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Issue 1

Service Letter

Subject:

This service letter is intended to provide a guide for an efficient method of assembling a GA8 received in a shipping container. These instructions are not to be used in isolation, as reference must always be made to the approved aircraft documentation and all work must be carried out and certified in accordance with the requirements of the appropriate National Airworthiness Authority.

Gippsland Aeronautics strongly recommends that personnel involved in the assembly and maintenance of the GA8 Airvan complete factory delivered GA8 Maintenance Familiarisation training.

Applicability:

All GA8 aircraft containerised for transport.

Amendments:

Nil – initial issue

Background:

For overseas transport the GA8 is disassembled and crated into a sea container. The principle of the design of the "in container" fuselage support frame (main undercarriage legs removed) requires the container to be at ground level for minimum effort to remove fuselage in terms of man-hours, safety considerations and ease of assembly.

The fuselage support frame is attached to the nose leg and main undercarriage pick-up points, its base allows the fuselage assembly to be slid out onto the hangar floor, and is at a comfortable/suitable work height, to prepare wing and empennage mounting points for assembly. Following the fitting of the complete empennage and wings, the standard wing jack points can be used to raise the aircraft to a suitable height to install and secure the main and nose undercarriage. Aircraft is stabilised for and aft via the tail support point provided in the ventral fin.

Instructions:

1. Equipment Required

1.1. Packing pieces/sloping ramps will be required to remove the fuselage from the container.

NOTE:

This is to prevent the tail end of the fuselage contacting the roof if the nose is lowered too quickly.

1.2. Standard set of AF spanners, wrenches and sockets.

1.3. Battery powered drills, screwdrivers for quick removal of industrial hex head screw fasteners used for securing and packing.

1.4. Wing installation trestles and supports: can be supplied by the factory or alternatively can be built from factory supplied sketches.

1.5. Aircraft jacks (Cessna single engine wing type jacks are suitable – compressed height approximately 70 inches, extended height approximately 80 inches above ground).

1.6. Suitable padding/trestles to support the wings and tail surfaces on while cleaning, inspecting and lubricating fittings as required prior to assembly. Support wings under “double ribs,” identified by the double rivet rows/runs.

1.7. Lubricants as per GA8 Service Manual Chapter section 12-20-30.

2. Personnel/Labour Requirements

2.1. Assuming the use of wing support trestle (on wheels and height adjustable), approximately five people to remove fuselage and wings for approximately one hour. Occasionally three men for three hours and two men for approximately fifteen hours each. The typical re-assembly should take approximately fifty to sixty man-hours labour.

3. Removal of Aircraft from Container

Description	Initial	Date
Before opening container door check seal installed – may have been replaced by customs, but should be intact.		
Open doors and Inspect for any damage, corrosion from seawater, etc. If damage is apparent take photos and contact insurance company prior to proceeding. You will require authorisation by Insurance to proceed further should damage be apparent.		
Remove any items stowed on front of or around fuselage that would impede removal. Items stowed in the rear of container between wings can remain until easy access is gained by removal of fuselage.		
Remove restraining straps from fuselage support frame and slide/wheel out, being careful not to prematurely lower nose that may result in damage to upper surface of rear fuselage by contacting the container roof.		
Remove entire fuselage assembly clear of container by at least 25 feet (8 metres) to allow easy removal of wings from container.		

NOTE:

Wing, struts and horizontal stabilizer fittings and attach hardware etc. can be cleaned, inspected and anti-seize lubrication carried out and installed immediately if desired, or can be removed from container and rested on suitable padded trestles etc. to allow rapid container despatch.

