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Instructions for continued airworthiness

(Maintenance Manual)

for the sailplane

DG-300 ELAN

This manual belongs to the sailplane DG-300 Elan

German Data Sheet No. 359

Factory Serial No.:	
Year of Construction:	
Registration No.:	

Manufacturer: ELAN Tovarna Sportnega Orodja,
YU-64 275 Begunje/Gor., Yugoslavia

Owner: .....
.....
.....

Issued: M a y 1984

Approval of translation has been done by best knowledge and judgement.

In any case the original text in German language is authoritative.

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 find in the sections system description, instructions for assembly and servicing work and especially in the diagrams of the maintenance manual.

In addition with the DG-400 you get a price-list for spare parts where you will find designations for the most important engine parts.

Yours sincerely

GLASER-DIRKS FLUGZEUGBAU GMBH

Wilhelm Dirks

Dipl. Ing. W. Dirks

Manual amendments

No.	Page	Description	Date	Signature
1	1-3,11,14 17a,17b 21, 23	amendments and corrections TN 359/7	May 85	
2	3,11,14 Installa- tionplan EFK	Installation of an additional optional tow hook for aerotow TN 359/8	Oct. 85	
3	2,diagram 6	Marking of canopy emergency release and ventilation TN 359/9	June 86	
4	Cover,1,2 10,12,18,19 22a/b/c diagr.1,2,3	Manual revision TN 359/12 Aileron massbalance TN 359/11	Nov. 86	
5	1,2,18,19, 22a,22b,24, 25,26 diagr.3,5 Install.plan 3ED	Manual revisions TN 359/13	Febr.88	
6	1,2,11a,27	Fin Waterballasttank -new version- ÄM 300/6/E/88	June 88	
7	diagr.2	Landing gear wheel axis ÄM 300/7/E/88	July 88	
8	1,2,3,4, 25	Manual revisions TN 359/15	March 91	
9	1.2, 21 diagr. 4	Additional suspension of the waterbags ÄM 300/12/E/95	Nov. 95	

Manual amendments

No.	page	Description	Date	Signature
11	1, 10	Landing gear control handle TN359/22	June 2004	
12	1, 2, 3, 8, 17a, 25, 26, 26a	Manual revision, increase of service time TN359/23	February 2005	

Diagrams

Instructions for continued airworthiness
Maintenance manual Glaser-Dirks DG-300

0 Airworthiness limitations

0.1 Repairs:

Repair damaged wings, fuselage and tail surfaces prior to next flight. Repairs outside the scope of Glaser-Dirks DG-300 repair manual and major repairs must be accomplished at a certified repair station rated for composite aircraft structure work in accordance with DG repair methods.

0.2 Life time of the airframe

The maximum allowable operating time for composite sailplanes 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.

0.3 Life time of components

a) The fabric straps of the safety harness have to be exchanged after 12 years.

b) other components:
All other components such as 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.

0.4 Service time, maintenance documents

Follow the instructions of the respective manufacturer.

a) tow release: Operating and maintenance instructions for the "release mechanism safety release G 72 and G 73" issued May 1975 or January 1989 (only for releases which have been overhauled)
or for tow release Series: Europa G 88 Safety Tow Release date of issue February 1989
and if installed, for the "nose release E 72 and E 75" issued May 1975 or March 1989 (only for releases which have been overhauled) or for tow releases Series: E 85 Nose Tow Release, date of issue March 1989.

b) safety harness: instructions of the manufacturer

c) minimum instrumentation: instructions of the manufacturer.

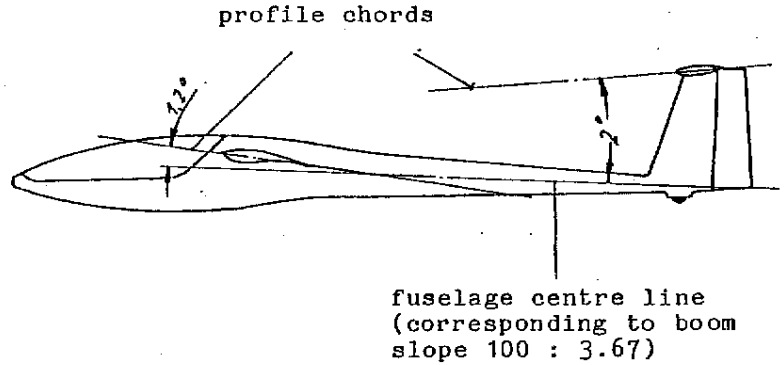
1.1 Wing and tailplane setting data

Wing:

Sweep back (leading edge):
0 at wing tip (tolerance ± 5 mm, ± 0.2 inch)

Dihedral (leading edge line):
3° = 377 mm at the tip (14.84 inch)

Angles of incidence:



Wing oscillation frequency: ca. 136 up to 140 / min

Aircraft should rest on both wheels during frequency measurements.

1.2. Elevator deflections and adjustment

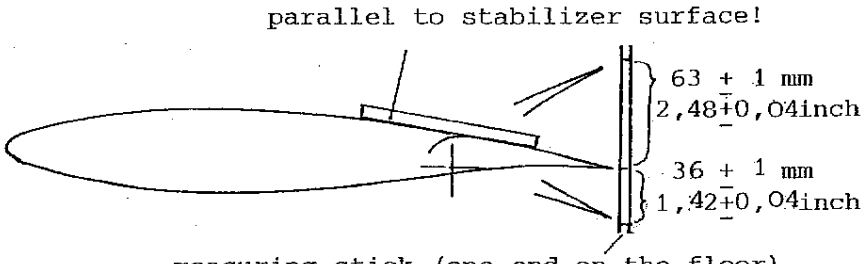
1.2.1. Control circuit - see Diagramm No. 1

1.2.2. Elevator deflections and tolerances

Up	63 ±	1 mm	2,48 ±	0,04 inch
Down	36 ±	1 mm	1,42 ±	0,04 inch

measured 150 mm (5,9 inch) from hinge axis.

The adjustment is made at the base of the control column. To measure displacement lay a straight edge over the elevator and trailing surface of the stabilizer (which is flat in this area). The straight edge must lie parallel to the stabilizer surface. Holding a measuring stick with one end on the floor mark the 0 point on the stick. Then mark the up and down displacement from this zero point.



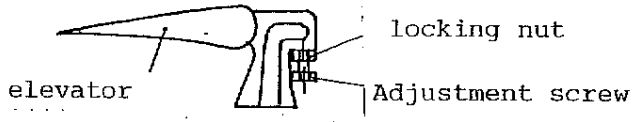
1.2.3. Elevator stops

The elevator stops are located at the base of the control column and can be adjusted with a 10 mm open ended spanner.

1.2.4. Elevator control circuit free play

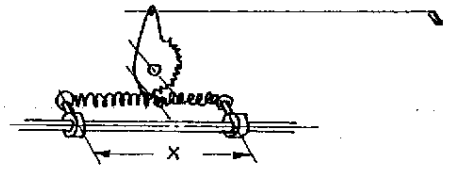
With the elevator held fixed at the 0 point, the free play at the top of the control column can be 3 mm (0,12 inch). Within the automatic elevator connection, there should be no free play, noticeable when the elevator is moved at its trailing edge.

1.2.4. Any free play can be reduced by screwing in the adjustment screw on the automatic connector funnel.



1.2.5. Trim

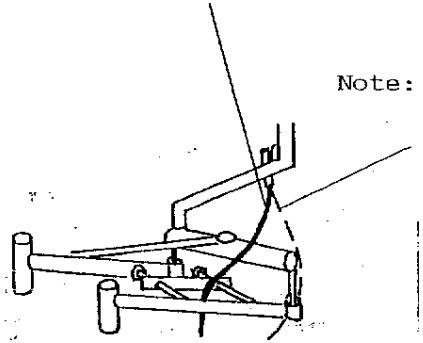
The automatic trim mechanism should be adjusted so that with full forward (nose down) trim, the control column is from 1 to 1.5 cm (0.4 - 0.6 inch) away from its maximum forward position. The tensioning of the trim mechanism springs is to adjust as shown on the sketch.



x = 360 mm
14.2 inch

1.2.6. Repair of the automatic trim mechanism bowden cable

In the event of a replacement bowden cable being installed, it should be ensured that the cable passes between the two parallel arms of the control column mechanism as shown in the sketch.



Note: if the cable passes outside the mechanism control column movement could be blocked.

1.3. Rudder

1.3.1 Rudder control circuit – see Diagramm 2

1.3.2 Rudder deflections and tolerances

± 215 ± 5 mm (± 30°) (8.46 ± .2 inch)

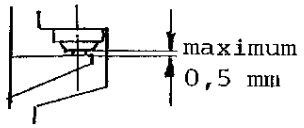
measured at 414 mm (16.3 inch) from the hinge axis.

1.3.3 Rudder stops

The rudder stops are located at the lower hinge point and can be adjusted with a 10 mm open end spanner.

1.3.4 Axial free Play

The maximum allowable free play at the upper hinge point is 0,5 mm (0.02 inch)



1.3.5 Sealing the rudder

The rudder is sealed on both sides with a V sealing band (3 M Scotch Flexodicht Band 2743 white) which is attached within the fin spar space. This seal is not to be removed. If damaged it should be replaced and sprayed with Teflon.

1.4 Aileron and wing flap control

1.4.1 **Control circuit** see diagram 3

1.4.2 **Aileron deflections and tolerances**

up	- 62 ± 3	(2.44 ± 0.12 in.)
down	+ 31 ± 3	(1.22 ± 0.12 in.)

measured at 120 mm (4.72 in.) from hinge axis (at inboard end)

1.4.3 **Aileron stops**

The aileron stops are located behind the removable left-hand side panel. The stops can be adjusted with two 4 mm (5/32 in.) diameter rods or drills.

