

BURKHART GROB

LUFT- UND RAUMFAHRT GmbH & Co. KG
8939 Mattsies

MAINTENANCE MANUAL

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Owner : 'DYRVEDALEN LANGFLYGARLAUG
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The translation has been accomplished to our best knowledge and judgement. In case of doubt, the German original is authoritative.

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Note: Service Bulletins and Airworthiness Directives are to be filed behind this page.

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1. Technical Data

- Wing

Airfoil	Eppler E 583		
Span	b =	18.00 m	(59.06 ft.)
Area	S =	17.52 m ²	(188.6 sq.ft.)
Aspect Ratio		18.50	

- Ailerons

Span	b _{QR} =	4.000 m	(13.12 ft.)
Chord (inboard)	t _i =	0.210 m	(8.27 in.)
(outboard)	t _a =	0.100 m	(3.94 in.)
Area (both)	S _{QR} =	1.240 m ²	(13.3 sq.ft.)
% of Wing Area		7.09 %	

- Fuselage

Length	l =	8.200 m	(26.90 ft.)
Width of Cockpit	b =	0.710 m	(2.33 ft.)
Height of Cockpit	h =	1.020 m	(3.35 ft.)
Height of Horizontal Stab.	h =	1.550 m	(5.09 ft.)
Surface Area (approx.)	S =	13.000 m ²	(139.9 sq.ft.)

- Vertical Stabilizer

Airfoil	Eppler E 608		
Height	h =	1.30 m	(4.27 ft.)
Area	S _{SLW} =	1.37 m ²	(14.7 sq.ft.)
Aspect Ratio		1.23	
Chord (bottom)	t _u =	1.25 m	(4.10 ft.)
(top)	t _o =	0.86 m	(2.82 ft.)

- Rudder

Height	h =	1.300 m	(4.27 ft.)
% of Vertical Stab.		37 %	
Average Chord	t _{Rm} =	0.388 m	(1.27 ft.)
Area	S _{SR} =	0.504 m ²	(5.4 sq.ft.)

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- Horizontal Stabilizer

Airfoil	Eppler E 528 MOD		
Span	b =	3.390 m	(11.12 ft.)
Area	S _{HLW} =	2.177 m ²	(23.4 sq.ft.)
Aspect Ratio		5.28	
Chord (inboard)	t _i =	0.824 m	(2.70 ft.)
(outboard)	t _a =	0.460 m	(1.51 ft.)

- Elevator

Span	b =	3.390 m	(11.12 ft.)
Average Chord	t _{Rm} =	0.18 m	(0.59 ft.)
Area	S _{HR} =	0.613 m ²	(2.00 ft.)

- Airbrakes (Type GROB)

Area (both)	S _{BK} =	0.476 m ²	(5.1 sq.ft.)
Span	b =	1.700 m	(5.58 ft.)
Height	h =	0.140 m	(0.46 ft.)

Masses (Weights)

Standard Empty Mass	490	kg	(1080 lbs.)
Max. Payload	220	kg	(485 lbs.)
Front seat max.	110	kg	(243 lbs.)
Rear seat max.	110	kg	(243 lbs.)
Min. Payload	70	kg	(154 lbs.)
Max. Flying Mass	710	kg	(1565 lbs.)
Payload as % of Flying Weight	31	%	
Wing Loading	31.0 - 40.53	daN/m ²	
	(6.3 - 8.3	lbs/sq.ft.)	
Max. Mass of Non-Lifting Parts	535	kg	(1179 lbs)

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Powerplant

Manufacturer : Bombardier-Rotax GmbH
Model : Rotax Type 505 A
Maximum Power, Take-Off : 31.6 kW/43 HP
 Continuous : 31.6 kW/43 HP
Maximum Engine rpm at MSL

• for variable pitch propeller: Take-Off : 6800 rpm
 Continuous : 6400 rpm

Although the maximum engine RPM for continuous operation is 6800 RPM, the RPM limit caused by the combination engine/propeller is 6400 RPM with propeller in CRUISE - position.

