

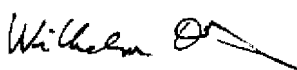
## Maintenance Manual DG-1000M

### Recommendations to order spare parts

Please try to determine the exact designations of the spare parts for your order using the maintenance manual. This is to guarantee a fast and correct delivery of the parts.

The designations are to be found in the sections system description, instructions for assembly and servicing work, in the partlist in section 8 and especially in the diagrams of the maintenance manual.

Yours sincerely  
DG FLUGZEUGBAU GMBH

  
Dipl.- Ing. W. Dirks

# Maintenance Manual DG-1000M

## 0 General

### 0.1 Manual amendments

No.	Page	Description	Date
1	0.0, 0.1, 0.3 ÷ 0.7, 0.9, 0.12 ÷ 0.14, 1.2, 1.5, 1.8 ÷ 1.12, 1.20, 1.24, 1.31, 1.33, 1.34, 2.1 ÷ 2.4, 2.6, 3.1 ÷ 3.7, 4.6 ÷ 4.8, 4.11, 4.12, 4.19 ÷ 4.24, 4.26, 4.27, 4.29, 4.30, 6.1, 6.4, 7.2, 8.1 ÷ 8.4, diagrams 2, 3, 7, 15, 16, 23, add drawing W59, 10E202 issue C (only with coolant pump Pierburg)	Manual revision Alternative for coolant pump TN1000/22	October 2012

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### 0.2 List of effective pages

Section	page	issued	replaced	replaced	replaced
0	0.0	October 2010			
	0.1	"	See list of amendments		
	0.2	"	See list of amendments		
	0.3	"	See list of amendments		
	0.4	"	See list of amendments		
	0.5	"	See list of amendments		
	0.6	"	See list of amendments		
	0.7	"	See list of amendments		
	0.8	"			
	0.9	"	October 2012		
	0.10	"			
	0.11	"			
	0.12	"	October 2012		
	0.13	"	October 2012		
	0.14	"	October 2012		
	1.1	October 2010			
	1.2	"	October 2012		
	1.3	"			
	1.4	"			
	1.5	"	October 2012		
	1.6	"			
	1.7	"			
	1.8	"	October 2012		
	1.9	"	October 2012		
	1.10.	"	October 2012		
	1.11	"	October 2012		
	1.12	"	October 2012		
	1.13	"			
	1.14	"			
	1.15	"			
	1.16	"			
	1.17	"			
	1.18	"			
	1.19	"			
	1.20	"	October 2012		
	1.21	"			
	1.22	"			
	1.23	"			

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	1.25	"			
	1.26	"			
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	4.34	"			
5	5.1	October 2010			
	5.2	"			
6	6.1	October 010	October 2012		
	6.2	"	October 2012		
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	8.3	"	October 2012		
	8.4	"	October 2012		
9	9.1	October 2010			
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<b>Diagram</b>		<b>issued</b>	<b>replaced</b>	<b>replaced</b>	<b>replaced</b>
1	October 10				
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10E4	Wiring plan electrically operated main landing gear	28.09.10		
10E202	Wiring plan DINA1 (in aircraft log)	29.07.10	28.09.12 issue C With coolant pump Pierburg	
5V18	Tool for airbrake adjustment	14.10.94		
W51	Hook spanner for upper drive belt pulley bearings	20.11.96		
W59	Test adapter	18.06.02		
W66	Tool to check drive belt tension	17.09.10		
Z181	Installation of aerial for transponder in vertical fin DG-1000	18.04.08		
Z193	406 MHZ ELT antenna BD3 installation 2-seaters	4.11.09		
SI 67/07	Service Info Ballast box in the fin / foam rubber rings	5.11.2007		

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- W51 Hook spanner for upper drive belt pulley bearings
- W59 Test adapter (for coolant pump check)
- W66 Tool to check drive belt tension
- Z181 Installation of aerial for transponder in vertical fin DG-1000
- Z193 406 MHZ ELT antenna BD3 installation 2-seaters
- SI 67/07 Service Info Ballast box in the fin, foam rings

## 0.4 Airworthiness limitations

### 0.4.1 Repairs

Repair damaged airframe parts prior to next flight. Follow the instructions of the DG-1000 repair manual. Repairs outside the scope of the DG-1000 repair manual and major repairs must be accomplished at an approved repair station or by an approved 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 the variant DG-1000M is 12000 flight hours. Therefore inspections according to section 2.4 of this manual have to be executed at 3000 h, 6000 h, 9000 h and every 1000 hours following thereafter.

### 0.4.3 Life time of equipment and components

For part. No.'s of all parts of the powerplant please refer to section 8.

- a) The following components of the power plant have to be replaced after 400 engine hours.
  1. All nuts and bolts on the engine
  2. The bearings in the upper drive belt pulley
- b) The **gasket for the drainer valve** has to be exchanged after 6 years.
- c) The **full tank sensor** has to be exchanged after 6 years.
- d) The **coolant hoses and the coolant** have to be exchanged after 6 years.
- e) All **flexible fuel lines** have to be exchanged after 6 years.
- f) The **drive belts** have to be exchanged after 100 engine hours.
- g) The **spark plugs** have to be exchanged after 100 engine hours.
- h) 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.
- i) The **rubber cord** in the elevator control system see section 1.2.6 has to be replaced at least every 6 years.
- j) The brake fluid of the wheel brake has to be exchanged after 4 years.
- k) **Other components**

All other components like propeller, 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.

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### 0.4.4 Service time, maintenance documents of equipment and components

Follow the instructions of the respective manufacturer.

a) Tow release:

Operating Manual for Safety Tow Releases Series: Europa G 88 Safety Tow Release, latest approved version.

Operating Manual for Tow Releases Series: E 85 Nose Tow Release, latest approved version.

b) Safety harness: instructions of the manufacturer, latest approved version.

c) Minimum instrumentation: instructions of the manufacturer

d) Engine: Manual for the engine SOLO Type 2625 02 I, latest approved version.

e) Propeller: Operation- and Maintenance manual for fixed pitch propeller in Glas or Carbon reinforced Plastic type BM, latest approved version.

#### ***Only for USA***

***Note:*** *The Airworthiness Limitations section is FAA approved and specifies maintenance required under Secs. 43.16 and 91.403 of the Federal Aviation Regulation unless an alternative program has been FAA approved.*

## 1.2 Elevator control and trim system

### 1.2.1 Control system

see diagram 1

### 1.2.2 Elevator deflections and tolerances

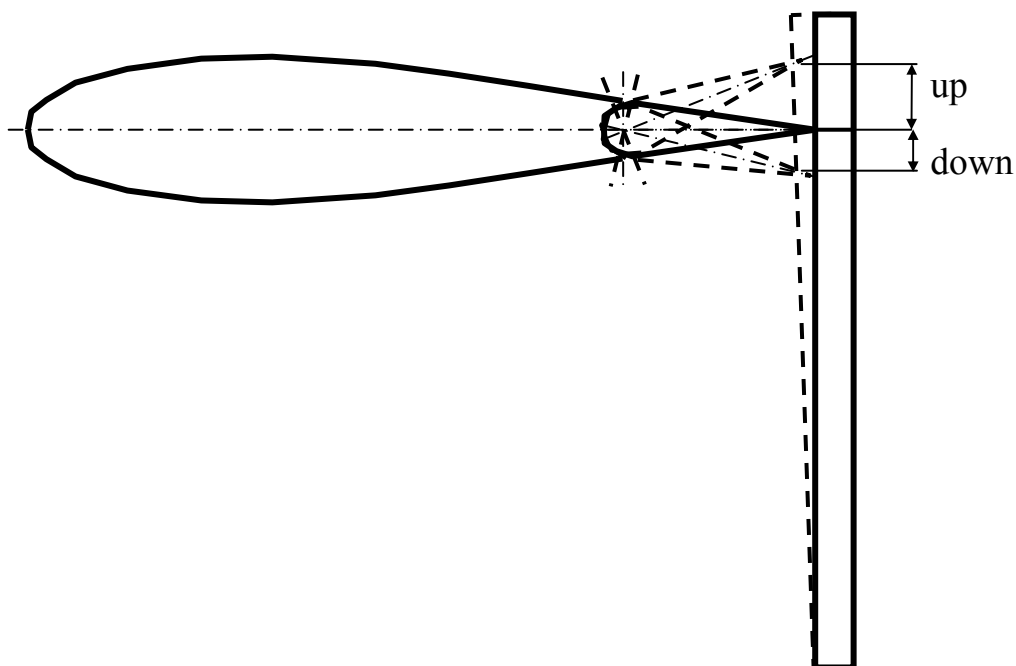
up:  $27^\circ$  77 up to 79 mm (3.03 up to 3.11 in.)

down:  $21^\circ$  61 up to 63 mm (2.40 up to 2.48 in.)

measured at 168 mm (6.61 in.) from hinge axis which is directly at the edge of the cut out for the rudder

Measurement:

- Hold a measuring stick with one end on the floor, the stick must be vertical when touching the elevator trailing edge.
- Set the elevator to zero by using a pattern. A drawing for the zero-pattern is available from DG Flugzeugbau.
- Mark the 0-point on the stick.
- Then measure the up and down deflections according to the sketch.



## 1.3 Rudder control

see diagram 2

### 1.3.1 Rudder deflections and tolerances

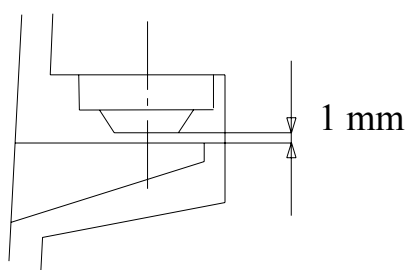
28 up to 29° which is 160 mm up to 165 mm (6.3 up to 6.5 in.) to both sides measured at 330 mm (13 in.) behind the hinge axis (lower rear end of the rudder).

### 1.3.2 Rudder stops

The rudder stops are located at the lower hinge of the rudder.

### 1.3.3 Axial space and free play

The maximum allowable space including free play at the upper hinge point is 1 mm (0.04 inch).



### 1.3.4 Sealing the rudder

The rudder is sealed on both sides. On the outside Mylar seals and inside the fin with V sealing tapes.

These seals are not to be removed.

If damaged replace the seals according to section 4.7.4.

### 1.3.5 Retaining spring for the pedal adjustment handle

A rubber cord with 2 mm (0.08 in.) diameter which pulls the pedal adjustment cable tight is installed in the console below the instrument panel. If this rubber cord is defective the handle of the pedal adjustment cable won't be pulled to the front so that it may hook into the trim release lever at the control stick with pedals in a rear position.

## 1.5 Airbrake control, wheelbrake

### 1.5.1 Control circuit

see diagrams 3 and 4

The wheelbrake is connected to the airbrake torsion shaft (part 10St105).

### 1.5.2 Adjustment

- a) **Airbrake overcentre locking force:** Adjustment according to section 4.4. The adjustment must be inspected once a year.
- b) **Airbrake extension height:** The height the airbrakes extend depends on the wheelbrake adjustment see c).
- c) **Wheel brake:** The wheelbrake can be adjusted at the adjustment screws between torsion shaft 10St105 and the master cylinder (at the landing gear box).

The adjustment should be made so that with wheel brake engaged, the airbrake levers 10F20 are vertical to the wing surface.

If with this adjustment the braking effect is insufficient you have to bleed the brake system see 4.6.

### 1.5.3 Airbrake stops

The airbrake control extension stop is located in front of the main bulkhead. The stop, in locked direction, is located at the wing rootribs. The corresponding stop at the guide rod 5St68/1 in the cockpit should be placed to allow a free play of 0-3 mm (0-.12 in.) between the airbrake handle and the stop at the guide rod with the airbrakes locked over centre.

Adjustment can be made by adjusting the rod end between pushrod 10St71 and the airbrake torsion shaft 10St105.

### 1.5.4 Free play

Free play in the airbrake control system has no effect.

The airbrakes themselves at their hinges should not have so much free play that the bolt heads at the airbrake plates hit the wing surface instead of entering into the airbrake boxes during retraction under airloads.

## 1.6 Undercarriage

### 1.6.1 Electrically operated main landing gear

#### 1.6.1.1 Landing gear control circuit

See diagrams 7, 8 (in LG box) and 9

In the normal operating mode the landing gear will be retracted and extended by an electrical spindle drive.

A control unit which is installed in the rear instrument tower controls all electrical functions and the control lights.

A landing gear warning device is integrated into the system.

The landing gear will be locked in the extended position by over centre locking of the drag struts and held in this position by the spindle drive.

The landing gear will be locked in the retracted position by 2 bolts at the drag struts which engage into 2 latches at shaft 10FW102.

Unlocking is actuated by a cam mounted to the spindle drive, which rotates the shaft 10FW109 via a bell crank and a push rod to release the bolts (see diagrams 7 and 9).

**Emergency operation:** The landing gear may be extended manually. The handles are located at the left hand fuselage wall, one in each cockpit (at the positions of the handles for the manually operated landing gears). Pulling on one of the 2 emergency extension handles will open the valve of a lockable gas strut. The gas strut will push the spindle drive forward on a linear guide to extend and lock the landing gear.

#### 1.6.1.2 Adjustment / limit switches

With the electrically operated landing gear only the limit switches have to be adjusted

##### a) Limit switch landing gear extended

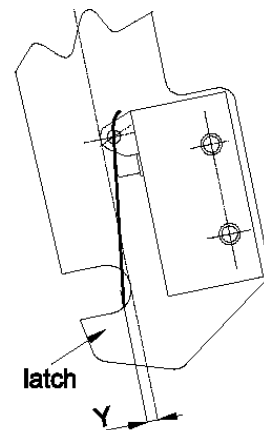
1. Extend the landing gear electrically and check if the stops at the drag struts 10FW255 touch the struts of the rear fork 10FW254.
2. Apply a force of 100 N (2 lbs.) to the hinge point perpendicular to the centre line of the struts in an upward direction. The system should be so stiff that you can't move the hinge point out of line (stops still touch the struts).
3. If item 2 is not fulfilled, the limit switch must be adjusted. To accomplish this you have to bend the arm of the switch accordingly. The limit switch is mounted on the landing gear box and is activated by the lever 10FW108.

