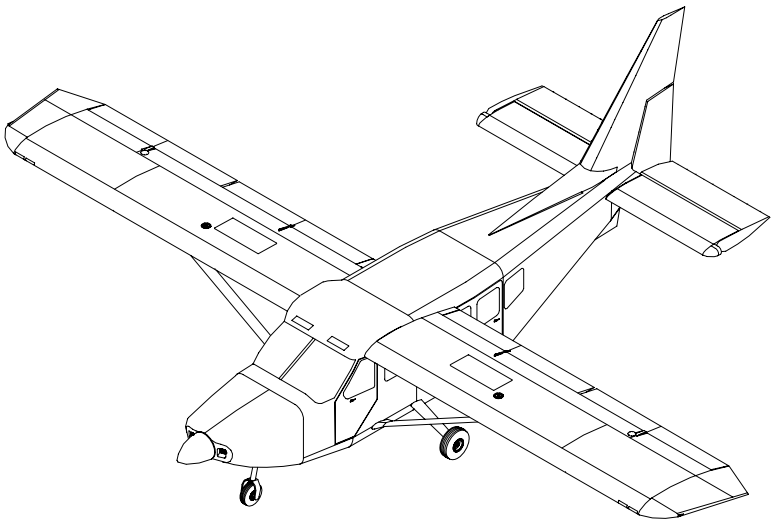
Gippsland Aeronautics



Model GA8

SERVICE MANUAL

CASA Approval has been obtained on technical data
that affects the aircraft type design

This Service Manual is applicable to GA8 serial numbers GA8-03-026 and subsequent, and GA8 serial numbers GA8-00-004 thru GA8-03-025 modified by Gippsland Aeronautics Service Bulletin SB-GA8-2003-04.

Manufacturer: Gippsland Aeronautics Pty Ltd
PO Box 881
Morwell Victoria 3840
Australia

Phone: +61 3 51721200
Facsimile: +61 3 51721201
Website: www.gippsaero.com

P/N: C01-00-03

This page intentionally left blank

AMENDMENT RECORD SHEET

Amendment Date	Affected Sections	Affected Pages	Date Inserted	Signature
14 Mar 2003	All	All	14 Mar 2003	Incorporated by Gippsland Aeronautics
15 Sep 2003	Intro, 4, 5, 20, 24, 34, 51, 53, 74	Various	15 Sep 2003	Incorporated by Gippsland Aeronautics
31 May 2005	Intro,5, 6, 24, 24, 25, 27, 28, 31, 32, 33, 37, 57, 79, 80	Various	31 May 2005	Incorporated by Gippsland Aeronautics
17 May 2006	Intro, 12, 24, 25, 27, 61, 76, 77	Various	17 May 2006	Incorporated by Gippsland Aeronautics
1 Oct 2006	Intro, 5	Intro-3, 5-1, 5-3, 5-5, 5-18	1 Oct 2006	Incorporated by Gippsland Aeronautics
2 May 2007	Intro, 5, 28	Intro-3, Intro-4, 5-1, 5-5, 28-13, 28-14, 28-15, 28-16	2 May 2007	Incorporated by Gippsland Aeronautics

This page intentionally left blank

LOG OF EFFECTIVE PAGES

Page	Date	Page	Date	Page	Date
Intro 1	14 Mar 2003	10-1	14 Mar 2003	24-15	15 Sep 2003
Intro 2	14 Mar 2003	10-2	14 Mar 2003	24-16	14 Mar 2003
Intro 3	1 Oct 2006	10-3	14 Mar 2003	24-17	15 Sep 2003
Intro 4	17 May 2006	10-4	14 Mar 2003	24-18	14 Mar 2003
Intro 5	15 Sep 2003			24-19	14 Mar 2003
Intro 6	14 Mar 2003	11-1	14 Mar 2003	24-20	14 Mar 2003
Intro 7	14 Mar 2003	11-2	15 Sep 2003	24-21	31 May 2005
Intro 8	14 Mar 2003	11-3	14 Mar 2003	24-22	14 Mar 2003
		11-4	14 Mar 2003	24-23	17 May 2006
4-1	15 Sep 2003			24-24	14 Mar 2003
4-2	15 Sep 2003	12-1	14 Mar 2003	24-25	14 Mar 2003
4-3	15 Sep 2003	12-2	14 Mar 2003	24-26	14 Mar 2003
4-4	15 Sep 2003	12-3	14 Mar 2003	24-27	15 Sep 2003
		12-4	14 Mar 2003	24-28	14 Mar 2003
5-1	2 May 2007	12-5	14 Mar 2003	24-29	14 Mar 2003
5-2	31 May 2005	12-6	14 Mar 2003	24-30	14 Mar 2003
5-3	1 Oct 2006	12-7	14 Mar 2003	24-31	15 Sep 2003
5-4	14 Mar 2003	12-8	14 Mar 2003	24-32	14 Mar 2003
5-5	2 May 2007	12-9	17 May 2006	24-33	14 Mar 2003
5-6	14 Mar 2003	12-10	14 Mar 2003	24-34	14 Mar 2003
5-7	14 Mar 2003	12-11	14 Mar 2003	24-35	31 May 2005
5-8	14 Mar 2003	12-12	14 Mar 2003	24-36	31 May 2005
5-9	31 May 2005			24-37	17 May 2006
5-10	31 May 2005	20-1	14 Mar 2003	24-38	17 May 2006
5-11	14 Mar 2003	20-2	14 Mar 2003		
5-12	14 Mar 2003	20-3	15 Sep 2003	25-1	31 May 2005
5-13	14 Mar 2003	20-4	14 Mar 2003	25-2	17 May 2006
5-14	31 May 2005	20-5	14 Mar 2003	25-3	31 May 2005
5-15	31 May 2005	20-6	14 Mar 2003	25-4	31 May 2005
5-16	31 May 2005			25-5	31 May 2005
5-17	31 May 2005	21-1	14 Mar 2003	25-6	31 May 2005
5-18	1 Oct 2006	21-2	14 Mar 2003	25-7	17 May 2006
				25-8	17 May 2006
6-1	14 Mar 2003	23-1	14 Mar 2003	25-9	31 May 2005
6-2	14 Mar 2003	23-2	14 Mar 2003	25-10	31 May 2005
6-3	14 Mar 2003				
6-4	14 Mar 2003	24-1	31 May 2005	26-1	14 Mar 2003
6-5	31 May 2005	24-2	14 Mar 2003	26-2	14 Mar 2003
6-6	14 Mar 2003	24-3	14 Mar 2003		
		24-4	31 May 2005	27-1	14 Mar 2003
7-1	14 Mar 2003	24-5	14 Mar 2003	27-2	14 Mar 2003
7-2	14 Mar 2003	24-6	14 Mar 2003	27-3	14 Mar 2003
7-3	14 Mar 2003	24-7	14 Mar 2003	27-4	14 Mar 2003
7-4	14 Mar 2003	24-8	14 Mar 2003	27-5	14 Mar 2003
		24-9	31 May 2005	27-6	14 Mar 2003
8-1	14 Mar 2003	24-10	14 Mar 2003	27-7	14 Mar 2003
8-2	14 Mar 2003	24-11	15 Sep 2003	27-8	31 May 2005
		24-12	14 Mar 2003	27-9	14 Mar 2003
9-1	14 Mar 2003	24-13	15 Sep 2003	27-10	31 May 2005
9-2	14 Mar 2003	24-14	14 Mar 2003	27-11	17 May 2006

LOG OF EFFECTIVE PAGES continued

Page	Date	Page	Date	Page	Date
27-12	31 May 2005	33-1	14 Mar 2003	57-3	31 May 2005
27-13	31 May 2005	33-2	31 May 2005	57-4	31 May 2005
27-14	15 Sep 2003	33-3	31 May 2005	57-5	31 May 2005
27-15	31 May 2005	33-4	14 Mar 2003	57-6	31 May 2005
27-16	14 Mar 2003				
27-17	14 Mar 2003	34-1	15 Sep 2003	61-1	14 Mar 2003
27-18	17 May 2006	34-2	15 Sep 2003	61-2	17 May 2006
27-19	14 Mar 2003	34-3	15 Sep 2003		
27-20	14 Mar 2003	34-4	15 Sep 2003	71-1	14 Mar 2003
27-21	14 Mar 2003	34-5	15 Sep 2003	71-2	14 Mar 2003
27-22	14 Mar 2003	34-6	14 Mar 2003	71-3	14 Mar 2003
				71-4	14 Mar 2003
28-1	14 Mar 2003	37-1	14 Mar 2003	71-5	14 Mar 2003
28-2	14 Mar 2003	37-2	14 Mar 2003	71-6	14 Mar 2003
28-3	14 Mar 2003	37-3	14 Mar 2003		
28-4	14 Mar 2003	37-4	31 May 2005	72-1	14 Mar 2003
28-5	14 Mar 2003	37-5	31 May 2005	72-2	14 Mar 2003
28-6	14 Mar 2003	37-6	14 Mar 2003		
28-7	14 Mar 2003			73-1	14 Mar 2003
28-8	14 Mar 2003	51-1	14 Mar 2003	73-2	14 Mar 2003
28-9	14 Mar 2003	51-2	14 Mar 2003		
28-10	14 Mar 2003	51-3	14 Mar 2003	74-1	14 Mar 2003
28-11	14 Mar 2003	51-4	14 Mar 2003	74-2	15 Sep 2003
28-12	31 May 2005	51-5	15 Sep 2003	74-3	14 Mar 2003
28-13	2 May 2007	51-6	14 Mar 2003	74-4	14 Mar 2003
28-14	2 May 2007	51-7	15 Sep 2003		
28-15	2 May 2007	51-8	14 Mar 2003	76-1	14 Mar 2003
28-16	2 May 2007	51-9	14 Mar 2003	76-2	17 May 2006
28-17	31 May 2005	51-10	14 Mar 2003	76-3	17 May 2006
28-18	31 May 2005	51-11	14 Mar 2003	76-4	17 May 2006
28-19	31 May 2005	51-12	14 Mar 2003		
28-20	31 May 2005			77-1	14 Mar 2003
28-21	31 May 2005	52-1	14 Mar 2003	77-2	17 May 2006
28-22	31 May 2005	52-2	14 Mar 2003	77-3	17 May 2006
				77-4	14 Mar 2003
		53-1	14 Mar 2003		
		53-2	15 Sep 2003	78-1	14 Mar 2003
31-1	14 Mar 2003			78-2	14 Mar 2003
31-2	14 Mar 2003	55-1	14 Mar 2003	78-3	14 Mar 2003
31-3	14 Mar 2003	55-2	15 Sep 2003	78-4	14 Mar 2003
31-4	14 Mar 2003	55-3	14 Mar 2003		
31-5	31 May 2005	55-4	14 Mar 2003	79-1	14 Mar 2003
31-6	14 Mar 2003			79-2	31 May 2005
		56-1	14 Mar 2003	79-3	14 Mar 2003
32-1	14 Mar 2003	56-2	14 Mar 2003	79-4	14 Mar 2003
32-2	14 Mar 2003	56-3	14 Mar 2003		
32-3	31 May 2005	56-4	14 Mar 2003	80-1	14 Mar 2003
32-4	14 Mar 2003			80-2	31 May 2005
32-5	14 Mar 2003	57-1	31 May 2005	80-3	31 May 2005
32-6	14 Mar 2003	57-2	14 Mar 2003	80-4	14 Mar 2003

INTRODUCTION

This manual contains factory recommended procedures and instructions for ground handling, servicing and maintaining the GA8 aircraft.

The manual has been prepared using the ATA 100 format as a guide. This provides an industry standard layout and subsequent easy identification of chapters. Some ATA 100 requirements have not been complied with as they are considered inappropriate for a manual of this size. In particular the page numbering system differs from the ATA 100 format. In this manual the page numbers are numbered consecutively for a complete chapter rather than the chapter/section/subject called for.

Only applicable ATA 100 chapters and paragraphs are included, hence the apparent gaps in chapter and paragraph numbers.

The manual is not a basic training manual. It is assumed that only properly trained and licensed personnel will be performing maintenance on the aircraft, and that all inspections, maintenance and repairs will be carried out not only in accordance with the procedures specified in this manual, but also in accordance with good aeronautical practice and industry standards.

The information in this manual is based on data available at the time of publication. The latest amendments to this manual will be issued and made available to operators, and therefore it is important that operators keep the factory informed of their current contact details. If there is a change of aircraft ownership, the new owner should advise the factory to ensure that they receive document amendments. If any errors or omissions are found please advise the factory.

In addition to this manual vendor publications are available for many of the vendor items fitted to the aircraft and these should be referred to for the maintenance, overhaul and parts breakdown of these items.

PREAMBLE

Highlighted notes used in this Service Manual such as **WARNING, CAUTION & NOTE** are employed throughout in the following context:

WARNING

Operating procedures, techniques, etc. which if not followed correctly, may result in personal injury or death.

CAUTION

Operating procedures, techniques, etc. which if not strictly observed, may result in damage to the aircraft or to its installed equipment.

NOTE

Operating procedures, techniques, etc. which it is considered essential to highlight.

ALTERATIONS OR REPAIRS

It is essential that the relevant airworthiness authorities are contacted **prior to** any alterations or modifications to the aircraft to ensure that continued airworthiness of the aircraft is not violated. The GA8 is certified under the requirements of Federal Aviation Regulations (FAR) Part 23 as documented by CASA Type Certificate VA503.

Alterations and repairs to the aircraft structure shall be carried out in accordance with the GA8 Service Manual, or in accordance with the FAA publication AC 43.13-1B or subsequent issues. Should any conflict occur between information contained in this Service Manual and AC 43.13-1B, this Service Manual will take precedence.

USE OF METRIC/IMPERIAL UNITS

This Service Manual uses the metric system as the basic system of measurement. Where common usage or available instrumentation refer to the Imperial/US unit system, both units are quoted. The following conversion factors are presented as a ready reference to the conversion factors that have been used in this manual.

1 Pound (lb)	=	0.4536 Kilogram (kg)
1 Pound per sq in (psi)	=	6.895 Kilopascal (kPa)
1 Inch (in)	=	25.4 Millimetres (mm)
1 Foot (ft)	=	0.3048 Metre (m)
1 Statute mile	=	1.609 Kilometres (km)
1 Nautical mile (NM)	=	1.852 Kilometres (km)
1 Millibar (mb)	=	1 Hectopascal (hPa)
1 Millibar (mb)	=	0.1 Kilopascal (kPa)
1 Imperial gallon	=	4.546 Litres (l)
1 US gallon	=	3.785 Litres (l)
1 US quart	=	0.946 Litre (l)
1 Cubic foot (ft^3)	=	28.317 Litres (l)
1 Degree Fahrenheit (°F)	=	[(9/5)°C]+32
1 Inch Pound (in lb)	=	0.113 Newton Metres (Nm)
1 Foot Pound (ft lb)	=	1.356 Newton Metres (Nm)

LIST OF CHAPTERS
(ATA 100)

CHAPTER	TITLE
4	AIRWORTHINESS LIMITATIONS
5	MAINTENANCE SCHEDULES
6	DIMENSIONS AND AREAS
7	LIFTING AND SHORING
8	LEVELLING AND WEIGHING
9	TOWING AND TAXIING
10	PARKING AND MOORING
11	PLACARDS
12	SERVICING
20	STANDARD PRACTICES AIRFRAME
21	ENVIRONMENTAL SYSTEMS
23	COMMUNICATIONS
24	ELECTRICAL POWER
25	EQUIPMENT/FURNISHINGS
26	FIRE PROTECTION
27	FLIGHT CONTROLS
28	FUEL SYSTEM
31	INDICATING/RECORDING SYSTEMS
32	UNDERCARRIAGE
33	LIGHTS
34	NAVIGATION
37	VACUUM
51	STRUCTURES
52	DOORS
53	FUSELAGE
55	STABILISERS
56	WINDOWS
57	WINGS
61	PROPELLER
71	POWERPLANT
72	ENGINE
73	ENGINE FUEL SYSTEM
74	IGNITION
76	ENGINE CONTROLS
77	ENGINE INDICATING
78	EXHAUST
79	OIL
80	STARTING

This page intentionally left blank

CHAPTER 4

AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations specified in this chapter are CASA Approved, and form the conditions of the aircraft type certificate. Aircraft not in compliance with these Limitations do not conform to the type design, and will not be eligible for a standard Certificate of Airworthiness.

CASA Approved:  Date: 15 September 2003

Delegate of the Authority

AIRWORTHINESS LIMITATIONS
LOG OF EFFECTIVE PAGES

Pages	Amendment
4-1	15 Sep 2003
4-2	15 Sep 2003
4-3	15 Sep 2003
4-4	15 Sep 2003

4-00-00 GENERAL

This Airworthiness Limitations Chapter is CASA approved and specifies mandatory inspection, replacement, or overhaul requirements (as appropriate) on specified components of the GA8 aircraft. These limitations have been established in consultation with the Australian Civil Aviation Safety Authority during type certification of the aircraft.

Airworthiness Directives may be issued from time to time that vary the limitations specified in this chapter or alternatively impose limitations on additional components. In this case, the limitations specified in the Airworthiness Directives will take precedence over those given in this chapter.

4-10-00 AIRFRAME LIMITATIONS

The following airframe components/assemblies are time-lifed and must be replaced/overhauled as indicated:

Component	Part Number	Life (hrs)	Requirement
Wing Spar	GA8-571012-11 GA8-571012-12	70802	Replace
Wing Strut	GA8-570026-35	98628	Replace
Wing Strut Pickup Lugs	GA8-571022-105 GA8-571022-106 GA8-571022-107 GA8-571022-108	25058	Replace
Strut Lugs	GA8-570026-27 *(Aircraft Serial No's 00-004 & 01-005 only)*	18979	Replace
Strut Lugs	GA8-570026-29 GA8-570026-31	60330	Replace
Fuselage Lugs	GA8-532021-11 GA8-532021-13 GA8-532021-15 GA8-532021-23 GA8-532023-37 *(Aircraft Serial No's 00-004 & 01-005 only)*	51395	Replace

Component	Part Number	Life (hrs)	Requirement
Fuselage Lugs	GA8-532021-11 GA8-532021-13 GA8-532021-15 GA8-532021-23 GA8-532021-137 GA8-532023-37 GA8-532023-38 GA8-532023-77 GA8-532023-78 *(Aircraft Serial No's 01-006 & up)*	107865	Replace

4-20-00 CONTROL SURFACE MASS AND BALANCE LIMITS

Limits	Aileron		Elevator		Rudder	
Mass	10.5 lbs	4.762 kg	14.9 lbs	6.754 kg	16.75 lbs	7.597 kg
Balance	0.667 lb ft	0.911 Nm	4.1 lb ft	5.601 Nm	2.3 lb ft	3.142 Nm

CHAPTER 5

MAINTENANCE SCHEDULES

5-00-00 GENERAL

Although the applicable regulations in the country of registration of the aircraft may vary the requirements somewhat, the aircraft will normally be required to undergo mandatory annual/100 hour inspection and maintenance performed in accordance with approved maintenance schedules. Subject to acceptance by the National Airworthiness Authority in the country of registration, these periods may be extended by up to 10%. In addition, some components, in particular the propeller, engine and its accessories, will be subject to complete overhaul based on time in service (refer to paragraph **5-10-00**).

> **Gippsland Aeronautics recommends that all Mandatory Inspection and Maintenance Requirements be conducted in accordance with the Gippsland Aeronautics GA8 MAINTENANCE SCHEDULES using the procedures and techniques specified in this GA8 SERVICE MANUAL.**

From time to time other mandatory inspections may be required in the light of in service experience. In this event airworthiness directives relating to the airframe, engine, propeller or other components/equipment as appropriate will be issued. It is the responsibility of the owner/operator to ensure compliance with all applicable airworthiness directives and, when the inspections are repetitive, to take appropriate action to prevent inadvertent non-compliance.

All maintenance carried out must be correctly recorded and certified for in the relevant logbooks and other maintenance documents.

5-00-10 Pilot Preventative Maintenance

There are no unusual features of the GA8 that prevent a suitably licensed pilot from conducting preventative maintenance as allowed by the applicable regulations in the country of registration of the aircraft.

5-10-00 TIME LIMITS

The following components are time-lifed. Gippsland Aeronautics recommends that they be replaced/overhauled as indicated:

Component	Life	Requirement
Engine	In accordance with Engine Manufacturer's requirements	Overhaul or Replace
Vacuum Pump	In accordance with the Pump manufacturer's recommendation, otherwise 500 hours time in service	Overhaul or Replace
Magnetos, starter motor, alternator, engine driven fuel pump, fuel metering system.	Same as Basic Engine	Overhaul or Replace
Propeller	In accordance with Propeller Manufacturer's requirements	Overhaul or Replace
Propeller governor	In accordance with propeller governor manufacturer's requirements.	Overhaul or replace.
Fuel and oil flexible hoses forward of firewall	5 years; or a time in service no greater than the engine overhaul/replacement hours, whichever occurs first.	Replace

No components other than those listed above are subject to specific replacement or overhaul periods, but should be maintained on an "on condition" basis. Airworthiness Directives may be issued from time to time that vary the above lives or alternatively impose lives on additional components. In this case the requirements/lives specified in the Airworthiness Directives will take precedence over those given above.

5-20-00 SCHEDULED MAINTENANCE CHECKS

Unless specifically approved otherwise by the appropriate airworthiness authorities, the replacement or overhaul requirements for time-lifed components as listed in paragraph **4-10-00** and **5-10-00** of this Service Manual must be complied with. Additionally any special techniques required by this manual, the component manufacturers service manual or an Airworthiness Directive are to be complied with as appropriate. Where the requirement is optional, compliance is also optional.

The inspections required by these schedules shall be a thorough functional and visual check of the nominated system, component, assembly and/or installation. The inspection should be conducted making extensive use of inspection panels, access doors, detachable fairings and fillets. Adequate lighting is to be used and where necessary inspection aids such as mirrors, torches, work stands etc. Surface cleaning of individual components may also be required. The inspection of the nominated system, component, assembly and/or installation must be adequate to determine continued airworthiness or to establish that repair or replacement is required.

All items are to be inspected for GENERAL CONDITION together with specific requirements where nominated. The term GENERAL CONDITION includes, but is not limited to the following:

- correct operation, full and free movement in the correct sense
- correct rigging, alignment and tension
- appropriate lubrication
- correct fluid quantities or levels
- correct air pressures
- security and cleanliness
- wear is within acceptable limits
- no loose or missing fasteners
- vents are free from obstruction
- correct clearance
- bonding straps correctly positioned, undamaged and secure
- freedom from excessive:
    - leakage
    - corrosion, deterioration of protective treatments
    - cracking and disbonds
    - deformation, wear, scoring, chafing, flat spots and fraying
    - obstruction or other obvious damage, or
    - burning, arcing or heat damage, and
- that hoses are within inspection and testing periods

Unless specifically approved or directed otherwise, the procedures and limits specified in this manual are to be adhered to. It is highly recommended that an engine ground run be performed prior to carrying out the inspection.

5-30-00 MAINTENANCE SCHEDULES

The maintenance schedules required by Gippsland Aeronautics for the Daily Inspection and the scheduled maintenance of the GA8 at each 50 hour and 100 hour/annual inspection, or as otherwise noted, form the remainder of this chapter.

Unless otherwise approved by the applicable national airworthiness authority, all inspections listed in Maintenance Schedules are to be carried out in accordance with the procedures contained in this Service Manual.

DAILY INSPECTION The Daily Inspection is to be carried out prior to the first flight of the day. The inspection is to be conducted in accordance with the pre-flight inspection check list contained in section 4.3.1 of the GA8 Flight Manual.

50 HOURLY MAINTENANCE SCHEDULE

The following is to be completed at 50 hourly intervals between the 100 hour/annual inspection as detailed in the following *GA8 Maintenance Schedules*.

OIL SYSTEM

- drain sump, refit plug and lock-wire, or use quick drain facility, if fitted.
- remove pressure filter, replace with new filter and lock-wire.
- refill sump with recommended grade and quantity of oil.

GA8 MAINTENANCE SCHEDULES *Page 1*

CATEGORY - AIRFRAME

Aircraft Registration: .....

	AME	LAME
REQUIRED PLACARDS External and Internal *Note: Reference should be made to Chapter 11 of the Service Manual and applicable airworthiness directives for required placards.*		
WINGS AND EMPENNAGE - INSPECT • skins for evidence of wrinkles, buckles, sheared or loose rivets, corrosion, disbonding of GRP fairings and general damage. • internally through normal inspection panels for corrosion, disbonds, distortion and damage to spars & internal structures. • lift struts, horizontal stabiliser and fin. • flight control surfaces, flaps, mass balances, hinges and hinge brackets. Check freeplay per **27-10-00, 27-20-00 and 27-30-00.** • wing and empennage to fuselage attachments and surrounding structure for damage, distortion, corrosion, GRP fairing disbonds, cracks and loose or sheared rivets or bolts. • lubricate all flight control system pivot points and hinges as per **12-20-30**.		
FUSELAGE - INSPECT • skins for evidence of wrinkles, buckles, sheered or loose rivets, corrosion, disbonding of GRP fairings and general damage. • areas around cut-outs such as inspection apertures for cracks and the sealing and fit of all doors/windows. • aircraft interior for damage and security of installed equipment. • internal structure. • locks, latches and hinges of doors. • windshields and windows for cleanliness, freedom from crazing, cracking, discolouration and scratches. • seats, attachments, adjustment mechanisms and stops, safety harnesses and buckles. • control columns, rudder pedals, control levers, control system bellcranks, push-pull rods, torque tubes and cables. • operate trim controls through complete range of travel and check for correct trim position indication. • brake master cylinders, lines, reservoirs for leaks and adequate fluid quantity, parking brake cable and brake system operating mechanisms.		

GA8 MAINTENANCE SCHEDULES ***Page 2***

CATEGORY - AIRFRAME

Aircraft Registration: .....

	AME	LAME
• cabin fire extinguisher for correct charge, legibility of operating instructions and condition of locking pin or seal; ensure that extinguisher has not reached expiry date. • fresh air system ducting and outlets, airflow control valves. • emergency and flotation equipment (if carried), ensure that equipment has not reached expiry date. • lubricate as per **12-20-30**.		
LANDING GEAR - INSPECT • jack aircraft so that landing gear is clear of the ground. • undercarriage attachment to airframe structural members. • nose wheel for security and condition. • main and nose wheel tyres. • clean wheel bearings and inspect for condition, re-lubricate, re-install and adjust pre-load per **32-40-00.** • brake pads and discs. • brake lines and flexible hoses.		
FUEL SYSTEM - INSPECT • fuel tanks, lines, drains, vents, placards, filler caps/seals. • emergency shut-off valve system for correct operation.		
AIR CONDITIONING – INSPECT (IF INSTALLED) • air conditioning (if installed) evaporator, condenser and compressor, ducting, pipelines and units. • cabin heating and defrost.		
POST INSPECTION CHECK On completion of the inspection, check to ensure that no tooling, maintenance equipment or rags have been left in the aircraft and all panels, access doors, detachable fairings and fillets have been correctly secured.		
CERTIFICATION: I hereby certify that all maintenance in AIRFRAME CATEGORY has been completed. **LAME:**..... **Lic:**..... **Date:**..... **NOTE:** This certification does not replace the requirement for a category certification in aircraft log book.		

GA8 MAINTENANCE SCHEDULES ***Page 3***

CATEGORY - ENGINE

Aircraft Registration: .....

	AME	LAME
COWLS • remove as required, clean, check cowls and fastenings.		
COMPRESSION CHECK CYLINDER: #1 #2 #3 #4 #5 #6 RESULT: Compression test method used:.....		
OIL SYSTEM • drain sump, refit plug and lock-wire. • remove pressure filter, cut open and inspect for foreign and abnormal particles, replace with new filter and lock-wire. • remove and inspect suction screen for foreign and abnormal particles. Clean, reinstall and lock. • oil cooler condition, security, cooling fins (clean as required) and ducting. • oil temperature control valves, oil lines, fittings and breather. • refill sump with recommended grade and quantity of oil.		
IGNITION SYSTEM • remove spark plugs, clean, inspect, gap, test or renew as required. • spark plug high tension leads and ceramics. • inspect magneto housings. • check ignition timing and inspect magnetos in accordance with Slick Magneto Products Maintenance Schedule 100hr inspection (and 500hr inspection if due). • switch and earth leads; • apply anti-seize to threads, refit and torque spark plugs. • clean insulators and refit high tension leads.		

GA8 MAINTENANCE SCHEDULES ***Page 4***

CATEGORY - ENGINE

Aircraft Registration: .....

	AME	LAME
FUEL SYSTEM		
WARNING **Do not perform any sort of maintenance on the fuel system in conjunction with maintenance on the electrical system. The escape of fuel fumes under the floor and/or in the aircraft may cause an explosion.**		
• pull emergency shut-off to OFF.		
• remove, inspect, clean and refit fuel strainers and screens, refit lock-wire, **caution:** ensure service taps are turned OFF prior to removing fuel strainer lids.		
• inspect fuel injector components.		
• inspect throttle and mixture shafts and operating cables.		
• inspect all fuel lines and fittings.		
• push emergency shut-off to ON position, ensure service taps are fully ON when filter lid retainers are fitted.		
• carry out **Periodic Sump Tank Warning System Maintenance** per **28-40-10**.		
• every 3 years or 300 hours (whichever occurs first) carry out **Complete Fuel Warning System Maintenance** per **28-40-10**.		
• carry out functional check of electric fuel pump operation and emergency shut-off.		
• every 3 years carry out **Fuel System Flow Rate Test** per **28-20-00**.		
• purge fuel system and check for leaks.		
INDUCTION SYSTEM		
• remove, inspect, refit or replace air filter.		
• alternate air system for integrity of seals, serviceability of valves, shafts, bearings and actuating cable connections.		
• cabin heat flexible ducts.		
EXHAUST SYSTEM		
• remove heat exchanger outer shroud and inspect exhaust pipe.		
• inspect carbon monoxide detector.		
ENGINE CYLINDERS AND BAFFLES		
• inspect cylinder assemblies for loose thread inserts, cracks, cracked and broken fins, worn or damaged baffles, baffle seals for serviceability.		

***GA8 MAINTENANCE SCHEDULES* Page 5**

CATEGORY - ENGINE

Aircraft Registration: .....

	AME	LAME
• inspect cylinder base to crankcase area for evidence of fretting and loss of torque on retention nuts. • inspect rocker covers, and • push rod housing seals. • inspect baffle seals for condition and sealing.		
CRANKCASE, ACCESSORY HOUSING AND FIREWALL • inspect engine for evidence of oil leakage. • inspect all accessories and drive belts. **NOTE** If alternator drive belt requires replacement, a tension check is to be carried out within 10–20 hours of installation • inspect engine mounts (rubbers) for delamination and set, engine mount bolts. • inspect engine mount frame for condition and signs of overheating. • inspect firewall including seals and sealant.		
CONTROLS Inspect the following controls for full and free movement in the correct sense: • throttle, mixture and propeller. • alternate air.		
PROPELLER *Note: For further details refer to the Propeller Owner's Manual.* • propeller for blade track. • propeller hub, spinner and backplate. • attachment bolts for looseness and locking. • blades for nicks, backlash, creep and dimensions within limits. • lubricate propeller hub and service with air IAW manufacturers instructions (if applicable).		
REFIT COWLS Ensure that no tooling, rags or other foreign objects remain in the engine compartment before proceeding. • latches and fasteners for correct tension. • inlet and cooling air ducting. • engine drain lines. • baffle seals forward facing and correct.		

GA8 MAINTENANCE SCHEDULES ***Page 6***

CATEGORY - ENGINE

Aircraft Registration: .....

	AME	LAME

ENGINE GROUND RUNS

Carry out an engine ground run. Functionally check, operate and observe the following. Cowls should all be in place and secured.

- start engine and stabilise engine temps and pressures.
- alternator charging, voltage correct.
- record maximum static RPM, manifold pressure, fuel flow, oil temperature and pressure, and cylinder head temperature.

	Recorded values
Airfield pressure height and OAT	
Max. static RPM	
Manifold pressure	
Fuel flow	
Oil temperature	
Oil pressure	
Cylinder head temperature	

- idle speed, mixture and magneto switch operation at low RPM - momentarily check for dead cut.
- operate alternate air and check warning light.
- note any unusual engine vibration or noises and rectify as required.
- check engine response to throttle application, smooth acceleration with no hesitation.
- magneto RPM drop check and prop governor operation.
- idle cut-off operation, then
- open cowls, check for oil and fuel leaks, secure cowls.

CERTIFICATION: I hereby certify that all maintenance in ENGINE CATEGORY has been completed.

LAME:..... **Lic:**.....

Date:.....

NOTE: This certification does not replace the requirement for a category certification in aircraft log book.

GA8 MAINTENANCE SCHEDULES ***Page 7***

CATEGORY - ELECTRICAL

Aircraft Registration: .....

	AME	LAME

WARNING

Do not perform any sort of maintenance on the electrical system in conjunction with maintenance on the fuel system. The escape of fuel fumes under the floor and/or in the aircraft may cause an explosion.

REQUIRED PLACARDS

External and Internal, including terminal labelling per **24-00-50**

Note: Reference should be made to Chapter 11 of the Service Manual and applicable airworthiness directives for required placards.

AIR CONDITIONING (IF INSTALLED)

- inspect distribution system electrical components and inter-wiring.
- inspect heating and temperature control system.
- inspect freon system electrical components and interwiring.

ELECTRICAL POWER

Inspect for security, freedom from damage and proper function

- DC generation system (includes: alternator, regulator, transform-er/rectifier units, interwiring, control relays and switches).
- DC distribution system (includes: busses, circuit breakers, relays, switches and interwiring).
- starter.
- battery general condition.
- external power system (if installed).
- functional test of alternator/capacitor system per **24-00-30**

FUEL

- inspect electrical components and interwiring associated with fuel pump and warning system.

STALL WARNING SYSTEM

- functional test of stall warning system.

LIGHTS

- inspect cockpit, navigation, landing and anti-collision(if fitted).

ENGINE AND IGNITION

Inspect for security and freedom from damage

- electrical harnesses, excluding ignition harness.
- ignition switching including insulation check of magneto switch leads.

GA8 MAINTENANCE SCHEDULES ***Page 8***

CATEGORY - ELECTRICAL

Aircraft Registration: .....

	AME	LAME

ENGINE STARTING

Inspect for correct starter operation, solenoid and relay operation and adequacy of high current operations

- cranking system.
- test starter solenoid and relay per **80-10-30**

POST INSPECTION CHECK

On completion of the inspection, check to ensure that no tooling, maintenance equipment or rags have been left in the aircraft and that all panels, access doors, detachable fairings and fillets have been correctly secured.

CERTIFICATION: I hereby certify that all maintenance in ELECTRICAL CATEGORY has been completed.

LAME:..... **Lic :**.....

Date:.....

NOTE: This certification does not replace the requirement for a category certification in aircraft log book.

GA8 MAINTENANCE SCHEDULES ***Page 9***

CATEGORY - INSTRUMENT

Aircraft Registration: .....

	AME	LAME

REQUIRED PLACARDS

External and Internal

Note: Reference should be made to Chapter 11 of the Service Manual and applicable airworthiness directives for required placards.

FUEL SYSTEM

- inspect fuel pressure and quantity indication systems.

INDICATING AND RECORDING

- inspect instrument panel and instruments.

NAVIGATION

- inspect pitot/static system including associated instruments.
- functional test of pitot heat caution light system per **34-10-00** (if fitted).
- inspect magnetic compass.

INSTRUMENT VACUUM SYSTEM

- inspect distribution system and filter.
- for Aero Accessories Inc AA215CC and AA3215CC dry air pumps, inspect for vane wear per 37-20-00 at manufacturers specified time intervals.

ENGINE INSTRUMENTS

- inspect tachometer, manifold pressure and fuel flow (if fitted).
- inspect oil temp, oil pressure.

CAUTION/WARNING LIGHTS

- functional test of caution/warning light system

POST INSPECTION CHECK

On completion of the inspection, check to ensure that no tooling, maintenance equipment or rags have been left in the aircraft and that all panels, access doors, detachable fairings and fillets have been correctly secured.

CERTIFICATION: I hereby certify that all maintenance in INSTRUMENT CATEGORY has been completed.

LAME:..... **Lic :**.....

Date:.....

NOTE: This certification does not replace the requirement for a category certification in aircraft log book.

GA8 MAINTENANCE SCHEDULES ***Page 10***

CATEGORY – RADIO

Aircraft Registration: .....

	AME	LAME
REQUIRED PLACARDS (VFR AND IFR) External and Internal, including frequency charts. *Note: Reference should be made to Chapter 11 of the Service Manual and applicable airworthiness directives for required placards.*		
COMMUNICATION & NAVIGATION (VFR AND IFR) • operation and function of all installed radio systems, including correct performance by communication with ground stations or other means. • ATC transponder system (if installed) for correct performance in all modes using the self test facility. Refer to local operating regulations for test code and any specified performance limits. • accessible interwiring, plugs and sockets. • microphones, headsets and cords. • antennas and antenna insulators. • ELT/ELB (if installed) batteries for electrolyte leakage and remaining battery life. • removable units, mounting racks and bonding. • switches and controllers. • radio panel lamps for adequate illumination, and • radio indicators for legibility.		
COMMUNICATION (IFR ONLY) • audio system, including correct operation of all distribution and amplifying systems in all modes of operation.		
NAVIGATION (IFR ONLY) • ADF system (if fitted) for accuracy of frequency selection and correct performance in all modes of operation. Refer to local operating regulations for any specified performance limits. • VOR system (if fitted) for correct performance. Refer to local operating regulations for any specified performance limits. • Localiser system (if fitted) for correct performance. Refer to local operating regulations for any specified performance limits. • Glideslope system (if fitted) for correct performance. Refer to local operating regulations for any specified performance limits. • Marker system (if fitted) for correct performance in all modes. Refer to local operating regulations for any specified performance limits. • DME system (if fitted). Refer to local operating regulations for any specified performance limits.		

GA8 MAINTENANCE SCHEDULES ***Page 11***

CATEGORY – RADIO

Aircraft Registration: .....

	AME	LAME
• GPS (if fitted). Refer to local operating regulations for any specified performance limits.		

POST INSPECTION CHECK (VFR AND IFR)

On completion of the inspection, check to ensure that all tools, maintenance equipment or rags have been removed from the aircraft and that all panels, access doors, detachable fairings and fillets have been correctly secured.

CERTIFICATION: I hereby certify that all maintenance in RADIO CATEGORY has been completed.

LAME:..... **Lic :**.....

Date:.....

NOTE: This certification does not replace the requirement for a category certification in aircraft log book.

5-40-00 UNSCHEDULED MAINTENANCE

Unscheduled maintenance includes those inspections required after the report of abnormal flight loads due to severe air turbulence or manoeuvres exceeding flight limitations, heavy landing or lightning strike.

If damage is found, this inspection must be extended to its logical conclusion as loads sufficient to produce damage or distortion at one point may be expected to have caused damage elsewhere.

5-40-10 Inspection After Abnormal Flight Loads

Abnormal flight loads result from severe turbulence or incidents where the aircraft is upset and subjected to excessive acceleration and/or the never exceed speed is exceeded. The defects that may result from such manoeuvres include structural distortion, usually indicated by skin wrinkles in the wings or fuselage, and damage at or near main assembly points. The following items detail the inspections required after the report of such occurrences.

- Inspect the control elements (tail surfaces and ailerons) together with flaps for general condition. Check the flap push-rod and operating lever for signs of deformation or damage. Check all mass balances for security of attachment. Operate all flight and engine control systems for full and free movement. If increase in static friction or backlash is noted, the system must be checked from end to end to ascertain the cause.

- Inspect the wing internally (through normal inspection panels) and externally, particularly in the region of the wing root at the front spar and in the vicinity of the front spar strut attachment, for evidence of wrinkles, buckles, sheared or loose rivets. Inspect the integral fuel tank for signs of leaks.

  Note: Cracked or flaking paint may be an indication of permanent deformation.

- Inspect lift struts, horizontal stabiliser and fin for signs of deformation.

- Remove wing and strut attachment bolts and inspect for deformation.

- Inspect engine mounts and fittings for evidence of permanent deformations and cracks.

- Inspect main spar, rear spar and strut carry-through structure.

- Inspect attachment of components such as the battery.

5-40-20 Inspection After Heavy Landing

The effects of heavy landings are usually more locally concentrated than in the case of abnormal flight loads. The impact of a hard landing transmits an upward force through one or more of the undercarriage components according to which takes the impact, into the

fuselage structure above, whilst a corresponding inertia load is applied to the remainder of the structure. If the undercarriage and attachments give indications of heavy landing damage, a more thorough inspection of the aircraft including all items of section **5-40-10** must be completed.

Jack the aircraft so the wheels are clear of the ground and perform the following inspections:

- Inspect main and nose landing gear legs for distortion and security of attachment.
- Remove attachment bolts as required and examine for signs of shearing.
- Remove wheels and examine for damage; hubs for signs of cracking, distortion or damage.
- Examine axle for bowing and attachment bolts for shearing.
- Examine tyres for creep, damage to outer casings, bulges etc., and general signs of casing fractures.
- Inspect all structure around the main undercarriage and nose wheel attachment points for signs of permanent deformation.

5-40-30 Inspection After Lightning Strike

Most lightning strikes show evidence of entering or leaving the tips of propeller blades. In some instances the area is dark in colour and erosion is present. Generally the material around the area is annealed. The other area that is damaged is the thrust bearing for the blades. Arcing sometimes occurs and is evident on the race balls of the bearing. In every case all steel parts are magnetized due to the flow of the current.

In the event of a propeller lightning strike act in accordance with the Propeller and Engine manufacturer's data. Overhaul or replace magnetos.

Perform a complete airframe inspection if there is evidence to suggest lightning has struck the wings or fuselage, typically indicated by scorch marks and erosion at the point of impact.

In addition to a complete airframe inspection, particular attention should be paid to control surface hinge bolts for erosion and other damage caused by arcing. Also inspect the fuel vent system plenum, located on the cabin roof between wing/fuselage pickups, for erosion along the trailing edge and burn marks on the paint.

CHAPTER 6

DIMENSIONS AND AREAS

6-00-00 GENERAL

This section provides general aircraft dimensions, control surface areas and deflection angles etc. Although the basic system of measurement used is the metric system, imperial units are used in certain areas in keeping with normal industry practice. This applies in particular to the aircraft station reference system as defines below. These dimensions are all in inches.

FS	Fuselage Station	A longitudinal reference system starting at the firewall face (aft +ve).
WS	Wing Station	A lateral reference system measured outboard from the outboard rivet run of Rib No.1.
BL	Butt Line	A lateral reference system starting at the aircraft centre line, and is either LEFT or RIGHT.
WL	Water Line	A vertical reference system starting at the horizontal reference plane (+ve up). The horizontal reference plane in the GA8 is the cabin floor.

6-10-00 THREE VIEW OF THE GA8

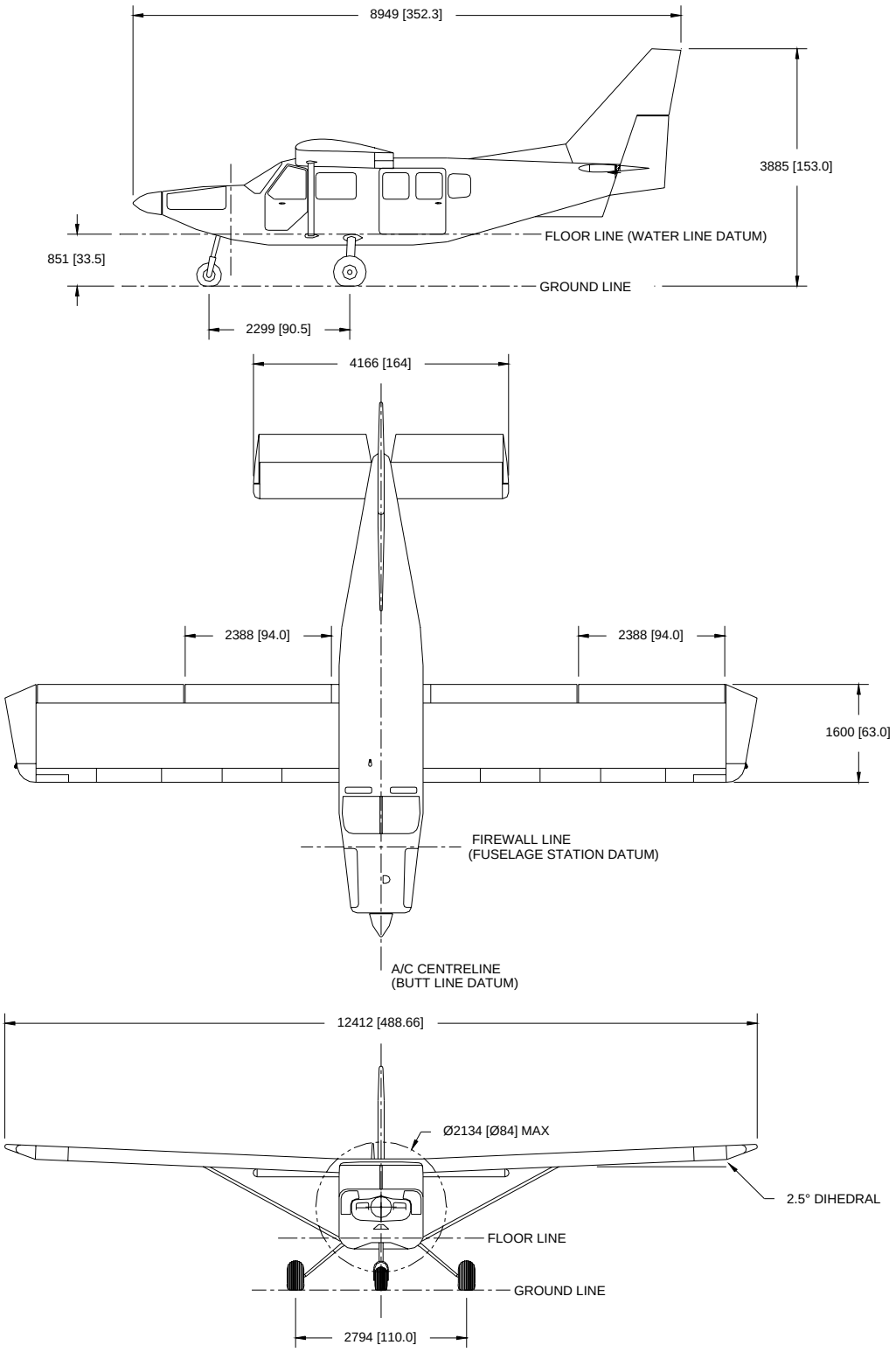


Figure 6-1 Three View of the GA8

6-20-00 SIGNIFICANT DIMENSIONS AND AREAS

GENERAL

Overall Length (level attitude).....8949 mm (352.3”)

Height .....3885 mm (153.0”)

Undercarriage Track.....2794 mm (110.0”)

Undercarriage Base.....2299 mm (90.5”)

WINGS

Wing Span ..... 12412 mm (488.68")

Root Chord .....1600 mm (63.0")

Mean Aerodynamic Chord.....1582 mm (62.29")

Wing Area.....19.305 m² (207.8 ft²)

Aspect Ratio 7.981

Dihedral .....2.5°

Root Incidence.....3.3°

Washout - Linear twist between root and structural tip chord lines.....1.7°± 0.1°

AILERONS

Length.....2388 mm (94.0")

Chord .....337 mm (13.25")

Max Deflection UP[1].....17°± 0.5°

Max Deflection DOWN[1] .....16°± 0.5°

Area .....0.969 m² (10.43 ft²)

[1] Measured between the under surface of the aileron and the rear under surface of the mainplane.

