10-00

The rear instrument panel is a painted carbon fiber structure, holding the flight instruments and the front seat shoulder harness in place. The entire unit, including installed instruments, can be removed for maintenance.

To service the Rear Instrument Panel:

1. Remove headrest panel in baggage compartment and disconnect antenna BNC connector
2. Disconnect main- and antenna connector on MFD1
3. Disconnect pitot- and static pressure connections to instruments
4. Remove fasteners holding instrument panel in place, remove instrument panel from airplane
5. Conduct service as required. For damages to composite structures refer to chapter 51
6. Reinstall reversing steps 1 – 5; Replace mounting fasteners as required, refer to section 51-11
7. Check for correct installation
8. Conduct pitot-static test, refer to section 31-05

Signature

39-03 Headrest GB1-3910-12-00

The headrest is mounted on top of the rear instrument panel. It is a painted glass fiber structure, providing room for the GPS/WAAS antenna.

NOTE: To allow reception of the antenna, the headrest must not be covered with anything metallic.

To remove the Headrest:

1. Remove fasteners
2. Lift headrest, remove antenna connector (BNC type)
3. Remove headrest from airplane
4. Conduct service or inspection as required
5. To reinstall, reverse steps 1 - 3

Signature

39-04 Front Instrument Panel GB1-3920-00-00

The front instrument panel is a painted glass fiber structure, providing space the front instruments and shielding some of the front seat rudder control- and avionic components.
The entire unit, including installed instruments, can be removed for maintenance purposes or operation with the optional single seat canopy.

1	MFD with attitude, structural temperature, CO and Accelerometer	Garmin GDU 450
2	Airspeed Indicator	United 8030B.168
3	Entry Speed placard	GB1-1130-00-09
4	Engine Control Quadrant	GB1-7613-00-00
5	Altimeter	United 5934PD-3
6	Headset sockets	

To service the front instrument panel:

1. Remove front instrument panel fasteners
2. Pull instrument panel approximately 10 cm / 4 in backwards, providing sufficient room to reach the connectors on the back
3. Unscrew MFD2 connector fasteners, pull off connector
4. Disconnect pitot and static quick disconnectors
5. Remove instrument panel

NOTE: Quick disconnects with shut-off function, does not affect MFD1.
Leak check after configuration change not required.
Color code: RED = PITOT; GREEN = STATIC

6. Conduct service as required. For inspection or repair of composite structures refer to chapter 51.
7. Reinstall reversing steps 1 – 5

Signature

NOTE: If any of the pitot-static lines have been disconnected by any other means than the quick disconnect valves (instrument maintenance for example), a pitot-static test per section 31-05 must be conducted.

40 Avionics

40-01 Garmin G3X Avionics System, General

This section provides an overview of the Garmin G3X touch System.
MFD1 is installed in the rear instrument panel, MFD 2 (optional) in the front instrument panel.
Each Multi-Function Display (MFD) displays the following functions:

1. Engine monitoring
2. Fuel Quantity and Flow indication
3. Electric system monitoring
4. Structure Temperature indication
5. Electronic Flight Instruments indication
6. Own-ship position Indication, signal from XPDR
7. ADS-B in / Traffic Indication, signal from XPDR
8. FIS-B information indication, signal from XPDR
9. VHF Interface
10. XPDR Interface

The G3X system consists of several sub-units or Line Replaceable Units (LRUs).
LRUs have a modular design, simplifying troubleshooting and maintenance.
A failure or problem can be isolated to a particular LRU, which can be replaced individually.
Each LRU has a particular function, or set of functions, that contributes to the system's operation.

A configuration module in mounted to the main connector of the MFD1. This module stores those data not accessible / changeable by a user, for example engine limitations. This module allows exchange of any of the system components (Line Replaceable Units) without compromising the setup or calibration.

None of the units require regular maintenance.

For troubleshooting, refer to section 40-06, or the Garmin G3X Touch Installation Manual, 190-01115-01, March, 2018, Revision AE. If a problem cannot be resolved following those procedures, replace defective unit or contact Game Composites.

VHF and Transponder are connected to MFD 1 and MFD 2, to allow use of their functions via the touchscreen, also allowing the front seat occupant to monitor and interact with those devices.
Connection between MFD1, MFD 2 and VHF is a CAN bus.
Between transponder and the GSU 25, connection is a RS232 bus.
From there, GPS, weather and ADS-B information are forwarded to MFD1 and MFD 2.
The VHF and transponder standard pilot interfaces remain unchanged.
In case of power failure of either or both MFDs, VHF and XPDR can be used normally.
Use of the standard interface overrides the touchscreen commands. The frequency selection is slaved, i.e. MFD1, MFD2 and the VHF and XPDR frequency indications match.

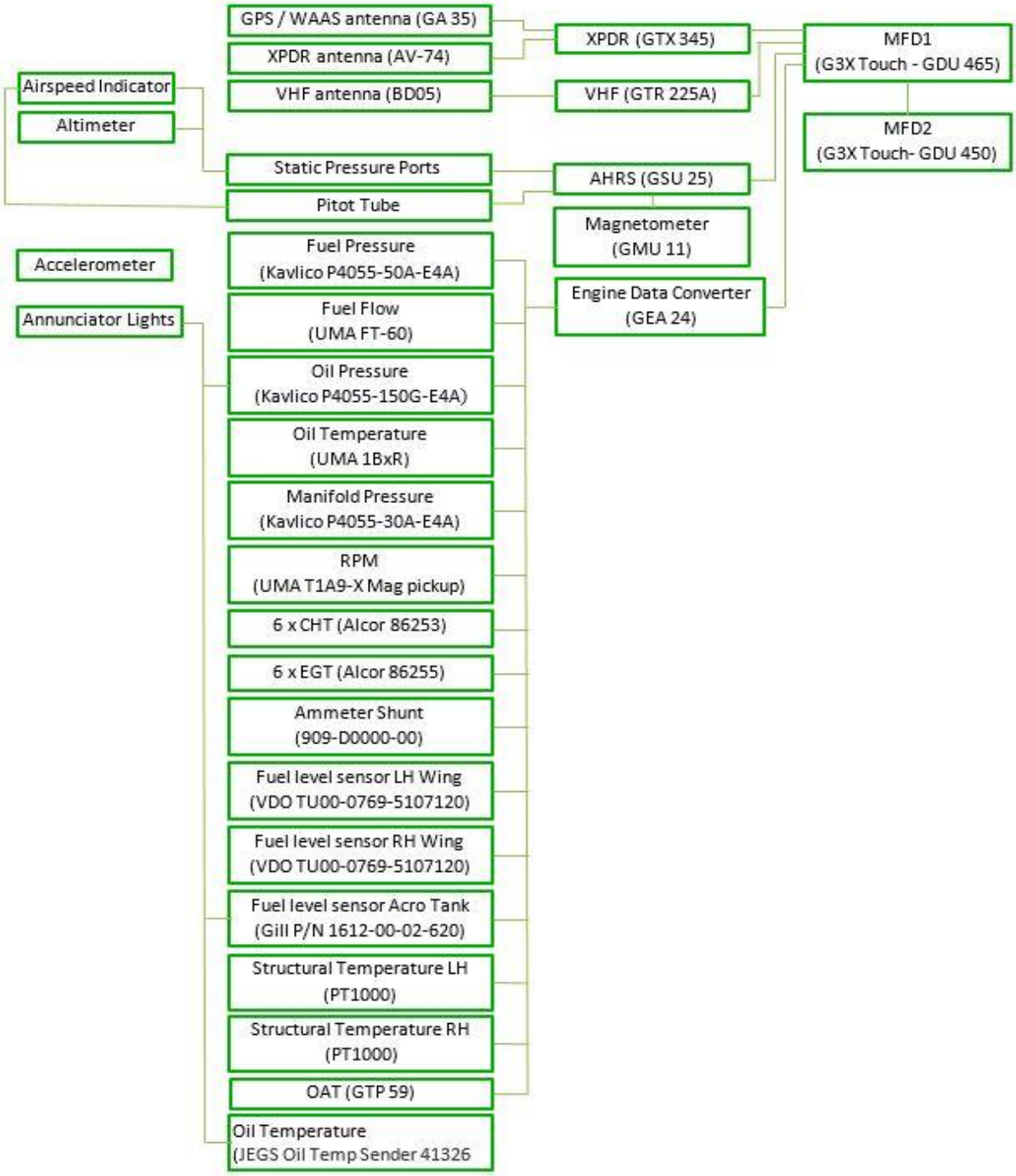
MFD1, MFD2, and the GEA 24, GMU 11 and GSU 25 have individual power supply and are secured by one circuit breaker each, located on the RH side console in the rear cockpit.

MFD1 in the rear instrument panel, the GEA 24 and the CO sensor are activated by the Battery Master Switch, to provide structural temperature indication (part of the pre-flight check per AFM) and engine information required for engine start.
All other devices are activated by the Avionic Master Switch.

Additional Documents:
Game Composites, Airplane Flight Manual GB1, AFM-GB1-0000-00-02
Available from www.gamecomposites.com

Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-02 System Schematic



40-03 Secure Digital (SD) Data Cards

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

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

The G3X Touch uses an SD Card for database updates, MapSource® data, checklist files, Chartview, Flight Data Logging, exporting Track Logs/User Waypoints and importing / exporting Flight Plans. Garmin recommends using an 8 GB SanDisk or Toshiba SD Card. MapSource detailed maps are available from Garmin dealers. 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

40-04 Navigation Database Update

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.

Obtain 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
4. Scroll down if necessary to see the System ID

Equipment required to perform the update:

- Windows-compatible PC (Windows 2000 or XP recommended)
- 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)

Update Database

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; 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, remove the SD Card.
5. Repeat steps 1-4 for the remaining GDUs if applicable.

Reload 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**; status is updated

40-05 General Troubleshooting

1. Check for loose wire terminals on the circuit breaker connections on the power wire(s) causing intermittent power connections.
2. Check for intermittent circuit breakers.
3. Have ground power connected to the aircraft.
4. Check system software level on the start-up page.
5. After the system is initialized, note any Red-X's on the displays, ALERT messages and Red-X's on the MFDs.

If the failure cannot be verified, proceed to the following physical inspection:

1. Switch off the Battery Master and remove the front instrument panel to gain access to the AHRS. Inspect the physical installation.
2. Check that the connectors are fully seated, and that the jack screw connectors are fully tightened on both sides of the connector.
3. Check for a loose wire harness that is able to move around during flight. This condition may cause the wire to pull on or vibrate the connector, making intermittent connections.
4. Ensure that the affected device is mounted securely. Use a screwdriver to check the tightness of the four mounting screws.
5. Look in the vicinity of the affected device for any heavy objects that may not be fastened tight to the structure and induce vibration in the AHRS.
6. Look for evidence of water or fluid contamination in the area around the affected device.
7. Unplug the affected device's connector and check for bent pins.
8. Inspect the wire harness clamp on the rear of the connector to verify that it is not too tight and smashing/shorting the wires. If the wire clamp is installed upside down, it has sharp edges that can cut into the wires. Check condition of protective wire wrap between wires and the clamp.

If the condition is not resolved by following the instructions above, contact Game Composites for support or refer to the manufacturer's document:
Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-06 Engine and Fuel Indication Markings

The table below lists the approved instrument markings.
If any of the parameters is displayed incorrectly, contact Game Composites.

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 to 108 liters)	-	0
Fuel Qty Right Wing	3.4 to 28 Gal (13 to 108 liters)	-	0
CHT	200 to 465°F	100 - 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

40-07 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.
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 / user is prompted to confirm.

40-08 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.

40-09 Use of System

Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-10 MFD 1

Electrical power for MFD1 operation is provided via the Battery Master (essential bus) and 5A MFD1 circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	Rear instrument panel	
Type:	G3X Touch - GDU 465, 10.6" Landscape Display	PN 010-01057-10
Accessories:	GDU 465 Install Kit	PN 010-12150-00
Manufacturer:	Garmin International, Inc. 1200 East 151st Street, Olathe, Kansas 66062, USA Tel: 913.397.8200 Fax: +1 913.397.8282 Aircraft on Ground (AOG) Hotline: +1 913.397.0836 www.garmin.com	

To service MFD 1:

1 Use 3/32” hex key to remove all 4 mounting fasteners
2 Tip the top of unit approximately 3” backwards to reach the main connector
3 Disconnect electrical connection: unscrew connector fasteners, pull connector off plug
4 Remove unit from airplane
5 Service or replace as required
6 To reinstall, reverse steps 1 – 4
7 Switch ON Battery & Avionic Master to check function
8 Switch Avionics- and Battery Master OFF

Signature

Screen cleaning:
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 GDU displays use infrared beams for touch detection, this makes it very important to keep the screen clean, especially along the edges**

NOTE: **Replaced units must be formatted with Game Composites configuration software. Contact Game Composites for details and support.**

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-11 MFD 2

Electrical power for MFD2 operation is provided via the 35A Avionic CB Switch, supplied through the Battery Master (essential bus) and 5A MFD2 circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	Front instrument panel	
Type:	G3X Touch- GDU 450 7" Landscape Display	PN 010-01056-00
Accessories:	GDU 465 Install Kit	PN 010-12150-02
Manufacturer:	Garmin International, Inc. 1200 East 151st Street, Olathe, Kansas 66062, USA Tel: 913.397.8200 Fax: +1 913.397.8282 Aircraft on Ground (AOG) Hotline: +1 913.397.0836 www.garmin.com	

To service MFD 2:

1 Use 3/32” hex key to remove mounting fasteners
2 Tip the top of unit approximately 3” backwards to reach the main connector
3 Disconnect electrical connection: unscrew connector fasteners, pull connector off plug
4 Remove unit from airplane
5 Service or replace as required
6 To reinstall, reverse steps 1 – 4
7 Switch ON Battery and Avionic Master to check function
8 Switch Avionics and Battery Master OFF

Signature

Screen cleaning:
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 GDU displays use infrared beams for touch detection, this makes it very important to keep the screen clean, especially along the edges**

NOTE: **Replaced units must be formatted with Game Composites configuration software. Contact Game Composites for details and support.**

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-12 Magnetometer

The Garmin GMU 11 Magnetometer is a remote mounted LRU that interfaces with a Garmin ADAHR (GSU 25) to provide flight attitude and heading data for flight instrumentation. An Attitude and Heading Reference System combines the functions of a Vertical Gyro and a Directional Gyro to provide measurement of Roll, Pitch, and Heading angles. Using long-life solid-state sensing technology, the GMU 11 Magnetometer uses magnetic field measurements to create an electronically stabilized AHRS.
The GMU 11 provides magnetic information to support the function of the ADAHRS (GSU 25).

Electrical power for Magnetometer operation is provided via the 35A Avionic CB Switch, supplied through the Battery Master (essential bus) and 2A FLUX circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	RH wing, 500mm outboard of aileron bellcrank access panel
Type:	GMU 11 PN 010-01788-00
Manufacturer:	Garmin International, Inc. 1200 East 151st Street, Olathe, Kansas 66062, USA Tel: 913.397.8200 Fax: +1 913.397.8282 Aircraft on Ground (AOG) Hotline: +1 913.397.0836 www.garmin.com

To service the Magnetometer:

1 Remove aileron bellcrank access panel on underside of RH wing
2 Unscrew unit from mounting bracket
3 Move unit out of wing
4 Disconnect electrical connection: unscrew connector fasteners, pull connector off plug
5 Service or replace as required
6 To reinstall, reverse steps 1 – 4
7 Switch ON Battery & Avionic Master to check function
8 Switch Avionics and Battery Master OFF

Signature

NOTE: **After installation of a new unit, conduct calibration in accordance with the Garmin G3X Touch Installation Manual.**

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-13 ADAHRS

The GSU 25 is an LRU that provides AHRS and Air Data information in a single mechanical package. The GSU 25 interfaces to a remote mounted GMU magnetometer for heading information and also computes OAT and TAS from inputs provided by the GTP 59.

Electrical power for ADHRS operation is provided via the 35A Avionic CB Switch, supplied through the Battery Master (essential bus) and 2A AHRS circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	On vertical Acrotank compartment bulkhead under front instrument panel	
Type:	GSU 25C	PN 011-02929-50
Accessories:	GMU 11 install Kit	PN 011-04349-90
Manufacturer:	Garmin International, Inc. 1200 East 151st Street, Olathe, Kansas 66062, USA Tel: 913.397.8200 Fax: +1 913.397.8282 Aircraft on Ground (AOG) Hotline: +1 913.397.0836 www.garmin.com	

To service the ADAHRS:

1 Remove front instrument panel, refer to section 39-04
2 Disconnect pitot- and static lines
3 Disconnect electrical connection: unscrew connector fasteners, pull connector off plug
4 Remove fasteners
5 Remove unit from airplane
6 Service or replace as required
7 To reinstall, reverse steps 1 – 5
8 Conduct pitot-static test, refer to section 31-05
9 Check for correct installation

Signature

NOTE: **After installation of a new unit, conduct calibration in accordance with the Garmin G3X Touch Installation Manual.**

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03.

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-14 Engine Data Converter

The GEA 24 is an input/output system LRU used to monitor and power engine and airframe sensors.

Electrical power for Engine Data Converter operation is provided via the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	On vertical Acrotank compartment bulkhead under front instrument panel	
Type:	GEA 24	PN 010-01042-00
Accessories:	GEA 24 Connector Kit	PN 011-02886-00
Manufacturer:	Garmin International, Inc. 1200 East 151st Street, Olathe, Kansas 66062, USA Tel: 913.397.8200 Fax: +1 913.397.8282 Aircraft on Ground (AOG) Hotline: +1 913.397.0836 www.garmin.com	

To service the EDC:

1 Remove front instrument panel, refer to section 39-04
2 Disconnect electrical connection: unscrew connector fasteners, pull connector off plug
3 Remove fasteners
4 Remove unit from airplane
5 Service or replace as required
6 To reinstall, reverse steps 1 – 4
7 Ground run in accordance with AFM section 4.4, 4.6, 4.11
8 Sign for correct installation

Signature

NOTE: **Replaced units must be formatted with Game Composites configuration software. Contact Game Composites for details and support.**

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03.

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-15 OAT Probe

The Garmin GTP 59 is an outside mounted temperature probe that provides raw air temperature data to the Engine Data Converter. The temperature input device is a three-wire temperature probe interface. OAT Power Out and OAT High are connected internally at the OAT probe.

Electrical power for the OAT Probe is provided through the Engine Data Converter GEA 24, via the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location: In RH landing gear leg fairing

Type: GTP 59 PN 011-00978-00

Manufacturer: Garmin International, Inc.
1200 East 151st Street, Olathe, Kansas 66062, USA
Tel: 913.397.8200 Fax: +1 913.397.8282
Aircraft on Ground (AOG) Hotline: +1 913.397.0836
www.garmin.com

To service the OAT Probe:

1 Remove cowling, refer to section 71-02
2 Disconnect electrical connection
3 Unscrew nut
4 Push sensor backwards
5 Remove unit from airplane
6 Service or replace as required
7 To reinstall, reverse steps 1 – 4
8 To check function, switch ON Battery Master, check OAT reading in line with ambient temperature (check against engine temperatures, engine must be cold). Switch Battery Master OFF.
9 Install cowling, refer to section 71-02
10 Sign for correct installation

Signature

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03.

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-16 RPM Sensor

Electrical power for the RPM Sensor is provided through the Engine Data Converter GEA 24, via the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	Ventilation port of LH Magneto
Type:	UMA T1A9-X Mag pickup Garmin PN 494-50005-00
Manufacturer:	UMA, Inc. P.O. Box 100, 260 N. Main St., Dayton, VA 22821, USA www.umainstruments.com

To service the RPM Sensor:

1 Remove cowling, refer to section 71-02
2 Disconnect electrical connection
3 Unscrew nut
4 Push sensor backwards
5 Remove unit from airplane
6 Service or replace as required
7 To reinstall, reverse steps 1 – 4
8 Conduct ground run in accordance with AFM section 4.4, 4.6, 4.11
9 Install cowling, refer to section 71-02
10 Sign for correct installation

Signature

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03.

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-17 Fuel Pressure Sensor

Electrical power for the Fuel Pressure Sensor is provided through the Engine Data Converter GEA 24, via the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	Branch side of T-fitting, downstream from engine driven fuel pump, LH side of engine oil sump
Type:	Kavlico P4055-50A-E4A Garmin PN 494-30004-02
Manufacturer:	Kavlico 1461 Lawrence Drive, Thousand Oaks, CA 91320, USA www.kavlico.com

To service the Fuel Pressure Sensor:

1 Remove cowling, refer to section 71-02
2 Remove tie wraps, slide off fire sleeve
3 Disconnect electrical connection
4 Unscrew sensor, remove from airplane
5 Service or replace as required
6 To reinstall, reverse steps 2 – 4
7 Ground run in accordance with AFM section 4.4, 4.6,4.1
8 Visually check for leaks
9 Install cowling, refer to section 71-02
10 Sign for correct installation

Signature

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-18 Fuel Flow Transducer

Electrical power for the Fuel Flow Transducer is provided through the Engine Data Converter GEA 24, via the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	Downstream from fuel pressure T-fitting, LH side of engine oil sump
Type:	Electronics International FT-60 Garmin PN 494-10001-00
Accessories:	AN816-6 fittings
Manufacturer:	Electronics International 63296 Powell Butte Hwy, Bend, Oregon 97701, USA buy-ei.com

To service the Fuel Pressure Sensor:

1 Set Fuel Selector Switch to 'OFF'
2 Remove cowling, refer to section 71-02
3 Remove / open Adel clamps supporting adjacent fuel lines
4 Disconnect electrical connection
5 Remove tie wraps, slide off fire sleeve
6 Disconnect fuel lines
7 Remove unit from airplane
8 Service or replace as required
9 To reinstall, reverse steps 3 – 7
10 Ground run in accordance with AFM section 4.4, 4.6, 4.11
11 Visually check for leaks
12 Install cowling, refer to section 71-02
13 Sign for correct installation

Signature

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-19 Ammeter Shunt

Electrical signal from the Ammeter Shunt is processed by the Engine Data Converter GEA 24.