- Retract the landing gear a small amount, extend again and check if the lower green control light starts shining. If not, the arm was bent too far.
- If the adjustment is correct, retract the landing gear and extend via the emergency system. Check if the lower green control light starts shining. If not, the arm was bent too far. After adjustment repeat the check according to item 2.

### b) Limit switch landing gear retracted

The spindle drive must be shut off in the retracted position when the bolt at the left drag strut 10FW102 engages in the notch of the left latch on shaft 10FW109 and activates the limit switch which is mounted to the latch.

Check: Activate the limit switch. The distance Y shall be 2 - 3 mm (0.08 – 0.12 in.) when the switch is activated. If necessary adjust the switch by bending its arm.



### c) Limit switch gas strut (emergency extension system)

This switch (position 12 in diagram 9) is mounted to the upper end of the gas-strut at bracket 10FW120. When resetting the gas strut the spindle drive must be stopped by the limit switch when the distance X in diagram 21 detail E (from counter nut up to gas strut body) is 17 - 20 mm (0.67 – 0.8 in.). If necessary loosen the mounting screws and rotate the switch for adjustment.

### d) Switch emergency extension system (optional with TN1000/19, standard from ser.no. 10-157 on)

This switch (position 20 in diagram 9) activates higher current for the spindle drive via the LG control unit to reset the gas-strut as long as one of the emergency extension handles is pulled. The switch is mounted to a bracket 10FW143 which is mounted to the bracket 10FW120 see item c). The switch is activated by the deblocking lever in the upper gas-strut end. In case the spindle drive doesn't have enough power to reset the gas-strut check the function of the switch. To accomplish this disconnect the 2 wires from the switch. With one of the emergency extension handles pulled the resistance between these 2 terminals must be zero. If necessary adjust the switch by bending its arm.

### 1.6.1.3 Free play

Free play between bell crank 10FW108 and shaft 10FW91 is not allowed. If there is any free play tighten the two bolts M8x45 inside the landing gear box with a 13 mm open-end wrench. If there is still some free play, the bolts should be removed and the holes drilled out and reamed to diameter 10 H7. M10 x 45 LN9037 bolts should then be installed.



## 1.6.2 Hydraulic brake system

- a) Brake fluid approved specification DOT 3, DOT 4, SAEJ 1703.  
The brake fluid must be exchanged at least every 4 years.  
Exchange see section 4.6.
- b) Adjustment: see section 1.5.2c)  
If adjustment does not increase the braking effect as desired, the brake system is leaking or there is air in the brake system. Bleeding of the brake system see section 4.6.
- c) The brake linings must be replaced if they are worn down to a thickness of 1.5 mm (0.06 in.). Removal of the brake calliper see section 4.5B.  
Replacement set (2 linings, 6 rivets) Tost Nr. 075860.
- d) The brake disc must be replaced if it is worn down to a thickness of 4.3 mm (0.17 in.).

## 1.6.3 Tailwheel

Steerable tail wheel linked to the rudder via springs, see diagram 10.

## 1.6.4 Wheels, tyres and tyre pressures

### Main wheel

Tyre: 380 x 150 6 PR, diameter 380 mm (15 in.),  
Wheel: Tost 5" wheel with disc brake Penta 130-30  
Tyre pressure 3 bar (43 psi)

### Tail wheel

Tyre: 200 x 50 6 PR, diameter 200 mm (7,87in.)  
Wheel: Plastic hub with ball bearings part. No. S23  
Tyre pressure 4 bar (58 psi)

## 1.7 Tow hooks

### 1.7.1 Tow release circuit

see diagram 5

### 1.7.2 Adjustment

Check if both tow releases open fully.

Adjustment is done at the connection of pushrod 10R162 to bellcrank 10R161 in the rear cockpit. The adjustable seat shell and the cover 10RU170 must be removed to accomplish the adjustment..

### 1.7.3 Damages

The ring muzzle of the C.G. hook should not be bent or ground down and should move easily. If the muzzle is damaged, the tow release has to be exchanged and repaired by the manufacturer (Tost).

### 1.7.4 Removing the tow hooks

#### 1.7.4.1 C.G. tow hook:

Remove the cover (front side of rear seat).

Remove the mounting bolts and the actuating lever. Don't remove the bolt which carries the actuating lever.

Move the tow hook some mm in an upward direction (use a piece of hard wood and a hammer). Then pull it out in forward and upward direction.

#### 1.7.4.2 Nose tow hook:

Remove the control cable from lever 5R2/1.

Remove the tow hook with the fittings 5R3/2 and 3.

### 1.7.5 Rubber cords

To keep the actuating cables tight there is a rubber cord at both of the cables in the compartment below the foot of the rear instrument panel in front of the main battery.

Replace the rubber cords if worn.

For further information refer to the operating and maintenance instructions for the release mechanism, see section 0.4.4 a).

## 1.13 Retraction - extension mechanism

### 1.13.1 Layout:

see diagrams 25 and 26 and 15 (propeller stopper)

Type of parts see section 8.1.2.

The retraction-/extension mechanism (spindle drive) consists of a 12 V electrically driven sealed ball screw shaft with electromagnetic brake.

A tension gas-strut is installed parallel to the spindle drive to compensate the engine weight.

### 1.13.2 Extension force of the gas-strut

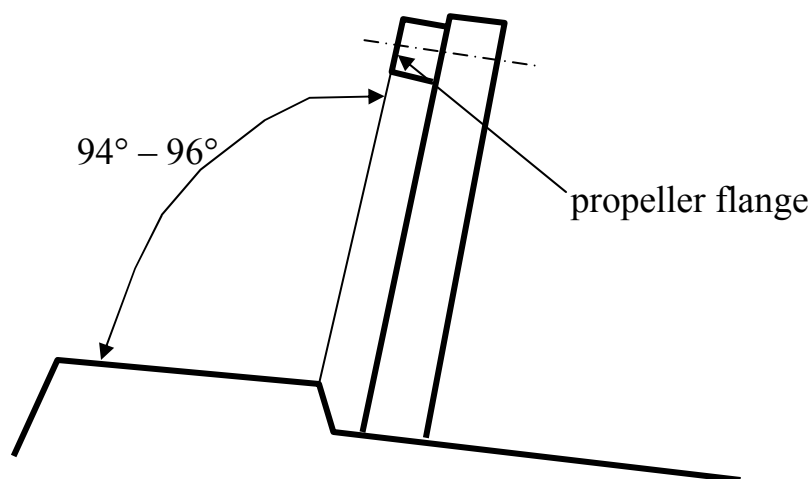
Time for extension approx. 8 seconds, time for retraction approx. 8 seconds. If the extension takes much longer than the retraction (3 seconds) then the gas-strut must be replaced. Measure at room temperature, with full batteries and via the ignition switch.

### 1.13.3 Adjusting the powerplant retaining cable

Extend the engine via the ignition switch until the extension is switched off by the position switch.

The powerplant shall be in the position shown on the sketch.

The retaining cable must be tensioned. If necessary adjust the limit switch (see section 1.13.5.1) and/or via the adjustment screw at the rear engine bay bulkhead, see diagram 18. Secure the adjustment screw by fastening its lock nut.



### 1.13.4 Position switches

Position engine retracted: via a switch actuated by the drive mount.

Position engine extended: via a switch actuated by the muffler frame

## 1.15 Electrical system

**Caution:** Before doing any work on the electrical system, isolate the power supply by switching off the main switch. The battery should also be disconnected before working at the control unit. This is done by disconnecting the fuse for the main battery (located in a recess in the floor behind the foot of the rear instrument console).

In addition the plugs from the wiring leading to control unit and DEI-NT must be sealed with tape when they are removed from the control unit or from the DEI-NT.

### 1.15.1 Layout

see wiring plan enclosed with this manual.

Type of parts see section 8.1.2.4.

### 1.15.2 Batteries

#### 1.15.2.1 Main battery

The installed battery is a sealed maintenance free battery 12V/17Ah with screwed terminals. The battery is installed in the lower part of the rear instrument console.

Recharging is via the 12 V sockets in the front and rear cockpit. Therefore switch on the main switch to the first position (charging). You don't need to remove the battery for charging.

#### 1.15.2.2 Additional batteries

Wiring with plugs BSK12 for additional batteries in baggage compartment and fin are standard equipment.

**Caution plugs BSK12:** The screws to fix the wires in the plugs must be tightened and secured with securing paint.

a) An additional battery Z73 12V/7Ah with holder Z72 or Z01 12V/10Ah with holder Z200 may be installed in the baggage compartment. In this case a battery selector switch must be installed in the front instrument panel.

b) A battery Z110 (12 V, min. 12 Ah, mass 5.5 kg, 12.1 lbs.) may be installed in the battery box in the fin.

The wiring for this battery is in parallel to the battery in the baggage compartment.

#### 1.15.2.3 All batteries

**Caution:** Use only automatic chargers suitable for sealed liquid acid batteries. To charge the batteries to their max. capacity a charger with a max. output voltage of 14.4 V is required (most chargers supply only 13.8 V). A suitable charger part No. Z 08 is supplied by DG Flugzeugbau.

**Note:** Don't charge longer than for 1 week.

## 1.15.15 Position switches for the powerplant

see sect. 1.13.4 and 1.13.5.

## 1.15.16 Proximity switch

The proximity switch at the engine receives the switching pulses by the steel pins located at the upper drive belt pulley, see diagram 19.

The proximity switch effects the following functions:

1. Activation of the retraction mechanism and indication in the DEI-NT
2. Pulses for the RPM measurement for drive belt slip indication and RPM indication for operation with the emergency system

The switch must be adjusted so that the propeller can't hit the fuselage cut out (left hand rear end) during retraction.

The switch range may be shifted by moving the switch in the elongated hole in the drive mount,

If the switch is moved (distance to the steel pins reduced) the range will be enlarged.

If the distance is too large, the RPM measurement won't work correctly.

For a new adjustment start with a distance of 1.0 mm (.04 in.).

Check if the switch activates by watching the DEI-NT display (main switch on). The propeller symbol must change from small to large.

It is absolutely essential to secure the switch with the 2 counter nuts, as damage to the switch will stop the RPM measurement and the retraction-extension control.

Secure the nuts with lockwire.

With a defective proximity switch the failure message "PropSensor" will be displayed on the DEI-NT.

## 1.15.17 External power supply socket (Option)

An external power supply socket to assist the gliders electrical system during engine start may be installed in the console of the rear instrument panel.

Suitable jump start cable: part no. Z69

## 1.15.18 Refuelling pump system

Start the pump by pressing the push button located in the fuselage main-bulkhead (behind the pilots left shoulder). As soon as the fuselage tank is full the control unit-NT automatically switches off the pump. If you want to interrupt or to stop the filling procedure before the tank is full press the push button again. Starting the pumping again is only possible by pressing the push button again.

### 1.15.20.2 Second unit in rear cockpit

The second unit has no control functions except for the ignition switch. It receives all data from the main unit, the ECU and the control unit-NT via CAN-bus.

### 1.15.21 Coolant pump

The coolant pump receives electric power as long as the ignition is switched on. Types see section 8.1.2.2.

With the coolant pump type Pierburg installed a voltage converter is installed in the upper mid fuselage section on the rear main bulkhead  
Type see section 8.1.2.4.

The voltage converter supplies 18 V to the pump, necessary for sufficient cooling efficiency. The wiring plan 10E202 issue C or higher is applicable.

### 1.15.22 Electrical system of the electrically operated main landing gear

Wiring see wiring plan 10E4 enclosed to the MM.

Description of operation see AFM section 4.2.2 and 4.5.1.

In the normal operating mode the landing gear will be retracted and extended by an electrical spindle drive.

A control unit which is installed in the rear instrument tower controls all electrical functions and the control lights.

For extension or retraction you have to operate the toggle switch. In addition for retraction you must press the press button twice while holding the toggle (safety circuit), see AFM section 4.5.1).

The system is equipped with an over current cut off which stops the extension or retraction if high accelerations occur to protect the drive against damage. As soon as the g-loads decrease, the landing gear will continue to travel.

The limit switches are described in section 1.6.1.2.

#### **Fuses and circuit breakers:**

The electrically operated landing gear is protected by a resettable fuse 10 A in the landing gear control unit.

#### **Landing gear warning:**

A landing gear warning device is integrated into the system. Warning is by a buzzer (only installed p to ser. no. M4) and in addition via the DEI-NT see AFM section 7.4.5.2 item 9.

Switches:

1. A magnet at the airbrake control rod 5St69 activates a solenoid operated switch mounted at the fuselage wall in the front cockpit.
2. Limit switch landing gear extended.

#### **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 centre (red) LED will shine.

For any service work switch off the main switch!

With the normal procedures you may retract or extend the landing gear again.

## 2 Inspections

### 2.1 Daily inspection

see flight manual section 4.3

### 2.2 Regular inspections

#### A After 200 flight hours and during the annual inspection

Check the rudder cables for wear especially around the “S” tubes on the rudder pedals. Worn rudder cables should be replaced (see section 4.2).  
Check the seals of the rudder (see section 1.3.4).

