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12	$0.2 \div 0.9, 0.9a, 0.10 \div 0.12,$	Manual revision TN1000/18	February
	1.2, 1.5, 1.11, 1.14, 1.15,		2011
	$1.27 \div 1.29, 1.33, 2.1,$		
	$2.4 \div 2.6, 3.3, 4.8, 5.1, 6.1,$		
	6.2, 6.4, 8.3, 9.2, diagr. 1,		
	9, 11, encl. 4 pages 1, 2, 2a,		
	3, Z193, SI 67-07, remove		
	5EP50		
13	0.6, diagrams 8 and 9	Wheel brake TN1000/21	July 2011
14	$0.2 \div 0.7, 0.10 \div 0.12, 1.3,$	Manual revision TN 1000/24,	October
	1.5, 1.11, 1.16, 1.29, 1.30,	New type 12V sockets and	2014
	2.1, 2.6, 3.1, 4.6, 4.10,	plugs,	
	4.12, 4.13, 4.19, 4.20, 6.1,	Changes due to TN 4603-14 of	
	7.1, 8.2, 8.3,	the Solo company (Exchange	
	diagrams: 2, 3, 9,	of the axle of the upper drive	
	Enclosure 4 pages: 4, 7	belt pulley on pages 4.19 and	
		4.20)	
15	0.2, 0.3 - 0.6, 0.9a, 0.11,	Propeller adapter ring with	August
	1.18, 3.5, 3.8, 4.20, 4.20a,	elastomeric damper	2015
	4.26, 4.28, 8.1 - 8.3	TN 1000/26	
	diagram 13, diagram 15,	Alternative mechanical fuel	
	diagram 15a	pump TN 1000/28	

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	0.1	see manual	amendments		
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	0.9	11	Febr. 2011		
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## 0.4 Airworthiness limitations

## 0.4.1 Repairs

Repair or replace damaged parts prior to next flight. Follow the instructions of the DG-1000 repair manual for repairs of the airframe. Repairs outside the scope of DG-1000 repair manual and major repairs must be accomplished at a certified repair station or by a certified mechanic rated for composite aircraft structure work in accordance with DG repair methods.

Use only genuine spare parts.

For all aircraft under EASA regulations the following applies: According to part 21, subpart M to accomplish major repairs an approved repair instruction is required, see also TN DG-G-01 "Approved repair methods according to EU Commission Regulation 1702/2003 part 21, subpart M"

### 0.4.2 Life time of the airframe

The maximum allowable operating time for German composite sailplanes and motor gliders was proofed for 12000 flight hours. The initial life time for the DG-1000T is 3000 flight hours and may be increased by inspections according to section 2.4 of this manual to 6000 h, 9000 h, 10000 h, 11000 h and 12000 h.

### 0.4.3 Life time of components

- a) The **gasket for the drainer valve** has to be exchanged after 6 years, part no. 60504402.
- b) The **spark plugs** have to be exchanged after 25 engine hours, part no.40050360.
- c) The **fabric straps of the safety harness** have to be exchanged according to the instructions of the respective manufacturer. If no limitations are given, exchange after 12 years, approved types see section 6.
- d) The **rubber cord** in the elevator control system see section 1.2.6 has to be replaced at least every 6 years, part no. 30091131.
- e) The **brake fluid of the wheel brake** has to be exchanged after 4 years (types see section 1.6.4).
- f) The adapter ring with elastic damping element 10M067 for the propeller (introduced with TN1000/26) has to be exchanged after 50 engine hours or 5 years, whichever comes first.
- g) The eccentric axle of the reduction gear (propeller axle) Solo part no. 2031211-V2 has to be replaced after 50 engine hours

#### h) Other components:

All other components like tow hook, wheels, gas struts, control system parts, bolts, pins etc. have no life time limitation, but should be replaced when worn, damaged or disqualified by excessive corrosion.

## **1.12 Power Plant**

#### 1.12.1 Arrangement:

see diagram 13.

You will find a part list with the designations and the reference numbers for the powerplant parts at the end of this manual.