4. Horizontal Stabilizer/Elevator Assembly Installation

Description	Initial	Date
To remove from container, use two persons to support horizontal stabilizer and elevator assembly. Using battery-powered driver remove fasteners.		
Remove complete assembly from container, carry out inspection for shipping damage, place on suitable trestles/tables, clean attachment fittings, bolts etc, lubricate with general purpose grease and ensure trim jack shaft is clean and lubricated IAW GA8 Service Manual Chapter 12-20-30. Also clean and lubricate rear stabiliser attachment fittings and pivot bushes. **NOTE:** *Ensure that the stabiliser trim jack shaft has remained secured by cable-ties to the bulkhead just forward. If the shaft is not secured and the forward trim wheel has been moved, there is a possibility that the trim system rigging may have become incorrect and will require checking IAW GA8 Service Manual Chapter 27-30-10.*		
With the aid of a person on either tip, lift assembly into position above rear fuselage pivot attach fittings. **NOTE:** *Ensure pivot bushes are installed.*		
Utilizing a third person, install NAS6605-20 bolts (heads outboard) AN960–516 washers, MS21042-5 nuts and correctly torqued IAW GA8 Service Manual Chapter 20-10-00 and install theAN356-524 pal nuts. Check that the leading edge of stabilizer moves up and down without binding. It is required that the outer flanges of the tailplane fitting clamp tightly on inner pivot bush to ensure the bushing rotates in the rear fuselage lug.		
Slide the upper end of the trim jack between front spar attach fittings ensuring that the anti rotation spacers are fitted. Install the AN5-14A bolt with AN960-516 washer under the head, MS21042-5 nut and washer, and torque IAW GA8 Service Manual Chapter 20-10-00. Install AN356-524 Pal nut and ensure uniball bearing is clamped tightly.		
Attach trim indicator operating cable on the forward face of the front spar. Check stabilizer and indicator rigging IAW GA8 Service Manual Chapter 27-30-10 and Type Certificate Data Sheet.		
Connect both elevator push rods to the elevator operating horns torque bolts IAW GA8 Service Manual Chapter 20-10-00.		

5. Vertical Fin Installation

Description	Initial	Date
Clean and inspect forward and rear spar attach holes, faces and bolts. Apply a light coating of preferred corrosion protection (i.e. LPS3 or similar). Three persons and a 10 ft (3 metre) high stepladder or work platform are preferable for fin initial installation.		
Pass the fin assembly to person on ladder/work platform and lower the assembly down into position ensuring correct fore/aft alignment.		
Loosely install 2 bolts in front and rear fin spars to safely hold fin in position. One person can finish the installation and torquing of the bolts in the rear spar, two persons required to correctly torque forward spar bolts. **NOTE:** *Ensure unthreaded portion of all bolts protrudes through spars and bulkheads and sufficient washes are used under the nut to prevent nut binding.* *Correctly torque all nuts IAW GA8 Service Manual Chapter 20-10-00.*		
Connect the strobe light/beacon and radio coax cables at the base of the fin.		

6. Rudder Installation

Description	Initial	Date
Clean and inspect rudder, hinge pivots and mass balance attachments. Lubricate pivot bushes and hinge holes with grease.		
Rudder can be installed with lower mass balance weight fitted – upper balance weight must be removed. **NOTE:** *GA8 IPC Chapter 27 Figure 27-37 shows correct installation of rudder pivot bushes and attach hardware.*		
Install upper and middle hinge bushes and bolts. Take particular notice of Note 1 of IPC Figure 27-37 regarding “spacer” washers and lower hinge bolt length. Spacer washers should be added until just taking up the gap.		
Install lower washes and MS21042 nuts, tighten and ensure pivot bushes are clamped and rotate with rudder.		

Description	Initial	Date
Connect rudder cables. **NOTE:** *It is usual that rudder cables are disconnected without disturbing the original rigging and the lock wire should be found intact. They can easily be reconnected by attaching one cable, then with the nose wheel held in position, moderate pressure on the trailing edge at lower rib position of rudder will allow easy installation of the second rudder clevis bolt.*		
Install both castellated nuts and split pin.		
Place the upper mass balance weight in position and install the 2 x AN4 bolts and washers leaving the bolts loose enough so that the weight can be rotated to align the pop rivet holes at each end of the weight. When the holes are aligned the bolts can be tightened and the pop rivets installed. **NOTE:** *If the pop rivet holes do not align then the weight may need to be swapped end for end.*		
Check complete rudder system installation IAW GA8 Service Manual Chapter 27 Section 27-20-00.		

