

Flight manual DG-1000S

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 under lying document for the revision and the date will be shown on the bottom of the page.

Rev. No.	Affected Pages/ section	Description	Issue Date	LBA Approval Date	Inserted Date Signature
1	0.3-0.5, 2.1, 2.9, 2.11, 4.5, 5.4, 6.3, 6.5, 6.10, 7.10	Manual revision TN 413/2	September 2003	Sept. 25. 2003	
2	0.3, 2.12, 3.2, 4.3	Manual revision TN 413/3	May 2004	May 10. 2004	
3	0.3, 0.5, 4.5, 7.6	Ballast box in the fin TN 413/4	June 2004	June 29. 2004	
4	0.3, 0.5, 3.2, 7.11	Canopies Gas-struts TN 413/6	October 2004	January 13. 2005	
5	0.3, 0.4, 2.7, 3.5, 4.1, 4.17	Manual revision TN 413/8	January 2005	February 22. 2005	
Rev. No.	Affected Pages/ section	Description	Issue Date	EASA Approval Date	Inserted Date Signature
6	0.1, 0.4, 0.5, 4.9, 4.13, 7.5	landing gear positive locking device TN1000/13	February 2008	April 8. 2008	
7	0.3, 0.5, 2.5, 2.9, 2.12, 7.13	Rudder pedals-loops (safety bows), manual revisions TN1000/16	May 2008	June 11. 2008	

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0.1 Record of revisions continued

Rev. No.	Affected Pages/ section	Description	Issue Date	EASA Approval Date	Inserted Date Signature
8	0.5, 9.1-9.12	Electrically operated main landing gear TN1000/14	November 2008	28. January 2009	
9	0.6, 9.1, 9.2, 9.13	Special equipment for very small pilots TN1000/17	May 2010	20. July 2010	
10	0.2 – 0.5, 1.4, 1.5, 2.9, 2.10, 4.3, 4.5, 4.6, 4.8, 4.9, 4.12, 6.3 ÷ 6.6, 6.11, 7.1, 7.2, 7.8, 7.10, 7.12, 7.13, 9.7, 9.13	Manual revision TN1000/18	February 2011	13.05.11	
11	0.2, 0.5, 9.1, 9.2, 9.14, 9.15	Special equipment for aerobatics TN1000/20	March 2011	6.05.2011	
12	0.2, 0.5, 9.15	TN1000/20 Revision 1	June 2012	20.07.2012	
13	0.1 ÷ 0.5, 1.5, 2.7, 2.9, 4.6 4.8, 4.18, 5.2, 5.4, 6.4, 6.7, 7.10, 7.11, 7.13, 9.8, 9.12	Manual revision TN1000/24	October 2014	11.11.2014	

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0.2 List of effective pages

Section	page	issued	replaced	replaced	replaced
0	0.0	March 2002			
	0.1	see manual	amendments		
	0.2		"		
	0.3		"		
	0.4		"		
	0.5		"		
	0.6	March 2002			
1	1.1	"			
	1.2	"			
	1.3	"			
	1.4	"	Febr. 2011		
	1.5	"	Febr. 2011	Oct. 2014	
	1.6	"			
2	App. 2.1	March 2002	Sept. 2003		
	" 2.2	"			
	" 2.3	"			
	" 2.4	"			
	" 2.5	"	May 2008		
	" 2.6	"			
	" 2.7	"	January 2005	Oct. 2014	
	" 2.8	"			
	" 2.9	"	Sept. 2003	May 2008	Oct. 2014
		Febr. 2011			
	" 2.10	"	Febr. 2011		
	" 2.11	"	Sept. 2003		
	" 2.12	"	May 2004	May 2008	
3	" 3.1	March 2002			
	" 3.2	"	May 2004	Oct. 2004	
	" 3.3	"			
	" 3.4	"			
	" 3.5	"	January 2005		
4	" 4.1	March 2002	January 2005		
	" 4.2	"			
	" 4.3	"	May 2004	Febr. 2011	
	" 4.4	"			

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0.2 List of effective pages (cont.)