#### B Annual inspection (and 100hr inspection – only for USA)

- Execute all items of the daily inspection (see flight manual section 4.3).
- Inspect all bolted connections and locking devices ie. locknuts, split pins etc.
- Check all metal parts for adequate greasing and rust prevention. (see section 3.3).
- Check the control surface deflections (see sections 1.2 up to 1.4).
- Check the free play in all control circuits (see section 1.2 up to 1.6)
- Check the fore and aft play of the wings (see section 1.11).
- Check the canopy emergency releases according to section 7.16 of the flight manual.
- Check the rubber cords in the control system (see sections 1.2.6, 1.3.6 and 1.7.5).
- Check the thickness of the wheel brake linings and of the brake disc (see section 1.6.2).
- Check if the brake fluid has to be exchanged (see section 1.6.2).
- Check the airbrakes according to section 4.4.
- Check the fin ballast box according to section 1.9.
- Check the canopy opening and canopy emergency release handles for enough friction (canopies removed from fuselage). A force of 15 – 20 N (3.3 up to 4.4 lbs.) should be required at the end of the handle. If the force is too low tighten the hinge bolt of the handles accordingly.
- Check if the powerplant has been serviced according to section 3.6.1.
- Check the torque of the propeller bolts (see section 3.6.1 item 23).
- **Tow hooks:** The operating and maintenance instructions for the release mechanisms, see sect. 0.4.4 of this maintenance manual have to be followed.
- **All-up weight and centre of gravity:** These should be checked at least every 4 years during the annual inspection.



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### **C Every 3 months**

Check the tension of the lines of the waterbag attachment (see section 4.1).

### **D Special inspections**

#### **C.G. tow hook:**

After a wheel-up landing, the C.G. tow hook is to be cleaned and to be carefully checked for any damage.

#### **Fuselage nose:**

After a landing where the fuselage nose has touched the ground, the nose tow hook is to be cleaned and to be checked for correct functioning.

Clean the hole of the PC port (necessary for the stall warning) located behind the fuselage nose on the lower surface.

**C.G. weighing:** After all work which may influence the C.G.

## 2.3 Inspections after a heavy landing

### **The whole aircraft:**

Check that the tailplane is still properly aligned in the vertical and horizontal axis. Check the wing oscillating frequency with respect to previous checks

### **Wings:**

#### **Spar ends:**

Check the wing pins and bushes for any deformation - are there any white areas around the bushes?

#### **Root ribs:**

Are there any cracks at the rib/wing skin joint or rib/spar joint? If so, remove any paint or filler to see if the crack continues into the structure. Any white areas around the bushes?

#### **Outer skins:**

Crushing, cracks, delaminations?

**Note:** Hairline cracks from the edges of the airbrake housing are harmless. Hairline cracks on the wing leading edge running along the span are harmless, if these don't enlarge when you press on the wing shells.

#### **Ailerons:**

Crushing, cracks, delaminations?

Hinge mounts checked? - Control circuit drives checked?

#### **Fuselage:**

##### **Fuselage wing connection:**

White areas, increased free play, bent lift pin tubes, damaged locking pins at the rear wing suspension, difficult assembly?

##### **Torsion check:**

Hold the fuselage fixed and from the top of the fin try to turn the fin around the fuselage. While applying this torsion are any cracks made visible? Does the fuselage shell show any uncommon deformations?

##### **Fuselage - fin intersection:**

Check for cracks. Remove gelcoat and any filler along the cracks. Apply pressure to the fin (push the fin towards the nose as well as applying torsion). Do the cracks penetrate the glass fibre structure?

Disassemble the rudder and check the glued connection of the fuselage end bulkhead and the fin trailing edge web.

To check the elevator control circuit and the bulkhead attachments in the fin area, the tailwheel and the cover plate in the wheel box should be removed.

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### **Tailplane attachment:**

Increased free play? Cracks in the fin top rib? Check if the aluminium parts of the tailplane attachment are bent or loose, check the tailplane locking device.

### **Rudder mounts:**

Increased free play? White areas in the glass fibre, bent rudder hinge pin supports?

### **Fuselage skin:**

Outside: cracks, nicks, folds? Any separation of the skin from the core?  
Inside: white spots, zig zag white lines, cracks? Has any bulkhead become loose?

### **C.G. tow release:**

Especially after a wheel up landing, check for dirt etc., check for proper functioning. Has the tow release housing become detached from the fuselage?

### **Seat back bulkhead:**

Cracks? Shoulder strap attachment points?

### **Belly harness attachment points:**

Check for cracking around the mountings in the seat. Check the safety harness assembly.

### **Controls:**

Check for proper functioning and condition of all controls and adjustment mechanisms (i.e. rudder pedal adjustment, tow release, air brake, control column and trim etc.).

### **Instruments:**

Proper functioning?

Dirt in the static ports, in the PC port (located behind the fuselage nose on the lower surface) or in the pitot probe?

### **Engine compartment:**

Check for damage of the walls. Does the engine retract without scratching the side walls? Do the engine doors fit as well as before?

Check the condition of the engine bay insulation.

## 2.4 Inspection procedure for increase of service time

### 1. General

The results of fatigue tests of wingspar sections have demonstrated that the service time of GFRP/CFRP gliders and motorgliders may be limited to 12000 hours, if for each individual glider (in addition to the obligatory annual inspections) the airworthiness is demonstrated according to a special multi-step inspection program particularly with regard to the service life.

### 2. Dates

When the glider has reached a service time of 3000 hours, an inspection must be done in accordance with the inspection program mentioned under point 3. If the results of this inspection are positive or if any defects found have been duly repaired, the service time of the glider is extended by another 3000 hours to a total of 6000 hours (first step).

The above inspection program must be repeated when the glider has reached a service time of 6000 hours. If the results of this inspection are positive or if any defects found have been duly repaired, the service time of the glider is extended to 9000 hours (second step).

When the glider has reached a service time of 9000 h the above inspection program must be repeated. If the results of the inspection are still positive, or if any defects found have been duly repaired, the service time may be extended to a total of 10000 hours (third step).

Proceed analogous when reaching 10000 and 11000 hours (4. + 5. step).

### 3. Ask the DG Flugzeugbau for the necessary inspection program.

When you request the inspection program, the following data should be submitted: Model/Type, Registration, Serial Number and the operating hours at which the inspection will be performed. A charge will be made for the inspection program.

### 4. The inspection must only be done by a licensed repair station or inspector.

### 5. The results of the inspections have to be recorded in an inspection test report wherein comments are required for each inspection instruction. If the inspections are done outside the DG Flugzeugbau facilities, a copy of the records must be sent to DG Flugzeugbau for evaluation and information.

## 3 Maintenance

### 3.1 General maintenance

See also flight manual section 8.

#### **Exterior surfaces of the fibre reinforced plastic parts**

The surfaces are coated by a UP-gelcoat or by PU paint (Option). This gelcoat is protected by a hard wax coating which has been applied during production with a rotating disc ("Schwabbel" procedure). Do not remove the wax, because this would lead to shading, swelling and cracking of the surface. In general, the wax coat is very resistant. As soon as the wax coat is damaged or worn, a new coat has to be applied. If you store your aircraft often outside, this may be necessary every half year!

**"Schwabbel" procedure:** The best method is with an electric power buffer as we do in the factory. Also an electric drill may be used. Speed approximately 2000 RPM. Two packages of special cloth discs (Schwabbelscheiben) have to be installed. A block of hard wax has to be pressed against the rotating discs. By doing so, the wax becomes hot and is taken up by the cloth. The hard wax and the cloth discs should be purchased from the DG Flugzeugbau factory.

Wax Part-No. 70000121

Cloth disc Part-No. 70000600

Adapter W67 (for mounting the cloth discs to a power buffer with thread M14) Part-No. 80010026

You get the best effect when polishing 90° to the microscratches of the sanding process.

**Caution:** Make sure that the surface does not get too hot, otherwise the finish will be damaged. Therefore move the polishing machine all the time, and do not stay on one spot!

#### **Plexiglas canopy:**

Small scratches on the exterior surfaces of the canopies can be removed by the "Schwabbel" procedure (see above). Lock the canopies to the fuselage!

#### **Metal parts:**

The pins and bushes for rigging the aircraft are not surface protected and must be covered with grease all the time (see section 3.3). The other metal parts, especially the control stick and all handles, should be preserved with metal polishes occasionally.

### 3.2 Maintenance of the airframe

The sailplane is service free except for the care of the surfaces (see above) and greasing and oiling of the control system and all pins (see section 3.3). After a landing in a soft field, the undercarriage box and tow hook should be thoroughly cleaned.

### 3.3 Greasing and oiling

A The contact surfaces of the canopies to the fuselage are to be rubbed with colourless floor-polish (canopy and fuselage side) to reduce grating noise in flight. Polish at the beginning of the flight season and then every month.

B Once a year your glider should be carefully checked and all bearings, including control surface hinges, should be cleaned and greased if necessary. The various greasing points are as follows:

- Aileron drive connections at the inboard aileron.
- Airbrake drive connection - in airbrake box, also grease the brake paddle pivots.
- Remove the access panels on the left hand cockpit walls and grease all the pushrod guides, but not those with Teflon linings, note see below.
- Remove the baggage compartment floors and open the baggage compartment rear cover to grease all bearings.
- Open the access panels (2 in the front and 2 in the rear cockpit). In the rear cockpit you have to remove the height adjustable seat pan first. Grease all accessible bearings (ball bearings and rod ends with universal bearings)
- Remove the control column boots and grease all the bearings associated with the control columns.
- Grease the rudder pedal adjustment slide.
- Oil all hinge points on the undercarriage in the undercarriage box.
- Clean and grease all control surfaces hinges.
- Clean and grease the control hook ups for ailerons, airbrakes and elevator control.
- Clean and grease all pins and bushes of the wing and tailplane attachment.
- Clean and grease the lower ball fitting of the gas strut at the front canopy.
- Electrically operated landing gear: Clean and grease the slotted hole at the attachment of the spindle drive to the bell crank 10FW106 (see diagram 9).

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**Note:** The greases we recommend are lithium based pressure-resistant anti-corrosion greases or lithium-soap greases (multi-purpose greases for rolling element bearings).

Use thin engine oil eg. SAE 5W30

**Caution:** The sliding guides of the following parts are made from Teflon and should not be greased:

- Airbrake control handle 5St69 on 5St68/1
- The linear guide on which the spindle drive is moving during emergency extension of the landing gear is made from plastic and should not be greased.

If these parts have been greased inadvertently you have to disassemble the parts and to clean them completely with Acetone.

### 3.4 Damage of the airframe

Before every flight, especially after a longer period of non-use, an inspection should be carried out. Check for any small changes such as small holes, bubbles and uneven areas on any skin surfaces, as these signal that something may be wrong.

With major damage, contact the DG Flugzeugbau factory and send photographs and a damage report from a licensed inspector or from an appropriately rated mechanic. With this information, the correct repair procedures can then be determined.

Minor damage such as small cracks and holes in the skin surfaces (as specified in the repair manual) may be self-repaired or be repaired by a certified repair station.

Additional information, such as a listing of all materials used in your aircraft can be found in the repair manual.

Home repairs should not be attempted when:

- the main spars or the spar ends are damaged or major fittings on the wings, fuselage or tailplane are broken out or white patches are noted around them in the laminate!
- When areas are so badly damaged that component parts cannot be repaired without special jigs for proper positioning and alignment!
- Whenever it is necessary to cut into undamaged areas to execute repairs!

### 3.5 Hydraulic wheel brake

The brake fluid must be exchanged at least every 4 years (see section 1.6.2 and 4.6).

### 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, 12, 13 and 23 should be executed at least 1 year after the last 25 hour inspection, preferably with the annual inspection. In your aircraft log you will find stickers on which you can enter the next maintenance dates. Fix these stickers in a visible place in the cockpit, preferably on the right side console. You find checklists for this maintenance work in section 9.2. Please complete the checklist when executing the inspection and file it in the aircraft log.

- 1) Remove the engine bay doors, general visual inspection.
- 2) Check spark plugs (Exchange latest after 100 hours).  
Check if the spark plug connectors have a tight fit on the spark plugs after you have installed the spark plugs. If not, the connector must be replaced.
- 3) Measure fuel pressure:  
Install the manometer (see section 7 item R). To accomplish this remove the screw cap from the block on top of the injection valves of the emergency system (see diagram 16 "service port"). Run the hose to the rear cockpit and secure it so that it can't be caught by the running propeller. Switch to normal system, switch on ignition, don't run the engine: the fuel pressure must pulse between 2.2 and 2.7 bar, tolerance  $\pm 5\%$ , this is a check for correct operation of the pressure switch. If you measure other pressure values exchange the fuel pressure switch.  
Switch over to emergency system: the fuel pressure must be 3 up to 3.2 bar. If the pressure is lower exchange the fuel filters and / or the fuel pump of the emergency system. If the pressure is higher exchange the pressure reducer.  
Further check with running engine see item 32.
- 4) Check all fuel lines for any wear, kinks, tight fit and leaks.



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- 5) Check the intake airfilters for excessive dirt and wear, wash with pure petroleum spirit and blow compressed air in reverse direction through the filters. Spray the outside with oil for filters with cotton fabric, reinstall the filters. We recommend exchange of the filters every 25 hours. Also new filters must be sprayed with filter oil.
- 6) Check the throttle cable and associated lever. Replace cable when worn.
- 7) Clean engine and radiator.
- 8) Check cooling system for leaks, refill coolant if necessary, check antifreeze (data see section 1.12.2).. Check the radiator and its mounting. To check the water pump, switch on the ignition. You should hear a buzz.
- 9) Remove the exhaust manifold.  
For the lower bolts a shortened wrench is needed see section 7 item U.  
Check the cylinders and pistons via the exhaust ports for seizing marks, for carbon remains and for sticking piston rings. Press against the piston rings with a suitable tool (e.g. small flat end screw driver). The rings must be movable. Black remains on the outside of the pistons below the rings indicate sticking or damaged piston rings, this is not acceptable.  
Illuminate the combustion chamber, check for combustion deposits and for cracks in the cylinder coating especially at the inlet and transfer ports. Use a torch and mirror for these checks. If seizing marks or cracks are detected the engine must not be used. Excessive combustion deposits have to be removed. With sticking piston rings the cylinders must be removed.  
Take out the piston rings and clean the grooves and the rings or replace the rings. Remove also any combustion deposits inside the pistons.

**Caution:** Necessary repair work including removal of combustion deposits must be accomplished at a certified repair station rated for such engine work.

- 10) Check the cylinder base for indications of leaking and/or damaged gaskets.  
When gaskets are damaged or leaking they must be exchanged.