7. Wing Installation

NOTE:

Whether the aircraft is on the shipping fuselage support frame or is on its wheels, it is stable with only one wing attached (assuming no fuel).

Description	Initial	Date
Clean, inspect and grease all wing, strut, fuselage pick up points and bolts etc. Remove all blanking, packaging tape from fuel supply and vent lines. Check and ensure they are all clear. Lightly grease outer surface of pipes and inner surface of rubber sleeves to allow easy assembly.		
Lift wing assembly onto mobile wing rigging trestle (or manhandle with 4-5 people) and adjust to correct height. Move wing assembly carefully towards correct position while feeding the aileron control cables into their correct positions, also ensue smooth insertion of fuel supply and vent lines. **NOTE:** *On left hand side fuselage rear spar ensure cam adjusters (if fitted) are well greased and inserted and the bolt holes aligned with each other. It has generally been found that balanced flight in terms of roll is achieved with the rear spar near the lowered position.*		
When front and rear spar holes are aligned in fittings, install bolts. See GA8 IPC Chapter 57 Figure 57-1.		

Strut Installation – Lower End (See GA8 IPC Figure 57-2)

Description	Initial	Date
Identify lower end of strut and carefully insert into position. **NOTE:** *Ensure fork mating surfaces are well greased to prevent galling during insertion.*		
Line up lower boltholes and partially insert bolt. Partial insertion allows slight twisting or radial movement of strut thus aiding installation alignment at the upper end.		

Strut Installation – Upper end (See GA8 IPC Figure 57-2)

Description	Initial	Date
Again make sure the wing mounted strut attach lug faces are well greased to prevent galling. Raise upper end of strut and insert into position. If wing lugs appears too far apart a G clamp can be successfully used to slightly squeeze or spring them together to allow entry into the strut fork.		
Raise or lower wing to align boltholes, locate tie down bracket into position and install bolt.		
Install all double locking nuts. **NOTE:** *It is easier to feed the 2 nuts into the lower strut attach bolt progressively as the bolt is moved in, due to limited access. Modified open-end spanners or wrenches can be used.*		
Carefully tighten all primary nuts and then lock secondary nuts onto the primary nut. **NOTE:** *The primary and secondary nuts are an FAA requirement, however they are awkward and require considerable care to install correctly as intended, especially the smaller diameter nuts as on the rear spar bolts, they are narrower than most spanners and wrenches and the threads in these nuts can strip very easily if over torqued due to the limited number of threads in each nut.*		

Fuel and Vent Lines

Description	Initial	Date
Ensure rubber hose joining sleeves are centred over the gap between the ends of the pipes, also that sufficient engagement has been achieved to allow correct clamping and sealing by the hose clamps. Tighten all hose clamps. **NOTE:** *Care should be taken when starting threads on all fuel line fittings at the wing roots as they can be easily cross threaded and damaged. Care should also be also be exercised to ensure that all fitted are well supported when tightened.*		

Control Cables Systems - Ailerons

Description	Initial	Date
Ensure correct routing of aileron left and right driving and balance cables. Ensure sufficient, even and correct thread engagement in turn barrels. Carry out Rigging and Cable tension IAW GA8 Service Manual Section 27-10-00.		

Control Cables Systems – Flaps (See GA8 IPC Figure 27-7)

Description	Initial	Date
Connect cables to Flap Torque tube operating arms. Ensure sufficient even and correct thread engagement in turnbuckles. Carry out rigging and cable tension IAW GA8 Service Manual Section 27-50-00.		

Electrical Connectors

Description	Initial	Date
Identify and correctly connect plugs located left and right leading edge section of wing roots.		