1.4.4 **Free play**

The max. free play measured at the trailing edge of the ailerons measured at 120 mm (4.72 in.) from hinge axis should not exceed 2 mm (0.08 in.) The control stick and should be in neutral position. For the measurement fix the aileron of the opposite wing.
With larger free play the hinge axis (Part No. 2F7/3) should be replaced.

With both ailerons fixed, a maximum free play of 3 mm (0.12 in.) at the top of the control stick is allowed.

1.5. Airbrake control circuit, wheelbrake

1.5.1 Control Circuit see diagramm 3

The wheelbrake cable is connected to the airbrake torsion shaft (part 3 St 3).

1.5.2 Adjustment

a) Airbrake overcentre locking force.
Adjust the airbrake rod in the airbrake box so that both airbrakes retract evenly and that the overcentre locking force on the airbrake operating handle is between 15 - 20 daN (33-44 lbs). Adjustment can be done with a 13 mm open ended spanner.

b) Airbrake extension height.
The height the airbrakes extend depends on the wheelbrake adjustment.

c) Wheel braking force.
With insufficient braking effect, the wheelbrake can be adjusted by a screw on the end of the bowden cable housing, located on the forward undercarriage fork above the brake actuating lever.
The wheelbrake should not be adjusted any further than that which would allow a minimum airbrake extension above the top of the wing of 38 mm (1.5in.)

1.5.3 Airbrake Stops

The rear airbrake control circuit stop at the cockpit bulkhead is not adjustable. The forward control stop is in the wings and not adjustable.

1.5.4 Free Play

Free play in the airbrake control system is of no effect. The airbrakes itself at their hinges should not have so much free play that they hit the wing surface instead of entering into their boxes during retraction under airloads.

1.6 **Undercarriage**

1.6.1 **Undercarriage control circuit** - see diagram 2

1.6.2 **Adjustment**

a) Should the undercarriage not retract fully, an adjustment can be made by screwing out the universal pushrod joint on pushrod No. FW 9a/3 with a 10 mm open end spanner.

b) The lock in extended position is by means of the gas strut in the landing gear box and additionally by a rubber buffer in the cockpit.
The clearance between the locking latch at the handle and the front end of the rubber buffer should be 0,5 to max. 1 mm (.02 to max. .04 in.) with the spring suspension of the undercarriage fully extended. Adjustment can be made at the mounting of the rubber buffer.
Without TN 359/22: The friction of the handle in sense of rotation should be adjusted so, that you can just rotate the handle.
With TN 359/22: A torsion spring is installed to keep the handle in the locked position.

1.6.3 **Free play**

Free play between lever FW 8b and the pivot bar FW 21/3 is not allowed. If there is any free play, then the two securing bolts M 6 x 40 should be tightened with a 10 mm open end spanner. If there is still some free play, the bolts should be removed and the holes drilled out and reamed to diameter 8 H 7. M8 x 40 LN 9037 bolts should then be installed.

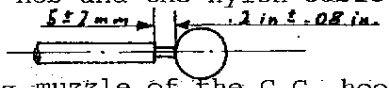
1.6.4 **Main wheel tyre pressure:** 3,5 bar (49 psi)

1.6.5 **Tail wheel tyre pressure:** 2 bar (28 psi)

1.7. Tow Hook

1.7.1. Tow release circuit see Diagramm 5

1.7.2. Adjustment
There should be 5 ± 2 mm space between the tow release nob and the nylon cable guide.



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

1.7.4. Removing the tow hook
The tow hooks are to be removed in upward direction (use a piece of hard wood and a hammer). Be careful not to break loose the seat shell with the C.G. tow hook.

1.7.5. For further information refer to the operating and maintenance instructions for the release mechanism see page 3 of this maintenance manual.

1.8. Water Ballast System
a) Wing tanks

1.8.1. Water ballast release circuit see Diagramm 5

1.8.2. Adjustment
For the dump valve in the closed position, there should be 1 mm (.039 in) space between the 8 mm (.315 in) Ø PVC rod from the dump valve, and the plate lever on the fuselage.
An adjustment can be made using the adjustment screw located on the plate level. If this is insufficient, the 8 mm Ø PVC rod can be shortened.
If the valve still leaks, then the rubber gasket and the associated spring at the end of the 8 mm Ø PVC rod should be loosened, pressed further in, and secured again. If this is not successful the valve ball seat should be greased, see sect.4.1.

1.8.3. Servicing: see sect.4.1.

b) **Fin tank**

1.8.4. **Adjustment**

The release cable must be adjusted so, that the wing tank handles only can be opened, when the fin tank has been opened fully.

1.8.5. **Inspection**

a) both versions
According to sect. 2.2.1 a special inspection is to be carried out on the fin ballast tank system. Therefor the tailwheel is to be dissasembled and the cover plate in the tailwheel box to be unscrewed.
Check the control cable and the lever of the valve carefully for wear.
The control cable has to be checked at the operating lever in the cockpit too. If the cable or the lever is worn, it is prohibited to use the fin tank any more.
Please contact the manufacturer for a detailed repair instruction.
The dump time of the full fin tank is to measure. 120 sec. should not be exceeded.

Check the calibration of the outside air-temperature gauge.

b) in addition for the version with measuring stick.

If so, the tank has to be flushed through the dump hole with the valve in open position and the fuselage in inverted position for some minutes. Therefor the strainer at the filling hole is to be taken out.
Check the water quantity indicator measuring stick for frictionless movement and proper calibration.

1.9 Massbalance and weights of control surfaces

After repairs or repainting the control surfaces-weights and moments should not exceed the following limits.

Control surface	Weight kg / lbs max.	Weight kg / lbs min.	Moment kg. cm / lbs.inch max.	Moment kg. cm / lbs.inch min.	Spring balance reading when attached to the points described kg / lbs max.	Spring balance reading when attached to the points described kg / lbs min.
Rudder	4	2,5	6	4	0,3	0,2
(with massbal.)	8,82	5,51	5,21	3,47	0,661	0,441
Elevator	2,2	1,6	8,7	6,7	0,58	0,447
(pushrod disconnected)	4,85	3,53	7,55	5,82	1,279	0,985
Aileron	5,7	3	9,9	8	0,66	0,533
(with massbal.)	12,57	6,62	8,55	6,94	1,45	1,175

Note: Before any changes to the massbalance weights are made, contact the Glaser-Dirks factory. For changes at the ailerons see also sect. 4.5.

Method for determining control surface moments

Rudder
Disconnect rudder cables, lay the fuselage on its side so that the fin is horizontal. Attach (by tape) a spring balance to the lower end of the rudder 200 mm (7.87 inch) behind the hinge axis.

Elevator
Hang the elevator friction free on its hinge points (pushrod disconnected) and attach the spring balance 150 mm (5.9 inch) behind the hinge axis.

Aileron
Hang the aileron friction free on its hinge points (pushrod disconnected) and attach the spring balance 150 mm (5.9 inch) (countour brake) behind the hinge axis.

1.10. Fore and aft play of the wings

With the aircraft fully rigged move the wings fore and aft to determine at which shear pin the most play exists.

Adjustment: - Derig the glider roughen the area around the shear pin and glue a washer (inside Ø 16,5 mm, o,25 mm thick) onto the fuselage using a recognized metal glue (ie Stabilit Express). Note on the fuselage with a waterproof marker the thickness of the washer (s). Rig the aircraft and check the free play again.

16,5 mm = .65 in.
0,25 mm = 0.01 in.

2. Inspections

2.1. Daily inspection

see flight manual DG-300

2.2. Regularly inspections

2.2.1. A) After 200 flighthours and during the yearly inspection

Check rudder cables for wear especially around the S tubes on the rudder pedals. Worn rudder cables should be replaced - see sect. 4.2.
Check the sealing of the rudder - see 1.3.5.

B) Yearly Inspection

All control circuits. Inspect all bolted connections and locking devices ie. locknuts, split pins etc.
Check all control circuits for adequate greasing and rust prevention. (see 3.3.)
Check the control surfaces deflections (see 1.2 - 1.4). Check the free play in all control circuits (see 1.2.-1.6.) and the fore and aft play (1.10.).
Check the fin ballast tank system (see 1.8.5.)

Tow hook

The operating and maintenance instructions for the release mechanisms see page 3 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) Every 3 Months

Careful inspection throughout and greasing of control circuit, hinges etc. (see 3.3.).
Check the tension of the perlon lines of the waterbag attachment (see 4.1.).
Check of the emergency canopy release according to flight manual sect. 1.3./16.

D) Special Inspections

Tow hook

After a wheel up landing the tow hook mechanism is to be carefully checked for any damage.

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

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 on the wing leading edge running along the span and from the edges of the air-brake housing, are harmless.

Ailerons

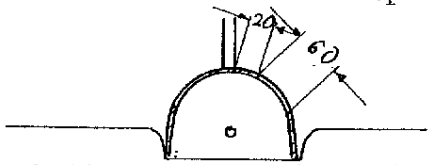
Crushing, cracks, delaminations?
Hinge mounts checked? - Control circuit mountings checked?

Fuselage

Fuselage wing connection:
White areas, increased free play, bent push rods-difficult assembly?

Torsion check:
Hold the fuselage fixed, try to turn the fin around the fuselage, does it move easier than normal? By applying this torsion are any cracks made visible?
Fuselage - Fin fairing: - Cracks?
Remove gelcoat and any filler along the cracks, move the fin (push the fin towards the nose as well as applying torsion). Do the cracks penetrate the glass fibre structure?

To check the elevator control circuit and the bulkhead attachments in the fin area, the tailwheel should be removed and a hole cut into the tailwheel housing as shown in the sketch. After completing the checks, the hole should be glassed over using 3 layers of 92 125 glass cloth. Overlapping length should be 2 cm. Before applying the glass cloth, roughen an area at least 3 cm around the hole with sandpaper 8o grit. For any repairs that need to be done see the repair manual.