FLAPS

Length	2388 mm (94.0")
Chord	337 mm (13.25")
Span	2385 mm (93.90")
Retracted Position[2]	0° ± 1°
Take-Off Position[2]	14° ± 1°
Landing Position[2]	38° ± 1°
Area	0.969 m² (10.43 ft²)

TAIL UNIT

Horizontal Stabiliser Area	2.210 m² (23.78 ft²)
Elevator Area	1.786 m² (19.23 ft²)
Horizontal Tail Span	4166 mm (164")
Horizontal Tail Aspect Ratio	3.962
Incidence of Horizontal Stabiliser[3]	2° to –5° ± 0.5°
Elevator Travel UP (Relative to stabiliser)[4]	15° ± 0.5°
Elevator Travel DOWN (Relative to stabiliser)[4]	19° ± 0.5°
Vertical Stabiliser Area	1.894 m² (20.39 ft²)
Rudder Area	0.773 m² (8.32 ft²)
Rudder Deflection (Left and Right)	21° ± 0.5°
Vertical Tail Aspect Ratio	3.38
Vertical stabiliser Offset Angle (Base)	0°
Vertical Stabiliser Twist	0°

[2] All measurements refer to hinge line rotation.
[3] Measured between the mid-section line of the stabiliser and the horizontal reference.
[4] Measured between the mid-section line of the elevator and the mid-section line of the horizontal stabiliser with the stabiliser in the full leading edge down position.

This page intentionally left blank

CHAPTER 7

LIFTING AND SHORING

7-00-00 GENERAL

The entire aircraft may be lifted by using jacks at the jack points provided on the wing main spar just outboard of the main lift strut attachment. The tail may be supported by placing a suitable fixture through the tie-down point and jacked up from this point.

The aircraft may be jacked with full fuel tanks if required.

When possible, the aircraft should be on a level firm surface. The jacking site should be protected from the wind, preferably inside a hangar. If jacked outside, or where some wind is blowing, the aircraft should be secured as required by suitable ropes attached to the aircraft tie down points. Additionally shoring may be required.

CAUTION

As a general safety rule raise the aircraft no more than is required for the task to be performed.

7-10-00 JACKING

The procedure for jacking the aircraft is as follows:

a. Place the main jacks under the jacking points located on the wing main spar just outboard of the main lift strut attachment. Jacking adaptors are required to suit the actual types of jacks used and to locate the jacks positively during the exercise.

b. Place a suitable fixture through the tail's tie-down point and jack up from this point.

c. Raise the jacks until the wheels are clear of the ground as required.

CAUTION

Empty Weight longitudinal Centre of Gravity for this aircraft type is in the vicinity of the main jacking points. Therefore, the tail jacking point may be required to be held down rather than lifted up. If this is the case, two courses of action are available. The tail maybe held down by the ventral fin tie down using rope attached to the ground or heavy weight. Alternatively if using a lifting jack, weights can be placed on top of the tailplane near the root section

7-20-00 SHORING

Shoring the aircraft may be accomplished by using contour boards. These boards may be fabricated locally using plywood glued up side to side until a thickness of approximately 50mm (2") is obtained. The boards are contoured to fit the lower wing surface or fuselage padded with 13mm (½") thick felt or equivalent.

When the majority of the aircraft's weight will not be supported by the undercarriage, the aircraft shall be supported on the belly skins utilising no less than two cross members per support point also ensuring that the contour boards do not distort the external stiffeners on the under side of the fuselage. Position contour boards so that most of the weight is taken under the cabin area and the tail cone is only secured as required to stabilize the fuselage.

7-20-10 Locations for Shoring

The aircraft may be shored at the following locations:

1. Rear cabin area under mid point of rear cabin door.
2. Forward fuselage approximately 600mm (24') aft of firewall.
3. Under each wing just outboard of strut attachment

This page intentionally left blank

CHAPTER 8

LEVELLING AND WEIGHING

8-00-00 GENERAL

This chapter provides information necessary to properly level the aircraft as may be required for rigging checks, and in addition identifies the correct weighing procedures.

8-10-00 LEVELLING

The aircraft is longitudinally level when an accurate level placed between the two level points on the left hand side of the fuselage gives a level indication. Two easy methods are a string line and spirit level or a water level.

The aircraft is laterally level when an accurate level placed across the cabin floor or across the belly of the aircraft gives a level indication.

Procedure

Place the aircraft on jacks as per **7-10-00**. Raise the jacks evenly, making small adjustments, until the cabin floor is level in both planes.

CAUTION

The load on the tail may be negative and require some ballast on the upper surface of the tailplane to stabilize the support point.

8-20-00 WEIGHING

For aircraft weighing procedures, refer to Section 6 of the Pilot's Operating Handbook.

CHAPTER 9

TOWING AND TAXIING

9-00-00 GENERAL

The steerable nose wheel makes manual ground handling of the aircraft easy. The aircraft can be turned using a suitable hand tow bar during ground handling. In congested areas, wing and/or tail walkers should be positioned to ensure adequate clearance from stationary objects.

9-10-00 TOWING/GROUND HANDLING

No provision is made for towing the aircraft as it is relatively light and can be readily man handled. One person using a tow bar to push or pull as required can easily manoeuvre the aircraft on level ground. Additional persons can assist by pushing or pulling on the main wing struts. **The aircraft should not be manoeuvred in any way by the empennage.** In congested areas, wing and/or tail walkers should be positioned to ensure adequate clearance from stationary objects.

9-20-00 TAXIING

The standard GA8 aircraft is fitted with positive nose wheel steering and ground control while taxiing is accomplished accordingly.

Full details of the procedures associated with taxiing the aircraft can be found in Section 4 of the Pilot's Operating Handbook.

CHAPTER 10

PARKING AND MOORING

10-00-00 GENERAL

This chapter provides information concerning the correct procedures for parking, securing and storage of the aircraft.

10-10-00 PARKING

Whenever possible park into the anticipated wind and set the parking brakes. Do not set the parking brakes during cold weather when accumulated moisture may freeze the brakes, or when the brakes are very hot. Lock the controls using the lower portion of the pilot's restraint harness around the control wheel to secure it. Install wheel chocks when available. When severe weather conditions or high winds are anticipated, the best precaution is to hangar the aircraft. In less severe conditions, or when hangarage is not available the aircraft should be tied down as outlined in the following paragraph.

10-20-00 MOORING

The following mooring procedures should be followed when the aircraft is to be parked outside for an extended period of time or during existing or expected bad weather:

a. Lock the ailerons and elevator as described above or by using suitable locally manufactured external control surface locks.

b. Chock the wheels.

c. Attach a suitably strong (recommended 550 kg (1200 lb) tensile strength) rope to the tie-down eye bolt provide at the wing/strut intersection. Leave sufficient slack to avoid damage due to rope shrinkage that may occur when a moist rope dries out.

d. Attach a suitably strong (recommended 550 kg (1200 lb) tensile strength) rope at the tail tie-down point found in the ventral fin, at approximately 45° to the ground. Leave sufficient slack to avoid damage due to rope shrinkage that may occur when a moist rope dries out.

In addition to the above, if high winds are anticipated the nose wheel should be tied down using a rope secured around the nose wheel fork. The rudder is connected directly to the nose wheel and would normally be adequately restrained by the control system.

WARNING

Ensure all control locking devices are removed before flight.

10-30-00 AIRCRAFT STORAGE

10-30-10 Flyable Storage

Aircraft in non-operational storage, for a maximum of 30 days, are considered to be in flyable storage status. Every seventh day during these periods, the propeller should be rotated by hand through five revolutions. This action limbers the oil and prevents any accumulation of corrosion on engine cylinder walls.

WARNING

For maximum safety, check that both magnetos are OFF, the throttle closed, the mixture control is in the ICO position, and the aircraft is secured before rotating the propeller by hand. Do not stand within the arc of the propeller blades while turning the propeller.

After 30 days, the aircraft should be flown for 30 minutes. As well as helping to avoid engine problems, this also helps to reduce accumulations of water in the fuel system, tops up the battery charge, and exercises the other aircraft systems. If it is not possible to fly the aircraft a ground run up should be made just long enough to produce an oil temperature within the lower green arc range and then long term storage procedures initiated. Excessive ground runs should be avoided.

10-30-20 Long Term Storage

If it is known that an aircraft is to remain inactive for a period of time exceeding 30 days, the aircraft should be prepared and stored as follows, preferably in a hangar:

1. Preserve the engine in accordance with the procedures detailed in section 7 of Lycomings Operator's Manual and Lycoming Service Letter No. L180A.

2. Top up fuel tanks to minimise condensation.

3. Lubricate all airframe items.

4. Remove battery for separate storage and maintenance.

5. Clean any oil or grease from the tyres, and coat them with a tyre preservative.

7. Plug all external openings to avoid the ingress of birds, insects and other foreign objects.

8. Ensure all airframe water drain holes are clear.

10-30-21 Returning the Aircraft to Service

Engine

To return the engine to service after long term storage, carry out the de-preservation procedure as detailed in section 7 of Lycomings Operator's Manual.

Airframe and General

Depending on the length of time the aircraft has been out of service, formal maintenance may be required due only to the elapse of calendar time. Additionally however, the following points require specific attention before returning the aircraft to service:

1. Drain all fuel drain points until no water or other contaminants remain and the fuel sample is absolutely clean and clear. A sufficiently large quantity of fuel should be drained so that there is no possibility of any contaminants remaining in the fuel system.

2. Check the fuel vent system is clear and operating correctly.

3. Check pitot-static system is clear and operating correctly.

4. Lubricate all airframe items. Check for full and free movement of all controls including engine controls.

5. Charge and replace battery.

6. Inflate all tyres to their recommended inflation pressure. Check wheel bearings for water ingress. Check wheel brake system for correct operation.

7. Remove all plugs from all external openings.

8. Ensure all airframe water drain holes are clear and there is no accumulated water, wasp nests or any other foreign objects anywhere in the airframe or flight control surfaces.

CHAPTER 11

PLACARDS

11-00-00 GENERAL

This chapter provides details of the interior and exterior placards and markings required for safety information, emergency information and ground servicing instructions.

These placards and marking are a legal requirement and must be repaired or replaced if they become illegible or de-faced in service.

Replacement placards can be either locally manufactured or purchased from the factory.

11-00-10 Required Placards

Refer to the aircraft's Approved Flight Manual for information regarding required placards.

11-00-20 Other Placards

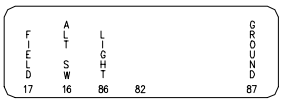
Located just below the rim of the two forward door pockets

Located adjacent to each air vent

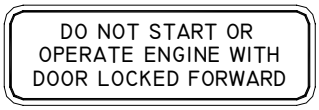
Located on left side of switch guard

Located just below the rim of the two forward door pockets

Located on inboard side of pitot-static probe



Located on System Controller



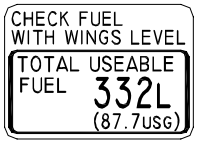
Located on cockpit door interior trim

Located on (i) nose gear fork and (ii) main gear leg fairings

Located adjacent to stall warning vane

Located below the rivet forward of the front edge of the cockpit door and aft of the rear edge of the sliding door

Located (i) midspan of the elevator upper trailing edge, (ii) each side of the rudder trailing edge, and (iii) on each main undercarriage fairing on the upper trailing edge

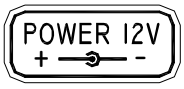


Located above the right hand "Check Fuel" amber caution light

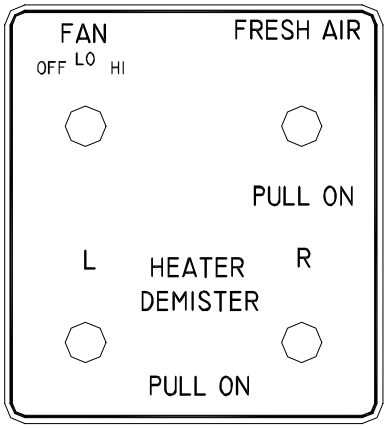
Located above the sump tank fuel warning LED

Located on the bottom of the left hand fuel gauge

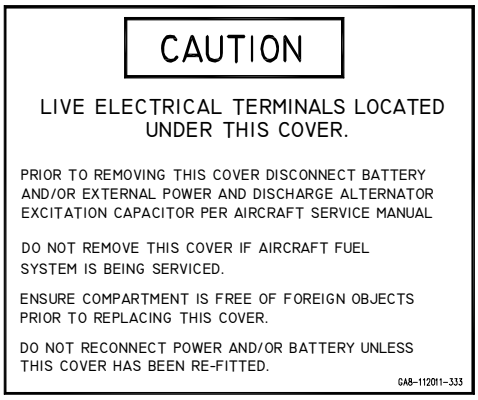
Located on the bottom of the right hand fuel gauge



Located directly below cigarette lighter



Located behind cabin heat controls



Located on the electrical box cover panel

This page intentionally left blank

CHAPTER 12

SERVICING

12-00-00 GENERAL

This chapter provides servicing procedures necessary to replenish or service the aircraft and its equipment as required.

The operational integrity of the aircraft systems can be seriously impaired if contaminated fuel, oil, fluids, and lubricants are used or if they do not meet the required specifications. Mixtures of various brands and types of materials is undesirable and should be avoided wherever possible even though the use of such mixtures may be technically acceptable. Specified lubricants will meet requirements for extreme hot or cold temperature operations. Use of substitutes or other lubricants may cause malfunction, or may allow excessive wear due to inadequate lubrication.

12-10-00 REPLENISHING

This section contains those instructions necessary for the replenishment of fuel, oil, hydraulic brake fluid and tyre inflation.

12-10-10 Fuel System Replenishment

Fuel Specification

Avgas 100LL or Avgas 100/130

Fuel Quantities

Two wing fuel tanks:	170 litres (44.9 US gallons) total each
Sump Tank:	9 litres (2.4 US gallons) total
Total Fuel:	349 litres (92.2 US gallons) total
Useable Fuel:	332 litres (87.7 US gallons) total

Refuelling Procedures

Observe all the required precautions for handling fuel and filling tanks. Ensure that the aircraft is bonded to Earth using the earthing point provided. Additionally prior to opening the fuel cap the earth strap on the refuelling nozzle should be attached to the earthing point adjacent to the tank filler neck. Fill the tank to within 25 mm (1") of the top of the tank.

Fuel Draining/Sampling

Five quick drain fuel drain fittings are provided in the GA8 fuel system. There is one for each main fuel tank located on the lower rear inboard corner of the tank, three on the lower right hand side of the fuselage just below the co-pilot's door to drain the sump tank and the two fuel filter bowls. Fuel should be drained/sampled from all of these points before the first flight of the day and after each subsequent refuelling.

The complete fuel system may be drained of all fuel by using the five fuel drain points.

12-10-20 Engine Oil System Replenishment

Oil Specification

Avco Lycoming Specification No. 301F approves lubricating oils of any brand name conforming to specifications MIL-L-6082 for straight mineral oil and MIL-L-22851 for ashless dispersant oil.

Straight mineral oil must be used during the first 50 hours of operation for new or overhauled engines, or until the oil consumption has stabilised. After the first 50 hours it is recommended that ashless dispersant oil be used.

Refer to Lycoming Service Instruction No. 1014 for further details.

Viscosity Grade

The following chart is intended to assist in choosing the correct grade of oil and must be considered as a guide only. Multi-viscosity grades can also be used as indicated. Refer to Lycoming Service Instruction No. 1014 for further details.

Average Ambient Temperature	Mineral Grades	Ashless Dispersant Grades
All Temperatures	-	SAE 15W50 or 20W50
Above 27° C	SAE 60	SAE 60
Above 16° C	SAE 50	SAE 40 or SAE 50
-1° C to 32° C	SAE 40	SAE 40
-18° C to 21° C	SAE 30	SAE 40, 30, 20W4
Below –12° C	SAE 20	SAE 30, 20W30

Equivalence of SAE and commonly used Commercial Grade designations:

SAE:	20	30	40	50	60
Commercial:	55	65	80	100	120

Capacity

Total: 11.4 litres (12 US quarts)
Useable: 8.8 litres (9.3 US quarts)
Min safe: 2.7 litres (2.8 US quarts)

Replenishment

An oil filler cap/dipstick is located on the top of the engine and is accessible through an access door in the engine cowling. Oil to the correct specification may be added utilising a suitable funnel to avoid oil spillage. It should be noted that **the dipstick is calibrated in US quarts.** To minimise possible loss of oil through the breather, normally 9 -10 US quarts as measured on the dipstick is sufficient for routine operations rather than the full 12 US quarts.

WARNING

Although the absolute minimum safe oil quantity in sump is 2.7 litres (2.8 US quarts), a flight should never be commenced unless at least 7.6 litres (8 US quarts) of oil is in the engine.

Draining

The engine sump is drained by removing the lower engine cowl and removing the sump drain plug (or using the quick drain valve if fitted). Ensure that the sump plug is correctly replaced **and lock wired** prior to refilling the engine with oil.

12-10-30 Hydraulic Brake Fluid Replenishment

Hydraulic Fluid Specification

MIL-H-5606 (mineral based)

Brake Servicing

This is accomplished from inside the cockpit by removing the plug from the top of the brake master cylinder reservoir and filling with hydraulic fluid to the above specification. Ensure that no contaminants are allowed to enter the reservoir, particularly when removing or replacing the plug.

Alternatively, the brakes may be serviced as follows:

1. Obtain a suitable clean pressure oil can or similar, and a short length of clear PVC plastic tube that fits snugly on the nozzle of the oil can as well as on the bleeder nipple on the bottom of the brake calliper.

2. Remove the rubber cap from the bleeder nozzle, fit the PVC tube over it. Crack open the bleeder nipple and using the oil can, pump hydraulic fluid into the reservoir being careful not to over fill the reservoir. The quantity in the reservoir can be monitored by observing the level through the plug hole in the top of the reservoir.

3. When the reservoir is full, tighten the bleeder nozzle, remove the PVC tube and replace the rubber cap. Ensure the plug in the top of the master cylinder reservoir is also replaced.

12-10-40 Tyre Inflation

The recommended tyre inflation pressures are:

MAINS	186-200 kPa (27-29 psi)
NOSE WHEEL	214-228 kPa (31-33 psi)

When checking tyre pressures, the opportunity should be taken to examine the tyres for wear, cuts, bruises, slippage and other defects.

12-20-00 SCHEDULED SERVICING

12-20-10 General

This section provides details necessary to carry out routine scheduled periodic maintenance on the GA8 airframe and is to be read in conjunction with the GA8 MAINTENANCE SCHEDULES. Should any conflict occur between information in this section and the GA8 MAINTENANCE SCHEDULES, the latter will take precedence.

12-20-20 Battery Service

The GA8 must be fitted with a Concorde Valve Regulated Sealed Lead Acid 12 Volt 29 Ampere Hour Battery (P/N RG-35A).

The battery is located in a compartment under the pilot's seat in the cockpit. To gain access to the battery, remove the seat, floor carpet and screws securing the battery box cover.

WARNING

Do not perform any sort of maintenance on the electrical system in conjunction with maintenance on the fuel system. The escape of fuel fumes under the floor and/or in the aircraft may cause an explosion.

As the name implies, the no maintenance battery requires no routine maintenance other than to check its security occasionally and to clean the terminals if required.

12-20-30 Airframe Lubrication

This section identifies areas deemed necessary for lubrication and the appropriate frequency of lubrication.

Prior to performing the various lubrication tasks in each area, it is important that proper safety precautions and access to the specific areas be accomplished.

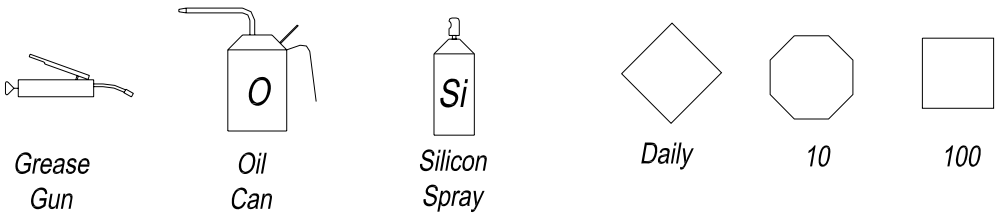
Wipe grease fittings/nipples and areas to be lubricated with a clean, dry cloth before lubricating. Use only clean and approved lubricants. After any lubrication, clean excess lubricant from all but the actual working parts. Store lubricants in an area free from dust and other contamination. Containers should be kept closed at all times when not in use. Any lubricant that becomes contaminated must be discarded.

When lubricating bearings that are not sealed, force grease into the fitting until old grease is extruded.

All sealed or prepacked anti-friction bearings are lubricated by the manufacturer and require no further lubrication.

LUBRICATION CHARTS

Method of Application *Frequency (hours)*



Grease Gun *Oil Can* *Silicon Spray*

WHERE NO INTERVAL IS SPECIFIED
LUBRICATE AS REQUIRED AND
WHEN ASSEMBLED OR INSTALLED

NOTE

Unless otherwise specified, the following lubricants may be used:

- Grease ..... General Purpose
- Oil ..... General Purpose
- Silicon spray ..... General Purpose

GENERAL NOTES

- All lubrication points should be serviced as directed or every three months depending on which constraint is reached first.
- Do not lubricate cables except under seacoast conditions.
- Lubricate unsealed pulley bearings, rod ends, pivot and hinge points, and any other friction point obviously needing lubrication, with general purpose oil every 100 hours or more often if required.
- Paraffin Wax rubbed onto seat rails will ease sliding the seats fore and aft.
- A commercial greaseless silicone type spray lubricant (such as Selleys Slick) should be used on the sliding side door to avoid dust sticking to it and jamming the mechanism.

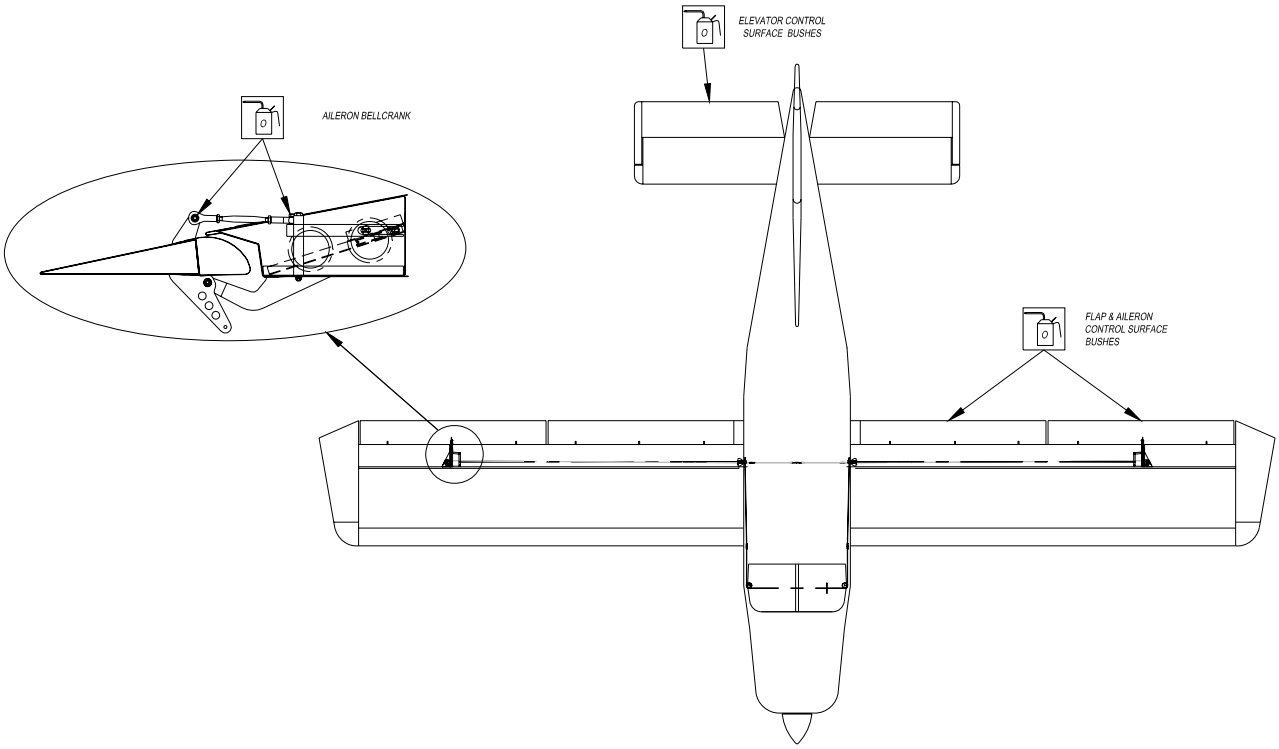


Figure 12-1 Aileron and Elevator Lubrication

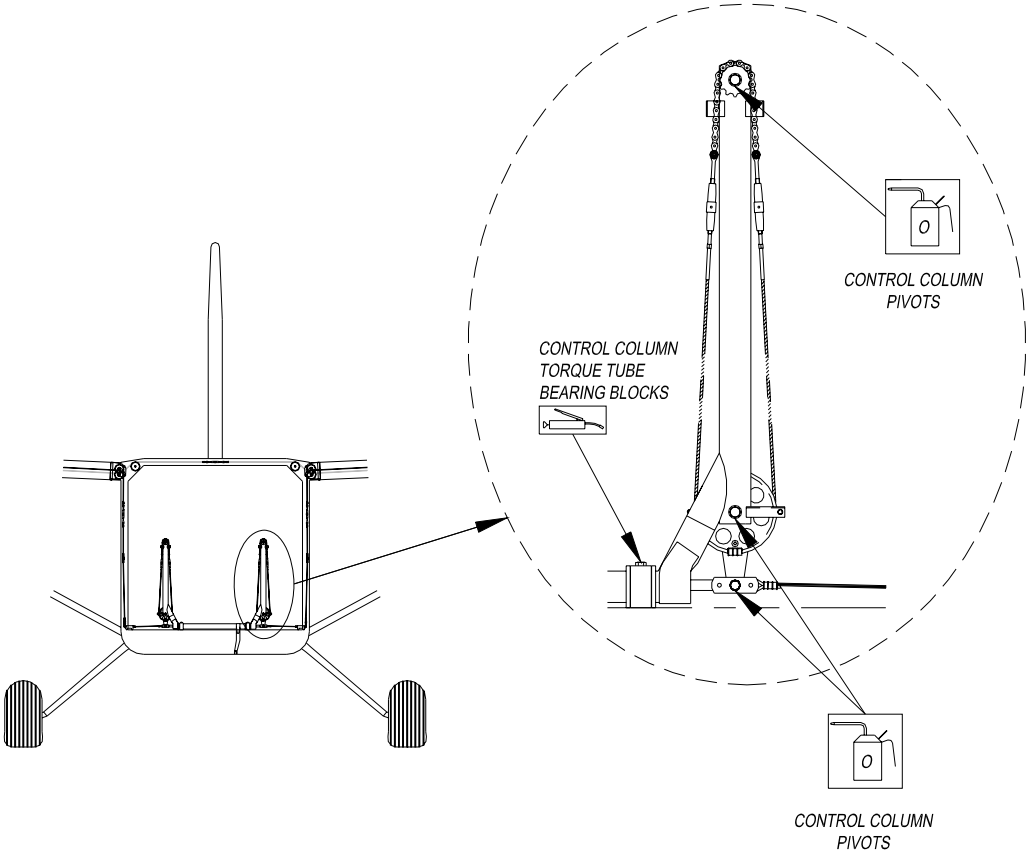


Figure 12-2 Control Column Lubrication

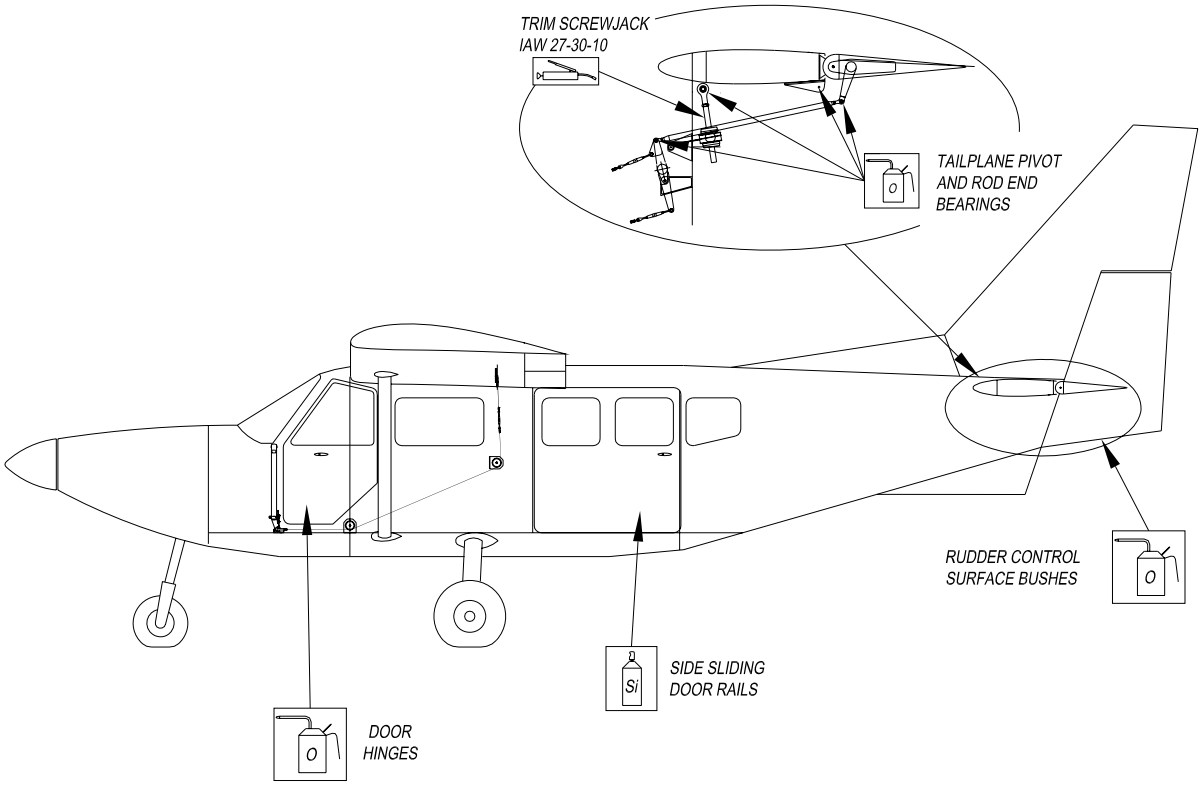


Figure 12-3 Door and Tailplane Trim Lubrication

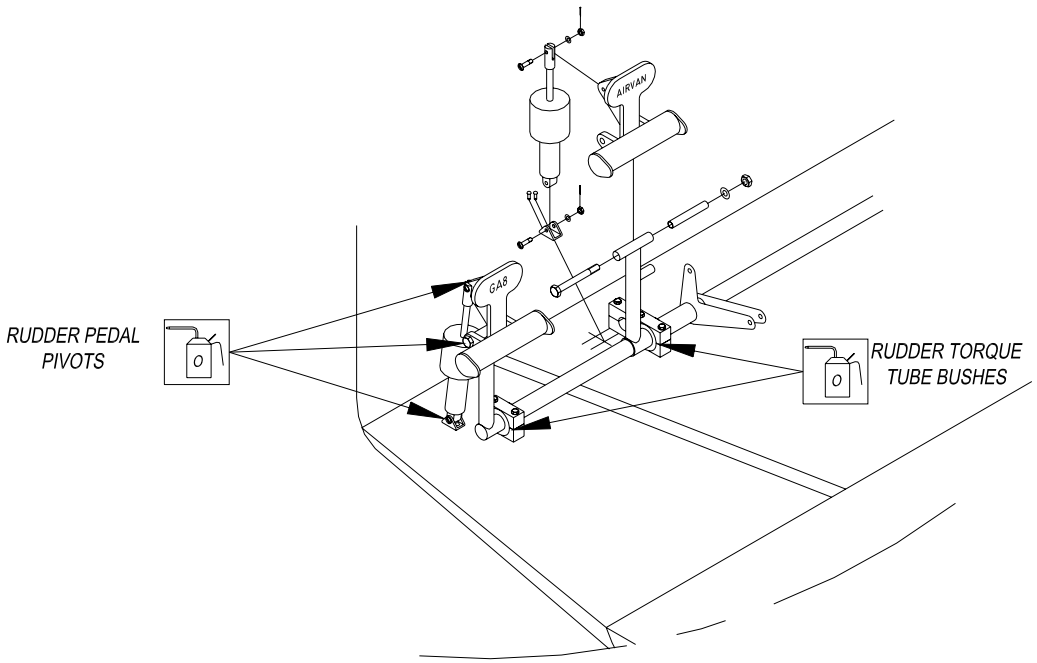


Figure 12-4 Rudder Pedal Lubrication

12-20-40 Induction Air Filter

Dust and dirt must be prevented from entering the engine induction system. Dust and dirt ingested into the engine is probably the greatest single cause of premature engine wear. The value of maintaining the air filter in good clean condition cannot be overstressed.

Visual Inspection

A visual inspection of the foam cartridge should be made at intervals of approximately eight flying hours, or more frequently under very dusty conditions. This inspection should be made to determine if the foam cartridge has been dislodged or damaged or suffering an excessive build up of debris.

Cleaning

The cartridge is treated with a sticky material during manufacture to increase its dust trapping ability and should be replaced rather than cleaned.

12-20-50 Cleaning

Windshield and Windows

The windshield and windows are made from a plastic material and consequently a certain amount of care is required to keep them clean. The following procedure is recommended:

1. Flush with clean water to remove excess dirt, bugs and other loose particles.

2. Wash with a mild soap and warm water. Use a soft cloth or sponge. Do not rub excessively.

3. Rinse thoroughly, then dry with a clean moist chamois. Do not rub with a dry cloth as this builds up an electrostatic charge that attracts dust. Oil and grease may be removed by rubbing lightly with a soft cloth moistened with kerosene. **Do not use volatile solvents** such as gasoline, alcohol, benzine, carbon tetrachloride, lacquer thinner or most commercial window cleaning sprays, as they will soften and craze the plastic.

4. After washing, the windshield and windows should be cleaned using an aircraft windshield cleaner following carefully the manufacturers instructions.

Painted Surfaces

The painted exterior surfaces of the aircraft can be washed using a mild detergent and water. Special aircraft cleaning detergents may be used or alternatively an automotive liquid detergent provided it is non corrosive and contains no abrasive materials. Stubborn oil and grease may be removed using a small amount of solvent such as kerosene.

Engine Compartment

An engine and accessories wash-down should be performed regularly to remove oil, grease, and other residue. Periodic cleaning allows proper inspection of engine components and can be an aid to discovering defects during inspection as well as reducing the potential for an engine fire during aircraft operation.

The engine and engine compartment may be washed down with a suitable solvent, then dried thoroughly.

WARNING

Do not use gasoline or other highly flammable substances for wash down. Do not attempt to wash an engine that is still hot or running. Allow the engine to cool before cleaning. Perform all cleaning operations in well ventilated work areas, preferably outside, and ensure that personal protective clothing is worn and that fire fighting an safety equipment is readily available.

CAUTION

Particular care should be given to electrical equipment before cleaning. Solvent should not be allowed to enter magnetos, starter, alternator, and the like. These components should be protected before saturating the engine with solvent. Any oil, fuel, and air openings on the engine and accessories should be covered before washing the engine with solvent. Caustic cleaning solutions should be used cautiously and should always be properly neutralised after their use.

Propeller

The propeller should be cleaned occasionally with water and a mild detergent to remove dirt, grass and bug stains. A wipe with an oily cloth will assist in corrosion proofing the propeller, particularly when operating in salt water areas.

Upholstery and Interior

The cockpit of the aircraft should be vacuumed out to remove all loose dirt gravel etc. from the seats and the floor pan. Seats should be cleaned with a household spray type cleaner and wiped down with a soft cloth. Oily spots should not be tackled with a volatile solvent such as gasoline as the upholstery material and the padding underneath may be damaged.

This page intentionally left blank

CHAPTER 20

STANDARD PRACTICES - AIRFRAME

20-00-00 GENERAL

This chapter provides standard torque values and safetying procedures that are to be used in all areas of the aircraft unless otherwise specified. The use of these standardised values and procedures will ensure security of installation and will prevent the overstressing of fasteners and components. Procedures specified in FAA publication AC 43.13-1B or subsequent issues relating to the use of aircraft hardware may be used except where stated otherwise in this document.

20-10-00 TORQUING PROCEDURES

Correct torquing of fasteners is vital to safety.

Fasteners that are under torqued are subject to fatigue failure due to insufficient pre-load. Additionally they may allow the components being fastened to move relative to one another resulting in unnecessary wear and fretting. Conversely, fasteners that are over torqued are subject to tensile failure or failure of the threaded portion of the fastener itself or its attaching nut.

Calculating Torque

If other than a direct reading torque wrench is used, some calculation of the correct torque will be required. Details of these procedures are given in the FAA publication AC 43.13-1B.

Torque Values - Bolts, Nuts and Structural Screws

The torque values provided in Table 1 apply to steel bolts, nuts, and structural screws except in applications listed below or where specific instructions to the contrary are published. It should be noted that the specified torque values assume that the threads are clean, dry and not lubricated. The values are additional to the torque required to run the nut on the thread after full engagement of any self locking feature, but prior to contact with the surface against which it will be tightened.

EXCEPTIONS TO TORQUE REQUIREMENTS

1. Screws attached to nut plates should be tightened firmly, but with no specific torque value specified.

2. Any bolts, nuts, and screws used in installation of hinged joints where the specified torque would prevent proper and free operation.

3. Screws with dimpled washers (Tinnerman washers) should not be tightened enough to fully eliminate washer crown.

4. Any bolts, nuts, and screws attaching fibre glass or plastic components or any other component that would clearly be damaged by use of the specified torque, should only be tightened sufficiently to secure the component without causing damage.

5. Wheel nuts are to be torqued to 150 in.lbs

Applicable to the following BOLTS and SCREWS:

AN3 thru AN20 AN42 thru AN49 AN73 thru AN81 AN173 thru AN186
NAS1303 thru NAS1320 NAS6600 thru NAS6608
AN509 AN525 MS20073 MS20074 MS24694 MS27039 NAS1300 NAS6605

Applicable to the following NUTS:

Tension Nuts - AN310 AN315 AN363 AN365 MS20365 MS20500 MS21042 MS21045 NAS679 NAS1021
Shear Nuts – AN316 AN320 AN364

	TORQUE LIMITS RECOMMENDED FOR INSTALLATION (BOLTS LOADED PRIMARILY IN SHEAR)							
	FINE THREAD SERIES							
	Tension Type Nuts				Shear Type Nuts			
	Nm		in lbs		Nm		in lbs	
Thread	Min	Max	Min	Max	Min	Max	Min	Max
8-36	1.4	1.7	12	15	0.8	1.0	7	9
10-32	2.3	2.8	20	25	1.4	1.7	12	15
1/4-28	5.6	7.9	50	70	3.4	4.5	30	40
5/16-24	11.3	15.8	100	140	6.8	9.6	60	85
3/8-24	18.1	21.5	160	190	10.7	12.4	95	110
7/16-20	50.8	56.5	450	500	30.5	33.9	270	300
1/2-20	54.2	78.0	480	690	32.8	46.3	290	410
9/16-18	90.4	113.0	800	1000	54.2	67.8	480	600
5/8-18	124.3	146.9	1100	1300	74.6	88.1	660	780
3/4-16	259.9	282.5	2300	2500	146.9	169.5	1300	1500
	COARSE THREAD SERIES							
	Tension Type Nuts				Shear Type Nuts			
	Nm		in lbs		Nm		in lbs	
Thread	Min	Max	Min	Max	Min	Max	Min	Max
8-32	1.4	1.7	12	15	0.8	1.0	7	9
10-24	2.3	2.8	20	25	1.4	1.7	12	15
1/4-20	4.5	5.6	40	50	2.8	3.4	25	30
5/16-18	9	10.2	80	90	5.4	6.2	48	55
3/8-16	18.14	20.9	160	185	10.7	12.4	95	110
7/16-14	26.6	28.8	235	255	15.8	17.5	140	155
1/2-13	45.2	54.2	400	480	27.1	32.8	240	290

Table 1: Torque Values - Bolts, Nuts and Structural Screws

NOTE

Castellated nuts requiring cotter pins should be tightened initially to the lower value. Torque can then be increased up to the maximum limit in order to install the cotter pin. A thick or thin washer may be added under the nut as required in order to remain within torque tolerances.

Torque Values - Tube Fittings on Flared 5052-0 Aluminium Alloy Tube

All tube fittings used on flared 5052-0 aluminium alloy tubing should be torqued to within the limits shown in Table 2 below. Under torque of these fittings leads to fluid leaks and further slackening of the joint, while over torque crushes the flare and often causes it to crack and subsequently allow leakage.

	Flared 5052-0 Aluminium Tube			
	Nm		in lbs	
Tube Dia.	Min	Max	Min	Max
1/4"	4.5	7.3	40	65
5/16"	6.8	9.0	60	80
3/8"	8.5	14.1	75	125
1/2"	16.9	28.2	150	250

Table 2: Torque Values - Aluminium Tube

20-20-00 SAFETYING PROCEDURES

All bolts and nuts, except the self locking type, should be safetied after installation. This prevents them from loosening in flight due to vibration.

Lock Wiring

Lock wiring is the most positive and satisfactory method of safetying nuts, bolt heads and turnbuckle barrels that cannot be safetied by any other practical means. Two or more units are wired together in such a manner that any tendency of one to loosen is counteracted by the tightening of the wire.

Cotter Pin Safetying

Castellated nuts and Clevis Pins (MS20392) may be safetied with cotter pins or lock-wire. The preferred method is to use cotter pins. Low carbon steel cotter pins (MS24665 or AN380) are normally used, however corrosion resistant steel cotter pins (MS24665 or AN381) may be used if desired, particularly where corrosion is a problem.

Cotter pins should be installed as follows:

1. Cotter pins must not be reused, they must be new in each installation.

2. The largest diameter cotter pin that can be accommodated by the hole or the slot shall be used.

3. When nuts are to be secured to the fastener with cotter pins, tighten the nut to the minimum of the specified torque range, and if necessary continue tightening until a slot aligns with the hole. In no case shall the maximum torque be exceeded.

4. If more than 50% of cotter pin diameter is above the nut castellation, a washer should be used under the nut or a shorter fastener should be used.

5. Install cotter pin with the head firmly in the slot of the nut with the axis of the eye at right angles to the bolt shank. Bend the prongs so that one goes towards the end of the bolt against the thread, and the other towards the head of the bolt along the flat of the nut. The prongs may be shortened if required, but should not be cut so that less than the equivalent of ¾ of the bolt diameter of each prong remains protruding beyond the slot of the nut.

6. In clevis pin installations, or in castellated nut installations where the installation procedure described above would cause interference, the cotter pin may be installed so that the axis of the eye is parallel to the shank of the clevis pin or bolt. Bend the prongs around the shank of the pin or around the nut as applicable, one each way. In the case of a castellated nut installation it is permissible to fit the eye of the cotter pin in the slot and twist the pin so that the prongs may be bent around the nut as described.

Safetying Turnbuckles

Turnbuckles shall be safetied using the procedures specified in the FAA publication AC 43.13-1B.

Self Locking Nuts

Self locking nuts are used at joints that subject neither the nut or the bolt to rotation in service. The most common (but not only) types used on the GA8 are nylon lock nuts (AN365 or MS20365) or all metal reduced head lock nuts (MS21042). Except where clearance dictates otherwise, these may be used interchangeably in corresponding sizes aft of the firewall. Forward of the firewall only metal locknuts shall be used.

Self locking nuts may be reused but <u>not</u> if they can be run on the thread by hand without using tools. After a self locking nut has been tightened at least one full thread pitch of the male thread must protrude through the nut locking feature.

20-30-00 CONTROL CABLES AND TERMINALS

The inspection and repair of all control cables in the GA8 aircraft shall be in accordance with the procedures specified in Chapter 4 of the FAA publication AC 43.13-1B.

This page is intentionally blank

CHAPTER 21

ENVIRONMENTAL SYSTEM

21-00-00 GENERAL

Ventilation air to the cockpit is provided by air inlets located on the side of the fuselage just forward of the cockpit doors. Air from these inlets is ducted to vents located on the instrument panel.

Ventilation air to the main cabin is provided by air inlets located on each side of the dorsal fairing. Air from these inlets is ducted to overhead vents that can be operated by the occupants to control the flow of air into the cabin as required.

Air for the cabin heat and demist system is drawn from the air intake plenum in the engine bay, heated using the engine exhaust system, and then ducted to the cockpit.

21-10-00 MAINTENANCE

The only required maintenance of the ventilation system will be the occasional cleaning of dust from the vents. Inspection of the cabin heat ducting should be made to ensure that there are no leaks.

Removal and Installation of Eyeball Vents

The eyeball vents may be removed by removing the four screws attaching the vent to the cabin interior. Installation is the reverse of the removal.

Lubrication and Adjustment

Dust may become trapped in the eyeball vents making it difficult to rotate. Removing the vent and blowing it clean with shop air may be necessary. If lubrication is required, a commercial greaseless silicone type spray lubricant (such as Selleys Slick) should be used to avoid dust sticking to it.

CHAPTER 23

COMMUNICATIONS

23-00-00 GENERAL

All maintenance and servicing of communication avionics equipment fitted to the GA8 should be carried out by approved agents of the avionics manufacturer.

CHAPTER 24

ELECTRICAL POWER

24-00-00 GENERAL

The GA8 has a 12/14 volt electrical system consisting of a 12 volt battery, starter motor, self regulating alternator with a nominal 14 volt output, starter solenoid, electric fuel boost pump, volts/amps meter, circuit breakers, stall and fuel warning systems, oil temperature gauge, navigation, taxi, landing and instrument lights, switches and related wiring. The electrical system is constructed as a dual bus system. Bus 1 provides power for electrical services such as the landing lights, COMM 1, GPS and instrument lights. All other services are powered from Bus 2. The bus that powers each service may be identified by examining the overhead panel. Bus 1 items are enclosed within a white line.

The master switches (mounted on the front left hand side of the overhead electrical panel) individually connect the two main busses by solenoids. The Bus 1 Master Switch connects to the battery, while the Bus 2 Master Switch simultaneously connects to both the alternator field and the battery. The feeds from the battery to the overhead electrical panel mounted main busses are protected by 50 amp (Bus 1) and 70 amp (Bus 2) circuit breakers mounted at the battery box. The master switch solenoids are protected by their own circuit breakers, as are the alternator feed (100 amps) and alternator field (10 amps). These circuit breakers along with the stall warning circuit breaker (1 amp) can be found in the floor in front of the pilot's seat under a kick proof cover. The breakers are located in this position to enable the pilot to reset the breakers in flight should such a need arise.

A combined volts/amps meter on the instrument panel provides information regarding the electrical system. The voltmeter indicates the system voltage for Bus 1 and Bus 2 (each bus is individually selected using a toggle switch), whilst the ammeter indicates the amount of electrical energy produced by the alternator. An amber alternator failure caution light will illuminate if the alternator is not delivering electrical power.