Section	Page	issued	replaced	replaced	replaced
4	App.	4.5	March 2002 Febr. 2011	Sept. 2003	June 2004
	"	4.6	"	Febr. 2011	Oct. 2014
		4.7			
	"	4.8	"	Febr. 2011	Oct. 2014
	"	4.9	"	Febr. 2008	Febr. 2011
	"	4.10	"		
	"	4.11	"		
	"	4.12	"	Febr. 2011	
	"	4.13	"	Febr. 2008	
	"	4.14	"		
	"	4.15	"		
	"	4.16	"		
	"	4.17	"	January 2005	
	"	4.18	"	Oct. 2014	
	"	4.19	"		
	"	4.20	"		
	"	4.21	"		
	"	4.22	"		
	"	4.23	"		
	"	4.24	"		
5	"	5.1	March 2002		
	"	5.2	"	Oct. 2014	
	"	5.3	"		
	"	5.4	"	Sept. 2003	Oct. 2014
	App.	5.5	"		
		5.6	"		
		5.7	"		
6		6.1	March 2002		
		6.2	"		
		6.3	"	Sept. 2003	Febr. 2011
		6.4	"	Febr. 2011	Oct. 2014
		6.5	"	Sept. 2003	Febr. 2011
		6.6	"	Febr. 2011	
		6.7	"	Oct. 2014	
		6.8	"		
		6.9	"		
		6.10	"	Sept. 2003	
		6.11	"	Febr. 2011	

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0.2 List of effective pages (cont.)

Section	Page	issued	replaced	replaced	replaced
7	7.1	March 2002	Febr. 2011		
	7.2	"	Febr. 2011		
	7.3	"			
	7.4	"			
	7.5	"	Febr. 2008		
	7.6	"	June 2004		
	7.7	"			
	7.8	"	Febr. 2011		
	7.9	"	Febr. 2011		
	7.10	"	Sept. 2003	Febr. 2011	Oct. 2014
	7.11	"	Oct. 2004	Oct. 2014	
	7.12	"	Febr. 2011		
	7.13	"	May 2008	Febr. 2011	Oct. 2014
8	8.1	March 2002			
	8.2	"			
	8.3	"			
	8.4	"			
	8.5	"			
	8.6	"			
9	9.1	March 2002	May 2010	March 2011	
	9.2	"	May 2010	March 2011	
	9.3	"			
	9.4	"			
	9.5	"			
	9.6	"			
	9.7	"	Febr. 2011		
	9.8	"	Oct. 2014		
	9.9	"			
	9.10	"			
	9.11	"			
	9.12	"	Oct. 2014		
	9.13	May 2010	Febr. 2011		
	9.14	March 2011			
	9.15	March 2011	June 2012		

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Technical data

Span	m	18	20
Wing area	m ²	16,72	17,53
Aspect ratio	/	19,38	22,82
Length	m	8,57	
Fuselage height	m	1,0	
Fuselage width	m	0,73	
Span of the horizontal tailplane	m	3,2	
Waterballast Wings	max. kg (l)	160	160
Waterballast fin	max. kg	6,2	
Trim ballast fin	max. kg	12	
Empty mass with basic instruments*	approx. kg	411	415
Wing loading (with one Pilot 80kg)	approx. kg/m ²	29,4	28,2
max. take off mass (max. TOW)	kg	750	750
max. wing loading	kg/m ²	44,9	42,8
Aerobatics		unlimited	simple
		Category „A“	
max. TOW for aerobatics	kg	630	630
max. speed	km/h	270	270

*Options will increase the empty mass accordingly!

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2.7 Manoeuvring load factors

The following load factors must not be exceeded:

Category		Utility	Aerobatic
at manoeuvring speed	V_A	+5,3 -2,65	+7,0 -5,0
at max. speed	V_{NE}	+4,0 -1,5	+7,0 -5,0
with airbrakes extended	V_{NE}	+3,5 0	+3,5 0

2.8 Flight crew

a) single seated, only permissible in the front seat

max. load in the front seat 110 kg (242 lbs.)

min. load in the front seat see placard in cockpit and weighing report page 6.7

b) two seated

Either the front seat or the rear seat may be designated as seat of the pilot in command.

If the rear seat is to be designated it must be assured that all necessary operating items and instruments are installed and that the pilot in command has sufficient training in flying safely from the rear seat.

Max. load in both seats combined: 210 kg (462 lbs.)

Max. load in the front seat: 105 kg (231 lbs.)

Exception: The load in the front seat may be max. 110 kg (242 lbs.) with the load in the rear seat not exceeding 90 kg (198 lbs.)

Max. load in the rear seat: 110 kg (242 lbs.)

Min. cockpit load in the front seat is the min. cockpit load see a) minus 40% of the load in the rear seat. This means that 10 kg (22 lbs.) in the rear seat replaces 4 kg (8.8 lbs.) missing cockpit load in the front seat.