#### 1.12.2 Engine:

The engine is a SOLO 2350C with single magneto ignition and air cooling. For further engine specifications refer to the engine manual, see sect. 0.4 of this manual.

Caution: If you don't operate the engine for periods longer than 2 months you must preserve your engine according to the instructions in the engine manual. The same applies for any overseas transportation.

#### **1.12.3 Exhaust Muffler:**

The muffler has been specially designed by the Solo company and is attached directly to the cylinders without a manifold.

#### 1.12.4 Propeller:

Type: DG-P001-1

Attachment bolts: - six bolts with holes for lock wire securing in bolt heads (made from M8 x 70 DIN931 - 8.8 zn) with washers 8,4 DIN9021 St zn. Tightening torque of the bolts -20 Nm (15 ft lb) applied at the bolt head. For lock wire securing refer to section 4.10.2.

An adapter ring with elastomeric damper element 10M67 is installed between propeller and upper drive belt pulley to reduce the vibration stress on the propeller axle.

#### **1.12.5** Drive belt reduction gear:

Reduction ratio: 1:2.3

2 pieces Poly-V drive belt, type see section 8.1.

Checking the drive belt tension: Press with 120 N (26 lbs.) simultaneously on both belts vertically to the belts in the middle of the free length between the pulleys and measure how far you can displace the belts. The displacement shall be 5 mm (0.2 in.)

Tensioning adjustment can be made by turning the eccentric axle (propeller axle), see sect. 4.10.1.

#### **3.6** Servicing the Engine

**Caution:** If you don't operate the engine for periods longer than 2 months you must preserve your engine according to the instructions in the engine manual. The same applies for any overseas transportation.

#### 3.6.1 25 hour inspection

**Note:** The engine time until the next maintenance is displayed on the DEI-NT operating time screen. After completion of the 25 hour inspection reset this time to zero, see section 4.11.2.1.

The following checks and maintenance work should be done every 25 hours engine time.

Items 1, 7, 8, 9, 10, 23 and 24 should be executed at least 1 year after the last 25 hour inspection, preferably with the annual inspection.

Checklists for this maintenance work are in the enclosures of this manual. Please complete the checklist when executing the inspection and file it in the aircraft log.

- 1. General visual inspection.
- 2. Change spark plugs. Check if the spark plug connectors have a tight fit on the spark plugs after you have exchanged the spark plugs. If not, the connector must be replaced.

Secure the spark plug connector again with Ty-raps.

- 3. Exchange the fuel filter. Filter types see sect. 8..
- 4. Measure fuel flow (see sect. 1.14.5). Disconnect the fuel supply line at the distributor near the carburettor. Hold the line into a measuring container. Switch on the electric fuel pump with the ignition switch. Determine the time for supplying 1 litre of fuel. For the measurement a minimum of 101 of fuel should be in the fuselage tank. Note down the value, max. time is 120 seconds for 1 litre.

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- 21. Check the engine retaining cables for wear and kinks. Check thimbles and bushes of the upper cable connection for wear. Check the adjustment of the retaining cable according to sect. 1.13.3. If necessary adjust the cables at the adjustment screws in the rear end of the engine bay.
- 22. Check the main bearings of the upper pulley for any free play.
- 23. Check the adapter ring with elastomeric damper element 10M67 for any wear as for example abrasion. Pull at one propeller blade to see if the adapter deflects.
- 24. Check the tension of the propeller bolts: remove the lockwire, loosen the propeller bolts and retorque them with a torque wrench, torque value see sect. 1.12.4. Secure again with lockwire according to section 4.10.2.
- 25. Check the propeller blades for any damage.
- 26. Check all electric cables and connectors. Check the terminals especially of the starter positive wire and the earthing strap between engine and engine mount for cracks.
  Note: The oritigal engine mount he concerned her best shrink terhing.

Note: The critical spots may be covered by heat shrink tubing.

27. Check the whole electrical system wiring, ensure all equipment is secure and all connections are OK. Check proper functioning of all systems and fuses/circuit breakers.

