

0 General**0.1 Manual amendments**

No.	Page	Description	Date
1	0.3, 0.6, 0.10, 1.22, 1.23, diagram 15a	TN1000/09	October 2006
2	0.5, 0.6, 8.2, diagram 15a	ÄM 1000-1-07	December 2006
3	0.0, 0.3-0.6, 0.12, 1.1, 3.3, 4.2, 4.16, 4.17, 4.21, 4.28, 8.1, 8.4, diagrams 5, 6, 8 - 10, 12, 15, 15a, SEP50, 5V18, 10FW2, encl. 2 page 1	TN1000/10 Manual revision	January 2007
4	0.1, 0.6, diagram 14	TN1000/11 Manual revision	October 2007
5	0.3, 0.4, 0.6, 0.10, 1.9, 1.10, 4.7-4.9, diagrams 17, 18	landing gear positive locking device TN1000/13	February 2008
6	0.3, 0.4, 0.6, 0.10, 1.19, 2.1, diagram 19, enclosure 3	TN1000/15 Throttle handle in rear Cockpit Option	March 2008
7	0.3, 0.6, 0.10, 1.14, diagram 6a	ÄM 1000-02 Fin ballast tank valve and handle	March 2008

0.2 List of effective pages

Section	page	issued	replaced/	replaced/	replaced/
0	0.0	June 2005	January 2007		
	0.1	see manual amendments			
	0.2	"			
	0.3	"			
	0.4	"			
	0.5	"			
	0.6	"			
	0.7	June 2005	January 2007		
	0.8	"			
	0.9	"			
	0.10	"			
	0.11	"			
	0.12	"			
			Febr. 2008	March 2008	
			January 2007		
1	1.1	June 2005	January 2007		
	1.2	"			
	1.3	"			
	1.4	"			
	1.5	"			
	1.6	"			
	1.7	"			
	1.8	"			
	1.9	"			
	1.10	"			
	1.11	"			
	1.12	"			
	1.13	"			
	1.14	"			
	1.15	"			
	1.16	"			
	1.17	"			
	1.18	"			
	1.19	"			
	1.20	"			
	1.21	"			
	1.22	"			
	1.23	"			
	1.24	"			
	1.25	"			
			Febr. 2008	March 2008	
			Febr. 2008	Febr. 2008	
			March 2008		
			March 2008		
			March 2008		
			October 2006	October 2006	
			October 2006		

0.2 List of effective pages (continued)

Section	page	issued	replaced/	replaced/	replaced/
	1.26	"			
	1.27	"			
	1.28	"			
	1.26	"			
	1.30	"			
	1.31	"			
	1.32	"			
	1.33	"			
2	2.1	June 2005	March 2008		
	2.2	"			
	2.3	"			
	2.4	"			
	2.5	"			
	2.6	"			
3	3.1	June 2005			
	3.2	"			
	3.3	"			
	3.4	"			
	3.5				
	3.6				
	3.7				
	3.8				
	3.9				
4	4.1	June 2005			
	4.2	"	January 2007		
	4.3	"			
	4.4	"			
	4.5	"			
	4.6	"			
	4.7	"	Febr. 2008		
	4.8	"			
	4.9	"	Febr. 2008		
	4.10	"			
	4.11	"			
	4.12	"			
	4.13	"			

0.2 List of effective pages (continued)

diagram	issued	replaced/	replaced/	replaced/
1	May 2004			
2	Nov. 2001			
3	June 2005			
4	Nov. 2001			
5	Nov. 2001	January 2007		
6	Nov. 2001	January 2007	March 2008 Not valid for 10-101, and from 10-128 on	
6a	March 2008			
7	Nov. 2004			
8	Nov. 2001	January 2007		
9	June 2005	January 2007		
10	May. 2005	January 2007		
11	June 2005			
12	Sept. 2003	January 2007		
13	June 2005			
14	June 2005	October 2007		
15	June 2005	January 2007		
15a	Oct. 2006	Dec. 2006	January 2007	
16	June 2005			
17	Febr. 2008			
18	Febr. 2008			
19	March 2008			
5EP34	25.01.90			
5EP50	17.12.98			
5V18	14.10.94			
10FW2	05.10.99			
10E102	14.09.05			
10E103	24.06.05			
Encl. 1	June 2005			
Encl. 2	June 2005	Page 1 January 2007		
Encl. 3	March 2008			

diagrams

1	Elevator control, trim
2	Rudder control
3	Aileron and spoiler controls in the fuselage
4	Aileron and spoiler controls in the wings
5	Tow releases
6	Water ballast system
6a	Waterballast system 10-101, from 10-128 on
7	Landing gear, hydraulic wheel brake (Version without nose wheel)
8	Landing gear, hydraulic wheel brake (Version with nose wheel)
9	Landing gear, non retractable
10	Systems for static and total pressure
11	Placards
12	Landing gear control (Version without nose wheel)
13	Powerplant
14	Extension/retraction mechanism
15	Fuel system
15a	Fuel system with automatic fuel cock
16	Powerplant retaining cables
17	Landing gear positive locking device
18	actuation unit LG locking device, differences to diag. 12
19	Throttle handle in front and rear Cockpit TN1000/15
5EP34	Installation plan Dräger oxygen system
5EP50	Installation plan ELT ACK
5V18	Tool for airbrake adjustment
10FW2	Spring leg (landing gear)
10E102	Wiring plan DINA1 (in aircraft log)
10E103	Wiring scheme
Encl. 1	Download instructions for flightlog and service data from the DEI-NT
Encl. 2	Instructions for transponder installation
Encl. 3	Service Throttle handle in front and rear Cockpit TN1000/15