The self-regulating engine driven alternator delivers a regulated nominal 14 volts to the aircraft electrical system. An over-volt relay is fitted that will trip the alternator off line if the output voltage exceeds approximately 16 volts. This system is designed to protect any avionics or electrical equipment from damage due to excessive voltage as well as protecting the battery from over-charge. The over-volt relay can be reset by momentarily turning the Bus 2 Master Switch OFF, then ON again. If the over-volt relay trips the alternator off line a second time it can be assumed that a fault definitely exists. The alternator can be taken off line at any time by turning off the Bus 2 Master Switch, or if battery power is still required on both master circuits, by pulling the 10-amp alternator field circuit breaker. In the event that the aircraft battery goes open circuit, the alternator will continue to function. A circuit incorporating a 47000μF 40V capacitor will re-energise the alternator automatically whenever the Bus 2 Master Switch is turned OFF then back ON. The alternator then provides the energy for the field current and recharges the capacitor. A diode placed in the field circuit between the bus and the alternator field breaker prevents the capacitor energy flowing to the electrical buses and discharging the capacitor.

The overhead panel contains circuit breakers (or switch breakers) for all circuits connected to either bus, except for the stall warning breaker located in the floor. The overhead panel is marked to show which circuits are on Bus 1 and which are on Bus 2, and is backlit for night operations.

A ground power receptacle is fitted externally on the fuselage floor behind the pilots. This receptacle is wired with reverse and over voltage protection.

WARNING

The capacitor is a potential hazard to personnel maintaining the aircraft by virtue of the potential for inadvertent shorting of the positive side to ground. This would cause a significant arc, which, if it came into contact with any part of the body, could result in a minor burn or cause a reflex action that may short out other electrical connections.

Before removing the cover panel to access the underfloor area in front of the pilot's seat, perform the following action to ensure that the capacitor circuit is disarmed:

(i) pull the 1 A Bus 2 control breaker

(ii) switch the Bus 2 master switch ON

Ensure that the breaker remains open and the master switch remains ON for the duration that the cover panel is removed. Note that Bus 2 is not live whilst the Bus 2 control breaker is pulled.

WARNING

Do not perform any sort of maintenance on the electrical system in conjunction with maintenance on the fuel system. The escape of fuel fumes under the floor and/or in the aircraft may cause an explosion.

24-00-10 Systems Controller

The Systems Controller is mounted on the left hand fuselage wall directly behind the instrument panel. The Systems Controller has two primary functions. The first and most important function is to disconnect the field of the alternator when an over-voltage condition exists (nominally over 16 volts). This prevents any undue damage to the circuit components. The second function is to alert the pilot that the battery charge is low (i.e. the battery potential has fallen below a nominal 12.5 volts). The two most probable causes of this situation are:

1. The alternator belt has broken or become dislodged from the pulleys.
2. The alternator is failing to deliver the required output.

The amber "ALT" alternator caution light illuminates when the master is switched ON, and goes off when the engine is started and the alternator comes on line. The light will also illuminate when the engine is running, but with the alternator off line.

If it is suspected that the Systems Controller is not functioning properly, the following test can be carried out to confirm the integrity of the unit.

NOTE

Prior to carrying out the test detailed below, switch off all systems not involved in the test.

1. Start the engine and place a load on the circuit by turning on the landing lights. Note if the ammeter is indicating a charge or not. Stop the engine and turn the master switch to OFF.

2. If the ammeter was showing no charge while the landing lights were illuminated, place an electrical jumper lead capable of carrying 10 Amps (#18 gauge) between terminals 16 and 17 of the System Controller. This has now bypassed the over voltage capability of the Systems Controller. Restart the engine and once again turn on the landing lights to place a load on the circuit. If the ammeter now shows a slight positive charge, the Systems Controller is not functioning as intended and must be replaced or repaired by authorised personnel. If the ammeter shows no charge or an abnormally high rate of charge then the alternator is not functioning as intended and must be replaced or repaired by authorised personnel.

3. When all testing has been completed disconnect the jumper lead from the system controller.

24-00-20 Caution System Controller

The Caution System Controller is mounted adjacent to the Systems Controller. The caution system controller controls the annunciator array located on the instrument panel directly above the main flight instruments, and the fuel system caution/warning lights located above the fuel quantity gauges.

The annunciator array controlled by the Caution System Controller provides the following information:

1. ALT – an amber caution light indicating that the Bus 1 voltage has dropped below a nominal 12.5 volts. This light is also activated by the system controller- refer to **24-00-10**.

2. PITOT HEAT (if fitted) – an amber caution light indicates that the pitot heat is turned off, or turned on but the heating element is inoperative.

3. VAC – an amber caution light illuminates to indicate a low vacuum system pressure (between 3.5 and 4 psi).

4. Alternate Air – an amber caution light illuminates whenever the alternate air valve is open.

5. OIL – a red warning light illuminates when the oil pressure drops below a nominal 25 psi.

6. SWITCH ON (up to S/N GA8-04-048) or FUEL BOOST PUMP (S/N GA8-04-049 and up) – a blue light illuminates to indicate that the electric fuel pump is switched ON.

Refer to **28-40-10** for details of the fuel system caution/warning lights.

A press-to-test button and dimmer switch are located to the right of the caution/warning lights. The press-to-test button should be used to test that all the lights illuminate. Refer to the following table for troubleshooting information.

Problem	Probable Cause	Procedure	Remedy
A caution or warning light does not illuminate	Blown Globe	Light does not illuminate	Blown globe – Replace
	Short circuit	Behind instrument panel, at the Caution System Controller, remove the lead of the bad sensor circuit from its socket	
		If the light illuminates	Faulty wiring – check wiring from Caution System Controller to sensor for shorted wire. Faulty sensor – Replace
		If the light still does not illuminate	Faulty Caution System Controller – Replace
All caution and warning lights do not illuminate	"Popped" circuit breaker	Check the CAUTION SYSTEM 1 circuit breaker	Reset circuit breaker. If it continues to "pop", check wiring from main supply bus to the Caution System Controller for shorted wire.
	Broken circuit	Inspect wiring	Check wiring from main supply bus to the Caution System Controller for dirty connections or broken wire.

24-00-30 Alternator Excitation System

Excitation of the alternator without battery power to provide initial excitation is achieved by the inclusion of a circuit utilising a 47000μF 40 volt capacitor to provide a voltage to the field coil of the alternator when the battery bus is unavailable. The system is activated by cycling the Bus 2 Master Switch through ON - OFF - ON, whereby the capacitor discharges it's stored electrical energy to energise the alternator field. The alternator then provides the energy for the field current and recharges the capacitor. The charge time for the capacitor is less than one second. A diode is placed in the field circuit between the bus and the alternator field breaker to prevent the capacitor energy flowing to the electrical busses and discharging the capacitor.

WARNING

The capacitor is a potential hazard to personnel maintaining the aircraft by virtue of the potential for inadvertent shorting of the positive side to ground. This would cause a significant arc, which, if it came into contact with any part of the body, could result in a minor burn or cause a reflex action that may short out other electrical connections.

Before removing the cover panel to access the underfloor area in front of the pilot's seat, perform the following action to ensure that the capacitor circuit is disarmed:

(i) pull the 1 A Bus 2 control breaker

(ii) switch the Bus 2 master switch ON

Ensure that the breaker remains open and the master switch remains ON for the duration that the cover panel is removed. Note that Bus 2 is not live whilst the Bus 2 control breaker is pulled.

WARNING

Do not perform any sort of maintenance on the electrical system in conjunction with maintenance on the fuel system. The escape of fuel fumes under the floor and/or in the aircraft may cause an explosion.

To functionally test the capacitor system, perform the following:

(i) start aircraft engine

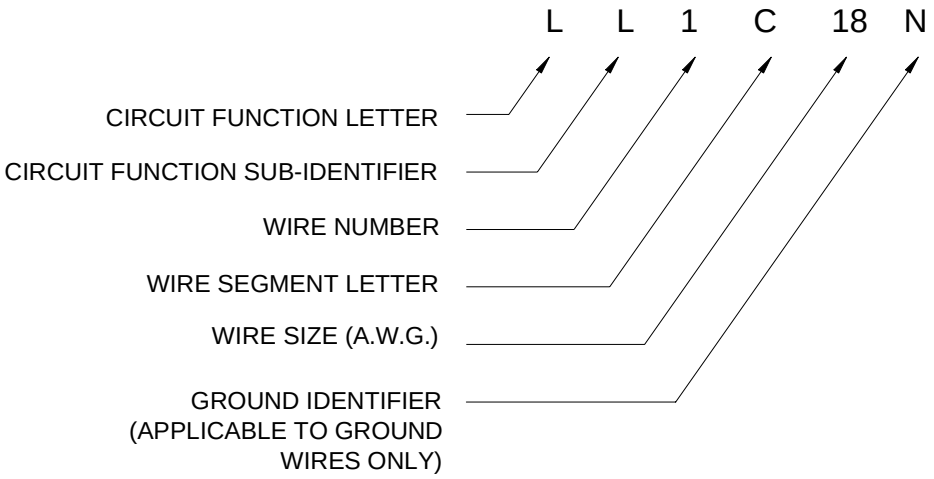
(ii) pull the 1 A Bus 2 control breaker, and turn both master switches OFF

(iii) wait a minimum of 10 seconds and turn the Bus 2 master switch ON. Do not activate the Bus 1 master switch.

(iv) ensure that Bus 2 becomes active

24-00-40 Wiring Codes

All wires used throughout the GA8 are identified according to the following convention:



The circuit function letter and sub-identifier codes are as follows:

C - Control Surfaces/Automatic Pilot
CA Automatic Pilot
CH Aileron Roll
CP Elevator Pitch
CR Rudder Trim/Yaw
CT Elevator Trim

D - Instruments
DA Ammeter
DC Clock
DH Flight Hour Meter

E - Engine Instruments
EE Instrument Cluster
EF Fuel Flow
EH Cylinder head Temperature
EQ Fuel Quantity Gauge and Transmitter
ER Tachometer
ET Oil Temperature

F - Flight Instruments
FA Attitude
FB Turn and Bank
FC Compass
FH Heater – Stall Warning and Pitot Tube
FS Stall Warning

H - Heating and Ventilation
HC Air Conditioning
HR Avionics Fan

J Ignition
JK Spark Advance
JM Magneto
JS Shower of Sparks

K - Engine Control
KS Starter Control

L - Lighting
LB Rotating Beacon
LC Cabin/Courtesy
LD De-ice
LE Instrument
LL Landing
LM Map/Cockpit
LN Navigation/Position
LR Radio
LS Strobe/Recognition Lighting
LT Taxi

P - DC Power
PB Battery Circuit
PC Accessory Power
PE External Power Source
PG Generator Circuits
PS Starter Power

Q - Fuel and Oil
QA Auxiliary Fuel Pump

R - Radio (Nav and Comm)
RA Audio Systems and Audio Amplifier
RB Marker Beacon
RC Command
RD Radio Direction Finding
RH High frequency
RJ Interphone
RM Distance Measuring Equipment (DME)
RN VOR/ILS Navigation
RS Satellite Navigation GNSS/GPS
RV VHF

S - Radar
SW Weather Radar/Strike Finder

U - Miscellaneous Electronics
UT Identification – Transponder

W - Warning and Emergency
WA Annunciator
WB Battery/Alternator

WD Warning Lamp Dim
WH Pitot Heat On
WK Alternate Air
WP Low Oil Pressure
WQ Low Fuel Level
WS Switches
WT Lamp Test
WV Low Vacuum Warning

All electrical connectors are labelled as P for the plug and J for the socket. Each matching pair is identified with a unique identifying number, e.g. plug P101 connects with socket J101.

The aircraft manufacturer may fit some aircraft with optional equipment. In this instance the electrical connectors associated with the option will be prefixed with a number that identifies the option. Even though a plug or socket may have a prefix, its associated connector will not be prefixed if it is part of the standard aircraft build. For example, plug label 1P28, where 1 identifies the option as the standard Australian VFR avionics package, and P28 identifies the connector that connects with socket J28.

24-00-50 Terminal Labelling

Refer to **24-10-00** for information regarding the identification of terminals.

24-00-55 Alternator Belt Tension

An incorrectly tensioned alternator belt will wear rapidly, slip and reduce the alternator output. The belt must be checked for proper tension at installation, within 10-20 hours of installation, and at each 100 hour inspection thereafter.

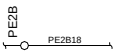
The 0.5” wide belt used in the GA8 should be tensioned in accordance with Lycoming Service Instruction No.1129B or later revision.

24-00-60 Electrical Schematic Symbols

CONNECTORS

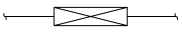
PLUG with plug number (P38) shown. Wiring connection pins installed, wiring position numbers shown.

RECEPTACLE with receptacle number (J38) shown. Wiring connection sockets installed.



TERMINAL CONNECTION with terminal connection identification number (PE2B) and wire code shown (PE2B18).

SOLDERED CONNECTION



PERMANENT SPLICE

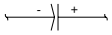
LIGHTS

INCANDESCENT LIGHT with terminal identification numbers (+ and GND) shown.

STROBE LIGHT

POWER COMPONENTS

BATTERY - MULTICELL

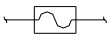


CAPACITOR

CIRCUIT BREAKER with amp rating shown.

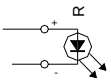
CIRCUIT BREAKER SWITCH with amp rating shown.

DIODE



FUSE

GROUND



LIGHT EMITTING DIODE (LED) with colour code (R = red) and terminal connection identification numbers (+ and -) shown.

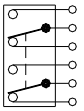
PHOTOCELL

RESISTOR

RHEOSTAT

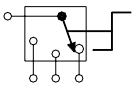
SWITCHES AND RELAYS

SWITCH single pole, double throw.

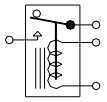


SWITCH double pole, double throw.

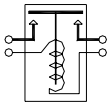
SWITCH single pole, momentary contact, operate by pushing.



SWITCH 3 position, operate by rotating.



RELAY SINGLE POLE



SOLENOID SINGLE POLE

POSITIVE CONTACT

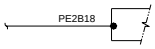
MOMENTARY CONTACT

EXAMPLES OF SWITCH AND RELAY CONTACTS, various combinations are to be found in the switch and relay assemblies.

WIRE

WIRE with wire code shown.

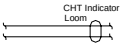
WIRE STOWED, for future optional equipment installation.



WIRE AS PART OF A SUB-ASSEMBLY with wire code shown.

WIRE SHIELDED with wire code shown.

WIRE MULTI-CORE, TWISTED AND SHIELDED with wire code shown.



WIRE LOOM ASSEMBLY, supplied by equipment manufacturer with assembly P/N shown.

24-10-00 ELECTRICAL SYSTEM SCHEMATIC

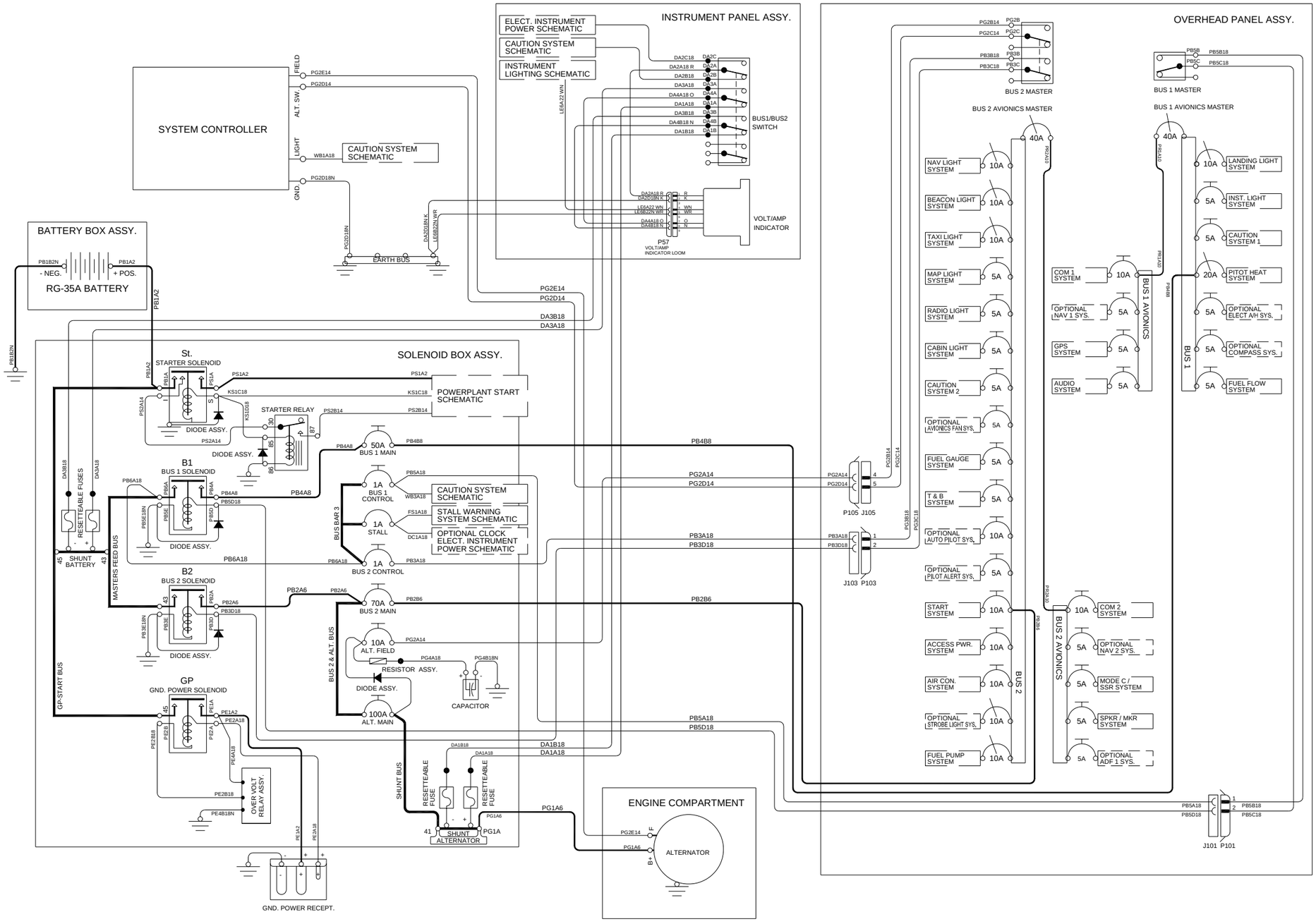


Figure 24-1 Power Distribution Schematic

POWER DISTRIBUTION SCHEMATIC

This page intentionally left blank

POWERPLANT START SCHEMATIC

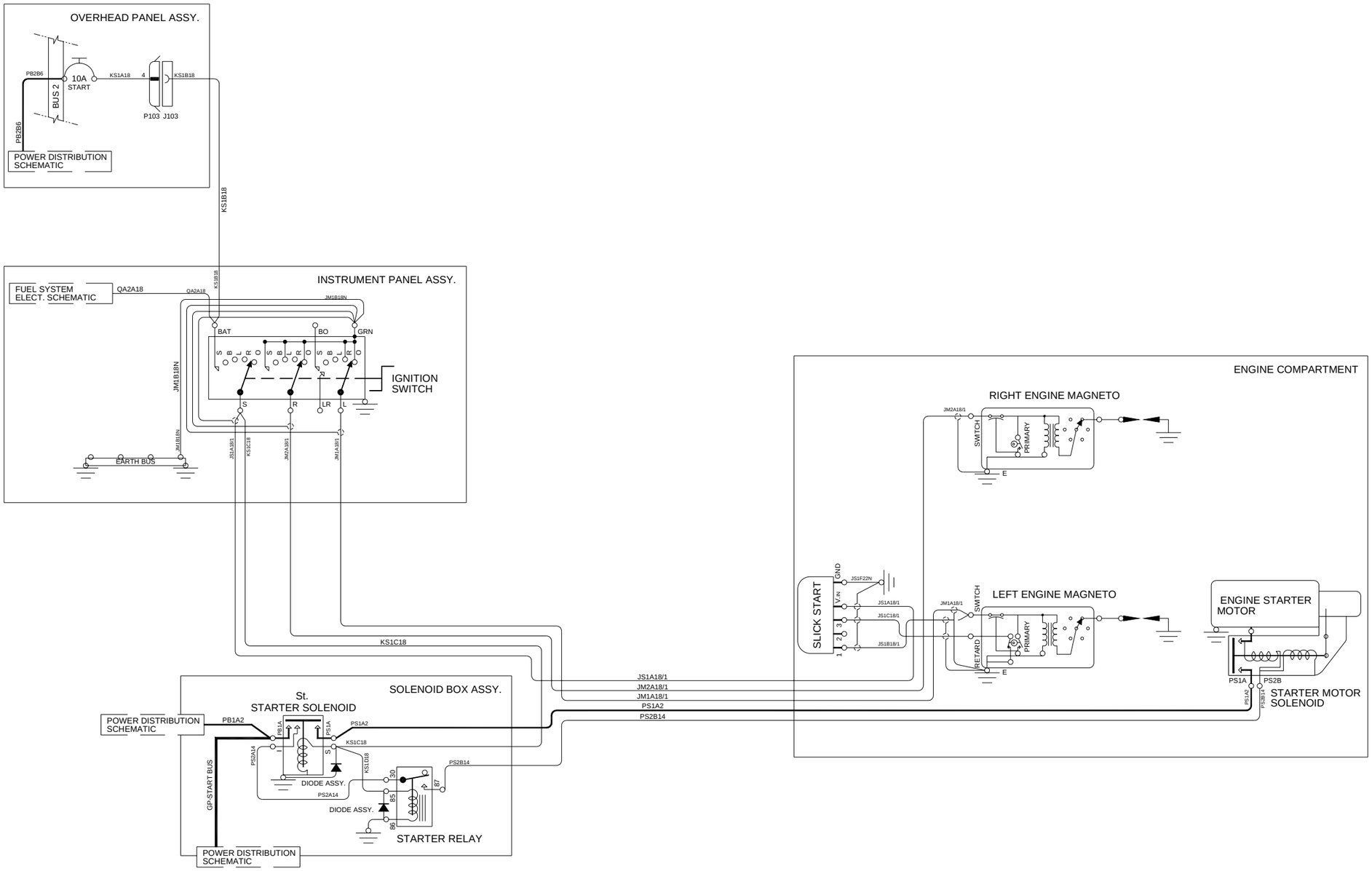


Figure 24-2 Powerplant Start Schematic

This page intentionally left blank

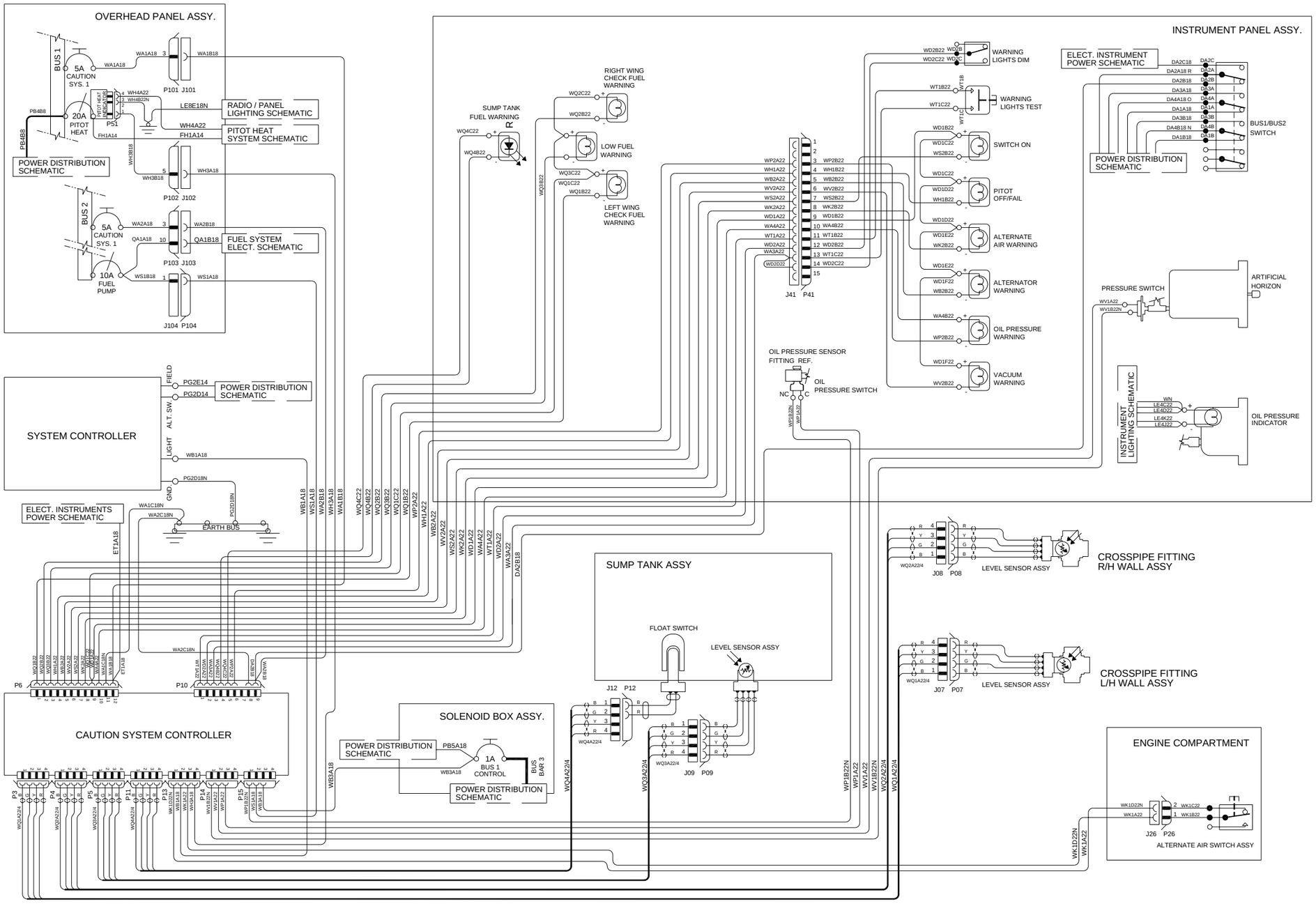


Figure 24-3 Caution System Schematic

CAUTION SYSTEM SCHEMATIC

This page intentionally left blank

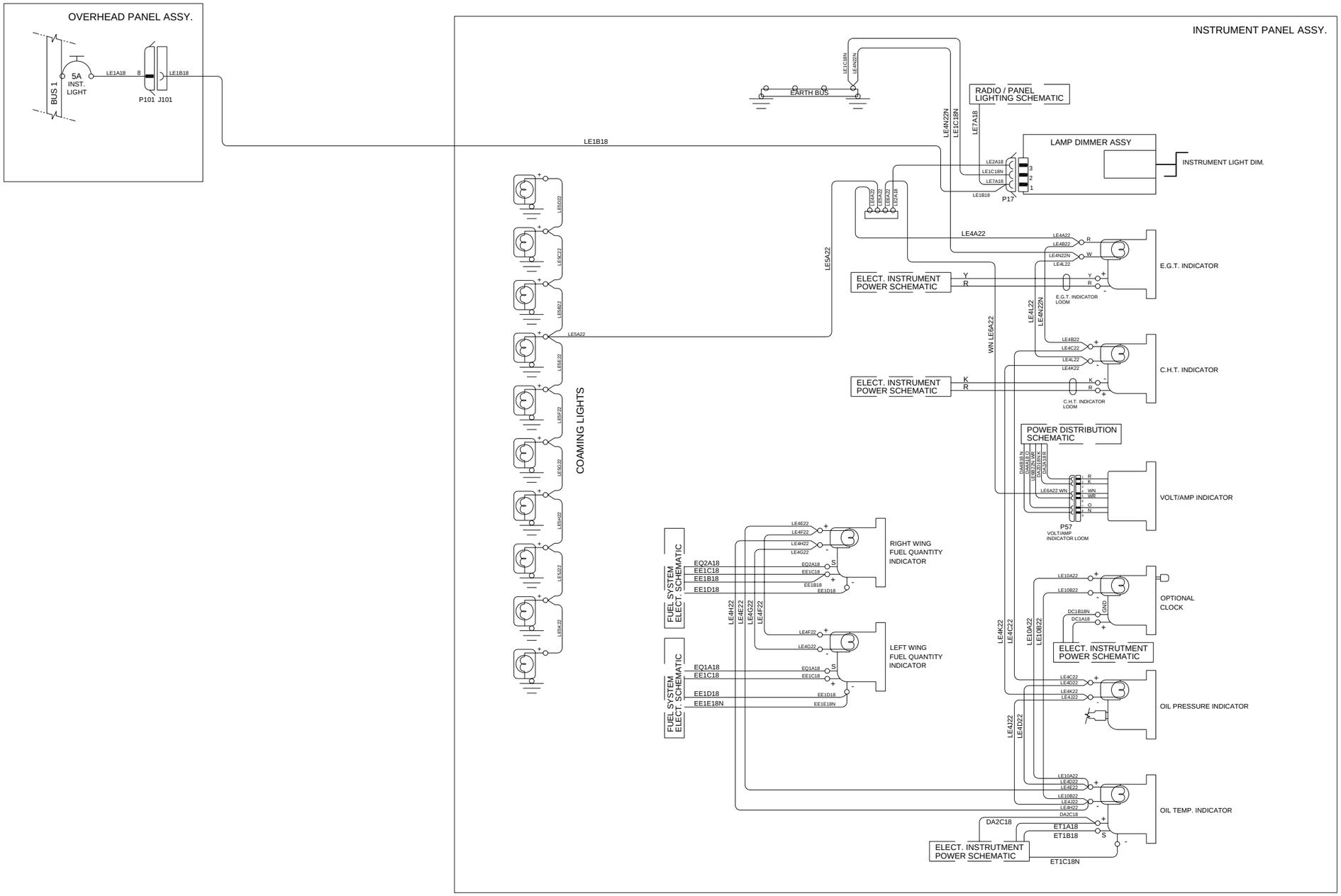
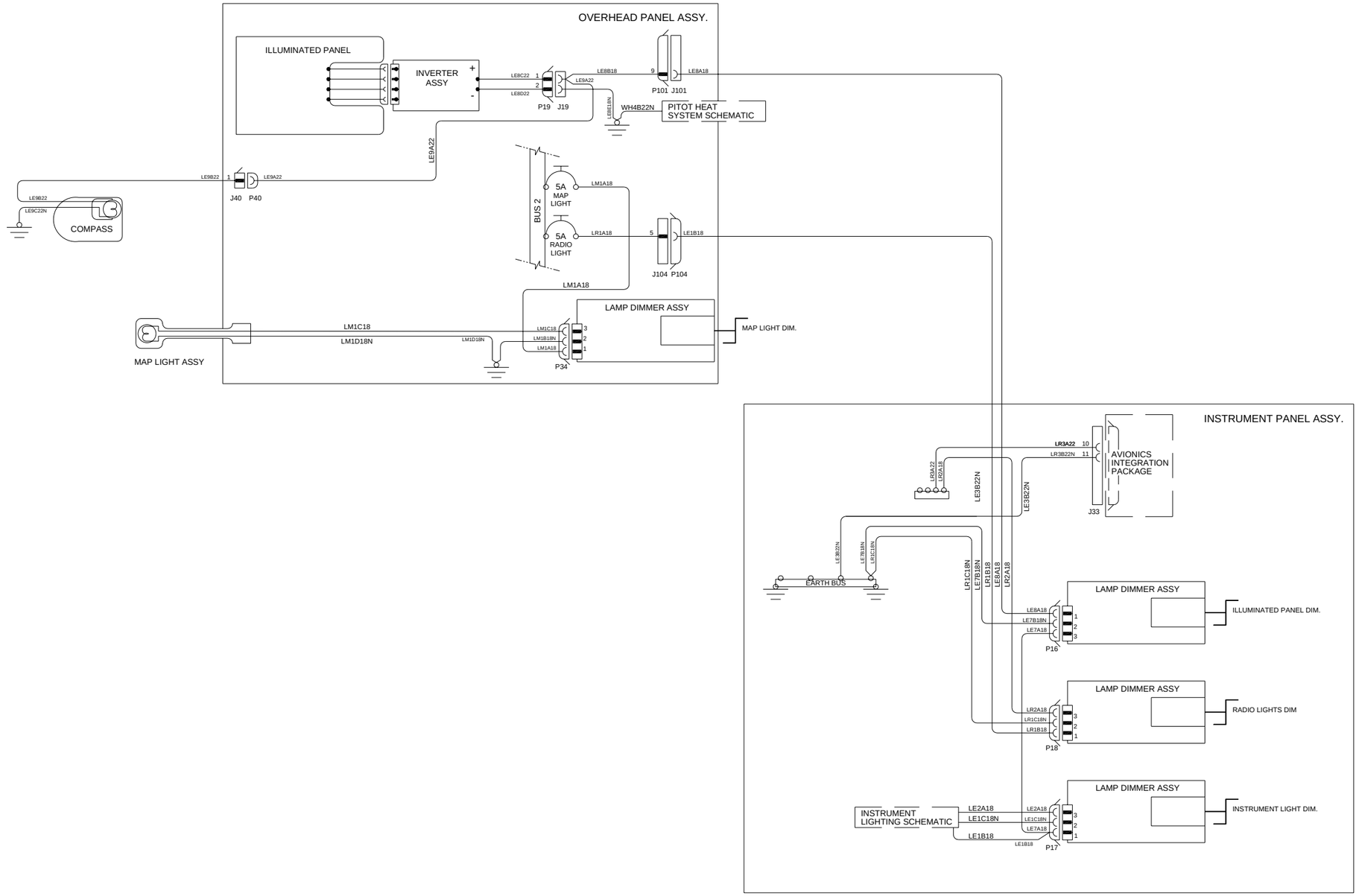


Figure 24-4 Instrument Lighting Schematic

This page intentionally left blank



RADIO / PANEL LIGHTING SCHEMATIC

Figure 24-5 Radio/Panel Lighting Schematic

This page intentionally left blank

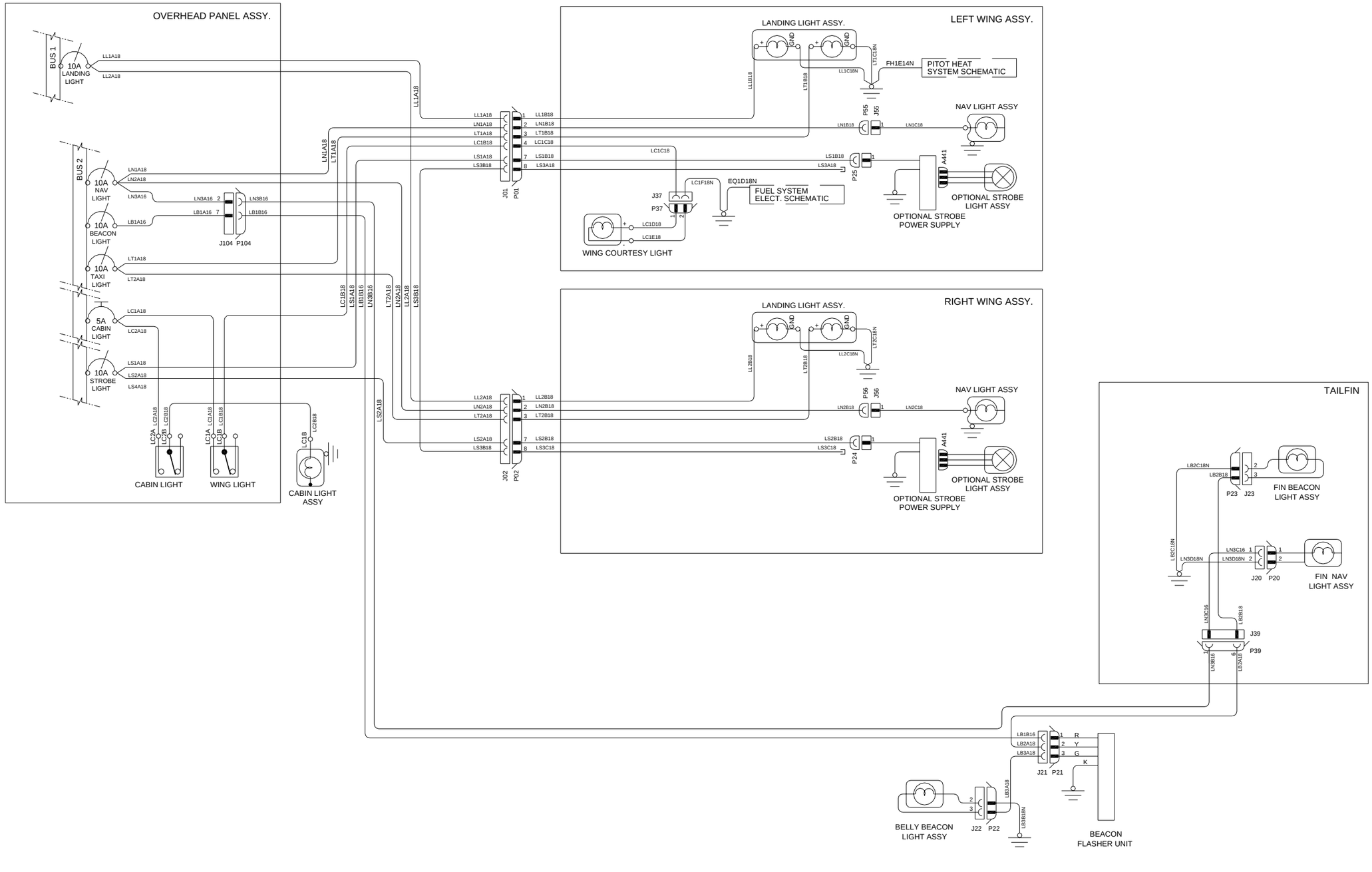


Figure 24-6 Lighting Schematic – Beacons (up to S/N GA8-03-042)

This page intentionally left blank

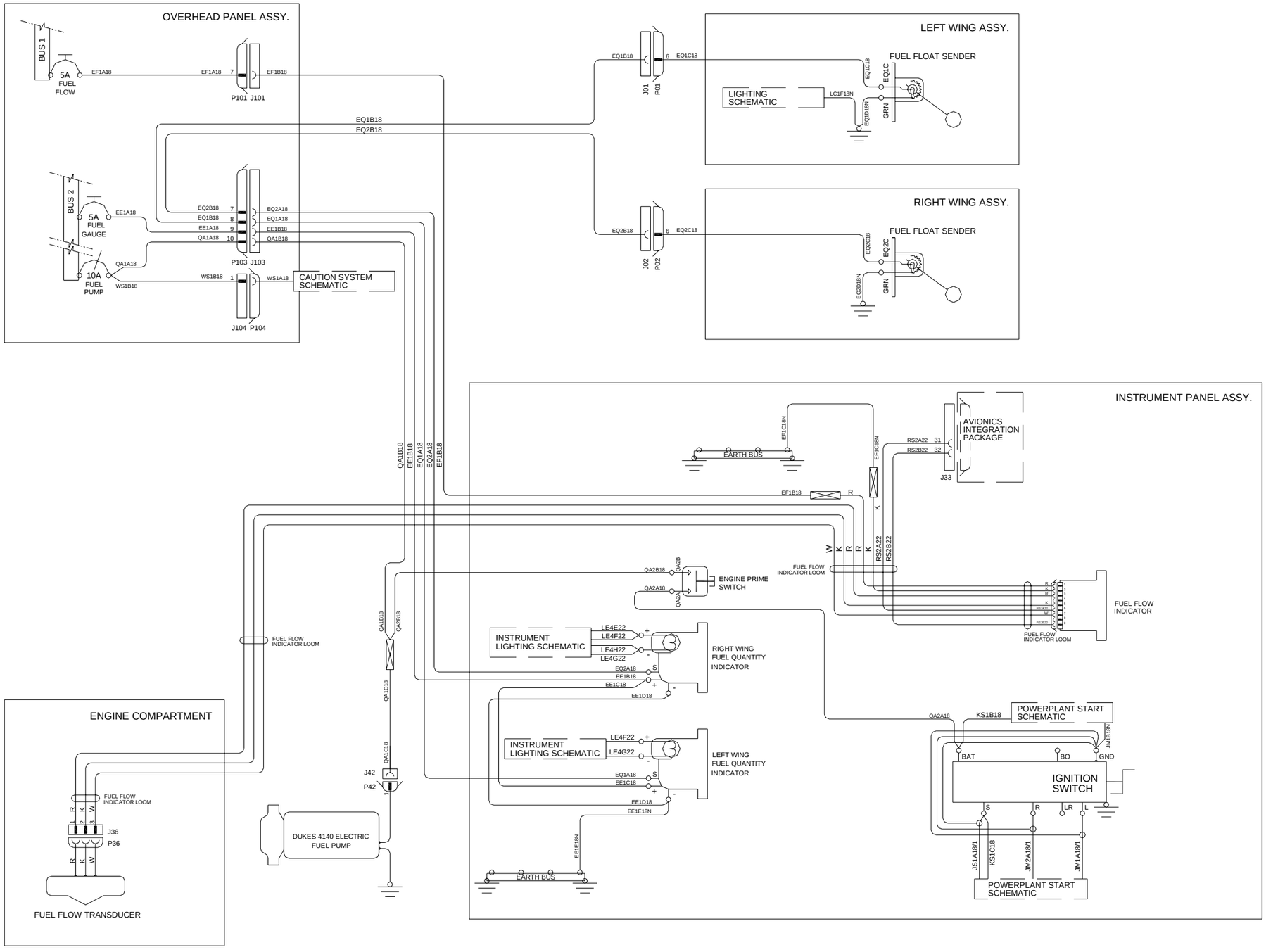


Figure 24-7 Fuel System Electrical Schematic (A/C up to S/N GA8-06-107)

This page intentionally left blank

PITOT HEAT SYSTEM SCHEMATIC

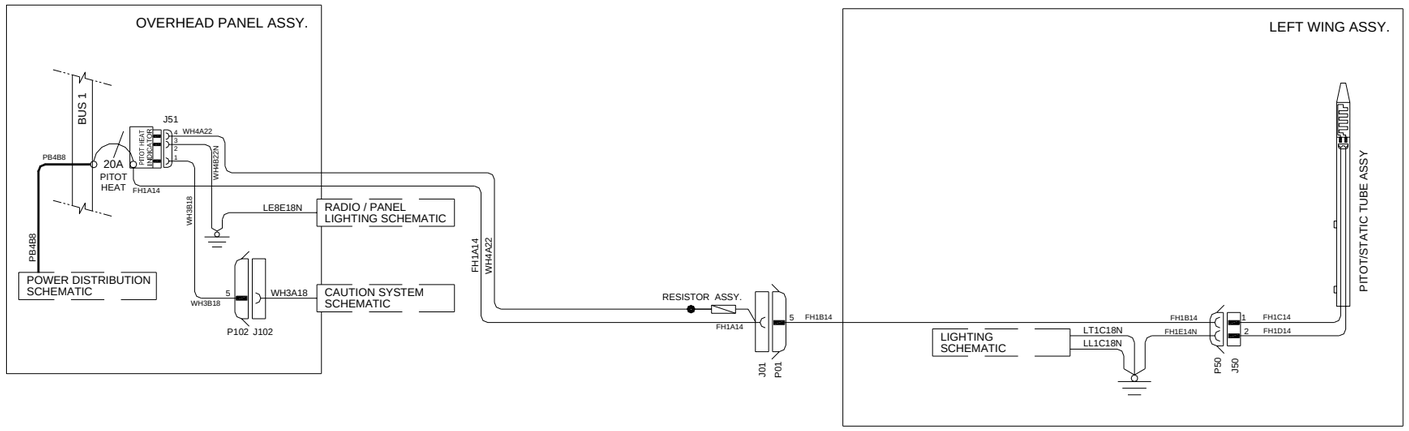


Figure 24-8 Pitot Heat System Schematic

This page intentionally left blank

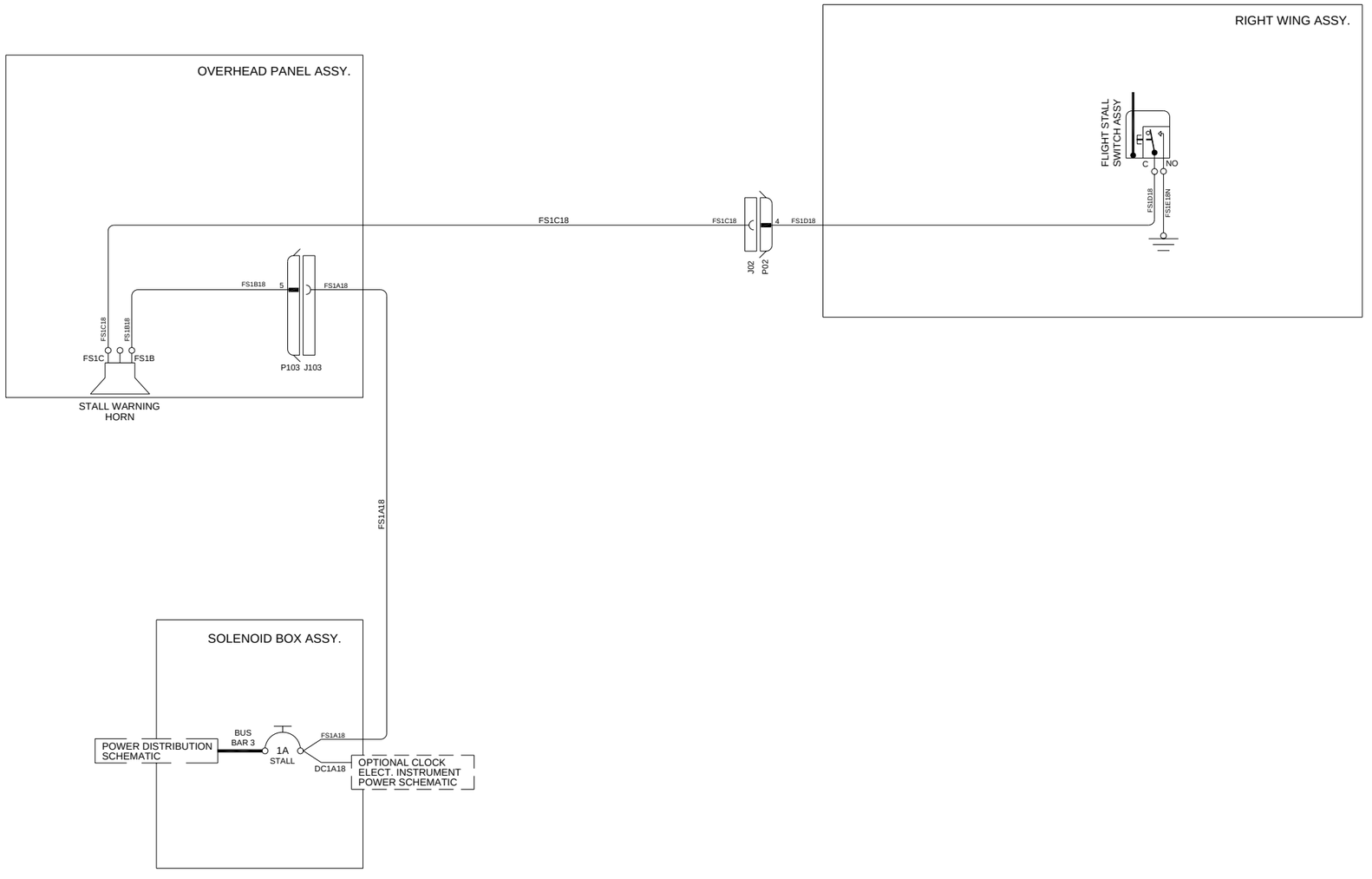
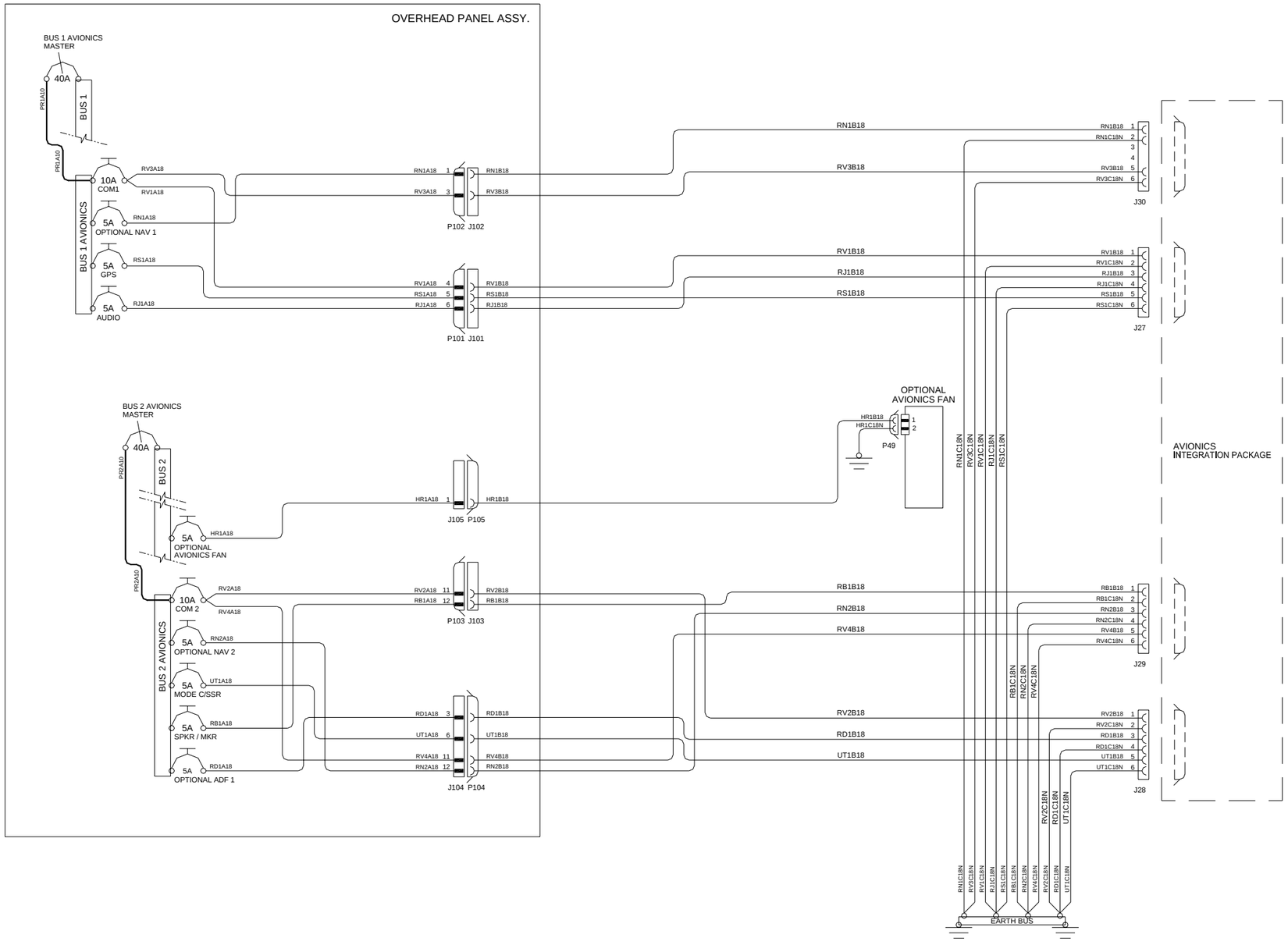