20 mm = .8 in.
60 mm = 2.4 in.
3 cm = 1.2 in.

If a fin ballast tank is installed, there is a screwed in coverplate in the wheel box.

Tailplane attachment

Increased free play? Cracks in the fin top rib, fin spar end with tailplane attachment, especially around the bushes?

Rudder mounts- Increased free play? White areas in the glass fibre, bent rudder stands?

Fuselage skin

outside: cracks, nicks, folds?
inside: white spots, zig zag white lines, cracks?
Has any bulkhead become loose?

Tow release

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

Backrest bulkhead

Cracks? Shoulder strap attachment point?

Belly harness attachment points:

Check for cracking around the mountings in the seat mould, excess free play?

Controls

Proper functioning and condition of all controls and adjustment mechanisms (ie rudder pedal adjustment, tow release, air brake, control column and trim etc.).

Instruments

Proper functioning? Dirt in the pressure sensing intakes?

Undercarriage

Check to insure if properly aligned? No bent frames? Proper extension and retraction? Any dirt in the forward fork pivot?
Any white areas or cracks in the wheel box? Remove the baggage area floor panels and inspect the wheel box from above.
Undercarriage control circuit condition?

Rear wheel

Any cracks or white patches around the attachment in the rear wheel box?

2.4 Inspection procedure for increase of service time

1. **General**
   The results of fatigue tests of wingspan sections have demonstrated that the service time of composite 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 11000 hours (4. step).

   Ask the manufacturer for the necessary inspection document.

3. LBA-approved Glaser-Dirks Flugzeugbau GmbH document No.XXXX (to be issued and approved in the future) contains the structural inspection procedures and limitations to be used for extending the service life above 3000 flight hours.

4. The inspection must only be done by the manufacturer or 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 manufacturer's facilities, a copy of the records must be sent to the manufacturer for his evaluation and information

6. The annual inspection is not affected by this inspection program.

3. Maintenance

3.1 General maintenance (see flight manual 5.7).

Exterior surfaces of the fibrereinforced plastic parts

The surfaces are coated by a UP-gelcoat. 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, 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 this the wax becomes hot and is taken up by the cloth. The hard wax and the cloth discs should be purchased from the Glaser-Dirks factory. You get the best effect when polishing 90° to the microscratches of the sanding process.
Note: Make sure that the surface does not get too hot, otherwise the finish will be damaged. Therefor move the polishing machine all the time, do not stay on one spot.

Plexiglas canopy:

"Schwabbel" procedure see above. Therefor lock the canopy to the fuselage!

Metal parts:

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

3.2 Maintenance of the airframe

Apart from the care of the surfaces see above and greasing and oiling (see maintenance manual 3.3) the aircraft is service free.

After a landing in a soft field, the undercarriage box and tow hook should be thoroughly cleaned.

3.3 Greasing and oiling

Every 3 months your DG-300 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 connection at the aileron.
- Airbrake drive connection - in airbrake box, also grease the brake paddle pivots.
- Remove the access panel on the left hand cockpit wall and grease all the pushrod guides.
- Remove the baggage compartment floors and the baggage compartment rear cover to grease all bearings.
- Remove the control column cover and grease all the bearings associated with the control column.
- 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 aileron, airbrake and elevator control.
- Clean and grease all pins and bushes of the wing and tailplane attachment.
- Take off the canopy and clean and grease the locking mechanism. After reinstalling the canopy, check the pilot force needed for emergency release with the red ball handle, using a spring balance. The force should not exceed 200 N (44 lbs.)
- Clean and grease the guide of the fin ballast tank handle in the cockpit.

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

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 patches on any skin surfaces, these signal that something can be wrong.
With Major Damage contact the Glaser-Dirks factory immediately and send photographs and a damage report from a licensed inspector. With this information, the correct repair procedures can then be determined.

Minor damage such as small cracks and holes in the skin surfaces can be repaired by a licensed workshop.

Additional information like a listing of all materials used in the DG-300 can be found in the repair manual.

Home repairs should not be attempted when:

- the main spars is damaged, 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.

4. Detailed instructions for assembly and servicing work

4.1 Replacement of the water ballast bags

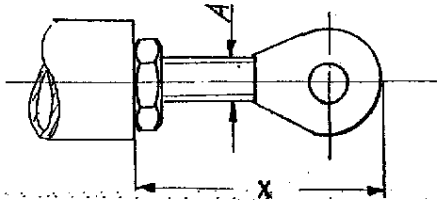
Unscrew the attaching bolt attaching the lines to the root rib and attach an additional 5 m (16.5 ft.) long line dia. 3 mm (.12 in.) to it. Unscrew the water ballast dump valve connector. Remove the dump valve with attached water ballast bag out of its wing stand by pulling the valve towards the end of the wing. Remove the valve and ballast tank through the hole in the wing root. Remove the line and loosen the hose clamp. Replace the ballast tank and reverse the above procedures to install the new tank. If you install the 95 l waterbag please make sure, that the nylon hose is inserted 40 mm (1.6 in.) into the valve, see diagr. 4.
The lines are to be fixed, so that the key ring will remain 5 cm (2 in.) inside of the wing when the lines are just tensioned. By this the tension of the lines will be satisfactory even if the lines will strain. But min. every 3 month you should check, if the lines are still tensioned. If not undo the knot and tie it again to the key ring (see above).
Each time you unscrew the valve, grease its thread, otherwise you won't be able to open it again. The seat of the valve ball (see diagr. 4) should be greased too.
Fill the new water ballast tank(s) and check for water tightness.
Note: From serial no. 3 E 446 on there are two sets of lines holding the bag. The white lines are for the outboard end of the bag, the black lines hold the bag at its center, see diagram 4.
Separate lines must be attached to the white lines as well as to the black lines to remove the bag.

4.2 Replacement of control circuit cables

The following cable connections are approved:
3.2 mm dia. cable according to LN 9374 or 1/8" MIL-W-1511A with Nicopress-sleeves 28-3-M Copper and tool No. 51-M850 or 63-V-XPM or 64-CGMP where the M groove is to be used. The above applies to the rudder cables and the tow release cable.
The cable for the rudder pedal adjustment is 1.6 mm dia. LN 9374 or 1/16" MIL-W-1511 A with nicopress-sleeves 28-1-C Copper and the C groove of tool 64-CGMP should be used.
Attachment of the nicopress sleeves should only be done using the respective tool. All the procedures and checks noted by the tool manufacturers should be followed.
Please refer to Aircraft Inspection and Repair FAA AC 43.13-1 A too.
Note: Instead of cable MIL-W-1511 A the newer MIL-W-83420 may be used.

4.3 Adjustment work on the control circuit

In all cases new stop nuts DIN 985.8 should be used. With all adjustment work, it should be ensured that the rod ends are not screwed out too far from the pushrod - see scetch below for allowable max. distances for the two sizes used.



A	max. of x	
	mm	inch
M 6	36	1.4
M 8	60	2.36

4.4 Removal and installation of the undercarriage

A. Removal

1. Disassemble and remove the wheel axle (see diagr. 2).
2. Remove the wheel brake cable at the brake lever by loosening the attachment screw.
3. Remove the wheel ensuring that the hub locking pin comes free out of the left hand front fork.
4. Rear fork: From inside the undercarriage box remove the three bolts M 6 (SW 1o) that secure parts FW 7 and FW 8 b. Remove the split pin at the gas strut attachment, retract the undercarriage. Remove the clevis pin on the gas strut attachment, the gas strut can now be removed. After removing the baggage compartment floors, disconnect the pushrod FW 9a/3 from FW 8b (SW 1o). Remove part FW 8b and FW 7. SW 1o = 1o mm open end spanner.
5. Front fork: After removing the baggage compartment floors, the axle can be unscrewed and the whole thing removed through a 14 mm (.55 in) dia. hole drilled through the left hand fuselage side.

B. Installation

Reverse the above procedures - a new brake cable should be provided - see sect. 1.5.2. for brake adjustment procedures.

C. Replacement of the rubber shock absorbing pads

1. Disattach the rear fork - see sect. A.
2. Remove the adjustment screw M 5 (SW 8) = 8 mm open end spanner.
3. Replace the shock absorbing pads.
4. Place the rear fork in a vice or clamp together that the absorbing pads are compressed. Tighten the adjusting bolts for 3o mm (1.2 in) clearance - see Diagram 2.
5. Reverse the above procedures to reinstall.

4.5 Removal and reinstallation of the ailerons

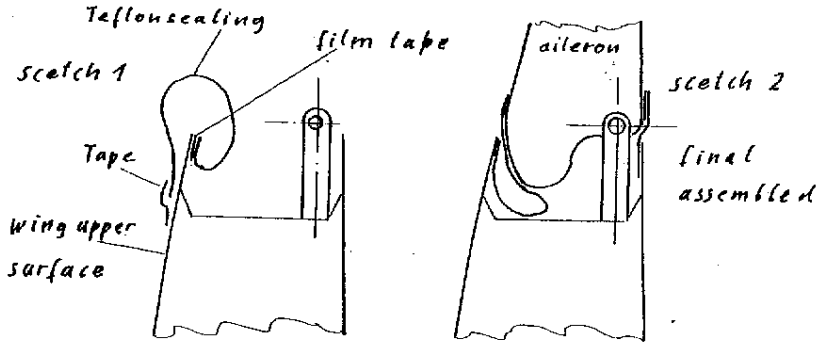
A Removal

1. Remove the glasfibre cover plate from the wing-shell at the outboard end of the aileron cutout using a knife or a chisel.
2. Loosen the teflonsealing at one edge on the upper aileronsurface and tear it out.
3. Remove the selflocking nut and the washer at the outboard aileron hinge.
4. Remove the stop-bolt at the wing root.
5. Remove the spring pin from the sliding latch of the Hotellier connector at the aileron drive push rod. Disconnect the push rod.
6. Displace the aileron fully down and remove it from the wing by sliding in outboard sence.