1.6 Undercarriage**1.6.1 Main wheel (Version without nose wheel)**

1.6.1.1 Undercarriage control circuit

see diagram 12 and 7 (inside landing gear box)

In the retracted position the undercarriage is locked by an over centre device.

In the extended position the lock is by a locking notch at pushrod 10FW38 in the rear cockpit and additionally by over centre locking force generated by a rubber buffer. A gas strut reduces the retraction force and keeps the undercarriage in the retracted overcentre locking position.

With TN1000/13 executed, standard from ser. no. 10-133 on:

An additional landing gear positive locking device (notch and latch at the landing gear struts) secures the landing gear in the extended position.

An additional catch in the front upper area of the landing gear box secures the landing gear in retracted position. See diagrams 17 and 18.

1.6.1.2 Adjustment

- a) In extended position (landing gear struts over centre) a max. free play of ca. 0.5 mm (0.02 in.) between the notch at pushrod 10FW38 and the locking plate 10FW35 (see detail X in diagram 12) is allowed when the landing gear handle is pushed forward with a force of approx. 200N (44 lbs.), measurement with main wheel not resting on the ground. Adjustment should be made at the rod end in pushrod 10FW20 at the connection to the actuating lever 10Fw15/1.

Adjustment of the rubber buffer:

- a) Screw out the rubber buffer just so far that it touched the GFRP block (L/G extended).
 b) Retract the L/G a little and screw out the rubber buffer for another 4-4.5mm (.16-.18 in.). Fix in position by counter rotating the nut.

With TN1000/13 executed, standard from ser. no. 10-133 on:

- screw out the rubber buffer for only 2 - 2.5mm (.08 -.10 in.).
 c) Sit in the front cockpit and extend the L/G. You must feel an over centre locking force.
 d) Retract the L/G, you must feel a strong locking force. If necessary increase the locking force by unscrewing the rubber buffer or decrease the locking force by screwing in the buffer.
 b) Overcentre lock in retracted position:
 Adjustment of the overcentre locking force inside the landing gear box is at the rod ends in the two pushrods 10FW14/3 at their connections to shaft 10FW13/1. The overcentre travel may be adjusted by changing the thickness of the stop-blocks located at the roof of the landing gear box.
Warning: If you have adjusted the overcentre locking force don't fail to readjust the locking in extended position see a).

c) **With TN1000/13 executed, standard from ser. no. 10-133 on::**

Adjust the stop bolt in part 10FW74 so that dimension a will be between 14,5 and 15.5 mm (.57 in. and .61 in.) see diagram 18.

Adjust the cable via the adjustment screw in part 10FW74 so that the locking pin disengages when retracting the landing gear. The distance 1mm according to diagram 17 also applies for the disengaged locking pin.

Don't tighten the cable too much!

1.6.1.3 Free play

Free play between bellcrank 10FW15/1 and shaft 10FW13/1 is not allowed.

If there is any free play tighten the two securing bolts M 6x35 at the bellcrank and the two securing bolts M6x35 inside the landing gear box at the shaft with a 10 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 8 H7. M 8 x 40 LN 9037 bolts should then be installed. The bolts for installation inside the landing gear box must be shortened to 36mm.

1.6.2 Main wheel (Version with nose wheel)

1.6.2.1 Undercarriage control circuit
see diagram 8

In the retracted position the undercarriage is locked by an overcentre device. In the extended position the lock is by a locking notch at pushrod 5FW38 in the rear cockpit. A gas strut reduces the retraction force and keeps the undercarriage in the overcentre locking position (retracted and extended).

1.6.2.2 Adjustment

- a) **Overcentre lock in retracted position:** Adjustment at the adjustment screw between landing gear operating lever 5FW8 and the bellcrank 5FW36.
The stop is located at the pushrod 5FW38 and stops against the pedestal 5FW41. Adjust this stop after adjusting the lock in the extended position see b) by gluing slotted shims onto the stop-sleeve of pushrod 5FW38.
- b) **In extended position** (landing gear struts over centre) a max. free play of ca. 0.5 mm (0.02 in.) between the lock at pushrod 5FW38 and the locking plate 5FW35 is allowed. Adjustment at the rod end in pushrod 5FW37 between 5FW38 and 5FW 36.

1.6.2.3 Free play

Free play between lever 5FW8 and the upper strut 5FW12 is not allowed.

