

0 General**0.1 Manual amendments**

No.	Page	Description	Date
1	0.5, 0.6, 4.14-4.16 diagrams 7, 11, 12	Manual revision TN 413/2	September 2003
2	0.6, diagrams 1 and 11	Manual revision TN 413/3	May 2004
3	0.4, 0.6, 1.9, diagram 7	Landing gear / over centre lock in extended position TN 413/7	Nov. 2004
4	0.4, 0.5, 0.11, 2.6, 6.2, 6.4, 7.1	Manual revision TN 413/8	January 2005
5	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	0.4, 0.6, 0.10, 1.14 diagram 6a	ÄM 1000-02 Fin ballast tank valve and handle	March 2008
7	0.4, 0.5, 0.6, 1.2, 2.6, 4.2, 6.2, diagrams 3, 9, 11, remove page 2.7	Manual revision TN1000/16	May 2008
8	0.4, 0.5, 0.6, 0.10, 4.8, 4.9, diagram 7a	ÄM 1000-04 production version of the positive locking device	Oct. 2008
	0.4, 0.6, 0.10, diagrams 20-22, drawings 10E3, 10E4, enclosure 1	Electrically operated main landing gear TN1000/14	November 2008

0.2 List of effective pages

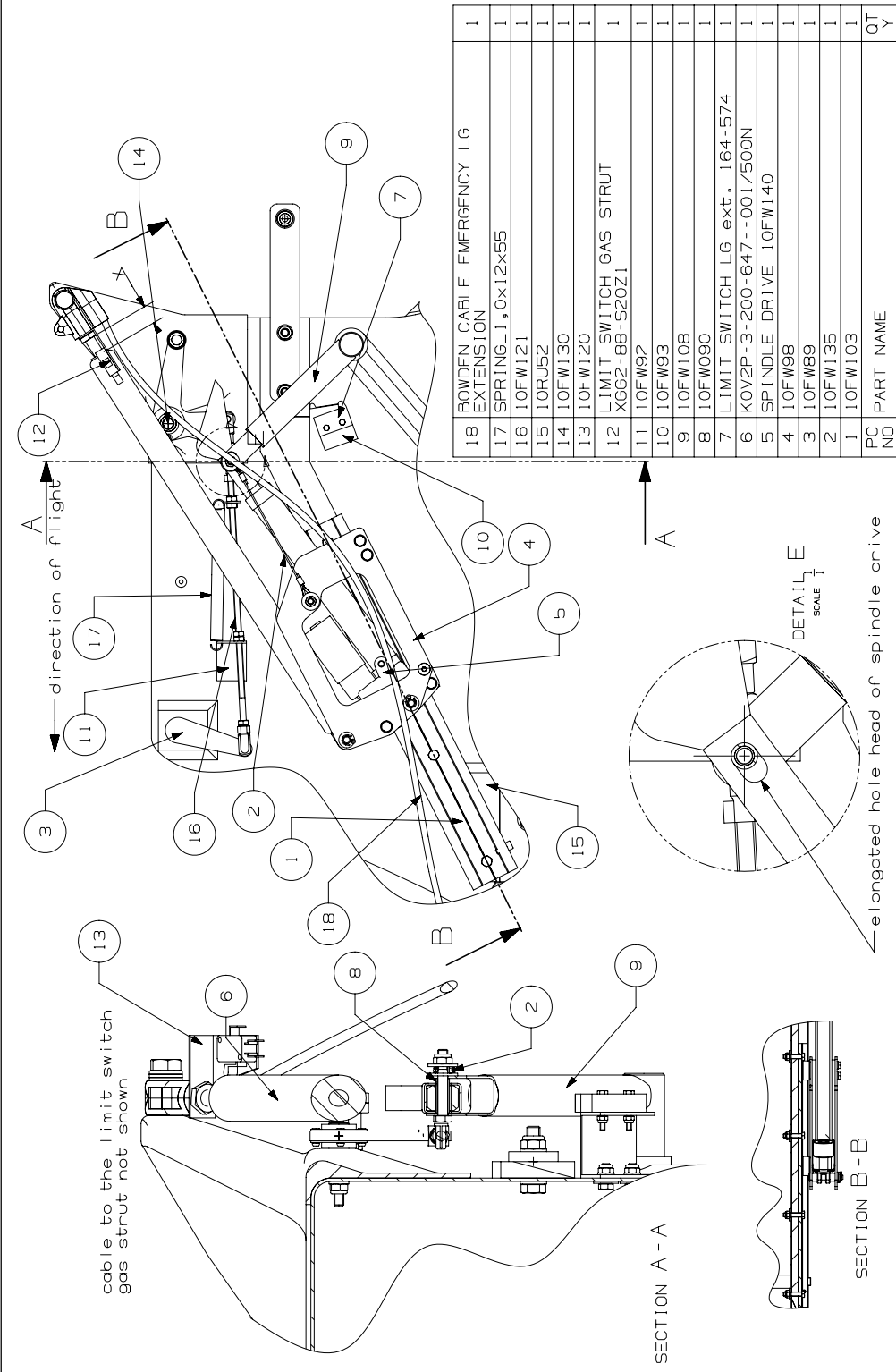
Section	page	issued	replaced/	replaced/	replaced/
0	0.1	March 2002			
	0.2	see manual amendments			
	0.3	“			
	0.4	“			
	0.5	“			
	0.6	“			
	0.7	March 2002			
	0.8	“			
	0.9	“			
	0.10	“	Febr. 2008 Nov. 2008	March 2008	Oct. 2008
	0.11	“	January 2005		
	0.12	“			
1	1.1	March 2002			
	1.2	“	May 2008		
	1.3	“			
	1.4	“			
	1.5	“			
	1.6	“			
	1.7	“			
	1.8	“			
	1.9	“	Nov. 2004	Febr. 2008	
	1.10.	“	Febr. 2008		
	1.11	“			
	1.12	“			
	1.13	“			
	1.14	“	March 2008		
	1.15	“			
	1.16	“			
	1.17	“			
2	2.1	March 2002			
	2.2	“			
	2.3	“			
	2.4	“			
	2.5	“			
	2.6	“	January 2005	May 2008	
	2.7	“	removed May 2008		