Location:	Top of firewall, next to Alternator, in engine compartment	
Type:	Shunt, +/-50 mV, 100 amps	PN 909-D0000-00
Manufacturer:	Garmin International, Inc. 1200 East 151st Street, Olathe, Kansas 66062, USA Tel: 913.397.8200 Fax: +1 913.397.8282 Aircraft on Ground (AOG) Hotline: +1 913.397.0836 www.garmin.com	

To service the Ammeter Shunt:

1 Remove LH front footrest panel, refer to 5-05
2 Disconnect battery
3 Remove cowling, refer to section 71-02
4 Disconnect electrical connections
5 Unscrew fasteners
6 Remove unit from airplane
7 Service or replace as required
8 To reinstall, reverse steps 4 – 6
9 Connect battery
10 Install LH front footrest panel, refer to 5-05
11 Ground run in accordance with AFM section 4.4, 4.6, 4.11
12 Install cowling, refer to section 71-02
13 Sign for correct installation

Signature

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-20 CHT Sensors

Electrical power for all 6 CHT Probes is provided through the Engine Data Converter GEA 24, via the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	In CHT sensor port of each cylinder, next to bottom spark plug	
Type:	Alcor 86253	Garmin PN K00-00513-00, Part of sensor kit
Manufacturer:	Alcor Inc. 300 Breesport, San Antonio, TX 78216, USA https://alcorinc.com	

To service any CHT Sensor:

1 Remove cowling, refer to section 71-02
2 Disconnect electrical connection
3 Push and turn counter-clockwise
4 Pull sensor out
5 Service or replace as required
6 To reinstall, reverse steps 2 – 4
7 Ground run in accordance with AFM section 4.4, 4.6, 4.11
8 Visually check for leak
9 Install cowling, refer to section 71-02
10 Sign for correct installation
CHT sensor for cylinder No. ☐

Signature ☐

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-21 EGT Sensors

Electrical power for all 6 EGT Sensors is provided through the Engine Data Converter GEA 24, via the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	Below exhaust port of each cylinder, in exhaust pipe	
Type:	Alcor 86255	Garmin PN K00-00513-00, Part of sensor kit
Manufacturer:	Alcor Inc. 300 Breesport, San Antonio, TX 78216, USA https://alcorinc.com	

To service any EGT Sensor:

1 Remove cowling, refer to section 71-02
2 Disconnect electrical connection
3 Unscrew clamp
4 Pull sensor out
5 Service or replace as required
6 To reinstall, reverse steps 2 – 4
7 Ground run in accordance with AFM section 4.4, 4.6, 4.11
8 Visually check for leak
9 Install cowling, refer to section 71-02
10 Sign for correct installation
CHT sensor for cylinder No. ____

Signature ____

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-22 Manifold Pressure Sensor

Electrical power for the Manifold Pressure Sensor is provided through the Engine Data Converter GEA 24, via the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	Mounted with Adel clamps to upper right main engine mount tube, connected to Manifold Pressure port on cylinder No. 5 via flexible hose	
Type:	Kavlico P4055-30A-E4A	Garmin PN K00-00513-00, Part of sensor kit
Manufacturer:	Kavlico 1461 Lawrence Drive, Thousand Oaks, CA 91320, USA www.kavlico.com	

To service the Manifold Pressure Sensor:

1 Remove cowling, refer to section 71-02
2 Disconnect electrical connection
3 Unscrew sensor, remove from airplane
4 Service or replace as required
5 To reinstall, reverse steps 2 – 3
6 Switch on system, check for correct Manifold Pressure Indication:
Equals ambient pressure, compare with altimeter set to Zero
7 Ground run in accordance with AFM section 4.4, 4.6, 4.11
8 Visually check for leak
9 Install cowling, refer to section 71-02
10 Sign for correct installation

Signature

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-23 Oil Pressure Sensor

Electrical power for the Oil Pressure Sensor is provided through the Engine Data Converter GEA 24, via the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	In oil pressure port of engine accessory case, adjacent to cylinder No. 5	
Type:	Kavlico P4055-150G-E4A	Garmin PN K00-00513-00, Part of sensor kit
Manufacturer:	Kavlico 1461 Lawrence Drive, Thousand Oaks, CA 91320, USA www.kavlico.com	

To service the Oil Pressure Sensor:

1 Remove cowling, refer to section 71-02
2 Disconnect electrical connection
3 Unscrew sensor, remove from airplane
4 Service or replace as required
5 To reinstall, reverse steps 2 – 3
6 Ground run in accordance with AFM section 4.4, 4.6, 4.11
7 Visually check for leak
8 Install cowling, refer to section 71-02
9 Sign for correct installation

Signature

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

40-24 Oil Temperature Sensor

Electrical power for the Oil Temperature Sensor is provided through the Engine Data Converter GEA 24, via the Battery Master (essential bus) and 2A EDC circuit breaker on the circuit breaker panel, located in the RH side console in the rear cockpit.

Location:	In oil screen assembly, back of engine accessory case	
Type:	UMA 1BxR	Garmin PN K00-00513-00, Part of sensor kit
Manufacturer:	UMA, Inc. P.O. Box 100, 260 N. Main St., Dayton, VA 22821, USA www.umainstruments.com	

To service the Oil Temperature Sensor:

1 Remove cowling, refer to section 71-02
2 Disconnect electrical connection
3 Unscrew sensor, remove from airplane
4 Service or replace as required
5 To reinstall, reverse steps 2 – 3
6 Ground run in accordance with AFM section 4.4, 4.6, 4.11
7 Visually check for leak
8 Install cowling, refer to section 71-02
9 Sign for correct installation

Signature

No regular maintenance is required for the unit. If defective, the unit must be replaced.

For wiring and connection details, refer to section 24-03

Troubleshooting or additional information:
Refer to Garmin G3X Touch Installation Manual, 190-01115-01_AE, available at www.gamecomposites.com

41 Ballast

41-25 General

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.

41-01 Ballast Installation

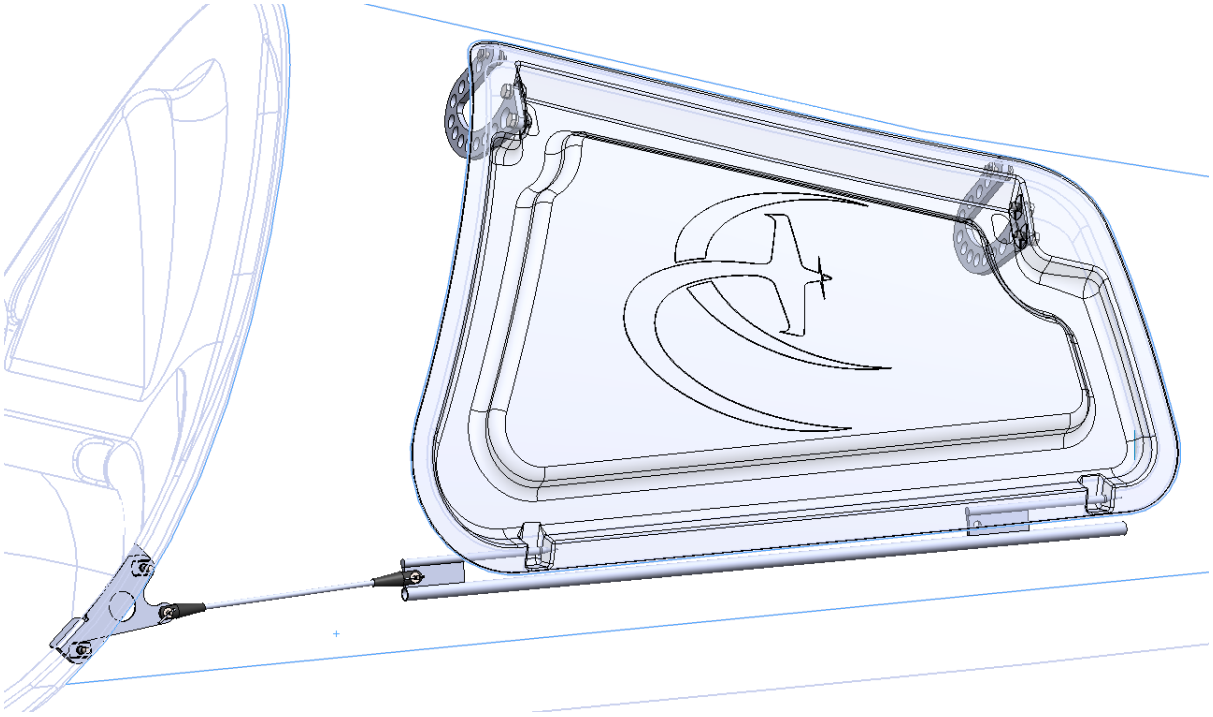
1. Insert ballast weight into chamber in the left-hand side of the fuselage, push until surfaces are flush
2. Spin on and hand-tighten wingnut on opposite side of fuselage
3. Insert safety pin through wingnut and hole in standoff bolt

41-02 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.

42 Baggage Compartment



A fully enclosed baggage compartment is molded into the upper fuselage behind the cockpit.
It is accessed via an external door on the left side of the fuselage which can be locked and unlocked by moving a lever up and down, only with canopy open.

51 Structure Repair Manual

51-01 Inspection for Delamination (Tap Test)

Warning: **Any visual evidence of damage must be investigated by the tap test method described here. The backside of the area should be inspected wherever possible.**
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, as well as the surrounding bond lines / load paths to adjacent parts.

Tap Test

To check the airframe composite structure for delamination a tapping inspection should be performed by an experienced person.
The following advice is adapted from FAA AC 41.13 issue 1B which is freely available on the FAA web site.
Tap testing is in section 8 paragraph 5-105 of the AC.

Tap testing is widely used for a quick evaluation of any accessible aircraft surface to detect the presence of crushing, delamination or de-bonding.

a. **The tap testing procedure** consists of lightly tapping the surface of the part using either a coin, a special lightweight hammer (less than 2 ounces / 57 grams, see figure 5-22 in the AC) or some other suitable object. The acoustic response is compared with that of a known good area.

b. **A "flat" or "dead" response** is considered unacceptable. The acoustic response of a good part can vary dramatically with changes in geometry so the entire area of interest must be tapped to establish its responses. The surface should be dry and free of oil, grease, and dirt. Tap testing is limited to finding relatively shallow defects in skins with a thickness less than .080 inch (2 mm). In a honeycomb structure, for example, the far side bond-line cannot be evaluated, requiring two-side access for a complete inspection. This method is portable, but no records are produced. The accuracy of this test depends on the inspector's subjective interpretation of the test response; therefore, only qualified personnel should perform this test.

Experience shows that damage can be as small as 15 mm (7/8") across, so the tapping should not be widely spaced.

51-02 General

These sections give information on the investigation, classification and repair of structural damage.

Before starting any repair, a decision must be taken whether the component, part, assembly etc. is to be repaired or to be replaced.

Warning: **Repairs must be conducted using materials and methods specified, defined and approved for the task either in this manual or in applicable approved repair schemes or approved service bulletins.**

All damage beyond cosmetic wear must be inspected by qualified and authorized personnel before any flying or any repair action.

51-03 Classifying Damage to Composite Parts

See section 51-01 for information about non-destructive inspection of composite structures for invisible damage.

Damage class 1:

- Large scale destruction, requiring a partial reconstruction or large-scale repair of the component
- Any destruction over 300 mm in any direction
- Any damage to a spar is automatically large-scale destruction and hence class 1

WARNING: The airplane must not be operated!

Damage class 2:

- Damage to structures where the holes or fractures extend through a sandwich component, less than 300 mm in any direction.

Subject to review by a suitably qualified person, the airplane may be ferried to a repair station.

WARNING: Aerobatics are not permitted!

Damage class 3:

- Damage to structures with small holes or cuts in the outer skin, (less than 15 mm diameter or length) not extending into either the sandwich or the inner skin
- Indentation damage, where a tap test (see 51-01) does not reveal any disbonds

Subject to result of the assessment, the airplane may be flown as normal until the next service when the damage must be reassessed in accordance with this manual.

Damage class 4:

- Erosion or small depressions or scratches or nicks not accompanied by fractures
- Any damage to non-structural fairings is automatically class 4

The airplane may be operated as normal.

51-04 Composite Materials

Epoxy resin:

Manufacturer: Hexion Stuttgart GmbH
Fritz Müller Str. 114, 73730 Esslingen, Germany
www.hexion.com

Manufacturer Designation	Game Composites Designation	Mix ratio by weight with L20
Epikote L 20	L20	
Epikure 960	H960	100:34
EPH 573	H573	100:25

Carbon fiber

Manufacturer: C. Cramer GmbH & Co.KG
Division ECC, Eper Strasse 45-47, 48619 Heek, Germany
www.ecc-fabrics.de

Manufacturer Designation	Game Composites Designation	Thickness (mm)	Weave pattern	Area weight (g/m^2)
Cramer CCC 452	C200	0.33	2/2 twill	200
Cramer CCC 469-2	C93	0.14	Plain	93
Cramer AU 030	CU300	0.37	Unidirec.	320

Glass fiber

Manufacturer: P-D INTERGLAS TECHNOLOGIES GmbH
Benzstrasse 14, 89155 Erbach, Germany
www.pd-interglas.com

Manufacturer Designation	Game Composites Designation	Thickness (mm)	Weave pattern	Area weight (g/m^2)
Interglas 92110	GT163	0.15	twill	163
Interglas 92125	GT280	0.26	twill	280

Foam

Manufacturer: Evonik Industries AG
Rellinghauser Straße 1-11, 45128 Essen, Germany
www.rohacell.com

Manufacturer Designation	Game Composites Designation	Thickness (mm)	Volume weight (kg/m^3)
Rohacell R51IG-F	R51IG-F 3	3	51
Rohacell R51IG-F	R51IG-F 8	8	51

Honeycomb

Manufacturer: SCHÜTZ GmbH Co. KGaA
Schützstraße 12, 56242 Selters, Germany
www.schuetz.net

Manufacturer Designation	Game Composites Designation	Thickness (mm)	Volume weight (kg/m³)
Schütz Cormaster C1-3,2-29	HC8	8	29

Or

Manufacturer: Plascore
615 N Fairview Street
Zeeland, Michigan, 49464-0170, USA

Manufacturer Designation	Game Composites Designation	Thickness (mm)	Volume weight (kg/m³)
PN2 - 1/8 - 1.8 - 15B01	HC8	8	29

Filler material for resin (Cotton Flocks)

Manufacturer: bacuplast Faserverbundtechnik GmbH
Dreherstraße 4, (Industriegebiet Großhülsberg), 42899 Remscheid, Germany
www.bacuplast.de

Manufacturer Designation	Game Composites Designation	Fiber details	Volume weight (g/L)
Milled Cotton Flocks	Flox	Fiber length app. 350 µm (typical 150-500 µm) Fiber width1-25 µm (1–3 Denier)	192

Filler material for resin (Microballoons)

Manufacturer: 3M Center
St. Paul, MN, USA
www.3M.com/engineeredadditives

Manufacturer Designation	Game Composites Designation	Volume weight (g/cm³)
3M™ Glass Bubbles, S25	MB	25

Peel Ply

Peel Ply from various suppliers can be used,
as long as it complies to the following parameters:

- Material: Polyamide / Nylon 6.6
- Style: plain
  Twill
- Thickness: 0.13 – 0.19 mm
- Sizing: washed, thermofixed
  No more than 0.5% residual sizing content
- Color, strips as available, purpose is to provide a visual cue that peel ply is present

51-05 Composite Repair Practices

Composite repairs, General

1. Assess and classify damage per 51-01
2. Protect damaged area against further contamination or uptake or humidity
3. Obtain necessary documentation and, if required, Approved Repair Scheme
4. Obtain approval to conduct repair work
5. Obtain all required tools and materials
6. Protect undamaged areas of airplane
7. Make sure work area conforms to required environmental conditions for laminating or bonding

Personal equipment

1. Medical examination gloves
2. Working gloves
3. Long sleeved clothing, ideally disposable overall
4. Dust respirator mask
5. Protective eye wear
6. Ear defenders

Tools

Bonding and laminating:

1. Scale, accuracy of no less than ±1gram
2. Mixing stick, wooden tongue depressor or similar
3. Cups, 100 to 500ml capacity
4. Heater, capable of providing 60°C for no less than 10hrs
5. Brushes, 50 mm / 2in wide
6. Paint Roller with arm, 4 – 7in width
7. Scissor

Sandwich repairs:

1. Vacuum pump, with vacuum hose
2. Perforated release film
3. Breather cloth
4. Stanley knife
5. Chisel

Preparation of repair area:

1. Electric angle grinder, 80 grit sanding discs
2. Hard, even sanding block
3. Sandpaper, 40, 80, 120 grit
4. Vacuum Cleaner
5. Plastic film (to protect intact areas)
6. Masking tape

Environmental conditions for laminating or bonding

1. Temperature 18 - 25°C / 65 – 77F
2. Humidity not above 60%
3. No oil, silicone or grease to contact any of the repair area or –material

Fabric preparation and handling

1. Clean and even table, cover with plastic film
2. Roll out fabric as much as required

CAUTION: Always wear medical examination gloves when handling fabric, skin contact can reduce the adhesive properties of the fabric!

3. Straighten fabric, check for imperfections
4. Use scissor to cut as required

Resin Mixing

The amount of resin required equals the weight of the fabric to be impregnated.

CAUTION: Do never mix less than 50g of resin plus hardener to minimize tolerances!

1. Check resin and hardener for expiration dates and condition (no crystallization)
2. Place empty and clean cup on scale, set scale to zero
3. Pour resin in cup
4. Pour hardener in cup, accuracy ±1gram
5. Use wooden tongue depressors to mix content until no more streak formation can be observed and liquid appears clear

CAUTION: Pot life starts from the moment the ingredients become mixed!

Bonding Material Mixing

Various bonding mixtures, all based on resin mix, are used throughout the GB1 structure.
The type of mixture for each bond or area is specified in the relevant drawing / Work Instruction.

Table for designations and mix ratios:

Designation in Work Instruction	Resin / Hardener mix in grams	Flocks in grams	Microballoons in grams	Aerosil
CF - Flocks	50 / 100 / 150 / 200	10 / 20 / 30 / 40	N/A	N/A
MB - Microballoons	50 / 100 / 150 / 200	N/A	14 / 28 / 42 / 56	N/A
FM – Flocks / Microballoons Mix	50 / 100 / 150 / 200	7.5 / 15 / 22.5/30	4.5 / 9 / 13 / 17	N/A
HS – Honeycomb / Skin Bond	50 / 100 / 150 / 200	6 / 12 / 18 / 24	N/A	N/A
Wing Fuel Tank sealing	50 / 100 / 150 / 200	N/A	N/A	2.5/5/7.5/10

51-06 Repairs to All Composite Structures, General

Chamfer

To achieve similar strength as the surrounding undamaged structure,
material specific overlap lengths have to be respected:

Glass fiber 1 : 40, i.e. 1 mm material thickness requires a 40 mm overlap
Carbon fiber 1 : 80, i.e. 1 mm material thickness requires a 80 mm overlap

For calculating the size of the overlap patch, the minimum ratio of overlap length ratio to fabric thickness is 1:50. This length may not be less than 20 mm.

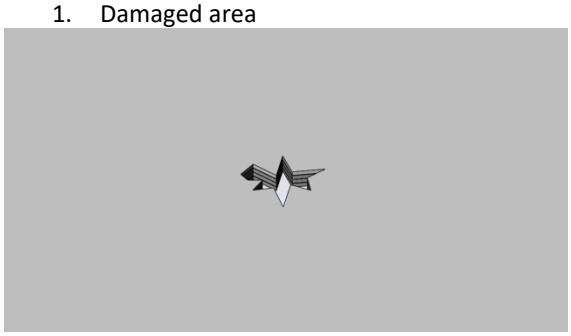
Examples: Repair is six layers of C200 which has a layer thickness of 0.33 mm. Thickness is 1.98 mm so minimum overlap is 99 mm.

Repair is two layers of C93 which has a layer thickness of 0.14 mm. Thickness is 0.28 mm so minimum overlap is 20 mm.

After the repair area has been prepared, it must be cleaned before starting the repair.
Remove the sanding dust with a vacuum cleaner and clean the scarfed overlaps with acetone in case there is any grease or dirt in this area.

51-07 Minor surface damage

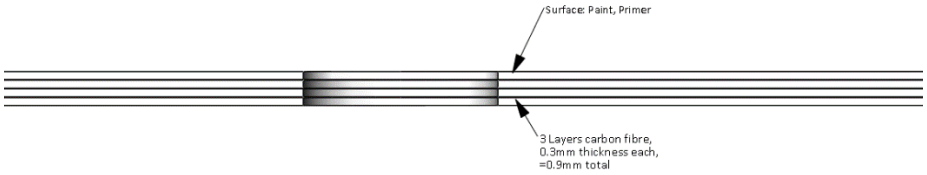
1. Damaged area



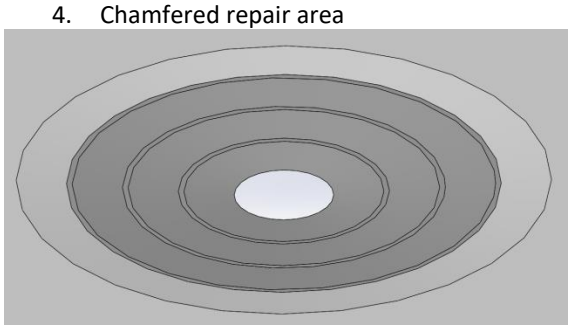
2. Damaged area, cleaned up

By trimming the damage into a regular shape, local material thickness and number of layers become visible. The surface is covered by a layer of primer and paint, below is the composite layup.

3. Cross section view of cleaned up area



4. Chamfered repair area

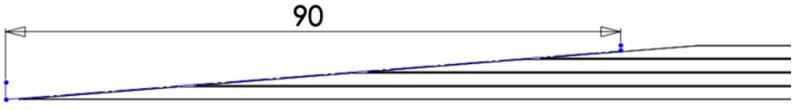


Chamfer for 3 layers carbon fiber, 0.3 mm thick each:
0.9 mm thickness x 80 (overlap length for carbon fiber) = 72 mm

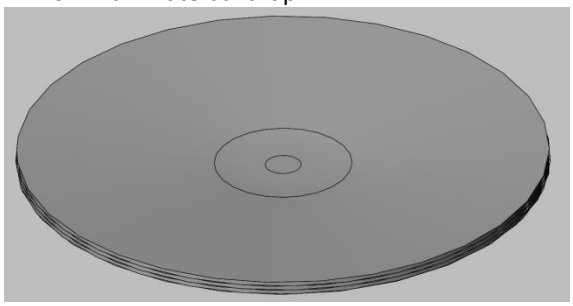
The overlap length must be for carbon to carbon contact surface, not including the paint area!

Start working out chamfer with angle grinder,
Use sanding block with 120 grit to smoothen and even surface

5. Cross section view of chamfered repair



6. Laminate build-up

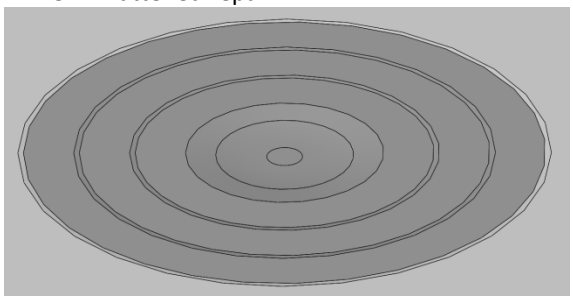


7. Cross section view of laminated repair

- Prepare laminate
- Cut three rectangular patches, slightly bigger than the repair area, laminate on top of each other
- Cut patch in the shape of the repair area. **Make sure fiber direction is correct!**
- Apply clear resin to repair area to improve contact
- Laminate patch on repair area
- Apply peel ply over repair area, bigger than laminate

- Cure: Wait until material feels dry.
  Build insulating box or tent around repair area,
  or place entire component into oven/ insulated box
  Heat up to 90°C - 95°C for no less than 8hrs,
  Use thermometer to measure temperature at repaired area.