If there is any free play, the two securing bolts M 6 x 40 should be tightened with a 10 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 8 H7. M 8 x 40 LN 9037 bolts should then be installed.

1.8.2 Fin tank

The fin ballast tank is constructed as integral tank.

a) Adjustment

The release cable must be adjusted so that the cable just becomes loose when the handle is parallel to the fuselage wall.

b) Inspection

According to sect. 2.2 a special inspection is to be carried out on the fin ballast tank system at each annual inspection.

The dump time of the full fin tank should be timed and should not exceed 120 seconds.

Check the calibration of the outside air temperature gauge (in the DEI-NT).

Up to ser.no. 10-100 and ser.no. 10-102 to 10-127:

Remove the tailwheel and the cover plate in the tailwheel box. Check the control cable and the lever of the valve carefully for wear. Check the control cable at the operating handle too. If the cable or the lever is worn, further use of the fin tank is prohibited. Please contact the manufacturer for a detailed repair instruction.

Ser.no. 10-101, and from ser. no. 10-128 on:

Check the control cable at the operating handle and at the dump valve (installed in the lower rudder mounting bracket). If the cable is worn, further use of the fin tank is prohibited.

1.12.6 Starter:

Electric starter motor, type see section 8.1.

1.12.7 Ignition system:

a) spark plugs;

Electrode gap 0.5 mm (0.02 in.), type see section 8.1.

b) Ignition coils: One coil per cylinder, type see section 8.1

1.12.8 Throttle cable connections

The cables can be finely adjusted at the adjusting screws located at the intake manifolds (holders for the Bowden outers).

The cables are 1.5 mm diameter Bowden-cable

The stop for idle adjustment is at the rear carburettor.

Friction brake for throttle control: This device is located at the control bellcrank in the instrument panel.

The brake force must be adjusted for a control force of 15 - 50 N (3 - 11 lbs.).

Option: throttle handle in rear cockpit TN1000/15:

a) No friction brake installed.

b) The interconnection between front and rear throttle handles is by means of 2 hydraulic cylinders and hydraulic lines.

Periodical service is not required. Instructions for service and repair are given in enclosure 3 for this MM.

1.12.9 Propeller stopper

Automatic operation: During powerplant retraction the propeller stopper is moved forward in the propeller circle by a gas strut (with compensator spring).

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 sealing of the rudder (see section 1.3.5).

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 7.14 of the flight manual.
 - Check the rubber cords in the control system (see sections 1.2.6 and 1.7.5).
 - Check the thickness of the wheel brake linings (see section 1.6.4).
 - Check if the brake fluid has to be exchanged (see section 1.6.4).
 - Check the airbrakes according to section 4.4.
 - Check the fin ballast tank system according to section 1.8.2.2.
 - Check if the powerplant has been serviced according to section 3.6.1.
 - Check the friction brake of the throttle control (see section 1.12.8).
- Option: throttle handle in rear cockpit TN1000/15:**
Check of friction brake not applicable, not installed.
- 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 yearly inspection.

C Removal of the lower landing gear fork 10Fw11/1

1. Remove the main wheel see A.
2. Retract the landing gear.
Warning: The landing gear will retract by itself when unlocked by the force of the gas spring!
3. Disassemble the gas spring from the left side of the undercarriage box see 4.5.0.
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 drawing 10Fw2 (enclosed to this manual).

E Removal of the struts 10Fw14/1

1. Remove the main wheel see A.
2. Retract the landing gear.
Warning: The landing gear will retract by itself when unlocked by the force of the gas spring!
3. Disassemble the gas spring from the left side of the undercarriage box see 4.5.0.
4. Extend the landing gear again.
5. **With TN1000/13 executed, standard from ser. no. 10-133 on:**
Remove the positive locking device for the extended landing gear position.
6. Remove the 2 bolts M8×65 LN9037 which connect the struts to fork 10Fw10/1.
7. Remove the 2 bolts M8×40 LN9037 which connect the struts to the rear fork 10Fw12/2.
With TN1000/13 executed, standard from ser. no. 10-133 on:
bolt M8x40 LN9037 on the right hand side and bolt M8x42 LN9037 on the left hand side
8. Remove the 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. Remove the nut M12 from the left hand side of the axle 10Fw10/2. Shift the axle towards the fuselage wall. Mark the head of the axis at the outside fuselage wall (e.g. by illuminating this area from the inside) and drill a dia. 24 mm hole through the fuselage wall. Insert a bolt with thread M8 into the head of the axle (from ser. no. 10-7 on) to pull out the axle through the hole.
7. Remove the front fork 10Fw10/1.