0.4 List of effective pages (continued)

diagram	issued	replaced/	replaced/	replaced/
1	Nov. 2001	May 2004		
2	Nov. 2001			
3	Nov. 2001	May 2008		
4	Nov. 2001			
5	Nov. 2001			
6	Nov. 2001	March 2008	March 2008	Not valid for 10-101, and from 10-128 on
		March 2008		
7	Nov. 2001	Sept. 2003	Nov. 2004	
7a	Oct. 2008			
8	Nov. 2001			
9	Nov. 2001	Jan. 2008		
10	Nov. 2001			
11	Nov. 2001	Sept. 2003	May 2004	May 2008
12	Nov. 2001	Sept. 2003		
17	Febr. 2008			
18	Febr. 2008			
20	Nov. 2008			
21	Nov. 2008			
22	Nov. 2008			
5EP34	25.01.90			
5EP50	17.12.98			
5V18	14.10.94			
10FW2	5.10.99			
10E3	28.11.2008			
10E4	20.10.08			
Encl. 1	Nov. 2008			

9 Enclosures	9.1
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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) up to ser. No. 10-132
7a	Landing gear, hydraulic wheel brake (Version without nose wheel) from ser. No. 10-133 on
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)
17	Landing gear positive locking device TN1000/13, no more valid from ser. No. 10-133 on
18	actuation unit LG locking device, differences to diagr. 12 for TN1000/13 and from ser. no. 10-133 on
20	Electrically operated main landing gear (in landing gear box)
21	Electrically operated main landing gear (outside landing gear box)
22	Placards electrically operated main landing gear
5EP34	Installation plan Dräger oxygen system
5EP50	Installation plan ELT ACK
5V18	Tool for airbrake adjustment
10FW2	Spring leg (landing gear)
10E3	Wiring plan DG-1000S with electrically operated main landing gear
10E4	Wiring plan electrically operated main landing gear
Encl. 1	Electrically operated main landing gear



electrically operated landing gear

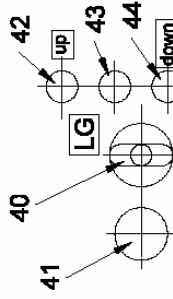
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TN1000/14

Diagram 21

Datenschilder elektrisch betätigtes Hauptfahrwerk DG-1000S
placards electrically operated mainlanding gear DG-1000S

Bedienelemente und Anzeigen für das elektrisch betätigte Fahrwerk im vorderen und hinteren Cockpit jeweils links oben im Instrumentenbrett
 Controls and control lights for the electrically operated landing gear in front and rear instrument panel (upper left hand side):