8. Flattened repair

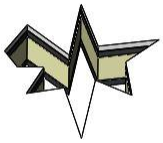


9. Cross section of flattened repair area

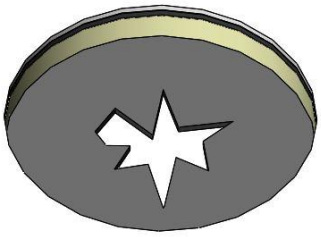
After curing, remove peel ply
Use angle grinder to remove excessive material and create a smooth surface
Use 120grit sanding block to smoothen surface and prepare for primer application

51-08 Sandwich Damage

1. Damaged area

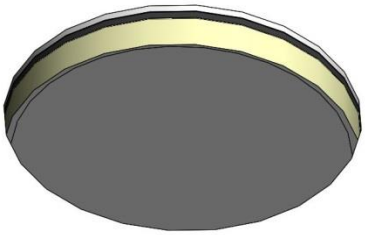


2. Damaged area, cleaned up



By trimming the damage into a regular shape, local material thickness and number of layers become visible.
The surface is covered by a layer of primer and paint, below is the composite layup.
Trim the outer layers and sandwich materials 20 – 30 mm bigger than the biggest damage to the inner layer.
Use chisel to remove residue of sandwich material from inner layer,
Use 120 grit sandpaper to roughen surface in preparation for step 3.

3. Repair inner laminate

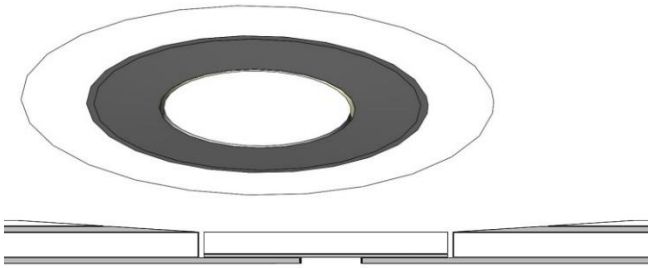


Prepare laminate on table, layup and fiber direction per original part.

4. Add sandwich material

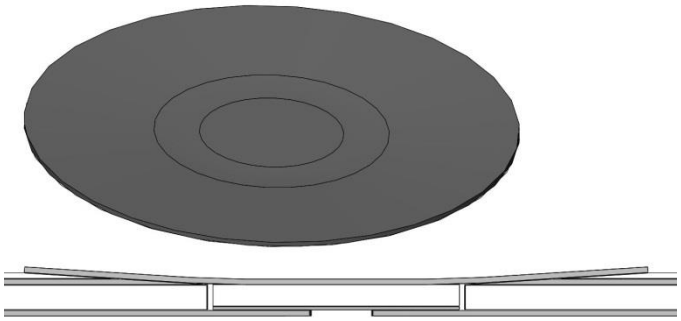
Bond in a patch of sandwich material, fill vertical gap with microballoons.
Apply gentle pressure to connect inner laminate with sandwich patch.

5. Chamfer



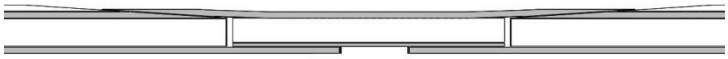
Chamfer repair areas, length of chamfer per layup and 94-06, Chamfer

6. Repair outer skin



Prepare laminate on table, layup and fiber direction per original part,
Apply to repair area,
Add peel ply over entire repair surface

7. Flattening



Use angle grinder to remove excess,
Use sanding block with 120 grit sandpaper to smoothen surface.
Use body filler if needed.

8. Cure: Wait until material feels dry.
   Build insulating box or tent around repair area,
   or place entire component into oven/ insulated box
   Heat up to 90°C - 95°C for no less than 8hrs,
   Use thermometer to measure temperature at repaired area.

51-09 Stripped threads in composite structures

The tailwheel fairing, landing light lenses and trim servos are located with self-tapping screws in composite.
If the threads are stripped:

1. drilling the remains of the damaged thread out (removing contamination)
2. Fill the hole with resin / flocks mix (refer to table in 5-06);
   Use L20 / EPH 573 or MGS L285 / H285F, both systems cure at Room Temperature
3. Match-drill new pilot holes, using the original part as pattern

51-10 Repairs to Spars

Warning: Any spar damage must be considered Class 1 and reported to Game Composites!

51-11 Adhesives, Sealants, Coatings

Tank Sealant PPG P/S 890 Class B

P/S 890 Class B is an aircraft integral fuel tank sealant, supplied in two-part kits and Semco® cartridges. It is used to seal access panels of the Wing tanks and Acrotank, as well as seal and threadlock bulkhead fittings. It has a service temperature range from - 65°F (-54°C) to 250°F (121°C), with intermittent excursions up to 275°F (135°C). This material is designed for fillet sealing of fuel tanks and other aircraft fuselage sealing applications. The cured sealant maintains excellent elastomeric properties after prolonged exposure to both jet fuel and aviation gas.

P/S 890 Class B is a two-part, manganese dioxide cured polysulfide compound. The uncured material is a low sag, thixotropic paste suitable for application by extrusion gun or spatula. It cures at room temperature to form a resilient sealant having excellent adhesion to common aircraft substrates.

Surface Preparation

Immediately before applying sealant to primed substrates, the surfaces should be cleaned with solvents. Contaminants such as dirt, grease, and/or processing lubricants must be removed prior to sealant application. A progressive cleaning procedure should be employed using appropriate solvents and a new lint-free cloth. (Reclaimed solvents or tissue paper should not be used.)
Always pour solvent on the cloth to avoid contaminating the solvent supply. Wash one small area at a time. It is important that the surface is dried with a second clean cloth prior to the solvent evaporating to prevent the redeposition of contaminants on the substrate.

Application Methods / Tools

Follow the application and mixing instructions printed on the packaging.

General Adhesive SikaBond

SikaBond® Construction Adhesive is used to fix for example cables.
It is a gray, one-component, durable and flexible exterior polyurethane adhesive.

Surface Preparation

Clean all surfaces. Surface must be sound, clean, dry, free of oil and grease.
Any residue or foreign matters have to be removed.

Application Methods / Tools

Recommended application temperatures: 40 to 100 °F (4 to 38 °C).
Cut plastic tip of nozzle to desired size and puncture airtight seal at base of tip. Force adhesive onto bonding surface. Use as spread, bead or for spot bonding. Components may require support during the cure period.

11. Low temperature and humidity will slow the cure of the sealant
12. Avoid contact with alcohol and other solvent cleaners during cure
13. Since system is moisture-cured, permit sufficient exposure to air
14. Can tend to yellow slightly when exposed to ultraviolet rays
15. Do not use on PVC based material
16. Will not bond to polyethylene, polypropylene, and polystyrene
17. Avoid contact with silicone or high solvent-based sealers / paints

Clickbond Adhesive

CB200 acrylic structural adhesive is a two-part thixotropic paste adhesive capable of bonding a wide variety of metals, engineering thermoplastics, and composites. CB200 cures quickly at room temperature and exhibits excellent environmental and chemical resistance. CB200 is packaged in an 8:1 cartridge and is recommended for installation of Click Bond adhesive-bonded fasteners.

Application Methods / Tools

Follow manufacturer's instructions outlined in 'Manual Adhesive Dispense Instructions CB7200165-B, available at www.gamecomposites.com.

Other Sealants

Designation	Manufacturer	Application
Scotchweld DP 490	3M	Securing bearings into composite seats
Scotchclad 776	3M	Tank surface sealant
PR-1422	PPG Aerospace 12780 San Fernando Road Sylmar, CA 91342, USA www.ppgaerospace.com	Tank sealant for fastener installation, liquid seal of access panels
Terostat MS9380	Henkel, Henkelstrasse 67 40589 Düsseldorf, Germany www.henkel.com	Bonding canopy and windshield glasses
Loctite 243	Henkel AG & Co. KGaA Henkelstraße 67 40589 Düsseldorf, Germany www.loctite.de	Securing fasteners
PR812	PPG Aerospace 12780 San Fernando Road Sylmar, CA 91342, USA www.ppgaerospace.com	Firewall joints & bonds

51-12 Painting

Prepare repaired area using up to 240 grit sandpaper. Any small indentations may be filled with polyester filler. Prior to primer application, the surface of the repair area must be cleaned of all sanding dust and other foreign materials. Primer is best applied with a spray gun. Pores visible after application of primer can either be closed with drips of primer, or body filler. The filler must be completely dry before the covering paint can be applied. Sand the surface up to 800 grade wet paper to achieve a smooth and clean surface. Allow the surface to dry before paint is applied. Prepare paint per manufacturer's mixing instructions.
Apply the paint with a spray gun.

51-13 Paint Materials

No color limitations apply.
The vertical stabilizer must not be painted with any color containing metallic particles, as it houses antennas.

	Type	Manufacturer designation	Manufacturer
Exterior Paint	**Body Filler**	Spreadable Fiberglass	Upol
		Rage Filler	Evercoat
		Plastik Honey	Evercoat
		Bodyglaze	3M
		Platinum Plus Finishing Glaze	3M
	Sealer	DAS, numbers as per color	PPG
	Hardener	DCX3030	PPG
	Thinner	F3350 or DT895	PPG
	Surface Primer	Global 8005	PPG
	Thinner	DT895	PPG
	Hardener	Global 39	PPG
	Base coat	DBC Color	PPG
	Thinner	DT895	PPG
	Top coat		PPG
	Thinner	F3350 or DT895	PPG
	Hardener	DCX61	PPG
Interior Paint, applied to: -Cockpit interior -Baggage bay -Cowling inside	**Body Filler**	Spreadable Fiberglass	Upol
		Rage Filler	Evercoat
		Plastik Honey	Evercoat
		Bodyglaze	3M
		Platinum Plus Finishing Glaze	3M
	Surface Primer	Global 8005	PPG
	Thinner	DT895	PPG
	Hardener	Global 39	PPG
	Paint	FDGH low gloss	PPG
	Thinner	F3350	PPG
	Flame Resistance Additive	Diatomaceous Earth, 8% weight mixed into cockpit paint	Various suppliers
	Hardener	F3260	PPG

51-14 Steel Materials

Steel parts should be replaced not repaired.
Chipped paint can be patched with an appropriate primer and acrylic paint.

51-15 Aluminum Materials

Aluminum parts should be replaced not repaired

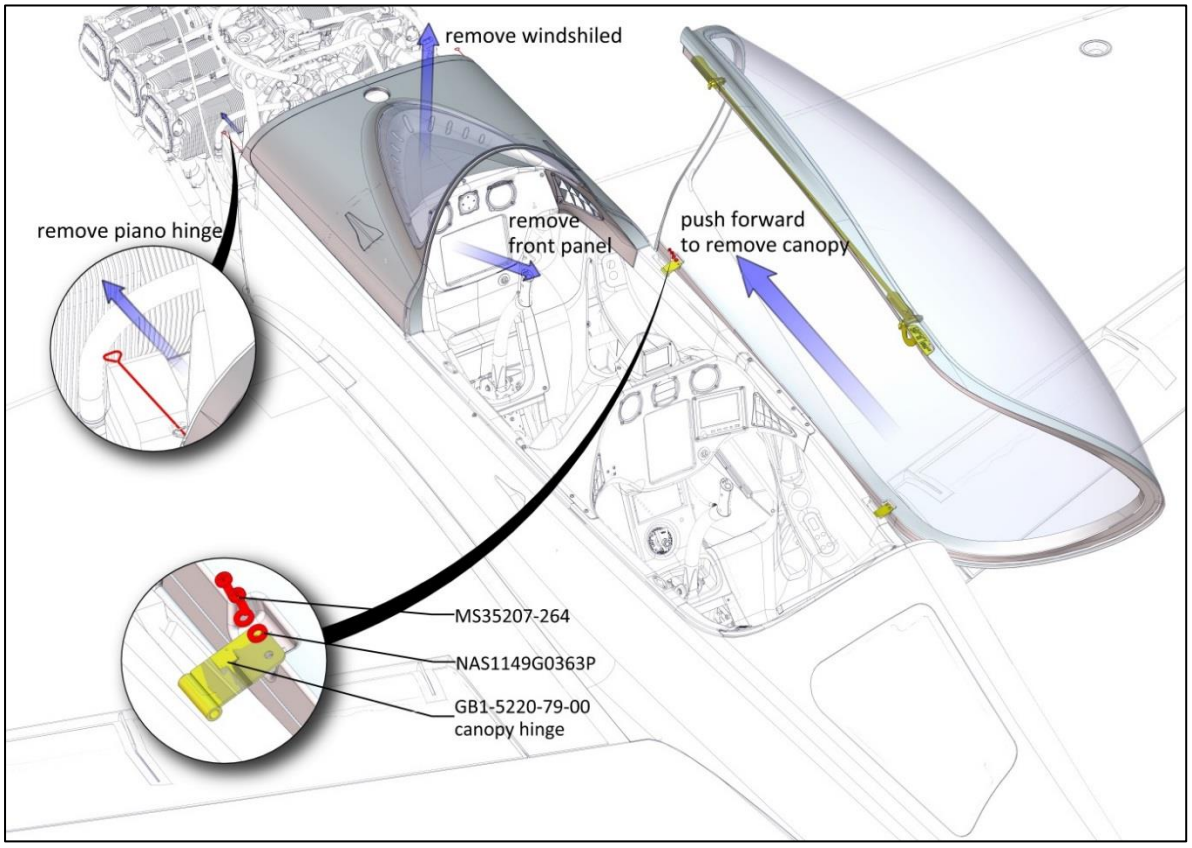
51-16 Titanium Materials

Titanium parts should be replaced not repaired

51-17 Additive Manufacturing Materials

Additive manufactured parts should be replaced not repaired.

52 Canopy and Windshield



52-01 Care of Canopy Glasses

Plexiglas is softer than glass and will scratch easily.
Use only clean water and clean leather or clean microfiber cloth.

NOTE: **Never wipe the canopy or windshield with dry or dirty cloths, sponges or paper!**
Only use clean water, or products suitable for Plexiglas™.

52-02 Remove Windshield – GB1-5211-00-00

1. Remove cowling, refer to section 71-02
2. Open or remove canopy
3. Remove front instrument panel, refer to section 39-04
4. Slide out the two securing pins (one each side)
5. Remove windshield
6. Clean all components
7. Inspect standard fasteners in accordance with 5-06, No.1
8. Inspect canopy glass in accordance with 5-06, No.11
9. Inspect welded assemblies in accordance with 5-06, No.5
10. For damages to composite structures refer to section 51
11. To reinstall, reverse steps 1 – 6
12. Lockwire each piano hinge pin from pin loop to firewall rivets
13. Check for correct installation

Signature

52-03 Remove Canopy – GB1-5220-00-00

1 Open the canopy
2 Support canopy in open position
3 Disconnect the retaining strap
4 With 2 persons, push canopy forward until clear of hinge pins, maneuver away
5 Clean all components
6 Inspect standard fasteners in accordance with 5-06, No.1
7 Inspect canopy glass in accordance with 5-06, No.11
8 Inspect welded assemblies in accordance with 5-06, No.5
9 For damages to composite structures refer to chapter 51.
10 To reinstall, maneuver canopy into position and, in open position, slide fully back on hinge pins
11 Attach retaining strap
12 Check canopy interface with the fuselage for steps and irregular gaps,
check free movement opening and closing canopy,
check proper engagement of canopy locking mechanism

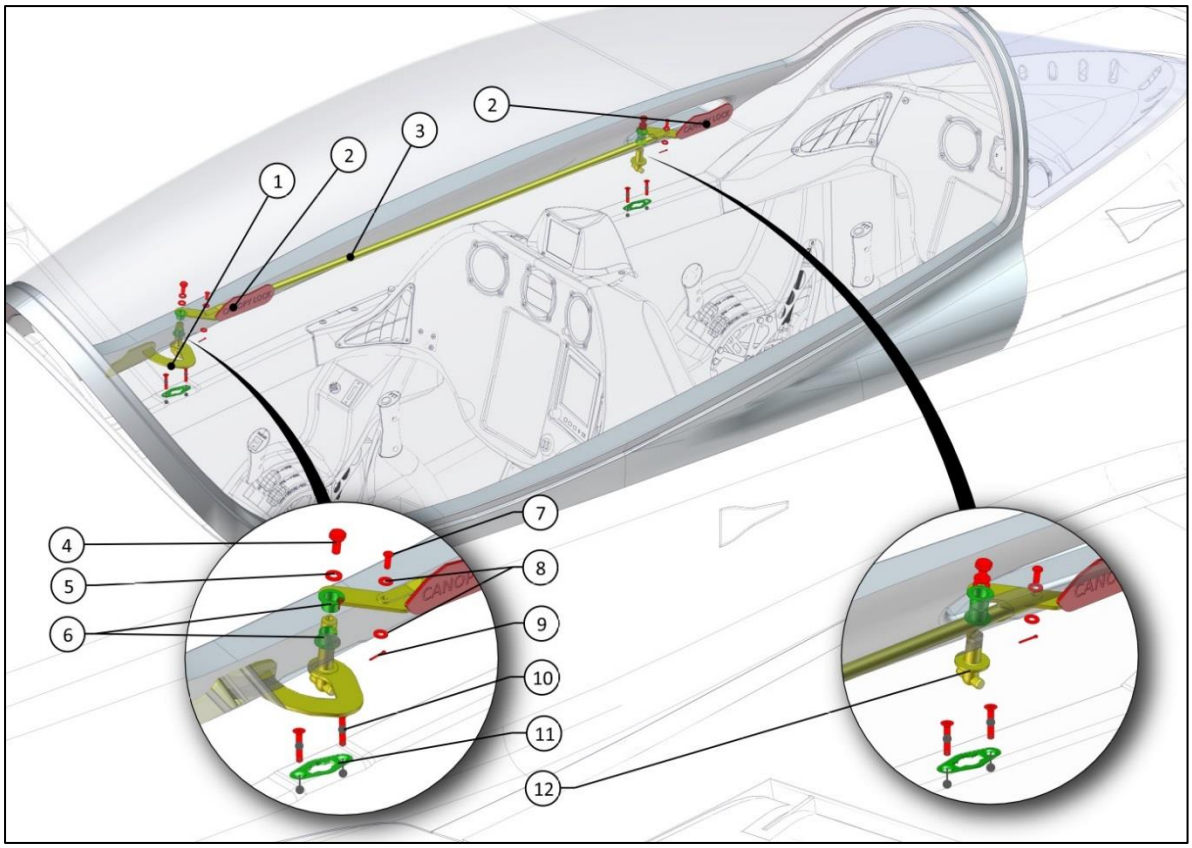
Signature

52-04 Canopy Hinges - GB1-5220-79-00

1. Remove fasteners, remove hinge
2. Clean, inspect for overall condition, deformation, cracks around welds
3. Exchange or reinstall
4. Check for correct installation

Signature

52-05 Canopy Lock



No.	Part No.	Description
1	GB1-5220-81-00	Assy Spindle, Canopy Lock Rear
2	GB1-5220-73-00	Assembly, Handle, Canopy Release
3	GB1-5220-71-00	Assy, Rod, Canopy Lock
4	AN4-4	Bolt
5	MS35338-44	Washer
6	Igus GFM-1214-07	Closed Linear Plain Bearing
7	MS20392-2C11	Clevis pin
8	NAS1149C0332R	Washer
9	MS24665-151	Cotter pin
10	GB1-5220-77-00	Assy Spindle, Canopy Lock Front
11	MS24693-S276	Screw
12	GB1-5210-90-03	Plate, Canopy Lock

52-06 Interconnecting Rod - GB1-5220-71-00

1. Remove cotter pins, pull out cotter pins
2. Remove Interconnecting Rod
3. Clean all components
4. Inspect standard fasteners in accordance with 5-06, No.1
5. Inspect welded assembly in accordance with 5-06, No.5
6. Exchange or reinstall, use new cotter pins
7. Check for correct installation

Signature

52-07 Aft canopy handle

1. Remove Interconnecting Rod
2. Remove top fastener, remove inner handle
3. Slide out lock and outer handle downwards
4. Clean all components
5. Inspect standard fasteners in accordance with 5-06, No.1
6. Inspect welded assembly in accordance with 5-06, No.5
7. Exchange or reinstall, secure fastener with Loctite 270
8. Reinstall Interconnecting Rod, use new cotter pins
9. Check for correct installation

Signature

52-08 Front canopy handle

1. Remove Interconnecting Rod
2. Remove top fastener, remove inner handle
3. Slide out locking pin downwards
4. Clean all components
5. Inspect standard fasteners in accordance with 5-06, No.1
6. Inspect welded assembly in accordance with 5-06, No.5
7. Exchange or reinstall, secure fastener with Loctite 270
8. Reinstall Interconnecting Rod, use new cotter pins
9. Check for correct installation

Signature

52-09 Replace Windshield and Canopy Glass

1. Uninstall canopy
2. Use a wooden or plastic wedge to loosen residual glass, pull / peel from frame manually
3. Use 80, then 120 grit sandpaper to prepare surface for bonding
4. Mask bonding area on inside of new canopy with masking tape
5. Use 400 grit sandpaper to prepare canopy surface
6. Use a cloth drenched with Acetone to clean bonding surface
7. Check for correct preparation

   NOTE: Do not touch bonding surface on either side with bare skin anymore!
8. Apply 3 mm wide foam tape to top rim of bonding surface
9. Mask airplane around canopy
10. Place canopy frame on fuselage, close canopy lock
11. Prepare Terostat MS9380 and caulk gun.

    CAUTION: Pot life is only 15 minutes!
12. Apply Terostat MS9380 with caulk gun on canopy frame
13. With 2 persons, position canopy glass on canopy frame, use Duct Tape to keep in place
14. After curing, remove excess
15. Check for correct installation
16. Paint as required

Signature

53 Fuselage

The fuselage consists of sandwich monocoque shells, with supporting structural elements bonded or laminated in. The fuselage is made from carbon fiber; the vertical stabilizer is made from glass fiber.
Honeycomb is used for sandwich cores.

Cockpit side consoles are permanently bonded into the fuselage.

Rear instrument panel is removable to provide access to control system items.

Front instrument panel is removable to provide access to various items.