#### Ground test run:

Warning: Never run the engine without the wings assembled.

- 28. If needed adjust the idle RPM (see sect. 1.14.9).
- 29. Check max. engine RPM 6300 RPM minimum with cold engine.
- 30. Check the CHT indication.
- 31. With engine running at full power switch off the main switch for 30 seconds to switch off the electric fuel pump. The engine must run with the fuel supplied by the mechanical pump and you should hear no drop of RPM.

After completion of the 25 hour inspection reset the time until the next maintenance to zero in the DEI-NT set up menu, see section 4.11.2.1.

- 6. If you find any seizing marks inside of the aluminium clamp remove them with fine abrasive paper.
- 7. Prior to reinstallation apply a thin film of oil to the axis.
- 8. Reassembly is the reverse of removal.

**Caution:** Removal of the pulley from the axis and reassembly must be performed by the Solo company.

**Caution:** Run the engine for approx. 30 minutes after exchanging the belts, then measure the drive belt tension again and adjust if necessary.

## 4.10.2 Mounting the propeller

The adapter ring with elastic damper element 10M67 is mounted to the upper drive belt pulley using the stud bolts in the adapter. Apply 8,4mm Schnorr lock washers and Thermag M8 nuts using a 12mm spanner. Tightening torque of the propeller adapter nuts is 20 Nm (15 ft lb). Use new self-locking nuts each time when assembling the propeller adapter. Tightening torque of the propeller bolts is 20 Nm (15 ft lb) applied at the bolt heads. Tighten the bolts crosswise (torque wrench with 13mm socket and 13mm open end spanner).

Secure the propeller bolts as follows:

Use lockwire with min. 0.8 mm (0.03 in.) diameter.

- a) Slide the wire through the hole in the bolthead and bend it around the head. The wire should run tangential to the bolthead so that it secures the bolt clockwise to tighten it. Direct the end of the wire which was laid around the head underneath the wire which runs through the hole.
- b) Twist both ends of the wire clockwise up to the other bolthead. Slide the upper wire through the hole in the bolthead and bend the other wire around the head. Twist with max. 8 rotations per inch.
- c) Direct the end of the wire which was laid around the head underneath the wire which runs through the hole. Twist the ends anticlockwise min. 3 max.
   8 rotation. Cut off the surplus and bend the end to prevent injuries.



## **Caution:**

Don't damage the lock wire. Also minor scratches or removal of the galvanisation have to be considered as damage.

### 4.10.3 Removal and installation of the fuel tank

- Drain the fuselage tank using the built-in electrical fuel pump. To accomplish this disconnect the fuel supply line at the distributor near the carburettor and stick it into an appropriate can. Switch on the ignition and wait until the tank is drained.
- 2. Remove the rear baggage compartment wall.
- 3. Remove the vent-line (Nylon tube 6x1) from the tank.
- 4. Remove the supply line, excess fuel line and the Drainer line from the tank.
- 5. Remove the 2 bolts fastening the tank to the bulkhead.
- 6. Pull out the tank to the front.
- 7. Disconnect the electrical wiring for the fuel gauge and fuel sensor.
- 8. If the glider is to be operated without the fuel tank, the fuel lines must be sealed with clevis pins or by similar means. Fix the lines with ty-raps so that they can't interfere with any control system parts.

Installation is the reverse of removal. Check after installation that all fuel line connections are tight and if the fuel gauge works properly.