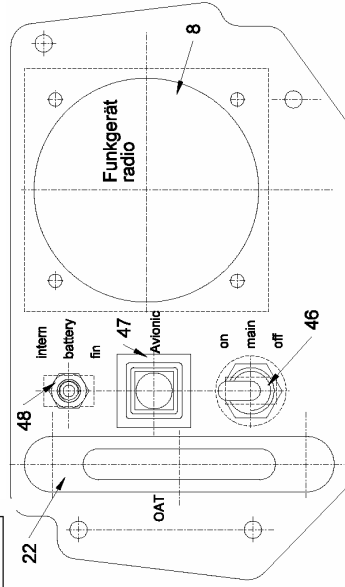
FW ein- ausfahren bis 185 km/h

or english

LG ext.-rétr. up to 185 km/h 100 kts.



linke Bordwand vorderes und hinteres Cockpit
 left fuselage wall front and rear cockpit



Instrumentenunterteil vom
 console below the front instrument panel

Diagramm 22

diagram

Ausgabe November 2008

issued

TM 1000/14

Electrically operated main landing gear

Part designations see MM diagrams 20 und 21

In the following text the changes to those sections of the maintenance manual which are effected by the installation of the electrically operated main landing gear will be given.

Section 1.6 Undercarriage

new subsection

1.6.5 Electrically operated main landing gear

This subsection replaces MM subsection 1.6.1.

1.6.5.1 Landing gear control circuit

See diagrams 20 (in LG box) and 21

With this version there are no handles and control rods for manual operation of the landing gear like Version A.

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 diagram 20).

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 red 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.

1.6.5.2 Adjustment / limit switches

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

Limit switch landing gear extended

1. Extend the landing gear electrically and check if the drag struts 10FW102 and the struts of the rear fork 10FW91 touch each other at their joint hinge point.
2. Apply a force of 100 N (2 lbs.) to the hinge point perpendicular to the centre line of the struts in upward direction. The system should be so stiff that you can move the hinge point no more than 2 mm (0.08 in.) out of line.
3. If it is possible to move the hinge point more than 2 mm, 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.
4. 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.
5. 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.

Limit switch landing gear retracted

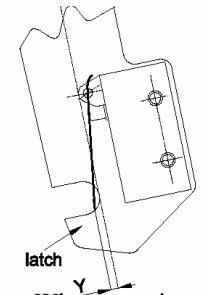
The spindle drive must be shut off in the retracted position when the bolt at the left drag strut 10FW102 engages in the notch of the left latch on shaft 10FW109 and activates the limit switch which is mounted to the latch.

Check: Activate the limit switch. The distance Y shall be 3 - 3 mm (0.08 - 0.12 in.) when the switch switches.

If necessary adjust the switch by bending it's arm.

Limit switch gas strut (emergency extension system)

This switch is mounted to the extension of the landing gear box. 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.



1.16.5.3 Free play

Free play between bell crank 10FW108 and shaft 10FW91 is not allowed.

If there is any free play tighten the two bolts M6x40 inside the landing gear box 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.

1.12 Electrical system

new subsection

1.12.1 Electrical system with electrically operated main landing gear

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

Description of operation see AFM section 9.3.

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 9.3).

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.

Limit switches see section 1.6.5.2.

Batteries: To operate the electrically operated main landing gear a battery Z01/2 must be installed in the baggage compartment. The battery must be equipped with a fuse G 250V 5x20 / 16 A.

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

Fuses and circuit breakers:

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

The wiring up to the control unit is protected by a 16 A fuse at the at the battery in the baggage compartment.

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

Landing gear warning:

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

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 retracted.

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.

Section 3 Maintenance

3.3 Greasing and oiling

Subsection amended

- Electrically operated landing gear: Clean and grease the slotted hole at the attachment of the spindle drive to the bell crank 10FW106 (see diagram 21).

Caution: 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.

Section 4 Detailed instructions for assembly and servicing work

4.5 Removal and installation of the undercarriage (main wheel)

New Subsection

4.5.3 Electrically operated main landing gear

see diagrams 20 and 21

A-D Removal of the main wheel of the brake assembly from the main wheel of the lower landing gear fork 10FW11/1 and removal of the spring legs 10FW2 see section 4.5.1 A-D

E. Removal of the drag struts 10FW102 (left) 10FW102/2 (right)

- 1 Remove the main wheel see section 4.5.1 A.
- 2 Disassemble the gas strut from the left side of the landing gear box see section 4.5.0
- 3 Remove the 2 bolts M8 LN9037 which connect the struts to fork 10FW10/1. Mark the bolts. Don't interchange the bolts during reassembly!
- 4 Remove the 2 bolts M8×40 LN9037 which connect the struts to the rear fork 10FW91.
- 5 Remove the struts.