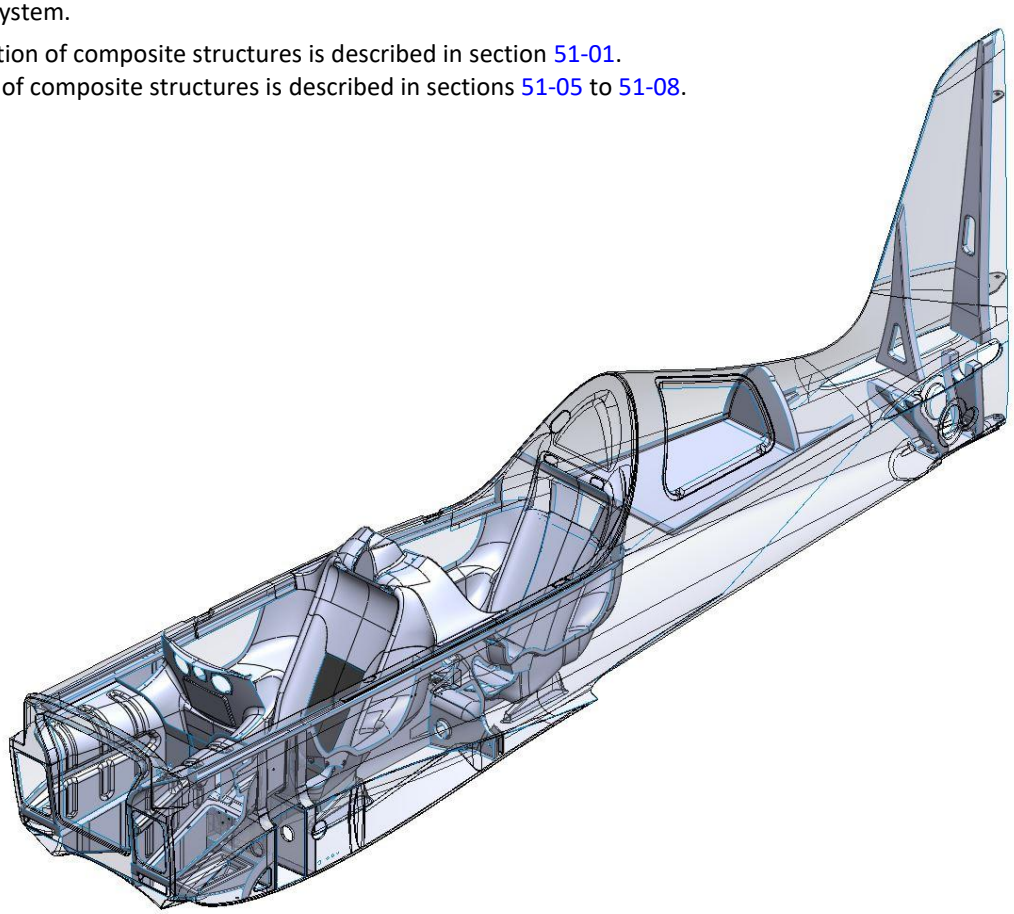
Access to battery, regulator, master- and starter relays and lower LH engine mount attachment point, located in a compartment under the front LH rudder pedal assembly is provided by removing the LH footrest plate, which also secures the LH main wing attachment bolt.

Access to the smoke pump and lower RH engine mount attachment point, located in a compartment under the front RH rudder pedal assembly is provided by removing the RH footrest plate, which also secures the RH main wing attachment bolt.

The seats are removable for access to parts of the control systems, fuel selector rods and electrical system. Small panels in the side consoles are removable for access to the powerplant control systems and electrical items.

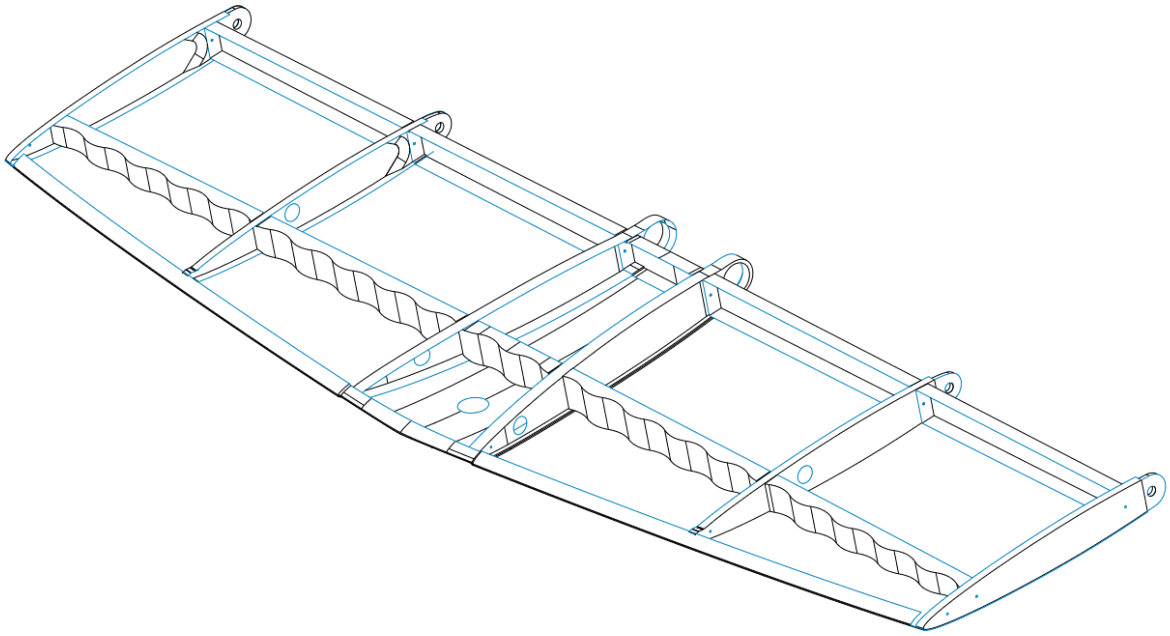
All surfaces exposed to the outside are protected by an epoxy primer, and painted with a polyurethane based paint system.

Inspection of composite structures is described in section 51-01.
Repair of composite structures is described in sections 51-05 to 51-08.



55 Stabilizers

55-01 Horizontal Stabilizer

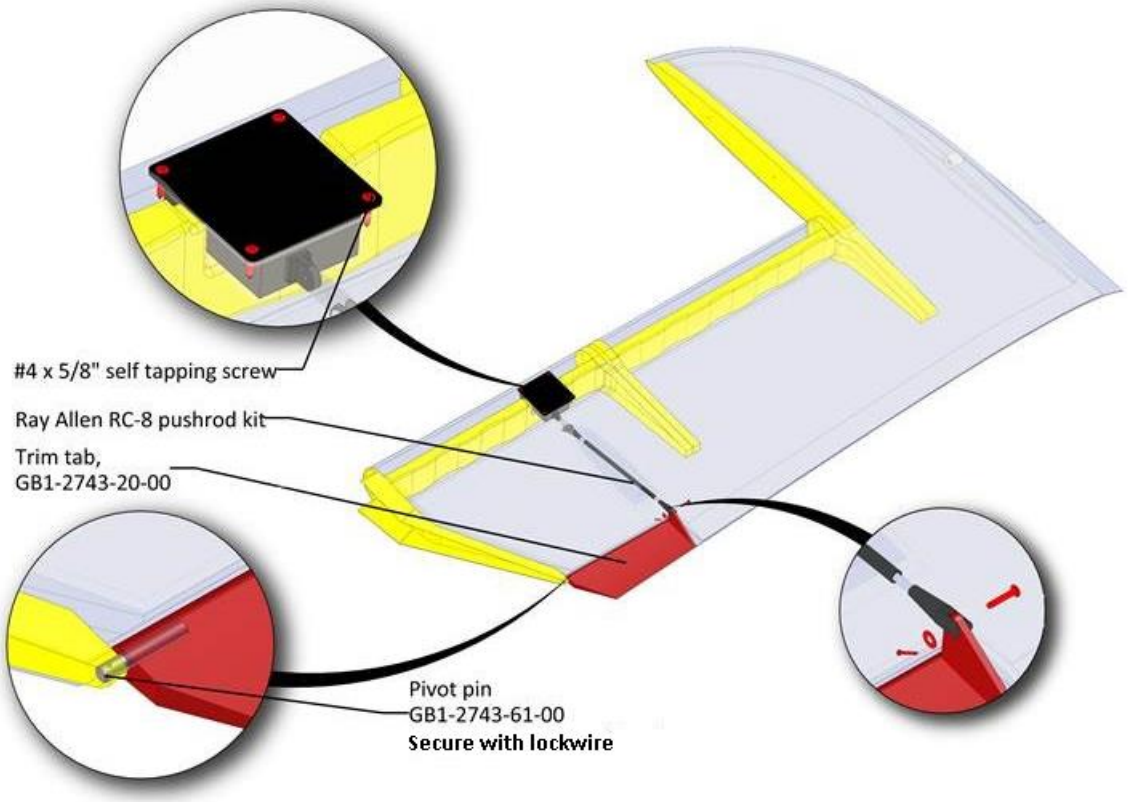


The horizontal stabilizer is a composite assembly bonded into the fuselage.
The composite ribs extent out of the trailing edge and serve as elevator hinges.
Skins are carbon fiber with 3 mm Rohacell sandwich cores.
The inner ribs hold the needle bearings for the elevator connector. The middle and outer ribs feature composite bushings integrated into the ribs, serving as bearings for the elevator.

Inspection of composite structures is described in section 51-01.
Repair of composite structures is described in sections 51-05 to 51-08.

55-02 Elevators – GB1-5520-00-00

Service Elevators



1. At the inboard end of each elevator, remove 6 bolts which fix the elevator to the elevator connector
2. At the outboard end of each elevator, unscrew the hinge pin from the elevator, then pull the hinge pin out of the elevator while holding the elevator in place
3. Remove the elevator backwards away from the airplane

NOTE: The electric line to the elevator trim servo in the LH elevator has to be disconnected; slide elevator backwards about 70mm / 3'', then disconnect.

4. Clean all components
5. Inspect standard fasteners in accordance with 5-06, No.1
6. Inspect welded assembly in accordance with 5-06, No.5
7. Inspection of composite structures is described in section 51-01.
8. Repair of composite structures is described in sections 51-05 to 51-08.
9. To reinstall, maneuver elevator in place, then insert hinge pin

NOTE: Connect the elevator trim servo in the LH elevator

10. Secure the hinge pin at the threaded end with torque seal
11. Install fasteners to connect with elevator connector, use new self-locking nuts
12. Check for correct installation

Signature

13. Function check of trim servo connection:
    actuate elevator trim, observe tab moving: trim tail heavy = tab moving down
    trim nose heavy=tab moving up

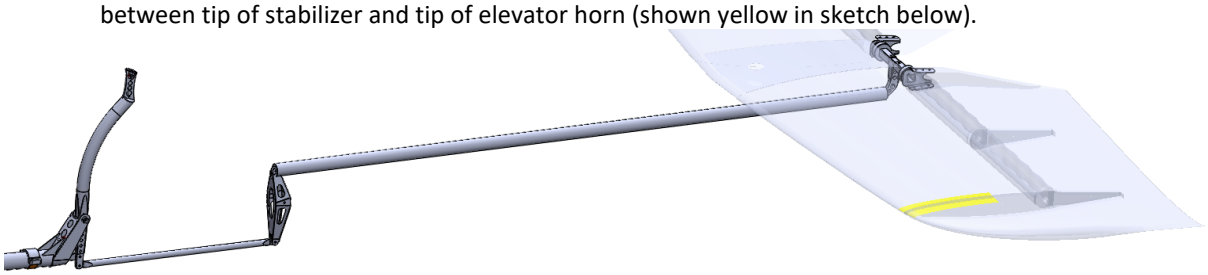
Elevator Deflection

1. Deflect elevator fully down and fully up, against bump stops
2. Measure distance from leading edge stabilizer to leading edge elevator horn, must be between 220 – 240 mm / 8.6 – 9.4 in either direction
   Actual value:

Signature

Allowable free play

1. Fix elevator relative to stabilizer in neutral position with masking tape around the leading edges between tip of stabilizer and tip of elevator horn (shown yellow in sketch below).



2. Measure free play on top of control stick (tape measure from control stick to instrument panel), must be less than 4 mm / 0.15in total. If out of tolerance, check entire elevator control circuit for correct torque of fasteners, overall condition and secure bearing seats.
   Actual value: [ ]
   Signature [ ]

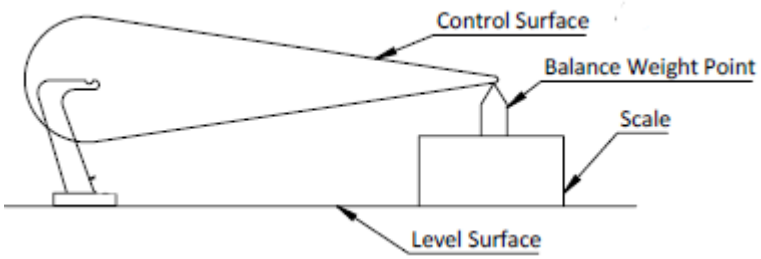
Elevator Weight & balance

1 Remove both elevators, refer to Service Elevators above

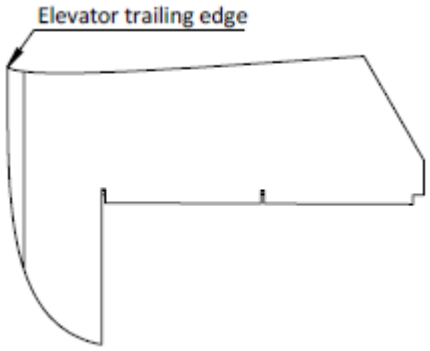
2 Place each elevator on scale individually,
allowable weight range 2.3 – 3.1 kg / 5 – 6.8lb
Actual value: LH [ ] RH [ ]
Signature [ ]

3 Reinstall hinge-pin

4 Suspend elevator on hinge pin, one on center-, one on outer hinge, hinge pin horizontal, make sure elevator is free to rotate



5 Place scale under trailing edge at outer trailing edge tip as per image below:



Allowable balance weight range 0.15 – 0.9kg/ 0.3 – 2lb
Actual value: LH [ ] RH [ ]
Signature [ ]

6 If values are within the given tolerances, remove hinge pins

7 Reinstall elevators, refer to Service Elevators above

Signature [ ]

If values are out of tolerance, contact Game Composites.

55-03 Elevator Trim Tab - GB1-2743-00-00

1 Disconnect control rod from trim tab by removing cotter pin and pulling out Clevis.
2 Remove inner trim tab hinge by removing AN525 fasteners
3 Remove trim tab
4 Reassemble in reverse order, install cotter pin to secure Clevis and secure hinge-pin fasteners with Threadlock
5 Check if deflection and free play is within the tolerances

Signature

Elevator Trim Tab Deflection and allowable play

1. Run elevator trim to nose heavy stop,
   measure trim tab trailing edge 3 mm / 0.11in higher than elevator trailing edge
2. Run elevator trim to tail heavy stop,
   measure trim tab trailing edge 35 mm / 1.37in lower than elevator trailing edge
3. Set elevator trim to neutral indication (trim tab trailing edge app 1 mm / 0.03 in higher than elevator trailing edge) and check for free play, which must not exceed ± 1 mm.
   If play exceeds tolerance, contact Game Composites.

55-04 Elevator Trim Servo

Type: T2-10A

Manufacturer: The Ray Allen Company Inc.
1341 Distribution Way Suite 15, Vista, CA92081, USA
www.rayallencompany.com

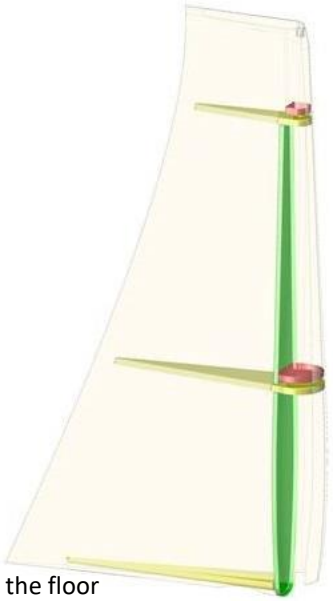
No regular maintenance is required for the unit.
If defective, the unit must be replaced.

1 Uninstall elevator, refer to Service Elevators above
2 Remove the four screws that attach the Servo to the Elevator
NOTE: If threads in composite to locate the trim servo are stripped, refer to section 5-06
3 Disconnect the electrical plug while removing the servo from the Elevator
4 If malfunction is detected, unit has to be replaced
5 Reconnect trim rod
6 Install cotter pin
7 To reinstall, maneuver Servo in position to connect electric lines
8 Connect actuating rod
9 Install cotter pin
10 Maneuver in position, install fasteners
11 Check for correct installation
12 Reinstall Elevator, refer to Service Elevators above
13 Check for correct installation and function:
Actuate elevator trim from stop to stop, observe tab moving and trim position indication for equal direction and synchronization: trim tail heavy = tab moving down
trim nose heavy=tab moving up

Signature

Signature

55-05 Rudder – GB1-5540-00-00



To service the rudder:

1. Release rudder cable tension by unscrewing turnbuckle 3 turns at the aft end of the LH control cable
2. Disconnect the rudder cables from the bellcrank
3. Unscrew and pull the rudder hinge pin out to the top
4. Remove the rudder backwards
5. Clean all components
6. Inspect standard fasteners in accordance with 5-06, No.1
7. Inspect welded assembly in accordance with 5-06, No.5
8. Inspection of composite structures is described in section 51-01.
9. Repair of composite structures is described in sections 51-05 to 51-08.
10. To reinstall, reverse steps 1 – 4 Signature
11. Check for correct installation

Rudder Deflection

1. Set rudder to neutral (visual aim), use plump bob to mark on the floor
2. Deflect rudder fully right against bump stop, use plump bob to mark on the floor
3. Deflect rudder fully left against bump stop, use plump bob to mark on the floor
4. Measure distance between neutral- and left and right marks, must be between 410 – 430 mm / 16.1 – 16.9 in. in either direction Signature
   Actual value:

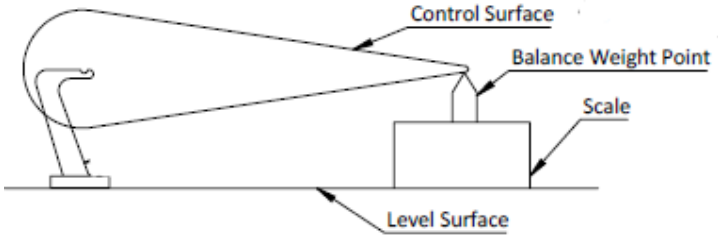
Rudder Weight & balance

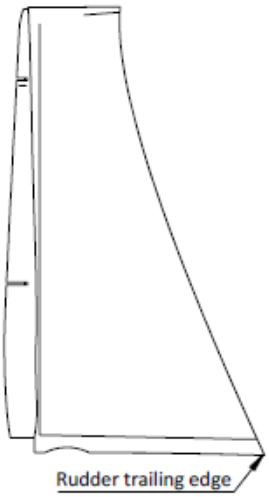
1 Remove rudder

2 Place rudder on scale, allowable weight range 4.3 – 5.23 kg / 9.5 – 11.7 lb Signature
Actual value:

3 Reinstall hinge-pin

4 Suspend rudder on hinge pin, one on the center, one on outer hinge, hinge pin horizontal, make sure rudder is free to rotate





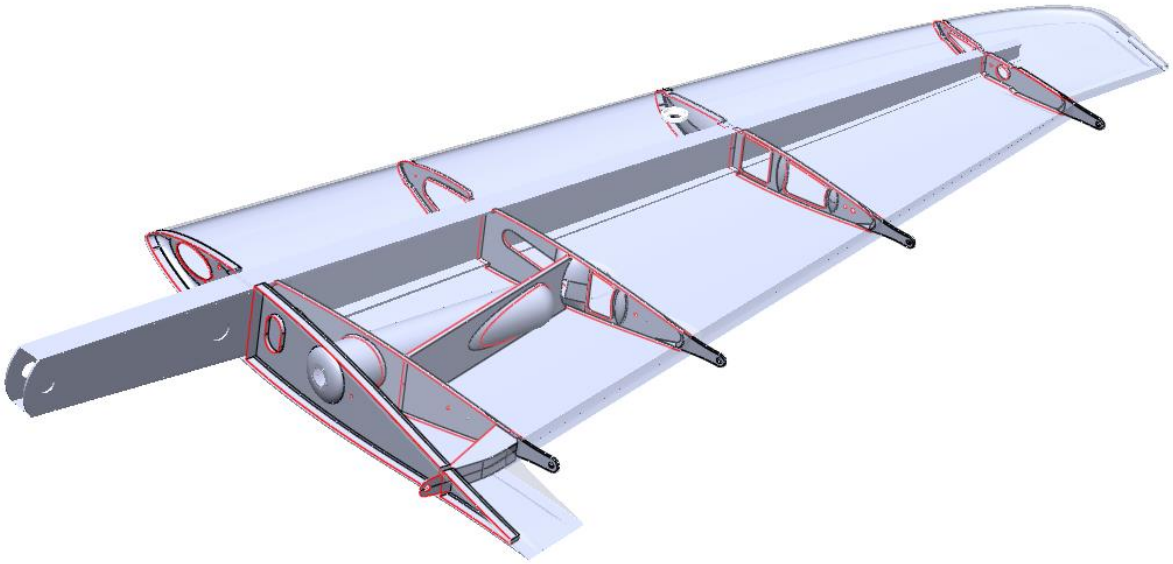
5 Place scale under trailing edge at the lower trailing edge tip, allowable balance weight range 0.7 – 1.5 kg/ 1.5 – 3.3 lb Signature
Actual value:

6 If the values are within the given tolerances, remove hinge pin, reinstall rudder. If values are out of tolerance, contact Game Composites. Signature

56 Not used

57 Wings

57-01 Wings



The wing consists of a right and a left half.
For assembly with the fuselage, the RH spar box slides into the LH spar box.
The main spar bolts connect both wings to the load transferring bulkheads in the fuselage.

Each wing features an auxiliary spar which runs along the trailing edge of the wing and enters into a pocket in the fuselage structure. The auxiliary spars are connected to a load transferring bulkhead in the fuselage via one aux spar bolt each, accessible via the rear cockpit foot wells.

The wings consist of one main spar assembly each, which is bonded inside the composite wing skins. Composite ribs do have stiffening purpose, and also serve as aileron hinges, bellcrank mounting structure and tank walls.

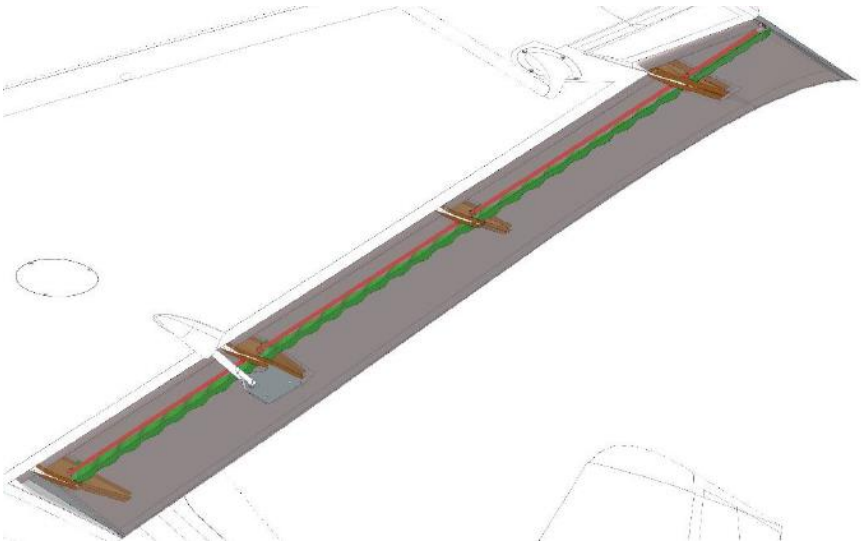
The inner two bays of the wing's forward section serve as fuel tank. To seal the composite against the fuel, Scotch Clad 776 sealer is applied to all surfaces exposed to fuel.