G Removal of the rear fork 10Fw12/2

1. Remove the main wheel see A.
2. Retract the landing gear.
Warning: The landing gear will retract by itself when unlocked by the force of the gas spring!
3. Disassemble the gas spring from the left side of the undercarriage box see 4.5.0.
4. Extend the landing gear again.
5. Remove the 2 bolts M8×40 LN9037 which connect the struts to the rear fork 10Fw12/2.
With TN1000/13 executed, standard from ser. no. 10-133 on:
bolt M8x40 LN9037 on the right hand side and bolt M8x42 LN9037 on the left hand side.
6. Remove the 2 bolts M6×24 LN9037 which connect the struts to the rear fork 10Fw12/2, don't change the length of the struts and don't mix up right and left strut.
7. Remove the nut M12 from the left hand side of the axle 10Fw12/1. Shift the axle towards the fuselage wall. Mark the head of the axis at the outside fuselage wall (e.g. by illuminating this area from the inside) and drill a dia. 24 mm hole (ser. no. 10-1 up to 10-6) resp. dia. 20mm (from ser,no. 10-7 on) through the fuselage wall. Insert a bolt with thread M8 into the head of the axle (from ser. no. 10-7 on) to pull out the axle through the hole.
8. Remove the fork 10Fw12/2.

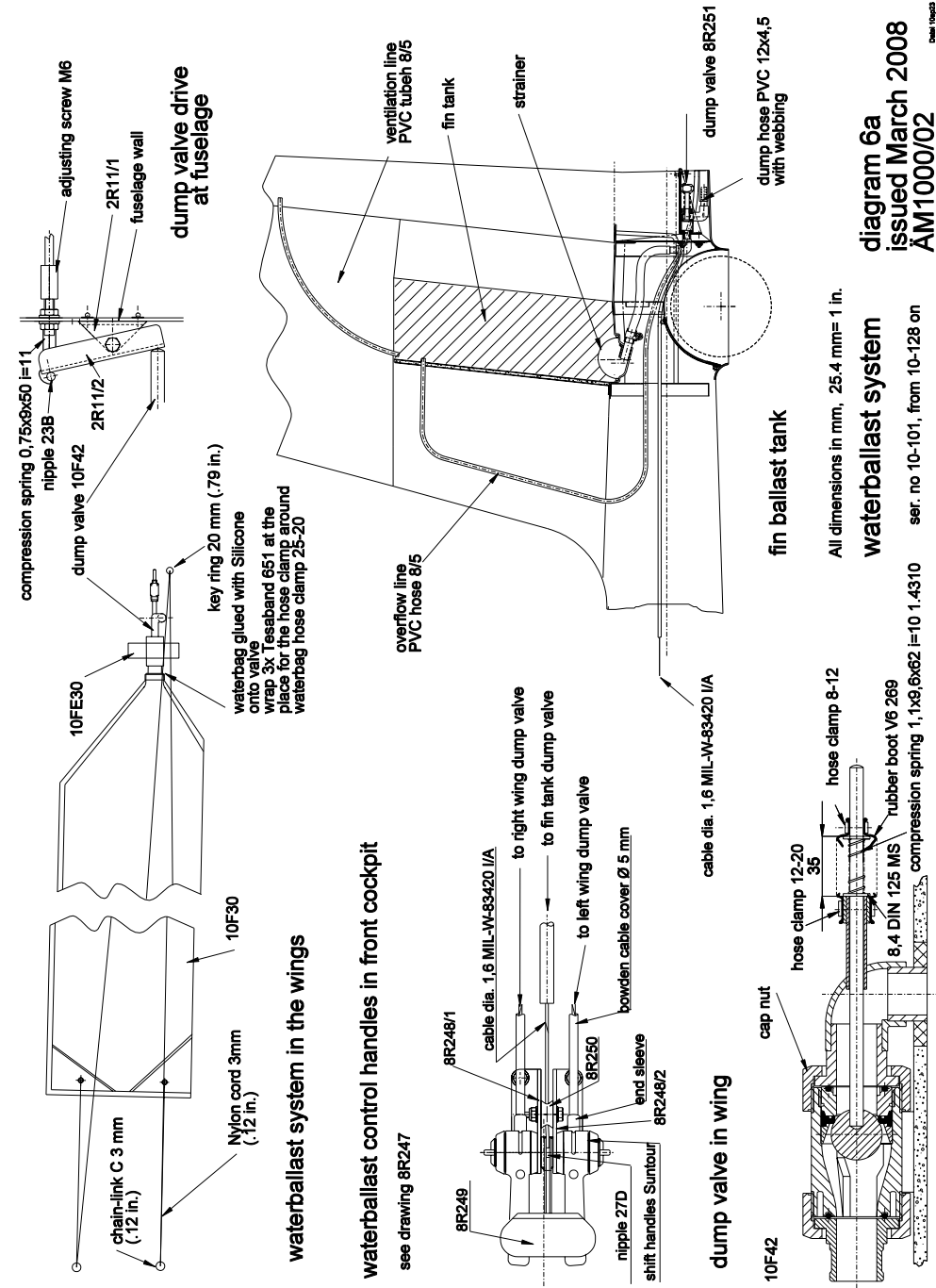
H Removal of the front upper fork 10Fw13/1