With these loads, the C.G. range given under 6.8 will be kept in the limits if the empty weight C.G. is in its limits. See loading chart in sect. 6.8.

Caution:

With lower pilot weights lead ballast must be added to the seat.

Ballast put on the seat (lead ballast cushion) must be fastened at the safety belt anchor point.

Option: Provision for removable trim-ballast in the front cockpit see sect 7.15.1.

Note: For Australia the lower limit for the min. load in the cockpit should not exceed 66 kg (146 lbs.). A provision for removable ballast see sect. 7.15.1 is mandatory.

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2.10 Minimum equipment

As minimum equipment only the instruments and equipment specified in the equipment list (see maintenance manual) are admissible.

Note: The actual equipment list is filed in the enclosures of the maintenance manual.

a) Normal operation

Airspeed indicator Range: 0-300 km/h (0-165kts.);

Speed range markings see sect. 2.3

Altimeter Range: 0 – min. 10.000 m,

(for altimeter in imperial units min. 20000 ft.)

Altimeter with fine range pointer, 1 turn max. 1000 m (3000 ft.)

Four piece symmetrical safety harness

VHF - transceiver (ready for operation)

Outside air temperature gauge with probe in the fuselage nose.

Marking blue for temperatures below 2°C, (36°F).

Battery Z110 or a ballast weight of 5.5kg (12.1 lbs.) installed in the battery box in the fin

Parachute automatic or manual type or a suitable firm back cushion

approximately 8 cm (3 in.) thick for the front seat and 3 – 8 cm (1 – 3 in.)

thick for the rear seat

Required placards, check lists

Flight and maintenance manual.

b) In addition for cloud flying

(Not permitted in the USA, Canada and Australia)

Magnetic compass compensated in the aircraft.

Variometer

Turn and bank indicator

c) In addition for aerobatics (Category Aerobatic)

Accelerometer capable of retaining max. and min. g-values

with markings red radial lines at +7 g and -5 g.

Remark:

Experience has shown that the installed airspeed indicator system may be used for cloud flying.

Ballast box in the fin cont.

In addition with TN413/4 executed, standard from ser. no. 10-49 on:

A switch will be operated by the locking pin of the ballast box cover. As long as the switch is not closed, the control light for the ballast box will blink with doubled speed without interruption. The blinking can't be switched off by pressing on the control light contrary to the blinking which indicates the amount of ballast.

4.2.5 Derigging

Derigging follows the reverse of rigging.

Waterballast must be dumped first.

Lock the airbrakes.

For disassembling the securing pins of the wings the tool W 38/2 must be screwed into the thread completely.

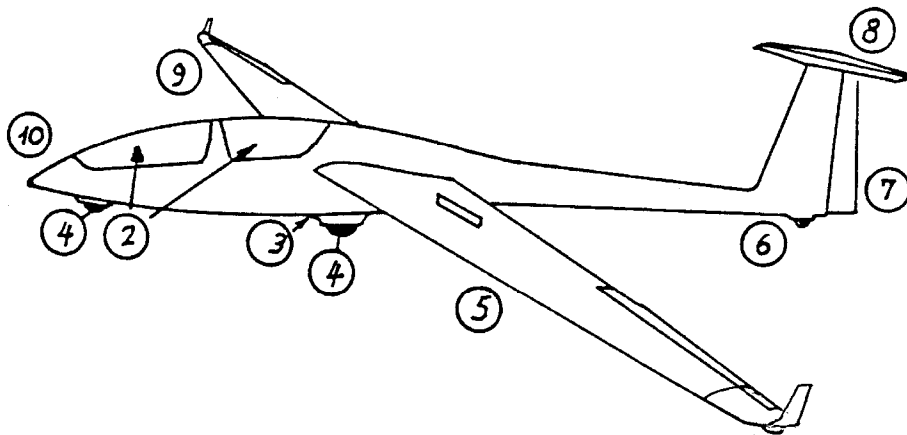
The brass part of the tool will then disengage the securing of this bolt.

It is recommended to leave the securing pin in the right wing while you derig the left wing.