All surfaces exposed to the outside are protected by an epoxy primer, and painted with a polyurethane based paint system.

Inspection of main and auxiliary spars is described in section 5-06.
Inspection of composite structures is described in section 51-01.
Repair of composite structures is described in sections 51-05 to 51-08.

57-02 Aileron – GB1-5721-00-00

Each aileron is a composite assembly consisting of sandwich skins and load introducing ribs, mounted to the wing via 4 hinge points. Each rib holds one composite bushing, acting as the pivot point.
Connection to the control system is via a 5 mm carbon fiber plate extruding from the underside of each aileron.
A bearing housing is bonded into this plate, which holds a spherical ball bearing.
Ailerons do not contain any counterbalance weights.



To service an Aileron:

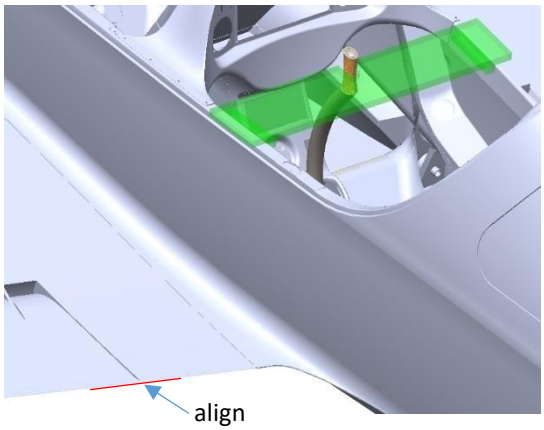
1. Disconnect the aileron linkage
2. Before removing the right aileron, remove the side panel in the right aft side console and disconnect the aileron trim servo wiring
3. At the outboard end of the aileron, use a 6 mm Allen Key to unscrew the hinge pin from the elevator, support / hold the aileron, then pull the hinge pin out and remove aileron
4. Clean all components
5. Inspection of composite structures is described in section 51-01.
6. Repair of composite structures is described in sections 51-05 to 51-08.
7. When reinstalling, reverse steps 1 – 3 and secure the hinge pin at the threaded end with torque seal.

Signature

8. Check for correct installation and function

Ailerons neutral position adjustment:

1 Fix aft control stick in the neutral position,
2 position JIG-GB1-5721-00-00 (shown in green) as shown, details of jig below.
3 Check top of aileron trailing edge is aligned with the bottom of inboard wing trailing edge
4 If required, adjust the length of outboard aileron control rods GB1-2717-40-00:
   a. Remove under wing access panel
   b. Uninstall fastener connecting outboard aileron control rod to aileron bellcrank
   c. Loosen counter nut, adjust Rose joint to length
   d. Secure counter nut
   e. Reinstall fastener connecting outboard aileron control rod to aileron bellcrank



5 Verify top of aileron trailing edge is aligned with the bottom of inboard wing trailing edge
6 When satisfactory, install castle nut and cotter pin

Signature

7 Check for correct installation
8 Reinstall under wing access panel
9 If required, repeat steps 2 – 10 on the other wing

Signature

10 Check for free motion from stop to stop

Aileron Deflection

1. Deflect aileron fully left and fully right, against bump stops
2. Measure distance from trailing edge aileron to trailing edge wing, must be between 110 – 130 mm / 4.3 – 5.1 in either direction
   Actual value: LH [ ] RH [ ] Signature [ ]

Allowable Free Play

1. Fix aileron to wing in neutral position with a piece of tape around the trailing edges
2. Measure free play on top of control stick (tape measure from control stick to cockpit frame), must be less than 4 mm / 0.15 in total. If out of tolerance, check entire aileron control circuit for correct torque of fasteners, overall condition and secure bearing seats.
   Actual value: [ ] Signature [ ]

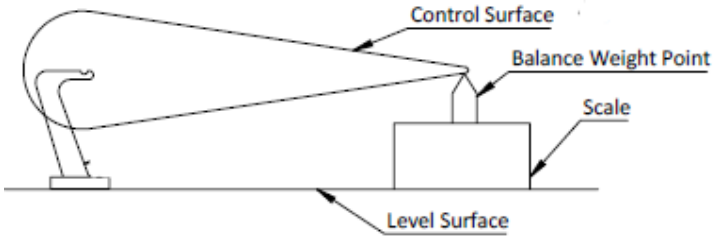
Aileron Weight & Balance

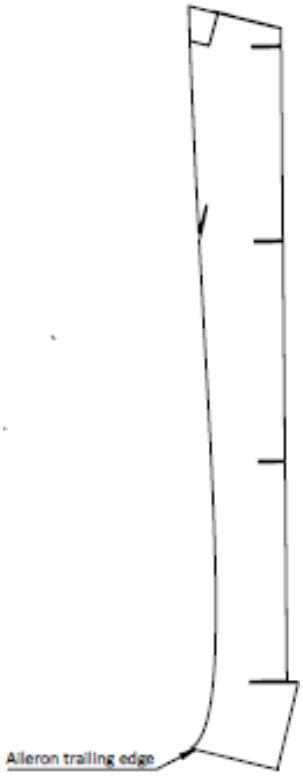
1 Remove both ailerons

2 Place each aileron on scale individually,
allowable weight range 5.4 – 6.6 kg / 11.9 – 14.6 lb
Actual value: LH [ ] RH [ ] Signature [ ]

3 Reinstall hinge-pin

4 Suspend aileron on hinge pin, one on center-, one on outer hinge, hinge pin horizontal, make sure elevator is free to rotate





5 Place scale under trailing edge at inboard trailing edge tip as shown,
Allowable balance weight range 0.8 – 1.4 kg/ 1.8 – 3 lbs

6 Actual value: LH [ ] RH [ ]

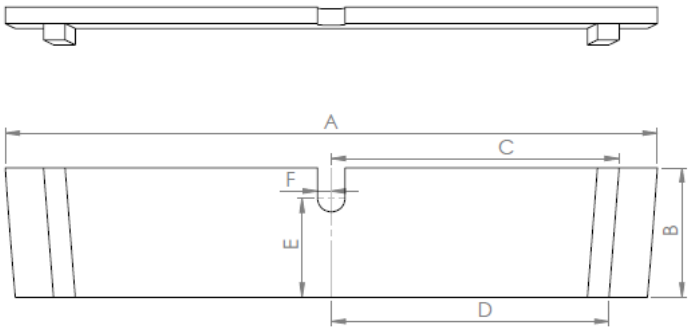
7 If values are within the given tolerances, remove hinge pins

8 Reinstall ailerons
If values are out of tolerance, contact Game Composites. Signature [ ]

Aileron rigging jig JIG-GB1-5721-00-00

This Jig is required to conduct the ailerons neutral position adjustment described above.
Jig can be ordered from Game Composites,
or fabricated from 19mm / ¾" plywood or MDF to drawing as shown.
Accuracy and symmetry of dimension C and D defines are important
Dimensions of the alignment blocks are not critical.

Dimensions:
A: 757mm, ±2mm / 29.8", ±0.1"
B: 150mm, ±5mm / 5.9", ±0.2"
C: 335mm, ±2mm / 13.1" ±0.1"
D: 323mm, ±2mm / 12.7" ±0.1"
E: 115mm, ±2mm / 4.5" ±0.1"
F: 16mm, +2mm / 7/16" +0.1"



57-03 Aileron Trim Tab - GB1-2717-40-00

1 Disconnect control rod from trim tab by removing cotter pin and pulling out Clevis.
2 Uninstall inner hinge by removing AN525 fasteners
3 Remove trim tab
4 Reassemble in reverse order, install cotter pin to secure Clevis.
5 Check for free movement
6 Check deflection and play within the tolerances
7 Check for correct installation and function

Signature

Aileron Trim Tab Deflection and allowable play

1. Run aileron trim to nose heavy stop,
   measure trim tab trailing edge 3 mm / 0.11 in higher than elevator trailing edge
2. Run aileron trim to tail heavy stop,
   measure trim tab trailing edge 35 mm / 1.37 in lower than elevator trailing edge
3. Set aileron trim to neutral indication (trim tab trailing edge app 4 mm / 0.15 in lower than aileron trailing edge) and check for free play, which must not exceed ± 1 mm.
   If play exceeds tolerance, contact Game Composites.

57-04 Aileron Trim Servo

Type: T3-12A

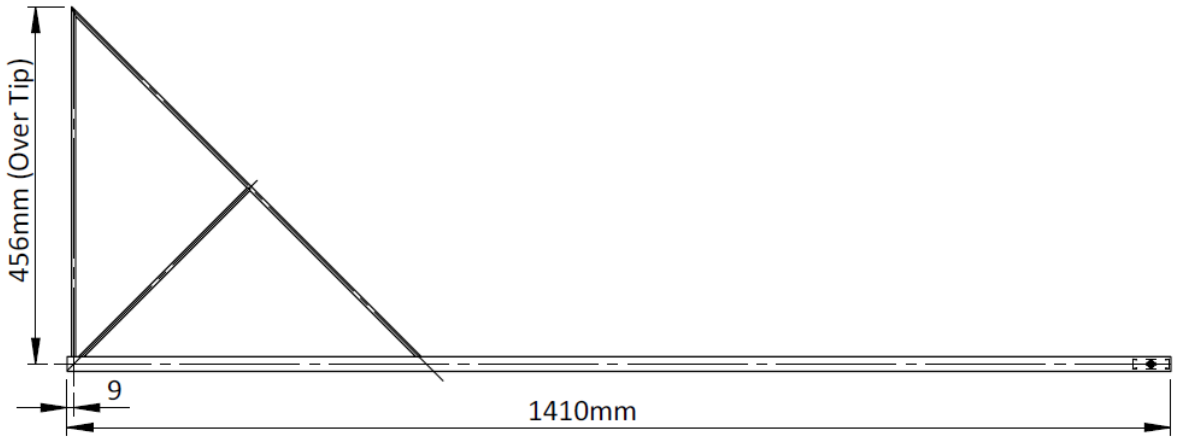
Manufacturer: The Ray Allen Company Inc.
1341 Distribution Way Suite 15, Vista, CA92081, USA
www.rayallencompany.com

No regular maintenance is required for the unit.
If defective, the unit must be replaced.

1 Disconnect the trim control rod at the trim tab
2 Remove the four screws that attach the actuator to the elevator
3 Disconnect the electrical plug while removing the unit from the elevator
4 Remove Servo
NOTE: If threads in composite to locate the trim servo are stripped, refer to section 5-06
5 Disconnect trim rod, if required
6 If malfunction is detected, unit has to be replaced
7 Reconnect trim rod
8 Install cotter pin
9 To reinstall, reverse steps 1 – 5
10 Install cotter pin trim rod to trim tab
11 Check for correct installation and function:
Actuate aileron trim from stop to stop, observe tab moving and trim position indication for equal direction and synchronization:
trim right wing heavy = tab moving down
trim left wing heavy = tab moving up

Signature

57-05 Sight Gauges – 5700-01-00



The airplane is equipped with removable carbon fiber sight gauges at the wing tips. It may be flown safely with or without, only one on either side, or both of the sighting devices.

To install a sight gauge:

1. Depress spring loaded pin
2. Slide in place, until pin locks in position

To uninstall a sight gauge:

1. Use a pointed object to depress spring loaded pin through hole in wing sleeve
2. Slide out

The sighting devices may be removed and refitted by either maintenance personnel or the pilot.
Before flight, check for alignment (facing up) and secure fitting (spring loaded pin in position).

Inspection of composite structures is described in section 51-01.
Repair of composite structures is described in sections 51-05 to 51-08

61 Propeller, Governor and Spinner

Propeller Type:	MTV-14-B-C/C190-130
Governor Type:	P-880-41
Spinner Type:	P-1369 (4R1)
Manufacturer:	MT-Propeller Entwicklung GmbH Flugplatzstrasse 1, 94348 Atting, Germany www.mt-propeller.com

For inspections, installation, inspections and repairs, refer to manufacturer manuals:
MT- propeller Operation and Installation Manual E124
and
Operation and Installation Manual Hydraulically Constant Speed Governor E-1048
available at www.gamecomposites.co and on the MT-propeller website.

71 Engine, Engine Mount and Cowling

71-01 General

To obtain information required to conduct maintenance on the engine, Lycoming manual and parts catalogue, which can be found at www.gamecomposites.com.
To identify the current publications and prices, use Lycoming Service Letter L114 which is freely available on the Lycoming web site.

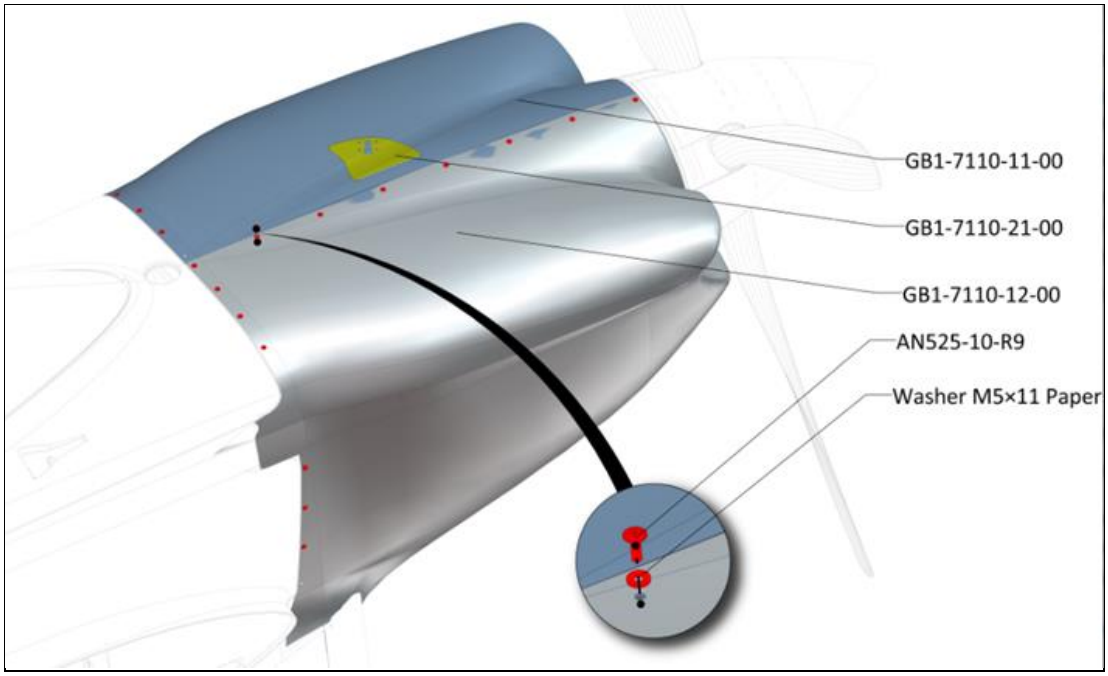
The engine, its associated systems and installation are described in sections 1.

An inverted oil system (Christen 801 inverted oil system) is installed as described in section 79.

Oil temperature is regulated through the oil cooler system as described in section 79.

If replacement of the engine or propeller control cables is done, renew the sealing of the bushing grooves and gaps at the engine side of the fire wall. Use PR812 high temperature sealant for sealing the firewall to the fuselage and for filling any gaps around cable bundles or where the firewall panels meet.

71-02 Cowling – GB1-7110-00-00



To service the cowling, or access items under the cowling:

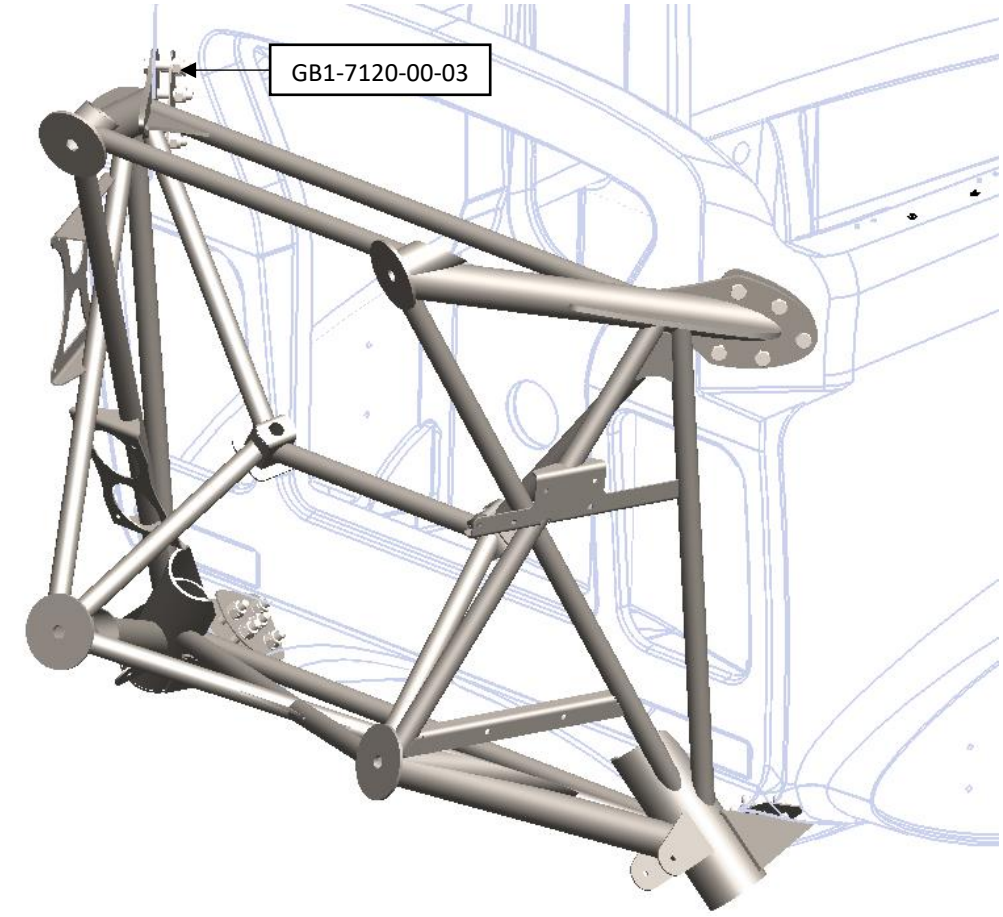
1 Remove all screws holding the RH cowling (AN525-10-R9, Phillips 2 screwdriver required)
2 Remove the RH cowling half
3 Remove all screws holding the LH cowling (AN525-10-R9, Phillips 2 screwdriver required)
4 Remove the LH cowling half
5 Clean all components
6 Inspect standard fasteners in accordance with 5-06, No.1
7 Inspect Click Bonds in accordance with 5-06, No.2
8 Inspection of composite structures is described in section 51-01
9 Repair of composite structures is described in sections 51-05 to 51-08
10 To reinstall, reverse steps 1 – 4

Vulcan Fiber washers under heads of AN525 screws, to be replaced on condition: P/N 10038970

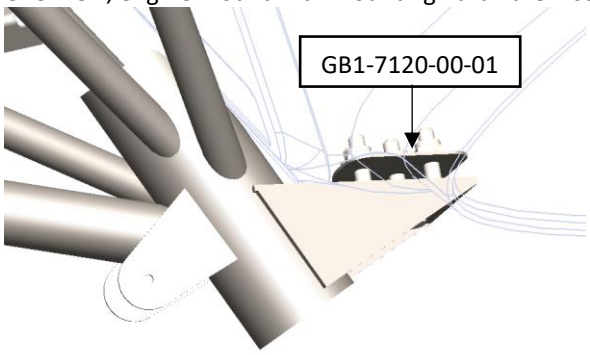
Manufacturer: Menzel & Seyfried GmbH
Olchinger Strasse 60
82194 Groebenzell, Germany
www.gummi-menzel.de

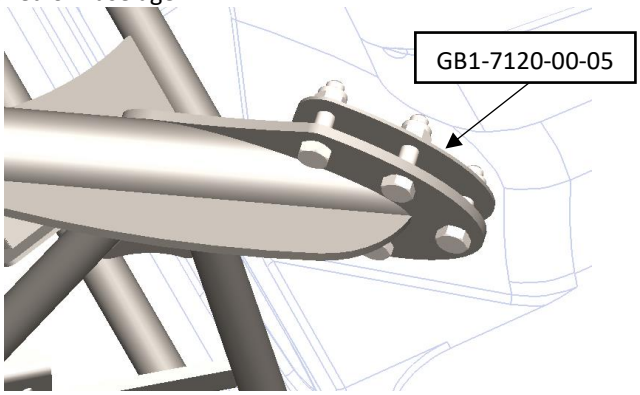
71-03 Engine Mount – GB1-7120-00-00

The engine mount is a welded tube structure, attached to the composite fuselage via AN fasteners.



Overview, engine mount with mounting hardware installed on fuselage:





Detail views: lower LH and upper LH engine mount attachment points, shown with backplate and mounting hardware.

GB1-7120-00-03	Compression plate upper RH
GB1-7120-00-05	Compression plate upper LH
GB1-7120-00-01	Compression plate lower
AN5-12A	Bolt AN5 x 1 11/32”
NAS1149F0532P	Washer Plain 5/16 x .032" Steel
MS21045-5	Nut Stiff Metal 5/16-24 UNF

Torque value for engine mount attachment bolts: 80 ft/lb

Removing the engine from the Engine Mount

1 Disconnect battery, refer to section 24-05
2 Remove the cowlings, refer to section 71-02
3 Remove the propeller, refer to section 61
4 Remove the front part of the cooling plenum, loosen the rear part, refer to section 71-04
5 Disconnect all electrical cables from the engine and accessories
6 Disconnect the hoses from the manifold and fuel pressure sensors
7 Disconnect mixture control cable from injector body and engine
8 Disconnect propeller control cable from the propeller governor
9 Disconnect the throttle Bowden cable from throttle body
10 If fitted, disconnect the smoke oil hoses from both exhaust stacks
11 If fitted, disconnect the heater hoses from the right-hand exhaust manifold
12 Disconnect all oil and fuel lines from the engine
13 Support the engine at the two engine hoist points on top of the engine
14 Remove the 4 bolts, nuts, washers and the shock mounts between the engine mount and the engine

Re-installing the engine

1. Support the engine from engine hoist, using 2 straps looped through the latches on top of the engine
2. Maneuver the engine from the front onto the engine mount.