1. Remove the main wheel see A.
2. Retract the landing gear.
Warning: The landing gear will retract by itself when unlocked by the force of the gas spring!
3. Disassemble the gas spring from the left side of the undercarriage box see 4.5.0.
4. Extend the landing gear again.
5. Remove the 2 bolts M6×26 LN9037 which connect the struts 10Fw14/3 to the front upper fork 10Fw13/1.
6. Remove the pushrod 10Fw20 from the actuating lever 10Fw15/1.
7. Remove the 2 bolts M6x35 LN9037 which connect the actuating lever 10Fw15/1 to the shaft 10Fw15/3. Shift lever 10Fw15/1 in outboard direction and remove it.
8. Remove the 3 bolts M6x35 LN9037 which connect the shaft 10Fw15/3 (left) and 10Fw15/2 (right) to the fork 10Fw13/1.
With TN1000/13 executed, standard from ser. no. 10-133 on: remove the locking catch. (lock for retracted position)
9. Shift the shaft 10Fw15/3 towards the left fuselage wall. Mark the shaft at the outside fuselage wall (e.g. by illuminating this area from the inside) and drill a dia. 18 mm hole through the fuselage wall. Insert a bolt with thread M8 into the shaft to pull out the shaft through the hole.
10. Insert a bolt with thread M10 into the shaft 10Fw15/2 to pull out the shaft (no hole in the fuselage shell needed).
11. Remove the fork 10Fw13/1.

I Installation

1. Reverse the above procedures
2. Use new nuts LN9348 and a new split pin dia. 1.6x12 DIN94 zn. Install bolts in same directions and washers at same positions.
During reassembly secure the 2 bolts A with Loctite 243 or safety wire.

Note: It is sufficient to tape the holes drilled for removal of the axles. GFRP repair is not necessary.



All dimensions in mm, 25.4 mm = 1 in.