Figure 24-9 Stall Warning System Schematic

STALL WARNING SYSTEM SCHEMATIC

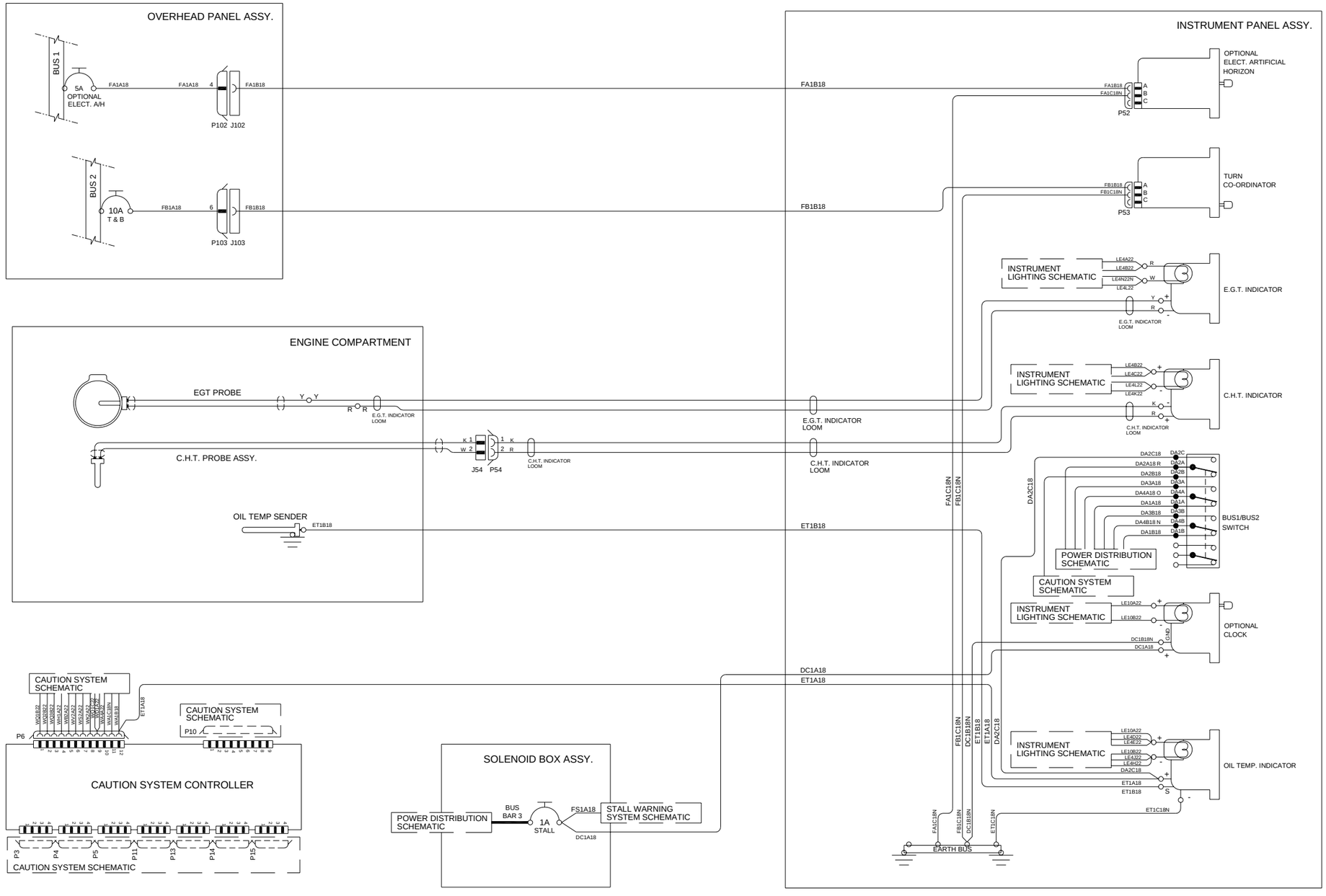
This page intentionally left blank



AVIONICS ELECTRICAL POWER SCHEMATIC

Figure 24-10 Avionics Electrical Power Schematic

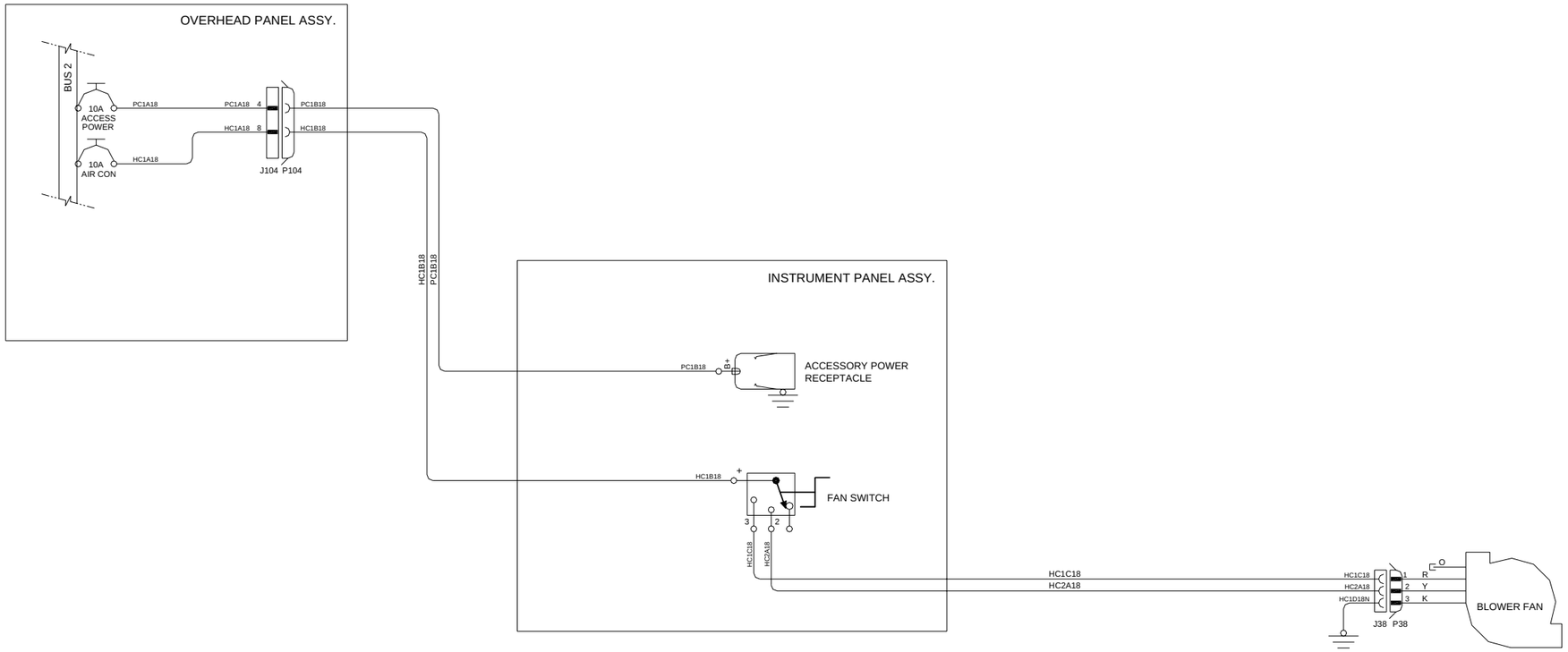
This page intentionally left blank



ELECTRICAL INSTRUMENT POWER SCHEMATIC

Figure 24-11 Electrical Instrument Power Schematic

This page intentionally left blank



MISCELLANEOUS SYSTEMS SCHEMATIC

Figure 24-12 Miscellaneous Systems Schematic

This page intentionally left blank

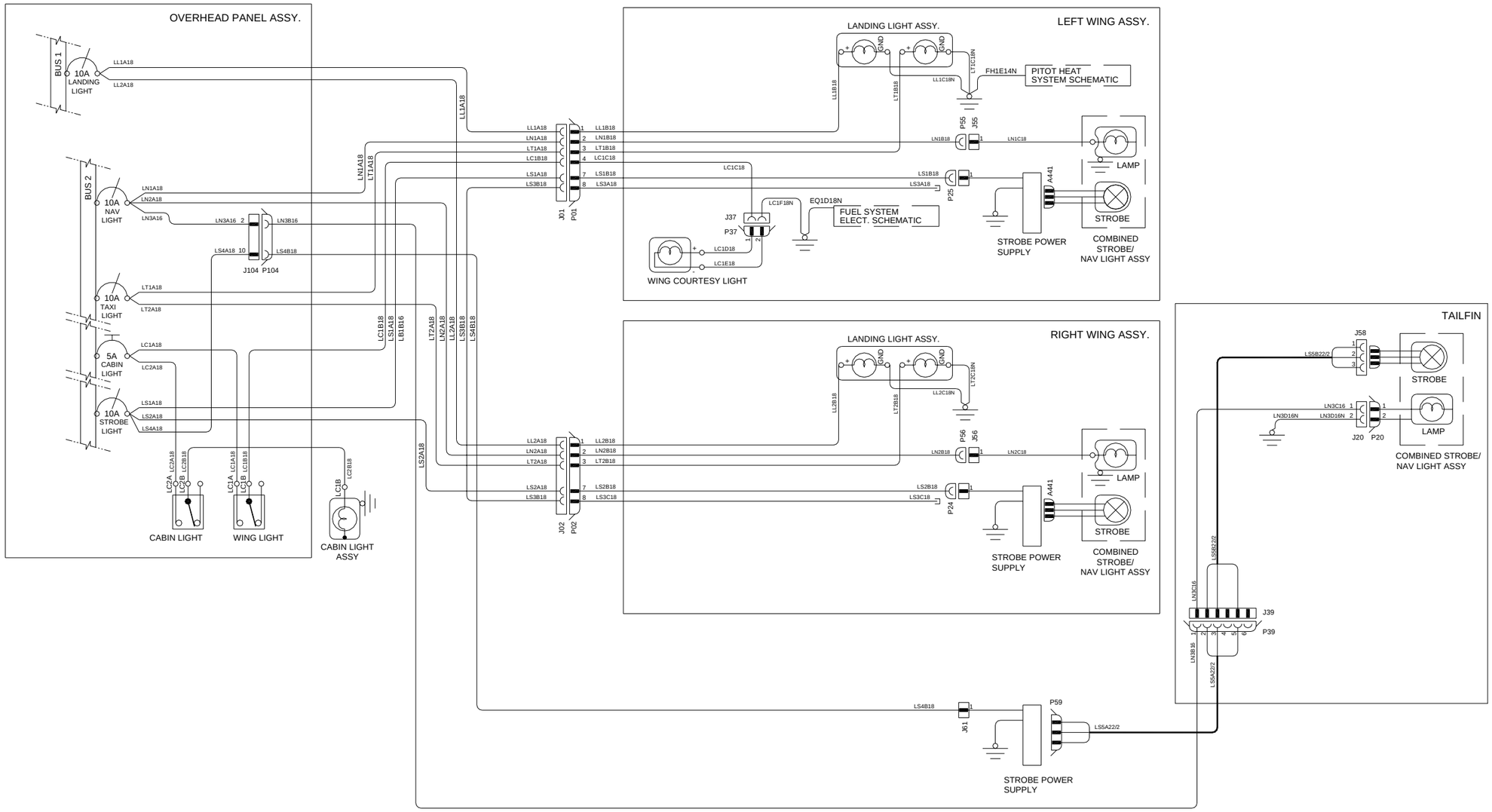


Figure 24-13 Lighting Schematic – Strobes (S/N GA8-04-043 and up)

This page intentionally left blank

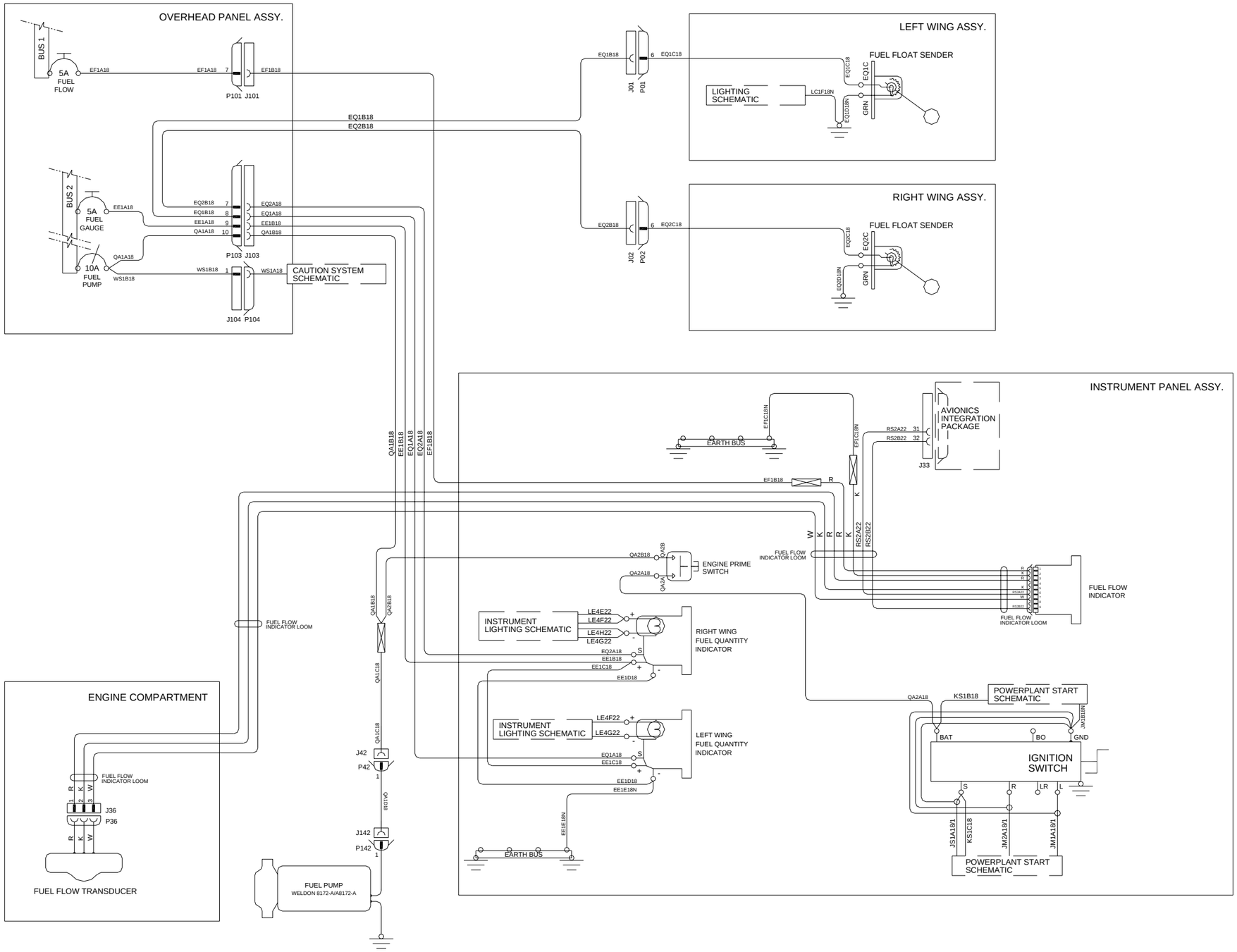


Figure 24-14 Fuel System Electrical Schematic (A/C S/N GA8-06-108 and up, A/C incorpotating SB-GA8-2005-30)

This page intentionally left blank

CHAPTER 25

EQUIPMENT/FURNISHINGS

25-00-00 GENERAL

This chapter covers the equipment and furnishings located in the flight and passenger compartment areas. It does not include items covered in other chapters.

25-10-00 FLIGHT COMPARTMENT

Flight compartment equipment and furnishings consists of the pilots seat, a second occupants seat located to the right of the pilots seat, together with associated seat belt/shoulder harness assemblies.

25-10-01 Pilots Seat

The pilot seat is mounted on a seat track rail attached to the cockpit floor structure. A handle is situated on both lower rear sides of the seat which when lifted releases locking pins to enable fore and aft movement of the seat as desired.

The seat cushions are attached to the seat by Velcro fasteners allowing easy removal.

The seat base is designed to crush in the event of an accident that induces large vertical decelerations. If the seat is dented, creased or damaged in anyway (maybe due to mishandling, being knocked with cargo or kicked by passengers) it should be taken out of service. **UNDER NO CIRCUMSTANCES SHOULD IT BE REPAIRED.** No repair patches or replacement material should be added to the seat as this will compromise its crashworthiness. The seat should be returned to the manufacturer for assessment and repair or replacement.

Removal and Installation of Pilots Seat

To remove the pilot's seat from the aircraft, remove the MS24694-S52 screw and seat track rail stop from the front of each seat track. This will allow the seat to be moved forward whereby the front attachment lugs can be disengaged from the front of the seat track, while the rear ones can be disengaged through the gap in the flanges of the seat track.

Installation is the reverse procedure.

Maintenance of Seat Adjustment Mechanism

The two seat locking pins and operating mechanism will require occasional lubrication with a light oil to ensure proper operation. These must operate freely and not bind.

The seat locking pins must enter the seat track rails to a depth of at least ½" (12 mm) when fully engaged. Ensure that the pins fully disengage from the seat track rail when the release mechanism is activated.

WARNING

It is extremely important that the seat stops are correctly installed and that the locking pins operate correctly and engage the seat rails as specified. If these precautions are not observed, especially during take off and landing, acceleration and deceleration could possibly permit the seat to move creating a hazardous situation.

Maintenance of Seat Cushions and Covers

Inspection

At periodic inspection the condition of the seat cushions and covers should be inspected for evidence of wear and damage. Obvious signs such as abrasion, cuts, tears, chafing, damage to fasteners and separation at seams should be assessed and replaced. As a general guide any defect that exposes the internal cushion material would mandate replacement. Damaged or worn fastening material or components that are not capable of securely fastening the cushions or covers in their appropriate positions are to be replaced. Cushions should be inspected for signs of deterioration, wear, delamination, exfoliation, and damage from liquids and fluids, which may not be obvious without removal of the covers.

Repair

Any seat cushion or cover that fails to pass the above inspection procedure should be replaced with manufacturer's parts, or be repaired by an approved organisation. After any observed, known or notified spillage or leakage of liquids or fluids, regardless of maintenance status, the seat cover should be removed from any affected cushion(s), the cushion and cover sponged or cleaned with clean warm water (do not over-wet the fabric) and a mild detergent, then inspected for signs of damage. The cushion should be allowed to dry prior to re installation onto the seat if it is considered suitable to do so.

Seat Cover Cleaning

Regular vacuuming of the seat covers is recommended. Spot clean any spills or stains as soon as possible. Gently scrape any soil or mop any liquid from the surface of the fabric - do not scrub. Apply proprietary cleaning agents strictly according to the manufacturers instructions to remove the residue of the spill. Do not saturate the fabric with water or other cleaning liquids. Spots may be treated with a dry-cleaning solvent to the manufacturer's directions – always test on a concealed area before proceeding.

For overall cleaning, the covers should be dry cleaned only. The flameproofing treatment applied to the seat cover fabric is durable to a minimum of five (5) dry cleaning cycles.

25-10-02 Second Occupants Seat

The second occupants seat, located to the right of the pilots seat, is for all practical purposes identical to the pilot's seat.

25-10-03 Occupant Restraint System

The pilot seat and second occupant seat are each fitted with an Am-safe 4054-1-011-2396 4-point inertia reel harness rated at 3000 lbs (1360 kg). The service life of the restraint system depends upon the service environment in which it is used and the degree of use to which it is subjected. This subsequently places the onus for continued airworthiness of the restraint on the operator since the flight times, usage and operating environment will vary between operators. The frequency of the inspection interval should be adjusted appropriately by the operator to ensure continued airworthiness of the restraint.

If the restraint is no longer usable based on the inspection for continued or renewed airworthiness, or has reached its service life of 84 months, the restraint system must be discarded or returned to Am-safe or an Am-safe approved repair station for overhaul/repair.

Am-safe Aviation
1043 N. 47th Avenue
Phoenix Arizona 85043
USA
Tel.: +1 602 850 2850
www.amsafe.com

Inspection Intervals

Continued or renewed airworthiness of the restraint system is determined by means of inspections that shall be conducted at the following intervals:

(a) Concurrently with the periodic inspection of the aircraft,
(b) When the equipment has sustained damage or if malfunctions occur,
(c) When the equipment has been, or is suspected to have been over-stressed.

Inspection Procedure

General

Inspect the harness and ensure that it is clean and does not contain:

(a) Dirt
(b) Oil or grease
(c) Other unwanted particles or substances

Make sure all parts are satisfactorily attached.

Webbing

Examine the harness webbing for:

(a) Cut or worn edges
(b) Damaged stitching
(c) Broken fabric threads
(d) Tears
(e) Excessive chafe marks
(f) Excessive wear
(g) Excessive fusing

NOTE

Slight wear of the webbing is permitted. However, excessive web wear that has progressed to cut or worn edges must be replaced, as described above.

Replace webbing if any of the following are observed:

(a) Any web that is cut or torn on the edge
(b) Any fray that is greater than 10% of the webbing's width, or exceeds 8 inches (200 mm) in length
(c) Webbing with more than 15 broken yarns in locations other than the edge
(d) Webbing that is frayed or distorted sufficiently to cause improper operation of any portion of the restraint system
(e) Any more than 15 torn stiches in a stitch pattern

A limited amount of frayed webbing will retain sufficient strength necessary to meet the required strength. Frayed webbing is defined as broken filaments from either the warp (longitudinal) yarns or the filler (transverse) yarns. The number of broken filaments should not be sufficient to obscure the identity of any yarn when viewed from a distance of about 8 inches (200 mm).

Verify the markings on the identification placards are legible.

Fittings, Buckle and Connector Assemblies, and Reel Assembly

Examine fittings, buckle and connector assemblies, and the reel assembly for:

(a) Burrs, nicks or scratches
(b) Cracks
(c) Dents
(d) Corrosion

Ensure moveable parts operate correctly.

Cleaning

Removal of dirt, oil and grease will help the restraint system last longer and prevent corrosion of the metal parts. Use water and a mild soap to clean the webbing, and a cloth moistened with isopropyl alcohol to clean the metal fittings. After cleaning the assemblies, protect them from sunlight, moisture, dust or other contamination until they can be visually inspected and returned to service.

If it is necessary to keep the restraint system in storage for any length of time, the temperature must be maintained between –30°C and 55°C.

Removal and Installation

Removal of the harness assembly is simple and obvious. The inertia reel is attached to the seat using four MS24694-52 screws, AN960-10 washers and MS21042-4 nuts. Each lap belt is attached using an AN5-16 bolt, AN960-516 washer and MS21042-5 nut. When re-installing the harness ensure that the correct hardware is used.

Refer to Figure 25-1 for details of the pilot seat harness installation in the GA8 aircraft.

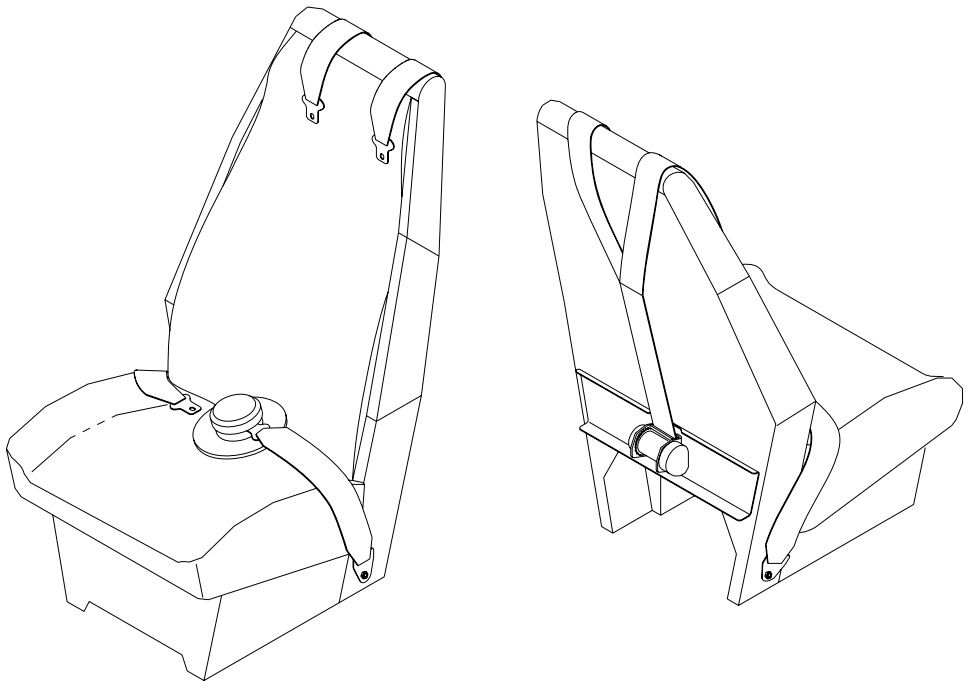


Figure 25-1 Pilot and second occupant seat harness installation

Service Life

The webbing of the restraint system has a service life of 84 months, after which it is to be replaced. Service life is defined as the sum of storage life and installation life, and is calculated from the month of manufacture stated on the webbing label.

Buckle and Connector Repairs

If repair to the buckle and connector assemblies is warranted, disassemble the unit only to the level necessary to make the repair. When new parts are necessary, refer to the Am-safe Illustrated Parts List for the correct part numbers.

Burrs, nicks and scratches result in material being raised above the normal surface. This material must be removed to make sure that the parts fit together correctly.

(a) Use an abrasive cloth to remove minor nicks and scratches from aluminium parts.
(b) Use crocus cloth to remove minor nicks and scratches from steel parts.
(c) For painted surfaces, apply a coat of epoxy primer followed by a coat of black epoxy paint.
(d) Clean the parts when the repair is complete.

CAUTION

Replacement of damaged metal parts on the restraint system is not permitted.

25-10-04 Flight Compartment Insulation

The flight compartment is insulated by fitted panels of Polyimide AC-350, a lamination of semi rigid skins on a foam core. The edges of the panels are sealed with Orcotape OT-26C, OT-49W, OT-54W, OT-157 or E&H 770-3FRD. These panels are resilient and durable provided they are handled with reasonable care. Repeated bending, flattening or deformation of the panels will cause the internal foam to be crushed resulting in degraded insulation qualities. Damaged panels should be replaced.

25-20-00 PASSENGER COMPARTMENT

The passenger compartment equipment and furnishings consists of up to six passenger seats and associated seat belt/harness assemblies, floor coverings, trim panels and insulation. Additional cargo nets may be used for the carriage of freight.

25-20-01 Passenger Seats

Each passenger seat is secured by docking into four anchor points attached to the cabin floor structure. The anchor points are fitted with leaf spring retainers to prevent the seat feet for inadvertently disengaging. These seats are not adjustable. The passenger seats are handed (i.e. left or right hand) due to the shoulder restraint guide and attachment points.

The seat cushions are attached to the seat by Velcro fasteners allowing easy removal.

The seat base is designed to crush in the event of an accident that induces large vertical decelerations. If the seat is dented, creased or damaged in anyway (maybe due to

mishandling, being knocked with cargo or kicked by passengers) it should be taken out of service. **UNDER NO CIRCUMSTANCES SHOULD IT BE REPAIRED.** No repair patches or replacement material should be added to the seat as this will compromise its crashworthiness. The seat should be returned to the manufacturer for assessment and repair or replacement.

Maintenance of Seat Cushions and Covers

The passenger seat cushions and covers are made from the same materials as used in the pilot seat. Refer to **25-10-01** for maintenance information.

25-20-02 Occupant Restraint Systems

The passenger seats are fitted with Amsafe 3026-1-011-2396 or 3026-1-021-2396 3-point inertia reel lap/sash restraint systems rated at 3000 lbs (1360 kg). Apart from *Removal and Installation* (see below), for maintenance purposes the harness is mechanically similar to the 4-point harness fitted to the pilot seat. Refer to **25-10-03** for maintenance information.

Refer to Figure 25-2 for details of the passenger seat harness installation in the GA8 aircraft. Removal of the harness assemblies is obvious, but during re-installation care must be taken to ensure that the correct hardware and method of installation is used as indicated in Figure 25-2.

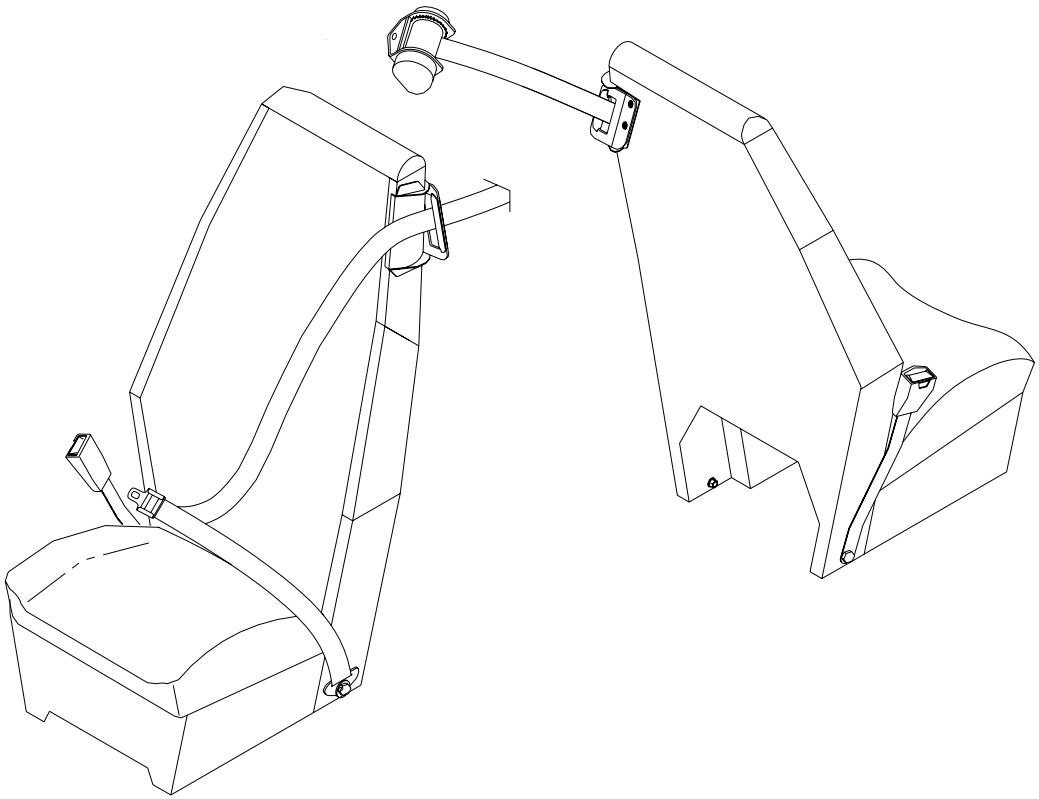


Figure 25-2 Passenger seat harness installation – typical

Removal and Installation

Removal of the harness is simple and obvious. The inertia reel end is attached to the fuselage using four MS24694-52 screws, AN960-10 washers and MS21042-3 nuts. The buckle end is attached to the seat using an AN5-16A bolt, AN960-516L washers and MS21042-5 nut. The stalk is attached to the seat using an AN-15A bolt, AN960-516L washers and MS21042-5 nut. When re-installing the harness ensure that the correct hardware is used.

25-20-03 Floor Coverings

The floor coverings of the GA8 are manufactured from flame resistant materials. If the floor coverings need replacing, only materials meeting FAR 23.853(a) at Amendment 54 or equivalent FAR 25 flammability requirements may be used.

25-20-04 Interior Trim Panels

The cabin of the GA8 is lined throughout with fibreglass panels manufactured using a flame retardant resin. Repairs to these panels should only be made using the materials specified in **51-30-00**.

25-20-05 Passenger Compartment Insulation

To reduce noise and provide a degree of thermal insulation, bags of Orcofilm AN-19, AN-49W or AN-54W filled with flame retardant insulation are fitted into the wall and roof cavities. Access to the insulation requires the interior trim panels to be removed, and care should be taken during maintenance to ensure that the bags are not cut, torn or otherwise damaged. Insulation bags that have been damaged should be replaced, or if the damage is minor, repaired with a flame resistant material such as Orcotape.

25-20-06 Cargo Nets

The cargo nets used in the GA8 are stressed to withstand up to 18 g loadings, and are manufactured from materials treated to provide flame retardant properties. The nets should be replaced if there is any indication that the webbing has been damaged.

Operators wishing to install custom nets should ensure that the nets comply with the requirements of FAR 23.787 and FAR 23.855 at Amendment 54.

This page intentionally left blank

CHAPTER 26

FIRE PROTECTION

26-00-00 GENERAL

This chapter covers the portable fire extinguishing units provided.

26-10-00 FIRE EXTINGUISHER LOCATION

A portable fire extinguisher, as required by FAR 23.851, is located adjacent to the flap lever that is easily accessible by both pilot and passengers.

CHAPTER 27

FLIGHT CONTROLS

27-00-00 GENERAL

This chapter contains information covering maintenance, rigging, removal and installation of the flight control system of the aircraft. Systems covered include ailerons, rudder, elevator, elevator trim and the wing flaps.

27-10-00 AILERON SYSTEM

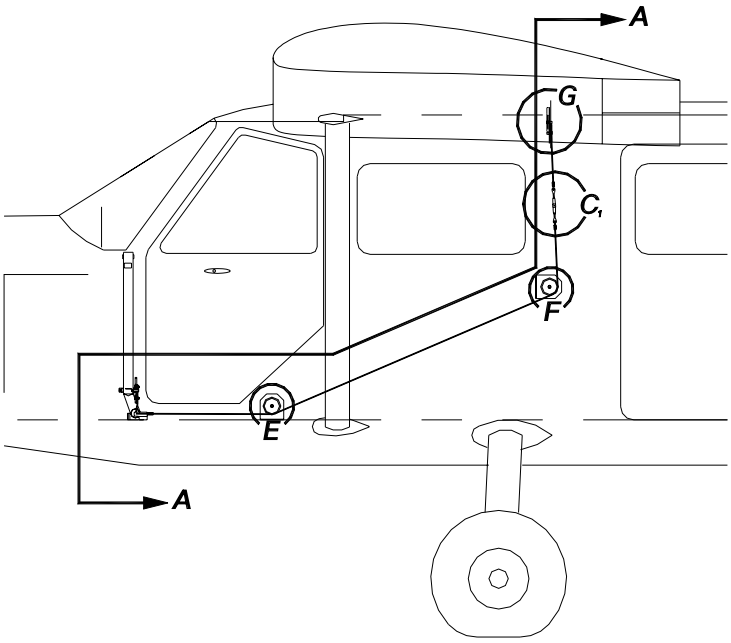


Figure 27-1 Aileron Circuit Schematic

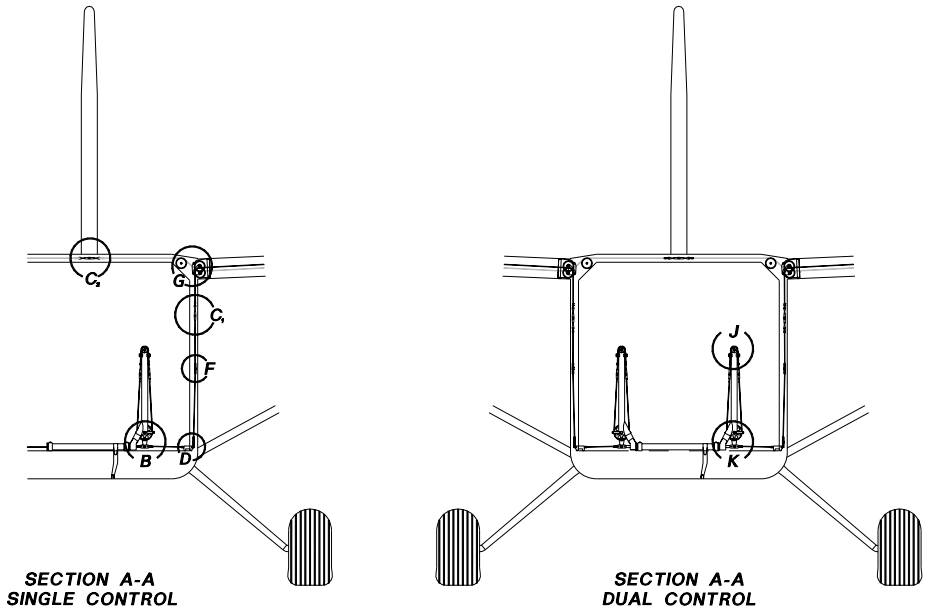


Figure 27-2 Aileron Circuit Schematic

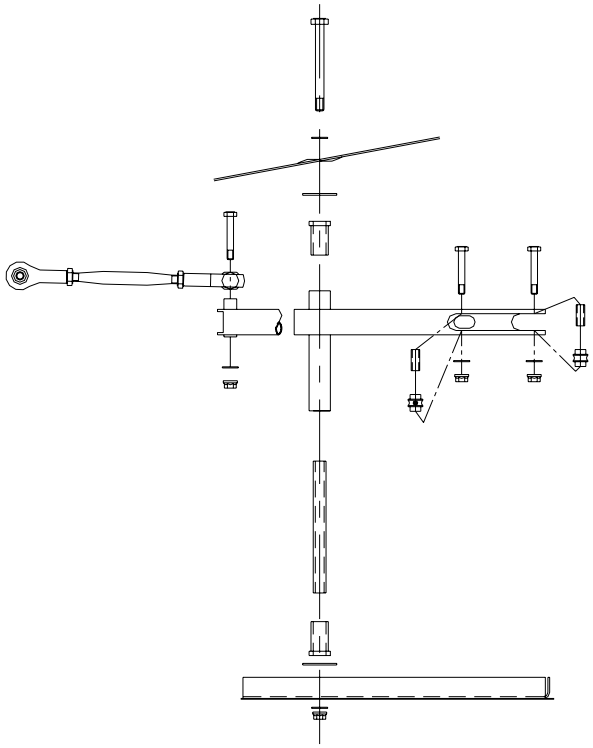


Figure 27-3 Exploded Aileron Bellcrank Details

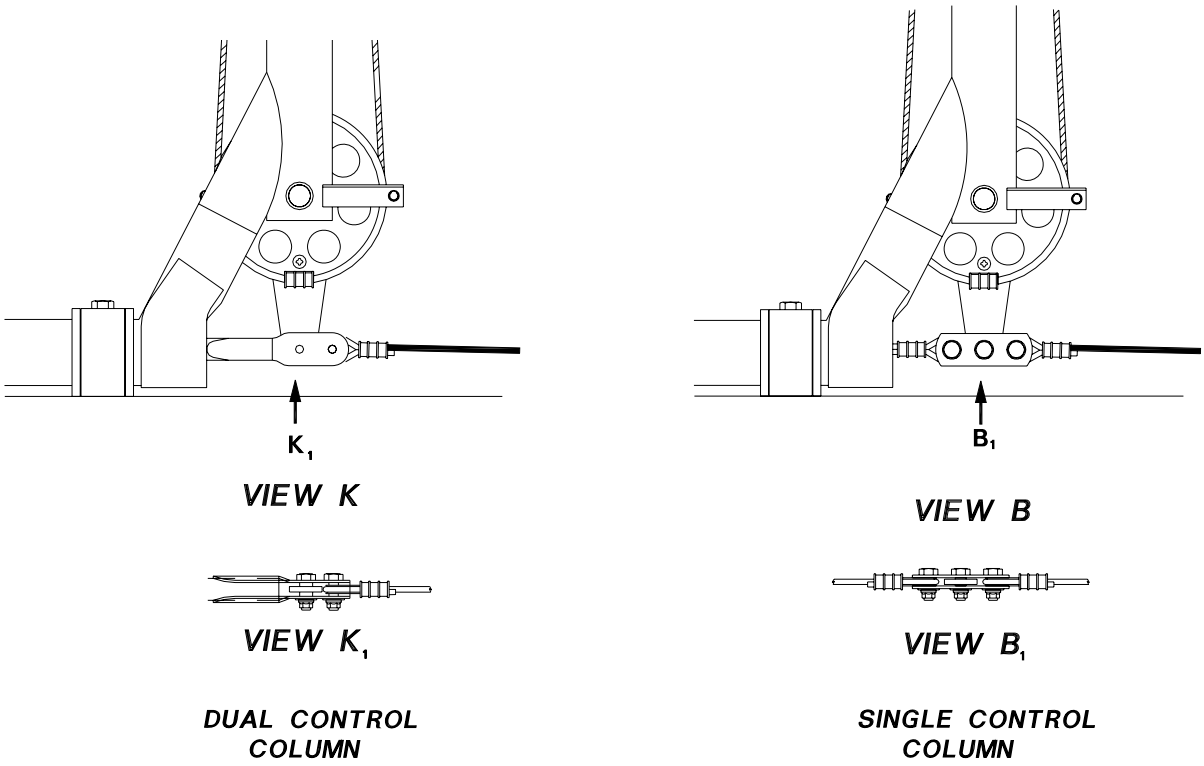


Figure 27-4 Aileron Circuit Detail

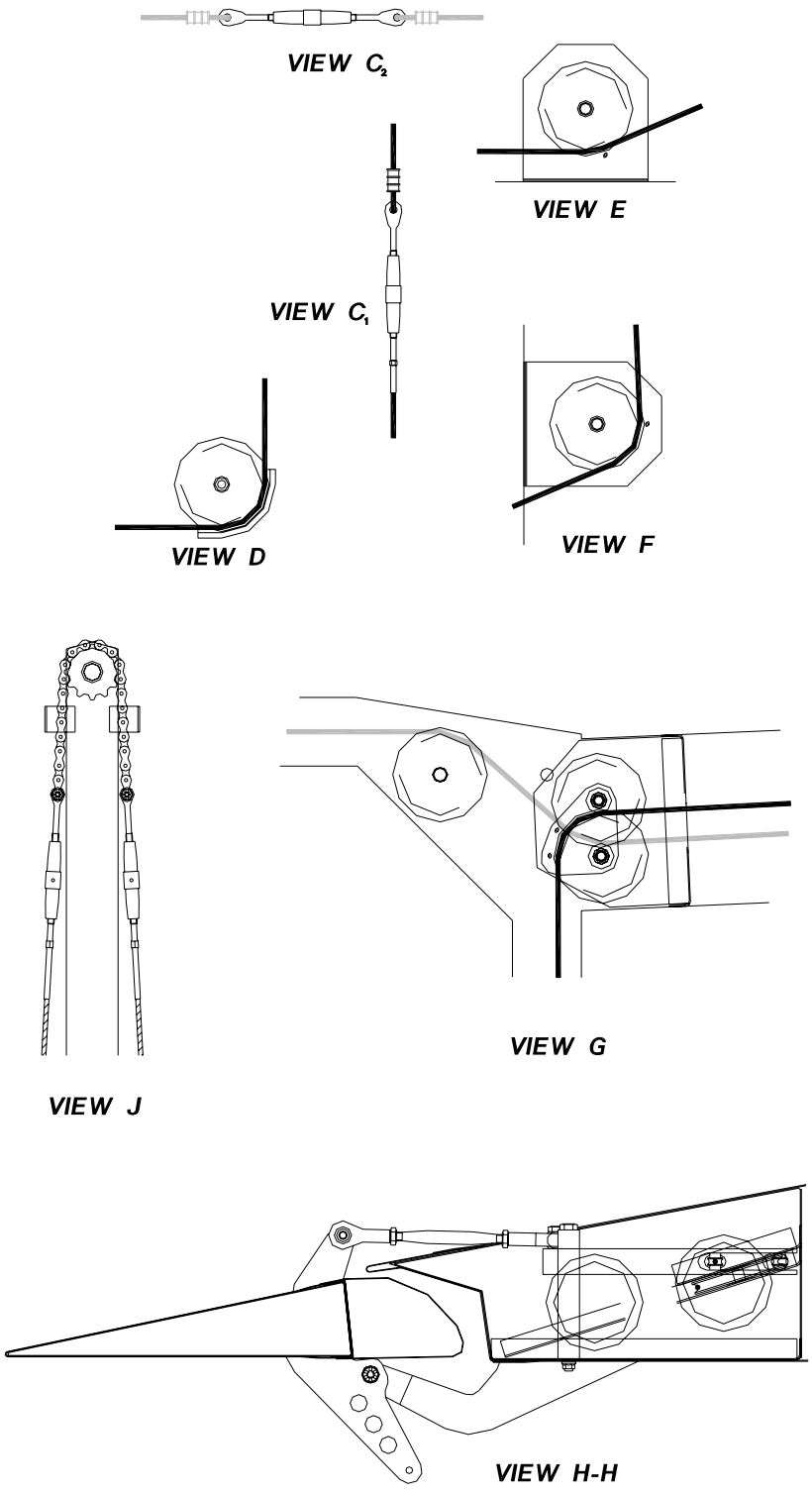


Figure 27-5 Aileron Circuit Details

Description

The ailerons are of sheet metal aluminium alloy construction and are partially mass balanced. They are constructed so as to be fully interchangeable from side to side providing that the mass balance is installed at the outboard end of the aileron. They are operated by a conventional closed loop cable system with outboard bell crank and pushrods.