4.10.6.2 Removal of the engine from the engine mount

Necessary tools:Socket wrenches:9 7, 10, 13 mmOpen end spanner10, 12, 13 mmAllen key wrenches:3, 4, 5 mm1 wire cutter11 sharp knife11 roll insulating tape

- 1. Extend the powerplant via the manual extension switch, don't tighten the retaining cables. Switch off the master switch.
- 2. Remove the propeller adapter ring nuts (12mm open end spanner). Remove propeller with the adapter 10M67 still assembled.
- 3. Remove the engine retaining cables from the powerplant, to accomplish this remove the mounting bolt from the engine with 13mm spanners. Let the cables retract slowly into the fuselage.
- 4. Disassemble the starter motor wires from the starter motor, insulate the terminals with tape. Remove Ty-raps and pipe clamps which fix the wiring harness to the engine. Disconnect the connectors of the ignition coils, the CHT probe and the proximity switch.
- 5. Disassemble the fuel lines from the carburettors. Disassemble the fuel line from the primer from the T-fitting between the carburettors. Remove the fuel distributor from the rear carburettor. Install the carburettor mounting bolt again after removal of the distributor and retorque with 23 Nm (17 ft.lb.). Disassemble the vacuum line from the mechanical fuel pump.
- 6. Disconnect the throttle cables from the carburettor levers. Measure and note how far the Bowden cable terminals are screwed into the carburettor intake flanges. When reassembling the adjustment must be exactly the same, otherwise the carburettors won't be synchronized correctly.
- 7. Unscrew the upper and lower rubber mounts from the engine mount (13mm spanner), take of the earthing strap.
- 8. Lift off the engine from the engine mount.

- 4.10.6.4 Reinstallation of the powerplant
- 1. Reverse the procedures for removal mentioned above. Refer to sections 4.10.6.1 and 4.10.6.3.
- 2. Use only new selflocking nuts for reinstallation.
- 3. Use Loctite 243 to secure all threads and screws without selflocking nuts.
- 4. Torque values

Cylinder head nuts M6	12 N m (9 ft lb)
Cylinder head nuts M8	20 N m (15 ft lb)
CHT probe	20 N m (15 ft lb)
spark plugs	20 N m (15 ft lb)
propeller (at bolt head)	20 N m (15 ft lb)
Screwed connections at engine,	
carburettors and muffler M8	23 Nm (17 ft lb)
Screwed connections at engine M6	10 Nm (7.4 ft lb)

- 5. Regard section 4.10.2 when reinstalling the propeller.
- 6. Torque the upper engine rubber mounts so that they are compressed to a value of 25 mm (1.06 in.) see sketch:



- 7. Check the adjustment of the proximity switch according to sect. 1.15.4 and correct if necessary.
- 8. Retract and extend the powerplant via the ignition switch and check the adjustment of the retaining cables according to section 1.13.3 and adjust if necessary.
- 9. Remove the air-intake filters to check the synchronisation of the carburettors. Look into the intake with different throttle settings and check if the throttle valves are in the same position in both carburettors. If necessary adjust via the Bowden cable terminals at the carburettor intake flanges.

## 8 Partlist

In this list you will find only parts of the powerplant, the electrical system and control surface seals and turbulators.

Please find the part no's of the control-system parts and of the metal fittings of the powerplant in the following diagrams.

## 8.1 Parts for the powerplant

## a) necessary for the 25 hours inspection

60510806 Spark plugs Bosch W5AC electrode gap 0.5 mm (.02 in.) **Caution**: The removable cap must be secured with a little bit of Loctite 638 on the thread prior to installation

- 40050360 Spark plug S36 (Bosch W5AC electrode gap 0.5 mm (.02 in.)) with screw cap fastened to the thread by crimping, marked with a red dot of paint on the insulator
- 60507571 MANN-fuel filter 500009180 WK 31/2(10)
- 60500150 Gaskets for exhaust manifold (2 pieces needed)
- 60500142 Air intake filter
- 70002200 Oil for air filters with cotton fabric K&N 99-05046