CAUTION: Do not pinch or damage preinstalled cables or hoses!

3. Install lower shock mounts first. Secure the nuts by hand, no less than 3 turns.

CAUTION: Do not forget the spacers in the shock mounts!

4. Unload the rear hoist point and remove the rear strap.
5. Lift the front end of the engine sufficiently to install the upper bolts, washers, and shock mounts.
6. Torque all four (4) bolts to 51-56 Nm (450–500 in.lb.) Mark nuts with torque seal.
7. Referring to the pictures in the appropriate sections of this manual:
    a. Install fuel and oil hoses
    b. If fitted, install smoke oil hoses with T-fitting and connect to both nozzles.
8. Connect the engine control cables:
    a. Throttle
    b. Propeller governor
    c. Mixture control

    Check and adjust for correct travel at both ends of their range, refer to section 71-02
9. Connect the hoses to the:
    a. Manifold pressure sensor
    b. Fuel pressure sensor
10. Referring to the wiring diagrams in section 24-03, re-connect all electrical sensors to the engine
11. Check for correct installation
12. Install cooling plenum
13. Conduct ground run in accordance with AFM section 4.4, 4.6,4.11
14. Visually check for leaks
15. Install cowling, refer to section 71-02

Signature

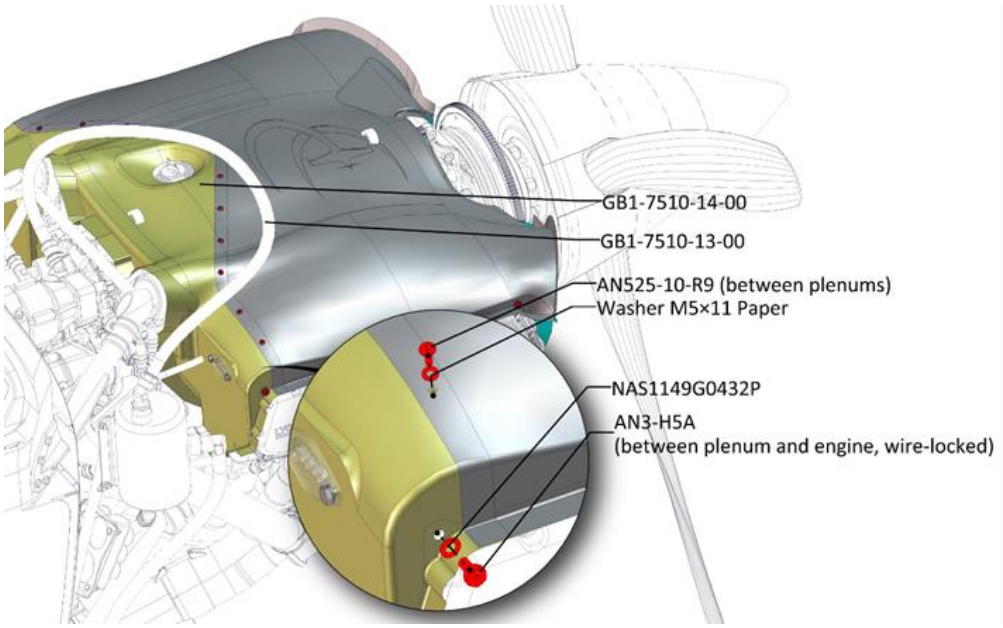
Removing the engine mount with or without the engine

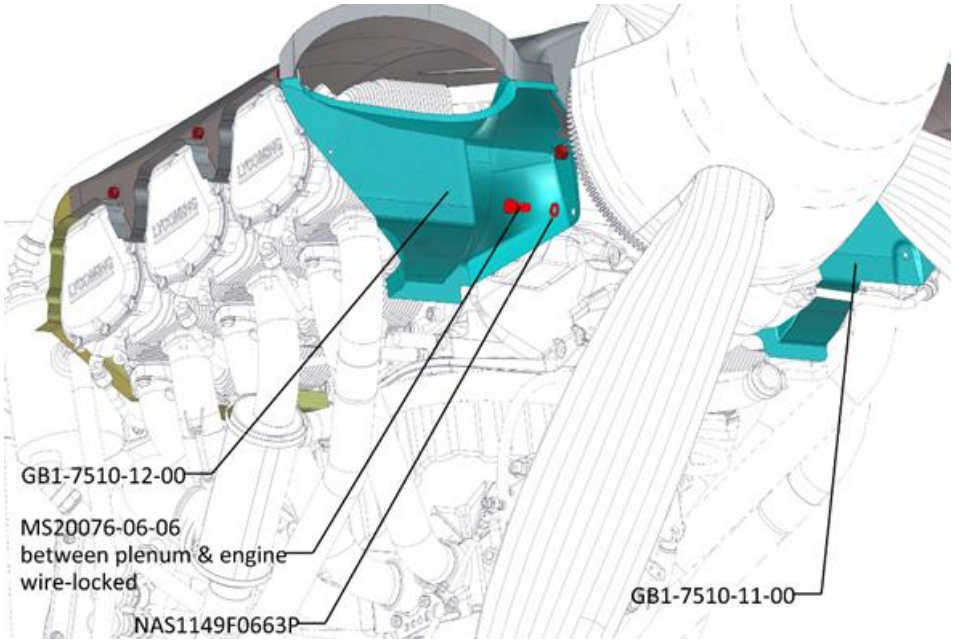
In addition to the tasks for removing the engine:

1. Support the forward fuselage and the engine mount separately
2. Remove the main gear legs per 32-03 and 32-04.
3. Remove the small firewall pieces which cover the mounting frame upper attachments
4. Inside the airplane, remove the front foot-well floor panels
5. Remove the lower mounting bolts and earth cable
6. Remove the upper mounting bolts
7. Remove all 20 nuts and bolts from the engine mounts.
8. Inspect standard fasteners in accordance with 5-06, No.1
9. Inspect welded assembly in accordance with 5-06, No.5
10. To reinstall, reverse steps 1 – 7
11. Reattach earth cable
12. Check for correct installation

Signature

71-04 Engine Cooling Plenum



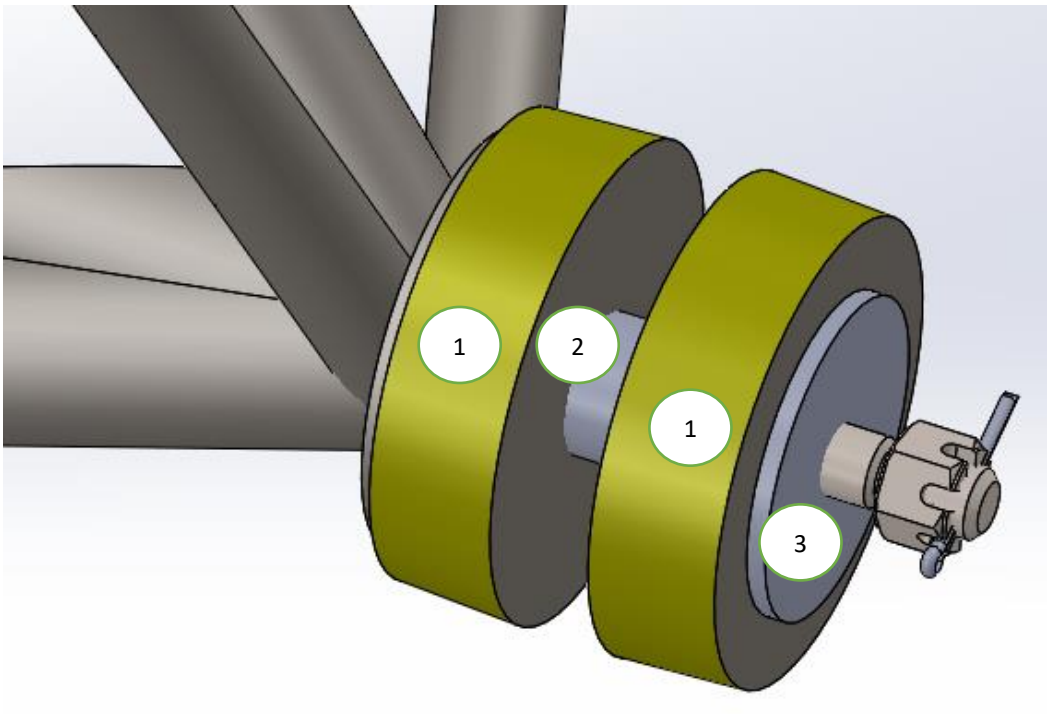


To service the cooling plenum, or access items under the cooling plenum:

1. Remove cowling, refer to section 71-02
2. Remove main front cooling plenum:
   Providing access to upper spark plugs, oil pressure valve and fuel divider and -injectors
3. Loosen main aft cooling plenum (for disassembly, engine has to be removed from engine mount):
   Providing access to aft support bracket, to lift engine
4. Front Inlets only have to be removed when damaged or engine is shipped away.
5. Clean all components
6. Inspect standard fasteners in accordance with 5-06, No.1
7. Inspection of composite structures is described in section 51-01
8. Repair of composite structures is described in sections 51-05 to 51-08
9. To reassemble, reverse steps 1 – 4
10. Wire-lock main front cooling plenum fasteners in cylinder heads
11. Sign for correct installation

Signature

71-05 Engine Shock Mounts



Type	J7764-31
Kit consisting of:	1 – Rubber cups 2 – Spacer 3 – Large washer
Manufacturer	Lord Corporation 2455 Robison Road West, Erie, PA 16509, USA www.lord.com

The units do not require regular maintenance.
Inspect in accordance with 5-06, No.20. If defective or worn the units must be replaced.

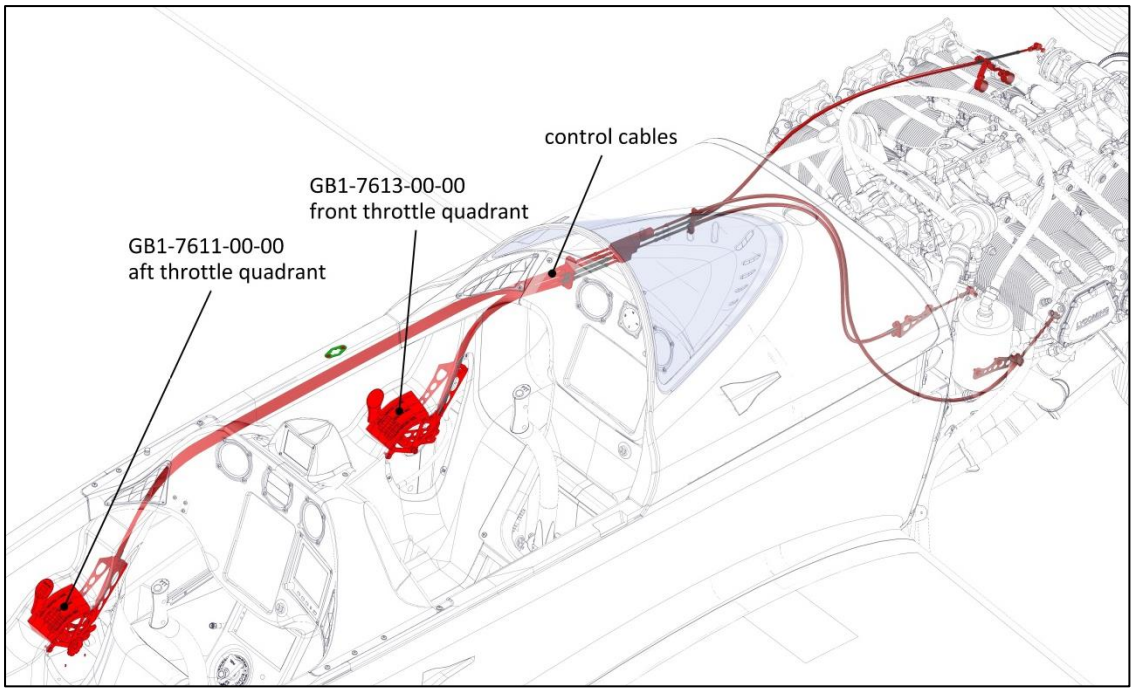
Mounting bolts:	AN177-33
Castel nuts	AN310-7
Washer	NAS1149F0763P
Cotter pins	MS24665-302

To replace one or more shock mounts:

1 Suspend engine by its lift lugs, using a hoist
2 Remove cotter pin, remove nut
3 Remove large washer and forward-facing rubber cup
4 For *upper* mounts, lower engine to allow removal of backwards-facing cup
  For *lower* mounts, raise engine to allow removal of backwards-facing cup
5 Put new backwards-facing cup in place
6 Lift engine in position
7 Push in bolt, align spacer on bolt, align forward-facing rubber cup
8 Push bolt all the way in, align large washer, hand-tighten castle nut
9 Torque to 41 lb/ft
10 Install cotter pin

73 Engine and Propeller Control

73-01 System Overview



The system, and all of the components do not require regular maintenance.
If defective, components have to be replaced.

To inspect or service the engine controls:

1. Remove cowling, refer to section 71-02
2. Remove LH side panels in both cockpits
3. Inspect standard fasteners in accordance with 5-06, No.1
4. Inspect welded assemblies in accordance with 5-06, No.5
5. Inspect machined components in accordance with 5-06, No.6
6. Inspect handles in accordance with 5-06, No.10
7. Inspect control cables in accordance with 5-06, No.16
8. Inspect electrical cables in accordance with 5-06, No.14
9. If required, reassembly in inverted order as disassembly
10. Install cotter pins
11. Check for correct assembly, check for correct function and full range of motion
12. Reinstall cowling, refer to section 71-02
13. Reinstall side panels

Signature

73-02 Throttle Quadrants

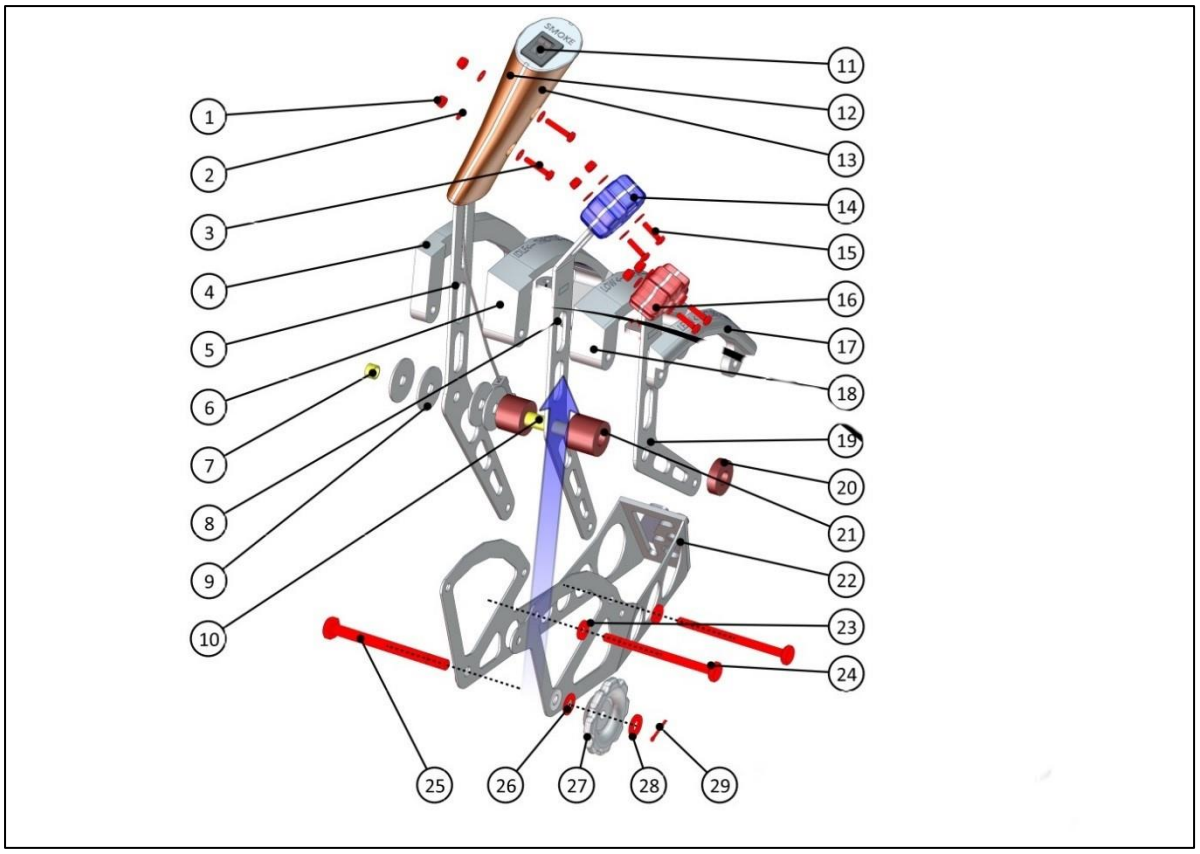


Fig. 73-1

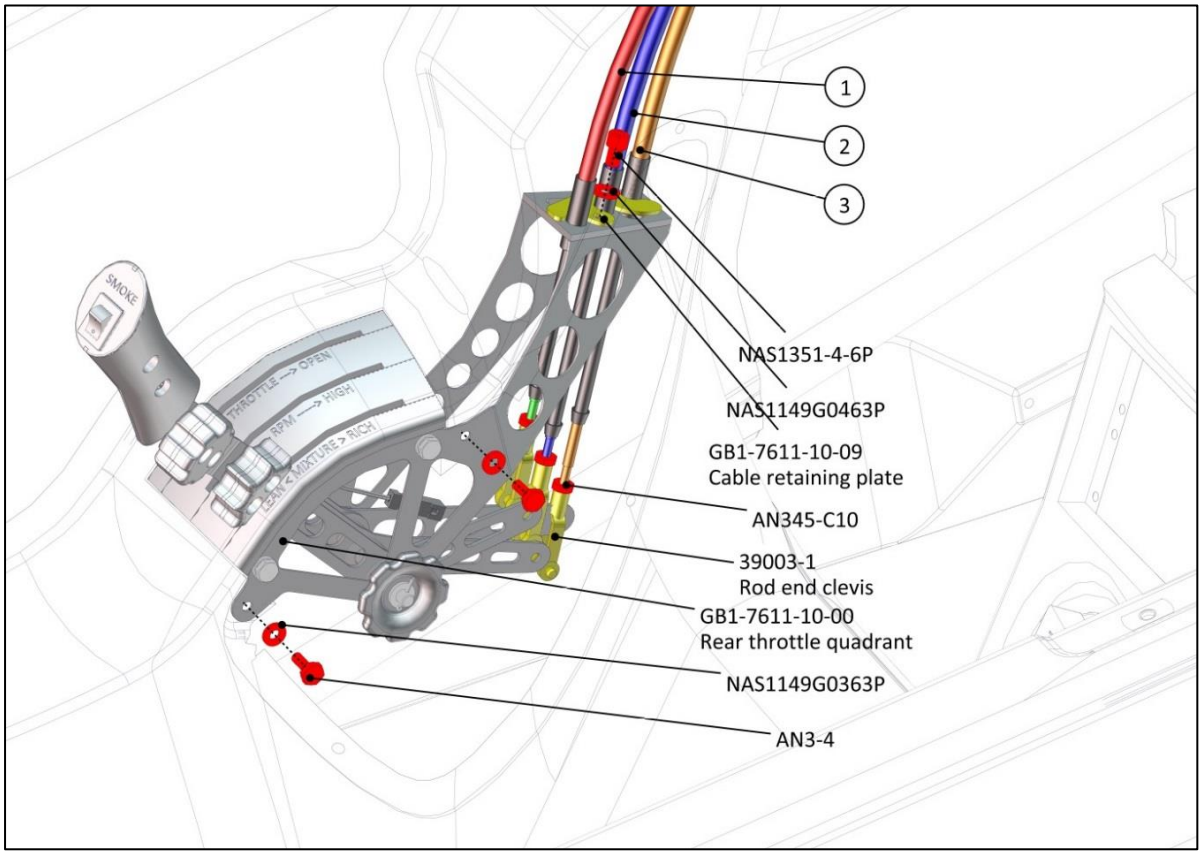


Fig. 73-2

	Part No.	Description	Front	Rear
1	DIN985 A2	Nut, M3, Nyloc, stainless steel	X	X
2	-	Washer, M3, plain, stainless steel	X	X
3	PnHdM3×16 SS	Screw, M3, Pan head, stainless steel	X	X
4	GB1-7611-10-75	Throttle Control Block 1	X	X
5	GB1-7611-20-00	Throttle Control Lever	-	X
	GB1-7613-20-00	Throttle Control Lever	X	-
6	GB1-7611-10-77	Throttle Control Block 2	X	X
7	GB1-7611-10-69	Outboard Spindle	-	X
	GB1-7613-10-68	Outboard Spacer	X	-
8	GB1-7611-30-00	Propeller Control Lever	X	X
9	GB1-7611-10-91	Brass Washer	X	X
10	GB1-7611-10-61	Inboard Spindle	-	X
	GB1-7613-10-61	Front Spindle	X	-
11	SRB22A2FBBNN	Cherry Rocker Switch	-	X
12	GB1-7615-13-91	Throttle Grip, left	X	X
13	GB1-7615-13-92	Throttle Grip, Right	X	X
14	GB1-7611-10-71	Propeller Control Grip	X	X
15	PnHdM3x12 SS	Screw, M3, Pan Head, Stainless Steel	X	X
16	GB1-7611-10-73	Mixture Control Grip	X	X
17	GB1-7611-10-81	Throttle Control Block 4	X	X
18	GB1-7611-10-79	Throttle Control Block 3	X	X
19	GB1-7611-40-00	Mixture Control Lever	X	X
20	GB1-7611-10-67	Inboard Spacer	X	X
21	GB1-7611-10-65	Middle Spacer	X	X
22	GB1-7611-11-00	Throttle Control Frame	X	X
23	NAS1149G0363P	Plain Washer	X	X
24	AN3-25	Bolt AN3 x 2 21/32 CPS	X	X
25	AN4-27	Bolt AN4 x 2 29/32 Drilled Thread CPS	X	X
26	250-025-500	Belleville Washer 1/4"	X	X
27	GB1-7611-10-83	Throttle Friction Control Knob	-	X
28	NAS1149G0463P	Washer Plain 1/4 ID x .063" CPS	-	X
29	AN310-4	Castle Nut 1/4-28 UNF CPS (in position of #27 & #28)	X	-
30	MS24665-151	Cotter pin 1/16" x 0.5" Lg SS	X	X

73-03 Throttle, Propeller, Mixture control cables

Manufacturer: CMA Cable Manufacturing & Assembly Company, Inc.
10896 Industrial Parkway, N.W. PO Box409 Bolivar, OH 44612, USA
www.cmacable.com