Rotation of the control wheel operates the aileron actuating horn at the control column base. Steel link plates attached to the horn pull the aileron operating cable that travels via a number of pulleys up the fuselage wall and outboard inside the wing just behind the rear spar. The balance cable follows a similar path in the wing and travels across the cabin inside the roof structure, just aft of the rear spar carrythrough. Both cables attach to a bell crank just forward of the aileron centre point. A push rod transfers the motion from the bell crank to the aileron. The system is tensioned and rigged using a total of five turnbuckles (single control). Two are used to tension the bridle cable that runs between the control wheel and the operating horn at the base of the control column. The other three tension the main circuit. The balance cable turnbuckle is located on the aircraft centreline in the cabin roof and the two operating cable turnbuckles are in the side cabin walls just aft of the rear spar carrythrough.

The ailerons are supported on the wing by three aluminium alloy brackets riveted to the wing structure. Corresponding steel brackets are used on the ailerons. AN4 bolts secured with AN410 castle nuts, AN960 washers and MS24665 cotter pins attach the ailerons to the wing. One bush is used in the centre bearing in the original factory installation. Should excessive wear occur in service, the inboard and/or outboard aluminium alloy wing attach brackets may be drilled and reamed to 5/16" (8 mm) oversize for the fitment of a push in bronze type bearing. The aileron is located laterally by the centre support bearing only and as such the centre bolt should be tightened to ensure the bush rotates with aileron movement. End play at the two outer support bearings is an intentional design feature and should not be eliminated.

Control Column

The control column is supported in split aluminium alloy bearing blocks that are readily replaceable if required.

Removal of Aileron

1. Disconnect push rod.
2. Remove aileron hinge bolts.
3. Remove aileron.

Installation of Aileron

1. Locate aileron on hinges.
2. Install hinge bolts.
3. Attach push rod.
4. Rig aileron system and adjust cable tensions.
5. Check correct locking of hinge attachment bolts.

Replacement of Aileron Cables

When replacement of an aileron cable is required, it may be replaced with a pre-manufactured replacement cable.

Replacement with Pre-manufactured Cable

1. Remove all pulleys and all fairleads for the cable run being replaced except as in (2) below.

2. Disconnect the old cable at each end. Attach the new cable to the old cable and slowly pull the new cable through with the old one. It will be necessary to manually guide the cable attaching hardware around pulleys, through pulley brackets, and through each fairlead holder and the small holes in wing root rib to avoid jamming.

3. When the new cable is in place, disconnect the old cable and discard it. Ensure that the new cable is routed correctly and runs around each pulley correctly. Install all pulleys, cable keepers, and fairleads using all hardware as removed.

4. Attach each end of the new cable to its correct location using all hardware as removed. Rig system and tension the cables as described below.

Lubrication

The aileron system is to be lubricated in accordance with **12-20-30**.

Aileron Balancing

Refer to **51-60-00** for details of the aileron balancing procedure and limits.

Aileron System Rigging

The UP aileron over travel is limited by non-adjustable aileron stops which are formed by the lower surface of the aileron nose where they contact the aluminium alloy hinge brackets on the wing.

The DOWN aileron travel is limited by a bush bolted to the horn that extends from the lower surface of the aileron. The bush limits aileron travel by contacting the lower surface of the aluminium alloy bracket on the wing. Minor travel adjustments can be made by changing the bush outside diameter. Due to the fixed geometry of the aileron circuit, and the fixed UP stops on both ailerons, the aileron travels are not readily adjustable. It is however important to ensure that the zero angles and the cable tensions are set correctly as if the zero angle is not correct the aileron travels will not be correct either.

NOTE

Zero aileron angle is defined as when the lower surface of the aileron at its inboard end is parallel to the lower surface of the wing at a position immediately forward of the inboard end of the aileron

Rigging Procedure

1. Neutralise aileron bellcranks. (This is when the fore and aft member of the bracket is parallel to the fore and aft axis of the aircraft.)

2. Ensure all turnbuckles (3) in the aileron cable circuit are slackened off.

3. Using a straight edge on the lower surface of the wing immediately forward of the inboard end of the aileron, position aileron so that its lower surface is parallel to the lower surface of the wing. Note that the aileron should be **level** with the lower surface, in the neutral position. Repeat for the other aileron.

4. Adjust aileron pushrod length until aileron neutral position and bellcrank neutral position coincide and lock pushrod jam nuts.

5. Secure the control wheels so that they are central in their travel and adjust the control column turnbuckles until the aileron horns at the base of the control column are vertical.

6. Adjust aileron operating and balance cable turnbuckles incrementally until the operating cable tensions are equal, and the **balance cable tension is 25 ± 5 lbs.**

7. With the control column still secured, check that the ailerons are still in the zero position. If not repeat the rigging procedure until they are.

8. Lock all 5 turnbuckles and remove all restraint/securing devices. Confirm full, free, and correct operation of the aileron system.

9. Check that the free-play does not exceed 3/16” (4.8 mm) at the trailing edge of the aileron control surface.

10. All parts of the system that have been disturbed must be inspected by an appropriately licensed independent person to confirm that system is correctly assembled, rigged and safetied.

27-20-00 RUDDER SYSTEM

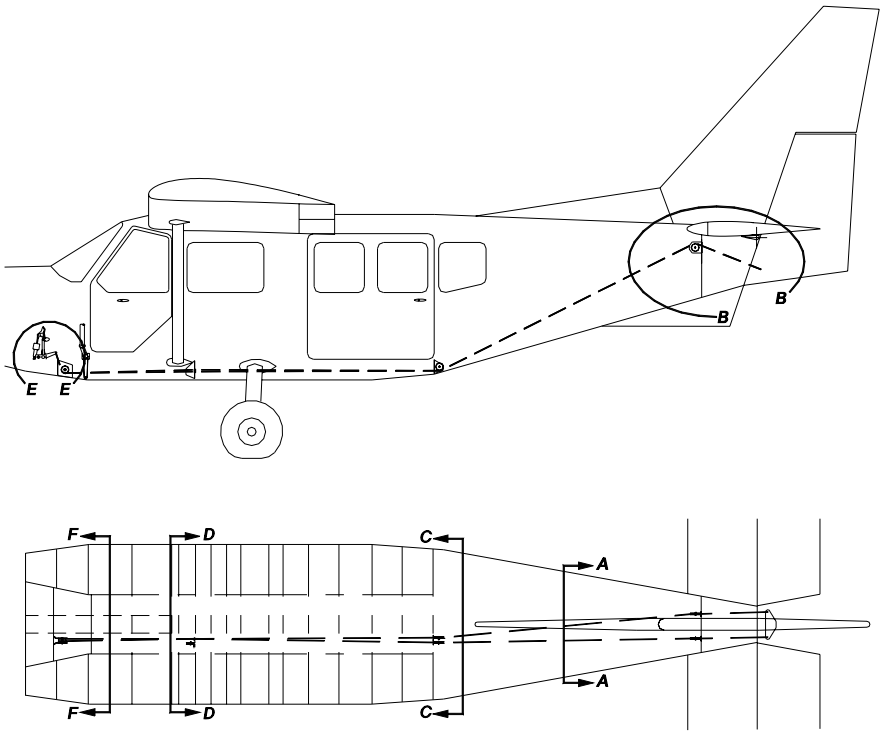


Figure 27-6 Rudder Circuit Schematic

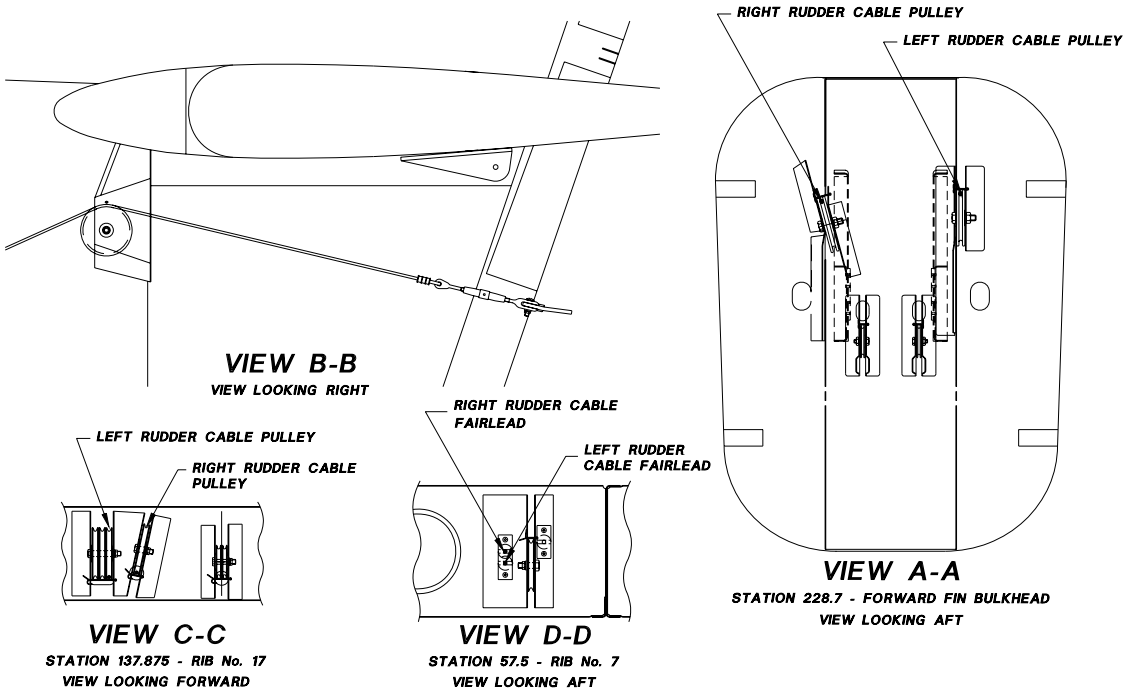


Figure 27-7 Rudder Circuit Detail

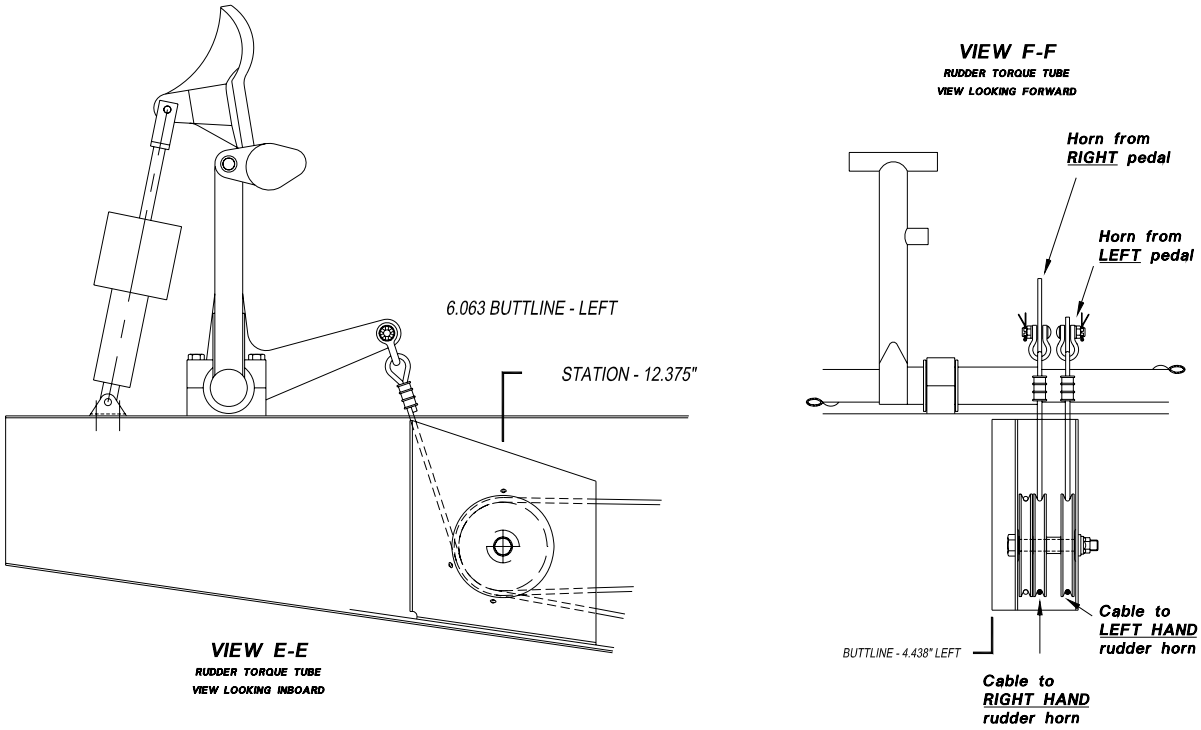


Figure 27-8 Rudder Circuit Details

Description

The rudder is a sheet metal aluminium alloy construction and is hinged in three places from the fin rear spar. It is operated by a conventional closed loop cable system incorporating the nose wheel steerage as part of the loop. The surface is partially mass balanced with a leading edge weight tube attached to the top rib and a lower mass balance located inside the rear fuselage tailcone. The rudder pedals are connected into the circuit between the cables and the nose wheel steerage push rods. The cables are supported along the route by two fairleads under the cabin floor just aft of the strut carrythrough structure and by forward and aft pulleys. Adjustment of the cable length for rigging purposes is provided by adjustable turnbuckles at the rudder horn. The rudder pedals are supported in split aluminium bearing blocks that are readily replaceable if required.

NOTE

*Individual rudder cables run from the respective rudder pedal horn to the rudder horn on the **OPPOSITE** side, as shown in Figure 27-8 View F-F. The cables cross over under the floor starting at the rudder pedal horns as side by side cables, travelling through the fairleads under the cabin floor that are vertically displaced and completing the cross over by the pulleys under the luggage area floor.*

Removal of Rudder

1. Disconnect rudder operating cables at rudder horn.
2. Remove rudder balance weight tubes.
3. Remove rudder hinge bolts.
4. Remove rudder.

Installation of Rudder

1. Locate rudder in hinges.
2. Install hinge bolts.
3. Connect operating cables and rig system as below.
4. Refit rudder balance weight tubes.
5. Check correct locking of hinge and cable attachment bolts.

Replacement of Rudder Cables

When replacement of a rudder cable is required, it may be replaced with a pre-manufactured replacement cable.

Replacement with Pre-manufactured Cable

1. Remove pulleys from three rudder cable pulley sites on the side of the cable being replaced.

2. Disconnect the old cable at each end. Attach the new cable to the old cable and slowly pull the new cable through with the old one. It will be necessary to manually guide the cable attaching hardware through the fairlead holders and the rear bulkhead pulley brackets.

3. When the new cable is in place, disconnect the old cable and discard it. Ensure that the new cable is correctly routed. Install the pulleys that were removed.

4. Attach the new cable both ends using all hardware as removed and rig the rudder system as described below. At the rudder pedal paint in situ the left cable and fitting red and the right cable and fitting yellow. At the rudder horn paint in situ the left cable and fitting yellow and the right cable and fitting red.

Replacement of Rudder Bushes

The steel rudder hinge bushes are readily replaceable in the event of excessive wear. The maximum allowable looseness in the hinge with the rudder cables disconnected is 0.025". Each hinge location has one bush. On aircraft fitted with a laminated rudder hinge bracket attached to the fin, the laminations may be replaced in the event of excessive wear. On aircraft fitted with a one piece machined rudder hinge bracket attached to the fin, oversize bushes may be obtained from Gippsland Aeronautics in the event of excessive wear.

Lubrication

The rudder system is to be lubricated in accordance with **12-20-30**.

Rudder Balancing

Refer to **51-60-00** for details of the rudder balancing procedure and limits.

Rudder System Rigging

The rudder travel is limited by fixed non-adjustable rudder stops consisting of alloy blocks attached to the rear spar that contact the rudder horn upon full travel being reached. These stops restrict the rudder travel to 21° ± 0.5° left and right. Additional over travel stops are located on the nose leg support structure positioned to contact the nose wheel steerage arms when the nose leg exceeds maximum travel. These stops preclude over stressing of the rear rudder stops during taxi and ground handling.

The steering geometry of the rudder pedals is set by adjustable nose wheel steerage push rods.

Rigging Procedure

1. With rudder cable turnbuckles slackened off, connect rudder pedals to nose wheel steerage push rods.

2. Adjust pushrods until the nose wheel is aligned with the fore and aft axes of the aircraft when the rudder pedals are neutral. For aircraft up to serial number GA8-04-085 the neutral position is with the pedals vertical. For aircraft from serial number GA8-04-86 and up, and aircraft incorporating Service Bulletin SB-GA8-2005-26, the neutral position is with the pedals canted approximately 10° forward.

3. **Tension rudder cables to 40 ± 5lbs** with rudder and pedals in neutral position.

4. Ensure that all securing bolts and nuts are correctly installed and locked. Confirm full, free and correct operation of the rudder system.

5. With the rudder cables correctly tensioned per step 3, there should be no free-play at the trailing edge.

6. All parts of the system that have been disturbed must be inspected by an appropriately licensed independent person to confirm that system is correctly assembled, rigged and safetied and operating in the correct sense.

7. On completion of rudder rigging, verify that there is at least 1/16” (1.6mm) clearance between the nose leg steering stop and the steering collar assembly on the nose undercarriage assembly. The gap is to be measured at full rudder deflection with the nose gear clear of the ground and no load in the system. Adjust the nose leg steering stop to achieve the required clearance if required.

CAUTION

*Individual rudder cables run from the respective rudder pedal horn to the rudder horn on the **opposite** side. The cables cross over under the floor starting at the rudder pedal horns as side by side cables, travelling through the fairleads under the cabin floor that are vertically displaced and completing the cross over by the pulleys under the luggage area floor. **Ensure that the rudder system operates in the correct sense.***

27-30-00 ELEVATOR SYSTEM

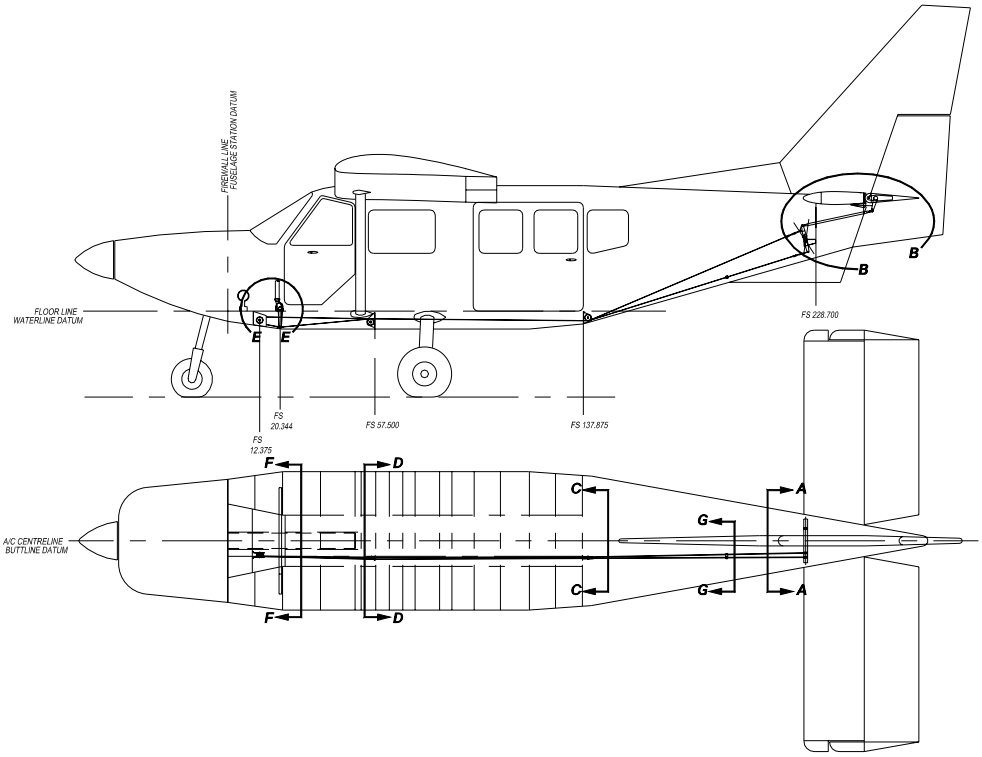


Figure 27-9 Elevator Circuit Schematic

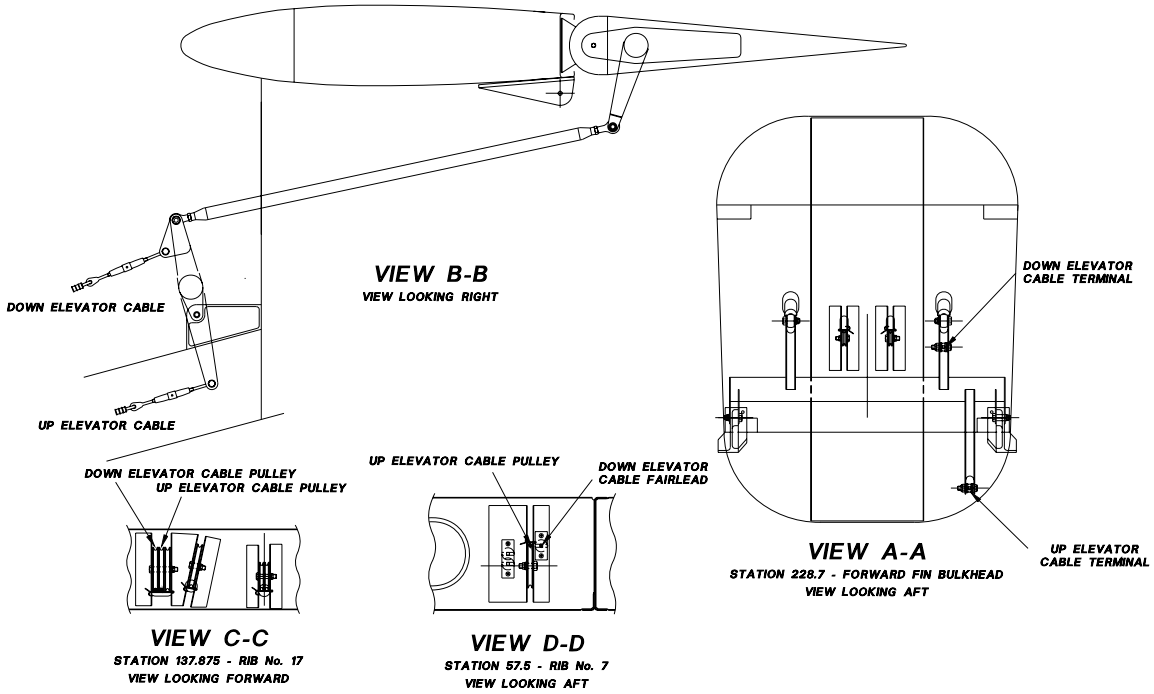


Figure 27-10 Elevator Control Detail

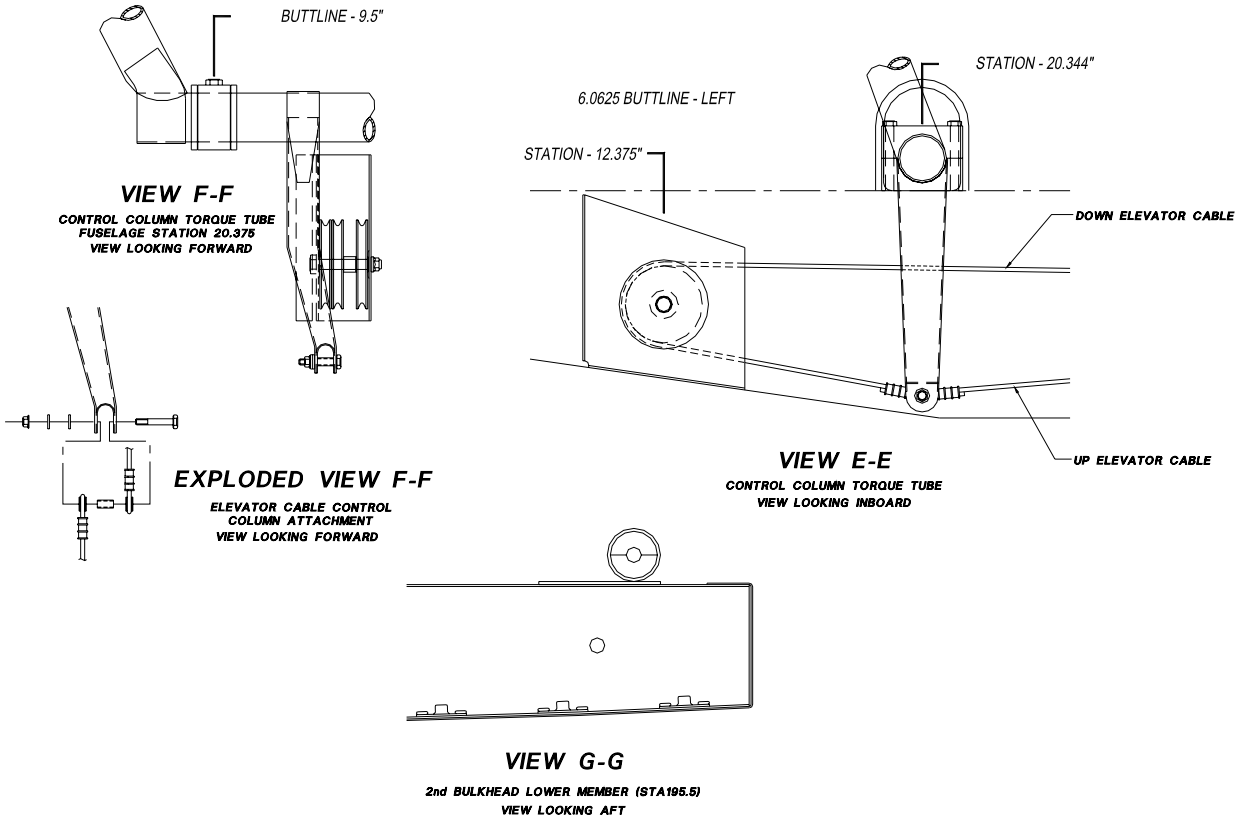


Figure 27-11 Elevator Circuit Detail

Description

The elevators are sheet metal aluminium alloy constructions and are partially mass balanced. They are constructed as two separate units - left and right. The only difference being a fixed trim tab on the right hand elevator and a handed horn assembly. They are individually supported on the horizontal stabiliser by three hinges on either side and are operated by two individual push rods connected at the aft fuselage walking beam.

Forward of this beam, a conventional closed loop cable system is used. The UP elevator cable runs from a pivot at the bottom of the control column over two pulleys to the walking beam where a turnbuckle is provided for rigging purposes. The DOWN elevator cable connects to the same pivot point at the control column base and runs forward around a pulley which reverses its direction to track back beside the UP elevator cable. The DOWN cable passes through a fairlead just aft of the main strut carrythrough then via a pulley to the walking beam where a turnbuckle is provided.

The UP and DOWN elevator STOPS are located at the aft fuselage bulkhead and provide individual stops for both elevators in both directions. These stops *are* adjustable.

The right hand elevator incorporates a fixed tab that is factory set and must not be varied from that setting.

Removal of Elevator

1. Disconnect elevator push rod at elevator horn.
2. Remove the elevator hinge bolts and remove the elevator.

Installation of Elevator

1. Locate elevator in hinges.
2. Install hinge bolts.
3. Reconnect push rod.
4. Check correct locking of hinge and push rod attaching bolts.

Replacement of Elevator Cables

When replacement of an elevator cable is required, it may be replaced with a pre-manufactured replacement cable.

Replacement with Pre-manufactured Cable

1. Remove the pulleys of the cable run being replaced.

2. Disconnect the old cable at each end. Attach the new cable to the old cable at the elevator end and slowly pull the new cable through with the old one. It will be necessary to manually guide the cable attaching hardware through the fairlead holders to avoid jamming.

3. When the new cable is in place, disconnect the old cable and discard it. Ensure that the new cable is correctly routed. Install the pulleys that were removed.

4. Attach the new cable both ends using all hardware as removed and rig the elevator system as described below. Paint in situ the upper cable end and fitting white and the lower cable end and fitting blue.

Replacement of Elevator Bushes

The steel elevator hinge bushes are readily replaceable in the event of excessive wear. Each hinge location has one bush - these bushes are different lengths and must NOT be mixed up. This bush operates in a laminated hinge bracket attached to the tailplane and in the event of excessive wear the laminations may be replaced.

Lubrication

The elevator system is to be lubricated in accordance with **12-20-30**.

Elevator Balancing

Refer to **51-60-00** for details of the elevator balancing procedure and limits.

Elevator System Rigging

1. Put in place elevator sector boards.

2. Set elevator travel using the adjustable stops at the rear fuselage bulkhead.

3. Set the trim with the tailplane leading edge down.

4. Adjust rear push rods to be 28.125" (714.4mm) between ball joint centre lines and connect between elevator horns and rear walking beams (Minor adjustment of the push rod length to synchronise the elevators is permitted).

5. Adjust the cable rigging until a clearance of 2" (50.8mm) between the control column and the instrument panel face is achieved when the elevators are fully DOWN.

6. **Tension the cables to 40 ± 5lbs.**

7. Lock turnbuckles and remove all restraint/securing devices. Confirm full, free, and correct operation of the elevator system.

8. Check that the free-play does not exceed 5/16” (7.9mm) at the trailing edge of the elevator control surface.

9. All parts of the system that have been disturbed must be inspected by an appropriately licensed independent person to confirm that system is correctly assembled, rigged and safetied.

27-30-10 Trim System

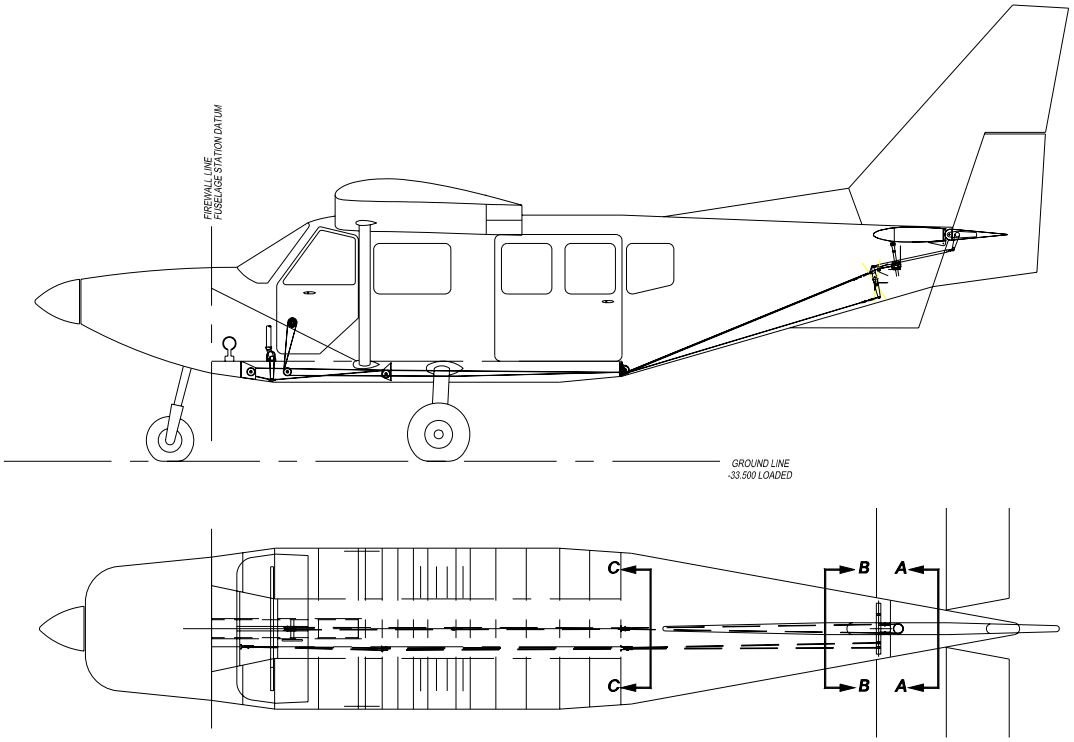


Figure 27-12 Trim Circuit Schematic

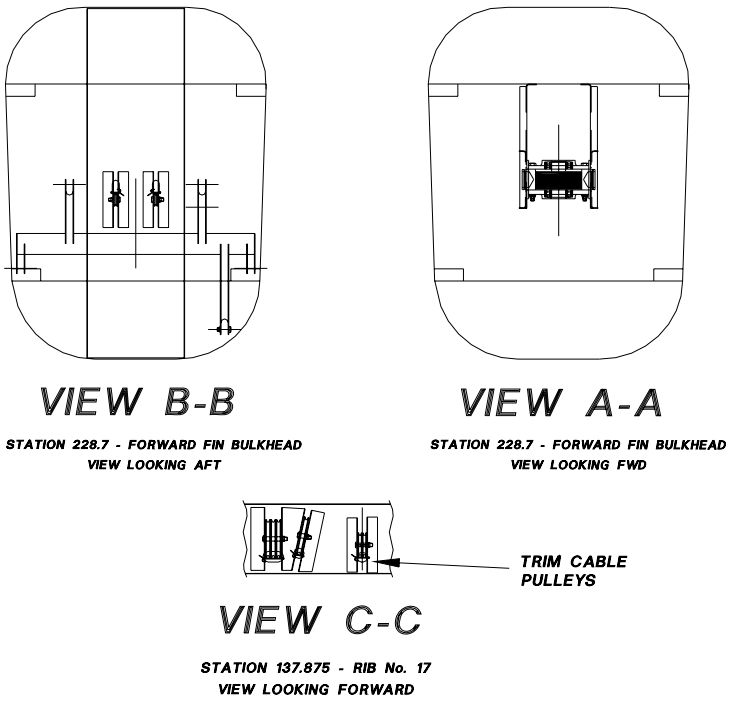


Figure 27-13 Trim Circuit Details

Description

The pitch trim control is located on the left side of the cockpit centre console. The system consists of an irreversible screw jack connected the tailplane front spar that is operated by cables wound around forward and aft drums. The forward drum is located inside the centre console and is operated by the trim wheel, the motion of which operates the screw jack via cables connected to the aft trim drum. The cable length prior to installation is 66 ft (20.1 m) minimum. Normal travel stops are provided at each end of the screw jack. Over travel stops are provided on the rear face of the fin front spar for up travel and the rear fuselage top deck for down travel.

Elevator Trim System Rigging

1. With the rear trim drum REMOVED, connect the trim cable at 33 feet (10 m) from one end to the drum. Wind the 33 foot long cable on until the drum is full, less one turn. Use the other cable to fill the remaining space on the drum.

2. Temporarily secure the cables to the drum using masking tape or equivalent.

3. Install trim drum in rear trim assembly (with the 33 foot cable on the right hand side) and route cables forward through the appropriate fairleads and pulleys.

4. Manually turn the screw jack upwards until it reaches the end of its travel (lower stop tube contacts bearing housing) at which point it should align with the tailplane leading edge attach fitting when the tailplane is at its maximum leading edge up position, i.e. the lower surface of the tailplane front spar is 2” to 2 1/8” (50 mm – 54 mm) above the fuselage top deck.

5. Feed the right hand cable through the right hand hole provided in the forward trim drum (with the cable passing around the forward side of the drum) and terminate cable using Nicopress swage. NOTE. Ensure that this is the cable that is wound fully (less one turn) onto the rear drum.

6. Remove masking tape from rear drum and wind the trim wheel aft at the top (towards tailplane leading edge down) whilst maintaining tension on the left trim cable to enable it to smoothly wind on to the rear trim drum, until full travel is reached. This will occur when the trim spring spacer bush contacts the top bearing housing. The tailplane should be clear of the top rear fuselage deck by approximately 1/16” (1.6 mm). (Maintain tension on the left forward cable by hand.)

7. Feed the left hand forward cable up the rear side of the trim drum and through the hole provided in the drum and also through the cable tensioning drum. Lock the cable in the tensioning drum using the screw provided.

8. Screw the tensioning drum to provide initial cable tension of approximately 10lbs and temporarily lock the drum using the screws provided.

NOTE: A hole in the console, behind the trim wheel, is provided for screwdriver access to trim locking screws. To gain access from this direction removal of the trim wheel is required.

9. Operate the trim throughout its range, ensuring that the cable tracking on drums is correct and that the system operates in the correct sense.

CAUTION

Ensure that the travel stops on the screw jack are contacted at each end of the travel prior to the cable reaching the end of its travel on either front or rear drum.

10. The trim position indicator on the centre console should point to the at the full nose up position marker with the trim set to full nose up (tailplane nose down), and the full nose down position marker with the trim set to full nose down (tailplane nose up).

11. **Final tension to be 15lbs ± 5lbs.**

12. Final lock all system fasteners and remove all restraint/securing devices. Confirm all full, free and correct operation of the trim system.

13. All parts of the system that have been disturbed must be inspected by an appropriately licensed independent person to confirm that the system is correctly assembled, rigged, safetied and operating in the CORRECT SENSE.

Lubrication

The thread of the screw jack is to be lubricated with a grease meeting MIL-PRF-23827C Type II such as Aeroshell 7.

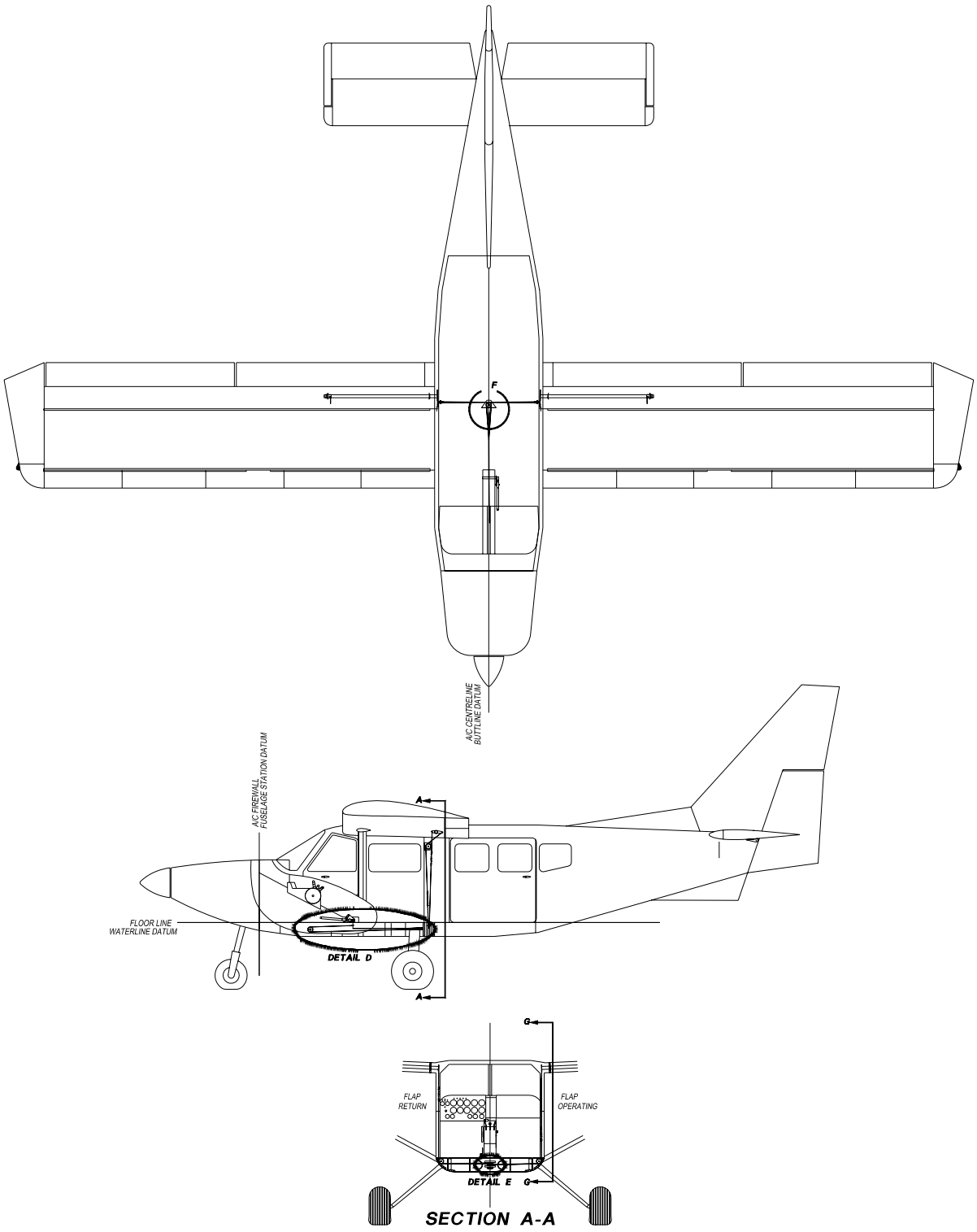


Figure 27-14 Wing Flap Circuit Schematic

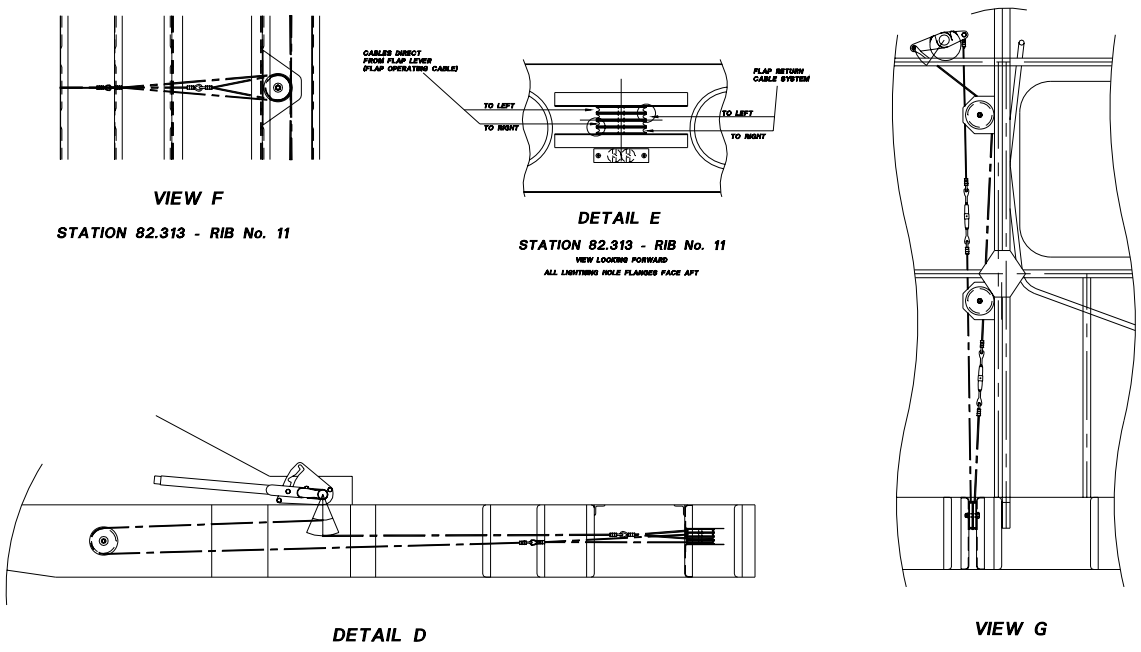


Figure 27-15 Wing Flap Circuit Details

Description

The wing flaps are of the single slotted type with three selectable positions; Up, 14° and 38°. There is no flap position indicator fitted, the position of the flaps being determined by the notch engaged by the operating lever on the left hand side of the centre console. The selected position can also easily be confirmed by visual observation from the cockpit.

The flaps are of sheet metal aluminium alloy construction and are constructed so as to be interchangeable from side to side.

The flap system is cable and push rod actuated. The flaps are extended by cable tension provided by the flap operating lever acting on a torsion tubes and push rod mechanisms. They are retracted by a return cable closing the loop with the extension cable. When the flaps are fully retracted the UP detent in the flap lever mechanism locks the flaps in the UP position.

Rigging

The relative position between the flaps and the torque tubes are set by fixed length push rods and therefore not adjustable. With the flaps selected UP, adjust the UP and DOWN turnbuckles until the flap ZERO setting is attained.

Zero flap angle is defined as when the lower surface of the flap at its outboard end is parallel to the lower surface of the wing at a position immediately forward of the outboard end of the flap.

This can be established by using a straight edge on the lower surface of the wing immediately forward of the outboard end of the flap, and positioning the flap so that its lower

surface is parallel to the lower surface of the wing.

Note that flap should be **level** with the lower surface.

1. Establish the zero position as described above.

2. Tension cable systems with the flaps in the UP detent while maintaining the zero position. **The down cable tension is 40 ± 5lbs**. The upper cable tension may vary due to the geometry of the system.

3. Check the system for freedom of operation.

4. Lock wire the turnbuckles.

5. Check for free, correct operation throughout total flap movement.

6. All parts of the system that have been disturbed must be inspected by an appropriately licensed independent person to confirm the system is correctly assembled, rigged and safetied.

The flap settings are acceptable throughout the flap range if the zero, 14° and 38° angles are correct. These settings are established with reference to the previously established zero position and can be measured using either an inclinometer or direct linear measurement of the travel at the trailing edge of the flap. The positions are defined by the flap lever detents. If the rigging tolerances cannot be met, then replacement of detent plates may be necessary.

Removal of Flap

1. Lower flaps.
2. Disconnect flap push rod .
3. Remove flap hinge bolts (3).
4. Remove flap.

Installation of Flap

1. Locate flap and install hinge bolts (3).
2. Select flaps full down. Connect flap push rod.
3. Check flap zero position and adjust if required as described above.
4. Check for free, correct operation throughout total flap movement.