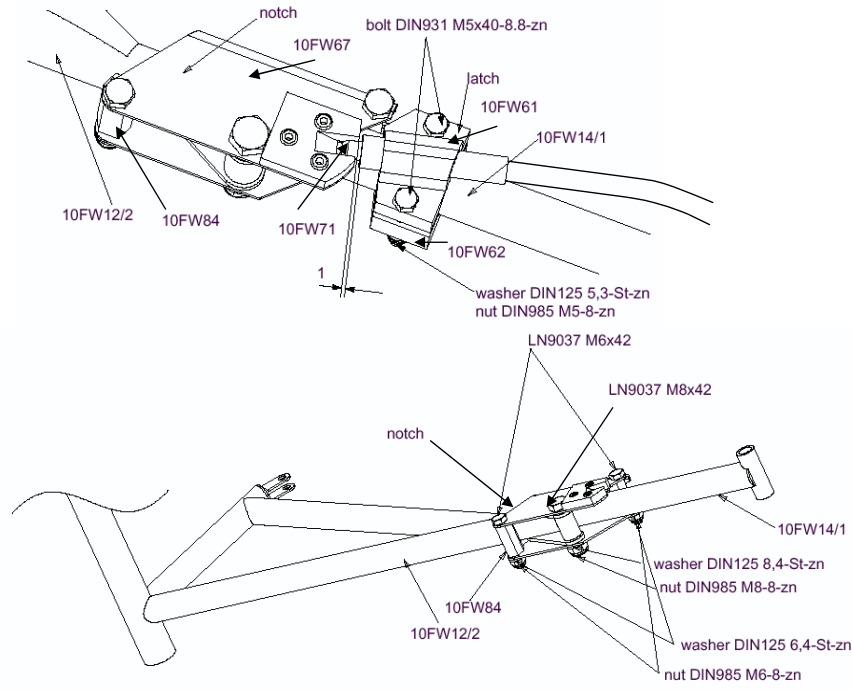
waterballast system

ser. no 10-101, from 10-128 on

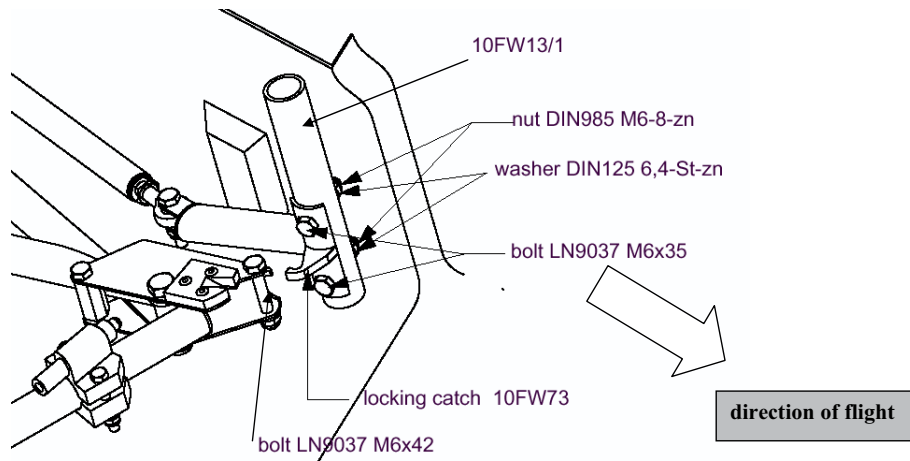
diagram 6a
issued March 2008
AM1000/02

Landing gear positive locking device

diagram17
issued February 2008
TN1000/13

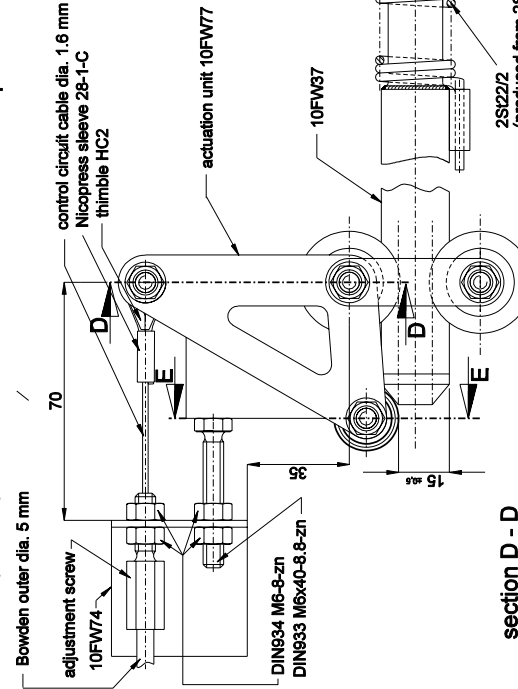


installation of the notch (LG extended) to 10FW12/2

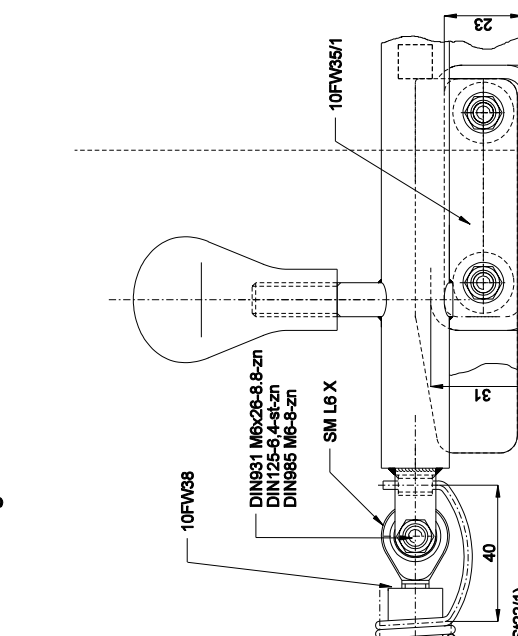


Installation of the locking catch. View LG retracted, locking catch not engaged

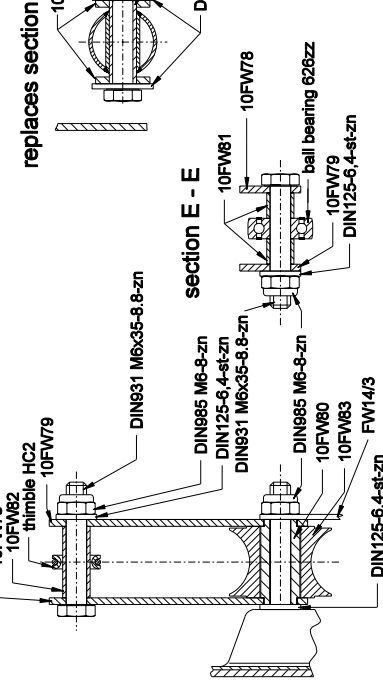
additionally to diagram 12



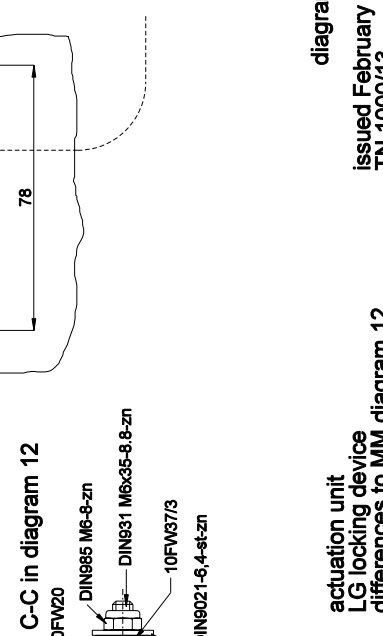
replaces detail W in diagram 12



section D - D



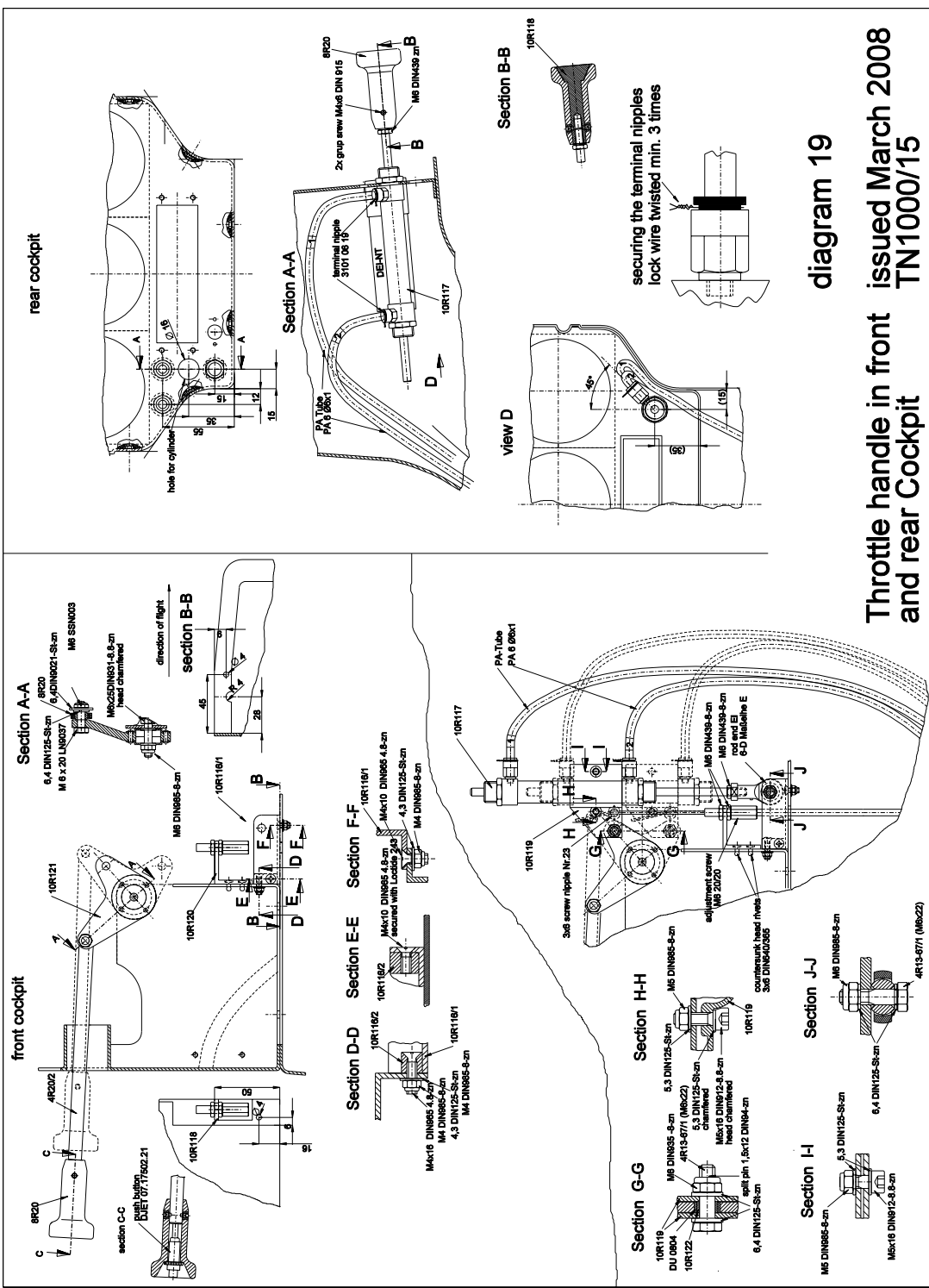
