0 Revisions

0.1 Record of revisions

Any revision of the present manual, except actual weighing data, must be recorded in the following table and in case of approved sections endorsed by the responsible airworthiness authority.

The new or amended text in the revised page will be indicated by a black vertical line in the right hand margin, and the Revision No. and the date will be shown on the bottom left hand of the page.

Rev. No.	Affected Pages/ section	Description	Issue Date	EASA Approval Date	Inserted Date Signature
1	0.1, 0.3 ÷ 0.6, 2.4, 2.6, 4.2, 4.3, 6.13, 6.14, 7.2, 7.33 ÷ 7.35	Manual revision TN LS10-02	December 2011	February 17. 2012	

0.2 List of effective pages

Section		page	issued	replaced/	replaced/
0		0.0	October 2009		
		0.1	see manual amendments		
		0.2	"		
		0.3	"		
		0.4	"		
		0.5	"		
		0.6	"		
		0.7	October 2009		
1		1.1	October 2009		
		1.2	"		
		1.3	"		
		1.4	"		
		1.5	"		
		1.6	"		
2	App.	2.1	October 2009		
	"	2.2	"		
	"	2.3	"		
	"	2.4	"	December 11	
	"	2.5	"		
	"	2.6	"	December 11	
	"	2.7	"		
	"	2.8	"		
	"	2.9	"		
	"	2.10	"		
	"	2.11	"		
	"	2.12	"		
	"	2.13	"		
	"	2.14	"		
3	"	3.1	October 2009		
	"	3.2	"		
	"	3.3	"		
	"	3.4	"		
	"	3.5	"		
	"	3.6	"		
	"	3.7	"		
	"	3.8	"		
	"	3.9	"		

0.2 List of effective pages (cont.)

Section		Page	issued	replaced/	replaced/
4	App.	4.1	October 2009		
	"	4.2	"	December 11	
	"	4.3	"	December 11	
	"	4.4	"		
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	"	4.28	"		
	"	4.29	"		
5	"	5.1	October 2009		
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	"	5.3	"		
	App.	5.4	"		
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		5.10	"		
		5.11	"		
		5.12	"		

0.2 List of effective pages (cont.)

Section	Page	issued	replaced/	replaced/
6	6.1	October 2009		
	6.2	"		
	6.3	"		
	6.4	"		
	6.5	"		
	6.6	"		
	6.7	"		
	6.8	"		
	6.9	"		
	6.10	"		
	6.11	"		
	6.12	"		
	6.13	"	December 11	
	6.14	"	December 11	
7	7.1	October 2009		
	7.2	"	December 11	
	7.3	"		
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	7.23	"		
	7.24	"		

0.2 List of effective pages (cont.)

Section	page	issued	replaced/	replaced/
	7.25	"		
	7.26	"		
	7.27	"		
	7.28	"		
	7.29	"		
	7.30	"		
	7.31	"		
	7.32	"		
	7.33	"	December 11	
	7.34	"	December 11	
	7.35	"	December 11	
	7.36	"		
8	8.1	October 2009		
	8.2	"		
	8.3	"		
	8.4	"		
	8.5	"		
9	9.1	October 2009		
	9.2	"		
	9.3	"		
	9.4	"		
	9.5	"		

2.3 Airspeed Indicator Markings

Airspeed indicator markings and their colour code significance are shown below.

Marking	(IAS) value or range km/h (kts)	Significance
White Arc	88 - 200 (47,5 - 108)	**Positive Flap Operating Range** (lower limit is maximum weight 1.1 VSO in landing configuration. Upper limit is maximum speed permissible with flaps extended positive +2, +1)
Green Arc	97 - 200 (52 - 108)	**Normal Operating Range** (Lower limit is 1.1 VS1 at maximum weight and most forward c.g. with flaps neutral. Upper limit is rough air speed.)
Yellow Arc	200 - 280 (108 - 151)	Manoeuvres must be conducted with caution and only in smooth air.
Red Line	280 (151)	Maximum speed for all operations.
L	150 (81)	Max. speed for landing configuration L
Yellow Triangle	100 (54)	Approach speed at maximum weight without water ballast
only LS10-st		
Blue line	95 (51)	Speed of best climb Vy, (only for LS10-st)

Fuel quantity indicator:
On left hand upper side of the DEI-NT display, digital indication with 2 digits. Limitation data for the non usable amount of fuel printed above the display:
Max Fuel capacity 12l
red 0.3 l
When a fuel quantity of approx. 2 Litres is reached a full screen warning "Low Fuel" appears, when this warning has been confirmed (by pushing the selector knob at the right hand side of the display) the fuel display will keep blinking.
When reaching the non usable amount of fuel "R" is displayed and will keep blinking.