Replacement of Flap Cables

1. Select flaps DOWN.
2. Remove attaching hardware from each end of the cable to be replaced.
3. Remove pulleys as required.
4. Use old cables to pull through new cables.

5. Install the new cable in position and secure each end using hardware as removed.
6. Install the pulley previously removed.
7. Rig the flap system as described above. Lock-wire the turnbuckles.

WARNING

Ensure flap cable positions around the pulley stack (just aft of the main under carriage bulkhead) remain in the correct order. Incorrect assembly can cause cable rub and associated wear on cables and fuselage main keel members.

CHAPTER 28

FUEL SYSTEM

28-00-00 GENERAL DESCRIPTION

The GA8 fuel system consists of an integral fuel tank in each wing, a sump fuel tank in the fuselage floor and associated plumbing. Each wing tank has a capacity of 170 litres (44.9 US gallons), and are integrally formed within the wing structure between the front and rear wing spars inboard of the wing strut fittings. The wing tanks are fitted with a conventional filler cap. Aircraft up to and including Serial Number GA8-02-016 are fitted with a spring loaded flapper valve.

The sump tank is located under the cockpit floor, below the co-pilot seat position. The sump tank has a nominal capacity of 9 litres (2.4 US gallons), and is permanently connected through filters and float operated needle valves to the main wing tanks in such a manner that cross feeding cannot occur.

NOTE

The sump tank float valves are arranged in such a way as to allow fuel to flow more readily from the "low wing" in un-coordinated flight that tends to correct the imbalance and also provide a degree of equalization of fuel usage.

All vents are interconnected. The fuel is supplied to the Electric Boost Pump (mounted beside the sump tank) direct from the sump tank. It then is plumbed to the fuel shut off and on through the firewall to the engine driven pump that supplies the injection system.

NOTE

To make it possible to carry out maintenance on the fuel system without draining the entire system, a servicing tap is provided on each main fuel filter to isolate fuel inflow during filter cleaning, sump tank maintenance, boost pump removal, etc. These taps are held in the ON position by a locating device incorporated in the fuel filter lid retainer that cannot be installed unless the tap is in the ON position.

Five fuel system water drain points are provided:

- under both wing tanks at inboard rear corner (two of)
- sump tank on forward fuselage belly right hand side
- main fuel strainers on forward fuselage belly right hand side (two of) just aft of sump tank drain

The airspaces between wing tanks and sump tank are interconnected via vent lines that run from each tank to the vent plenum located in the cabin roof just aft of the main spar carrythrough. The vertical fuel lines (four of) in the main cabin walls are also vented from their 90° top joint to the plenum. The plenum contains stand pipes that prevent cross feeding and excessive fuel loss overboard. The plenum is vented and drained to a position on the under side of the right hand wing, just aft of the rear spar, approximately 35" (890 mm) out from the fuselage.

A fuel low warning system is provided by means of solid-state fuel sensing devices installed in the main feed lines, just aft of the forward cabin doors in the fuselage side panels. Two amber caution lights, a red warning light and red warning L.E.D. positioned on the left hand

side of the instrument panel are operated by these sensors. The two amber “CHECK FUEL” lights will illuminate independently indicating when there is no fuel in the corresponding main fuel feed lines. These lights will begin to flash in flight at very low fuel quantities due to slosh, the intent being to draw the pilot’s attention to the fuel situation. The red “FUEL” warning light and red “SUMP TANK LOW FUEL” L.E.D. warn the pilot that only a few litres of fuel remain in the sump tank.

The fuel indicating system is by two float activated, electrically operated fuel gauges of which there is one in each main fuel tank. Two fuel gauges are located at the top left hand corner of the instrument panel.

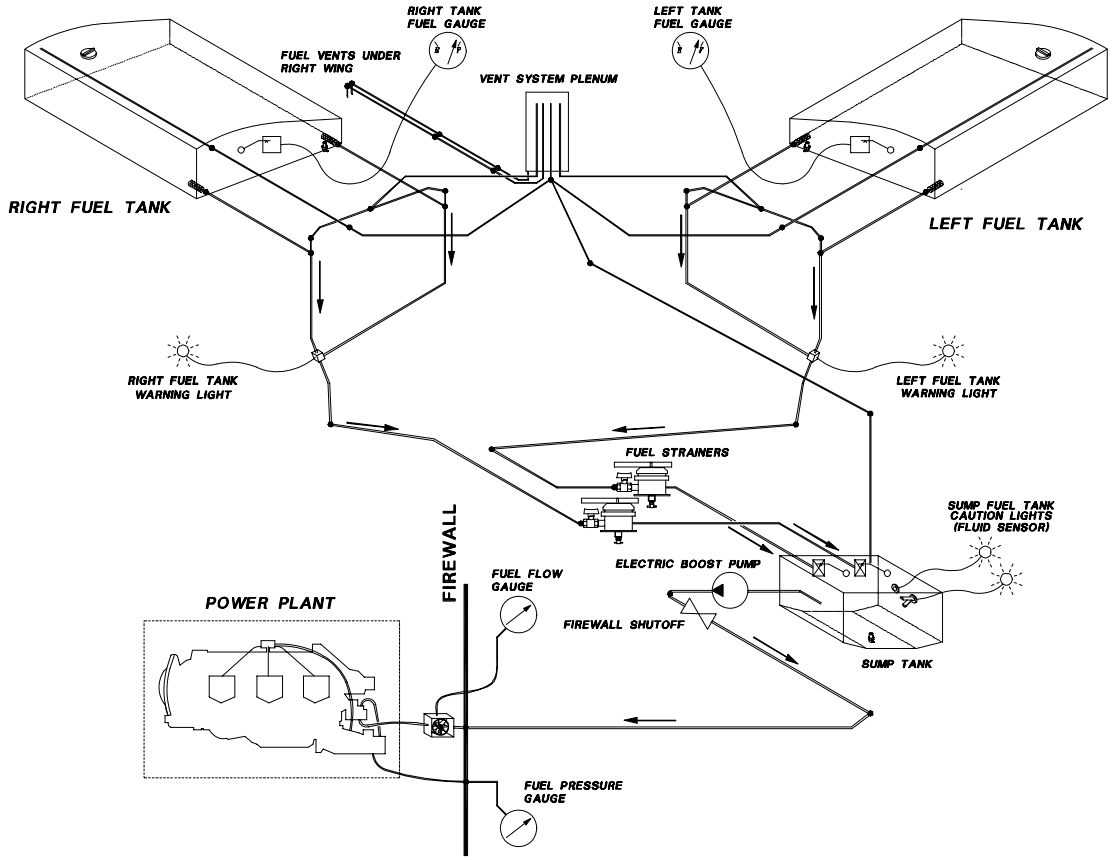


Figure 28-1 Fuel System Schematic

28-00-10 General Precautions and Procedures

There are certain general precautions and procedures concerning the fuel system that should be observed when performing any operations on the fuel system.

WARNING

Do not perform any sort of maintenance on the fuel system in conjunction with maintenance on the electrical system. The escape of fuel fumes under the floor and/or in the aircraft may cause an explosion.

These are:

1. During all fuelling, de-fuelling, tank purging, repairing the tanks, or any disassembly of the fuel system, ground the aircraft to a suitable grounding point.

2. Residual fuel draining from lines and hoses constitutes a fire hazard. Use caution to prevent the accumulation of fuel when lines or hoses are disconnected.

3. Cap open lines and cover connections to prevent thread damage and the entrance of foreign material.

4. Do not allow smoking, or any other activity that could produce an ignition source, to occur within 50ft (15m) of the aircraft when work is being conducted on the fuel system.

NOTE

Throughout the aircraft fuel system, from the fuel tanks to the injector, use Parker Sealube (or equivalent) as a thread lubricant or to seal a leaking connection. Apply sparingly to male fittings only, omitting the first two threads. Always ensure that the residue from any previously used compound, or any other foreign material, cannot enter the system.

28-00-20 External Inspection of Drains

There are 12 drains in the fuselage belly skins under the aircraft that serve as fuel and water drains. These drains should be inspected, and if any fuel stains are evident then this would indicate a fuel leak and warrant a thorough investigation of the fuel system plumbing.

Section **71-70-00** should also be consulted in the inspection.

28-10-00 FUEL TANKS

An integral fuel tank is located in each wing. The wet wing cavity extends outward between Rib 4 (WS 31.0) and Rib 9 (WS 81.0), and fore and aft between the front and rear spars. The tank is sealed using a fuel proof sealant, PR-1422, to specification MIL-S-8802. The resulting tank has a capacity of 170 litres (44.9 US gallons).

The tank consists of upper and lower skins, ribs, front and rear spars and one access panel on the top skin. The tank contains fuel drains, electrical reading fuel gauges and fuel venting components. An un-vented fuel filler cap is located adjacent to Rib 9. Aircraft up to and including Serial Number GA8-02-016 are fitted with a spring loaded flapper valve. An earthing lug is located adjacent to the filler cap to enable the refuelling hose earth strap to be used to bond the hose to the airframe during refuelling operations.

Fuel Cap

The fuel cap is an <u>un-vented</u> type. The neoprene seal should be replaced if found to be cracked or damaged.

Removal of Flapper Valve Assembly (if fitted)

If the flapper valve assembly is found to be defective, or if the closing spring is broken, it will be necessary to remove the entire flapper valve assembly from the wing for repair or replacement.

Access to the flapper valve assembly can be gained by removing the outboard fuel tank access panel. The flapper valve assembly is riveted along Rib 8, Rib 9 and around the fuel filler neck assembly. It will be necessary to drill out these rivets and carefully prise the flapper valve assembly from the wing skin and rib flanges. Care must be taken to avoid damage to the skin and ribs during this operation as the bond formed by the PR-1422 sealant is quite significant.

Installation of Flapper Valve Assembly (if fitted)

NOTE

*Refer to **28-10-10** for specifications of acceptable fuel tank sealants and techniques associated with their use.*

1. Clean off all old sealant in the vicinity of the flapper valve, and the valve assembly itself if the old valve is to be reinstalled after repair.

2. Ensure all machining/cutting work is completed before final assembly. This includes drilling, deburring, trimming etc.

3. Clean all swarf and foreign material from the tank.

4. Wet assemble the flapper valve assembly in the tank ensuring a good bead of sealant is formed around the filler neck and along the rib flanges. Pin the assembly securely in position for final riveting.

5. Rivet the assembly in place using MS20470AD4 rivets along the rib flanges, and MS20426AD4 rivets around the filler neck. Prior to installing each rivet, the rivet hole should be filled with sealant if it is not already filled by squeeze out.

6. Clean off excess sealant on the outer surfaces of the wing with MEK (methyl-ethyl-ketone).

7. Position the flapper valve closing spring leg so that it bears on the forward flange of Rib 5 inboard of the rivet line, and not on the main spar web. Bend the spring leg slightly to achieve this and also to achieve a suitable tension for proper closing of the flapper valve. Ensure that the end of the spring is bent slightly so that the sharp end itself does not touch the rib and scratch or dig in to it.

28-10-10 Fuel Tank Sealing Procedures

Sealant Specifications and Description

When originally manufactured, the GA8 fuel tanks were assembled and sealed using Products Research and Chemical Corporation PR-1422 A-2 sealant manufactured to comply with specification MIL-S-8802. In subsequent repair, depending on the location, method of

application and personnel preference, PR-1422 Classes A-$^1/_2$, A-2, B-$^1/_2$, B-2, or B-4 sealant may be used in lieu.

PR-1422 sealant is a two part, polysulphide, liquid polymer compound and in the unmixed form, consists of a base compound and an accelerator.

Class A-() is a brushable consistency compound that may be applied with an ordinary paint brush. Class B-() is a highly thixotropic paste that can be applied with a spatula, an extrusion or injection gun, and does not flow from vertical or overhead surfaces after application. Where beads or fillets of sealant are required, Class B-() is the best choice. Class A-() is primarily used as the sealant around metal fasteners, over seams, or as a faying surface sealant. It can also be used as a prime coat under Class B-() to improve surface wetting, or as an overcoat to aid in smoothing and feathering out fillets. The final digit represents the approximate "pot life" in hours after mixing, i.e. "2" represents 2 hours, "$^1/_2$" represents 30 minutes etc.

While other similar sealants may be suitable, they have not been used by Gippsland Aeronautics, and consequently no comment on their use is made. The following instructions apply to all classes of PR-1422 sealants, but in general terms would be applicable to most other similar products.

The optimum temperature for the application of PR-1422 sealant is 21° ± 3°C (70° ± 5°F).

Sealant Mixing

The instructions for mixing the sealant are on the pack and are to be strictly adhered to. Kits as supplied by the manufacturer contain the correct ratio of the base compound and the accelerator, and it is recommended that the complete kit be mixed and used at one time. Do not use sealant that is time expired on its shelf life.

If it is necessary to mix a small batch of sealant, the correct ratios are:

Class A-() 1 part accelerator to 10 parts of base compound **(by weight)**
Class B-() 1 part accelerator to 7.5 parts of base compound **(by weight)**

WARNING

The accelerators contain heavy metal peroxides. Keep away from heat and flame. Use only in a well ventilated area. Avoid skin and eye contact. WEAR EYE PROTECTION. In case of eye contact, flush generously with water and get prompt medical attention.

Sealing During Structural Repairs

Any repair that breaks the fuel tank seal will necessitate resealing that tank area. Repair parts that need sealing must be installed during the sealing operations. All joints within the boundary of the tank, but which do not provide a direct fuel path out of the tank such as rib flanges, must be sealed by applying sealant on one mating part prior to assembly. Enough sealant must be applied so that it will squeeze out around the joint when the parts are finally fastened together. Sealer is applied to the edge of all riveted joints, joggles, bend reliefs, voids, rivets, or other fasteners. All boundaries are sealed, as well as any other place that could become a fuel leak. Where a fillet sealant is applied over a joint, the joint sealant need

not be cured before the fillet seal is applied, however, the sealant must be free of dirt or other contaminants. Fillets must be pressed into the joint to displace any entrapped air bubbles. Where fillets are laid on intersecting joints, the fillets shall be joined together to form a continuous seal. An extrusion gun may be used to lay a bead along a joint, but a suitable spatula should then be used to work the material into the joint and to remove any entrapped air bubbles.

CAUTION

Protect vent inlets, fuel drain outlets and finger strainer/fuel outlet before applying any sealants. Ensure all parts have been trial assembled and have had all required machining operations, such as pre-drilling, de-burring, countersinking, dimpling, trimming etc. completed before being cleaned and having sealant applied for the final assembly operation.

Procedure

1. Remove all existing sealant from the area to be sealed, leaving a taper on the remaining sealant. The taper will allow a scarf bond, and a continuous seal when the new sealant is applied.

NOTE

The best method of removing sealant is with a chisel-like tool made of hard fibre. Any remaining sealant can be removed with aluminium wool or "Scotch Brite". Steel wool or sandpaper must not be used.

2. Vacuum thoroughly to remove all chips, filings, etc. from tank.

3. All surfaces to be sealed should be thoroughly cleaned by wiping with a clean cloth dampened with MEK, Acetone or similar solvent, and dried with a clean cloth before the solvent has been allowed to evaporate. Always pour the solvent on the cloth to prevent contaminating the solvent remaining in the container. Wipe surfaces with clean, dry cloth until white haze disappears. Never use contaminated solvent.

4. Apply surface sealant to one mating part, and install rivets or fasteners while sealant is still within its working (pot) life.

NOTE

During any large sealing job the mixed sealant must be checked occasionally to ensure that it has not exceeded its pot life, particularly towards the end of its anticipated pot life. The sealant can be checked by putting a small amount on a suitable wooden tongue depressor, or stirring stick, and touching on to a piece of clean sheet metal. If it adheres, the sealant can still be used, if it does not adhere, the sealant must be discarded.

5. Apply a fillet seal to the repaired area on the inside of the tank.

6. Apply a fay surface seal to access panels, fuel gauges, etc. if they have been removed, then install.

7. Use MEK to remove any excess sealant from the outside of the tank where it would be seen and detract from the final finish.

8. Allow sealant to cure. Refer to **Curing Time** below for cure times.

9. Test tank for leaks.

Sealing Fuel Tank Leaks

First determine the source of the fuel leak. Fuel can flow along a seam or the structure of the wing for some distance making the leak source difficult to find. A fuel stain left from the dye in the fuel can be a good indication of the leak source. Fuel leaks can also be found by testing the complete tank as described below in **Testing the Fuel Tank**. Another method of determining the source of a fuel leak if the approximate position is known, is to remove the access panels and blow with an air nozzle from the inside of the tank in the area of the leak while soap bubble solution is applied to the outside of the tank. After the leak source has been confirmed, proceed as follows:

1. Remove existing sealant in the area of the leak.

2. Clean the area and apply a fillet seal. Press sealant into the leaking area with a small spatula, working out all air bubbles.

3. If leakage occurs around a rivet or screw, restrike the rivet or re-torque the screw, then reseal over the rivet tail or the anchor nut.

4. Apply a fay surface seal to access panels, fuel gauges, etc. if they have been removed, then install.

5. Test tank for leaks.

Curing Time

Based on a standard temperature of 24°C (75°F) and a 50% relative humidity, the approximate curing times for PR-1422 are:

Class A-$^1/_2$	30 hours
Class A-2	72 hours
Class B-$^1/_2$	45 hours
Class B-2	72 hours
Class B-4	90 hours

These times are for <u>minimum</u> acceptable cure. Longer cure times are beneficial in that they further improve the ultimate resistance of the sealant to fluids, heat and pressure. Cure may be hastened by applying heat up to a maximum of 55°C (131°F).

Testing the Fuel Tank

1. Drain the fuel tank if not already empty.

2. Disconnect the fuel line and the return line/airspace connection line at the wing root. Cap the fuel line fitting.

3. Fabricate a simple open ended manometer from $^{3}/_{8}$" (9.5 mm) clear PVC tubing and attach to the under wing vent tube. The dimension from the bottom of the "U" bend to the top of the open end is to be not more than $23^{5}/_{8}$" (600 mm). Fill manometer tube with water until 11¾"(300 mm) of water is in each leg.

4. Ensure fuel cap is secure and totally seals the refuelling neck.

5. Attach a suitable fitting to the return line/airspace connection fitting and connect a well regulated supply of air capable of supplying 3.4 kPa (0.5 psi), or 13¾" (350mm) of water as the MAXIMUM pressure.

CAUTION

Do not attempt to apply pressure without a good regulator and a positive shut-off in the supply line. Do not deliberately inflate the tank to a pressure in excess of 13¾" (*350mm*) *of water. Damage may result.*

6. Apply pressure slowly until the manometer indicates 13¾" (350 mm), of water.

7. If the tank holds the pressure for 15 minutes without pressure loss, the tank is acceptable.

8. If a leak is indicated, apply a soap solution to all accessible joints. Reseal and retest as required.

Testing the Sump Tank

1. Drain sump tank.

2. Plug outlets and pressurise with air to a maximum pressure of 30” (760 mm) of water using a plastic pipe manometer.

CAUTION

Do not use a high pressure air source. Damage may result.

3. Check for leaks with soapy water. Minor leaks may be sealed with PR1422 sealant whereas more serious leaks may require the sump tank to be replaced.

28-10-40 Fuel Vent System

The airspaces between wing tanks and sump tank are interconnected via vent lines that run from each tank to the vent plenum located on the cabin roof just aft of the main spar carrythrough. The vertical fuel lines (four of) in the main cabin walls are also vented from their 90° top joint to the plenum. The plenum contains stand pipes that prevent cross feeding and excessive fuel loss overboard. The plenum is vented and drained to a position on the under side of the right hand wing, just aft of the rear spar, approximately 35” out from the fuselage.

Maintenance

Routine maintenance of the fuel vent system consists of:

Operational Checks

1. Check that the system has no blockages by blowing into the overboard vent drain (located on the under side of the right hand wing, just aft of the rear spar, approximately 35" (890 mm) out from the fuselage).

2. Check that all vent connections are secure and that all lines and components are free from damage.

3. After the completion of the operational checks of the fuel vent system ensure that any corks etc. used to block the main tank vents are removed.

WARNING

Although blowing/sucking fuel vent lines by mouth is the most convenient method of checking the vent system, it can be dangerous. Be particularly careful not to swallow any gasoline if this method is used. The use of a short length of suitable clear PVC tubing fitted over the vent will minimise the possibility of direct contact with the gasoline. Contact with gasoline, particularly in the mouth, is highly undesirable and could be hazardous to health.

28-20-00 DISTRIBUTION

Fuel gravity feeds through the two main fuel filters to the sump tank from where it is delivered to the electric boost pump (mounted beside the sump tank). Both wing tanks and sump tank are fitted with lowest point water drains. Fuel is piped from the boost pump to the main fuel shut off valve assembly, then through the firewall to the engine driven pump and on to the fuel injection system.

Cleaning of Main Tank Finger Strainer

1. Remove the access panels in the top of the fuel tank to gain access.

2. Remove any accumulated debris.

3. Reinstallation is the reverse of the above process. The access panels in the top of the fuel tank must be sealed during reinstallation in accordance with the procedures specified in **28-10-10**.

Electric Emergency Fuel Pump

The fuel pump assembly is located under the right hand side of the cockpit floor. Access can be gained by removing the right hand side cockpit floor panel. The pump is repairable, and overhaul kits are available to suitably licensed organizations.

Removal/Installation of Fuel Pump Assembly

The entire pump assembly is readily removable from the aircraft. This may be accomplished as follows:

1. Disconnect electrical wiring.
2. Turn off fuel servicing taps located on fuel filter assemblies.
3. Disconnect and cap fuel lines being careful to minimise fuel spillage if the fuel system has not been drained. Mop up any spilled fuel immediately.
4. Undo the pump assembly mounting clamps.
5. Remove the fuel pump assembly from the aircraft.
6. Installation is the reverse of the above procedure.

Main Fuel Shut Off Valve Assembly

The shut off valve assembly is mounted just outboard of the electric boost pump, under the right hand cockpit floor, and is actuated by a Bowden cable type push-pull control located on the left hand side of the instrument panel.

Operational Check

1. Pull emergency fuel shut-off to OFF position.
2. Select mixture in the rich position, and advance the throttle to approximately half travel.
3. Turn ON the electric boost pump
4. Observe that the fuel pressure gauge remains at zero.
5. Push emergency fuel shut-off to ON position and observe the fuel pressure gauge indicate normal fuel pressure.
6. Turn the electric boost pump OFF, and reposition throttle and mixture to closed and idle cut-off.

If items 4 or 5 are not observed as above then an inspection of the fuel shut-off cable/adjustment or tap replacement may be required.

CAUTION

Do not operate the electric boost pump for more than approximately 5 seconds per check without provision for collecting excess fuel from engine.

Cleaning Fuel Strainer/Sump

1. Cut lock wire and remove the three wing nuts securing the top to the filter bowl. Whilst holding down on the filter top, remove the top retaining plate to gain access to the servicing tap. Shut off fuel supply by turning off the servicing tap.

CAUTION

Ensure that the top of the filter bowl is held down (by hand) as the retaining plate wing nuts are loosened, as the fuel pressure head is adequate to lift the filter bowl top and allow fuel spillage. After the servicing tap is turned off, if some fuel is drained from the filter bowl water drain prior to releasing the top then no spillage will occur.

2. Clean the filter, sump, O ring, and O ring groove using clean gasoline or a suitable solvent. Compressed air may be used as required to assist.

3. Locate the strainer in position then install the O ring in its groove. Install the filter top and, whilst holding down pressure on the top (by hand), turn ON the servicing tap. Install top hold down plate, ensuring correct location locking the service tap ON. Tighten the wing nuts finger tight only and secure with lock wire.

4. Check for leakage and correct if necessary.

Fuel System Flow Rate Test

Every 3 years perform a flow rate test of the fuel system as indicated below. The test is to be done separately for the left and right systems.

NOTE

*It is recommended that this test be done in conjunction with cleaning of the fuel strainer per **Cleaning Fuel Strainer/Sump** of **28-20-00.***

1. Level the aircraft both longitudinally and laterally.

2. Ensure that the main fuel tanks are filled to an equal level so that both have equal head relative to the sump tank at operating level.

3. Turn off the service taps and drain the sump tank completely.

4. For each system, turn on the respective service tap and allow fuel to flow into the sump tank for 30 seconds, then turn the service tap off.

5. Drain the contents of the sump tank into a container.

6. Measure the quantity of fuel collected and determine the flow rate into the sump tank.

If the flow rate exceeds 2.5 litres per minute (i.e. 1.25 litres in 30 seconds), the flow rate is acceptable.

If the flow rate is less than 2.5 litres per minute, check for obstructions to fuel flow between the main tanks and the sump tank.

Sump Tank Lateral Adjustment

Lateral adjustment by rocking of the sump tank can be achieved to cause minor changes to the rate of fuel used from one tank in comparison to the other.

Generally small corrections to the lateral level of the tank are sufficient to alleviate most cases of uneven fuel burn.

The flow of fuel from each wing into the sump tank is regulated by individual float valves in the sump tank.

The fuel lines from each wing tank cross over prior to entering the sump tank.
(The right wing tank supplies the left float valve and the left wing tank supplies the right float valve).

As a result of this cross over the sump tank should be biased toward the wing tank which remains the fullest or is using the least amount of fuel during flight as shown in figure 28-2.

NOTE

Prior to any adjustment of the lateral level of the sump tank to correct uneven fuel usage, ensure that the turn co-ordinator is level in the instrument panel when the aircraft is level on the ground and that the aircraft is rigged so that the aircraft will fly straight and level in yaw and roll without the need for control input, ensure that no fault or problem with the fuel delivery or venting system exists that could cause uneven fuel usage.

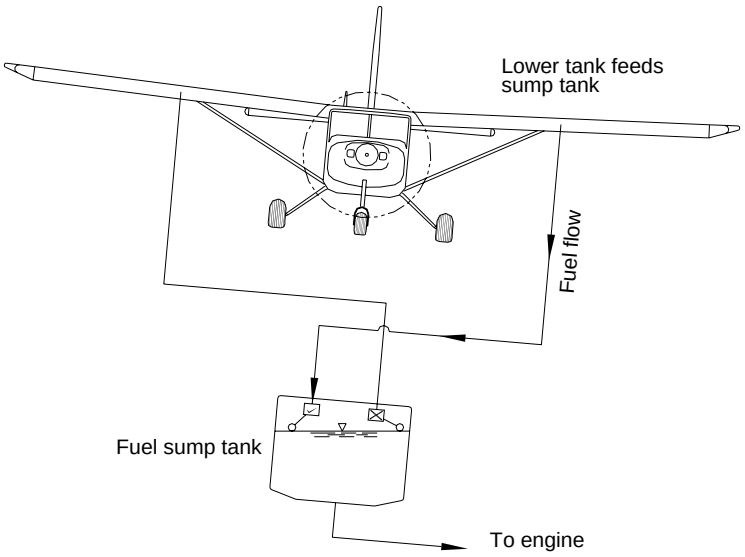


Figure 28-2

Adjustment to the lateral level of the fuel sump tank can be carried out as follows.

1. With the Co Pilot seat and the floor panels that cover the strainer valves and sump tank removed, turn off both service valves at the fuel strainers and drain all of the fuel from the sump tank.

2. Loosen the fuel lines at the sump tank fittings.

The tank is held in its lateral position by washers fitted to the top of the tank (shown in figure 28-2), these washers bear against the bottom of the cover panel.

NOTE

If the sump tank does not have AN970-3 washers installed as shown in figure 28-3 they can be installed by counter sinking 4 x AN970-3 washers to suit the heads of MS24694S50 screws, these screws are then used to retain the washers.

3. By adjusting the position of these washers from side to side the lateral level of the tank can be adjusted.

4. Removing washers from the left side of the tank only will cause the tank to rock to the right; removing washers from the right side only will cause the tank to rock left.

5. Washers can be removed from one side only or removed and added to the existing washers on the other side as required to achieve the desired amount of lateral movement.

6. The collector tank should be rocked or biased towards the tank that remains fullest or is having the least amount of fuel used from it.

7. The tank should be rocked in the required direction and held in this position whilst re-tightening the fuel line fittings.

8. Place a small amount of PR 1422, Pro Seal or equivalent around the base of the washer and screw for final installation.

9. Turn on both service valves and ensure that the strainer hold down plates are correctly installed and lock wired.

10. Check for any evidence of fuel leakage.

11. Install floor panels.

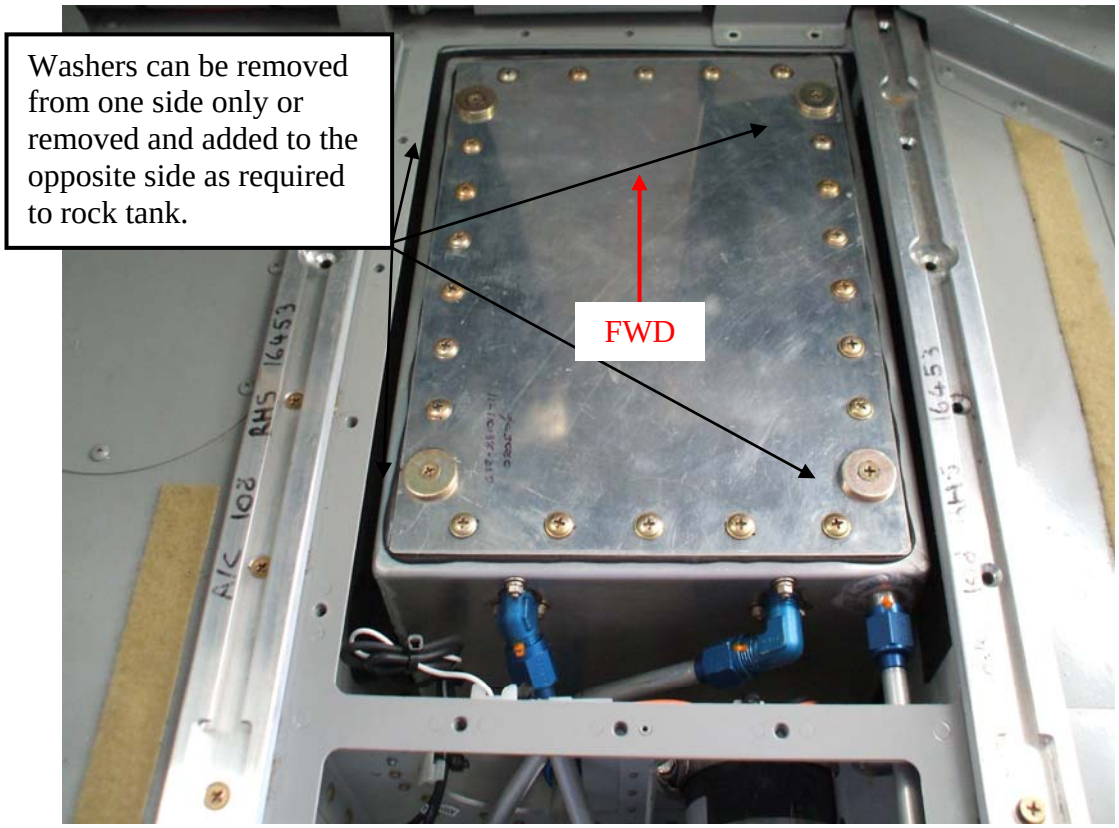


Figure 28-3

Maintenance and Calibration of the Sump Tank Floats

WARNING

Do not perform any sort of maintenance on the fuel system in conjunction with maintenance on the electrical system. The escape of fuel fumes under the floor and/or in the aircraft may cause an explosion. Also ensure the aircraft is properly electrically grounded and any containers used are also grounded. Use only metal containers.

1. Level the aircraft both longitudinally and laterally.

2. Fill main fuel tanks to an equal level and ensure that both have equal head with the sump tank at operating level.

3. Turn on sump tank drain valve and collect fuel (this approximates engine fuel usage in cruise).

4. Monitor the fuel usage from both tanks by dipping the level and watching the aircraft gauges.

If the tanks empty at the same rate then no adjustments need to be made to the sump tank floats.

If the tanks empty at rates that differ by more than 10%, initially check for obstructions in the fuel system between the main tank and the sump tank.

If after checking for obstructions and any required cleaning the rates still differ by more than 10%, readjust the floats per steps 5 thru 10.

5. Remove sump tank top plate.

6. Bend the float, corresponding to the tank which is emptying faster, **down** by a small amount, approximately $^{1}/_{16}$" (1.5mm). Note that the floats are connected to the opposite side tank i.e., if the left hand tank empties faster, bend **down** the right hand float.

7. Retest and continue to make fine adjustments until flow rates are within 10%.

8. Turn service taps off and drain fuel from sump tank.

9. Reseal the sump tank top plate.

10. After sealant has cured, open service taps and check for leaks.

NOTE

1. *The initial float setting has the float pivot arm as near as practicable to horizontal with final adjustments (detailed above) to correct flow.*

2. *The static fuel level in the sump tank is not critical to the operation of the fuel system as manoeuvres in flight create considerable variations in the fuel level.*

3. *The sump tank drain is used in this test to approximate engine fuel usage and should flow at approximately 1lt/min.*

Maintenance of Valve

Should the valve become stiff to operate in service, it may be dismantled and cleaned as required. Should damage or wear be detected it is recommended that the entire valve be replaced rather than attempting to repair it.

Fuel Hoses and Lines

All replacement hoses and solid aluminium lines throughout the entire fuel system may be locally manufactured using the removed components as patterns. The hoses and solid aluminium lines are to be fabricated using the procedures specified in the FAA publication AC 43.13-1B. The single exception to these procedures is that in lieu of the double flare specified for aluminium tubing 3/8" outside diameter or less, a single flare may be used.

The following material specifications are to be used:

Hoses:	MIL-H-8794
Solid Aluminium Lines:	WW-T-700/4 (5052-0)

28-40-00 INDICATING

Fuel Quantity Indication

The fuel indicating system is by two float activated electrically operated fuel gauges, one in each main fuel tank. Two fuel gauges are located at the top left hand corner of the instrument panel.

Maintenance and Calibration of Main Tank Fuel Gauges

The main tank fuel gauges are of a lever action type with a PVC float operating a sender unit connected electrically to indicators on the instrument panel. Trouble shooting consists of checking wiring for continuity, terminals for security, gauges for serviceability. Wiring can be swapped from gauge to gauge to check where a fault may be.

CAUTION

Ensure the wiring is returned to its correct position after check is carried out

Checks for sunken floats or other sender unit failures can be carried out by measuring the electrical resistance of the sender unit whilst the tank is approximately one third full and the wings are rocked. Under normal conditions this will result in varying resistance as the fuel level changes.

Due to the arrangement of non-interconnected tanks, calibration of both fuel gauges can be done independently. The procedure detailed below assumes that a fuel bowser (accurately calibrated in accordance with applicable government regulations) is used as a means of adding the specified fuel quantities.

To calibrate the fuel gauging system, proceed as follows:

1. Drain the entire fuel system and level the aircraft.

2. Add 13 litres (3.4 US gallons) of fuel to one main tank. Allow sufficient time for some of this fuel to fill the sump tank (9 litres (2.4 US gallons)).

3. Add 4 litres (1 US gallon) to the other main tank.

4. Ensure that both wing fuel gauges indicate EMPTY.

5. Slowly add fuel to one main tank, noting the actual quantities as the gauge reads quarter, half, three quarters and full.

6. Repeat Step 5 on other main tank.

7. Produce correction card as required.

28-40-10 Fuel Warning System

A fuel low warning system is provided by means of solid-state fuel sensing devices installed in each of the main feed lines just aft of the forward cabin doors in the fuselage side panels, and two sensors in the sump tank. Two amber caution lights, a red warning light and red warning L.E.D. positioned on the left hand side of the instrument panel are operated by these sensors. The two amber "CHECK FUEL" lights will illuminate independently indicating when there is no fuel in the corresponding main fuel feed lines. These lights will begin to flash in flight at very low fuel quantities due to slosh, the intent being to draw the pilot's attention to the fuel situation. The red "FUEL" warning light and red "SUMP TANK LOW FUEL" L.E.D. warn the pilot that only a few litres of fuel remain in the sump tank.

Maintenance

Maintenance of the fuel warning system consists of a periodic check of the sump tank warning system, and a check of the complete fuel warning system every 3 years or 300 hours (whichever occurs first).

Periodic Sump Tank Warning System Maintenance

Maintenance of the sump tank fuel warning system consists of:

1. Ensure aircraft is on level ground and in the normal operating attitude.

2. Turn on the Bus 1 Master Switch and ensure all four caution/warning system lights are not illuminated. Press the Press-to-Test button on the instrument panel coaming and ensure all four fuel caution/warning lights illuminate. Turn off the Bus 1 Master Switch.

3. Gain access to the fuel strainer bowls under the co-pilot seat. Shut off fuel supply by turning OFF each service tap, and drain the sump tank completely.

   CAUTION

   Ensure that the strainer bowl lid is held down (by hand) as the strainer cover wing nuts are loosened, as the fuel pressure head is adequate to lift the strainer bowl lid and allow fuel spillage. After the service tap is turned off, draining some fuel from the strainer bowl drain prior to releasing the lid will prevent spillage of fuel.

   NOTE

   *It is recommended that this check be done in conjunction with cleaning of the fuel strainer per **Cleaning Fuel Strainer/Sump** of **28-20-00.***

4. Turn on the Bus 1 Master Switch and ensure that the "FUEL" warning light and the "SUMP TANK LOW FUEL" L.E.D. are illuminated. Turn off the Bus 1 Master Switch.

5. Turn on the service taps and re-fill the sump tank. Turn on the Bus 1 Master Switch and ensure that the "FUEL" warning light and the "SUMP TANK LOW FUEL" L.E.D. are not illuminated.

If this check is passed correctly then the sump fuel tank warning system is operating properly. If the system does not complete these operation checks correctly, see the troubleshooting table.

6. Replace each strainer bowl lid. Install the strainer cover, ensuring that the service tap is locked in the ON position. Tighten the wing nuts finger tight only and secure with lock wire.

Complete Fuel Warning System Maintenance

Maintenance of the complete fuel warning system consists of:

1. Ensure aircraft is on level ground and in the normal operating attitude.

2. Before the fuel system is drained, and with more than 25 litres (6.6 US gallons) in the system, turn on the Bus 1 Master Switch and ensure that all four fuel caution/warning system lights are not illuminated. Press the Press-to-Test button on the instrument panel coaming and ensure all four fuel caution/warning lights illuminate. Turn off the Bus 1 Master Switch. Drain the fuel system completely.

3. Turn on the Bus 1 Master Switch. Check that all four fuel caution/warning lights illuminate. Turn off the Bus 1 Master Switch.

4. Fill the system with 9 litres (2.4 US gallons) of fuel and allow time for the sump tank to fill. Turn on the Bus 1 Master Switch and ensure that the “FUEL” warning light and “SUMP TANK LOW FUEL” L.E.D are not illuminated. Turn off the Bus 1 Master Switch.

5. Add an additional 8 litres (2.2 US gallons) of fuel to each main tank. Turn on the Bus 1 Master Switch and ensure that the amber “CHECK FUEL” lights are not illuminated.

If all checks are passed correctly then the fuel warning system is operating properly. If the system does not complete these operation checks correctly, see the troubleshooting table.

Removal/Installation of Fuel Sensor Unit

The fuel sensor unit is removable from the aircraft. This may be accomplished as follows:

1. Drain fuel system and disconnect electrical wiring. If removing sensor from sump tank, remove the tank itself from the aircraft.

2. Remove cabin interior trim to gain access to the fuel sensors in the main fuel lines just aft of the cockpit doors.

3. Remove the sensor unit from the fitting.

4. Installation is the reverse of the above procedure. See **28-10-10** Fuel Tank Sealing Procedures for details on sealing the sensor units. Perform an operational check as described above, excluding step 2.

Troubleshooting

The following table is supplied to help troubleshoot problems in the fuel warning system.

NOTE

When operating correctly with no fuel across a fuel sensor (i.e. less than unusable fuel) the fuel sensor opens the circuit. The function of the fuel warning system controller is to reverse this state and illuminate the particular warning light.

Problem	Probable Cause	Procedure	Remedy
With empty fuel tanks a warning light/L.E.D. does not illuminate	Blown Globe and/or Faulty L.E.D.	Push "Press to Test" button Light/L.E.D. does not illuminate Light/L.E.D. does illuminate	 Blown globe – Replace Faulty L.E.D. – Replace Try next Probable Cause
	Short circuit	Behind instrument panel, at the Caution System Controller, remove the lead of the bad fuel sensor circuit from its socket If the light/L.E.D. illuminates If the light/L.E.D. still does not illuminate	 Faulty wiring – check wiring from Caution System Controller to sensor for shorted wire. Faulty sensor – Replace Faulty Caution System Controller – Replace
With empty fuel tanks <u>all</u> warning lights/L.E.D.s do not illuminate	"Popped" circuit breaker	Check the CAUTION SYSTEM 1 circuit breaker for lights, and CAUTION SYSTEM 2 for L.E.D.s	Reset circuit breaker. If it continues to "pop", check wiring from main supply bus to the Caution System Controller for shorted wire.
	Broken circuit	Inspect wiring	Check wiring from main supply bus to the Caution System Controller for dirty connections or broken wire.
With sufficient fuel in the tanks (i.e. more than unusable fuel) a warning light is still illuminated	Broken circuit	Behind instrument panel, at the Caution System Controller, remove the lead of a properly functioning warning circuit from its socket (ignore the warning light that will now illuminate). Plug that lead into the faulty fuel sensor socket. If the faulty warning light extinguishes	 Faulty wiring – check wiring from Caution System Controller to sensor for dirty connections or broken wire. Faulty sensor – Replace
		If the faulty warning light is still illuminated	Faulty Caution System Controller – Replace

This page intentionally left blank

CHAPTER 31

INDICATING SYSTEMS

31-00-00 GENERAL

This chapter provides a pictorial coverage of all instruments, the instrument panel, and all controls mounted on it.

31-10-00 INSTRUMENT AND CIRCUIT BREAKER PANELS

The instrument panel spans the full width of the cockpit, with most instruments located on the left hand side in front of the pilot. Radio and navigation aids are stacked in line with the centre console but are canted towards the pilot for ease of observation. The right hand side may contain additional instruments and/or avionics. The overhead panel contains circuit breakers (or switch breakers) for all circuits connected to either bus (except for the stall warning breaker located in the floor). The overhead panel is marked to show which circuits are on Bus 1 and which are on Bus 2, and is backlit for night operations. To accommodate future changes to the electrical system, space is provided for additional circuit breakers.

The space between the firewall and the instrument panel is designed to be semi sealed to facilitate cooling of the avionics and flight instruments. To enclose this space there are panels fitted to the underside of the instrument panel that span the gap to the firewall. Ram air is ducted to the rear of the central avionics stack. The air also provides cooling to the flight instruments as it flows to exhaust vents on the fuselage sides just forward of the cockpit doors.

Additional cooling for IFR avionics may be provided by an avionics cooling fan.

Figure 31-1 Instrument Panel - Typical

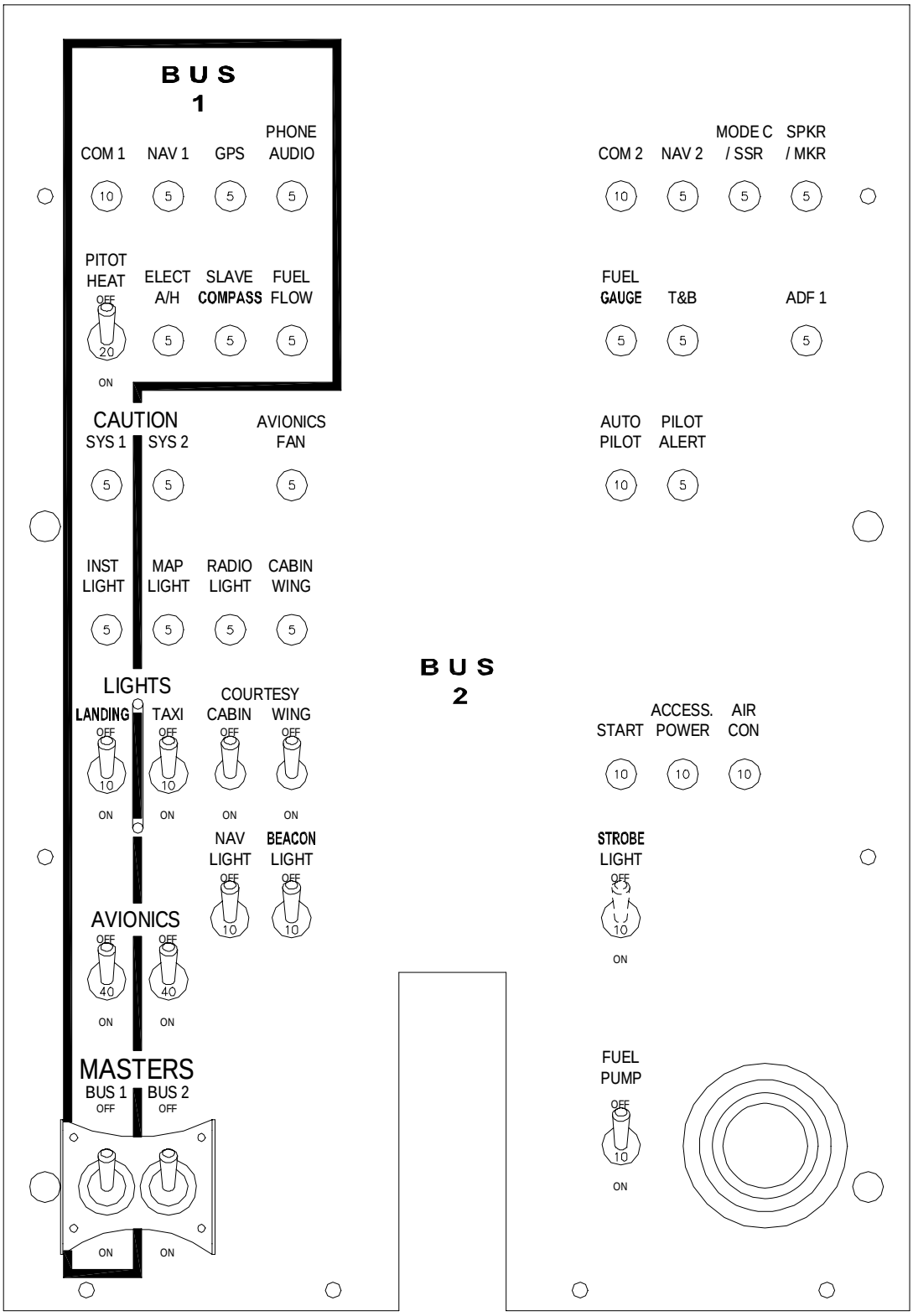


Figure 31-2 Overhead Circuit Breaker Panel – Typica

31-10-10 Flight Instrument Sub Panel

The main flight instruments, vacuum pressure gauge and caution/warning light annunciator array are fitted to a removable sub-panel.

To Remove/Install Flight Instrument Sub-Panel

1. Remove the underside cover panels between the instrument panel and the firewall.

2. Disconnect the vacuum line between the vacuum pump and the vacuum regulator, and disconnect the vacuum regulator from the firewall.

3. Remove the 7 screws attaching the flight instrument sub-panel to the main instrument panel.

4. Pull the sub-panel out to gain access to the rear of the flight instruments.

5. If the sub-panel is to be removed from the aircraft:

   (i) disconnect caution/warning light connecter J41/P41, turn co-ordinator connector J53, and vacuum pressure switch wires WV1A22 and WV1B22N.