replaces section C-C in diagram 12



section E - E

diagram 18
issued February 2008
TN 1000/13

actuation unit
LG locking device
differences to MM diagram 12



Throttle handle in front and rear Cockpit
 diagram 19
 issued March 2008
 TN1000/15

Enclosure 3 for maintenance manual DG-1000T

Optional throttle handle in the rear cockpit TN1000/15 Service Instructions

Part designations see MM diagram 19 and sketches below

I. Bleeding the hydraulic system

Necessary material:

- Hydraulic fluid: Magura Blood Hydraulic Mineral Oil (don't use brake fluid)

Necessary tools:

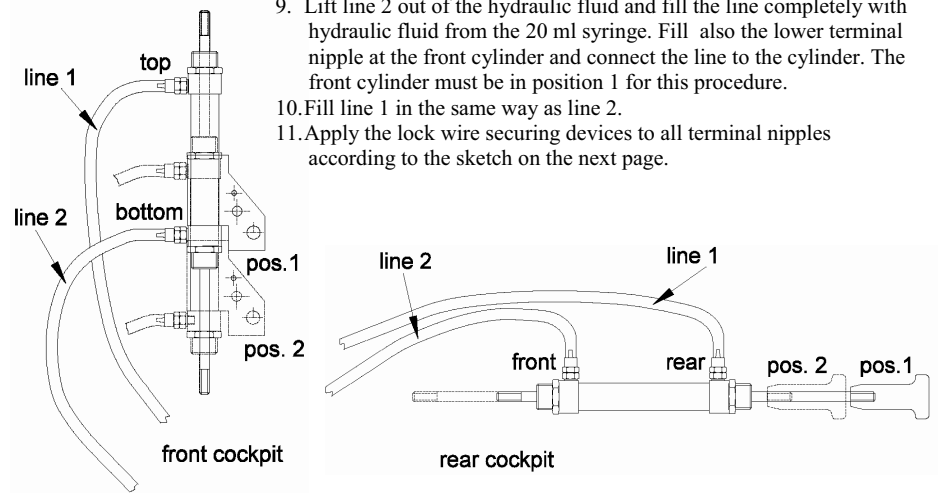
- Different spanners
- one 50 ml syringe
- one 20 ml syringe