• for fixed pitch propeller: Take-Off : 6800 rpm
 Continuous : 6800 rpm

Idle rpm : approx. 2000 rpm

Carburetors : 2 x HR diaphragm-type carburetors
 or
 2 x BN 38 diaphragm-type carburetors

Spark Plugs : BR8ES

Cylinder Head Temperature : Thermoring under spark plug;
 max. 250 °C permissible

Lubricant/Fuel : see POH Sec. 2.4

Refer to Manual for ROTAX Engine Model 505 A
for further technical data.

Propeller 1:
Manufacturer : MT-Propeller-Entwicklung
Model : MTV-24-M/158-16
Diameter : 1.58 m (5.18 ft.)

Propeller 2:
Manufacturer : Technoflug Leichtflugzeugbau
Model : KS-1C-158-R-108
Diameter : 1.58 m (5.18 ft.)

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2. Description of Components and Systems

2.1 Airframe

The GROB G 103 C TWIN III SL is a two-seater mid-wing powered sailplane with a damped T-type tail. State-of-the-art industrial technology is used to manufacture the motorglider using fiber composite materials. The aircraft can be used for instruction, training and high performance flights.

The two seats are arranged in tandem in the safety cockpit. The two canopies are independent of each other and open to the right.

The landing gear consists of non-retractable nose and main wheel in a tandem arrangement. The main wheel is equipped with a hydraulic disk brake. A tail wheel is also installed.

- Wing

The 2-section wing is triple tapered and is equipped with GROB-type airbrakes on the upper side.

The wings consist of CRP/ARP sandwich shells with spar caps made of carbon fiber rovings and a spar web made of GRP foam sandwich. The ailerons are made of CRP/ARP sandwich.

- Fuselage

The fuselage in the cockpit area is made of GRP. The entire rear fuselage, including the vertical stabilizer, is made of carbon fiber. The rudder is made of ARP sandwich.

- Horizontal Stabilizer

The horizontal stabilizer consists of stabilizer and elevator. The stabilizer is a CRP/foam sandwich construction with spar. The elevator is made of carbon fiber.

2.2 Flight Controls

The flight control system is designed as a pushrod control system (see also Appendix A1 and A2). Handles, bellcranks and drive levers are made of welded steel tube or aluminum. The pushrods are made of steel or aluminum tubes with riveted end connections.

- Elevator Control

Force is transmitted from the control stick to the elevator pushrod via the control stick split lever. The two control sticks are connected to each other. The rear control stick is secured by a butterfly nut and is removable. Four elevator pushrods lead from the rear split lever to the automatic elevator connection in the upper section of the vertical stabilizer.

All elevator control elements inside the fuselage are removable. The drive lever is laminated into the elevator. Elevator stops are installed on both control stick split levers below the seats.

- Elevator Trim

The trim levers are located on the LH wall of each cockpit next to the airbrake lever. The operating handles are green. Both trim levers are connected to each other. A trim spring is installed below each seat shell between the trim rods and the elevator rods. A further spring is installed between the front elevator rod and the frame. The control sticks move while adjusting the trim.

- Rudder Control

The front pedal support is designed as cable control and infinitely variable. Two pulleys on each pedal provide a constant cable tension by means of springs. The cables lead to the rudder split lever which is mounted below the rear pedal assembly. Pushrods inside the fuselage tube drive the rudder.

The entire rudder control is removable. The rudder stops are installed at the rear control stick frame.

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Manual control for the rudder

A manual control for the rudder according to SB 869-14 may be installed for operation of the motorglider by instructed pilots. The hand lever is located on the left side of the front cockpit behind the airbrake lever. This lever actuates the left pedal in the rear cockpit via a pushrod. Before operation by other pilots this system must be removed.

- Aileron Control

The aileron control force is transmitted from the control stick to the aileron bellcrank on the fuselage side wall via a short intermediate rod. Two pushrods couple the aileron bellcranks of each control stick. Pushrods lead from the rear lever via an intermediate lever to the bottom drive lever of the control spider in the center fuselage. The top lever drives the aileron connectors and the pushrods inside the wing. The aileron differential lever in the outboard section of the wing drives the aileron directly via the short connecting rod.