### b) Spare parts

- 45002085 Spark plug connector PVL, 5kOhm, SOLO Nr. 2300701
- 60510601 Ignition coil Prüfrex MTZ 120/1 or compatible
- 60500131 Starter motor: S.J.C.E. Typ 101, 12 Volt, 0,4 kW
- 60510829 Poly-V belt 4PK755 (4 ribs, profile PK) length: 755 mm
- 39001031 Exchange kit nuts and bolts for 200 h overhaul
- 45002081 Gasket for muffler (2 pieces necessary)
- 60000209 Gas strut for ext.-retr. drive G10 23 0300 1 0676 AU19 GZ10 01000N
- 60000154 Gas strut for propeller-stopper G06 15 0070 0 0222 AG27 GZ07 00080N
- 60000742 Rubber-buffer D4045 for propeller-stopper and landing-gear overcentre lock
- 60502240 Spindle-drive HG 7000-12-300-30
- 41070460 CHT probe
- 60500163 Seal gasket (for CHT probe)
- 60001115 Clamps XO for 6mm bungee (bungee for retaining cable)
- 41070672 Propeller adapter ring with elastomeric damper element 10M67

## Rubber mounts for engine suspension:

- 45002079 Upper engine mount (4 pieces necessary)
- 45002080 Lower engine mount rubber buffer (2 pieces necessary)

#### 8.2 Parts for fuel system

- 60507550 Drainer CAV 110 (1/8" NPT)
- **Warning:** Replace the seal ring of the drainer against part no. 60504402 prior to installation
- 60504402 Seal ring for drainer CAV 110 (for automotive fuel)
- 60507560 Electric fuel pump Facet 40105
- 60507558 Refuelling pump KAVAN 12 V up to ser. no. T28
- 60507562 Refuelling pump Facet 60106 from ser. no. T29 on
- 60500164 Mechanical fuel pump Bing 8080 (no more available)
- 60500257 Mechanical fuel pump Mikuni DF44-18 from ser. no. T57 on and as spare part (for installation follow TN1000/28)
- 60507571 MANN-fuel- filter 500009180 WK 31/2(10) for refuelling pump
- 41070521 Fuel distributor 10M52/1 with filter for primer valve and restriction for excess fuel line
- 60000527 Fuel cock KH 1072 T
- 60507609 Coupling for fuel filler hose KL-006-0 WR513
- 60503070 Primer-valve IWP069
- 45001576 Full tank sensor ready assembled with wiring and plug
- 60000103 Fuel hose PU hydrolyse and microbe-resistant 6x1,5x9 mm
- 60000102 Fuel hose PU hydrolyse and microbe-resistant 8x2x12 mm

#### 8.3 Parts for the electrical system

- 60510898 Battery 12V 17Ah
- 41076000 DEI-NT-DG1000T
- 41076020 DEI-NT-DG1000T second unit (rear cockpit)
- 41076010 Control unit-NT 10E601
- 60510815 Limit switch 164-025 05 for positions engine extended and for stopping the engine
- 60510463 Limit switch for propeller-stopper 164-564
- 60510464 Limit-switch engine retracted and engine extended 164-574, alternatively SI2010-B2T20YR30,5m
- 60510484 Manual extension-retraction switch MTG 206 S
- 60510854 Key switch 3 Pos, 2 Pol KL09-1908KA (Master switch)
- 60510362 Switch STA 106 E (selector intern-extern)
- 60510372 Press-button DJET 07.17502.21 for starter
- 60510375 Press-button 12G2904 for refuelling pump
- 60510385 Circuit breaker ETA 2A
- 60510386 Circuit breaker ETA 3A
- 60510437 Fuse 80 A for main battery
- 60510434 Fuse socket for main battery fuse 80 A
- 60510550 Proximity switch Insor INCT 1212
- 41075000 Proximity switch 10E107 ready assembled with wiring and plug
- 10002317 Preh plug for 12V sockets

#### From ser. No. 10-120 on:

- 60510796 Socket BSB12 (in main bulkhead)
- 60510797 Plug BSK12 (for socket BSB12)

#### From ser. No. 10-202 on:

- 60510880 Socket XLR 3-pole NC3FD-LX-BAG (in main bulkhead)
- 60510881 Plug XLR 3-pole NC3MX-BAG (for socket XLR)

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## **Fuel system**

# diagram 15



All dimensions in mm, 25.4 mm= 1 in. Change Detail A

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## Fuel system with automatic fuel cock



All dimensions in mm, 25.4 mm= 1 in.

Change Detail A

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