B Reinstallation of the ailerons and the teflonsealing

1. Prior to reinstallation remove the teflonsealing pieces from the lower aileronsurface at the hinges. Then clean off all remains of adhesive from the aileronsurface and from the wing side. Use petroleum ether (pure petroleum spirit).
2. Make a pencil mark 3 mm aft of the cutout for the aileron drive at the upper aileronsurface.
3. Reinstall the ailerons reversing A 6.
4. Displace the aileron so far that the pencil mark corresponds to the trailing edge of the wing. Hold the aileron in this position and enlongate the pencil mark along the trailing edge over the whole aileron span.
5. Remove the aileron again.
6. Install new film tape (e.g. 3M No. 465, 9 mm wide) at the innerside of the wing (see scetch) over the whole aileron span. Remove the cover paper.
7. Install the new teflonsealing (tefloncoated glas-fibrefabric 50 x 0,08 mm etched on 1 side) see scetch. The etched (darker) side is to be glued. Fold the teflonsealing onto the upper wing surface and fix it there with tape.
8. Install a new film tape (see 6.) just in front of the pencil mark on the upper aileron surface. Do not remove the cover paper.

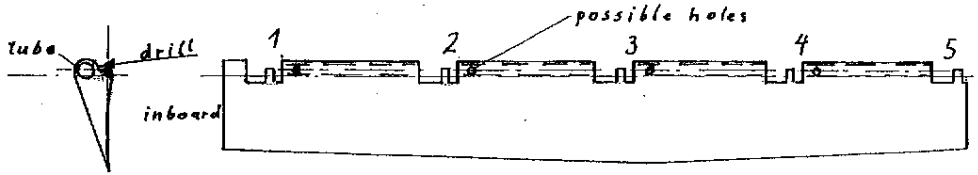
9. Reinstall the aileron by reversing A 3.)to 6.). Use a new selflocking nut (M5 DIN 985 - 8 zn)
10. Displace the aileron fully downward and fix it in this position. Remove the tape which fixes the teflonsealing to the wing surface and push the teflonsealing into the gap inbetween wing and aileron until its end corresponds with the film tape on the upper aileron surface. Be careful to avoid wrinkles.
11. Now remove the cover paper from the film tape and press simultaneously the teflonsealing to the film tape.
12. Clean off surplus film tape (if there is any) with petroleum ether.
13. The cutouts for the hinges at the lower aileron surface are to be sealed again with new pieces of teflonsealing. Use the old pieces as patterns.
14. Push this pieces into the gap between wing and lower aileron surface as far as possible. Displace the aileron fully downward and mark the position of the teflonsealing pieces.
15. Displace aileron upwards. Glue film tape onto the marked area. Remove cover paper and press teflon pieces onto the film tape.
16. Clean off surplus film tape (if there is any) with petroleum ether.
17. Reinstall the coverplate see A 1. with contact adhesive (e.g. Pattex).
18. Finally check that you can reach the max. upward aileron displacement (min. 65 mm, 2 18/32 in. measured at the inboard aileron trailing edge). In addition the teflonsealing pieces at the lower surface should not come out of the gap.



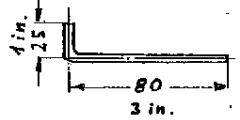
C Increasing the aileron massbalancing

If the massbalance is out of limits after a repair the massbalancing may be increased as follows:

1. Place the disassembled aileron lower surface up



2. There are tubes installed in the aileron nose inbetween the aileron hinges. You can fill the tubes with lead balls diameter ca. 2 mm (3/32 in.) by drilling 8 mm (5/16 in.) holes see scetch.
3. First fill the tubes inbetween hinge 2 and 3 and inbetween hinge 3 and 4. It is possible that these tubes may be already filled in some extent during manufacturing. If filling these tubes does not change the massbalancing as necessary you may fill the tube inbetween hinge 4 and 5.
   Only in the case that this is still not enough, you can fill the tube inbetween hinge 1 and 2 too.
   Note: To measure the massbalance prepare two 5 mm (3/16 in.) steel rods to suspend the aileron at hinge 2 and 4.
   In addition refer to sect. 1.9.



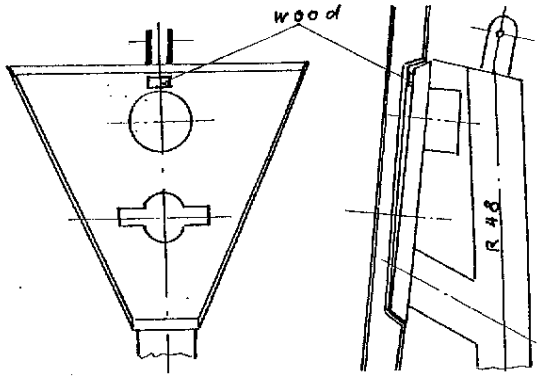
   Each tube can accomodate approximately 300 g (.66 lb) of lead balls. 100 g (.22 lb) lead reduces the massmoment by 10 g (.022 lb).
4. When the massbalancing is in limits you have to fill the tubes with thin Epoxy- or Polyesterresin-hardener mixture to hold the lead balls in place.
5. Weigh the ailerons. The upper limit (see sect.1.9) should not be exeeded.
6. Record the new data for weight and massbalance in the aircraft logs.

4.6 Fixing excessive free play of the canopy

Shrinkage of the fibre reinforced plastic material may result in free play between the canopy hinge R 48 and the canopy.

You can fix the free play as follows:

a) Take off the canopy and remove the emergency release spring.
b) Tape the hinge completely and coat it with demoulding agent.
c) Roughen the depression for the hinge at the canopy carefully with abrasive paper.
d) Fix a piece of wood 10 by 10 mm (3/8 in.), 2 mm (1/12 in.) thick with double-sided tape at the rear end of the hinge (see sketch).
Put on the canopy and try to lock the canopy to the hinge. If this is not possible take off accordingly of the wood.
If there is still free play, use a thicker piece of wood.



e) Mix epoxyresin with cottonflocks and apply it in the depression see c).
f) Reinstall, close and lock the canopy.
g) After the resin has cured, take off the canopy again.
h) Trim the depression, remove the tape and re-install the canopy.
i) Finally check the canopy emergency release according to flight manual page 8. The opening force for the emergency release should in no case exceed 20 daN (44 lbs)!

5. Weight and Balance

Method of weighing your DG-3oo:

1. Assemble the glider completely with gear down.
2. Place a scale under the tailwheel.
3. The fuselage must be leveled so that the top of the aft fuselage boom has a tail-down slope of 1oo : 3.67.
4. Water ballast tanks empty.
5. Read weight of tail wheel. W_2
6. Be certain the wings are level.
7. Measure the distance between perpendiculars through points a and b. (See figure, next page).

Using the Empty Weight and the values determined above, calculate the C.G. as follows:

$$\text{C.G. Empty: } X_{s\ \text{empty}} = \frac{W_{2\ \text{empty}} \cdot b}{\text{Gross weight}_{\text{empty}}} + a$$

Weight includes all accessories but excludes pilot and parachute. Remove loose objects from cockpit.

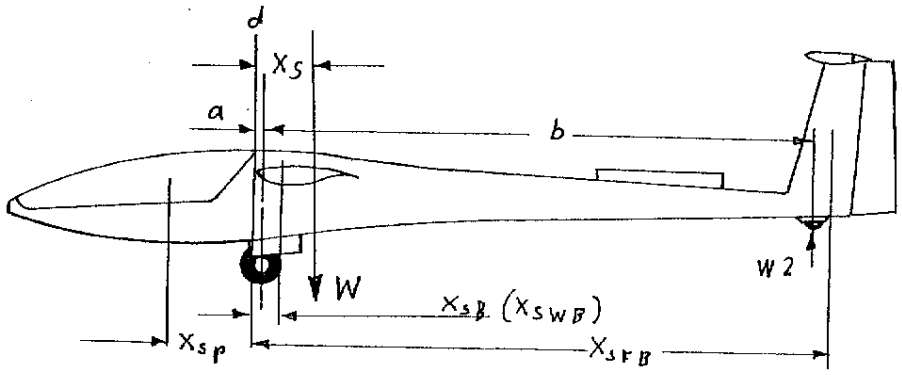
$$\text{C.G. In Flight: } X_{s\ \text{flight}} = \frac{W_{2\ \text{flight}} \cdot b}{\text{Gross weight}_{\text{flight}}} + a$$

The flight weight includes empty weight items plus pilot, parachute, and all items needed in flight (barograph, camera, cushions, etc.). In addition, the rudder pedals and seat back should be adjusted as in flight.

Datum (d)

Wing leading edge
near root

Leveling line:
Aft fuselage boom slope
100 : 3.67 (tail down)



XSP = 549 mm (21.6 inches) Pilot C.G. at WP = 70 kg
XSB = 140 mm (5.5 inches) baggage C.G.
XSWB = 160 mm (6.3 inches) water ballast tank
XSFB = 4180 mm (164.6 inches) fin water ballast tank

Empty weight C.G. measurements
After the addition or deletion of equipment or accessories, repairs, painting, or any change in the aircraft that could influence the weight and balance; a new weight and balance must be carried out. Aircraft certified as Standard Category must have the weight and balance executed by a licensed Airframe Mechanic. Empty weight C.G. range is determined by reference to diagram no. 5. If the C.G. is out of limits, adjustments may be made by ballasting or by relocating equipment or accessories.

The result has to be entered in the flight manual and in the aircraft logs. Weight and balance must be carried out at least every four years.