F. Removal of the front fork 10Fw10/1

see section 4.5.1 F

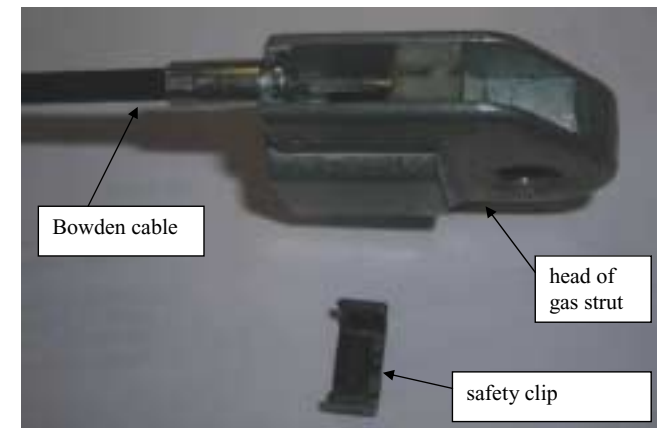
G. Removal of the shaft 10FW109 (with the latches for locking the LG in retracted position)

- 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 10FW131 and lever 10FW89.

- 4 Remove bolt M6x32, which connects the lever 10FW89 to the shaft 10FW109.
- 5 Remove the axle with cone clamping devices 10FW124. To remove the axle hold the screw head with a spanner and unfasten the counter nut with an open end spanner until the axle can be pulled out.
- 6 Pull out the lever 10FW89.
- 7 Remove the shaft 10FW109.

H. Removal of the drive unit

- 1 Retract the landing gear
- 2 Press the toggle switch down and immediately up again and press simultaneously the press button. The landing gear now should be extended so far that the bolt which connects the spindle drive to the lever 10FW108 is located in the centre of the elongated hole. The bolts at the drag struts should be still in the latches. Remove the bolt.
- 3 Remove the wiring from the spindle drive, disconnect the connector plugs in the wiring to the limit switch (gas strut). Remove the Ty-rap which fixes the wires to the landing gear box.
- 4 Disconnect the Bowden cable of the emergency extension system from the head of the gas strut. To accomplish this remove the safety clip from the head and take out the Bowden cable, see picture..



- 5 Remove the bolt which mounts the gas strut to the extension of the landing gear box.
- 6 Slip the drive unit on the linear guide to the front position.
- 7 Remove the 2 rear bolts M6x28 which mount the linear guide to the landing gear box.

- 8 Slide the drive unit on the linear guide to the rear position. Be careful not to slide the drive unit too far so that it may slide off the linear guide.
- 9 Remove the 2 front bolts M6x28 which mount the linear guide to the landing gear box.
- 10 Remove the drive unit from the fuselage.

I. Removal of the rear fork 10FW91

- 1 Remove the main wheel see A.
- 2 Disassemble the gas strut from the left side of the undercarriage box see section 4.5.0
- 3 Remove the 2 bolts M8x40 LN9037 which connect the drag struts to the rear fork 10FW91.
- 4 Remove the drag struts.
- 5 Remove the landing gear drive unit according to H.
- 6 Remove the bolts which connect the rear fork with the lever 10FW108.
- 7 Remove the axle with cone clamping devices 10FW127. To remove the axle hold the screw head with a spanner and unfasten the counter nut with an open end spanner until the axle can be pulled out.
- 8 Pull out the lever 10FW108.
- 9 Remove the rear fork.

J. Reinstallation

- 1 Reverse the above procedures.
- 2 Use new lock nuts and a new split pin dia. 1.6x12 DIN94 zn. Install bolts in same directions and washers at same positions.. During reassembly of the brake assembly secure the 2 bolts A with Loctite 243 or safety wire.
- 3 Clean and lubricate (using oil) the axles 10FW124 and 10FW127 before reinstallation. Fasten the counter nut with a torque of 6.5 Nm (4.8 ft lb) for axle 10FW124 and 12 Nm (8.8 ft lb) for axle 10FW127.
- 4 Secure the bolt M10x 44 which mounts the gas strut to the extension of the landing gear box with Loctite 243.