Instructions:

If there is so much air in the system that you can move the rear cylinder with the front cylinder blocked more than ± 5 mm, both lines and both cylinders must be refilled.

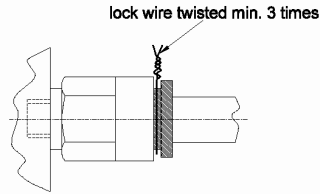
Proceed as follows:

1. Remove the cover from the front instrument panel and open the rear instrument panel.
2. Remove both cylinders. To accomplish this disconnect the front cylinder at its lower mounting and remove the clamp from the front cylinder. Don't remove the Bowden cable from the clamp! Remove the handle from the rear cylinder. Remove the lock wires from all terminal nipples.
3. Move the rear cylinder from position 1 to position 2. The terminal nipples must point upwards.
4. Remove line 2 from the front cylinder. To accomplish this press the black securing ring into the terminal nipple. Push one 50 ml syringe into the line.
5. Remove line 2 from the rear cylinder. Insert the line into a canister with hydraulic fluid.
6. Pull approx. 50 ml hydraulic fluid with the syringe through the line.
7. Fill the 20 ml syringe with hydraulic fluid. Lift line 2 out of the hydraulic fluid and fill the line completely with hydraulic fluid from the 20 ml syringe. Fill also the front terminal at the rear cylinder and connect the line to the cylinder.
8. Remove the syringe from the front end of line 2. Fill the line completely with hydraulic fluid. Insert the line into a canister with hydraulic fluid. Pull the rear cylinder to position 1. The terminals of the front cylinder must point upwards. Pick up the excess hydraulic fluid
9. Lift line 2 out of the hydraulic fluid and fill the line completely with hydraulic fluid from the 20 ml syringe. Fill also the lower terminal nipple at the front cylinder and connect the line to the cylinder. The front cylinder must be in position 1 for this procedure.
10. Fill line 1 in the same way as line 2.
11. Apply the lock wire securing devices to all terminal nipples according to the sketch on the next page.



Securing the terminal nipples

Use lock wire with min. 0.8 mm diameter.
The lock wire is necessary to prevent the connection from inadvertent opening.



12. Reinstall all parts. The clamp at the front cylinder must contact the lower flange of the cylinder.

II. Replacing of components of the hydraulic system

Instructions:

II.1 Replacing a cylinder

Necessary material and tools:

- see I
- Hydraulic cylinder: JOUCOMATIC 43850028-0050
- 2 pieces of Polyamid PA6 tube 6 x 1 (outside dia. x wall thickness), approx. 0.5 m long

Instructions:

1. Perform steps 1 and 2 of I.
2. Remove the lines from the defective cylinder. To accomplish this press in the black securing rings into the terminal nipples. Empty the cylinder into a container. Remove the terminal nipples from the cylinder.
3. Screw the terminal nipples into the new cylinder and tighten firmly.
4. Fill the new cylinder. To accomplish this fill a Polyamid PA6 tube 6 x1 approx. 0.5 m long via a syringe with hydraulic fluid. Move the cylinder into position 2
Connect the tube to the front terminal (rear cylinder) resp. the upper terminal (front cylinder). Insert the other end of the tube into a container with hydraulic fluid and move the cylinder to position 1.
5. Fill the second Polyamid PA6 tube with hydraulic fluid and connect it to the other terminal nipple of the cylinder. Insert also the other end of the tube into a container with hydraulic fluid.
6. Place the cylinder below the container and move the piston rod several times until no air bubbles come out of the cylinder.
7. Remove the lines.
8. Connect lines 1 and 2 to the cylinder and perform steps 3 up to 12 of I

II.2 Replacing a line

Necessary material and tools:

- see I
- Hydraulic line: Polyamid PA6 tube 6 x 1 (outside dia. x wall thickness), approx. 1,80 m long
- Tape

Instructions:

1. Perform steps 1 and 2 of I.
2. Remove the defective line from both cylinders. Pull out the hydraulic fluid with a 50 ml syringe.
3. Fix the new line to the defective line with tape. Pull out the defective line while pushing in the new line at the same time. Remove the defective line.
4. Fill the new line via a 50 ml syringe with hydraulic fluid.
5. Reconnect the line to the cylinders and perform steps 3 up to 12 of I.