6. Instrumentation and accessories list

6.1 Air speed indicator (0 - 300 km/h, 165 kts)

Manufacturer	Type	Certification No.
Winter	6 FMS 4(diam. 80mm)	TS 10.210/15
	0-300 km/h Ident.No. 6421177	
	0-160 kts Ident.No. 6423177	
Winter	7 FMS 4(diam. 58mm)	TS 10.210/19
	0-300 km/h Ident.No. 7421177	
	0-160 kts Ident.No. 7423177	

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

6.2 Altimeter

Manufacturer	Type	Certification No.
Winter	4 FGH 10 (diam. 80mm)	TS 10.220/46
	1.000-10.000m Ident.No.4110	
	3.000-30.000ft Ident.No.4330	
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)

Manufacturer	Type	Certification No.
Gadringer	BAGU 5202	40.070/32
	SCHUGU 2700	40.071/05
Gadringer	BAGU 5202 G	40.070/32
	SCHUGU 2700 G	40.071/05
	rubber coated adjuster bars	
Autoflugr	BAGU FAG 7 D-O	40.070/30
	SCHUGU FAG 7 H-O	40.071/21
Schroth	4-01-0.104	40.073/11

6.4 Compass

Manufacturer	Type	Certification No.
PZL	B - 13	FD 19/77
Ludolph	FK 16	10.410/3
Airpath	C 2300	
Hamilton	H I 400	TSO C 7c Type1
Bohli	46 MFK 1	(only as additional equipment.)

The compass should be compensated in the A/C. A deviation table must be installed if deviation is more than 5°.

6.5 VHF transceiver

Manufacturer	Type	Certification No.
Dittel	FSG-40 S	10.911/45
	FSG-50	10.911/71
	FSG-60 M	10.911/72
	FSG-70,71 M	10.911/81
	FSG-90	10.911/98JTSO
	FSG 2T	LBA.0.10.911/103JTSO
Becker	AR 3201-(1)	10.911/76
	AR 2008/25 (A)	10.911/48
	AR 4201	JTSO-2C37 D, ED-23A
Avionik Dittel	ATR 720 A	10.911/74
	ATR 720 C	10.911/83
	ATR 600	O.10.911/106JTSO
	ATR 500	LBA.0.10.911/113JTSO

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

6.6 Variometer

Manufacturer	Type	Certification No.
Winter	5 StVM5 (Durchm.58)	TS 10.230/14
	± 5 m/s Ident.No. 5451	
	±1000 ft/min Ident.No. 5452	
	± 10 kts Ident.No. 5453	
Winter	5 STV 5 (Durchm.80)	TS 10.230/13
	± 5 m/s Ident.No. 5251	
	±1000 ft/min Ident.No. 5252	
	± 10 kts Ident.No. 5253	

6.7 Turn and bank indicator

Manufacturer	Type	Certification No.
Apparatebau Gauting	WZ-402/31 12 V	10.241/8

6.8 Outside air temperature gauge

Manufacturer	Type	Certification No.
Störk	TF 00-059 K (-20 - + 40 °C)	/

6.9 Instruments which are not part of the minimum equipment:

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

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.

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 a appropriately rated fuses, the power consumption of each single part should not exceed 3A.

After installation raise a new weight and balance report.

7. List of special tools

A. Special 8 mm wrench for front tailplane mounting screw (supplied with the glider)

B. Open end spanners

mm	mm
7	10
8	13
9	14

C. Allen key wrench
5 mm, 6 mm

D. Mounting tool for spring washer installation
A (outside) and I (inside) size 8 to 14 mm
3 to .55 in.

E. Steel rods:
two dia. 4 mm (5/32 in.) - ca. 70 mm (3 in.) long.

F. Spring balance:
max. reading 50 N, 11 lbs.

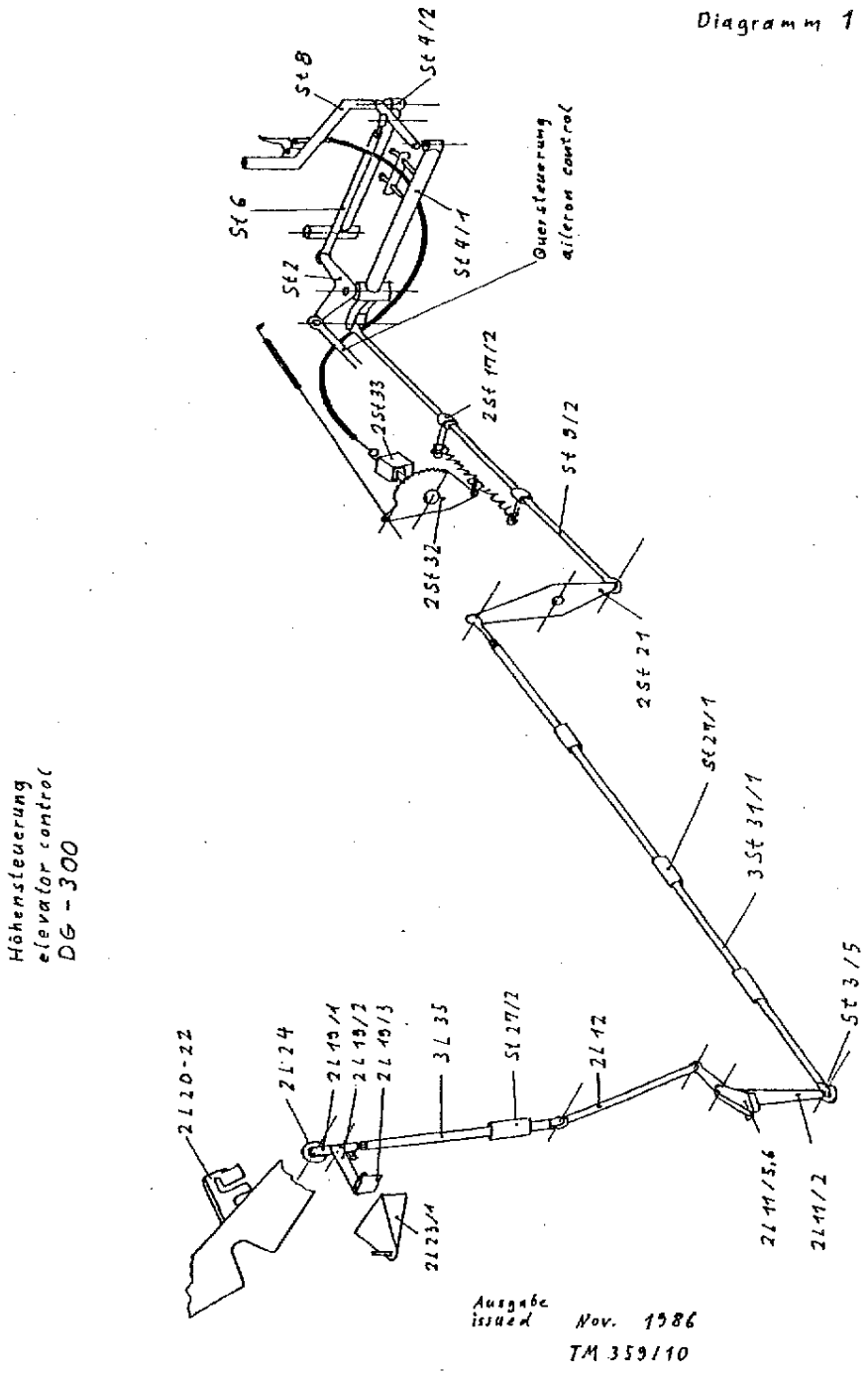
G. Nicopress tool 64 - CGMP

H. **DG-300 with fin ballast tank**
(version with measuring stick)
1/4 inch extension piece 150 mm (6 inch) long with handle for the tank filler cap.
(supplied with the glider).

I. **DG-300 with fin ballast tank** (new version without measuring stick)
Funnel with clear PVC hose inner diameter 12 mm (.47 in.) 1,9 m (6 ft.) long and hose connector GRS 10-12 to fill the fintank (Z 28).