**Caution:** The exchange of cylinder base gaskets must be accomplished at a certified repair station rated for such engine work.

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- 11) Check the muffler for cracks and ensure mounting is secure.  
Check especially the cable which lifts the muffler during engine extension. Check the moving part at the front end of the muffler for any cracks. Check the exhaust manifold (already removed) for cracks. Reinstall the exhaust manifold, therefore remove any remains of the gaskets, install new gaskets.  
Check the length of the cable which lifts the muffler. To accomplish this extend the engine and press the muffler body in downward direction at its front end with a force of approx. 50 N (11 lbs.). If the cable is too long or if the spring in the cable has been permanently stretched, the muffler will interfere with the exhaust manifold.  
Check the spring pressure at the coupling of exhaust manifold to muffler. To accomplish this, measure the distance between the brackets for the spring couplings at the muffler pipe and at the movable part of the muffler in disengaged and in operating position. Extend the powerplant completely via the manual switch. In this position the distance should be approx. 1 mm (0.04 in.) smaller than when disengaged. If the difference should be less than 0.5 mm (0.02 in.) you have to adjust to 1mm using the nut on the eyebolt. By this procedure you will pull the muffler forwards in its frame.  
**Note:** With new manifold and/or new movable part the difference should be adjusted to 2 – 3 mm (0.04 – 0.12 in.) to allow breaking in of the parts.
- 12) Check the spring tension of the bungee which pulls the cable (which lifts the muffler) back. With engine completely extended pull the bungee upwards in the centre with a spring balance, hold the front steel cable down at the muffler lifting cable. With 100 mm deflection the force needed should be min. 6 N. (1.3 lbs.) If the force is lower or if the bungee is damaged exchange the bungee.
- 13) Check the spring tension of the bungee which pulls the muffler down. retract the engine so far that the muffler disengages and rests on its lower stop. Install a spring balance to the muffler frame at the point where the cable running to the bungee is installed. Pull the mufflerframe upwards. A force of min. 60 N (13 lbs.) should be needed. If the force is lower or if the bungee is damaged exchange the bungee.
- 14) Check all engine nuts and bolts with a torque wrench (see section 1.12.9).
- 15) Check the rubber engine mounts, especially for cracks. Therefore apply strong pressure to the drive mount in forward, backward and sideways direction.  
Check the rubber buffer which limits the tilt of the engine against the drive mount due to the engine torque (see diagram 27) according to section 1.12.1. Adjust if necessary.

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- 16) Check and grease the starter motor gear shaft (don't grease the starter motor gear) Check starter motor for tight mounting. There should be no excessive radial free play of the starter motor gear axle. With too much free play the starter must be exchanged.
- 17) Clean the starter ring gear and check for damage.
- 18) Remove the fairings which protect the drive belts. Check the drive belts for wear. If a drive belt shows signs of wear all drive belts must be replaced. Check and correct tension (see sect. 4.10.2). Check if drive belt operating time is exceeded see section 0.4. Check the rollers which guide the drive belts for tight fit to their mounting brackets and for easy turning. If there is any significant friction in their bearings, the rollers have to be replaced.
- 19) Clean the spindle drive. Check the connections of the spindle drive to fuselage and powerplant.
- 20) Check the time taken to retract and to extend the power plant. If it takes longer than described under sect. 1.13.2 the gas strut has to be replaced.
- 21) Check the engine retaining cable for wear and kinks. Check the engine position with the retaining cable fully tensioned according to sect. 1.13.3. If the cable is too long it has to be adjusted at the adjustment screw in the rear end of the engine bay.
- 22) Check the main bearings of the upper pulley for any free play.
- 23) Check the tension of the propeller bolts: remove the lockwire, loosen the propeller bolts and retorque them with a torque wrench, torque value see section 1.12.9. Secure again with lockwire according to section 4.10.6.
- 24) Check the propeller blades for any damage.
- 25) Check all electric cables and connectors. Check the terminals especially of the starter positive and earth wire for cracks.

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

- 26) 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.
- 27) Reinstall the engine bay doors. Check all the hinges on the engine compartment doors for proper fit and any cracks, tears etc. Check if hinge pins are secured properly. Check the engine door control system.

### 4.5 Removal and installation of the undercarriage (main wheel)

see diagrams 7 up to 9

**Warning:** A gas strut is installed inside the landing gear box to compensate the mass of the landing gear. The landing gear may retract by itself when the spindle drive is removed by the force of the gas strut, especially when the glider is not in the normal position. So when working on the landing gear make sure that inadvertent retraction of the landing gear is prevented e.g. by fixing the drag struts.

**0 Removal of the gas strut in the landing gear control system:** Use a screw clamp to pre-stress the gas strut sufficiently so that the bolts can be removed.

#### **A Removal of the main wheel**

1. Remove axis 10FW11/7 together with the 2 parts 10FW11/2.
2. Remove the wheel axle 10FW11/6 and the 2 bushes 10FW257/1 and /2.
3. Move the wheel with the brake assembly to the right, so that the pin of part 10FW18 slides out of the fork 10FW11/1. Now remove the wheel with the brake assembly.

#### **B Removal of the brake assembly from the main wheel**

1. This is only necessary if the tyre is to be removed or if the brake linings are to be exchanged.
2. Remove the 2 bolts A (see diagram 8) from the brake assembly.
3. Take off brake assembly with holder 10FW18 and take away the loose part (back plate assy.) with the brake lining.
4. During reassembly secure the 2 bolts A with Loctite 243 or safety wire.

**Caution:** Don't operate the airbrake and thus the wheelbrake with brake assembly disassembled, as the piston and the brake-fluid will be pressed out of the brake assembly.

### **C Removal of the lower landing gear fork 10FW11/1**

1. Remove the main wheel see A.
2. Retract the landing gear.
3. Disassemble the gas spring from the left side of the undercarriage box see item 0.
4. Extend the landing gear again.
5. Remove the 2 bolts M10 LN9037 which connect 10FW11/1 to 10FW10/1. (Mark the bolts and don't mix them up when reassembling the parts).
6. Remove fork 10FW11/1.

### **D Removal of the spring legs (parts 10FW16 and 10FW17)**

1. Remove the main wheel see A.
2. Remove the bolts M8×62 LN9037 which connect the spring legs to the fork 10FW10/1.
3. Remove the spring legs.
4. If it is necessary to disassemble the spring leg to exchange a component, the reassembly must be done according to diagram 8.

### **E. Removal of the drag struts 10FW255/1 (right), 10FW255/2 (left)**

- 1 Disassemble the gas strut from the left side of the landing gear box see item 0
- 2 Remove the 2 bolts M8 LN9037 which connect the struts to fork 10FW10/1. Mark the bolts. Don't interchange the bolts during reassembly!
- 3 Remove the 2 bolts M8×40 LN9037 which connect the struts to the rear fork 10FW254.
- 4 Remove the drag struts.

### **F. Removal of the front fork 10FW10/1**

1. Remove the baggage compartment floor and the rear cover of the baggage compartment.
2. Remove the main wheel see A.
3. Remove the lower fork 10FW11/1 see C.
4. Remove the spring legs see D.
5. Remove the struts see E.
6. Enlarge the marking hole dia. 6 mm at the right hand fuselage side to dia. 25 mm (1 in.). Remove the nut M12 from the left hand side of the axle 10FW10/2, to accomplish this hold the axle at the right hand side with a thin socket wrench if necessary. Insert a long bolt with thread M12 into the head of the axle to pull out the axle through the hole.
7. Remove the front fork 10FW10/1.

### **G. Removal of the shaft 10FW256 (with the latches for locking the LG in retracted position)**

- 1 Remove the baggage compartment floor and the rear cover of the baggage compartment.
- 2 Disconnect the wiring from the limit switch (mounted to the left latch of the shaft).
- 3 Remove the push rod 10FW121 between bell crank 10FW130 and lever 10FW89.
- 4 Remove bolt M6x32, which connects the lever 10FW89 to the shaft 10FW256.
- 5 Pull out the lever 10FW89.
- 6 If not already existent, drill a 10 mm hole into the left fuselage wall on an extended centre line of the shaft.
- 7 Insert a threaded rod M8 min. 310 mm long and screw it into axle 10FW252/1.
- 8 Remove bolt M6x32, which connects the axle 10FW252/1 to the shaft 10FW256.
- 9 Pull out the threaded rod with the axle.
- 10 Remove the shaft 10FW109.

## 4.6 Filling and bleeding the hydraulic disc brake

**Caution:** The master cylinder is mounted in an horizontal position. Due to the position of the reservoir filling and bleeding of the system is only possible from the lowest point which is the brake cylinder assembly at the wheel.

### 1. Necessary tools and material:

- 1 open-end wrench 1/4" = 6.35 mm for the bleeder valve at the cylinder assy..
- 1 open-end wrench 11/16" = 18 mm.
- 2 Plastic syringes acid resistant, volume ca. 100 ml (6 cu.in.). Use this syringe for brake fluid only!
- 1 bleeder assy. Tost No. 075890.
- 1 m (3 ft.) transparent PVC hose inside diameter 8 mm (0.31 in.), fixed to syringe and bleeder assy. with hose clamps.
- Brake-fluid DOT 3, DOT 4 or SAEJ 1703.

### 2. Preparations

- raise the fuselage, extend the landing gear
- fix left wheel door in the fully open position
- set the airbrake control in the retracted position
- remove the baggage compartment floor and rear cover, check that the actuating cable for the master cylinder is loose and that the piston rod of the master cylinder is at its stop (brake open).
- Unscrew and pull out the eye-bolt which fixes the brake hose to the rear landing gear strut. Flap the hose to the right hand side so that the hose makes no bow above or below the horizontal. Fix the hose in this position.

### 3. Filling

**Warning:** Brake fluid is poisonous!

Protect your hands and clothes. Remove all spilled brake fluid. Clean all parts which had contact with brake fluid with alcohol, don't use fuel or solvents.

- Remove the cap and the membrane from the reservoir.
- Fill the first syringe (with hose and bleeder assy.) with brake fluid, eliminate all air bubbles.
- Remove the protection cap from the bleeder valve at the brake calliper, attach the bleeder assy. and fix it with the 11/16" wrench.
- Open the bleeder valve at the cylinder assy, use the 1/4" wrench, fill in slowly the complete volume avoiding air bubbles.
- Fill the complete system up to 15 mm (0.6 in.) below the upper edge of the reservoir, avoid over filling.
- Close the bleeder valve at the brake calliper.
- Use the second syringe to remove all brake fluid from the reservoir.
- close the bleeder valve with the protection cap.

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- Fill the first syringe again, open the bleeder valve and fill in further brake-fluid. Look at the reservoir while filling to see if air bubbles are coming out of the line. Fill up to 15 mm (0.6 in.) below the upper edge of the reservoir.
- Close the bleeder valve, reinstall the membrane and the cap to the reservoir and remove the bleeder assy.
- Check brake pressure according to step 4.
- Reinstall the main wheel.

### 4. Check brake pressure

- extend the airbrakes, there must be a strong pressure when the wheel brake engages.
- check several times, the wheel brake must engage at the same point every time
- if this is not the case, you have to bleed the system again

### 5. Check the hydraulic brake system for leaks

- extend the airbrakes with high force and hold it in this position for 2 minutes.
- Then check the whole hydraulic system visually for leaks. If necessary tighten the screwed joints or replace the sealings and bleed the system again.

**Note:** The adjustment of the length of the cable between the master cylinder and the airbrake control shaft restricts the max. airbrake extension height. The adjustment of this cable should be done with the glider rigged.

### 6. Bleeding the hydraulic brake system

- Remove the brake fluid from the reservoir using the syringe.
- Then execute again items 3 and 4 of this instruction.

### 7. Exchanging brake fluid (every 4 years)

- Perform preparations (see step 2.) of this instruction. It is not necessary to remove the main wheel.
- Fill the system with new brake fluid (see step 3.). To accomplish this remove all brake fluid from the reservoir first with the second syringe. Used brake fluid is darker than new brake fluid and can easily be identified. Watch the reservoir while filling to see when the new fluid streams into the reservoir. Repeat the filling process until only new fluid is in the system and no air bubbles can be detected.
- Perform steps 4. and 5. of this instruction.



### 4.10.2 Mounting and tensioning of the drive belts

See diagram 20.

#### a) Tensioning of the drive belts

1. Tensioning and loosening of the drive belts is accomplished by the bolts of the front engine mounting.
2. Extend the engine so far that you are still able to hold the nut M14 of the rear bolt. Tension the bolt M14x110 with a 22 mm socket and ratchet from below the engine.
3. Measure the drive belt tension according to item c). If the tension is not correct proceed again according to item 2. with lower or higher tension, as necessary. Measure tension again.
4. If the tension is in the limits, torque the front bolt just so far that you still can turn it by hand.

**Note:** The front bolt acts as a fail safe device in case the rear bolt fails. The front bolt shouldn't be tightened as otherwise the flexible engine mounting will be impaired.

**Caution:** With a failed rear bolt the drive belt slip will be higher and a failure message will be given by the DEI-NT. Exchange the bolt prior to the next engine operation.

#### b) Exchanging the drive belts

Additional to the items see a):

1. Remove the drive belt covers.
2. Eliminate tension of the belts by loosening the 2 bolts see a).
3. Exchange the belts.
4. Tension the belts according to a).

**Note:** To exchange the drive belts it is not necessary to remove the propeller and to disconnect gas strut and spindle drive from powerplant.

#### c) Measuring the drive belt tension

Accomplish measurement according to drawing W66 (enclosed to the MM). Turn the propeller one turn by hand prior to the measurement.

Use tools W66 and a calliper according to drawing W66.

Apply 100 N (22 lbs.) tension to the drive belts in the centre of the belts and vertically to the belts. The displacement of the belts shall be from 6 up to 9 mm.

**Caution:** After exchanging the belts activate the slip indication in the DEI-NT and watch the slip while operating the engine. With slip more than 4% you have to tension the belts prior to the next take-off. Tensioning may be necessary more than one time until the belts reach their final length.