2.6 Fuel (only LS10-st)

Fuel capacity:
Fuselage tank:

total:	12 l	(3.20 US gal.)
Non usable amount of fuel:	0.3 l	(0.08 US gal.)
Usable amount of fuel:	11,7 l	(3.09 US gal)

Approved fuel grades:
Automobile super gasoline min. 95 octane (ROZ) (RON) leaded or unleaded
or: AVGAS 100 LL (only if super gasoline is not available)
or: mix 50% AVGAS 100LL with 50% car gasoline min. 92 octane (ROZ) (RON)

mixed with self-mixing Super quality two stroke oil - specification TSC 3 or API TC or JASO FC or higher quality. Mixing ratio 1:40

Note: The SOLO company recommends the following oil types: CASTROL Actevo 2T or Castrol Super Two stroke.

4.1 Introduction

Section 4 provides checklists and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in section 9.

4.2 Rigging and derigging, filling the watertanks, refuelling

4.2.1 Rigging

1. Execute the inspection prior to rigging according to section 4.3 A.
2. Clean and grease all pins and bushes and all 4 automatic control system connectors.
3. Open the canopy.
4. Set the airbrake handle to the forward stop and control stick and wingflap handle to neutral.
   Always rig inner wings without 15 m or 18 m tips.
   With a helper on the wingtip, push the left wing into place, then the right wing.
   Check for correct dihedral. The flaperons should be held at neutral for rigging, airbrakes locked. All controls will hook up automatically.

Caution: Make sure that the wing trailing edge is at the same height as its counterpart at the fuselage before the controls hook up. Otherwise a ball bearing of a control hook up bellcrank (mounted at the wing root) may knock against the fuselage-side control and will be damaged.

   Sight through the wing main pin bushings to determine alignment. Push the main pins in as far as possible. Turn one handle after the other up to the fuselage wall, while pulling out the white securing knob, then release the knob back to its locked position. Check the securing.
5. Insert the wing tip extensions (18 m) into the wing.
   Press in the locking pin with your finger.
   Insert the wing tip until the flaperon connecting pins start to slide into the centre-flaperon bushes.
   Strike firmly with the palm of your hand on to the wing tip to lock the wing tip extension.
   The rigging of the 15 m wingtips (Option) has to be done in the same manner as the wing tip extensions.
6. Check if you are safe to fly with the fin battery (see Data Placard in cockpit or entries in section 6). Insert the battery into place. Connect battery to the aircraft electric system and check operation.

7. Rigging of the horizontal tailplane
   Check the glued joint of the spherical insert in the eye-bolt in the front horizontal tailplane attachment. Swivel movement is not allowed!

Warning: If this insert is loose, flights are strictly prohibited. Contact the aircraft manufacturer.

Install the horizontal tailplane and fix it by turning the slotted nut mounted on the rear attachment (using supplied key or suitable coin) until there is no more free play and the red marking on the main attachment bracket is no longer visible via the hole in the upper shell.

8. Install total energy tube, secure against rotating using tape.
9. Mount all necessary equipment in the baggage compartment. Safely secure all items.
10. Connect automatic parachute ripcord at red marked position at main bulkhead. Wrap cord around the lift pin tube.
11. Tape the gaps of the wing-fuselage junctions, the wing joints and the horizontal stabilizer.
12. Execute a positive control check, one helper is needed to hold firmly the control surfaces.

Only LS10-st

13. Pull off the fuel vent surge bottle from the fuel vent line (bottom side of the fuselage).
14. Open fuel shut off valve.

4.2.2 De-Rigging:

Derigging follows the reverse of rigging.

Waterballast must be dumped first.

Airbrakes should be locked.