J. Hose outsside diameter 25 mm (1 in.)
ca. 2 m (6.5 ft.) long to fill the wingtanks.

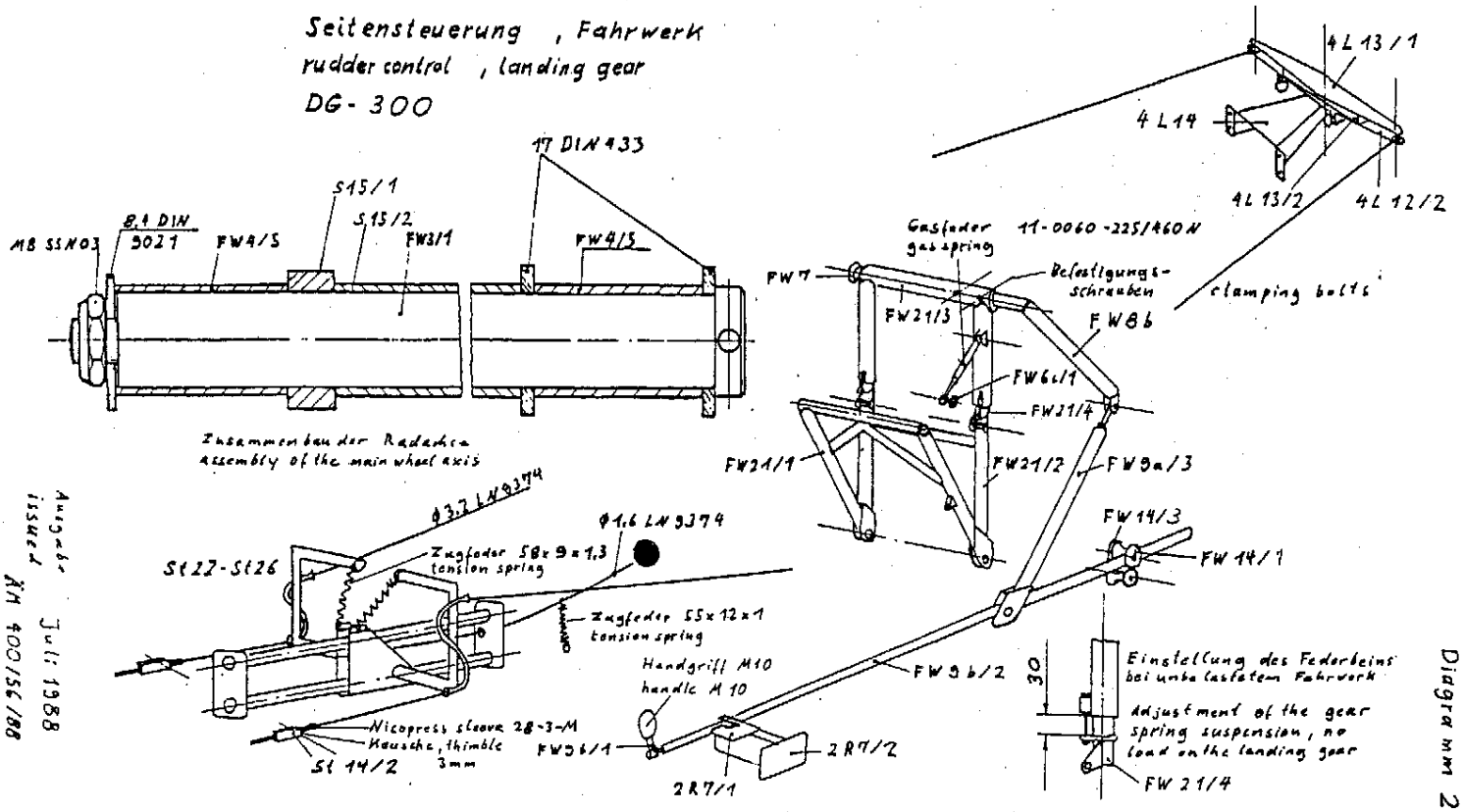
Diagramm 1



Höhensteuerung
elevator control
DG-300

Ausgabe
issued Nov. 1986
TM 359/10

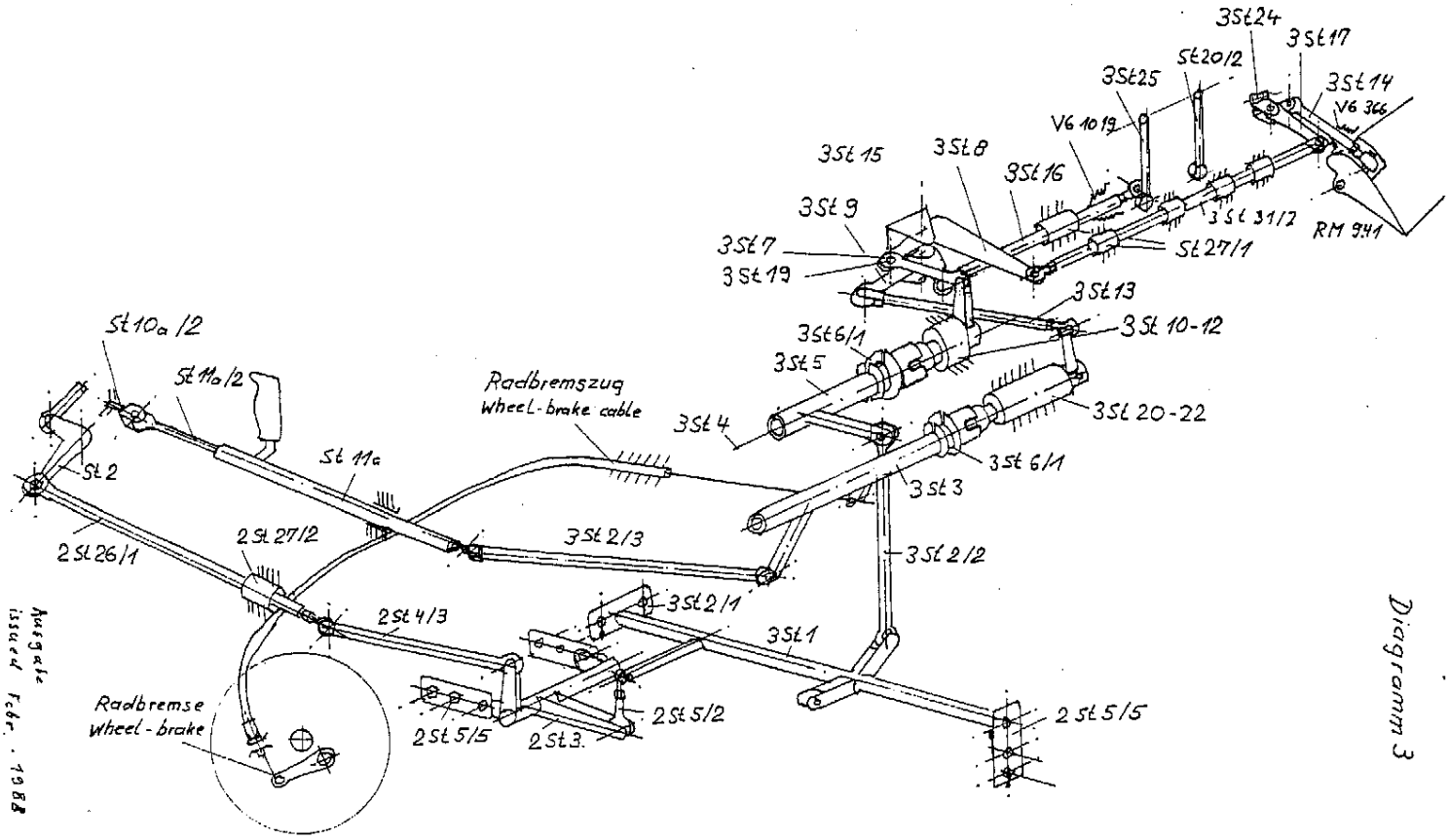
Seitensteuerung , Fahrwerk
rudder control , landing gear
DG-300