Pitot/Static Lines

Description	Initial	Date
Locate and connect in Left hand wing root.		

Pitot Static Head Assembly

Description	Initial	Date
Remove left hand fibreglass tip faring (GA8 IPC Figure 57-1 Item 3, Part No. GA8-571019-11).		
Pitot-static assembly is stored inside with the pitot and static lines connected. The mount bolts and stand off spacers can be found in their appropriate holes in the end rib. Attach the pitot head using the hardware as removed (connect the plug for the heated pitot and test if fitted).		
Check pitot-static lines are correctly installed and tightened.		
Carry out a pitot-static leak check IAW GA8 Service Manual Section 34-10-00.		
Install the tip fairing.		

8. Undercarriage Installation

Description	Initial	Date
Install wing jacks and tail support IAW GA8 Service Manual Section 7. Pay attention to Caution regarding empty weight longitudinal centre of gravity.		
Raise aircraft sufficiently to remove weight from main undercarriage and nose leg attach bolts from shipping fuselage support frame. Raise aircraft clear of frame, remove inboard securing bolts from main undercarriage support bars and remove from fuselage.		
Clean and inspect main undercarriage legs, fuselage mounting fittings, nose leg fork and mounting pad.		
Lightly grease faces or apply preferred anti-corrosion treatment (LPS 3 or similar).		

Main Undercarriage

Description	Initial	Date
Insert main legs into fuselage fittings and install outboard NAS mounting bolts first (this gives easier access, spanner/wrenches are not continually hitting inboard bolt heads). See GA8 IPC Figure 32-1 Items 33 and 34, GA8 Service Manual Chapter 32-10-00.		
Tighten 16 mounting bolts, double check (independent check recommended) and install bolt retaining cap.		
Install brake caliper onto torque plate and secure pad assembly.		
Secure brake line to leg and install the leg fairings.		

Nose Wheel (See GA8 IPC Figure 32-4 View DD)

Description	Initial	Date
NOTE: *Nose wheel fork is not handed therefore has no front or rear. Locate fork and wheel assembly, as shown in View DD. Install 4 mounting bolts, washers and nuts and correctly torque.*		
Correctly inflate tyres. Mains - 29 psi Nose – 33 psi		
Lower aircraft off jacks.		

9. Electrical System

Battery

Description	Initial	Date
It would be preferable to ensure aircraft battery is fully charged. This can be accomplished by either removing the battery and charging on 14 volt charger as required by battery manufacturers recommendations (supplied in Aircraft Documents), or using 3 pin ground power plug, connect 14 volt Ground power until current drain is nearly zero or with aircraft master switches on, battery voltage is 14 volts. **NOTE:** *When battery is only partially charged Voltage indication is proportionally lower i.e. 10 to 14 volts.*		

Electrical System Checks

Description	Initial	Date
With ground power installed or battery fully charged, turn on Master Switches.		
Ensure all breakers are in and check operation of all electrical systems in particular the following items disturbed by disassembly. • Nav Lights • Strobe Lights Pitot Heat – ensure pitot heat cover is removed, short test to prevent overheating, beware of burns.		

10. Final Checks

Fuel System Leak Check

Description	Initial	Date
Ensure fuel drains are tight (are left loose following de-fuelling prior to disassembly) and closed. Add approximately ¼ fuel to each tank and check for leaks. **NOTE:** *A slow leak may take some time to become visible, preferably leave overnight.*		

Brake System

Description	Initial	Date
Cycle brake pedals until pedal becomes firm (this action moves the pistons out in the wheel calipers until they are in the normal position). Remove fill cap from Master Cylinder, and using a torch/flashlight ensure reservoir is at least ¾ full – MIL-H-5606 hydraulic fluid.		