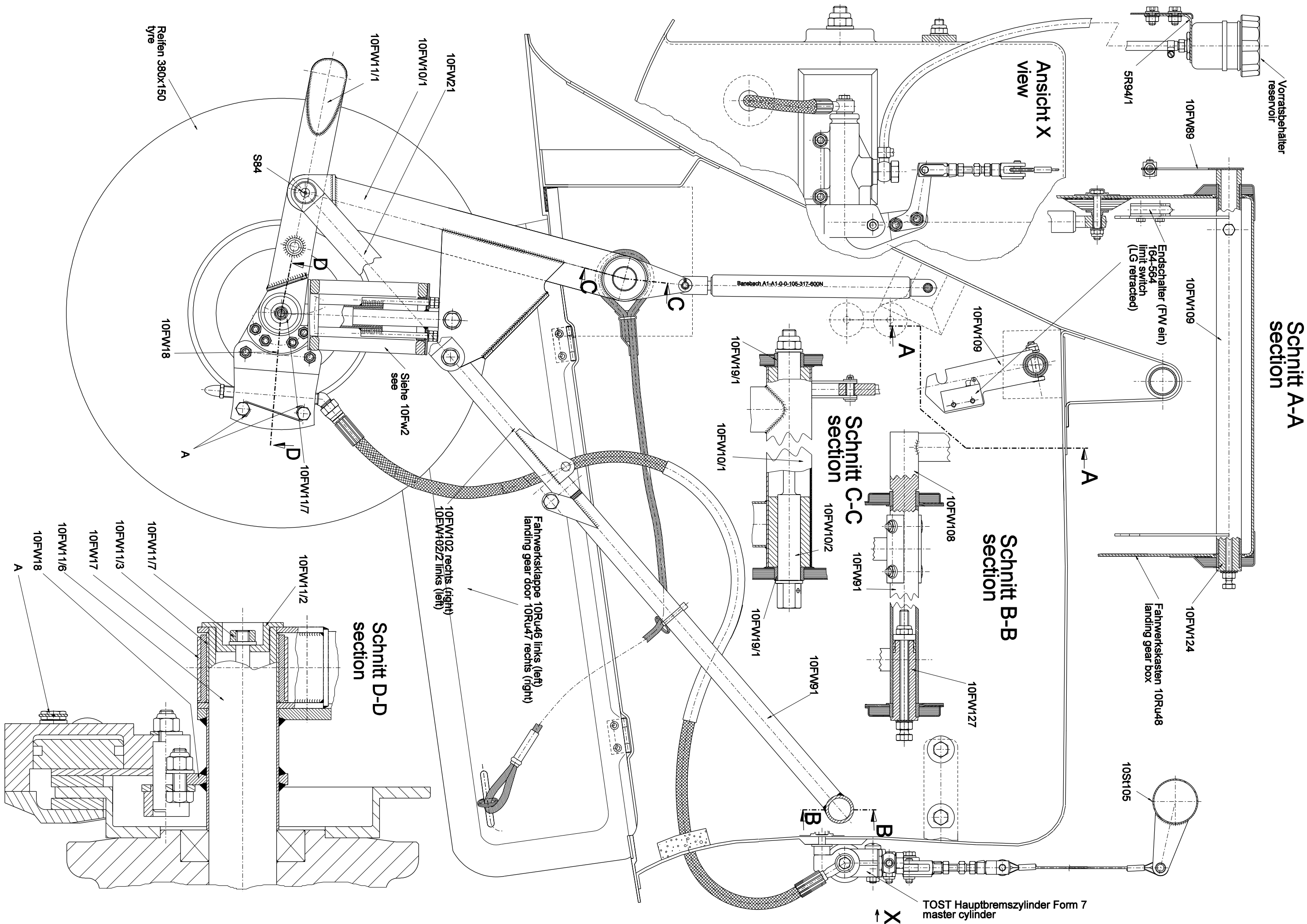
Note: It is sufficient to tape the holes drilled for removal of the axles. GFRP repair is not necessary.

Section 8 Partlist

new Subsection

8.5 Parts for the electrically operated landing gear

60000168	Lockable gas strut K0V2P-3-200-647-001/500N
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)
60510484	Extension-retraction switch MTG 206 S (LG up, down)
60510375	Press button 12G2904 with cap 12G2910 black (LG up)
60510387	Circuit breaker ETA 4A
60510360	Toggle switch STA 106 D (selector switch Avionic)
60510476	Toggle switch APR20-647 H (main switch)
10180012	Battery Z01/2 (12V/12 Ah) with fuse 60510459
60510459	Fuse G 250V 5x20 / 16 A



elektrisch betätigtes Hauptfahrwerk, hydraulische Radbremse
 electrically operated main landing gear, hydraulic wheelbrake

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Diagramm 20
 diagram