Ausgabe Juli 1988
issued
Kh 400/56/88

Diagramm 2

Querruder - und Bremsklappensteuerung
aileron and airbrake controls
DG-300



Ausgabe
issued Febr. 1988

Diagramm 3

Diagramm 4

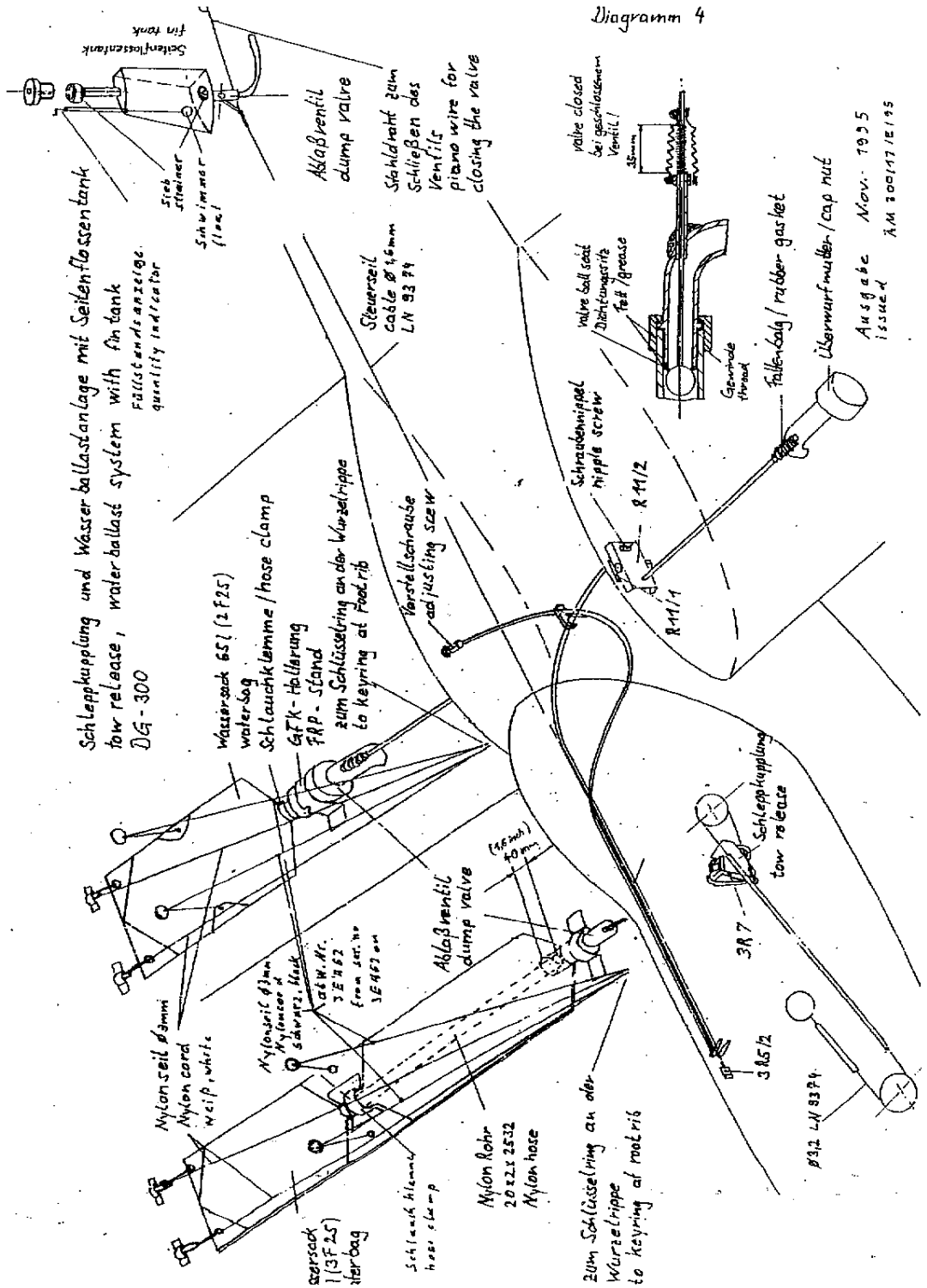
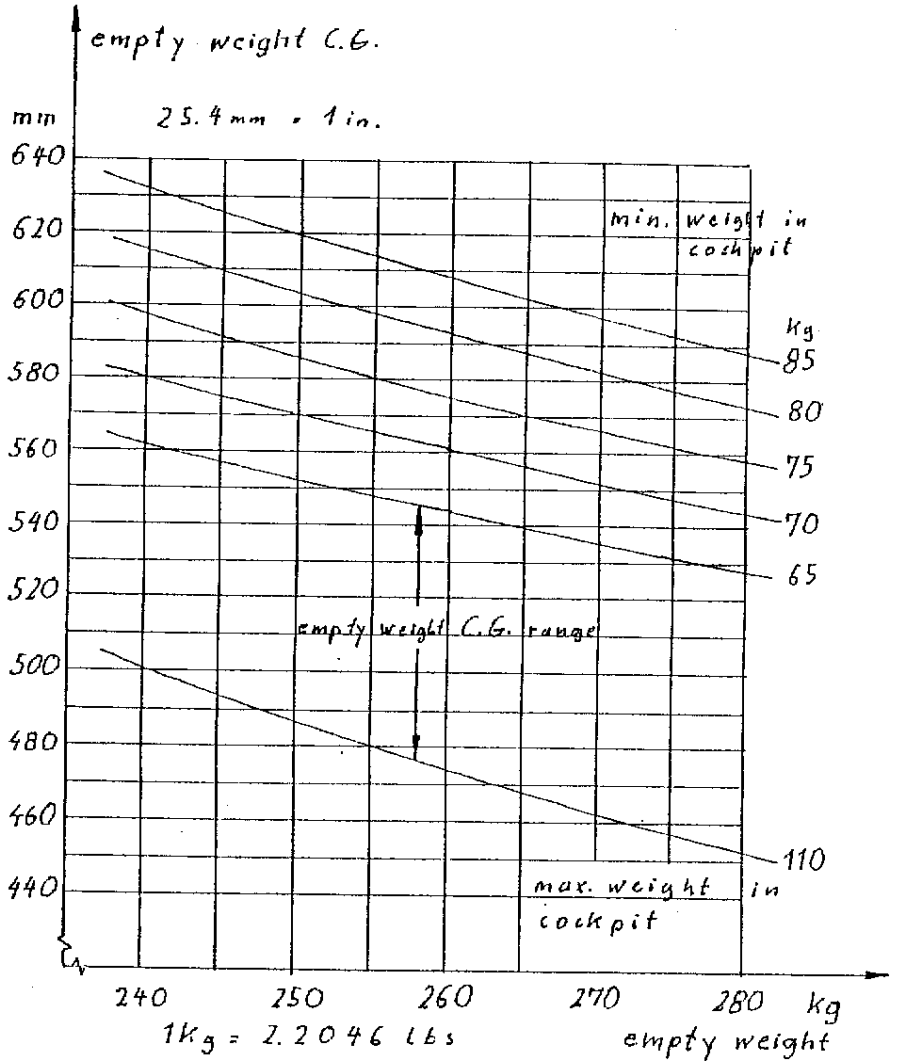


diagram 5

maintenance manual DG-300

approved empty weight C.G. range



issued Febr. 1988

TN 359/13

Gepäck max. 15kg
baggage max. 33lbs.

at the main fuselage bulkhead

Baumuster Nr.:

part No. of airframe components
at the main bulkhead, at the
root ribs of the wings and
ailerons, at the rudder nose,
at the horizontal stabilizer

fire proved identification
plate on DG-300 ELAN
at the main fuselage bulkhead

Reifendruck 2bar
tyre pressure 28psi

over the tailwheel

Sollbruchstelle max 680 daN
rated load max 1500 lb.

on the right main wheel door

Reifendruck 3,5bar
tyre pressure 49psi

diagram 6

type: DG-300	Serial No.: 3E	Year of construction:
Maximum airspeeds	km/h	kts.
Winch launch	130	70
Aero-tow	200	108
Manoeuvring V_A	200	108
Rough air	200	108
Landing gear operating	200	108
Maximum speed V_{NE}	270	146

Approved aerobatic manoeuvres (only without ballast in the wings): pos. Loop, Stall Turn, Chandelle, Spin

Maximum weight: 525kg (1157lb.)

Cockpit load (parachute included)
maximum 110kg (242lb.) minimum 70kg (154lb.)

12

Cockpit Check

1. Load ballast (for under weight pilot)?
2. Finballastiank emptied or correct amount filled in?
3. Parachute worn properly?
4. Safety harness buckled?
5. Seat back and pedals adjusted?
6. All controls and knobs in reach?
7. Altimeter?
8. Dive brakes cycled and locked?
9. Control check? (One person at the control surfaces).
10. Trim?
11. Canopy locked?

13

limits for use of the fin waterballast tank

minimum	°C	13,5	17	24	31	38	
ground temperature	°F	56	63	75	88	100	
maximum	m	1500	2000	3000	4000	5000	
flight altitude	ft.	5000	6500	10000	13000	16500	

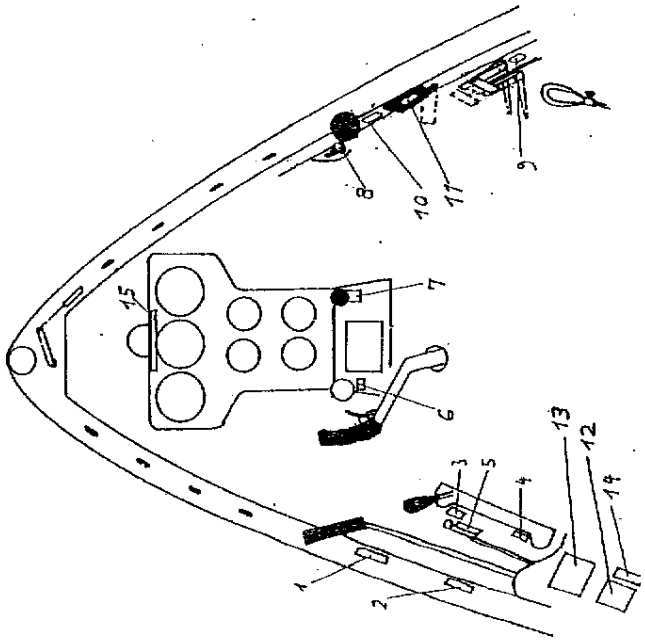
14

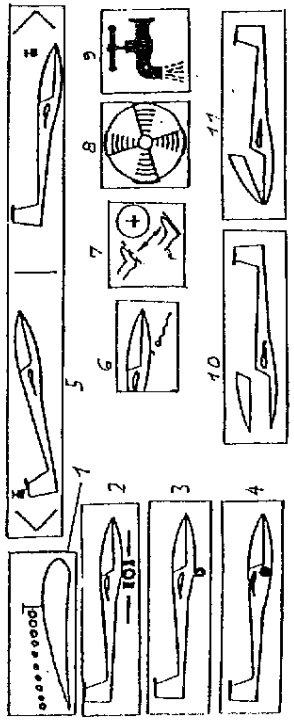
Alt.	ft.	0–6600	10000	13000	16000	20000
V_{NE}	kts.	146	138	131	124	117