   (ii) disconnect pitot line from the airspeed indicator, and the static line from the altimeter.

6. Installation is the reverse of the above procedure. After installation is complete, conduct a pitot-static leak test per **34-10-00**.

31-10-20 Overhead Circuit Breaker Panel

The overhead circuit breaker panel is attached to the cabin roof by six Dzus quick release fasteners. The Dzus fasteners are located behind the illuminated cover panel and are accessed through six 0.375” diameter holes in the illuminated cover panel.

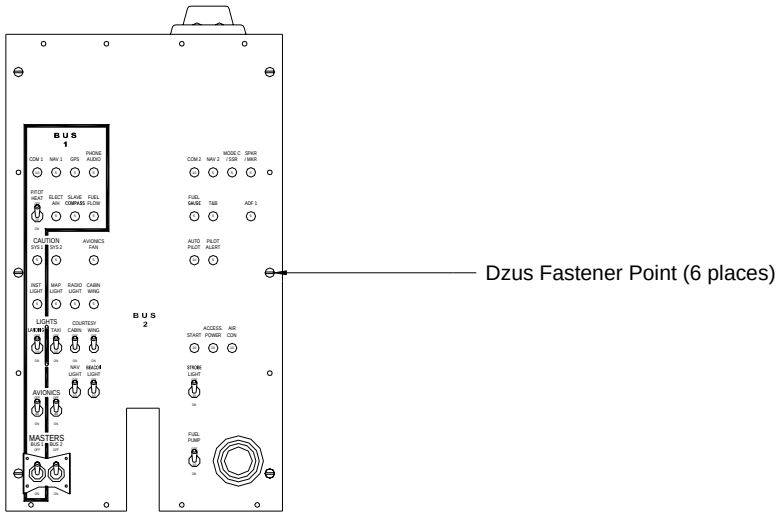


Figure 31-3 Dzus Fastener Locations

To Gain Access to Rear of Overhead Circuit Breaker Panel

1. Unfasten the six Dzus quick release fasteners.

NOTE

Do not remove the 12 perimeter screws that attach the illuminated cover panel to the overhead electrical panel assembly.

To Remove/Install the Overhead Circuit Breaker Panel

1. Pull Bus 1 Control, Bus 1 Main, Bus 2 Control, Bus 2 Main and stall warning breakers. Disconnect battery.

2. Remove forward wing root covers, and disconnect connectors J01/P01 and J02/P02.

3. Remove cockpit interior roof trim panels.

4. Unfasten the six Dzus quick release fasteners.

5. Disconnect connectors P19/J19, P34, J40/P40, J101/P101, J102/P102, J103/P103, J104/P104 and J105/P105. Disconnect power feed PB4B8 and PB2B6 to Bus 1 and 2 respectively.

6. Withdraw cabling from wing root.

7. Remove the overhead circuit breaker panel from the aircraft.

8. Installation is the reverse of the above procedure.

To Remove/Install the Central Avionics Stack

1. Remove the six screws that attach the avionics stack to the instrument panel.

2. Carefully withdraw the avionics stack from the instrument panel. There is sufficient length of cable installed to the various items of equipment to allow the stack to be placed onto the centre console without disconnecting any plugs.

3. If the avionics stack is to be completely removed from the aircraft, disconnect the plugs to the various items of equipment.

4. Installation is the reverse of the above procedure. When replacing the stack ensure that the loom is placed to the left of the stack so that the loom does not become entrapped between the bottom of the stack and the centre console.

This page intentionally left blank

CHAPTER 32

UNDERCARRIAGE

32-00-00 GENERAL

The aircraft is fitted with a tricycle type undercarriage with tubular spring steel main legs and a steerable nose wheel that incorporates a coil spring and hydraulic damping inside the leg.

32-10-00 MAIN UNDERCARRIAGE

The main undercarriage is manufactured from machined and heat treated 5160 steel tube that plugs into fittings in the fuselage main landing gear (MLG) carrythrough structure. The leg is restrained on the inboard fitting using 8 bolts to connect it to a machined alloy fitting that in turn is bolted to the main keel member.

The axle is machined and welded from 4130 steel tube and is restrained on a taper by two bolts. Cleveland wheel and brake assemblies are fitted and are equipped with 6 ply rating 8-50 x 6 tyres.

The main undercarriage has no provision for adjustment of toe-in or camber. These are preset during manufacture. Minor damage where no dimensional changes or alignment problems are involved may be blended out. Where more significant damage is involved, the undercarriage leg is not considered to be repairable. Should the leg or axle be bent or dimensionally changed in any way it should be replaced. Also, the surrounding fuselage structure should be carefully inspected if such leg or axle damage is found.

General Undercarriage Maintenance

With the weight removed from the undercarriage, the leg can be checked for the following:

- any looseness in fuselage attachment
- tyre wear and bearing
- the condition of the brake line

Removal of Main Undercarriage Leg

1. Jack the aircraft.
2. Remove fairing.
3. Disconnect and cap the brake line and remove from the undercarriage.
4. Remove the inboard 8 attaching bolts (accessed through inspection panel underbelly).
5. Remove the undercarriage leg from the aircraft.

Installation of Main Undercarriage Leg

Installation is the reverse procedure of removal.

Bleed brakes in accordance with section **32-40-00**.

32-20-00 NOSE UNDERCARRIAGE ASSEMBLY

The aircraft is fitted with a steerable nose wheel that incorporates a coil spring and hydraulic damping inside the leg. The leg slides in two Lubron bearings that maintain alignment. A third Lubron bearing maintains the station of the steerage collar, relative to the leg. This collar is driven by two push rods from the rudder pedals and in turn drives the scissor links that are connected to the lower scissor link clamp assembly. The end thrust of the leg is taken by a tapered roller bearing at the top of the strut and transferred into the fuselage fitting provided. A coil spring is fitted inside the leg, and together with MIL-H-5606 hydraulic fluid provides the necessary shock absorption. The leg contains no residual air or spring pressure when the aircraft weight is removed from it.

Refer to section **27-20-00** for setting of the nose gear stops with respect to rudder deflection.

32-40-00 WHEELS AND BRAKES

The aircraft has a single hydraulically actuated disc brake on each main undercarriage wheel. Each brake is connected by a hydraulic line to a master cylinder attached to the respective rudder pedal. Each brake is thus independently operated by pushing the top part of the corresponding rudder pedal. When the aircraft is parked, both main wheel brakes may be set by pulling the park brake knob (located on the centre console) out then pushing both brakes ON. To release the park brakes, push the park brake knob in.

Removal of Main Wheels

NOTE

It is not necessary to remove the main wheels to reline the brakes or remove brake parts, other than the brake disc or torque plate.

1. Jack the aircraft.
2. Remove cotter pin and axle nut.
3. Remove bolts (4) and washers attaching brake calliper back plates (2) and remove back plates from behind the brake disc.
4. Pull wheel from axle.

Disassembly of Main Wheel

1. Deflate tyre and break tyre beads loose.

CAUTION

Avoid damaging wheel flanges when breaking tyre beads loose. A scratch, gouge, or nick may cause subsequent wheel failure.

2. Remove thru-bolts and separate wheel halves, removing tyre and tube and brake disc.

WARNING

Serious injury can result from attempting to separate wheel halves with the tyre still inflated.

3. Remove the grease seal rings, felts, and bearing cones from the wheel halves.

NOTE

The bearing cups are a press fit in the wheel halves and should not be removed unless replacement is necessary. To remove the bearing cups, heat the wheel half in boiling water for 15 minutes. Using an arbor press if available, press out the bearing cup and press in the new cup while the wheel is still hot.

Inspection and Repair of Wheels

1. Clean all metal parts and the grease seal felts in solvent and dry thoroughly.

2. Inspect wheel halves for cracks. Cracked wheel halves must be replaced. Sand out nicks, gouges, and corroded areas. Thoroughly clean areas where the protective coating has been removed, prime with zinc chromate and repaint with aluminium lacquer.

3. Brake disc should be replaced if excessively scored or warped. Small nicks and scratches should be sanded smooth.

4. Bearing cups and cones should be inspected carefully for damage and discolouration and replaced if necessary.

Assembly of Main Wheels

1. Insert thru-bolts through brake disc and position in the inner wheel half using the bolts to guide the disc. Confirm that the disc is bottomed in the wheel half.

2. Position the tyre and tube with the inflation valve through the hole in the outboard wheel half.

3. Place the inner wheel half in position on outboard wheel half so that thru-bolts protrude through the outer half. Using a light force push the two halves together sufficiently to enable the washers and nuts to be assembled on the thru-bolts being careful not to pinch the tube between the two wheel halves. Torque the nuts to the value marked on the wheel.

CAUTION

Uneven or improper torque of thru-bolt nuts may cause failure of bolts and subsequent wheel failure.

4. Clean bearing cups and cones. Repack cones with clean grease as specified on the lubrication chart before installation in the wheel.

5. Assemble the bearing cones, grease seal felts, and rings into wheel halves.

6. Inflate tyre to seat tyre beads, then adjust to correct pressure.

Installation of Main wheels

1. Place wheel assembly on axle.

2. Install axle nut and tighten until slight bearing drag is obvious when the wheel is rotated. Back off nut to the nearest castellation and install the cotter pin.

3. Locate the brake backing plates in position and secure with bolts and washers.

Wheel Balancing

Since uneven tyre wear is usually the cause of wheel unbalance, replacing the tyre will probably correct this condition. Tyre and tube manufacturing tolerances permit a specified amount of static unbalance. The light weight point of the tyre is marked with a red dot on the tyre sidewall and the heavy weight point of the tube is marked with a contrasting colour line, usually near the valve stem. When installing a new tyre, place these marks adjacent to each other. If a wheel becomes unbalanced during service, it may be statically re-balanced using a suitable balancing rig and stick-on type automotive wheel balancing weights.

Brake Fluid Servicing and Bleeding

This is accomplished from inside the cockpit by removing the plug from the top of the brake master cylinder reservoir and filling with hydraulic fluid. Ensure that no contaminants are allowed to enter the reservoir, particularly when removing or replacing the plug.

Alternatively, the brakes may be serviced as follows:

1. Obtain a suitable clean pressure oil can or similar, and a short length of clear PVC plastic tube that fits snugly on the nozzle of the oil can as well as on the bleeder nipple on the bottom of the brake calliper.

2. Remove the rubber cap from the bleeder nozzle, fit the PVC tube over it. Crack open the bleeder nipple and using the oil can, pump hydraulic fluid into the reservoir being careful not to over fill the reservoir. The quantity in the reservoir can be monitored by observing the level through the plug hole in the top of the reservoir.

3. When the reservoir is full, tighten the bleeder nozzle, remove the PVC tube and replace the rubber cap. Ensure the plug in the top of the master cylinder reservoir is also replaced.

Brake Adjustment

The brakes do not require adjustment of pad clearances. Worn brake pads should be replaced before they are worn to the extent that the attaching rivets damage the brake disc prior to the next scheduled inspection. The actual extent of permissible wear before replacement is left to the discretion and judgment of the engineer concerned.

Tyres

The approved main wheel tyre size is 8.50 x 6 (6 ply rating).

The approved nose wheel tyre size is 6.00 x 6 (6 ply rating).

The recommended tyre inflation pressures are:

MAINS	186-200 kPa (27-29 psi)
NOSE WHEEL	214-228 kPa (31-33 psi)

When carrying heavy loads, or when operating from hard or sealed surfaces, increased pressure in the mains may be found desirable. Operator experience and the tyre wear pattern may be used as a guide to determine variations to the specified tyre pressures.

When checking tyre pressures, the opportunity should be taken to examine the tyres for wear, cuts, bruises, slippage and other defects and replaced if necessary.

CHAPTER 33

LIGHTS

33-00-00 GENERAL

This chapter provides information on the flight compartment and exterior lighting systems of the GA8.

33-10-00 FLIGHT COMPARTMENT LIGHTING

The instrument panel and radios are illuminated by a number of lights embedded in the fibre glass coaming above the instrument panel, as well as by internal lights in radios and some instruments. These lights are switched on, off and adjusted by a pair of rheostats mounted on the centre console just under the radio stack. The overhead switching panel is illuminated and has its own rheostat mounted in the panel itself. Additionally a map light and emergency flood lighting is provided. The system provides good illumination and is adequate for night flight.

33-40-00 EXTERIOR LIGHTING

Conventional navigation lights are located on the wing tips and the trailing edge of the fin. Two 50-watt lights are fitted in the leading edge of each wing tip – a landing light mounted inboard and a taxi light mounted outboard. These exterior lights are controlled by circuit breaker type toggle switches located on the overhead panel. For aircraft up to S/N GA8-03-042 two red anti-collision beacons are provided - one on the fin and one under the aft fuselage. For aircraft S/N GA8-04-043 and subsequent, wing tip and tail strobe lights are fitted.

Refer to **24-10-00** for electrical wiring schematic.

Replacement of Landing/Taxi Light Bulb

1. Remove leading edge fairing containing the landing light assembly, unclip the globe from the rear of the assembly.

2. Remove defective bulb and disconnect electrical wiring.

3. Locate replacement bulb in position and connect electrical wiring.

4. Reinstall landing light assembly in the wing leading edge and align beam, if necessary, using the slotted holes provided.

NOTE

Bulbs should be positioned so that the filament is vertical for the landing light, and horizontal for the taxi light.

Replacement of Wing Tip Navigation Light Bulb

1. Remove navigation light rear metal fairing taking care not to allow the glass lens to fall off the aircraft and break.

1. Carefully remove the lens and remove the defective bulb.

2. Install the replacement bulb, then the lens, securing it in position with the rear metal fairing.

Replacement of Rear Navigation Light Bulb

1. Remove the two screws securing the rear navigation light metal shroud. Remove it and the lens.

2. Replace the defective bulb with serviceable one.

3. Reinstall the lens and secure it in position with the metal shroud.

This page intentionally left blank

CHAPTER 34

NAVIGATION

34-00-00 GENERAL

This chapter provides information on those systems and components that provide aircraft navigational data such as the pitot-static system, airspeed indicator, altimeter, outside air temperature gauge, turn and bank indicator, compass and electronic navaids.

34-10-00 FLIGHT ENVIRONMENT DATA

Pitot-Static System

The pitot system utilises a pitot-static tube located on the leading edge of the left hand wing at the tip. The pitot-static tube may be heated. Ram air pressure enters the pitot tube and is routed through a nylon pressure line (3/16" diameter for aircraft up to S/N GA8-02-019 and 1/4" diameter for S/N GA8-02-020 and subsequent) to the pitot input connection of the airspeed indicator. The nylon pressure line runs along the wing leading edge into the fuselage and thence to the airspeed indicator. The routing is designed so that any moisture that enters the system will accumulate at the drain points for easy draining.

The static system has sources located in the pitot head itself. Static air pressure enters the static sources and is routed through a nylon pressure line (3/16" diameter for aircraft up to S/N GA8-02-019 and 1/4" diameter for S/N GA8-02-020 and subsequent) to the altimeter and the static input connection of the airspeed indicator. The nylon pressure line is routed along side the pitot line to the back of the instrument panel from where it is tee'd to other instruments that require static pressure. The routing is designed so that any moisture that enters the system will accumulate at the drain points for easy draining.

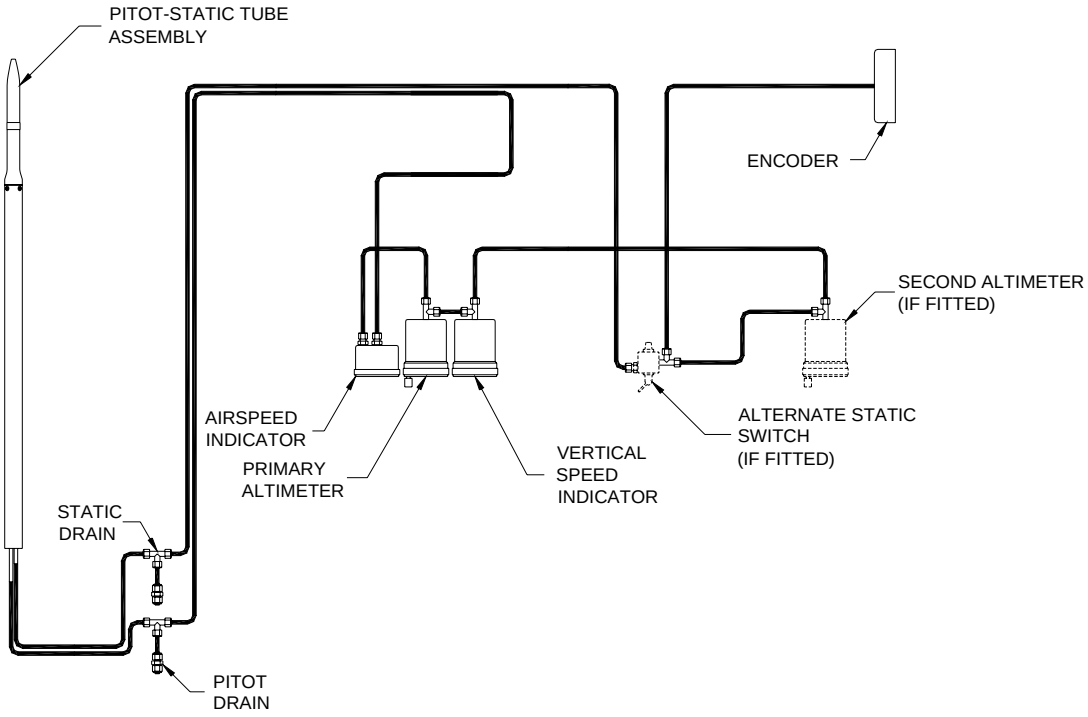


Figure 34-1 Pitot-static system layout

The pitot-static system may also include an alternate static source selector. This selector is designed to disconnect the normal static source and open the static side of the instruments to the cabin static. The alternate static source selector may be checked by selecting the normal static source and applying gentle suction to the cabin port. The instruments should not respond to the suction. The alternate static source should then be selected and gentle suction again applied. The altimeter should show an increase in altitude, the vertical speed indicator should show climb, and the airspeed indicator should show positive airspeed. With the suction held constant the altimeter and airspeed indicator should show constant settings and the vertical speed indicator should show zero. Take care when applying suction to these systems to prevent damage to the sensitive instruments.

Maintenance Practices

Leaks, moisture and obstructions are the major problems associated with pitot-static systems. Provided these problems are adequately addressed, the pitot-static system is essentially maintenance free.

If it becomes necessary to blow through either the pitot or the static system to clear blockages etc. the system should be disconnected at the instrument end and blown out with clean, dry air from that end (**ensure** all lines tee'd into the static system are disconnected). Avoid blowing through by mouth as this will introduce moisture into the system. Never blow through from the source end, particularly with the instruments connected, or they will surely be ruined.

The pitot and static drain lines can be accessed via the inspection panel located in the floor directly behind the pilot's seat. Refer to Figure 34-2. To drain the system, remove the end fitting and allow any accumulated moisture to drain from the tube. Replace the end fitting on completion.

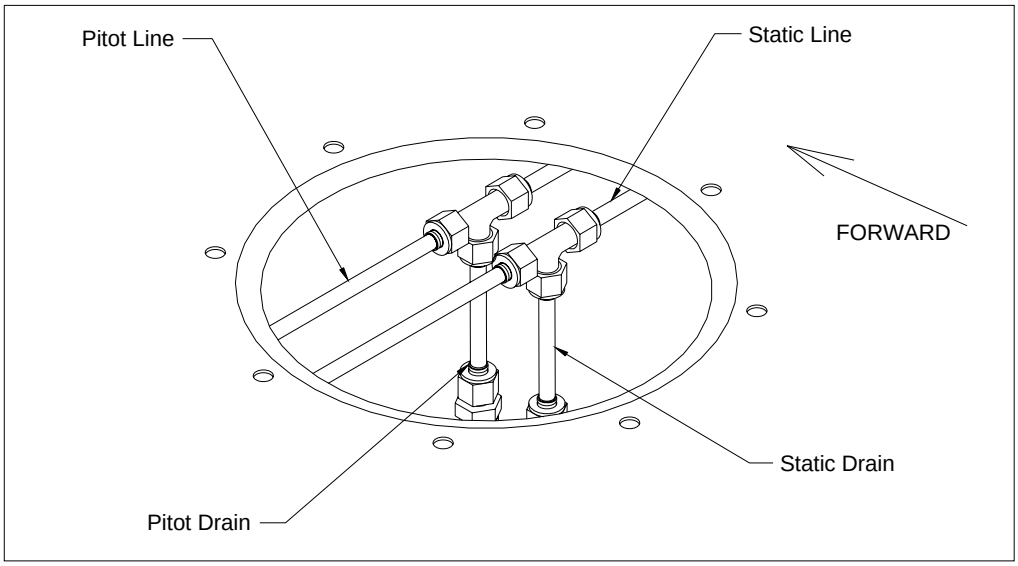


Figure 34-2 Pitot and Static Drain Location

Testing the Pitot System

The pitot system is to be tested for leaks by applying a pressure at the pitot head sufficient to cause the airspeed indicator to read 120 knots. There shall be no sign of restrictions in the plumbing during the application of the pressure and no decrease in the reading when the system is sealed for at least 10 seconds.

Testing the Pitot-Heat Caution Light System

The pitot-heat caution system is functionally tested as follows:

1. With the pitot-heat switched off, check that the amber pitot-heat caution light illuminates.

2. Switch on pitot-heat. Check that amber caution light extinguishes.

3. Disconnect left hand wing root electrical connector P01/J01. Check that amber caution light illuminates.

Testing the Static System

The static system is to be tested for leaks by plugging the static source and applying sufficient suction to the system to cause the ASI to read 85 knots. The system shall then be sealed. The reading on the airspeed indicator shall not decrease by more than 4 knots within 10 seconds.

Testing the Air Speed Indicator

The airspeed indicator is to be tested against an appropriate test instrument. The scale errors at the major graduations of the scale shall not exceed ± 4 knots up to 140 knots when tested first with the pressure increasing, and then with the pressure decreasing. Operation throughout the range shall be smooth and continuous.

Testing the Altimeter

The altimeter is to be tested for diaphragm errors against an appropriate test instrument from sea level up to 20,000 feet. Errors shall not exceed those specified in Appendix E of FAR Part 43.

NOTE

A sensitive altimeter regularly checked to ensure that it complies with the calibration tolerances specified in Appendix E of FAR Part 43 is acceptable as meeting the requirements of this paragraph for use as an appropriate test instrument.

Outside Air Temperature Gauge

A mechanical outside air temperature (OAT) gauge is fitted centrally in the cockpit roof. It is calibrated in both degrees Celsius and Fahrenheit. It may be removed by unscrewing the outer hexagonal shield and then removing the gauge unit inside the cockpit.

The gauge can be calibrated by comparing its temperature readings to those obtained from a mercury-in-glass thermometer when both are immersed in water and subsequently heated over the calibration range of the OAT gauge. The gauge is not repairable, and if found to be faulty should be replaced with a serviceable unit.

34-20-00 ATTITUDE AND DIRECTION

Turn and Bank Indicator

The turn and bank indicator is electrically powered and indicates the rate of turn of the aircraft as well as indicating if the aircraft is slipping or skidding in flight.

If the turn and bank indicator becomes unserviceable, it should be overhauled by an approved instrument overhaul facility or replaced with a serviceable unit.

Compass

The magnetic compass is liquid filled, with expansion provisions to compensate for temperature variations. It is equipped with adjustable compensating magnets accessible behind the small lift up cover on the face of the instrument below the indicator section. No maintenance is required on the compass except for periodic adjustment as required by local regulations. This will also be required of course if the compass has been removed for repair or is replaced with another unit.

The compass is installed on the windscreen centre pillar with brass screws and nuts to minimise local magnetic disturbances. If the instrument is removed for any reason care must be taken to ensure that only brass screws and nuts are used for its reinstallation.

If the compass sticks, is low on internal fluid, or has other known defects, it should be overhauled by an approved instrument overhaul facility or replaced with a serviceable unit.

34-30-00 ELECTRONIC NAVAIDS

The aircraft may be fitted with various electronic navigation aids such as ADF, VOR and GPS. Approved agents of the equipment manufacturer should carry out maintenance and servicing of these items.

This page intentionally left blank

CHAPTER 37

VACUUM

37-00-00 GENERAL

This chapter describes the vacuum system that is used to power the artificial horizon and the directional gyro. The system is very simple and consists of a vacuum pump mounted on the engine that is plumbed through a regulator valve on the fire wall to the instruments. A gauge to indicate differential pressure across the instruments is provided. A filter is fitted on the inlet side of the instruments to prevent dirt and dust entering the gyro system. A low vacuum warning light is also provided.

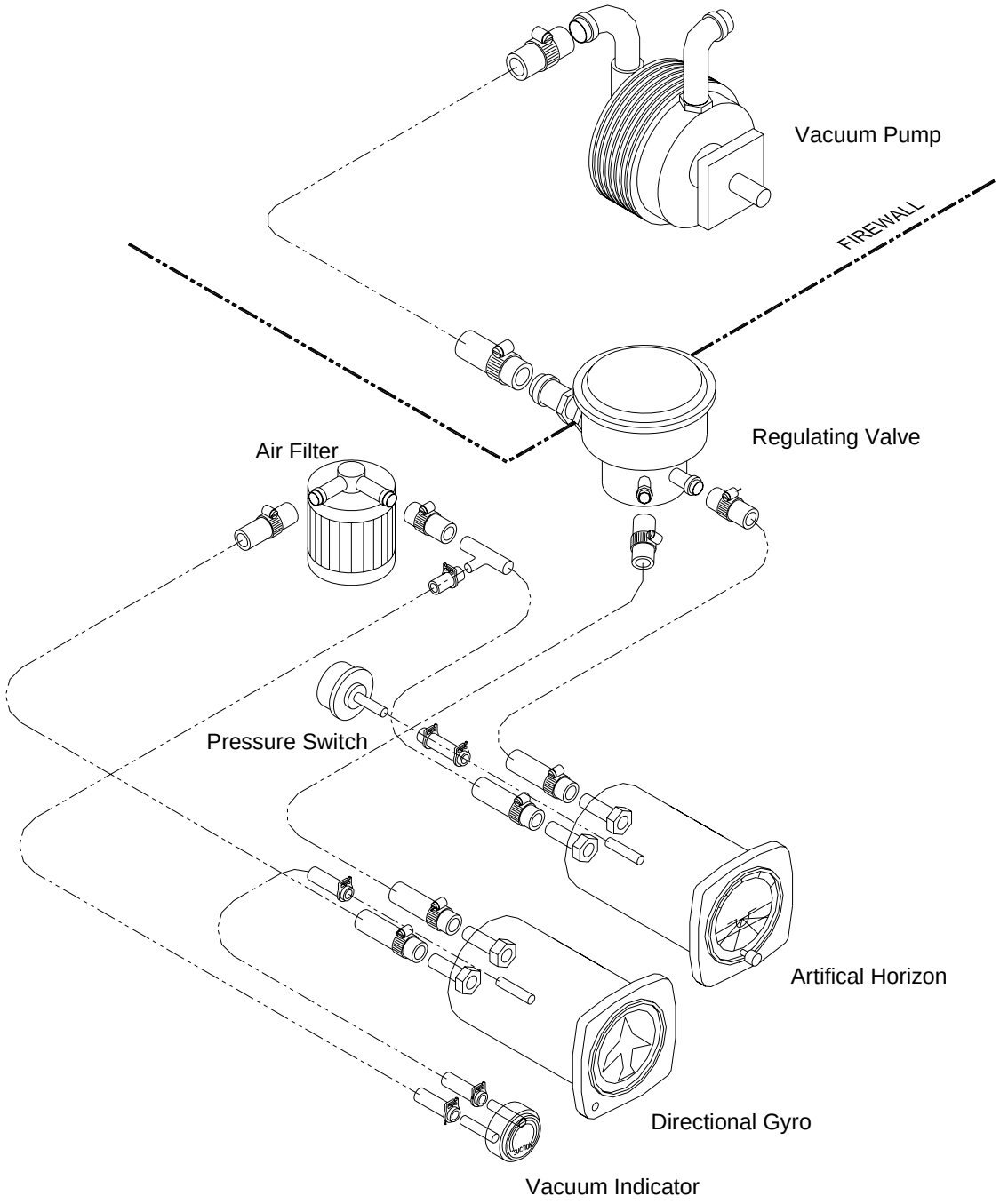


Figure 37-1 Vacuum system layout

37-10-00 TROUBLESHOOTING

Trouble	Cause	Remedy
No vacuum gauge indication at instrument	Filter clogged or dirty Line from gyro to filter restricted	Clean or replace filter Check line
No vacuum gauge indication at instrument or source	Faulty gauge malfunctioning pump	Replace gauge Replace pump
Low vacuum system pressure	Filter dirty Vacuum regulator valve incorrectly adjusted Line from gyros to filter restricted Line from pump to gyros leaking	Clean or replace filter Adjust regulator valve in accordance with Adjustments in this section Repair line Check all lines and fittings
Normal pressure indicated but sluggish operation of instruments	Faulty instrument	Replace instrument
High system pressure	Vacuum regulator incorrectly adjusted Vacuum regulator sticking or dirty screen	Adjust regulator Clean and check operation of regulator
Regulator cannot be adjusted to produce correct pressure	Lines leaking Vacuum pump malfunctioning. Regulator sticky	Check lines and fittings Replace pump Clean regulator
Vacuum correct but pilot reports pressure erratic or shows complete loss in flight	Regulator sticky	Clean regulator
Pressure can only be maintained at full throttle on ground	Leak in system Worn pump Stuck regulator	Repair or replace lines Replace pump Clean or replace regulator

37-20-00 VACUUM PUMP

The vacuum pump is of the rotary four vane, positive displacement type and consists of an offset rotor with four moving blades. This assembly is driven by means of a coupling mated to the engine driven gear assembly. The pump is mounted on the accessory section of the engine.

Inspection of Blade Wear (AA215CC and AA3215CC models)

Inspect in accordance with Aero Accessories Inc's Service Letter Number 004 Revision C or later superseding issue.

Removal of Vacuum Pump

1. Remove the top portion of the engine cowling.

2. Loosen the hose clamp and remove the hose from the vacuum pump fitting.

3. Remove the vacuum pump by removal of the four retaining nuts, lockwasher and plain washers.

Installation of Vacuum Pump

1. Thoroughly clean any old gasket left on the pump and/or the engine mounting.

2. Install a vacuum pump in the reverse order given for removal.

3. Check complete vacuum system for proper operation.

37-30-00 VACUUM REGULATOR

One vacuum regulator valve is incorporated in the system to control vacuum pressure to the gyroscopic instruments.

Testing of Vacuum Regulator

1. Start the engine, after allowing time for warm-up, run the engine at medium RPM.

2. With the engine at medium RPM, the suction gauge should indicate 5.0 inches of mercury ± 0.1 inches of mercury.

3. a) If the pressure reading is within the acceptable range nothing further needs to be done.
   b) If the pressure reading is outside this range shut-down the engine.

4. Bend the locking tab and adjust the regulator valve by moving the valve adjustment screw clockwise to increase the pressure, and counter-clockwise to decrease the pressure.

5. Start the engine and repeat the check until satisfactory pressure reading is noted.

6. Bend the locking tab down to lock in place.

Removal of Vacuum Regulator

To remove the regulator valve, disconnect the three lines, remove the mounting screws and remove the valve

Installation of Vacuum Regulator

1. Install a regulator valve in the reverse order given for removal.

2. Check complete vacuum system for proper operation.

37-40-00 VACUUM FILTER

The vacuum filter is located on the rear side of the firewall (LHS upper) and has an element that is readily replaceable.

The vacuum regulator filter is located on the vacuum regulator and has an element that is readily replaceable.

37-50-00 VACUUM PRESSURE SWITCH

The vacuum pressure switch is located at the back of the artificial horizon instrument.

Resetting the Vacuum Pressure Switch

1. Disconnect the vacuum pressure switch and remove from the aircraft.

2. Connect the vacuum pressure switch to a calibrated vacuum source, and the contacts to a continutiy test instrument (eg. multimeter).

3. Adjust the pressure switch so that the contacts close at 3.5 to 4 inHg.

4. If the vacuum pressure switch cannot be reset to the required setting, replace with a new unit.

This page intentionally left blank

CHAPTER 51

STRUCTURES

51-00-00 GENERAL

The aircraft fuselage is constructed predominantly from 2024-T3 aluminium alloy. It is corrosion protected by being primed internally prior to assembly and primed and painted with two pot Acran enamel (or equivalent) externally. The engine mount is constructed of welded 4130 steel tube.

The wings are of all metal stressed skin construction (2024-T3), but are externally braced with streamline section lift struts that bolt to the lower fuselage carry-through member and wing spar fittings. The main fuel tanks are incorporated in the inner wing panels between the main and rear wing spars and between the wing strut attachment fittings and the fuselage. The wing tips are removable for access to the internal wing structure and for easy replacement. The ailerons and flaps are of sheet metal construction.

The main undercarriage legs are constructed of 5160 spring steel tube. The nose undercarriage leg is constructed of 4130 steel tube.

51-00-10 Primary and Secondary Structure

Primary Structure All structure that is essential to maintain the structural integrity and airworthiness of the aircraft is considered to be primary structure. Primary structure that is damaged beyond damage that can be classified as "negligible" must be repaired or replaced in accordance with the requirements of this manual before further flight.

The following is deemed to be primary structure:

- All of the wing structure between the front and rear spars including the spars themselves, the wing attachment fittings, the strut attachment fittings, and the struts themselves
- The flaps and ailerons, their attachment fittings including the fittings attaching them to the wing primary structure
- All welded steel tube structure (except forward cabin entry steps)
- All control system components and support structure
- The cockpit floor, both seats and their attachments, also the cabin seat attachment points (including the seats themselves when fitted), occupant restraint systems and all their attachments

Secondary Structure All structure other than primary structure. Structure in this category is not considered to be of significant importance to the structural integrity of the aircraft but may nevertheless perform an essential role in the overall airworthiness of the aircraft.

The following secondary structure is considered to be of particular importance to the airworthiness of the aircraft and any damage to it or its attachments must be considered

carefully and repairs carried out where necessary in accordance with good aircraft practice:

- Wing leading edges and attachments forward of the main spar. In particular a good aerodynamic profile must be maintained
- Wing tip structure outboard of the most outboard wing rib
- Wing structure aft of the rear spar
- Access panels and doors
- Engine cowls
- Cockpit doors

51-10-00 DAMAGE ASSESSMENT

After a thorough cleaning of the damaged area, all structural parts should be carefully examined to determine the extent of the damage. Frequently, the force causing the initial damage is transmitted from one member to the next, causing strains and distortions. Abnormal stresses incurred by shock or impact forces on a rib or similar structure, may be transmitted to the extremity of the structural member, resulting in secondary damage, such as sheared or stretched rivets, elongated bolt holes, wrinkled skins etc.

Points of attachment should be carefully examined for distortion and security of fastenings in the primary and secondary damaged areas at locations beyond the local damage. This is particularly true with wing tip, horizontal stabiliser tip, vertical fin tip, or control surface damage. If the damage is due to a load in the rearward direction, the rear spars should be checked for indications of compression damage for the full length, including the fuselage components.

51-10-10 Damage Classification

Damage to the aircraft can be divided into three major categories:

- Negligible Damage
- Repairable Damage
- Major Replacement Damage

These categories are intended to provide the engineer with some general guidelines to use in determining the extent and criticalness of any damage. Obviously there will be some overlapping between categories, and common sense should be used in determining the final action to be taken with regard to any damage.

Negligible Damage

Negligible damage shall be considered as damage that will not affect the airworthiness of the aircraft when it has been sustained by either primary or secondary structure. The damage can be allowed to exist or be corrected with simple repairs such as removing dents, burnishing scratches, or stop-drilling cracks in secondary structure.

Examples of this type of damage are small dents that are free from cracks, abrasions or small wrinkles that are not stress related wrinkles, and do not interfere with any internal structure or mechanism. In areas of low stress intensity (such as near the wing tips), cracks, deep scratches or deep sharp dents which after trimming or stop-drilling can be enclosed by a 50 mm (2") circle, may be considered as negligible if the damaged area is at least one diameter of the enclosing circle away from all existing rivet lines and material edges. Stop-drilling should be considered as a temporary repair to be used only until permanent repairs can be made.

Damage in the fuel tank wing bays should be more carefully evaluated as any cracks, dents or abrasions may lead to subsequent fuel leakage due to crack initiation or the elongation of any existing crack.

Cracks in control surface hinge fittings or supporting structure are not considered negligible and the components must be replaced.

Damage to wing spar caps or wing attachment fittings generally will not be considered negligible and will require repair or replacement.

Repairable Damage

Repairable damage is that damage that might affect the airworthiness of the aircraft and result in the loss of function of that component, and which may be repaired by patching or the insertion of a like piece of material.

Examples of repairable damage include damage to metal skins/ribs/panels, damage to any welded steel tube structure, and fibreglass components. Damage may be beyond the definition of negligible damage, but will not usually include rework to warped or twisted components that are damaged to the extent that they require extensive re-forming, or on which alignment of the components is critical. Skin damage beyond negligible damage in the form of dents, scratches, or punctures requires a patch repair.

Replacement Damage

Replacement damage is that damage that might affect the airworthiness of the aircraft and result in the loss of function of that component, but for which repair by patching or insertion is not practical or is specifically prohibited.

Examples of this are assemblies that have been twisted or warped beyond practical re-work limits, parts with extensive corrosion damage, repairs that require jigs or fixtures which are not available or easily fabricated in the field, or small parts which may be easily fabricated from materials available locally.

Specific items that must be replaced if damaged include the following:

- All wing attachment (including strut) fittings
- All aileron and wing flap hinges and attachment fittings
- Wing struts
- Undercarriage legs
- Wheels

51-20-00 REPAIR PROCESSES

Repair of Welded Steel Tube Structure and Components

All repairs to welded steel tube structure and components may be carried out in accordance with the limitations and procedures presented in the FAA Publication AC 43.13-1B.

NOTE

No welded steel tube components or structure comprising the airframe of the GA8 aircraft has been heat treated after welding and therefore no special heat treatment after any weld repair is required.

Repair of Sheet Metal Structure and Components

All repairs to sheet metal structure and components may be carried out in accordance with the limitations and procedures presented in the FAA Publication AC 43.13-1B. Repairs requiring procedures that cannot be done in accordance with, or are not covered by AC 43.13-1B, are to be carried out in accordance with a scheme approved by Gippsland Aeronautics Pty Ltd or the local airworthiness authorities.

51-30-00 MATERIALS

For easy repair and maintenance, only a limited number of commonly available structural materials have been used in the construction of the GA8.

Structural Steel

All structural steel used in the GA8 is 4130 cond "N" Chromium Molybdenum steel to the following specifications:

- Sheet steel MIL-S-18729C
- Tubular steel MIL-T-6736B

The only exceptions are the main undercarriage legs. These are heat treated 5160 tubular spring steel.

Structural Aluminium Alloy

With the exception of some minor components that are lightly loaded but heavily formed (such as the wing, aileron and flap leading edge ribs), all of the structural aluminium alloy used in the GA8 is Alclad 2024-T3 to specification QQ-A-250/5.

Fibreglass, Resins and Associated Materials

All fibre reinforced plastic components on the GA8 are manufactured from a combination of the following materials:

Resin	Derakane 510N NORPOL 34GY	Vinyl-ester resin Gelcoat
Glass Cloth	Colan AF297 Colan AF251 Woven Rovings	Bi-directional 385 g/m² Bi-directional 193 g/m² 600 g/m²
Kevlar	DuPont KW4170	Bi-directional 170 g/m²
Carbon Fibre	Porsche CW4193	Bi-directional 193 g/m²
Space Fabric	M&M Luftfracht D13335	945 g/m²

51-40-00 FASTENERS

Fasteners used in the aircraft are generally solid aluminium alloy rivets, commercial "pop" rivets and steel threaded nuts, bolts and screws. Usage of each is primarily a function of the loads to be carried, accessibility, and frequency of removal. With the exception of some critical and highly stressed bolts which comply with the NAS specification, all bolts used in the GA8 airframe are the industry standard AN series. Torque values and locking procedures for threaded fasteners can be found in Chapter 20 of this manual.

Rivet Types

Standard solid-shank MS rivets are the primary fastener used in the construction of aluminium alloy components. The following rivet types are used:

- Universal head MS20470AD- } manufactured from
- Countersunk head MS20426AD- } 2117 aluminium alloy

Additionally commercial monel "pop" rivets are used in some non-structural locations.

Substitution of Rivets

Solid shank MS20470AD and MS20426AD rivets should be replaced by rivets identical to those removed whenever possible. When rivet holes become enlarged, deformed, or otherwise damaged, use the next larger size rivet as a replacement. Replacement shall not be made with rivets of a lower strength material.

When it is impractical to replace existing solid shank rivets with similar type rivets, "Cherrymax" rivets of the equivalent type may be used. Normally it is not good practice to replace a considerable number of solid shank rivets with blind rivets, as although the "Cherrymax" rivet is at least as strong in shear as the solid shank rivet, it has different deflection characteristics under load which could cause subsequent overstressing of the remaining solid shank rivets. These rivets are available in both nominal and oversize diameters. The following are acceptable substitutions:

Solid Shank	Nominal Cherrymax	Oversize Cherrymax
MS20470AD-	CR 3213-	CR 3243-
MS20426AD-	CR 3212-	CR 3242-

Hole Preparation for Riveting

Rivet holes should be between 0.002" and 0.004" larger than the rivet shank. Parts should be firmly held together while they are being drilled or riveted. Ensure that the drill is held at 90° to the surface during the drilling process. After drilling, the holes should be de-burred and any swarf between the sheets or components removed.

Installation of Rivets

- Solid shank rivets Refer to FAA Publication AC 43.13-1B.

- Cherrymax rivets

NOTE

Cherrymax rivets (as distinct from "Cherrylock" rivets) may be installed using a special pneumatic or mechanical Cherrymax installation tool or a standard "pop" rivet gun.

1. Check that the hole size and rivet diameter are compatible.

2. Check that holes in parts to be fastened are properly aligned.

3. In blind clearance applications, check the "BK" dimension if the manufactured head of the blind rivet is protruding above the top sheet due to the stem hitting an obstruction behind the rivet. The rivet will pull down satisfactorily if the "BK" dimension is met or exceeded. This dimension can be found in the manufacturers published data.

4. Ensure riveting tool is held at 90° to sheet surface and set the rivet. Do not press down too hard while setting the rivet as this may prevent the rivet from "self-aligning" itself in the hole possibly resulting in a loose rivet.

5. Ensure that the ejected stem and driving anvil are removed from the aircraft.

- "Pop" rivets These rivets are installed using similar procedures and precautions as for Cherrymax rivets.

Loose or Working Rivets

Rivets that appear to be loose shall be checked with a 0.002" feeler gauge by inserting the

gauge around the head of the rivet in question. If:

a) the feeler gauge can be inserted to the shank of the rivet, it shall be classified as a loose rivet and shall be replaced.

b) If the feeler gauge can be inserted approximately halfway to the shank for 30% of the circumference of the rivet head, it shall not be classified as a loose rivet.

The feeler gauge shall also be used to check the shear section between the riveted members in a similar manner to that used around the rivet head. If:

a) the skin around a rivet can be moved by depressing the skin with finger pressure around the rivet, the rivet shall be replaced.

b) a rivet is found which turns by applying a rotating load to the head of the rivet, it should be replaced.

Cracked paint around a rivet head may be an indication of a loose rivet but the rivet need not be replaced unless it is confirmed to be loose by one of the methods described.

51-50-00 SUPPORT OF AIRCRAFT FOR REPAIR

Refer to Chapter 7 of this manual for procedures associated with the support of the aircraft if required for repair work.

51-50-10 Alignment Check Procedures

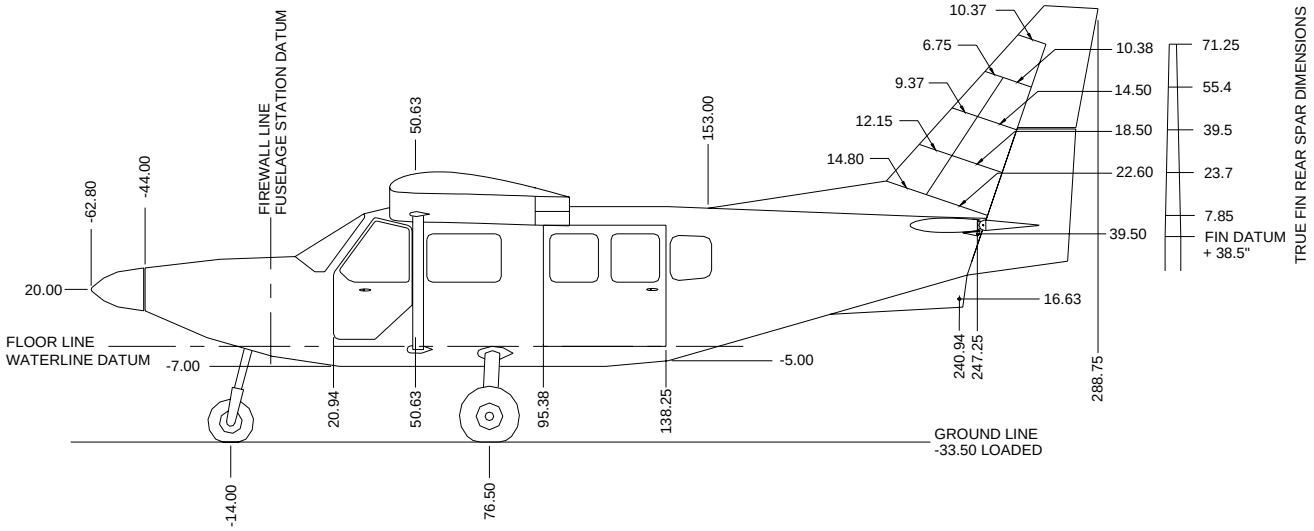


Figure 51-1 Alignment Datums

51-60-00 CONTROL SURFACE MASS AND BALANCE

All primary flight control surfaces on the GA8 are mass balanced and they are to **remain within the CASA Approved tolerances specified in Chapter 4-20-00** after repair or painting.

Additionally they have a maximum weight restriction and this also must not be exceeded after repair or painting.

Any balancing procedure must be conducted in draft free area and only after all finishing processes such as painting have been completed.

As the allowable tolerances are quite large, if it is found that they are exceeded it indicates that the repair and/or finishing have not been completed in a manner consistent with normal workshop practices. The recommended fix is to **re-do the job properly.**

51-60-10 Aileron Balancing

In initial manufacture the ailerons are balanced by a moulded lead weight secured on an arm forward of the leading edge outboard end of the aileron.