### 4.10.3 Replacing the bearings of the upper drive belt pulley

see diagram 19

#### a) **Removing the bearings**

1. Remove the propeller.
2. Remove the proximity switch. Mark the position prior to removal.
3. Remove the drive belts see sect. 4.10.2.
4. Remove the sealing cap 8M118/1.
5. Bend up the securing washer DIN462-20.
6. Screw off the nuts KM4 one after the other.

#### **Note: left hand thread.**

Use one of the 2 specially bent hook spanners according to drawing W51 (encl. with this manual). Remove the antirotation securing washer.

7. Now you can pull off the complete pulley 10M102 from the shaft 10M166.
8. Take the inner ring and the rollers of the front bearing out of the pulley.
9. To remove the outer rings of both bearings from the pulley you have to produce 2 pieces of round material each 100 mm (4 in.) long and with 47 mm (1.85 in.) and with 53 mm (2.09 in.) diameter.
10. Press out the outer rings together with the Nilos rings (32 205 JV and 320/32 JV) carefully using a press or a hammer.
11. Pull off the inner ring of the rear bearing together with part 8M117/1 from shaft 10M166. Use a suitable puller assy..

#### b) **Installation of the new bearings**

1. To press the outer rings of both bearings into the pulley you have to produce 2 pieces of round material each 30 mm (1.6 in.) long and with 51 mm (2 in.) and with 57 mm (2.24 in.) diameter.
2. Press in new outer ring together with new Nilos rings.
3. To press the inner ring of the rear bearing to the shaft you have to produce a piece of tube with 32 mm (1.26 in.) inside diameter and 90 mm (3.54 in.) long.
4. Press the inner ring together with part 8M117/1 to the shaft.
5. Fill the space in the pulley for both bearings with grease.
6. Apply grease to the inner ring of the rear bearing and place the rollers onto the ring. Apply enough grease to completely fill the bearing.
7. Place the pulley onto the shaft with care. It's best if the powerplant is retracted so that the shaft is in vertical direction.

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8. Put the rollers and the inner ring of the front bearing into place, apply grease according to item 6. Put on the antirotation securing washer and the first one of the KM4 nuts. Tighten the nut with the other hook spanner see a) 6. until the pulley starts to rotate a little stiffer than with a loose nut. Put on a new securing washer DIN462-20. Screw on the second nut. Secure this nut with Loctite 243. Fix the first nut with a hook spanner so that the adjustment doesn't change and tighten the second nut as far as possible. Check again the rotation of the pulley. No free play is allowable.
9. Press the sheet metal securing washer into the grooves of the rear nut.
10. Fill the sealing cap with grease and put it into place.
11. Install the drive belt and adjust it according to sect. 4.10.2.
12. Reinstall the proximity switch and check its adjustment according to section 1.15.16. Secure with lockwire.
13. Reinstall the propeller and secure with lockwire according to sect. 4.10:6.

### Necessary material

1. roller bearing	32205B
2. "	320/32X
3. Nilos ring	32205 JV
4. " "	320/32 JV
5. securing washer	DIN 462-20
6. grease for bearings	SKF LGMT3

**Caution:** Don't use another type of grease

### 4.10.4 Replacement of the engine retaining cable

Please refer to diagram 18

1. Extend the powerplant.
2. Remove the access panel from the rear engine bay floor.
3. Remove the engine retaining cable from the propeller mount. Let the cable retract slowly, otherwise the retraction bungee may jump from its pulley located inside the rear end of the fuselage. The bungee pulley is accessible via the access hole inside the tailwheel box.
4. Pull out the bungee via the access hole in the rear engine bay floor until you reach the terminal of the retaining cable.
5. Fix the bungee to the floor to prevent it from disappearing into the fuselage boom.
6. Cut off the retaining cable and pull it out. Don't damage the bungee! Don't loose the steel washer.
7. Loosen the counter nut and turn out the adjustment screw at the rear bulkhead as far as possible (anti-clockwise direction). Then turn in the screw for 5 mm (0.2in.).
8. Push the retaining cable from the front via the adjustment screw through the rear engine bay bulkhead and pull it out of the access hole.  
An absorber element is installed on the adjustment screw. Check if the washer at the rear end of the absorber is in place and fixed and if the absorber element is still glued firmly to the adjustment screw (see diagram 18 Detail X).
9. Install the steel washer 5R28/3 on the new cable. Attach the cable with thimble and 2 Nicopress sleeves to the bungee. Press the Nicopress sleeve, the end of the cable must be inside the second Nicopress sleeve. and wrap Tesaband 651 twice around washer and Nicopress sleeves.
10. Let the bungee retract slowly into the aft fuselage.
11. Install the retaining cable together with thimble and Nicopress sleeve to the propeller mount. Don't press the sleeve. Adjust the position of the powerplant and the cable length according to section 1.13.3. Press the Nicopress sleeve. Cut off the excess cable.
12. Check again the length of the retaining cable according to section 1.13.3. Adjustment is possible at the adjustment screw at the rear bulkhead. Fasten the counter nut.
13. Reinstall the access cover to the rear engine bay floor.

#### **Material:**

Steel cable diameter 3.2 mm (1/8 in.) type see sect. 4.2 approx. 2.3 m (91 in.) long

2 thimbles 3mm DIN 6899A

3 Nicopress sleeves 28-3-M

Tesaband 651 (self-adhesive textile tape)

### 4.10.5 Filling and bleeding the cooling system

Please refer to diagram 14.

**Coolant:** Total amount needed: approx. 1.7 Litres (0.45 US. Gal.), Commercially available anti-freeze for car engines (recommended: BASF Glysantin G48 Protect Plus concentrate) and tap water (hardness 0-20°dH). Normal operation: mixing ratio 1:2 (up to approx. -20°C, -4°F). May be changed for high altitude flying to mixing ratio 1:1 (up to approx. -40°C, -40°F).

#### 4.10.5.1 Adjustment of coolant mixture

I) Initial condition -20°C, increase anti-freeze protection:

- a) Fix an instrument-hose approx. 200 mm long to a syringe (min. 100 mL 0.0265 US. gal.). Remove the radiator cap and insert the hose into the radiator down into the coolant hose (at the side at the upper end of the radiator). Suck coolant out of the radiator while squeezing the coolant hose as far as possible to get out as much coolant as possible.
- b) Disconnect the coolant hose from the upper fitting at the radiator and hold it into a container. Move the hose with the container down to cylinder head level.
- c) Remove approx. 0.4 Liter (0.106 US. gal.) coolant (incl. the coolant in the syringe).
- d) Reinstall the coolant hose to the radiator and fill in 0.4 Liter pure anti-freeze. Switch the ignition on to run the coolant pump.
- e) Check the anti-freeze protection with an “antifreeze coolant tester”, it should be good for approx. -40°C.

II) Initial condition -40°C, decrease anti-freeze protection:

- a) Remove as much coolant as possible, method see a). approx. 0.55 Liter (0.145 US. gal.) should be removed.
- b) Fill in 0.55 Liter water. Switch the ignition on to run the coolant pump.
- c) Check the anti-freeze protection with an “antifreeze coolant tester”, it should be good for approx. -20°C.

#### 4.10.5.2 Filling and bleeding

- a) The engine must be cold. Extend the powerplant.
- b) Remove the screw cap of the radiator. Press down on cap for easier handling. Fill in coolant until the radiator is completely filled.
- c) Switch on the ignition to run the coolant pump. Look into the radiator, you must see the coolant bubbling. If this is not the case there may be air bubbles in the hoses. Squeeze the hoses 1 and 5 (see diagram 9) several time until the coolant starts bubbling. Run the coolant pump for approx. 1 minute. Switch off the ignition. If necessary top up the radiator.

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- d) Close the radiator cap.
- e) Run the engine to warm up, then run approx. ½ minute at full throttle. Stop the engine.
- f) Allow the engine to cool down. Remove the radiator cap and check the coolant level. The coolant level should be approx. 2 cm (0.8 in.) below the top of the radiator. If necessary top up to this level.
- g) Close the radiator cap again.

### 4.10.5.3 Removal of the coolant

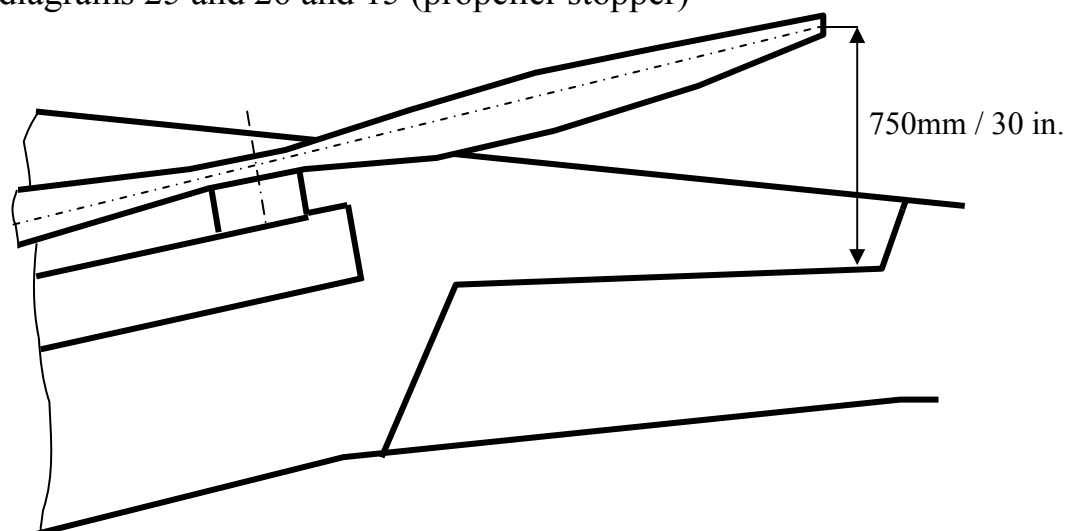
- a) Extend the powerplant completely, don't remove the radiator cap.
- b) Remove the screw plug from the coolant inlet fitting 10M171 at the lower rear end of the rear cylinder (service port see diagram 14), catch any coolant dripping out with cloth or cleaning paper. Screw in a hose connector GES8/M10x1 with hose 2 m long.
- c) Hold the hose into a container with approx. 2 Liter (0.53 US. gal.) volume.
- d) Remove the radiator cap and let the coolant drain into the container.
- e) Reinstall the screw plug, use a new copper sealing ring 10x14x0,8 DIN 7603 A.

### 4.10.5.4 Inspection of the coolant pump

- a) Extend the engine.
- b) Remove the coolant hose from the radiator (upper end). insert the test adapter W59 (drawing see enclosure to this MM) into the hose and secure with a hose clamp. Install a PVC hose (instrument line) on the other end of the adapter and put its end in a calibrated container.
- c) Switch on the ignition and measure the time needed to fill 0.2 liters into the container, then switch off the ignition immediately. Otherwise the pump will suck in air and bleeding may be difficult.  
Normal time is about 15 seconds.
- d) If the time needed exceeds 20 seconds the pump is worn and should be exchanged. Repeat the test after installation of the new pump.
- e) Remove the adapter and connect the coolant hose to the radiator again.
- f) Remove the screw cap of the radiator. Press down on cap for easier handling and fill in the coolant from the test, if necessary refill coolant.
- g) Switch on the ignition to run the coolant pump. Run for approx. 1 minute. Switch off the ignition. If necessary top up the radiator.
- h) Close the radiator cap.

### 4.10.7 Installation and removal of the extension/retraction unit

See diagrams 25 and 26 and 15 (propeller stopper)



#### a) Removal

1. Retract the engine to the position shown in the sketch.
2. Remove the baggage compartment rear cover.
3. Disconnect the plug for the spindle drive wiring inside the fuselage.
4. Open the hose clamp fixing the rubber boot to the spindle drive.
5. Remove the nuts of the spindle drive mounting bolts, M12 at the front and M10 at the powerplant.
6. Remove the mounting bolt at the powerplant and rest the powerplant in the engine bay.
7. Remove the actuating plate for the propeller-stopper with mounting bracket 10M206 from the fork at the spindle drive (bolt M6x10).
8. Remove the mounting bolt at the fuselage.
9. Pull out the spindle drive to the front.

#### b) Reinstallation

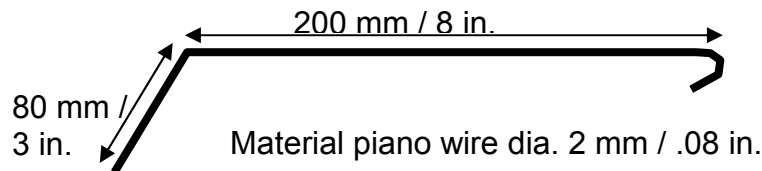
1. Reinstallation is the reverse of removal. Use new self-locking nuts.
2. Secure the bolt M6x10 to fix 10M206 to the fork. with Loctite 243
3. Don't tighten the bolt which connects the spindle drive to its front mounting block. Extend the powerplant to the position (see sketch). Then tighten the bolt. The reason for this procedure is to make sure that the rubber bush in the mounting block will be twisted approx. by the same amount in upward and downward direction. False adjustment may result in cracks in the rubber.

### 4.10.8 Removal and installation of the tension gas-strut

See diagrams 25 and 26 and 15 (propeller stopper)

#### a) Removal:

1. Retract the powerplant to the position with propeller stopper fully extended.
2. Hang out the tension spring of the propeller stopper at the bellcrank 10M109. To accomplish this use a tool (see sketch):



3. Take a piece of tube with 12mm (.47 in.) inside diameter and 80 mm (3.15 in.) length and cut it to receive two halfshells.
4. Retract the powerplant until the gas-strut is extended a little further than 80mm.
5. Place both halfshells onto the piston rod of the gas-strut and secure with a Ty-rap.
6. Remove the mounting bolts of the spindle drive. It must be possible to move the spindle drive so far that you can remove the front mounting bolt of the gas-strut.
7. Remove the nuts of the gas-strut mounting bolts, M8 at the front and M10 at the powerplant.
8. Open the hose clamp fixing the rubber boot to the gas-strut.
9. Lift the engine a little further, so that the two halfshells block the gas-strut.
10. Remove the gas-strut mounting bolt at the powerplant, take off the bush 10M209 and the propeller stopper bellcrank 10M109. To accomplish the removal of the bolt a helper is needed who pushes the powerplant forward at the upper end.
11. Rest the powerplant in the engine bay.
12. Remove the mounting bolt at the fuselage and pull out the gas-strut to the front.