Flight Controls/Wings/Empennage

Description			
Carry out independent inspections of the following installations and systems: a) Installation attach fasteners and locking of wings and empennage b) Primary flight control systems c) All control surface attach points are correctly installed and locked.			
First inspection	**Signature**	**Authority Number**	**Date**
Second inspection	**Signature**	**Authority Number**	**Date**

Description	**Initial**	**Date**
Install all interior trim panels, seats and carpets.		
Install all fairings.		

Engine

Description	**Initial**	**Date**
De-inhibit engine as per Lycoming service letter SL-L180B.		
Carry out inspection forward of firewall to ensure:		
a) All engine controls are correctly installed, operation correct.		
b) Silica – Moisture absorbent bags etc. removed.		
c) Oil System – correct level and oil type.		
d) Remove covers from exhaust tail pipes.		
e) Engine may need cleaning externally to remove excess corrosion inhibitor applied prior to shipping.		
Install all engine cowls.		

Engine Ground Run

Carry out the following engine ground run:

Record OAT _____°C	Record Altitude _____ ft	Static MP _____in.Hg

Item	Description		Result
1	Auxiliary fuel pump operation (record pressure mixture ICO)		psi
2	Normal cranking and starting		Yes / No
3	Oil pressure rising (light off)		Yes / No
4	Alternator light off		Yes / No
5	Ammeter charging		Yes / No
6	Vacuum light off and gauge indicating		Yes / No
7	CHT rising		Yes / No
8	Engine warm		Yes / No
9	Shut down and check for leaks		OK / Not OK
10	Re-install cowls and repeat engine start and warm-up Items 1 through 8		OK / Not OK
11	Magneto check at 1800 RPM Mag drop LH Mag Selected		RPM
	Mag drop RH Mag Selected		RPM
12	Pitch operation normal *(cycle prop at 1500 RPM)*		Yes / No
13	Record at Full Throttle *Full throttle check not to exceed 30 seconds* *Ensure tarmac is clear of debris*	RPM	RPM
		Manifold Pressure	in.Hg
		Vacuum	in.Hg
		Oil Pressure	psi
		Oil Temperature	°C
		Fuel Pressure	psi
		Fuel Flow	L/Hr
		CHT	°C
		EGT Recording	Yes / No

14	Record at Idle	Idle Normal	Yes / No
		RPM	RPM
		Oil Pressure	psi
		Oil Temperature	°C
		Magneto Dead Cut	Yes / No
		Idle Mixture Check	Lean / OK / Rich
		Normal Shut Down	Yes / No
15	Abnormal vibrations at any RPM		Yes / No
16	Engine security and leak check		OK / Not OK
17	Ensure all panels installed		Yes / No
18	Engine run carried out *(Refer Lycoming Operator's Manual Section 3)*	Print Name	
		Signed	
		Date	
19	Remarks:		

Description	**Initial**	**Date**
Check correct operation of avionics.		
When moving off to taxi check brakes – correct operation.		
Prepare aircraft for flight.		
Complete log book entries and certify. Check and ensure all AD's, SB etc have been carried out, complied with as required by the country's National Airworthiness Authority.		

11. Flight Check and Delivery

Description	Initial	Date
During check flight: observe all systems for normal operation.		
In smooth air at approximately 23" in.Hg MP, 2300 RPM check lateral rigging (i.e. does aircraft tend to roll left or right). **NOTE:** *Skid ball should be checked prior to flight, must be centred when cabin floor laterally level.*		
Adjust rear spar cam adjuster IAW Service Letter SL-GA8-2004-02 to ensure hands off, wings level. **NOTE:** *If aircraft is tending to yaw, ball must be kept centred with rudder application.* **NOTE:** *For aircraft not fitted with a rudder trim tab, refer to Service Bulletin SB-GA8-2005-22 for rudder tab installation and adjustment.*		
Ensure the exterior of aircraft is clean.		
Ensure interior is clean. Fingermarks removed, carpet vacuumed.		
Ensure seats installed correctly.		
Ensure all shoulder harnesses installed correctly.		
All customer ordered items present and correct.		