Derigging of the outboard wing panels (20m wing extensions or 18 m wing tips):

Use a 6 mm diameter pin (e.g. tool W36) for pressing in the locking pin on the wings upper side. Pull out the wing tip or the wing extension. |

B Inspection after rigging - Walk around the aircraft



1.
 - a) check for flaws such as bubbles, holes, bumps and cracks in the surface;
 - b) check leading and trailing edges of the wings and control surfaces for cracks;
2. Cockpit area
 - a) check the canopy locking mechanism;
 - b) check the canopy emergency release see section 7.14 (not each day, but min. every 3 month);
 - c) check the main pin securing;
check the securing ropes of the headrest (not applicable for the Version mounted at the lift pin tube);
 - d) check all controls for wear and function, incl. positive control check; check if the handle of the pedal adjustment cable will be pulled to the front so that it can't hook into the trim release lever at the control stick, even with pedals in a rear position;
 - e) check the tow release system for wear and function incl. cable release check;
 - f) check for foreign objects;
 - g) check the instrumentation for wear and function;
 - h) check the radio and other parts of the electric system (fuses!) for function. If there is no electrical power, it can be expected that the battery in the fin is not fitted. **Flying without this battery is only permitted when flying solo with an extremely under weight pilot, (see paragraph 6.8.4) otherwise the forward C.G. limit may be exceeded**
 - i) check the brake fluid level;
 - j) check if the fin tank is empty
3. C.G. Tow hook
 - a) check the ring muzzle of the C.G. hook for wear and function;
 - b) check for cleanliness and corrosion;

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4.5.8 Aerobatics

Caution: The DG-1000S is a high performance sailplane. Therefore the speed increase in the dive, especially in inverted flight is high.

Training aerobatics therefore should only be executed after a rating with an experienced pilot, or if you can master the manoeuvres on other sailplane types. In any case don't try to execute the manoeuvres with entry speeds other than those listed.

Caution: Do not make full or abrupt control movement above the manoeuvring speed $V_A=185$ km/h (100 kts.). At speeds between V_A and $V_{NE}=270$ km/h (146 kts.) reduce the control movements accordingly. At V_{NE} only 1/3 of the max. control movements are allowed.

4.5.8.1 Category U, Utility

Warning: Execute only the approved manoeuvres.

Approved manoeuvres valid for all spans, but only without waterballast and with the weight of the rear pilot compensated by ballast in the ballast box in the fin see section 6.8.7.

Approved manoeuvres	Entry speed	g-loads
Spin	/	/
Inside loop	180 - 200 km/h (97 - 108 kts)	4.0
Chandelle	180 - 200 km/h (97 - 108 kts)	3.5
Lazy Eight	180 - 200 km/h (97 - 108 kts)	3.5
Stall turn	200 - 220 km/h (108 - 119kts)	4.0

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5.1 Introduction

This section provides approved data for airspeed calibration, stall speeds and non-approved additional information.

The data in the charts has been computed from actual flight tests with the sailplane in good and clean condition and using average piloting techniques.

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5.2.2 Stall speeds

The given speeds are the minimum achievable speeds during level flight in km/h and (kts.).

Airbrakes retracted 20m span

mass kg	470	500	550	600	650	700	750
mass lbs.	1036	1102	1213	1323	1433	1543	1653
W/S kg/m ²	26,8	28,5	31,4	34,2	37,1	39,9	42,8
W/S lbs./ft. ²	5.5	5.84	6.43	7.01	7.59	8.18	8.76
V km/h	62,9	64,9	68,0	71,1	74,0	76,8	79,5
V kts.	34	35	36.7	38.4	40	41.5	42.9

Airbrakes retracted 18m span

W/S kg/m ²	28,1	29,9	32,9	35,9	38,9	41,9	44,9
W/S lbs./ft. ²	5.76	6.12	6.43	7.35	7.96	8.57	9.18
V km/h	64,4	66,4	69,7	72,8	75,8	78,6	81,4
V kts.	34.8	35.9	37.6	39.3	40.9	42.4	44

Airbrakes extended 20m span

mass kg	470	500	550	600	650	700	750
V km/h	67,4	69,5	72,9	76,2	79,3	82,3	85,1
V kts.	36,4	37,5	39,4	41,1	42,8	44,4	46,0

Airbrakes extended 18m span

V km/h	69,0	71,2	74,7	78,0	81,2	84,2	87,2
V kts.	37,3	38,4	40,3	42,1	43,8	45,5	47,1

The loss of height for stall recovery is approximately 50 m (160 ft) if recovered immediately. |

6.8 Loading chart

6.8.1 Cockpit load

see weighing report section 6.8.8.

a) single seated:

max. load in the front seat 110 kg (242 lbs)

min. load in the front seat see placard in cockpit and weighing report

b) two-seated:

max. cockpit load is 210 kg (463 lbs.) with a max. of 105 kg (231 lbs.) in the front seat or 110 kg (242 lbs.) in the front seat and 90 kg (198 lbs.) in the rear seat.

min. cockpit load in the front seat is the min. cockpit load see a) minus 40% of the load in the rear seat.

c) With these loads, the C.G. range given under section 6.8.8 will be kept in the limits if the empty weight C.G. is in its limits.