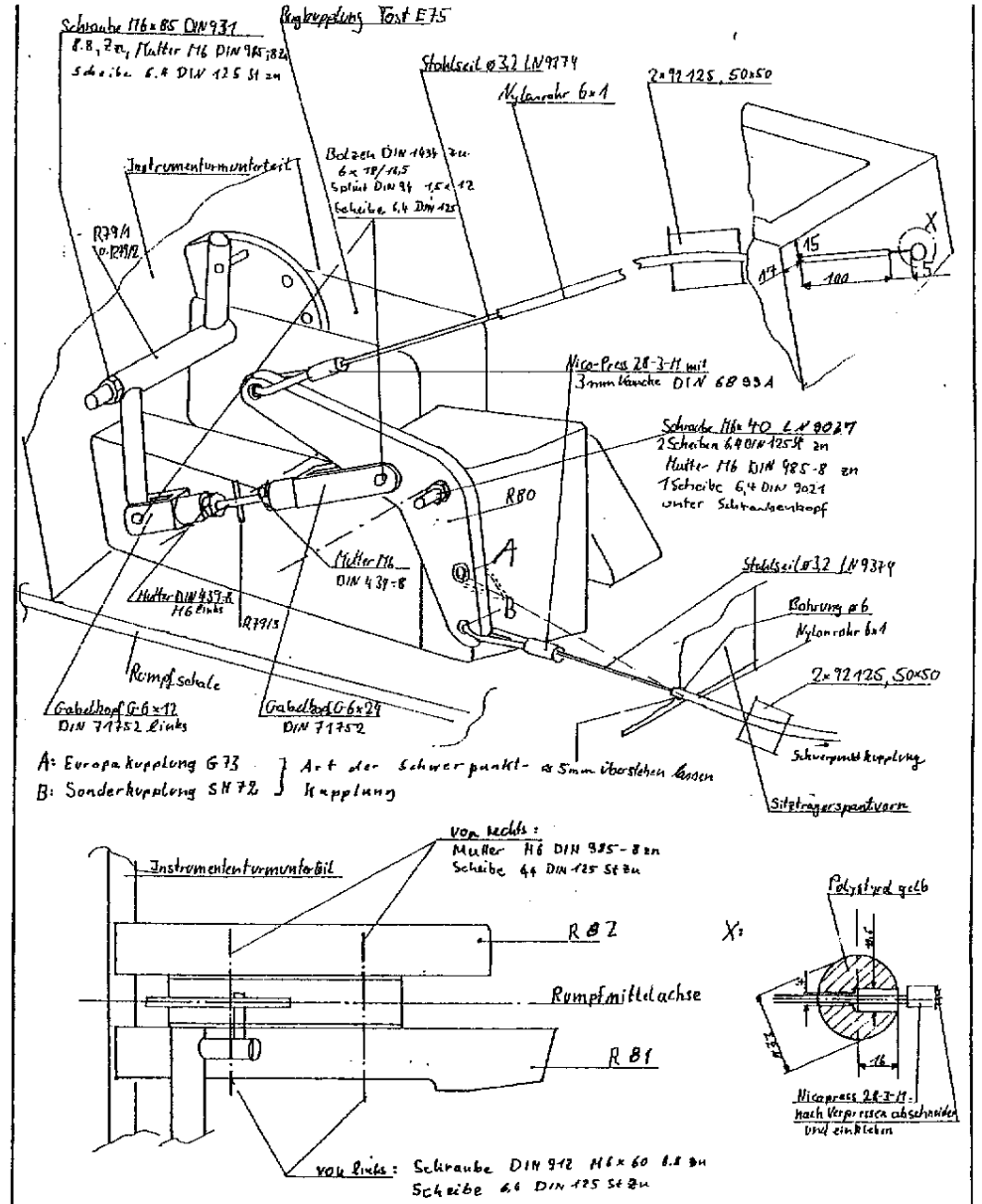
15

Placards

issued June 1986





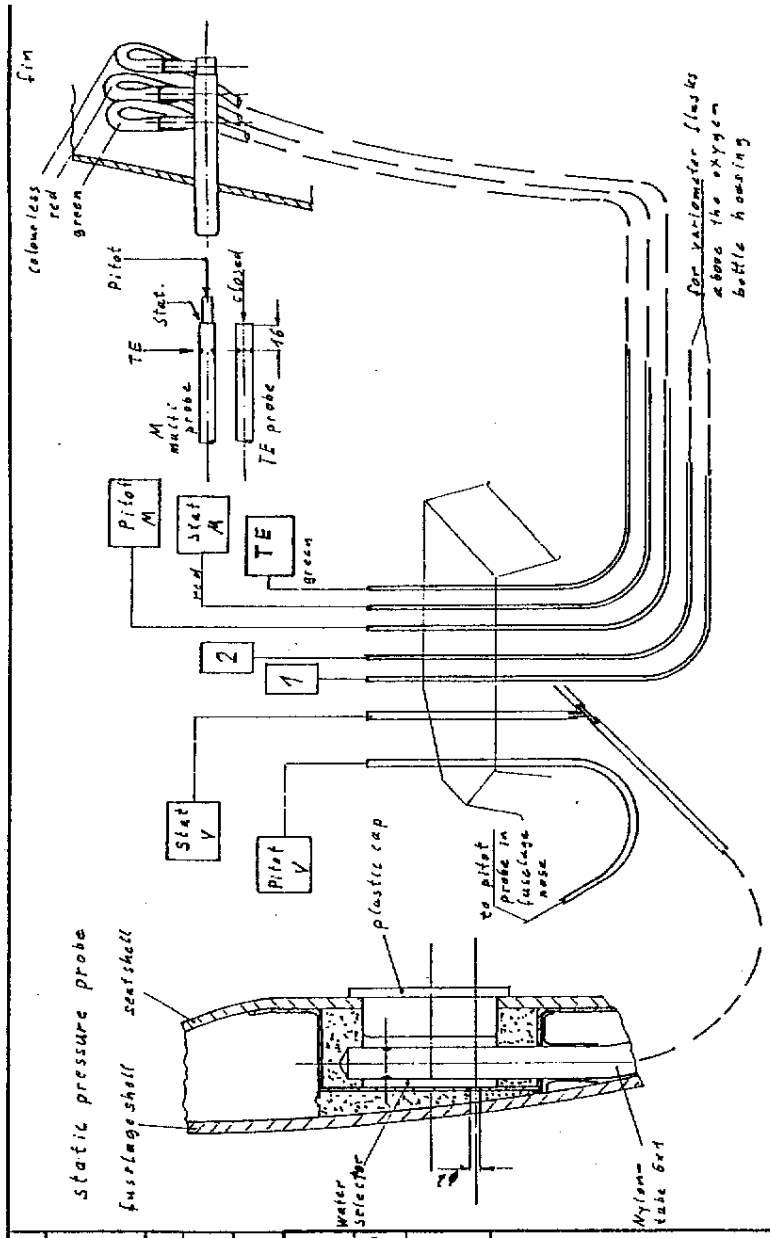


Ausg.	Änderung	AM	Tag	Name
			1984	Tag / Name
			Gez.	31.01 Hamm
			Gepr.	23.10.85 W. Dirks
			Norm.	
			Maßstab	/
			Maße ohne Toleranz-ang. nach:	/

Einbauplan
Zusätzliche Schleppkupplung
für den Flugzeugschlepp

Glaser-Dirks
Flugzeugbau GmbH
7520 Bruchsal 4
Im Schollengarten 19-20

DG
EFK



	Tag	Name
Ges.	15.8.97	W. Dirks
Gepr.		
Norm.		

Maßstab 1:1

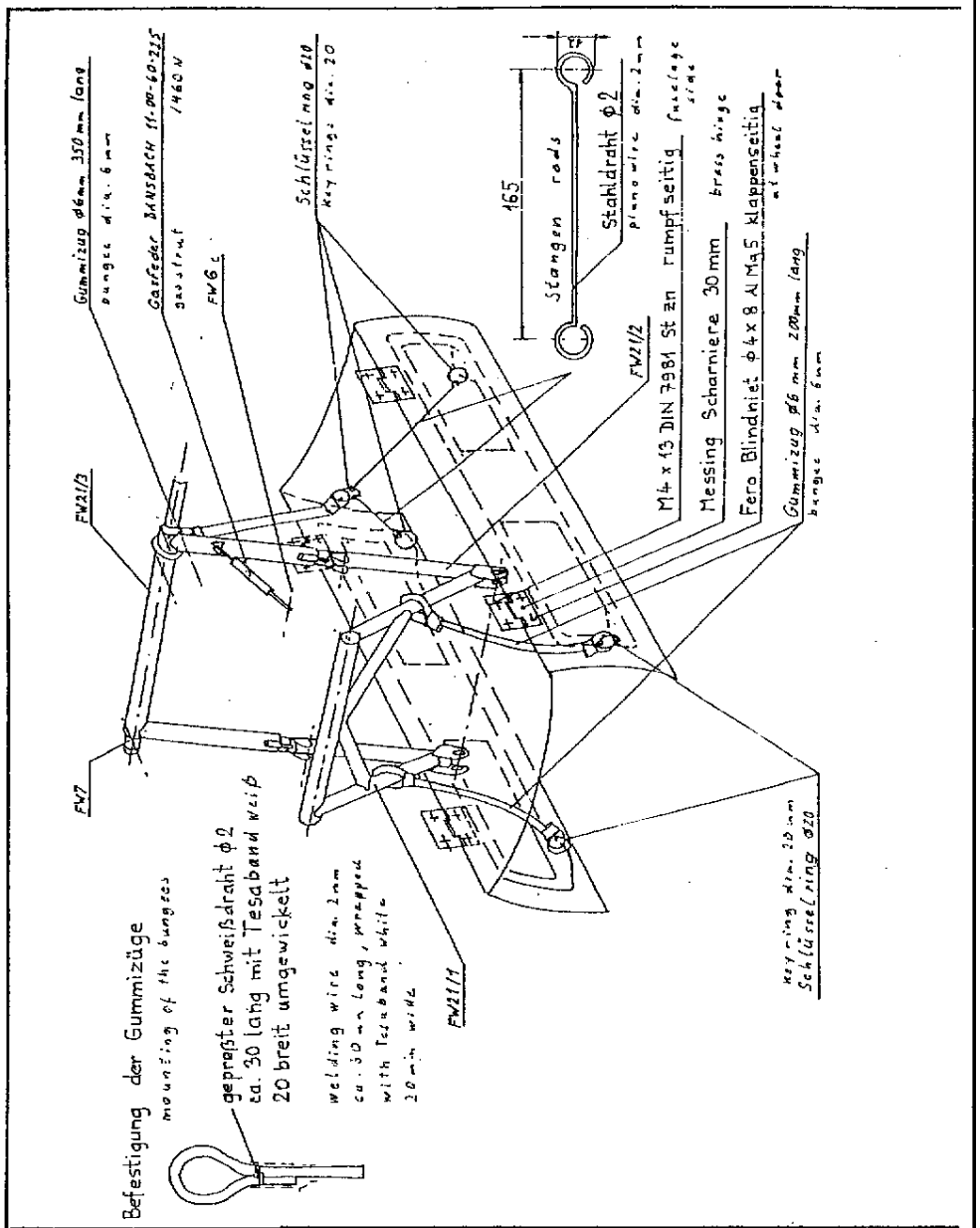
Maße ohne Toleranzang. nach

instrument pressure lines and probes with M adapter

Glaser-Dirks Flugzeugbau GmbH
7520 Bruchsal 4
Im Schollengarten 19-20

3 E D

Zustand | Änderung | Ltd | Tag | Name



	Tag	Name
Ges.	Okt. 97	
Gepr.		
Norm.		

Maßstab

Maße ohne Toleranzang. nach

Einbauplan Fahrwerksklappen

Installation sketch landing gear doors

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