Following any repair, painting or any other operation that may affect the aileron weight or balance, the following procedure must be carried out:

1. Weigh and record the weight of the aileron.

It must not exceed 4762 grams (10.5 lbs)

2. Suspend the aileron upside down but laterally level using a separate thin wire around pins inserted through each of the two outboard hinges as shown below:

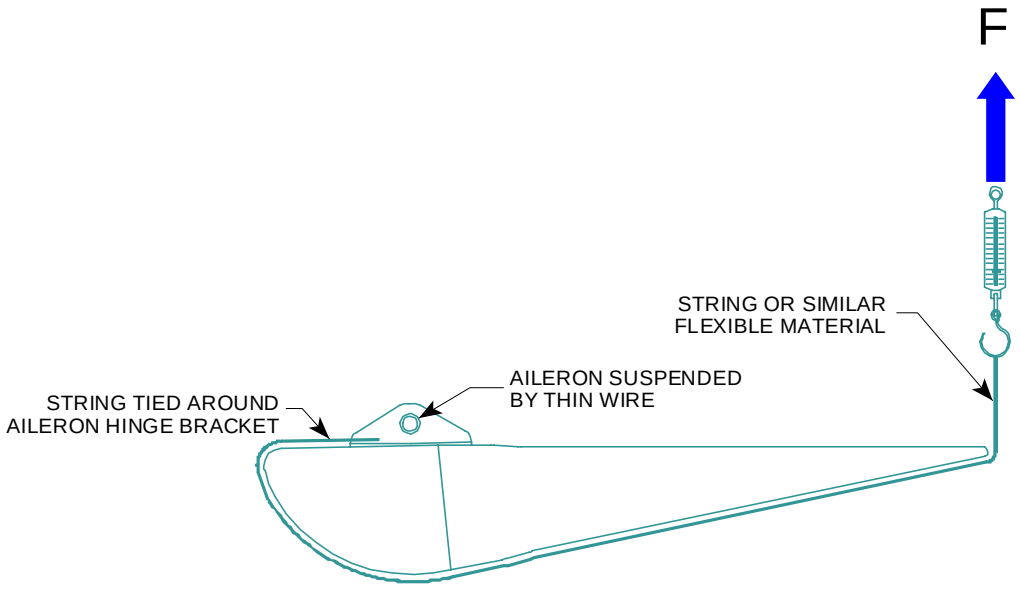


Figure 51-2 Aileron Balancing

3. Using an accurate balance, measure the force required **at the trailing edge** to level the aileron lower surface (on the top when suspended as described).

   It must be within the range:

	grams	pounds
Minimum	0	0
Maximum	341	0.75

NOTE

The minimum and maximum trailing edge weights listed above for the aileron refer to the trailing edge being heavy, i.e.: the centre of gravity of the aileron is aft of the aileron hinges.

4. Should the aileron fall outside these tolerances it is recommended that the repairs be re-done. Depending on the amount of out of balance it may be possible to adjust the balance weights to achieve the required balance. It is permissible to alter the length of individual mass balance weights, or if necessary, replace individual weights with one of new manufacture. Any newly installed balance weights must be secured in the same manner to the original.

5. In unusual or extreme cases where it is not possible to achieve the required balance, advice should be sought from the factory.

51-60-20 Rudder Balancing

In initial manufacture the rudder is balanced by pouring molten lead into the mass balance tubes located on the rudder balance horns.

Following any repair, painting or any other operation that may affect the rudder weight or balance, the following procedure must be carried out:

1. Weigh and record the weight of the rudder.

It must not exceed 7597 grams (16.75 lbs)

2. Place hinge pins through the rudder hinges and position on knife edge balancing mandrels supported on a table or other suitable flat surface.

3. Using an accurate balance, measure the force required **at the lower trailing edge point** (furthest from the hinge line) to level the rudder.

   It must be within the range:

	grams	pounds
Minimum	0	0
Maximum	430	0.95

NOTE

The minimum and maximum trailing edge weights listed above for the rudder refer to the trailing edge being heavy, i.e.: the centre of gravity of the rudder is aft of the rudder hinges.

4. Should the rudder fall outside these tolerances it indicates unsatisfactory workmanship and the repairs should be re-done.

51-60-30 Elevator Balancing

In initial manufacture the elevator is balanced by bolting a preformed block of lead to the elevator balance horn.

Following any repair, painting or any other operation that may affect the elevator weight or balance, the following procedure must be carried out:

NOTE

The following procedure relates to each elevator half individually. In particular the maximum weight and out of balance tolerances apply to each elevator half.

1. Weigh and record the weight of the elevator.

It must not exceed 6758 grams (14.9 lbs)

2. Place hinge pins through the elevator hinges and position on knife edge balancing mandrels supported on a table or other suitable flat surface.

3. Using an accurate balance, measure the force required **at the trailing edge point** (furthest from the hinge line) to level the elevator.

   It must be within the range:

	grams	pounds
Minimum	0	0
Maximum	1147	2.53

NOTE

The minimum and maximum trailing edge weights listed above for the elevator refer to the trailing edge being heavy, i.e.: the centre of gravity of the elevator is aft of the elevator hinges.

4. Should the elevator fall outside these tolerances it indicates unsatisfactory workmanship and the repairs should be re-done.

This page intentionally left blank

CHAPTER 52

DOORS

52-00-00 GENERAL

The GA8 is fitted with two hinged cockpit doors, and a sliding aft fuselage access door.

Due to the simple design of the doors, their attachment and latching mechanisms, no specific maintenance procedure except normal lubrication is warranted. Cracks or damage should be repaired in accordance with standard industry practices.

52-10-00 PASSENGER/CREW DOORS

A forward opening cockpit door is fitted to each side of the aircraft. The door latch is a simple rotary latch operated by a handle on both the inside and out.

To remove the doors, undo and remove the two hinge bolts. Installation is the reverse.

NOTE

The doors have been designed so that when the upper forward corner of the door contacts the door frame, the lower rear corner remains slightly clear of the door frame. This feature provides pre-load when the door is latched closed and prevents rattling.

52-40-00 SERVICE DOORS

The main cabin door is located on the left hand side of the aircraft and slides forward to open. The door can be opened in flight, provided a wind deflector is fitted and operating limitations as stated in the In-flight Rear Door Open Operations supplement of the Flight Manual are observed.

The latching apparatus has simultaneous operations of pulling the door back to the completely closed position whilst moving the front end of the door inboard to seal. The door latch is a two part operation to unlock. From the inside, the handle is pulled inwards, then rotated forward where upon the door slides freely. From the outside, depress the button above the handle with one hand and then rotate the handle with the other hand, where upon the door begins to slide. For closing, the door is slid closed and the handle rotated from either inside or outside until it locates into the lock detent.

CHAPTER 53

FUSELAGE

53-00-00 GENERAL

The aircraft fuselage is constructed predominantly from 2024-T3 aluminium alloy. It is corrosion protected by being primed internally prior to assembly and primed and painted with two pot Acran enamel (or equivalent) externally. The engine mount is constructed of welded 4130 steel tube.

53-10-00 FUSELAGE STRUCTURE

The fuselage structure is semi-monocoque and is fabricated from aluminium alloy (mainly 2024-T3). It is made in six separate sections and joined together during manufacture. These sections consist of the forward fuselage/cockpit structure, the left and right hand side assemblies, the roof assembly (including main and rear spar carry-through), the main floor assembly and the aft fuselage tailcone. The datums used in construction of the aircraft are the cabin floor for longitudinal and lateral levelling (also station zero for vertical measurements), and the fire wall face is station zero for fore and aft dimensions.

When repair or replacement of damaged members are required, individual sheets may be removed and replaced with new items using the same rivet pitch and position. Where damage to skin or minor underlying structure requires repair this may be carried out in accordance with the procedures specified in FAA Publication AC 43.13-1B. Further details on the structural repair of the fuselage and materials used in its construction can be found in Chapter 51 of this manual.

CHAPTER 55

STABILISERS

55-00-00 GENERAL

The stabiliser group (empennage) consists of the vertical stabiliser (fin), rudder, horizontal stabiliser, and the elevators. All are constructed of aluminium alloy (2024-T3). The tailplane is hinged to the fuselage at the rear spar and connected to the trim screw jack at the front spar. All control surfaces are partially mass balanced. The left and right hand elevators differ in that:

- A fixed tab is fitted permanently to the right hand side elevator trailing edge.
- The operating horns that are bolted in are left and right handed.

55-10-00 HORIZONTAL STABILISER

The horizontal stabiliser consists of a parallel chord symmetrical section, cantilever structure fabricated from 2024-T3 aluminium alloy sheet. Two attachment brackets are bolted to the rear spar and centre rib assemblies. These attachment brackets provide the pivot point for tailplane mounting. The forward tailplane mount is on the centre line of the front spar and arranged in such a way as to connect with the trim screw jack. The tailplane leading edge moves up and down for trimming. Normal travel stops are provided by sleeves fitted to the trim screw jack. Over travel stops are provided on the rear face of the fin front spar for up travel and the rear fuselage top deck for down travel. Six elevator pivot hinges are provided along the rear spar. The tailplane has no dihedral or aerodynamic twist.

Removal

1. Remove the elevators.
2. Remove the fin and rudder.
3. Remove the attaching bolt at the trim jack.
4. Remove attaching bolts through both rear pivots.
5. Slide horizontal stabiliser off fuselage fittings.

Installation

Installation of a previously removed horizontal stabiliser is the reverse of the removal procedure. Final rigging is to be in accordance with the procedure specified in **27-30-10.**

55-20-00 ELEVATORS

The elevators are manufactured using aluminium alloy (2024-T3) and are partially mass balanced. They are constructed as two separate units - left and right. They are individually supported on the horizontal stabiliser by three hinges on either side. The left and right hand elevators differ in that a fixed trim tab is fitted to the right hand elevator trailing edge, and the bolt on operating horns are handed. A partial elevator/horizontal stabiliser gap seal is provided by a rounded fairing on the front of the elevator.

All procedures associated with the removal, installation and rigging of the elevators can be found in Chapter 27. Repair procedures can be found in Chapter 51.

55-30-00 VERTICAL STABILISER

The vertical stabiliser (fin) consists of a two spar tapered surface manufactured using aluminium alloy (2024-T3) as a separate removable sub-assembly bolted to the rear fuselage structure. There is also a dorsal fin screwed to the top of the aft fuselage and a ventral fin screwed to the under side of the aft fuselage. This also incorporates a tie down point that has been designed with sufficient strength to withstand a moderate tail strike.

The fin aft spar incorporates three rudder hinges and rudder travel stops. The forward fin spar has the tailplane leading edge up stop attached to it. A navigation light mounting point is provided at the top of the trailing edge, also the top rib is used to mount the anti-collision beacon.

Removal of Fin

1. Remove rudder.
2. Remove tailplane to fin fairings.
3. Remove dorsal fin.
4. Disconnect wiring to beacon, nav light, etc.
5. Remove attaching bolts through front and rear attachment points.
6. Lift fin assembly clear of fuselage fittings.

Installation of Fin

Installation is the reverse of the removal procedure.

All parts of the system that have been disturbed must be inspected by an appropriately licensed independent person to confirm that the system is correctly assembled, rigged and safetied.

55-40-00 RUDDER

The rudder is manufactured using aluminium alloy (2024-T3) and is partially mass balanced. All procedures associated with the removal, installation and rigging of the rudder can be found in Chapter 27. Repair procedures can be found in Chapter 51.

This page intentionally left blank

CHAPTER 56

WINDOWS

56-00-00 GENERAL

The windows in the aircraft consist of two windshield, two side cockpit windows, and eight cabin window panels. The cockpit door windows are bulged outward slightly to improve downward visibility as well as to increase shoulder room in the cockpit for the occupants. All windows and the windshield are made from acrylic Plexiglas, the windshield and left front cabin window being 5 mm (0.20") thick and all other windows 3 mm (0.12").

56-00-10 Cleaning

Due to the soft nature of Plexiglas a certain amount of care is required to keep windows clean. The following procedure is recommended:

1. Flush with clean water to remove excess dirt, bugs and other loose particles.

2. Wash with mild soap and warm water. Use a soft cloth or sponge. Do not rub excessively.

3. Rinse thoroughly, then dry with a clean moist chamois. Do not rub with a dry cloth as this builds up an electrostatic charge that attracts dust. Oil and grease may be removed by rubbing lightly with a soft cloth moistened with kerosene. **Do not use volatile solvents** such as gasoline, alcohol, benzine, carbon tetrachloride, lacquer thinner or most commercial window cleaning sprays, as they will soften and craze the plastic.

4. After washing, the windshield and windows should be cleaned using an aircraft windshield cleaner following carefully the cleaner manufacturers instructions.

56-10-00 REMOVAL/REPLACEMENT

CAUTION

Plexiglas is easy to damage when cutting or drilling. Ensure component is clamped securely and cannot chatter. A small angle grinder with a coarse sanding disc is a convenient way to trim Plexiglas if not too much material needs to be removed. Drills should ideally be ground so that they have zero rake angle.

56-10-10 Windshield

Removal

1. Remove rivets around lower windscreen retaining strip.
2. Remove rivets down forward door post.
3. Prise fairing strips clear.
4. Remove windscreen by sliding out to the side

NOTE

The windscreens are bonded in using PR-1422, therefore some care will need to be taken when freeing the windscreen to avoid stretching or damaging the surrounding metal work.

Installation

1. Remove any existing sealant from channel in cabin roof and other attachment areas.

2. Trim new windshield to fit, preferably using the old windshield as a pattern.

3. Locate the trimmed windshield in place and carefully check fit. Remove windshield and de-burr edges of the trimmed Plexiglas to prevent subsequent stress raisers and possible cracking.

4. After ensuring that no swarf remains, apply a small amount of PR-1422 or similar sealant to the cabin roof and windscreen centre pillar channel and all surfaces where the windshield contacts the airframe.

5. Carefully install the windshield and install all of the fairing strips.

6. Re-rivet the fairing strips.

NOTE

The windscreens should be masked prior to installation to limit any sealant contact with the surface other than where bonding is required.

CAUTION

Ensure that all drilled out rivet tails are removed as their presence may cause serious electrical problems.

56-10-20 Cabin Windows

Removal

1. Remove cabin interior around window.
2. Remove screws holding window retaining strips.
3. Remove window.

Installation

1. Remove any existing sealant from window surround.
2. Trim new window to fit, preferably using the old window as a pattern.
3. Install window using a small amount of RTV or similar silicone sealant.
4. Refit window retaining strips and cabin interior.

56-10-30 Cockpit Door Windows

Removal

1. Drill out "pop" rivets securing window attachment fairing strip to door frame and remove fairing.

2. Break seal as required around perimeter of window and lift window out.

Installation

1. Remove any existing sealant from door frame and fairing strips.

2. Trim new window to fit, preferably using the old window as a pattern.

3. Locate the trimmed window in place to check the fit. Remove window and de-burr edges of the trimmed Plexiglas to prevent subsequent stress raisers and possible cracking.

4. Apply a small amount of RTV or similar silicone sealant to the channels and all surfaces where the window contacts the airframe. Carefully install the window on the door frame and install the fairing strips and "pop" rivet in place.

CHAPTER 57

WINGS

57-00-00 GENERAL

The wings are of all metal stressed skin construction, and externally braced with streamline section tension struts that bolt to the lower fuselage members and wing spar fittings. The main fuel tanks are incorporated in the inner wing panels between the main and rear wing spars and between the wing strut attachment fittings and the fuselage.

The wing tips are removable for easier access to the internal wing structure and for easy replacement.

An integral fuel tank is located in each wing. The wet wing cavity starts at Rib 4 (WS 31.0), and extends outboard to Rib 9 (WS 81.0), and extends fore and aft between the front and rear spars. The tank is sealed using a fuel proof sealant, PR-1422, to specification MIL-S-8802. The resulting tank has a capacity of 170 litres, (44.9 US gallons). The tank consists of upper and lower skins, ribs, front and rear spars and one access panel in the top skin. The tank contains fuel drains, fuel gauge sender units, fuel delivery and venting components.

57-10-00 WING STRUCTURE

The primary wing structure consists of all of the wing structure between the front and rear spars including the spars themselves, the wing attachment fittings, the struts and strut attachment fittings. Primary structure also includes the flaps and ailerons, their attachment fittings including the fittings attaching them to the wing primary structure. All other wing structure is considered to be secondary structure.

Procedures for damage assessment and subsequent repair of the wing structure can be found in Chapter 51 of this manual.

57-10-10 Removal/Installation

Removal

1. Drain fuel from aircraft using normal precautions specified in **28-00-10**.
2. Remove wing root and strut fairings.
3. Disconnect wiring to landing lights, nav lights, heated pitot, fuel gauges and any other optional wiring installed.
4. Disconnect aileron and flap cables at turnbuckles inside fuselage.
5. Remove flaps and ailerons.
6. Disconnect fuel supply and fuel lines.
7. Support wing and undo main spar, rear spar and strut bolts.
8. Remove bolts and lift wing clear of aircraft.

NOTE

The wing weighs approximately 160 lbs (72.5 kg). One wing can be removed without supporting the remaining wing provided the aircraft is otherwise complete and empty of fuel.

Installation

Installation is the reverse of the removal procedure. All parts of the system that have been disturbed must be inspected by an appropriately licensed independent person to confirm that the system is correctly assembled, rigged and safetied.

Wing Rigging

The wing rigging is fixed at manufacture for aircraft S/N GA8-00-004 through GA8-04-053 (unless modified by incorporation of Service Bulletin SB-GA8-2004-12), the only adjustment to correct wing low condition being the flap up setting. The flap and aileron rigging details are in chapters **27-50-00** and **27-10-00** respectively.

The nominal geometric wash-out between the wing root and tip is:

$1.7° \pm 0.1°$ (wing tip leading edge down)

This can be measured using an inclinometer to measure the angular difference between the lower surfaces of the root rib and the tip rib, measured between the main and rear spars.

For aircraft S/N GA8-04-0054 and subsequent and lower S/N's incorporating Service Bulletin SB-GA8-2004-12, the wing rigging is adjustable on the left wing only. To correct a wing low condition carry out the following:

1. Ensure flap and aileron rigging is correct in accordance with **27-50-00** and **27-10-00**. If the aileron or flap rigging is found to be incorrect, rectify and test fly the aircraft to confirm that the wing low condition still exists.

2. Remove the upper and lower wing root fairings on the left hand side. Remove interior trim panels as required to gain access to the rear spar attachment bolt.

3. Remove the lock nut form the rear spar attachment bolt.

4. Loosen but do not remove the nut on the rear spar attachment bolt.

5. Adjust the rears par adjusting bushes as required. Adjust the rear spar down by turning the indicating mark on the adjusting bush upwards to correct a left wing low condition. Adjust the rear spar up by turning the indicating mark on the adjusting bush downwards to correct a right wing low condition.

6. Torque rear spar attachment bolt to 60-85 in.lbs. Re-fit the lock nut and torque to 60-85 in.lbs.

7. Ensure flap and aileron rigging still complies with **27-50-00** and **27-10-00**, paying particular attention to cable tensions.

8. Re-fit all items removed for access.

9. Conduct test flight to confirm rectification of wing low condition.

NOTE

Forward and aft rear spar adjusting bushes are to be moved in unison.

57-20-00 OUTER WING

The wing structure has been designed so that the main and rear spar webs join at the strut attach station. This provides a means of replacing outboard spar webs should damage occur in the outboard wing panel .

Some degree of jigging will be required to carry out this type of repair to maintain the washout angle at factory settings.

57-30-00 WING TIP

The wing tips are removable for access to the internal wing structure and for easier replacement.

Removal

1. Remove nav light and disconnect wiring.
2. Remove wing tip leading edge fairing.
3. Remove the two AN3 bolts attaching the forward wing tip sub-spar to the forward wing spar.
4. Drill out the rivets around the periphery of the wing tip both top and bottom. Pull the wing tip assembly clear.

Installation

Installation is the reverse of the removal procedure.

57-40-00 LEADING EDGE

The leading edge consists of three skins on each wing. The centre skin has a stiffening angle and contributes to the structural integrity of the wing whilst the inner and outer skins act as fairings to maintain the airfoil shape.

57-50-00 TRAILING EDGE AND FLAPS

Trailing Edge

The trailing edge of the wing consists of a folded aluminium alloy fairing that forms the aileron and flap gap seal.

This fairing forms part of the upper skin and may be replaced in segments as required, however the inboard sections form part of the fuel cell sealing and it may prove more expedient to local repair any skin damage in this area in accordance with AC 43.13-1B.

It is important however to ensure that a uniform clearance of approximately 6 mm (0.25”) is maintained between the trailing edge and the aileron and flap upper surface when they are both in their full up position. This may be achieved by adjusting the lower attachment rivet line slightly.

Flaps

The wing flaps are of the single slotted type with three selectable positions; Up, 14° and 38°. The flaps are of sheet metal construction and are interchangeable left to right.

All procedures associated with the removal, installation and rigging of the flaps can be found in Chapter 27. Repair procedures can be found in Chapter 51.

57-60-00 AILERONS

The ailerons are of sheet metal construction and are partially mass balanced. All procedures associated with the removal, installation and rigging of the ailerons can be found in Chapter 27. Repair procedures can be found in Chapter 51. Refer to **51-60-10** for aileron balancing procedures.

This page intentionally left blank

CHAPTER 61

PROPELLER

61-00-00 GENERAL

The aircraft is equipped with a two blade, constant speed Hartzell model HC-C2YR1BF/F8475R propeller. The propeller is of forged aluminium construction and is anodised to reduce corrosion. A gate is installed on the propeller control quadrant that restricts RPM to 2500. The gate may be bypassed in an emergency that will make 2700 RPM available. This is achieved by moving the control to the right and then pushing it fully forward.

61-10-00 PROPELLER ASSEMBLY

All aspects of propeller installation/removal, maintenance, troubleshooting and repair to be carried out in accordance with the Propeller Owner's Manual (latest revision).

CAUTION

The propeller fine pitch stop is set, as a function of Type Certification prior to installation on the aircraft at 12 degrees and is not to be changed in service.

61-20-00 PROPELLER GATE SETTING

The governor is preset to achieve 2700 RPM at full throttle with the propeller control at the most forward point in the quadrant (through the gate).

To set TAKE-OFF RPM:

- Loosen propeller gate attaching screws
- Start engine and allow to warm up:
- Cycle propeller control several times to ensure warm oil has circulated through the propeller
- Retard propeller control until 2500 RPM is set
- Set propeller gate abutting the propeller control and tighten attach screws

CHAPTER 71

POWERPLANT

71-00-00 GENERAL

This chapter provides information relating to the engine installation, but not the engine itself, or its accessories. Information on these may be found in subsequent chapters.

71-00-10 Engine Run-Up

Refer to the Pilots Operating Handbook & Approved Flight Manual for engine run-up procedures. If the engine run is being conducted for a specific maintenance purpose, more information can be obtained from:

- Lycoming Operator's Manual covering the IO-540 series engine, or
- Overhaul Manual - Lycoming Aircraft Engines - Direct Drive Models.

CAUTION

Beware of loose stones in the run-up area. Loose stones can be sucked up by the propeller and cause severe propeller damage in a very short time. Run-ups are best conducted on a clear sealed surface or on grass, never on gravel.

71-00-20 Engine Removal/Installation

Engine removal and installation is straight forward and obvious but the following procedure may assist:

Removal

1. Ensure that the emergency fuel shut-off valve is OFF.
2. Remove all of the engine cowling.
3. Remove the propeller and spinner.
4. Disconnect all fluid flexible lines, cap and identify.
5. Disconnect tacho cable, magneto earth leads, oil temp sender wire, throttle, mixture, alternator, starter wiring and propeller pitch control cable.
6. Using a suitable hoist, sling from the lifting lug on the crankcase centre line and initially just take the weight. Disconnect all four engine shock mount bolts and carefully lift the engine clear of the airframe making sure that nothing remains connected between the engine and the airframe.

NOTE

If desired the engine mount structure can be removed with the engine by removing the bolts attaching it to the airframe instead of removing the shock mount bolts.

Installation

The installation procedure is the reverse of the removal procedure.

After installation

- All fluid lines must be checked for leakage
- All electrical wiring, operating cables and fluid lines must be adequately tied, clamped or secured in place
- All locking devices are in place, including propeller lock-wiring
- Check or replenish engine oil as appropriate.

71-10-00 COWLING

The engine cowling on the GA8 has been carefully designed to allow excellent access to the engine and its accessories without totally removing the cowl. One cooling air outlet is provided underneath the fuselage. This outlet utilises air flow deflectors fitted on the firewall adjacent to the outlet thus improving the flow of cooling air from the outlet.

In addition to two removable side cowl panels, the cowling consists of the following removable sections:

- Upper central panel
- Lower central panel

71-20-00 ENGINE MOUNTS

The engine mount is of welded steel tube construction. The engine mount assembly is attached to the main fuselage structure at the firewall with four bolts and can be readily removed and installed when required.

The Lycoming IO-540 engine utilises "Dynafocal" type mounting and is supported on the engine mount assembly at four points through rubber shock mounts . These shock mounts should be inspected regularly for deterioration, excessive sagging and other damage. It is recommended -<u>but is not considered mandatory</u>- that these be replaced at 500 hour intervals.

Any damage or distortion to the engine mount structure should be repaired promptly, as apart from any loss of structural integrity, distortion or misalignment of the engine mount structure could impose abnormal stresses on the engine itself.

71-60-00 AIR INTAKES

There are three separate air intakes associated with the power plant installation. These are:

- Main engine cooling air intakes (2 of),
- Oil cooler air intake and filtered air intake to engine

71-60-10 Engine Cooling

Primary Engine Cooling

Engine cooling is achieved primarily by utilising cool ambient air obtained from the two cooling air intakes in the upper forward cowl nose bowl. Cooling air enters these intakes and is forced by the baffling to exit between the engine cylinders and associated cooling fins and finally out through the rear cowl cooling air outlet. Apart from the cylinder baffling, no ducting is associated with these inlets. No adjustable cowl flaps of any kind are provided or necessary. The cooling system as designed provides excellent cooling under all ambient conditions and incurs a minimum amount of parasite drag.

The engine baffles create a plenum above the cylinders. Providing the flexible baffle seals are in good condition and effective, the only way the air can escape is down past the engine cooling fins. The inter-cylinder baffles restrict the cooling air from escaping between the cylinders rather than down between the cooling fins. The baffles and seals should be inspected for condition during routine maintenance and repaired as necessary. Replacement baffle seals may be locally manufactured using a heat resistant silicone rubber material (Varga Enterprises Inc P/N VSR3 or equivalent). It is essential that at least 25 mm (1") of this material laps onto the adjacent cowl surface on the high air pressure side to ensure a proper seal. The seal is to be attached to the baffles in a similar manner to the original.

NOTE

It is essential that the baffles and seals are in good condition for efficient engine cooling.

Secondary Cooling - Oil Cooling

Secondary engine cooling is provided by the oil cooling system. Hot oil is routed through the oil cooler (refer to Chapter 79 of this manual for more details) and a returned to the engine after cooling.

Cool ambient air enters the engine compartment through the oil cooler air intake in the lower cowl and is routed to a plenum attached to the lower cowl. After passing through the oil cooler, the cooling air exits the engine cowl through the cowl air outlets.

71-60-20 Induction Air Intakes

Cold filtered air is provided to the throttle body from an intake in the lower cowl that is also used for oil cooling.

Alternate air is provided through a suck-in door in the intake system that allows warm air to directly enter the injector bypassing the filter and cold air inlet. This door can also be operated manually using the alternate air control in the cockpit. Refer to Chapter 73 for further details of both of these systems.

71-70-00 ENGINE DRAINS

The following are provided to drain off excess fluids from the engine installation:

Engine Crankcase Breather

A flexible hose is connected to the breather fitting on the rear accessory case. This connects to a solid aluminium alloy tube attached to the left hand engine mount structure with cushioned clamps. The breather exhausts just aft of the lower cowl cooling air outlet.

Fuel Pump Drain

A short length of tubing is connected to the drain fitting on the engine driven fuel pump and drains into the lower engine cowl. This drain line is provided to drain any fuel overboard that may otherwise be trapped between the pump seal and the engine. This situation could occur if the primary pump seal fails. Under normal circumstances no fuel will drain from this line.

Injector Intake Drain

A small hole is provided in the bottom of the injector intake to drain off any excess fuel that would otherwise accumulate there after the engine had been primed excessively prior to start. An accumulation of fuel at this point would constitute a fire hazard in the event of a back-fire during engine start. The hole drains this fuel overboard.

Intake Manifold Drain

A drain line is provided from the intake manifold drain valve to overboard to clear over-prime fuel.

This page intentionally left blank

CHAPTER 72

ENGINE

72-00-00 GENERAL

The aircraft is fitted with a Lycoming IO-540-K1A5 horizontally opposed, six cylinder, overhead valve, air cooled, fuel injected engine with an air cooled wet sump oil system. The engine is rated to produce 300 BHP with full throttle at 2700 RPM by Lycoming, but as installed in the GA8 a maximum rating of 275 BHP at 2500 RPM has been declared.

72-00-10 Maintenance and Overhaul

Other than any specific procedures specified elsewhere in this Service Manual, detailed procedures for the maintenance and overhaul of the Lycoming IO-540 engine fitted to the GA8 aircraft can be found in the following documents:

- Lycoming Operator's Manual covering the IO-540 series engine, or
- Overhaul Manual - Lycoming Aircraft Engines - Direct Drive Models.

These documents are supplemented by Lycoming Service Letters and Service Bulletins as appropriate.

CHAPTER 73

ENGINE FUEL AND CONTROL

73-00-00 GENERAL

The GA8 fuel system consists of two wing fuel tanks and a sump tank together with other associated fuel system components. The sump tank is located under the cockpit floor, on the right hand side. The sump tank has a nominal capacity of 9 litres (2.4 US gallons) and is permanently connected, through filters, to the main wing tanks in such a manner that precludes cross feeding. All vents are interconnected. The fuel is supplied to the electric boost pumps (mounted beside the sump tank) directly from the sump tank. It is then plumbed through the fuel shut off valve and on through the firewall to the engine driven pump that supplies the injection system.

73-10-00 DISTRIBUTION

The general principles of operation of the fuel distribution system are described above. This section covers all of the components associated with the fuel and air induction systems forward of the firewall.

73-10-10 Fuel System Components

Engine Driven Fuel Pump

The engine is fitted with a vane type engine driven mechanical fuel pump. This pump must be maintained in accordance with the relevant manufacturers data. When installing a replacement fuel pump or after the fuel lines have been disconnected for any reason, ensure that the hoses are connected to the correct IN and OUT fittings. These are clearly marked on the fuel pump body. Refer to **71-70-00** for details relating to the drain line.

Fuel Injection System

The engine is equipped with a Bendix RSA fuel injection system that is composed of two primary components, a servo regulator and a flow divider. The servo regulator regulates fuel pressure by means of a servo valve using airflow signals. When this regulated pressure is applied across the fuel control jetting, a fuel flow is provided that is proportional to the airflow. The air/fuel ratio is controlled, within limits, by the mixture control. The flow divider is the device that ensures the correct distribution of metered fuel to each cylinder fuel nozzle.

73-10-20 Induction Air Components

The engine induction air normally enters through an intake in the lower cowl that is shared with the oil coolers. A filter is provided in this plenum. The inlet air then passes down a duct on the left side of the engine to the injector. The injector adapter box is fitted with a spring loaded valve that supplies air to the engine in the event that the air filter becomes severely or completely blocked. This valve may be manually operated by the alternate air control below the throttle quadrant. The air enters the inlet to the fuel injection servo regulator that is mounted on the lower rear left side of the engine. The inlet air is then ducted to the engine cylinders through intake manifold tubes. The servo regulator monitors the air flow mass passing through it and meters fuel in direct proportion giving the proper fuel/air mixture at all engine speeds.

Refer to **12-20-40** for details of air filter inspection and maintenance.

CHAPTER 74

IGNITION

74-00-00 GENERAL

Engine ignition is provided by two engine driven magnetos, as well as two spark plugs in each cylinder. The right magneto fires the upper right and the lower left spark plugs, and the left magneto fires the upper left and the lower right spark plugs. Normal operation is conducted with both magnetos on, due to the more complete burning of the fuel-air mixture with dual ignition sources. The individual magnetos are selected using a single key type switch located on the left hand end of the instrument panel.

74-10-00 ELECTRICAL POWER SUPPLY

Various magneto types are approved for use on Lycoming IO-540-K1A5 engine. Refer to current Lycoming data for details of the approved types/models that may be fitted.

The magnetos should be maintained and overhauled in accordance with the magneto manufacturers or Lycoming data. Details of general maintenance, installation and timing can be found in the Lycoming Operator's Manual covering the IO-540 series engine.

74-20-00 DISTRIBUTION

74-20-10 Ignition Harness

The ignition harness is a fully shielded type to avoid radio interference. Damage to the outer shielding may not affect engine performance but could cause significant radio problems.

General inspection, repair and replacement procedures for ignition harnesses can be found in FAA publication AC 43.13-1B.

In the event that an ignition harness or an individual lead needs to be replaced, consult the wiring diagram in the Lycoming Operator's Manual covering the IO-540 series engine to be sure that the harness is correctly installed. Mark the location of clamps and clips to be certain that the replacement is clamped at the correct locations.

74-20-20 Spark Plugs

General inspection, repair and replacement procedures for spark plugs can be found in FAA publication AC 43.13-1B.

- Spark plug gap must be set at 0.41-0.53 mm (0.016"-0.021")
- Installation torque is 47.5 Nm (420 in lbs)
- Always use new gaskets (P/N STD-295) when reinstalling spark plugs

Only fully shielded spark plug types approved for the engine model may be fitted. The latest edition of Lycoming Service Instruction No. 1042 should be consulted for a complete list of approved spark plugs.

CAUTION

Do not depend on engine model designation for spark plug application. The same engine model may use short or long reach spark plugs. Engines with long reach plugs are identified by yellow paint on the cylinder fins between the spark plug hole and the rocker cover; engines with short reach plugs have no identifying colour. See latest edition of Lycoming Service Instruction No. 1181.

74-30-00 SWITCHING

The magnetos are switched off (grounded) by key type switch located on the instrument panel. Shielded wire is used between the magnetos and the corresponding ON-OFF switches to minimise any radio interference.

WARNING

The magnetos are only disabled when the switch lead is grounded. Consequently the magneto is LIVE if the switch wire is disconnected or the switch is faulty so that is not grounding the magneto switch wire when the OFF position is selected. In either case the propeller must be treated as LIVE and dangerous. Suitable precautions must be taken to avoid possible injury or death.

Details of the electrical circuit associated with the magneto switching can be found in **24-10-00**.

This page intentionally left blank

CHAPTER 76

ENGINE CONTROLS

76-00-00 GENERAL

Engine power is controlled by a throttle located in a throttle quadrant on the centre console. It is readily identified by a black handle/knob. The throttle operates in the conventional sense in that when fully forward the throttle is full open, and in the fully aft position the throttle is closed. Should the mechanical linkage from the throttle lever fail, the throttle shaft is sprung loaded to move to the full throttle position.

Propeller pitch control is provided in the throttle quadrant on the centre console. It is fitted with a blue knob for identification. Forward is fully fine (2700 RPM) and aft is full coarse. For aircraft issued with Flight Manual C01-01-03, a gate limits take-off and maximum continuous RPM to 2500 RPM which can be exceeded in an emergency to 2700 RPM by advancing the control beyond the gate. Should the mechanical linkage from the propeller pitch lever fail, the governor is sprung loaded to move to the full fine position.

The mixture control is located in the throttle quadrant on the centre console. It is fitted with a red knob for identification. The full rich position is fully forward, and fully aft is idle cut off. Should the mechanical linkage from the mixture lever fail, the mixture control is sprung loaded to move to the full rich position.

The alternate air control is a push-pull control located on the lower rear of the throttle quadrant. With the control pushed fully forward (in), cold air is selected. Fully aft (out) selects alternate air.

All engine controls utilise Bowden type PUSH-PULL cables running from the cockpit control to the appropriate engine linkage. They are clamped and supported at various locations to avoid kinking and damage.

76-00-10 Inspection and Maintenance

In order that the Bowden type cables may operate correctly they must:

- Not be kinked or damaged
- Be adequately lubricated internally and not binding
- Have their outers properly and securely clamped at **both ends**
- Have their inners operated correctly at the control end, and
- Have their inners correctly connected to the respective engine linkage and be rotationally free so that the linkage can operate correctly through its full travel without causing binding or bending/kinking of the inner.

Any problems with Bowden type controls can usually be traced to one or more of the above. Rectify as required. If the cable is damaged or kinked it should be replaced. Care must be taken during installation not to kink the replacement cable and to ensure that the routing is correct and will not cause damage or kinking in service.

It is difficult to adequately clean the sliding surfaces of an old Bowden cable. It is usually easier to replace one that binds internally rather than attempting to clean and re-lubricate it. If the binding is not very bad it may be possible to free and lubricate the inner using a penetrating thin lubricant such as WD-40, RP-7 or similar.

After any maintenance to the engine controls a careful check should be made to ensure that the cable is correctly secured to the appropriate engine linkage and that the respective engine control can be operated through its full range of travel from stop to stop using the cockpit control. To set the RPM gate refer to section **61-20-00.**

This page intentionally left blank

CHAPTER 77

ENGINE INDICATING

77-00-00 GENERAL

Engine operation is monitored by:
- Tachometer
- Manifold pressure gauge
- Fuel pressure gauge
- Oil temperature gauge
- Oil pressure gauge

These instruments are located in the instrument panel and are marked with green arcs to indicate the normal operating range, yellow arcs to indicate the precautionary operating range, and red radial lines at the maximum/minimum allowable limits.

These limits are as follows:

INSTRUMENT	Minimum Limit	Normal Operating	Red Arc Maximum Limit	Precautionary Range
Tachometer[1]	-	575 - 2500 RPM	2500 - 2700 RPM	-
Tachometer[2]	-	575 - 2500 RPM	2700 RPM	2500 - 2700 RPM
Manifold Pressure	-	10 – 30 in Hg	-	-
Oil Pressure	25 psi (idle)	55 - 95 psi	115 psi	25 – 55 psi 95 – 115 psi
Oil Temperature	-	60°C – 118 °C	118 °C	-
Fuel Pressure	12 psi (idle)	18 - 55 psi	55 psi	12 – 18 psi

[1]Aircraft with Flight Manual C01-01-03
[2]Aircraft with Flight Manual C01-01-07

77-10-00 POWER INSTRUMENTS

77-10-10 Tachometer

The tachometer is a cable driven mechanical unit mounted in the instrument panel in front of the pilot and records engine operating hours as well as engine RPM. The tachometer drive cable is fitted to the tachometer connection on the upper centre of the engine accessory case and runs through the firewall to the tachometer.

The tachometer is not field repairable and if it becomes unserviceable it should be overhauled by an approved instrument overhaul facility or replaced with a serviceable unit.

The tachometer drive cable is made up of an inner torque cable and an outer protective shroud. In the event of damage, either or both of these may be replaced as required. **Prior to replacing an inner cable, the outer should be carefully inspected for damage.** Damage to the inner is usually obvious, damage to the outer may not be. If the outer is considered serviceable, the inner may be replaced without removing the outer from the aircraft. Although this can be done from either end it will normally be easiest from the engine end.

When replacing the inner back into the outer, a thin molybdenum disulphide based lubricant should be smeared on the inner prior to inserting it in the outer. Insertion will be made much easier if the inner is rotated as it goes in, in a direction that tends to tighten the twisted cable strands. It should not be rotated the other way.

77-10-20 Manifold Pressure/Fuel Pressure Gauge

Manifold pressure and fuel pressure are indicated on two separate instruments. Two pressure lines pass from the engine compartment through the firewall to connect to these gauges. The direct reading mechanical manifold pressure gauge measures absolute pressure from a pressure tap at the intake manifold.

Fuel pressure is tapped from the inlet to the fuel injector on the fuel injector body mounted at the rear of the engine and is transferred to the cockpit gauge through a two segment fuel pressure line. This line has a flexible hose segment running from the engine to the firewall and a second flexible line running from the back of the firewall to the gauge.

The manifold and fuel pressure gauges are not field repairable and if found to be unserviceable should be overhauled by an approved instrument overhaul facility or replaced with serviceable units.

77-20-00 TEMPERATURE INDICATION

77-20-10 Oil Temperature Gauge

The oil temperature gauge is electrically operated with a remote sensing unit fitted in the top of the engine oil filter housing. The gauge and the sender are considered to be non-repairable and should be replaced if found to be unserviceable.

Details of the electrical circuit associated with this system can be found in **24-10-00**.

77-30-00 ANALYSERS

77-30-10 Oil Pressure Gauge

The oil pressure gauge is a direct reading type. The gauge is considered to be non-repairable and should be replaced if unserviceable.

Oil pressure is tapped from the oil pressure gauge connection on the right hand side of the engine accessory case and is transferred to the cockpit gauge through a two segment oil pressure line. This line has a flexible hose segment running from the engine to the firewall and a second flexible line running from the back of the firewall to the gauge on the left hand instrument cluster.

CHAPTER 78

EXHAUST

78-00-00 GENERAL

Two separate welded stainless steel 3-into-1 exhaust manifold assemblies are fitted, one for the left bank of cylinders and one for the right. Both mufflers have heat muffs fitted to provide a source of heated air for the optional cabin heat system.

78-10-00 COLLECTOR/NOZZLE

The left and right forward exhaust systems are handed and are manufactured with slip joints between each section to allow for heat expansion. The mufflers are connected using a spring loaded ball joint to absorb engine vibration.

These mufflers are designed in such a manner as to cause the expanding exhaust gases to swirl in the outer expansion chamber and align themselves with the tangentially mounted outlet pipe to achieve best flow.

The tail pipes are squeezed in at the outlet end to reduce the tendency for exhaust gas to impinge on the belly of the aircraft.

Removal and installation of the exhaust system is simple and obvious. When re-installing the exhaust system new exhaust gaskets should be fitted unless the spiral wound type (Lycoming P/N 77611 or Airborne P/N 1000) have been used. Although it is recommended that they be replaced, they may be re-used if found to be in good condition.

Inspection of exhaust system

The entire exhaust system, including heat exchangers, stacks, mufflers, and all exhaust connections must be inspected. It is recommended that the system be checked even more carefully as the number of hours increase. The system should also be checked carefully before winter operation when the cabin heat will be in use.

1. Remove the tail pipe and stacks.

2. Remove or loosen all exhaust shield, cabin heat muffs, shrouds, etc., as required to permit inspection of the complete system.

3. Perform necessary cleaning operations.

4. Inspect all external surfaces for dents, cracks and missing parts. Pay particular attention to welds, clamps, supports, support attachment fittings, slip joints, stack flanges and gaskets.

5. Inspect internal baffle. Any cracks, warpage or severe oxidation are cause for replacement of the muffler.

6. Re-assemble exhaust system.

Inspection and Testing of Heater System to Ensure Freedom from Carbon Monoxide

1. Check the operation of the push-pull controls to insure valve doors function correctly. When the controls are pulled out the door should be completely open and when the controls are pushed in the door should be completely closed.

2. Head the aircraft into wind.

3. Warm the engine on the ground.

4. Advance the throttle to full static RPM with cabin heat valves open.

5. Using appropriate sampling procedures applicable to the particular indicator being used, take readings of the heated airstream in the cabin at each outlet.

6. If carbon monoxide concentration exceeds 0.005 percent or if a dangerous reading is obtained on an indicator not calibrated in percentages, then the muffler must be replaced.

This page intentionally left blank

CHAPTER 79

OIL

79-00-00 GENERAL

The Lycoming IO-540-K1A5 is a wet sump type engine. The entire oil system (with the exception of the external oil cooler) is an integral part of the engine itself.

Detailed procedures for the maintenance and overhaul of the integral engine oil system and its components may be found in the relevant Lycoming engine manuals.

79-10-00 STORAGE

Oil for engine lubrication is supplied from a sump at the bottom of the engine. The oil capacity of the engine sump is 11.4 litres (12 US quarts). The sump incorporates an oil drain plug and oil suction screen.

79-20-00 DISTRIBUTION

Oil is drawn from the sump through an oil suction strainer screen into the engine driven oil pump. Oil passes from the pump to a thermostatically controlled bypass valve. If the oil is cold, the bypass valve allows the oil to bypass the oil cooler and flow directly to the filter. If the oil is hot, the bypass valve routes the oil from the accessory case through flexible hoses to the oil cooler. On returning to the accessory case, the oil passes through the full flow replaceable element oil filter. The filtered oil then enters a pressure relief valve that regulates the engine oil pressure by allowing excessive oil to return to the sump, while the remaining oil under pressure is circulated to the various engine components for lubrication. Residual oil returns to the sump by gravity flow.

79-20-10 Oil Cooler

The oil coolers are mounted on the engine mount structure behind and below the engine.

Ambient air is ducted from a separate air intake in the lower engine cowling and into the oil cooler plenum. After passing through the cooler the air exits the engine cowl through the cooling air outlets.

The oil cooler installation will require the following maintenance:

- Checking the cooler and its mounting flanges for cracks
- Checking the cooler mounting and hardware for security and damage
- Checking and rectifying oil leaks
- Checking plenum for security and damage
- Cleaning the cooler air fins and checking for damage (The fins can usually be cleaned without removing the cooler from the aircraft by using a compressed air nozzle with fairly high air pressure and blowing through the fins from the rear).

79-20-20 Oil Filter

The oil filter fitted is a Champion (P/N CH48110) and is located on the back side of the engine.

The oil filter should be changed at regular intervals as per the Maintenance Schedules section of this manual in Chapter 5.

This page intentionally left blank

CHAPTER 80

STARTING

80-00-00 GENERAL

The electrically driven starter motor is mounted at the front of the engine. When energised, the starter motor pinion engages a ring gear that is fitted to the flywheel/alternator pulley. A key start is located on the instrument panel. When the master switches are on, turning this key to START will energise the starter solenoid located near the battery, and this in turn allows the starter motor to be energised. Because the IO-540-K series engine does not feature magnetos with impulse couplings, a starter vibrator is fitted that provides a voltage boost to the ignition system to assist starting.

80-10-00 CRANKING

80-10-10 Starter Motor

The aircraft may be fitted with any light weight 12 volt geared starter with 12/14 pitch approved for the IO-540 series engines such as Lycoming P/N 31A21198. Functionally these starters are interchangeable and maintenance procedures associated with them are similar.

Refer to the starter motor manufacturers maintenance data for specific maintenance and overhaul procedures for the particular starter fitted.

NOTE

The starter motor fitted at the factory is modified to remove the link between the main starter lead and the solenoid. When installing a new starter motor, ensure that this link is removed from the unit before installation.

80-10-20 Energising System

A heavy duty automotive type (Ingrams P/N 9557 or equivalent) starter solenoid and starter relay is located in the solenoid box forward of the battery. Turning the starter key located on the instrument panel to START activates the starter solenoid and starter relay, thereby allowing current to pass from the bus through the solenoid coil and relay to earth. This in turn causes the solenoid and relay to close the main starter circuit and energise the starter. The solenoid and relay are connected in series to prevent the starter motor from remaining engaged should the solenoid or relay fail in the closed position. This provides a level of redundancy in the starter circuit. The starter vibrator, mounted on the left hand side of the upper firewall, is energised concurrently with the starter solenoid and relay. The electrical system schematic for this system can be found in **24-10-00**.

80-10-30 Starter Solenoid and Relay Test

WARNING

Do not perform any sort of maintenance on the electrical system in conjunction with maintenance on the fuel system. The escape of fuel fumes under the floor and/or in the aircraft may cause an explosion.

1. Turn both Master Switches OFF, and discharge the alternator excitation system per **24-00-30**.

2. Gain access to the solenoid box.

3. Using a multimeter check the voltage reading on terminal PS1A on the starter solenoid. The reading should be zero. If the reading is approximately 12 volts (i.e. the battery voltage), the starter solenoid is faulty and is to be replaced.

4. Using a multimeter check the continuity from terminal I of the starter solenoid to earth. The circuit should be open. If the circuit is closed the starter relay is faulty and is to be replaced.

This page intentionally left blank