With lower pilot weight necessary ballast must be added in the seat or in the optional ballast boxes see below. Ballast put on the seat (lead ballast cushion) must be fastened at the connections of the safety belts.

Note: Extremely light pilots may remove the fin battery, see section 6.8.4.

6.8.2 Removable ballast for underweight pilots

Option: Ballast boxes in the front cockpit for removable ballast (trim weights), see section 7.15.1.

6.8.3 Baggage

max. 15 kg (33lbs)

Heavy pieces of baggage must be secured to the baggage compartment floor (screwing to the floor or with belts). The max. mass secured on one half of the floor (left and right of fuselage centre line) should not exceed 7,5 kg (16.5 lbs.). With the load added in the fuselage the max. load without waterballast (W.B.) (see weighing report section 6.8.8) must not be exceeded.

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6.8.8 Weighing report (for section 6.3)

Distances in mm, masses in kg -- 25.4 mm = 1 inch / 1 kg = 2.2046 lbs.

Date of weighing:						
Executed by:						
Date of equipment list:						
wing span	18m	20m				
Empty mass						
Empty mass C.G.						
Max. mass without W.B.						
Cat. U						
Cat. A	630	/				
Max. load without W.B.						
Cat. U						
Cat. A						
max. mass with WB						
max. useful load with W.B.						
min. cockpit load YY (kg)						
min. cockpit load XX (kg)						
max. load in both seats	210	210				
Inspector, signature, stamp						

W.B.= waterballast

YY= min. load in front seat for solo flying with fin ballast box empty.

XX= YY+35= min. load in front seat for solo flying with fin ballast box filled.

Weighing was executed with: battery in the fin Z110

tailwheel with: plastic hub

brass hub (see section 7.15.4)

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7.11 Ballast box in the fin

A box for ballast (trim-weights) is installed in the fin. It can be used to compensate the mass of the rear pilot and as a trim-possibility for heavy pilots. Max. ballast capacity: 12 kg.

Filling see section 4.2.4, determination of the permissible amount of ballast see section 6.8.7.

Indication of the amount of ballast inserted is via a control light in the front instrument panel see section 4.2.4 and section 7.3 item 23).

7.12 Electrical system

Battery in the fin.

For C.G. reasons the battery is installed in the fin. Only the use of the factory supplied battery Z110 (12 V, min. 12 Ah, mass 5.5 kg, 12.1 lbs.) is permitted. The battery fuse is installed at the battery, type: G fuse 250 V with indicator 5 x 25 medium slow / 4 A.

For batteries produced from mid of 2002 on: Type: G fuse G 250 V 5 x 20 / 4 A fast.

After inserting the connector plug in the fin the battery is connected to the electrical system of the glider. If you want to charge the battery inside the glider this can be done via the socket see section 7.3 item 20).

Warning: Use only automatic chargers designed to charge sealed lead acid batteries. To charge the battery to its full capacity a charger with 14.4 V max. charging voltage is necessary (normal automatic chargers charge only up to 13.8V). Such a charger is available from DG Flugzeugbau code no. Z 08.

For periodical recharging the “power independent “ unit is suitable. This unit is also available from DG Flugzeugbau.

All current - carrying wiring conforms to aeronautical specifications.

7.13 Pitot and static system

see diagram 8 M.M.

Pitot probe in fuselage nose, static ports a short distance behind fuselage nose. The airspeed indicator and the altimeter are to be connected to these ports and probe. Additional holder for a TE-probe or a Multiprobe in the fin is to operate variometer and flight computer systems. To preserve the sealings inside the holder, the end of the probe should be greased with e.g. Vaseline from time to time.

7.14 Canopies

To **jettison** the canopies in flight see section 3.2.

Removing a canopy:

Open the canopy, detach the retaining cable and if installed detach the gas strut from the front canopy. Then close the canopy and operate the red canopy emergency release handle (right) and the white-red canopy opening handle (left). Lift the canopy upwards.