**b) Reinstallation** is the reverse of removal

#### c) Installation of a new gas-strut

**Warning:** Only installation of the gas-strut S47/2 (see section 8.1.2.1) is permitted.

Usually the gas-strut is delivered ready to install with a halfshell according to a) item 4. If this should not be the case extend the new gas-strut with a pulley block to place the halfshells



### 4.10.9 Removal and reinstallation of the powerplant

#### Removal

Remove fuel return from the tube 10M198, remove the supply line directly at the fitting 4R30/2 at the fire wall (see diagram 16).

Remove the hose clamp which fixes the fuel hoses to the left hand side ignition coil.

Open the main plug at the bulkhead in the front upper edge of the engine compartment and dismount the clamp holding the wires.

Open the 2 plugs for the EGT probes located at the right upper edge of the engine bay wall.

Screw off the starter positive wire from the starter motor and the earth wire from the engine block.

Disassemble the engine retaining cable from the powerplant (see diagram 18).

Disassemble the spring of the muffler lifting cable from the bracket at the cylinder head (see diagram 23).

Throttle cable: Remove the nipple from the lever at the throttle axis and the clamp which fixes the Bowden cable.

Rest the powerplant on a wooden bar layed across the engine bay cutout.

Disassemble gasstrut including the bell crank for the propeller stopper and spindle drive from the powerplant according to sections 4.10.7 and 4.10.8 and diagram 15.

Remove the bolts of the main powerplant bearings (hinge axis of drive mount at fuselage) according to diagram 22. Mark the position of the now accessible eccentric brass bushes to be able to reinstall them in the same position.

Lift the powerplant with 2 persons or a crane out of the fuselage.

#### Reinstallation

Reinstallaton is the reverse of removal. Use new selflocking nuts and secure with Loctite243 where applicable.

When reinstalling take into account that the sideways position of the upper end of the drive mount may be adjusted by the eccentric bushes at the main powerplant bearings see diagram 22.

Adjust so that the powerplant retracts in the centre of the engine bay cut out.

Secure powerplant main hinges with new securing washers 13 DIN432-St zn.

### 4.10.10 Removal and reinstallation of the engine (from the drive mount)

#### Removal:

Remove coolant (see section 4.10.5.3) and disconnect the following coolant hoses see diagram 14:

- a) right hand hose from the rear end of the coolant pump,
- b) hose which comes down from the radiator from the T-fitting on top of the engine.

Pull off the spark plug connectors.

Disconnect the plug of the propeller sensor.

Remove the flat pin terminals from the primary side of the ignition coils.

Disassemble the EGT probe wires from the right hand side ignition coil.

Open the flat pin terminals in the wiring of the coolant pump.

Remove Ty-raps as necessary.

Disassemble the bolts of the front engine mounting (see diagram 20 and section 4.10.2).

Disassemble the bolts of the rear engine mounting (see diagram 21). Don't loose the rings 10M222 which are installed between the 2 rubber elements.

Remove engine from the drive mount.

**Note:** The carbonfibre mounting bracket must not be removed from the front end of the engine and the wiring harness must not be removed when shipping the engine for repair. Thus also the lower drive belt pulley with starter ring gear must not be removed.

#### Reinstallation:

Reinstallaton is the reverse of removal. Use new selflocking nuts and secure with Loctite243 where applicable.

Secure the bolts of the rear engine mount with lock wire according to section 4.10.6.

During reassembly tension the drive belts according to section 4.10.2.

Check the rubber buffer which limits the tilt of the engine against the drive mount due to the engine torque (see diagram 27) according to section 1.12.1. Adjust if necessary.

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## 6 Instrumentation and accessories list

### 6.1 Air speed indicator

(range : 0 - 300 km/h, 165 kts)

<b>Manufacturer</b>	<b>Type</b>	<b>Certification No.</b>
Winter	6 FMS 4(diam. 80mm)	TS 10.210/15
	0-300 km/h Ident.No. 6421567	
	0-160 kts Ident.No. 6423567	
Winter	7 FMS 4(diam. 58mm)	TS 10.210/19
	0-300 km/h Ident.No. 7421567	
	0-160 kts Ident.No. 7423567	

The airspeed indicator must have colour coded speed ranges marked as indicated in the flight manual section 2.3.

### 6.2 Altimeter

<b>Manufacturer</b>	<b>Type</b>	<b>Certification No.</b>
Winter	4 FGH 10 (diam. 80mm)	TS 10.220/46
	1.000-10.000m Ident.No.4110	
	1.000-20.000ft Ident.No.4320	
Winter	4 FGH 20 (diam.58mm)	TS 10.220/47
	1.000-10.000m Ident.No.4220	
Winter	4 FGH 40 (diam.58mm)	TS 10.220/48
	1.000-20.000ft Ident.No.4550	

Or any other TSO C 10b specified and approved altimeter with fine range pointer 1 turn max. 1000 m, 3000 ft.

### 6.3 Harness (seat)

<b>Manufacturer</b>	<b>Type</b>	<b>Certification No.</b>
Gadringer	BAGU 5202 G	40.070/32
	SCHUGU 2700 G	40.071/05
	rubber coated adjuster bars	
Schroth	4-01-0.104	40.073/11

### 6.10 Instruments which are not part of the minimum equipment:

#### 6.10.1 Transponders:

Transponders certified for aircraft use according to TSO or JTSO or ETSO standards may be installed.

Installation of Transponder antenna must be accomplished according to drawing Z181 (attached to the MM) or according to TN DG-G-02.

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

**Caution:** The antenna wire must be installed during production of the aircraft, retrofit is not possible.

#### 6.10.2 ELT:

The ELT is or must be installed according to the ELT manufacturers instructions.

The designated place is the baggage compartment on the floor.

Installation of ELT antenna must be accomplished according to drawing Z193 (attached to the MM).

Further installations possibilities see TN DG-G-08.

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

The ELT must be switched off during road transport.

#### 6.10.3 Other instruments and equipment (eg. variometers, gliding computers or flight data recorders):

Instruments and other equipment may be installed if they do not in themselves, or by their effect upon the sailplane, constitute a hazard to safe operation.

TN DG-G-07 must be regarded.

**Caution:** If additional instruments or equipment are to be installed after production of the glider, it must be assured that they will be installed in the places provided by the design. If installed in other places it must be assured that they are secured safely.

Electrical instruments and equipment must be connected via appropriately rated fuses, the power consumption of each single part should not exceed 3A.

**Warning:** If equipment is mounted on the canopy special care must be taken that canopy jettison is not impaired. To accomplish this any wire must be equipped with a plug in the vertical part. All plugs must be able to disconnect with low force, max. 10 N (2 lbs.).

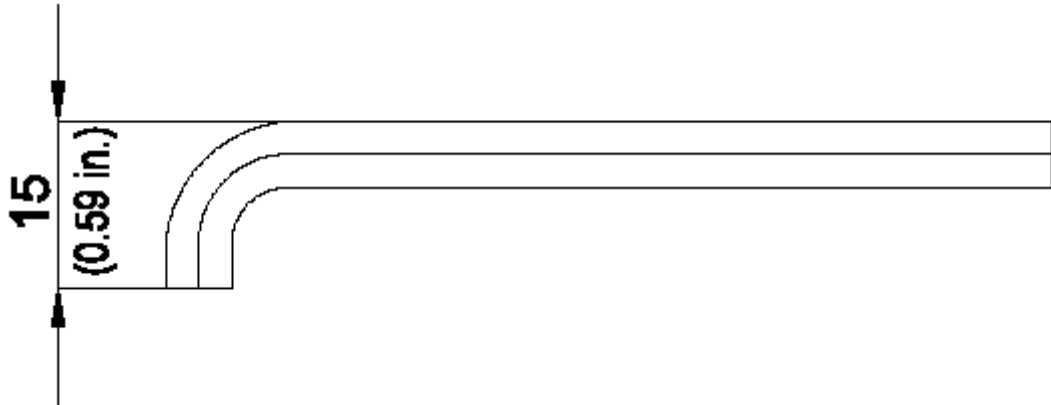
Equipment shall only be mounted at the fastening threads in the canopy frame provided by the design.

Max. mass of the equipment: 1 kg (2 lbs.).

**Caution:** After installation raise a new weight and balance report.

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U Shortened Allen key wrench for removing the lower bolts of the exhaust manifold, see sketch:



## 8 Partlist

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

**Note:** The number at the left hand side is the DG part no.. Please use these numbers for ordering any parts.

### 8.1 Parts for the powerplant

#### 8.1.1 Parts necessary for the 25 hours inspection

- 60500150 Gaskets for exhaust manifold (2 pieces needed)
- 60500185 Air intake filter K&N RU2760
- 70002200 Oil for airfilters with cottonfabric K&N 99-05046
- 60000377 Copper sealing ring 10x14x0,8 DIN 7603 A

#### 8.1.2 Spare parts

##### 8.1.2.1 Power plant and extension retraction system

- 40050360 Spark plug S36 (Bosch W5AC electrode gap 0.5 mm) with screw cap fastened to the thread by crimping, marked with a red dot of paint on the insulator
- 60510821 Spark plug connector Bosch 0356351032 1k $\Omega$ (no longer available)
- 45002085 Spark plug connector PVL 5k $\Omega$  (replacement for Bosch)
- 60500155 Gasket for coolant outlet
- 60500127 Nut for spring coupling M8 for exhaust muffler
- 60500128 Spring for spring coupling M8
- 60000337 Spring for propeller stopper
- 41071730 Starter motor: 10M173DENSO 128 000-1671 12 V modified
- 60510831 V-drive belt Optibelt Super X-Power XPZ 2540 Ld (5 pieces needed)
- 40871711 Drive belt roller 10M101
- 59332050 Front bearing for upper pulley 32205 B
- 59320320 Rear bearing for upper pulley 320/32 X
- 52200054 Securing washer 20 DIN462 for upper pulley front bearing
- 30002028 Special grease for upper pulley bearings SKF LGMT3
- 39001028 Exchange kit nuts and bolts for 400 h overhaul
- 60000157 Gas strut for ext.-retr. drive S47/2 with Ultra-bush
- 60504045 Ext.-retr. spindledrive type Stross BSA10 RN1 C205
- 60504043 Ext.-retr. spindledrive type Stross BSA10 RN1 C205 assembled with fork 10M170 and flange 8M230/2
- 60000219 Rubber mount at engine hinge axis in engine mount: Ultra-bush 0118055.60
- 41071170 Front engine shock mount 10M117
- 60504014 Rear engine mount Lord J-3608-1 Shock mount
- 60001115 Clamps XO for 6mm bungee (bungee for retaining cable)
- 52130011 Securing washer 13 DIN432-St zn for powerplant main hinges
- 60000338 Rubber buffer 3917210000 (engine tilt limit stop)

### 8.1.2.2 Parts for cooling system

- 60001201 Electric water pump Webasto U4810 modified (no longer available)
- 60001210 Coolant pump Pierburg modified (replacement for Webasto).
- 41072800 Elastic adapter-ring 10M280

**Note:** A voltage converter 10E211 (see section 8.1.2.4) must be installed to run the coolant pump Pierburg with sufficient power.

- 60504049 Radiator KTM VW 0425
- 39001019 Service kit cooling system hoses

Rubber mounts for radiator

- 60000275 2 pieces Rundlager Type B (upper mount)
- 60000262 1 piece Rundlager Type A (lower mount)
- 60000377 Copper sealing ring 10x14x0,8 DIN 7603 A for service port

### 8.1.2.3 Parts for fuel system

- 60507550 Drainer CAV 110 (1/8" NPT)
- Warning:** Replace the sealing ring of the drainer against partno. 60504402 prior to installation
- 60504402 Sealing ring for drainer CAV 110 (for automotive fuel)
- 60510516 Fuel pressure switch DRS 5 ES 0,5 – 5 bar seal FKM or
- 60510519 Fuel pressure switch Beck 901.51
- 60507577 Fuel pressure regulator Pierburg 7.21476.50.0
- 60507575 Fuel pump Pierburg with rubber sleeve 7.22156.60.0
- 60507562 Refuelling pump Facet 60106
- 60507576 Fuel filter Pierburg Nr. 4.00030.80.0 (in front of fuel pump)
- 60507568 Fuel filter MANN WK 613 (behind fuel pump)
- 60507571 MANN-fuel- filter 500009180 WK 31/2(10) for refuelling pump
- 60510833 Injection valve Bosch 0 280 155 868
- 60504407 O-Ring for Injection valve Bosch
- 60507802 Front fuel gauge: VDO 224-011-020-279X
- 60507800 Rear fuel gauge: VDO 224 082 005 088
- 60000527 Fuel cock KH 1072 T
- 60507607 Coupling for fuel filler hose KL-006-0-SL007
- 45001605 Full tank sensor
- 48000009 Fuel hose 7,5x13,5 mm DIN 73379-2A
- 48000092 Fuel hose Inner dia. 3,5 mm fabric braided 2122.0200 (for emergency system)
- 60507526 Fuel hose 15 x 23 mm fabric braided (at fuel pump)
- 30092051 Metal braiding inner dia. 8 mm
- 60000377 Copper sealing ring 10x14x0,8 DIN 7603 A for service port

## Maintenance Manual DG-1000M

### 8.1.2.4 Parts for the electrical system

- 60510899 Main battery: Odyssey PC625 12V/17Ah
- 41076003 DEI-NT- DG-1000M
- 41076004 DEI-NT-DG-1000M second unit (rear cockpit)
- 41076005 Control unit-NT-DG-1000M
- 41076006 Engine control unit ECU Trijekt-Plus T101 Solo No. 23 00 886
- 41076007 Controller for emergency system Solo No. 23 00 896
  