No.	GC Part No.	Manufacturer No.	Description	Cable type	Cable travel	Conduit fitting
1	GB1-7600-10-04	300-03233-01660	Mixture Cable aft quadrant to Firewall	3 HEFT2	2”	Clamp (both ends)
2	GB1-7600-10-07	300-03333-01730	Propeller Cable aft quadrant to Firewall	3 HEFT2	3”	Clamp (both ends)
3	GB1-7600-10-01	300-03333-01720	Throttle Cable aft quadrant to Firewall	3 HEFT2	3”	Clamp (both ends)
4	GB1-7600-10-05	300-03233-00700	Mixture Cable front Quadrant to Firewall	3 HEFT2	2”	Clamp (both ends)
5	GB1-7600-10-08	300-03333-00755	Propeller Cable front quadrant to Firewall	3 HEFT2	3”	Clamp (both ends)
6	GB1-7600-10-02	300-03333-00730	Throttle Cable front quadrant to Firewall	3 HEFT2	3”	Clamp (both ends)
7	GB1-7600-10-03	300-03333-01155	Throttle Cable Firewall to Fuel Servo	3 HEFT2	3”	Clamp (both ends)
8	GB1-7600-10-09	300-03333-01130	Propeller Cable Firewall to Governor	3 HEFT2	2 “	Clamp (both ends)
9	GB1-7600-10-06	300-03233-01345	Mixture Cable Firewall to Fuel Servo	3 HEFT2	3”	Clamp (both ends)

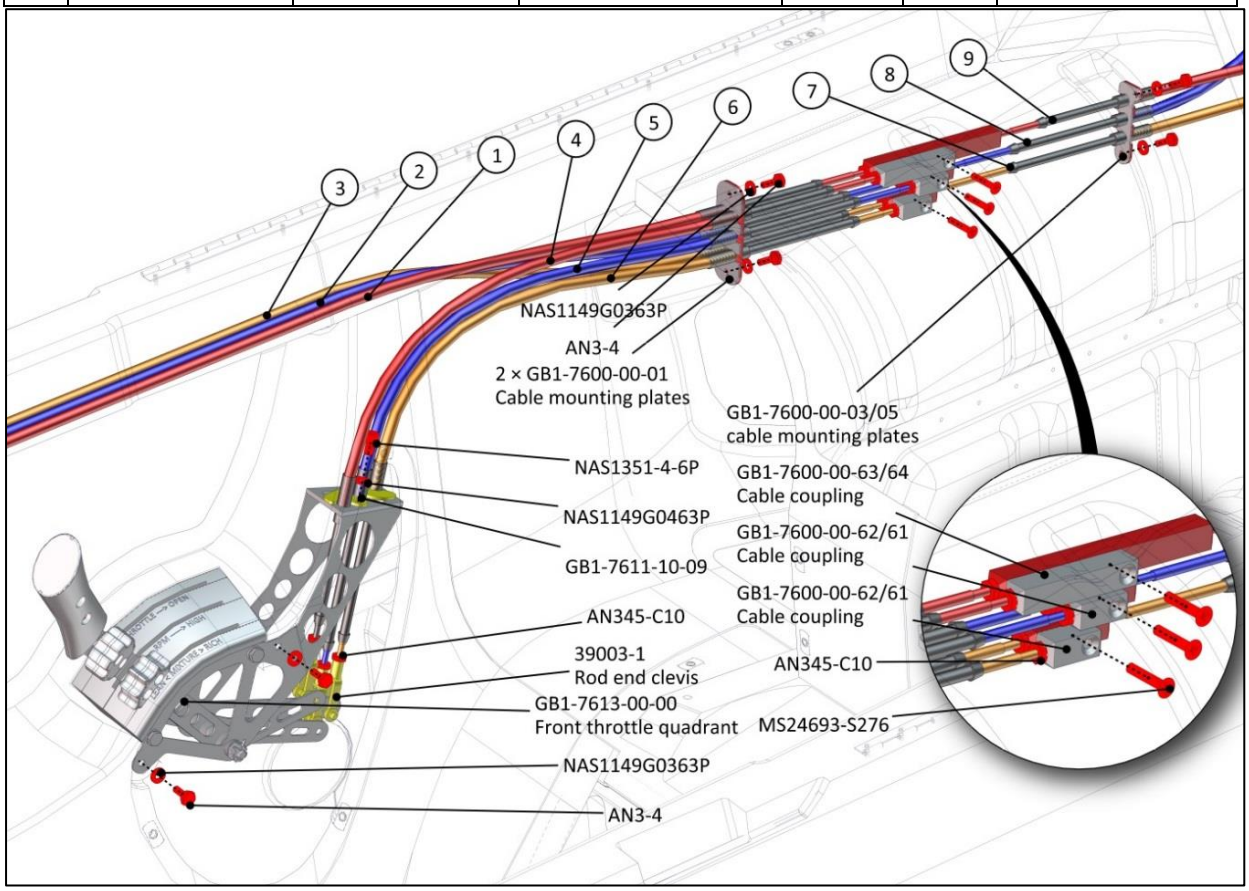


Fig. 73-3

Installation and adjustment:

Fig. 73-4

1. Install Rod End Bearings on one end of cables 1 to 6 as shown to the right.
2. Connect cables 1, 2 and 3 to aft throttle quadrant
3. Maneuver cables and throttle quadrant in place
4. Secure aft throttle quadrant as shown
5. Connect cables 4, 5 and 6 to front throttle quadrant
6. Maneuver cables and throttle quadrant in place
7. Secure front throttle quadrant as shown on Fig. 73-2
8. Install cable couplings and jam nuts on threaded ends of cable 1, 2 and 3; count 6 turns, threaded connecting holes in couplings oriented horizontally
9. Move all levers on both throttle quadrants 2mm (1/16”) from forward stop
10. Install cable couplings on threaded ends of cable 4, 5 and 6, adjust until connecting holes align with couplings for aft throttle quadrant
11. If necessary, adjust that front and rear levers reach front and rear stops in both quadrants at the same time
12. Connect couplings as shown on Fig. 73-3
13. Install cables 7, 8 and 9 into firewall
14. Install forward retention of cable 7 as shown on Fig. 73-5 below
15. Install forward retention of cable 8 as shown on Fig. 73-6 below
16. Install forward retention of cable 9 as shown on Fig. 73-7 below
17. Connect to respective couplings as shown on Fig. 73-3
18. Install rod end bearings on front end of cables 7, 8 and 9
19. Adjust and connect throttle as shown on Fig. 73-5
20. Adjust and connect propeller as shown on Fig. 73-6
21. Adjust and connect mixture as shown on Fig. 73-7
22. Function check:
    a. Move throttle to idle stop. Lever on fuel servo must hit stop while both throttle levers must have no less than 2mm travel to aft stop in each quadrant.
    b. Move throttle to forward stop. Lever on fuel servo must hit stop while both throttle levers must have no less than 2mm travel to forward stop in each quadrant.
    c. Move prop lever to low RPM. Lever on prop governor must hit stop while both throttle levers must have no less than 2mm travel to aft stop in each quadrant.
    d. Move prop lever to high RPM. Lever on prop governor must hit stop while both throttle levers must have no less than 2mm travel to forward stop in each quadrant.
    e. Move mixture to cut-off. Lever on fuel servo must hit stop while both throttle levers must have no less than 2mm travel to aft stop in each quadrant.
    f. Move mixture to full rich. Lever on fuel servo must hit stop while both throttle levers must have no less than 2mm travel to forward stop in each quadrant.

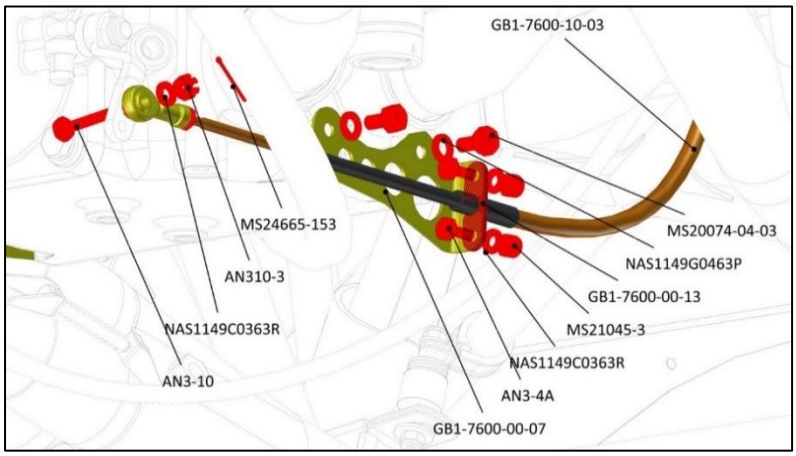


Fig. 73-5 Throttle Control Cable, sleeve retention bracket and connection to Fuel Servo

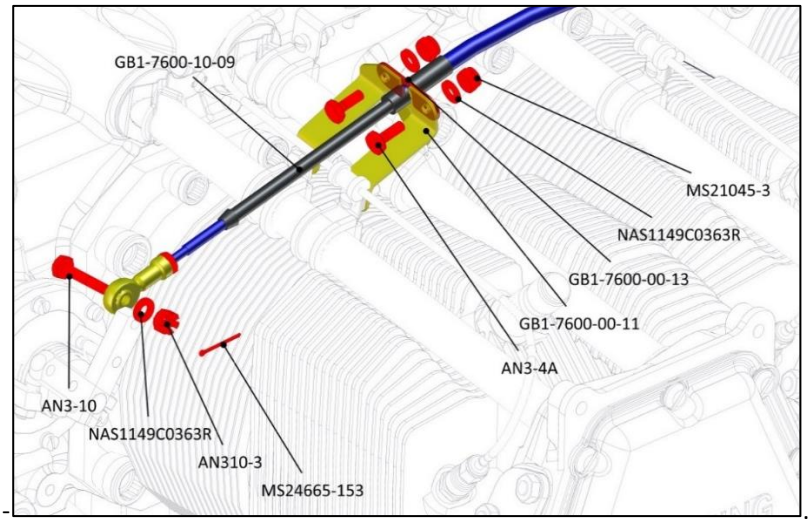


Fig 73-6 Propeller Control Cable, sleeve retention bracket and connection to Governor

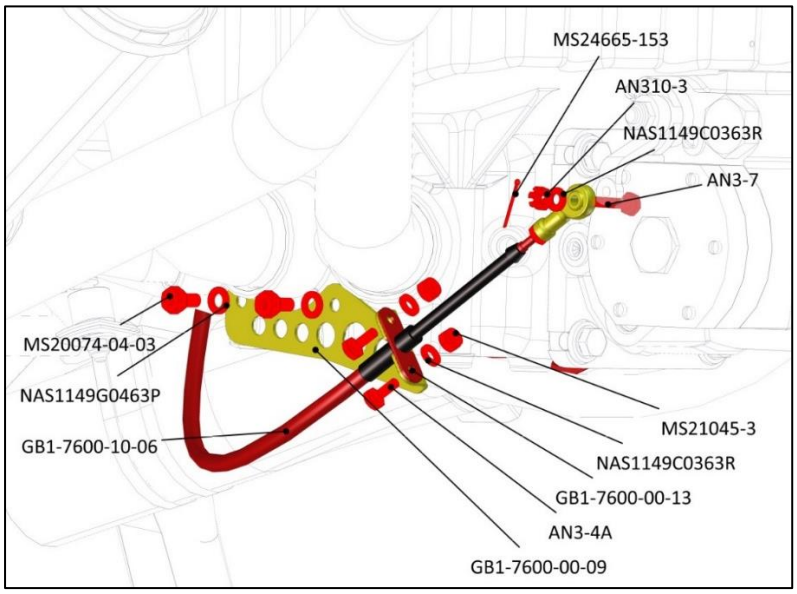


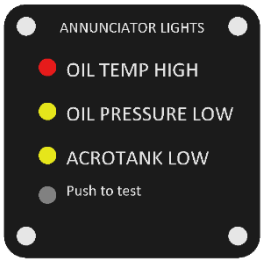
Fig. 73-7 Mixture Control Cable, sleeve retention bracket and connection to Fuel Servo

77 Engine Indicating System

77-01 Engine Monitor

For details of engine monitoring functions and components included in the Garmin G3x Touch System, refer to section 40.

77-02 Annunciator Lights Panel



Location: Rear instrument panel, above altimeter

Manufacturer: Game Composites
3201 SW I Street, Bentonville, AR 72712 USA
www.gamecomposites.com

The unit does not require regular maintenance.
If defective, the unit must be replaced.

To service the Annunciator Lights Panel:

1 Remove GPS antenna cover
2 Disconnect electrical connection
3 Unscrew faceplate, remove faceplate and unit in the back from airplane
4 Service or replace as required
5 To reinstall, reverse steps 1 – 3
6 To check, follow troubleshooting instructions below
7 Sign for correct installation

Signature

Troubleshooting Guide:

- To check functions of the LEDs, press test button on Panel.
- Check for loose connections, cable chafing, and power input to the unit
- Measure resistance in cables

Oil Temp high:

Red LED, triggered when the oil temperature reaches the upper limit, 245°F.
A separate oil temperature sensor (JEGS 41326), mounted in the branch port of a T-fitting on the upstream port of the oil cooler, is used to provide the signal. To check for correct function:

- Dip the uninstalled sensor in oil, and heat up the oil
- If the light does not illuminate at 245°F, replace the sensor

Oil Press low:

Yellow LED, triggered when the oil pressure reaches the upper end of the lower caution range, 55psi or below.
The installed oil pressure sensor is used to provide the signal. To check for correct function:

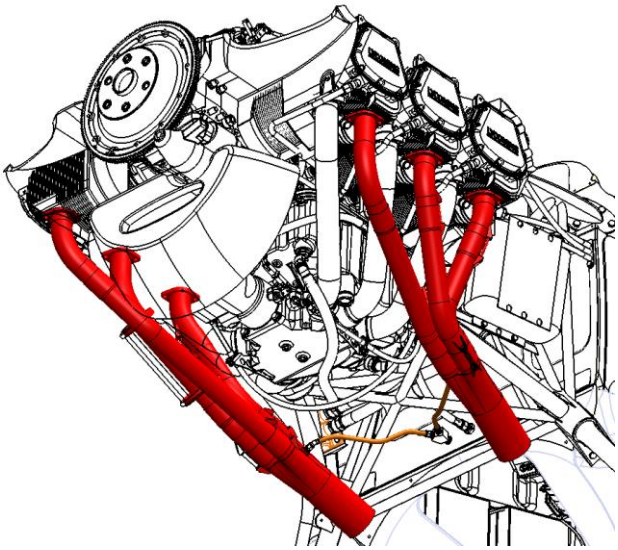
- Manually spin propeller (with spark plugs removed) until oil pressure on MFD1 shows 55psi.
- Oil press caution light should extinguish
- If not, the unit may be faulty; contact Game Composites

Acrotank low:

Yellow LED, triggered when the fuel quantity in the Acrotank reaches 7 Gallons (legal VFR reserve) or less.
The installed capacitive fuel sender is used to provide the signal. To check for correct function:

- Drain Acrotank fuel.
- Caution light should illuminate at or below 7 gal remaining
- If not, the unit may be faulty; contact Game Composites

78 Exhaust



Location: Engine

Type: 3 into 1 unit, each side

Manufacturer: Skydynamics Corp.
1900 Skyway Drive,
Moneta, VA 24121, USA
www.skydynamics.com

The unit does not require regular maintenance.

To service the exhaust:

1. Remove cowling, refer to section 71-02
2. Uninstall EGT sensors
3. Disconnect Smoke Hoses
4. Remove nuts from cylinder flange
5. Remove exhaust from airplane
6. Get service conducted by approved maintenance facility as required
7. To reinstall, reverse steps 1 – 5
   Use new gaskets under cylinder flanges, TXN 77611-L

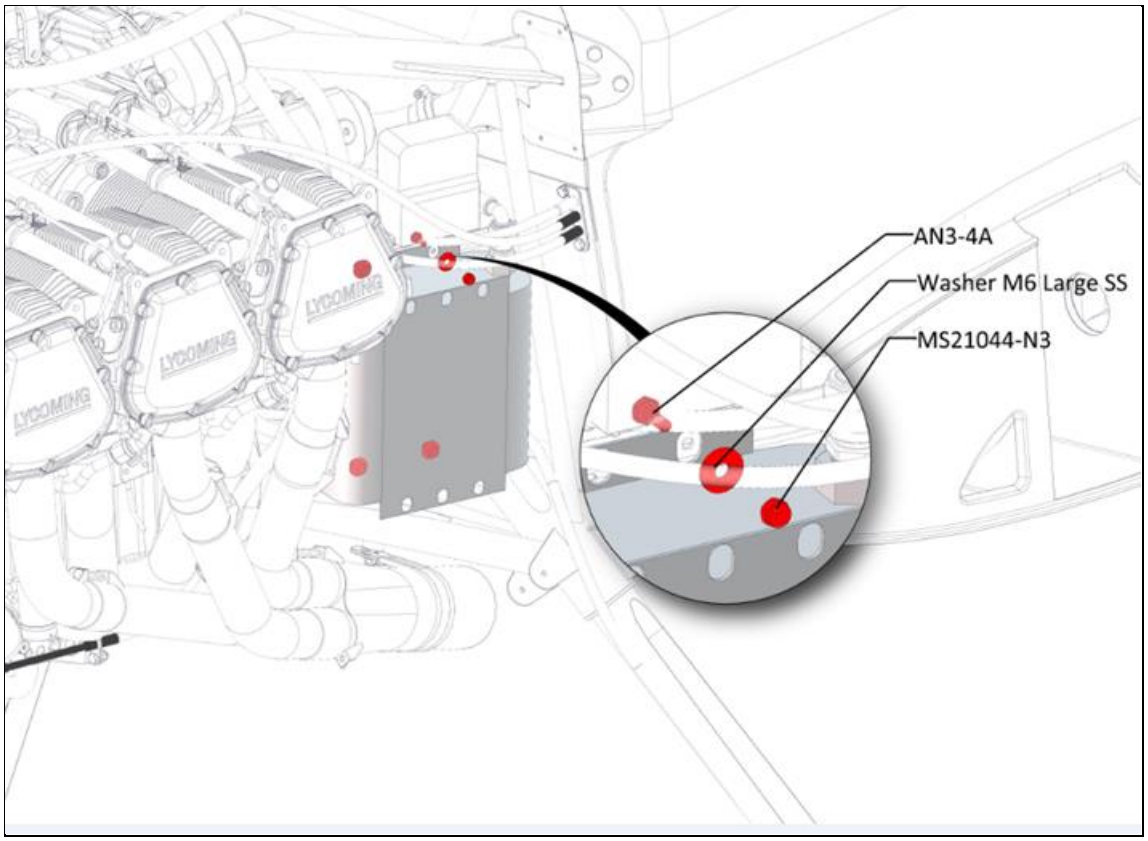
CAUTION: **Leave 1-2 threads for play when assembling the spring retainers. Do not tighten, might cause cracks!**

8. Conduct ground run in accordance with AFM section 4.4, 4.6, 4.11
9. Check for correct installation

Signature

79 Engine Oil System

79-01 Oil Cooler



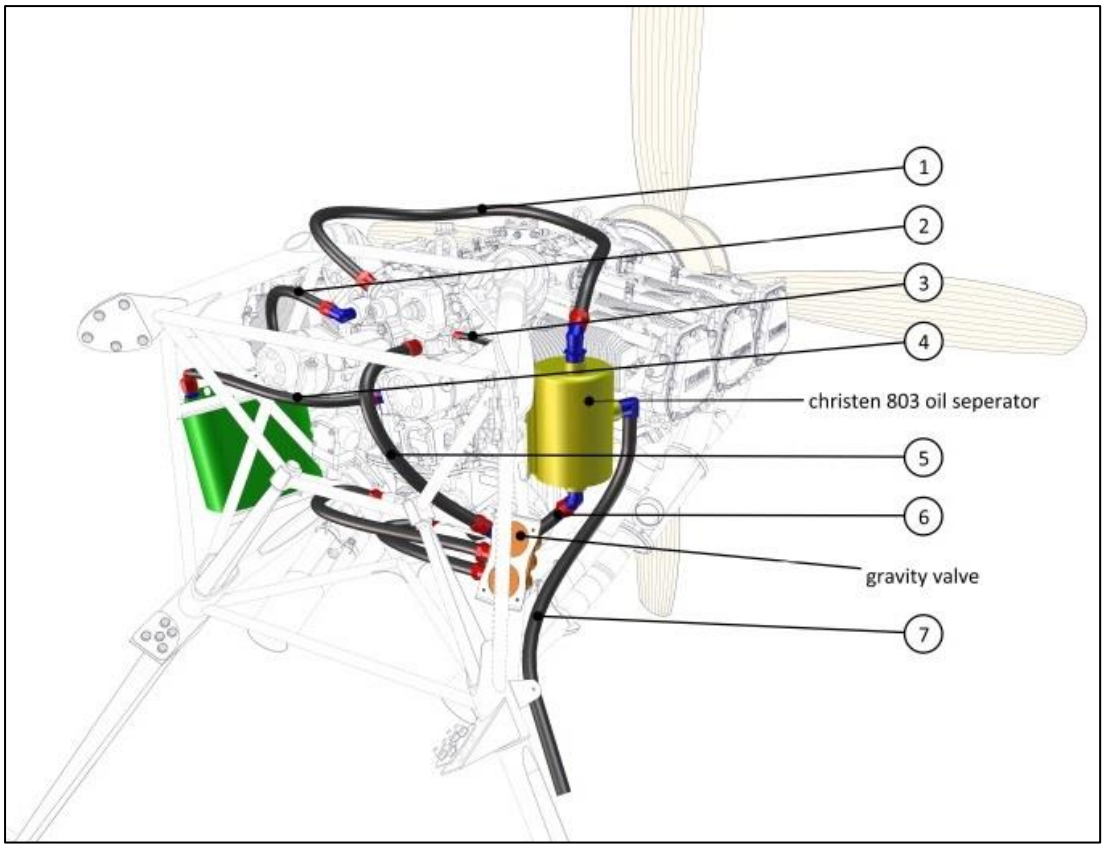
Type	AS2008X
Manufacturer:	Airflow Systems Zona Gale Rd & Bluff Dr W, CA 92024, USA www.airflow-systems.com

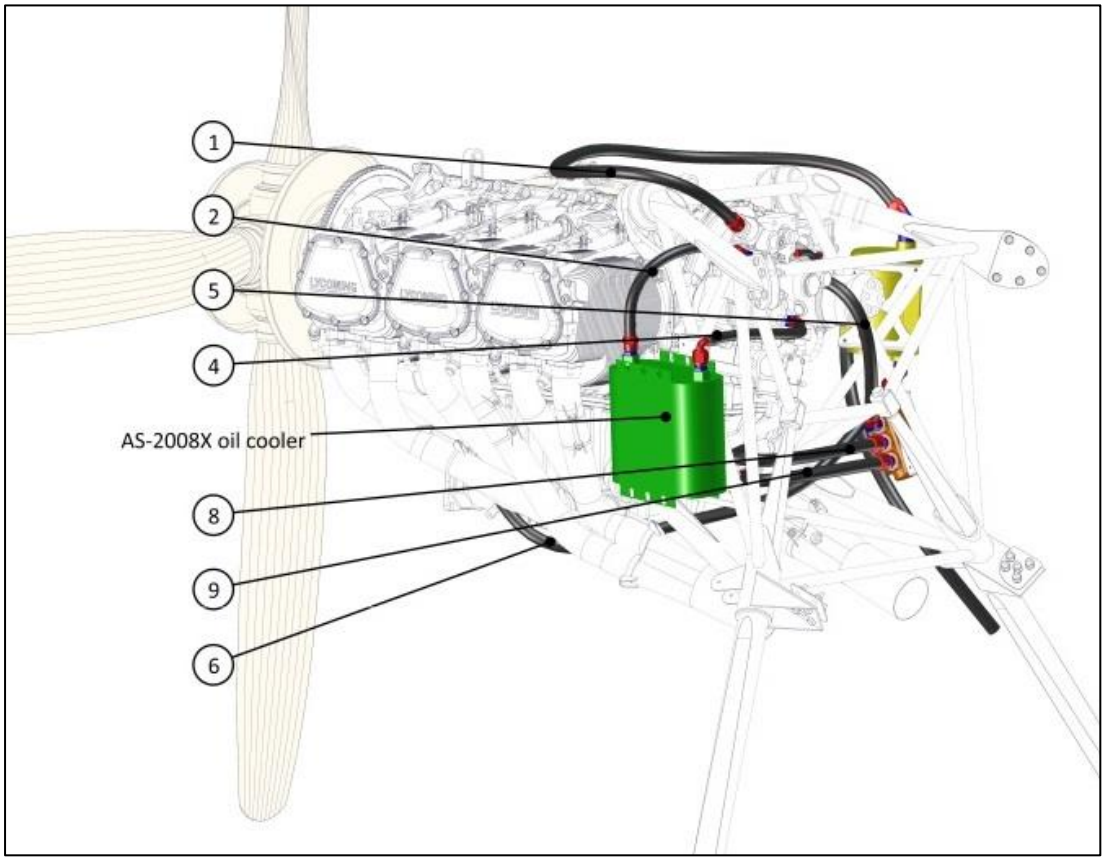
The unit does not require regular maintenance. If defective, the unit must be replaced.