Reinstalling a canopy:

Open emergency release and canopy locking levers. Place the canopy in vertical direction onto the fuselage. Close the emergency release. Open the canopy and snap in the retaining cable and the gas-strut (if installed).

Checking the canopy emergency release system:

- a) check with open front canopy if the gas-struts (if installed) can be disengaged from their ball fittings (from canopy and from fuselage). Grease the ball fittings.
- b) check with closed canopy if the emergency release handle can be operated and if the canopy can be removed easily, resp. if the canopy will be lifted by the gas-strut. Grease the locking pins.

7.15 Miscellaneous equipment (Options)

7.15.1 Removable ballast for under weight pilots

The ballast boxes (Option) at the right and left hand side of the instrument console underneath the carpets can accommodate 2 ballast weights of min 2.4 kg (5.3 lbs.) each. Each weight compensates a pilot mass of 3.2 kg (7 lbs.). So a max. of 12.8 kg (28 lbs.) missing pilot mass can be compensated.

The ballast weights are to be fixed in the box with a M8 knurled nut.

Note: The ballast weights used for the ballast box in the fin may be used for these ballast boxes too.

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7.15.5 Battery in the baggage compartment with battery selector switch

An additional battery Z01 12V 12AH may be installed in the baggage compartment.

The battery fuse is installed at the battery, type: G fuse 250 V 5 x 25 medium slow / 4 A.

For batteries produced from mid of 2002 on: Type: G fuse G 250 V 5 x 20 / 4 A fast.

A battery selector switch must be installed in the front instrument panel.

In the centre position of the switch both batteries are disconnected from the gliders electrical system.

In position **I** (left) the battery in the fin is connected to the electrical system.

In position **II** (right) the battery in the baggage compartment is connected to the electrical system.

From ser. No. 10-170 on and all ser. No.'s with electrically operated landing gear: The selector switch is installed in the console below the front instrument panel.

up= battery in baggage compartment

intern
battery
fin

down= battery in the fin

4.5.12.3 Resetting the emergency extension system for normal operation

After an emergency extension the system must be reset for normal operation. To accomplish this you must pull one of the 2 emergency extension handles and simultaneously switch the toggle switch down. The centre (red) and the lower green LED will shine.

Switch and handle must be operated until the centre LED stops shining and only the lower green LED continues shining. The spindle drive will then stop operating, then let go handle and switch

Thereafter you may retract the landing gear again according to section 4.5.12.1.

4.5.12.4 Part extension and retraction for inspection and servicing

The retraction may be stopped by switching the toggle switch down,

The extension may be stopped by switching the toggle switch up and pressing simultaneously the press button.

Only the red LED will shine.

For any service work switch off the main switch!

With the procedures described in section 4.5.12.1 you may retract or extend the landing gear again.

4.5.12.5 Precautionary measures against retracting the landing gear while on the ground

If the glider is resting on the main landing gear the landing gear should not be retracted, as retraction will result in damage of the landing gear. To minimise the risk of such operating error the following safety features have been incorporated:

1. If the toggle switch is switched up, nothing will happen.
2. If the toggle switch is switched up and the press button is pressed 1 time a warning tone will sound, otherwise, nothing will happen.
3. The landing gear will be retracted only if one of the following procedures will be used:
 - a) Hold the toggle switch switched up and press the press button 2 times within 2 seconds.
 - b) Hold the press button pressed and switch up the toggle switch 2 times within 2 seconds.

Caution: If you leave the DG-1000 unattended switch off the main switch to prevent any operating error.

7.12 Electrical system

Subsection amended

Electrical system with electrically operated landing gear

Wiring see wiring plans 10E3 and 10E4 enclosed to the maintenance manual.

Batteries: To operate the electrically operated landing gear a battery Z01/2 must be installed in the baggage compartment. This battery must be equipped with a fuse G 250V 5x20 / 16A MT (medium slow).

The battery in the fin Z110 (with fuse 4A) supplies power only to the instruments. The instruments may be switched by a selector switch in the front instrument panel to the battery in the baggage compartment.

Fuses and circuit breakers:

The electrically operated landing gear is protected by an automatically reset fuse in the landing gear control unit.

The wiring between battery and control unit is protected by the fuse at the battery.

The instruments are protected by a 4 A circuit breaker in the console below the front instrument panel.

Landing gear warning:

A landing gear warning device is integrated into the system. Warning is by a buzzer.