- 41075210 Engine speed sensor (normal system+emergency system) Bosch 0261210147 assembled with wiring and plugs
- 60510836 Throttle valve sensor: Bosch 0 280 122 201
- 60510837 Probe for coolant temperature Bosch 0 281 002 209
- 60510669 Intake air sensor Epcos B57881S212F
- 41075204 Proximity switch ready assembled with wiring and plug
- 41075211 Voltage converter 10E211 for coolant pump Pierburg
  
- 60510834 Ignition coil Solo No. 23 00 883
  
- 60510832 Regulator Ducati 34407011
- 60504044 Voltage reducing module for generator/regulator
- 60510202 Condensor for generator/regulator 100.000 $\mu$ F/40V
  
- 60510464 Limit-switch engine retracted and engine extended 164-574
- 60510506 Manual extension-retraction switch MTG 106 G
- 60510465 Black cap for switch MTG206S
- 60510483 Switch for emergency engine control: APEM 5636 MA
- 60510466 Red cap for APEM 5636 MA
  
- 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 01191017003 80 A for battery
  
- 60510796 Socket BSB 12 (in main bulkhead)
- 60510797 Plug BSK12 for socket BSB 12



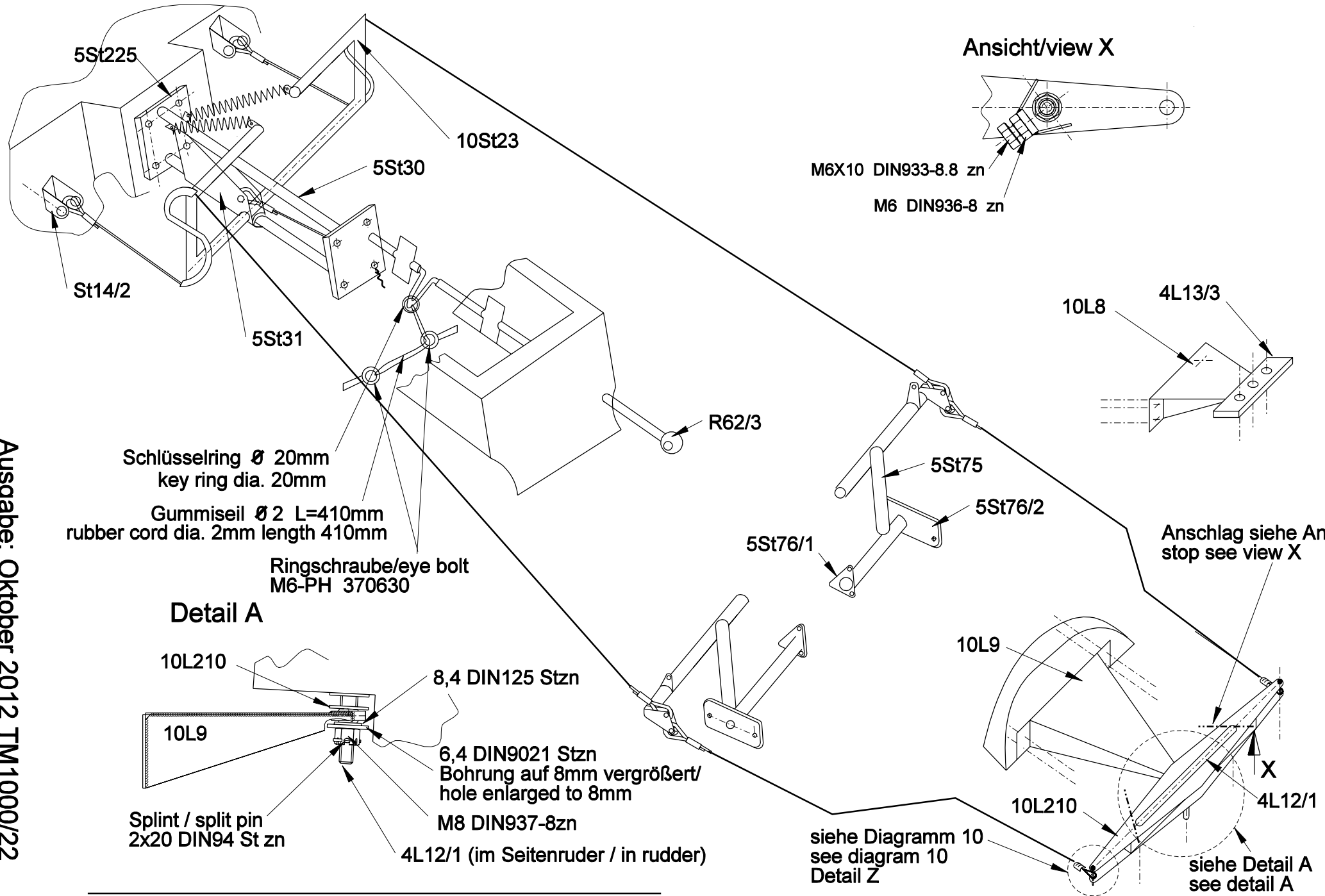
### 8.2 Control surface sealings and turbulators

25.4 mm= 1 in., 1 m = 3.2809 ft.

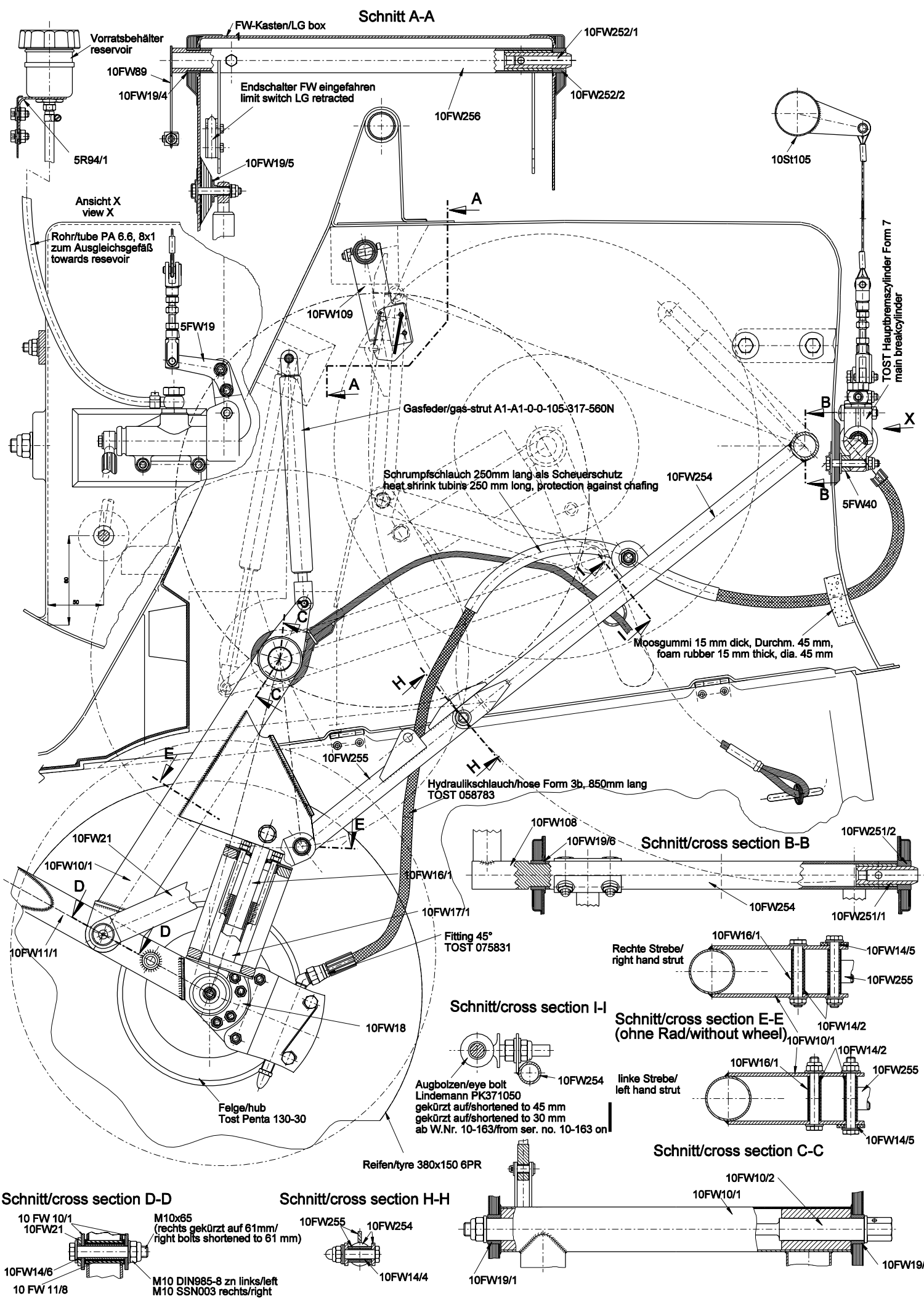
1. Wings - upper surface
  - 30003125 Mylar sealing 0.19 x 22 mm without glue, curved
  - 70000253 Tesafix No. 4965, 9 mm wide, 50 m roll glue film
  - 70000229 Tesafilm 4104 white, 19 mm wide, 66 m roll PVC tape
2. Wings - lower surface
  - 30003300 Noppenband 10m roll (dimple turbulator tape)
3. Ailerons (sliding surface and internal sealing)
  - 30003136 Teflon-glass fabric 0.08 x 38 mm, 33 m roll selfadhesive
  - 70000229 Tesafilm 4104 white, 19 mm wide, 66 m roll PVC tape
4. Horizontal tailplane
  - 30003129 Zig-zag turbulatortape 60 degree 0.4 mm thick
  - 30003125 Upper surface: Mylar sealing 0.19 x 22 mm without glue, curved
  - 30003124 Lower surface: Mylar sealing 0.19 x 22 mm without glue, flat
  - 70000253 Tesafix No. 4965, 9 mm wide, 50 m roll glue film
  - 70000229 Tesafilm 4104 white, 19 mm wide, 66 m roll PVC tape
5. Vertical tailplane
  - 30003142 Zig-zag turbulatortape 60 degree 0.8 mm thick
  - 30003128 Mylar sealing 0.19 x 30 mm without adhesive, curved, leading edge scarfed
  - 70000253 Tesafix No. 4965, 9 mm wide, 50 m roll glue film
  - 70000229 Tesafilm 4104 white, 19 mm wide, 66 m roll PVC tape
  - 70000295 Internal sealing: 3M Scotch V-seal weatherstrip Cat.Nr.2101 5.2 m roll

### 8.3 Parts for landing gear

- 60000322 Gasstrut A1-A1-0-0-105-317-560N (for LG- retraction)
- 60000072 Mainwheel assembled Tost No.: 055536+665681+065995, 5" "Scheibenbremsrad Penta 130-30"
- 60000168 Lockable gas strut K0V2P-3-200-647-001/460N
- 41041400 Spindle drive completely assembled
- 60510463 Limit switch 164-(LG retracted)
- 60510464 Limit switch 164-574 (LG extended)
- 41040008 Limit switch XGG2-88-S20Z1 (gas strut)
- 60510506 Manual extension-retraction switch MTG 106 G (LG up, down)
- 60510375 Press button 12G2904 with cap 12G2910 black (LG up)
- 60510865 Switch 1006.1511 (**optional with TN1000/19, standard from ser.no. 10-157 on**)

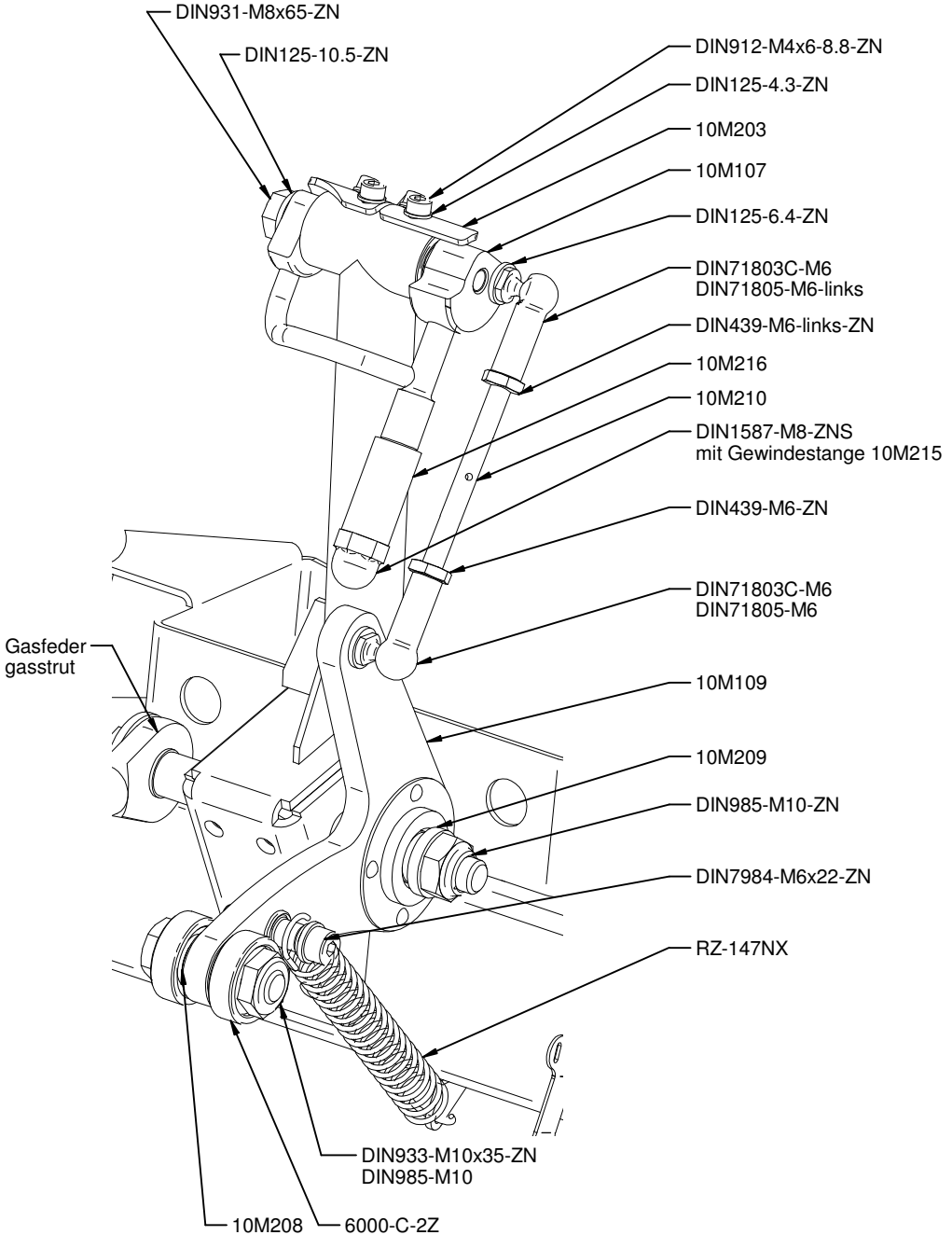






# Propellerstopper Propeller stopper

# Diagramm 15 diagram 15



**fuel hoses**  
 8x2x12 PUR, transparent  
 PU hydrolyse and microbe resistant

7,5x13,5 DIN 73379-2A,  
 with metal shield

3,5x7,5 fabric braided  
 with metal shield

7,5x13,5 DIN 73379-2A

15x23 fabric braided

**Fittings and clamps**

m red heat shrink tubing, 30mm long  
 n blue heat shrink tubing, 30mm long

o clamp 95  
 p clamp 145

r elbow fitting WSAG 06 1/8" brass  
 s elbow fitting WSAG 08 1/8" brass  
 t nipple SAG 08/R 1/8"

u hose clamp S70/7 (14/9)