Note: It is also possible to de-rig with the airbrakes not locked. In such case you have to make sure that the airbrakes won't be damaged in the trailer in case they extend due to vibrations. It is not necessary to lock the airbrakes for rigging

Disassembling the wing tips:

Use a 6 mm diameter pin for pressing in the locking pin on the wing's upper surface. Pull out the wing tips.

Only LS10-st

Push the fuel vent surge bottle onto the fuel vent line (bottom side of the fuselage).

Close fuel shut-off valve.

Note: During road-transport with full fuel tank fuel may spill via the carburettors or via the ventilation line. To avoid this the fuel shut-off valve should be closed during de-rigging and the fuel vent surge bottle installed.

Table of C.G. positions for various items of equipment:

Item	**mass**		**C.G. behind datum**	
	kg	**lbs**	**m**	**ft**
1 Battery in front of control stick *)	2,5	5,5	-1,05	-3,44
Battery in baggage compartment 4BR-255/2	2,5	5,5	0,185	0,61
Battery in the fin 3BR-199	2,6	5,7	4,308	14,13
Water in LH (System No.1)-(forward) fin tank - up to	3,9	8,6	4	13,12
Water in RH (System No. 2)-(rear) fin tank - up to	4,6	10,1	4,16	13,65
Water in outer wing tank (System No.1) - up to	30,0	66,1	0,189	0,62
Water in the centre wing tank (System No. 1)- up to	50,0	110,2	0,189	0,62
Water in the inner wing tank (System No. 2) - up to	110,0	242,5	0,196	0,64
Powerplant	26,5	58,4	1,05	3,44
Empty fuel tank	1,5	3,3	0,38	1,25
Fuel in main tank max.	7,0	15,4	0,38	1,25
Trim weight rear fuselage 4R8-109	2,5	5,5	4,383	14,38
Trim weight in front support 4R8-108	2,45	5,4	-1,69	-5,54
Heavy tail wheel (P/N.: S27) **)	3,4	6,6	4,314	14,15

*) usually 2 batteries are installed

**) 3.0kg (6.6 lbs) more than standard tail wheel with plastic hub S23 (mass of plastic hub S23 with tyre= 0,9 kg (1.98 lbs.))

Rule of thumb:

Installation of 1 trim ballast weight (2.45 kg, 5.4 lbs) in front support..... ..... **reduces** Minimum Cockpit Load by **5,5 kg / 12 lbs**
Installation of 1 Battery (2.5 kg, 5.5 lbs) in front of the control stick..... ..... **reduces** Minimum Cockpit Load by **3,9 kg / 8.6 lbs**
Installation of battery in the fin (2.6 kg, 5.7 lbs) ....**increases** Minimum Cockpit Load by **11,2 kg / 24.6 lbs**
Installation of heavy tailwheel (mass difference to standard tail wheel 3 kg 6.6 lbs.).....**increases** Minimum Cockpit Load by **12,9 kg / 28.5 lbs**
Installation of trim weight rear fuselage (2,5 kg, 5.5 lbs.) .....**increases** Minimum Cockpit Load by **11kg / 24 lbs**

Warning: In case of doubt: Mass and Balance must be determined by reweighing the sailplane

C.G. Shift due to extension of the engine

XS2 = XS1 – 2,3/W

W = total mass (kg)
XS2 = C.G. position with engine extended (m)
XS1 = C.G. position with engine retracted (m)

7.1 Introduction

Section 7 describes the operation of the sailplane including its systems.
M.M. = Maintenance manual
Refer to section 9 "Supplements" for details of optional systems and equipment.

7.2 Airframe

The **LS10-s** is a single-seater high performance glider.
The **LS10-st** is a self-sustainer single-seater high performance motorglider with retractable powerplant.
18 m wingspan with wing parting at y=7 m, wingtips for 15m span optional.

Construction

Wings	CFRP-foam-sandwich-shell with CFRP-roving spar caps
Flaperons	CFRP-foam-sandwich-shell
Rudder	GFRP-foam sandwich-shell
Horizontal stabilizer	GFRP/ AFRP-foam sandwich-shell
Elevator	AFRP -skin
Fuselage	CFRP-GFRP-shell

Canopy

Large single piece canopy, hinged at the front (nose) and supported by a gas strut. Canopy is made of Plexiglas GS clear “GS 241“ or optionally green “GS green 2942” or optionally blue “GS blue 2928“.
Canopy glass glued onto a GFRP frame

Tailplane

T-Tail with conventional stabilizer-elevator and spring trim.