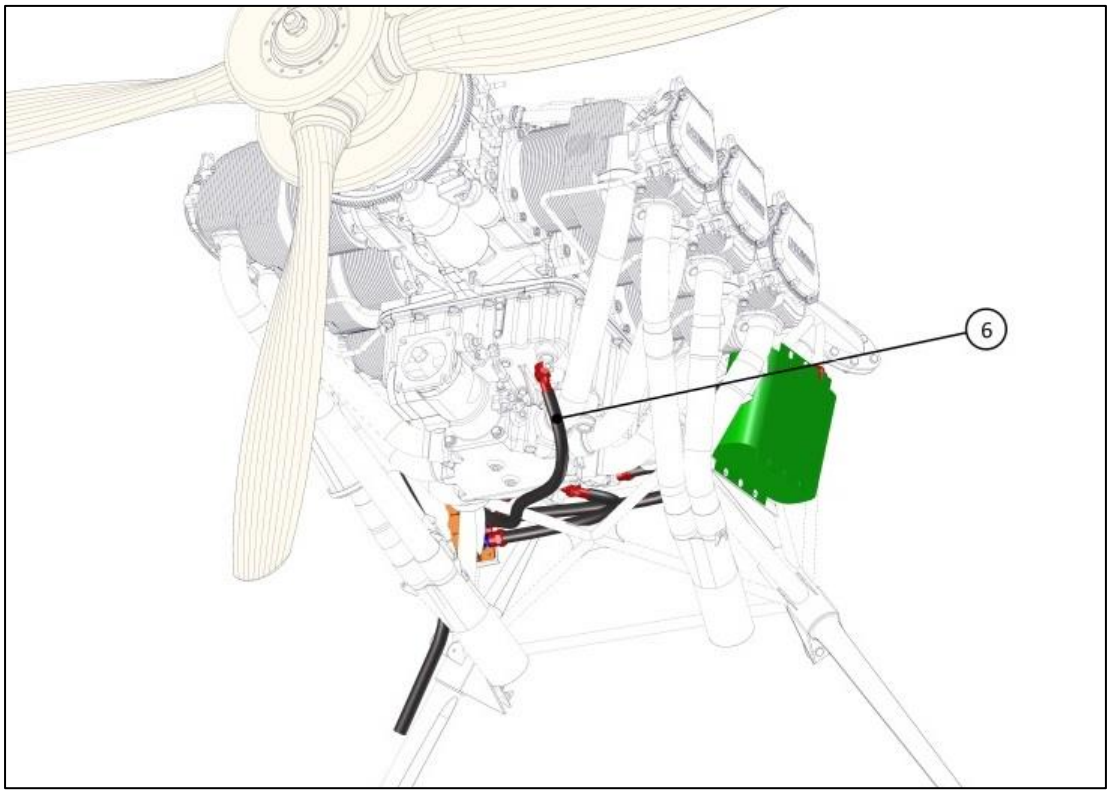
1. Remove the left cowling, refer to section 71-02
2. Disconnect the two hoses from the cooler, be prepared to catch spilt oil
3. Remove the four screws and nuts which attach the cooler to the engine mount
4. Remove cooler
5. Clean, inspect for cracks or deformations. Flush out if blockage / flow restriction is suspected.
6. To reinstall, maneuver cooler in place
7. Reinstall fasteners
8. Reconnect oil hoses
9. Conduct ground run in accordance with AFM section 4.4, 4.6, 4.11
10. Visually check for leaks
11. Sign for correct installation
12. Reinstall cowling, refer to section 71-02

Signature

79-02 Oil Lines







No.	GC Part No.	Type	Mfr. No.	Fitting 1	Fitting 2	Angle (deg.)	Length (mm)
1	GB1-7913-05-00	Stratoflex 101-10	101001-10CR-0462	413524-10-10CR	413524-10-10CR	N/A	1175
2	GB1-7913-07-00	Stratoflex 101-8	101001-8CR-0123	413524-8-8CR	413524-8-8CR	N/A	314
3	GB1-7923-21-00	Stratoflex 101-3	101001-3CR-0041	413524-3-3CR	413524-3-3CR	N/A	105
4	GB1-7923-06-00	Stratoflex 101-8	101005-8CR-0143	413524-8-8CR	413524-8-8CR	N/A	364
5	GB1-7923-03-00	Stratoflex 101-10	101001-10CR-0166	413524-10-10CR	413524-10-10CR	N/A	426
6	GB1-7923-04-00	Stratoflex 101-10	101003-10CR-0325	413524-10-10CR	413516-10-10CR	N/A	828
7	GB1-7913-00-70	MIL6000D Hose ¾”ID × 1 1/8” OD	N/A	N/A	N/A	N/A	500
8	GB1-7913-20-00	Stratoflex 101-10	101001-10CR-0220	413524-10-10CR	413524-10-10CR	N/A	558
9	GB1-7913-01-00	Stratoflex 101-10	101003-10CR-0230	413524-10-10CR	413516-10-10CR	N/A	584

79-03 Christen Inverted Oil System

Type: Christen 802 Gravity Valve
Christen 803 Oil Separator

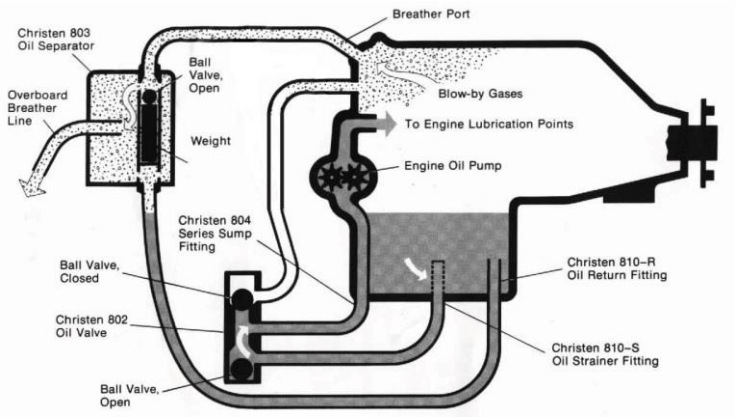
Manufacturer: Aviat Aircraft, Inc.
672 S. Washington Afton, WY 83110, USA
www.aviataircraft.com

The parts are supplied with the engine by the engine manufacturer Lycoming.
Spare parts can be obtained via Game Composites, Lycoming or Aviat.

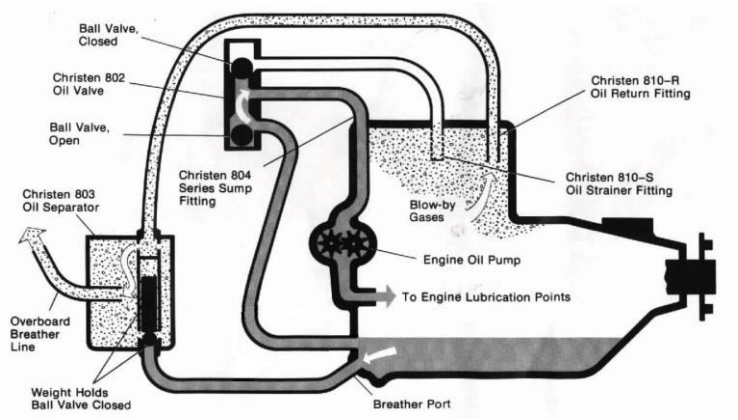
The units do not require regular maintenance. If defective, the units must be replaced.

System Description

The Christen inverted oil system is gravity operated and works for all flight attitudes.



During normal flight, the weighted ball valve at the top of the Christen 803 Oil Separator is open, allowing blow-by gases from the engine crankcase to be vented from the breather port to the top of the Oil Separator, and out through the overboard breather line. The top ball valve of the Christen 802 Gravity Valve is closed, and the bottom valve is open. This permits oil to flow from the sump out to the oil pump and engine lubrication points.



When the aircraft is inverted or during negative-g maneuvers, engine oil falls to the top of the engine crankcase. The weighted ball valve in the Oil Separator closes, preventing overboard loss of oil through the top of the Oil Separator. Blow-by gases from the engine crankcase are vented from the sump to the bottom of the Oil Separator and through the overboard breather line. The top ball valve of the Gravity Valve is open, and the bottom valve is closed, allowing oil to flow out from the breather port to the Gravity Valve, through the sump fitting to the oil pump and engine lubrication points. Oil which fails to return to the sump during transition between normal and inverted flight drains into the Oil Separator. This oil then returns to the sump from the bottom of the Oil Separator during periods of normal flight, therefore the oil loss is reduced to a minimum.

Troubleshooting

If: oil pressure starts to drop / flicker during aerobatics earlier than usual
- or oil pressure is lost when changing attitude and rebuilds slowly
- or oil consumption during aerobatic increases,

it is recommended to clean/flush the system components.
Thickened oil residue, flat spots on the balls and nicks / corrosion in the component surfaces may cause any or all of those symptoms.

NOTE: **Condition of the system does not affect normal operation.**
Malfunctions will only appear during aerobatics.
The result of a maintenance process can only be checked during aerobatic flight.

To check or maintain components

1. Remove cowling, refer to section 71-02
2. Remove hoses, prepare to catch oil spillage
3. Remove components
4. Flush all components and hoses with Avgas
5. Check for nicks, flat spots, surface deterioration or corrosion. When surface imperfections cannot be polished out, the component should be replaced
6. Reinstall components
7. Reconnect hoses
8. Check for correct assembly
9. Conduct ground run in accordance with AFM sections 4.4, 4.6, 4.11
10. Visually check for leaks
11. Reinstall cowling, refer to section 71-02

Signature

Gravity Valve Service

Service the gravity valve as follows:

1. Remove cowling, refer to section 71-02
2. Remove hoses, prepare to catch oil spillage
3. Remove components
4. Open gravity valve by removing one of both circlips
5. Remove steel balls
6. Flush all components and hoses with Avgas
7. If corrosion or nicks are detected, use 1000 – 1500 grit sandpaper to smoothen surface
8. Reassembly gravity valve, put circlips in place
9. Reinstall components
10. Reconnect hoses
11. Conduct ground run in accordance with AFM sections 4.4, 4.6, 4.11
12. Visually check for leaks
13. Reinstall cowling, refer to section 71-02

Signature

85 Smoke System

85-01 Description

The smoke system consists of two glass fiber tanks in each wing with collapsible silicone bladders inside (36 liters /7.4-gal total capacity), an electrical pump is located in a compartment under the right front leg support. Oil lines from each tank route into a T-fitting under the front seat, from there one line to the pump, from there via a bulkhead fitting through the firewall into the exhaust collectors.

To fill the system, a T-fitting and a check valve are installed between the pump and the firewall bulkhead fitting. An oil line routes from the T-fitting to a pneumatic connector, installed in the bottom of the fuselage, accessible from underneath the plane, just aft of the right landing gear leg.

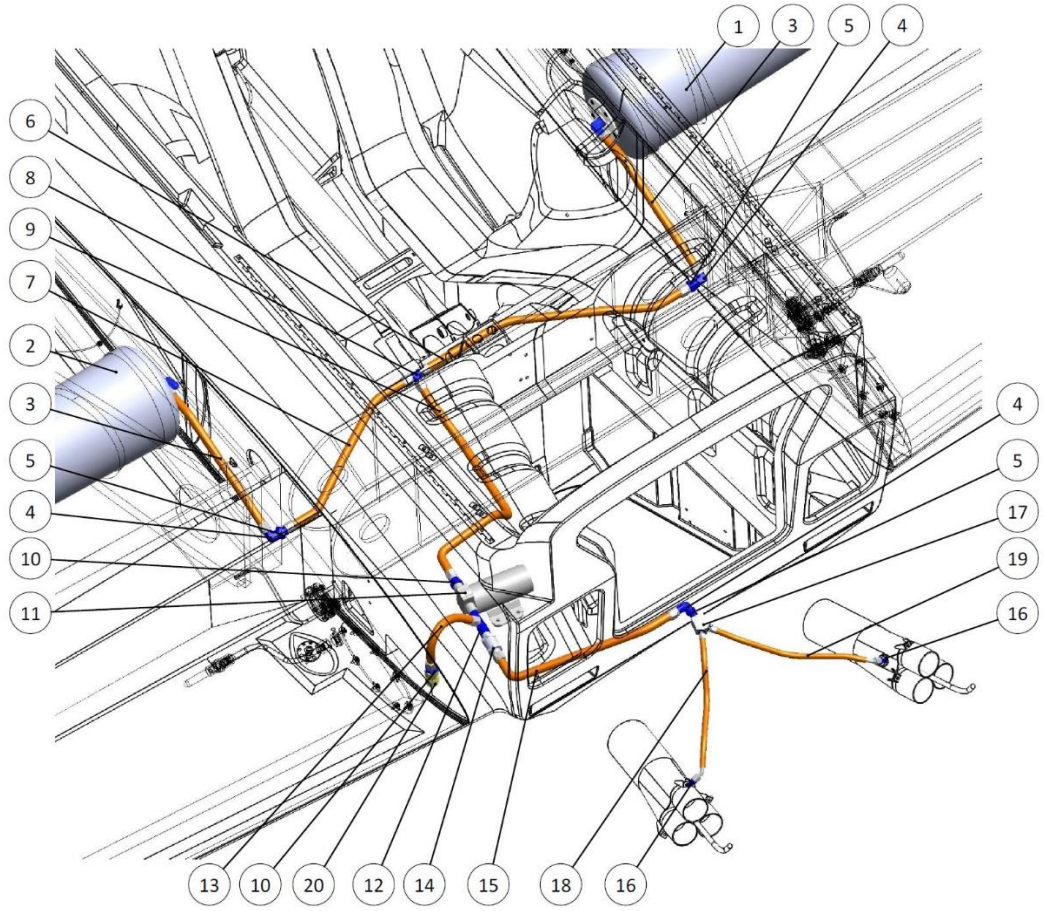
The Circuit Breaker Switch marked “SMOKE REFILL” reverses the polarity of the pump to fill or use the system. The rocker switch on the throttle activates the pump.
The system can be deactivated by pulling the Button Circuit Breaker marked “SMOKE”.

Troubleshooting

Pump not working	Check wiring and electrical connections
	Uninstall and bench-test pump, replace if necessary
	Check relay, replace if required
	Check CB switch and switch on throttle, replace if required
System does not fill to full capacity	Air trapped in system, run dry until pump slows down audibly, indicating empty bladders
Smoke oil leaking out of wing drains	Check bladders, replace if leaking
Smoke oil leaking during refill	Clean / replace check valve
Smoke oil leaks	Check hoses and connections, replace damaged components
Smoke oil leaking out of filler connector	Check filler connector, replace if required

85-02 Smoke Oil Specification and Handling

- Only paraffin-based oil is approved for use in the smoke system.
- This oil is not considered an environmental hazard under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), neither is it classified as dangerous under either 67/548/EEC (Dangerous Substances Directive) or 1999/45/EC (classification, packaging and labelling of dangerous preparations).
- In the event of eye contact, flush with water. If persistent irritation occurs, obtain medical attention.
- Prolonged or repeated skin contact may cause skin irritation. Wash with water and soap.
- Flash point 200°C (390°F)
- Auto-ignition point >320°C (600°F)



	Game P/N	Description	Manufacturer P/N
1	GB1-8511-11-00	Bladder Assy LH	-
2	GB1-8512-11-00	Bladder Assy RH	-
3	GB1-8513-17-00	Smoke Hose, Wing to Fuselage	3175001-6CR-0156
4	-	Bulkhead, Elbow, 3/8" Tube, 9/16UNF	AN833-6D
5	-	Nut, 9/16-18 UNF	AN924-6D
6	GB1-8513-15-00	Smoke Hose, Left Root Rib to Tee	3175001-6CR-0212
7	GB1-8513-16-00	Smoke Hose, Right Root Rib to Tee	3175001-6CR-0164
8	-	Tee, 3/8" Tube, 9/16UNF Thread	AN824-6D
9	GB1-8513-11-00	Smoke Hose, Spar to Pump	3175001-6CR-0247
10	-	Union, 3/8 Tube, 9/16UNF, 1/4NPT	AN816-6D
11	-	Smoke pump, Marco UP2-P 12 Volt	16420212
12	-	AN Male to Male to swivel Female T	926106
13	GB1-8513-18-00	Smoke Hose, Pump to Refill	3175001-6CR-0066
14	-	Check Valve, 3/8" Hose Tails	CK375-NM
15	GB1-8513-03-00	Smoke Hose, Check Valve to Firewall	3175001-6CR-0110
16	-	Union, Tube OD 3/16, UN 3/8, NPT 1/8	AN816-3D
17	GB1-8513-10-15	Y Fit, AN6, 2 AN3	-
18	GB1-8513-02-00	Smoke Hose, Firewall to Nozzle RH	3175001-6CR-0130
19	GB1-8513-01-00	Smoke Hose, Firewall to Nozzle LH	3175001-6CR-0130
20	-	Coupling with Female thread NW 7-2	L-K17-1_4-MS

85-03 Smoke Pump

Location: Compartment under the right front leg support

Type: Marco UP2-P, P/N 164 202 12

Manufacturer: MARCO s.p.a.Via Mameli, 10, 25014 Castenedolo, Brescia, Italy
www.marco.it

The unit does not require regular maintenance. If defective, the unit must be replaced.

To service the smoke pump:

1 Drain the system as described above
2 Remove left front leg support, refer to section 32-03
3 Disconnect oil lines
4 Disconnect electrical connection
5 Remove fasteners
6 Remove pump from airplane
7 Replace as required
8 To reinstall, reverse steps 1 – 6
9 Conduct function test:
   a. SMOKE CB pushed IN
   b. SMOKE REFILL switch ON
   c. Battery Master ON
   d. SMOKE switch on throttle ON
   e. check for smoke oil pouring out if the exhaust
   f. All switches OFF

Signature

NOTE: The pump is self-priming, no bleeding is required

85-04 Smoke Pump Relay

Location: Compartment under the right front leg support

Type: RM 8 05012

Manufacturer: TE Connectivity Ltd.
Rheinstrasse 20, Ch-8200 Schaffhausen, Switzerland
www.te.com

The unit does not require regular maintenance. If defective, the unit must be replaced.

To access the Smoke Pump Relay:

1. Remove the right-hand foot rest panel
2. Disconnect leads
3. Remove fasteners
4. Remove Master Relay from airplane
5. Replace Master Relay as required
6. Reinstall reversing steps 1 – 3
7. Conduct function test:
   a. SMOKE CB pushed IN
   b. SMOKE REFILL switch ON
   c. Battery Master ON
   d. SMOKE switch on throttle ON
   e. Listen for relay clicking, and pump running
   f. All switches OFF

Signature

85-05 Check Valve

Location: Compartment under the right front leg support
Type: ACS Free Flow One-Way Check Valve
Manufacturer: ACS Products
1585 Copper Drive, Lake Havasu, AZ 86403, USA
http://acsproducts.co

The unit does not require regular maintenance. If defective, the unit must be replaced.
If smoke oil is dripping out of the exhaust during refill, conduct service on check valve.
To service the Check Valve:

1 Drain the system as described above
2 Remove right front leg support
3 Disconnect oil lines
4 Remove Check Valve from airplane
5 Replace as required
6 To reinstall, reverse steps 1 – 5

Conduct refill procedure, refer to For troubleshooting information see section 24-11.

7 Filling, below
check for smoke oil is dripping out of the exhaust during refill

Signature

85-06 Refill Hose

Hose: 9 mm (3/8 inch) ID PVC / flexible plastic hose, length as required
End fitting: Timmer L-ST7-9-MS

85-07 Smoke System Operation

For troubleshooting information see section 24-11.

Filling

1. Click the fitting into the push connector in the fuselage and immerse the other end of the hose in the container of new oil
2. Ensure the button Smoke Circuit Breaker is pushed in.
3. Set the switch-CIRCUIT BREAKER marked Smoke Refill to ON
4. Move the smoke switch on the throttle to ON, the pump will draw oil into the two tanks until full.
5. Move the smoke switch on the throttle to OFF
6. Set the switch-CIRCUIT BREAKER marked Smoke Refill to OFF
7. Remove the hose

Draining

1. Place container(s) with a total capacity of at least 38 liters to catch oil from both exhausts
2. Master Switch ON
3. Circuit Breaker “Smoke” pushed in
4. Throttle lever rocker switch “Smoke” until oil stops flowing = system empty
5. Smoke off at throttle switch
6. Battery Master OFF

System Testing, return to service

1. Conduct ground run in accordance with AFM sections 4.4, 4.6
2. With no less than 1300°F EGT and 1700 RPM, switch on smoke system
3. Observe smoke emission
4. Smoke switch OFF
5. Shut engine down in accordance with AFM sections 4.11
6. Visually check for leaks

Signature