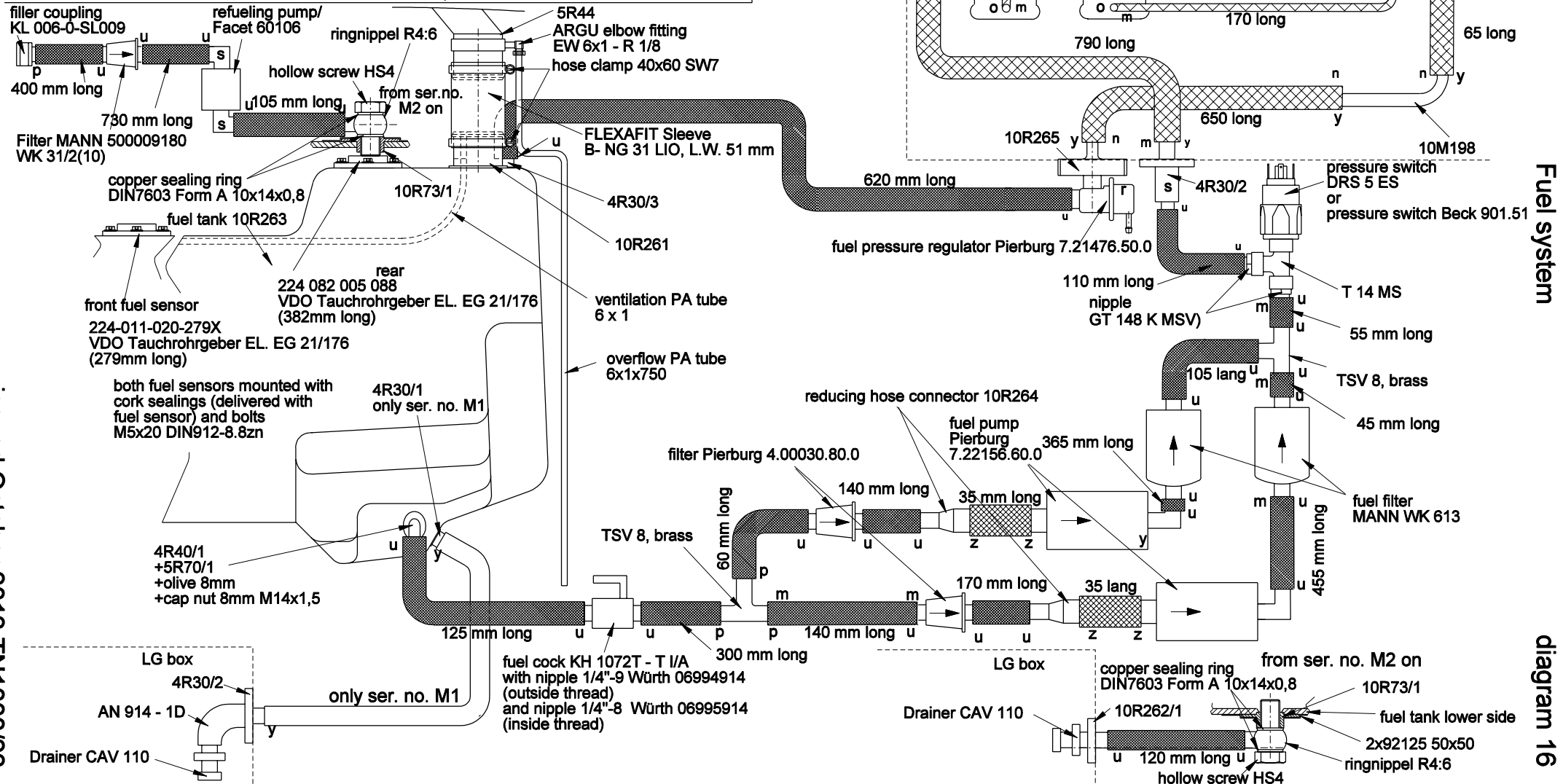
v hose clamp S70/4 (6/7)

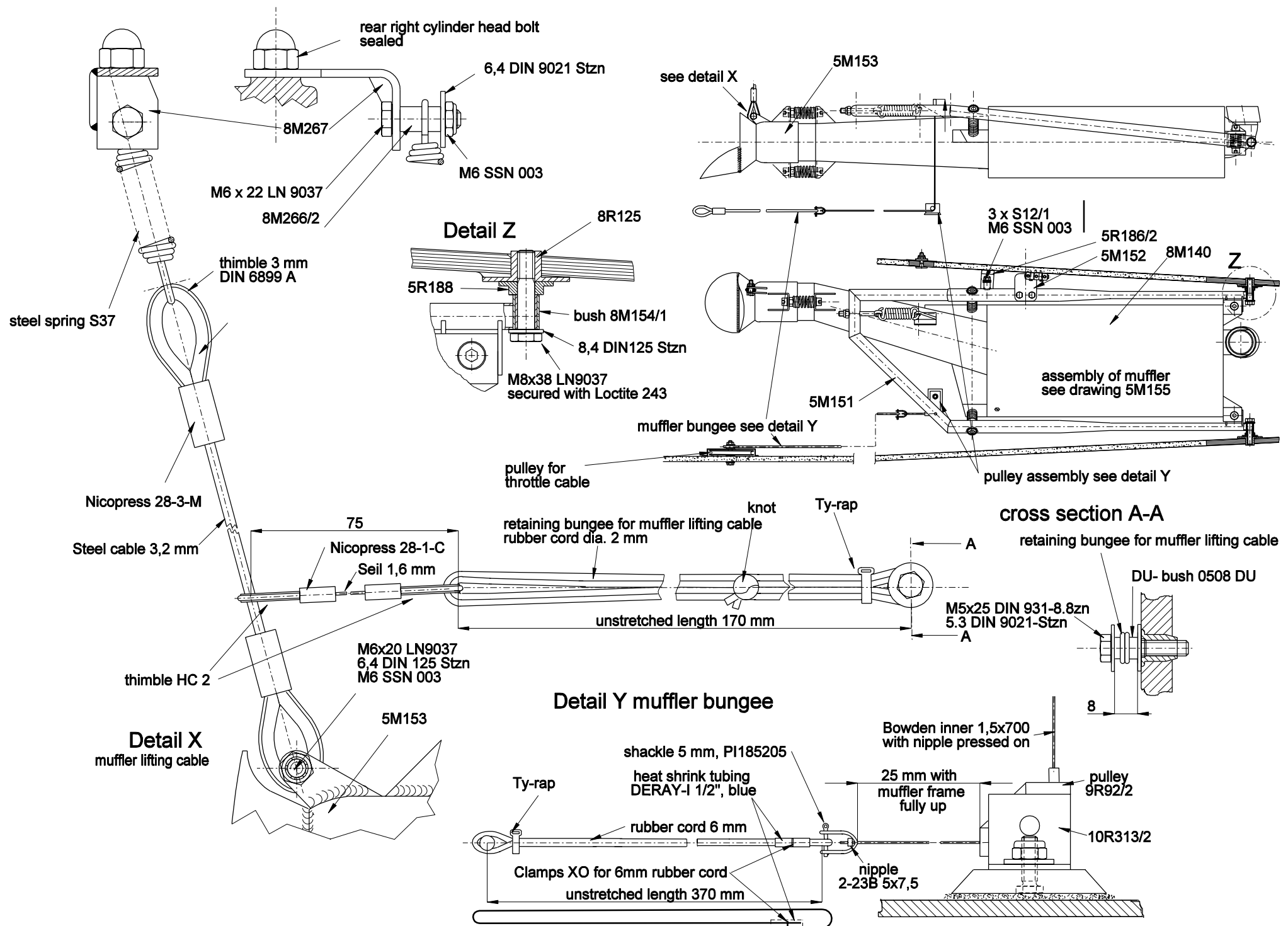
w hose clamp S70/1 (9/9)

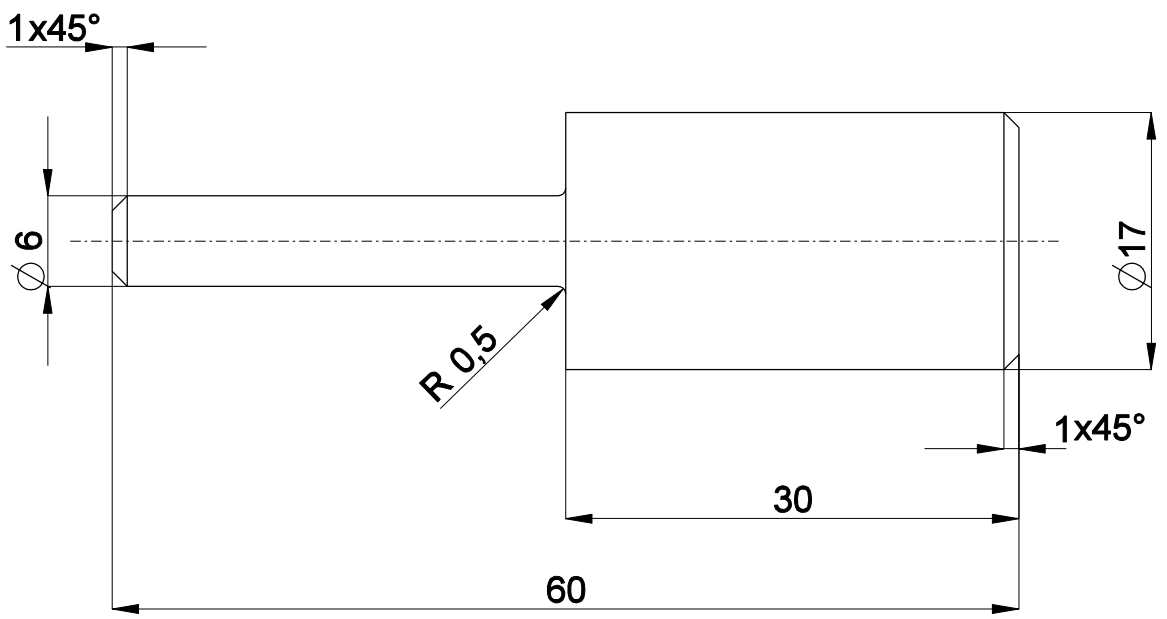
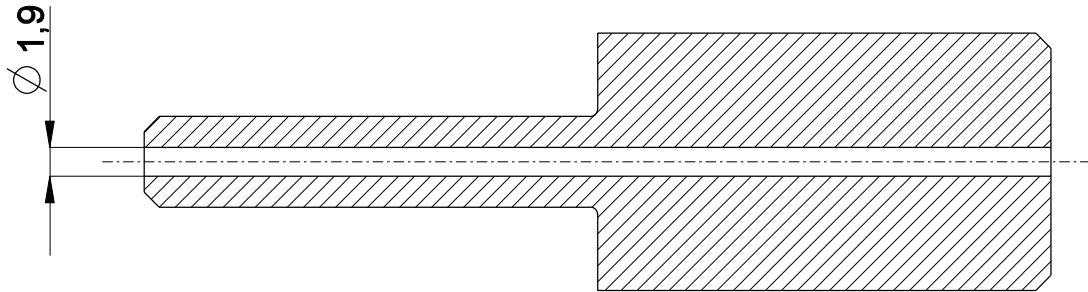
x hose clamp S70/2 (11/9)

y hose clamp 539, 8-16mm, width 9mm W2

z hose clamp 539, 16-25mm, width 9mm W2








Teil 1	Stück 1
Oberflächenschutz: /	
Werkstoff: Messing beliebig	

material: brass

Toleranzen nach Arbeitsanweisung BA 1					Tag	Name	<b>DG</b> <b>Flugzeugbau GmbH</b> 76646 Bruchsal Otto-Lilienthal-Weg 2
Schweißen nach Arbeitsanweisung SA 1							
					Gepr.		
					Norm.		
					Maßstab	<b>Prüfadapter</b> <b>test adapter</b>	 <b>W59</b>
					2:1		
					Maße ohne Toleranzang. nach:		
Ausg.	Änderung	ÄM	Tag	Name			