Colours

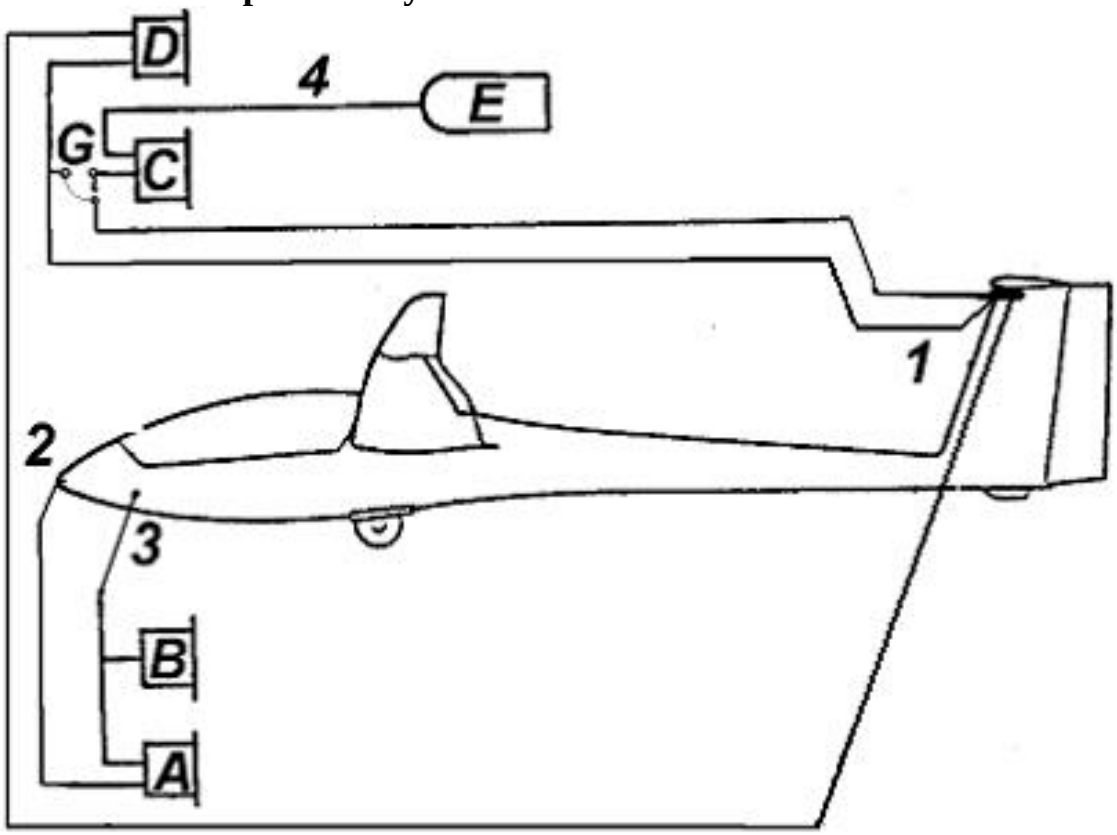
Airframe:		white			
registration numbers:	grey	RAL 7001	or	red	RAL 3020
	blue	RAL 5012	or	green	RAL 6001

Anti collision paint

Approved colours: red, fluorescent red or orange
Approved areas:
1. Rudder: may be painted completely
2. Horizontal tail: paint only the stabilizer and only up to 200 mm from the tips
3. Wing Sections: the inner wing shall not be painted
4. 15 m tips: can be painted entirely
5. 18 m wing tips: paint only the wing and not the ailerons, no more than 400 mm from the tips

Note: 3M mirror foil may be applied to all parts of the airframe

7.15 Pitot-/Static pressure system



1 Multi Probe : Pitot-/Static-/TE pressure port
2 Pitot pressure port at fuselage nose.
3 Static pressure port for airspeed indicator and altimeter – forward fuselage sides.
4, Vacuum Bottles.

A ASI
B Altimeter
C Variometer
D Electrical Variometer
E Capacity bottles for variometers
G Variometer switch (Option):
TE (Soaring) / static (Engine operstion)
(switch shown in „SOARING“ position

Colours of instrument lines:

1 Multi Probe:
Pitot **clear**
Static **red**
TE **green**
2 Front total pressure **yellow**
3 Static pressure front **blue (<u>for ASI and altimeter only!</u>)**
4 Variometer capacity bottles **clear Ø8 mm (0,315 in)**

Note: To preserve the sealing-rings inside the holder for the Multi Probe, the end of the probe should be greased with e.g. Vaseline from time to time.

7.16 Canopy

Canopy emergency release

Canopy locks :pull both red handles to stops

- Right handle operates emergency canopy jettison, therefore it has longer travel than left handle.
  Pull with more than 15kg / 33lbs!
- Hand force increases for emergency jettison travel to avoid unintentional jettison during normal operation.

Canopy: Push off canopy using both red handles

- The gas strut which lifts the instrument panel assists the canopy jettison.

LS-latch (Röger hook): This device is installed at the upper rear end of the canopy and serves as hinge point for the canopy after emergency release..

Checking the emergency release on the ground and removal of canopy:

One person must sit in the cockpit and one person must hold the canopy at the front end.

1. With canopy closed pull on both red handles to bring them to the open position. Thereafter pull strongly on the right hand handle to jettison the canopy.
2. As soon as the canopy is lifted by the instrument panel support the person at the front end must hold the canopy so that it will not be lifted more than approx. 3 cm (1 in.).
3. The person in the cockpit must then lift the canopy at the rear end to disengage the LS-latch (Röger hook).
4. Open the canopy simultaneously with the movement of the instrument panel.
5. If you want to remove the canopy from the glider disconnect cables, if equipment like a GPS antenna is installed on the glare shield.

Reinstalling the canopy:

Two people are required to operate and hold the canopy

1. Connect all cables, if equipment like a GPS antenna is installed on the glareshield
2. Bring the locking lever at the canopy into the open position (rotate clockwise)
3. Place the canopy on the instrument panel support. Move the locking pin with the knurled knob (at the instrument panel support) upwards and move the locking pin through the release cut-out in the canopy. Rotate the locking lever at the canopy counter-clockwise until the canopy is locked. Both elements are accessible from the fuselage nose with an open canopy.

Caution: If you pulled the emergency release inadvertently while opening the canopy you should hold down the canopy at the emergency release handle. Then lift the canopy at the rear end with your left hand to disengage the Röger hook. Then open the canopy simultaneously with the movement of the instrument panel and take off the canopy. If you don't follow this procedure the canopy might be damaged by the instrument panel.

7.17 Miscellaneous equipment (Options)

7.17.1 Removable Ballast

The installation of one trim ballast weight 4R8-108 2.45 kg (5.4 lbs) at the holder in front of the rudder pedal assy decreases the necessary pilot mass by approximately 5,5 kg (12 lbs). (max. 3 front trim weights can be installed).Further data regarding Cockpit Load see section 6.

7.17.2 Oxygen system

A fiberglas receptacle is installed in the left hand side of the main bulkhead for 3 or 4 Litre oxygen bottles of 100 mm (3.94 in) in diameter. Bottles must be fixed with the designated clamp (P/N.: 4R8-41c)

After permanent installation of an oxygen system according to its manufacturer instructions by an adequately licensed maintenance/ repair shop, the sailplane including oxygen system must be inspected (Weight and Balance, Loading Instructions).

When using a removable oxygen unit, its weight must be counted as cockpit load.

7.17.3 Emergency Locator Transmitter (ELT)

ELT: The ELT may be installed on the holder 9R96 according to installation plan 9EP24 attached to the Maintenance Manual and according to the ELT manufacturer's instructions.

The designated place is the moulding on the RH side of the landing gear box below the baggage compartment. As the ELT is not accessible in flight an ELT remote control must be installed.

The gain access to the on-off switch of the ELT e.g. for switching off the ELT for ground transport, the radio speaker plate must be mounted on an access door according to drawing 4R07-091.

Caution: Antenna installation is only certified according to installation plan 9EP22 attached to the MM.

After installation, a functional test and inspection must be performed by a licensed inspector.

The ELT must be switched off during road transport.

With ELT installed onto holder 9R96, the installation of an additional battery see AFM sect. 7.17.4 is not possible.