All aileron control elements in the fuselage are removable. The aileron differential lever and the swivel in the wing can only be removed by opening the wing shell. Aileron stops are installed on each control stick.

- Airbrake Control

Both airbrake operating levers are connected to each other through pushrods. Pushrods lead from the rear lever via intermediate levers to the bottom driving lever of the control spider (fuselage center). The locking rods in the wings are driven by the top drive lever via connectors (GROB quick-locks). Pushrods lead from the locking rods to the swivel levers. The airbrake panels are mounted to the swivel levers.

All airbrake control elements in the fuselage are removable. The airbrake panels and the cover strips are also removable. The locking lever and the swivel levers in the wing can only be removed by opening the wing shell. The airbrake stops are installed on the outboard swivel lever.

- Nose wheel steering

The installed nose wheel steering is connected to the rudder controls by a cable and two tension springs.

2.3 Radio Installation

The front cockpit instrument panel can accommodate 58 mm diameter instruments. The internal loudspeaker is mounted to the side of the rear instrument panel. "Swan neck" microphones may be mounted to the pilot's right on the canopy frame. Drawings for radio installation may be obtained on request.

A transponder (ATC) and a NAV can be installed optional.

Suitable units (LBA approved) can be found in the List of Available Equipment in Section 8.

2.4 Oxygen Installation

An oxygen system can be installed on the RH fuselage sidewall between the pilot's seats. Depending on customer requirements, the size of the oxygen bottle can be between 4 and 6 liters. The pressure reducing valve on the bottle has two outlets; one for each crew member. The oxygen bottle is secured to the fuselage sidewall by tension straps and a stud plate. The stud plate is bonded to the sidewall.

For the retrofit of oxygen equipment, drawings are available from GROB.

Suitable units (LBA approved) can be found in the List of Available Equipment in Section 8.

Caution: After installation of oxygen equipment, the empty mass center of gravity position must be determined. This is to ensure that the c.g. is still within the permissible range.

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2.5 Powerplant/Propeller

The engine used is the Bombardier-Rotax Type 505A with the following features:

- twin cylinder, two-cycle spark ignition
- in-line cylinder arrangement
- ram air cooled
- fuel/oil mixture lubrication
- AC generator
- contactless capacitor dual ignition system

The powerplant is installed in the fuselage tube immediately aft of the cockpit.

Two diaphragm pump type carburetors (type HR or BN 38) are installed on the RH side of the engine. The fuel and choke controls are operated through Bowden cables from two control levers in the cockpit.

An electric starter is installed.

The engine drives a two-blade propeller through a belt drive arrangement. A belt drive pulley wheel is flange-mounted on a conical shaft at the front of the engine. A toothed belt is used to drive the two-blade propeller. The belt is of the type "Gates Poly Chain GT-8M-800/50" (50 mm (1.97 in.) wide). The propeller drive pulley arrangement provides a reduction factor of 3 : 1 between engine speed and propeller speed.

Flush-fitting aerodynamic doors close off the engine compartment when the engine is retracted.

Engine Retraction and Extension Mechanism

The engine is suspended on three rubber mounts between two swivel bearings. The swivel bearings are secured in the engine compartment to the top of the engine bulkhead behind the rear cockpit. An electromechanically driven spindle retracts and extends the engine. The spindle is attached to a transverse connecting tube between the two swivel bearings and to a bearing support on the fuselage floor. Two gas struts mounted parallel to the spindle assist the retraction and extension operation.

2.6 Fuel System

A fuel tank with a capacity of 33 liters (8.7 US gal / 7.26 imp. gal) is installed in the fuselage in the vicinity of the main landing gear. The fuel supply line runs from the underside of the tank to an electrical fuel pump and then to a fuel shut-off cock. The fuel cock is operated through a Bowden cable by a pivot-mounted lever in the cockpit. A fuel filter is installed downstream of the fuel cock. It is important that a paper filter is not used when the filter is changed. A fuel line runs from the fuel cock to the diaphragm pump on the engine. Fuel is supplied by the pump straight to the two carburetors. Because of the installation of diaphragm pump, a return line is not necessary.

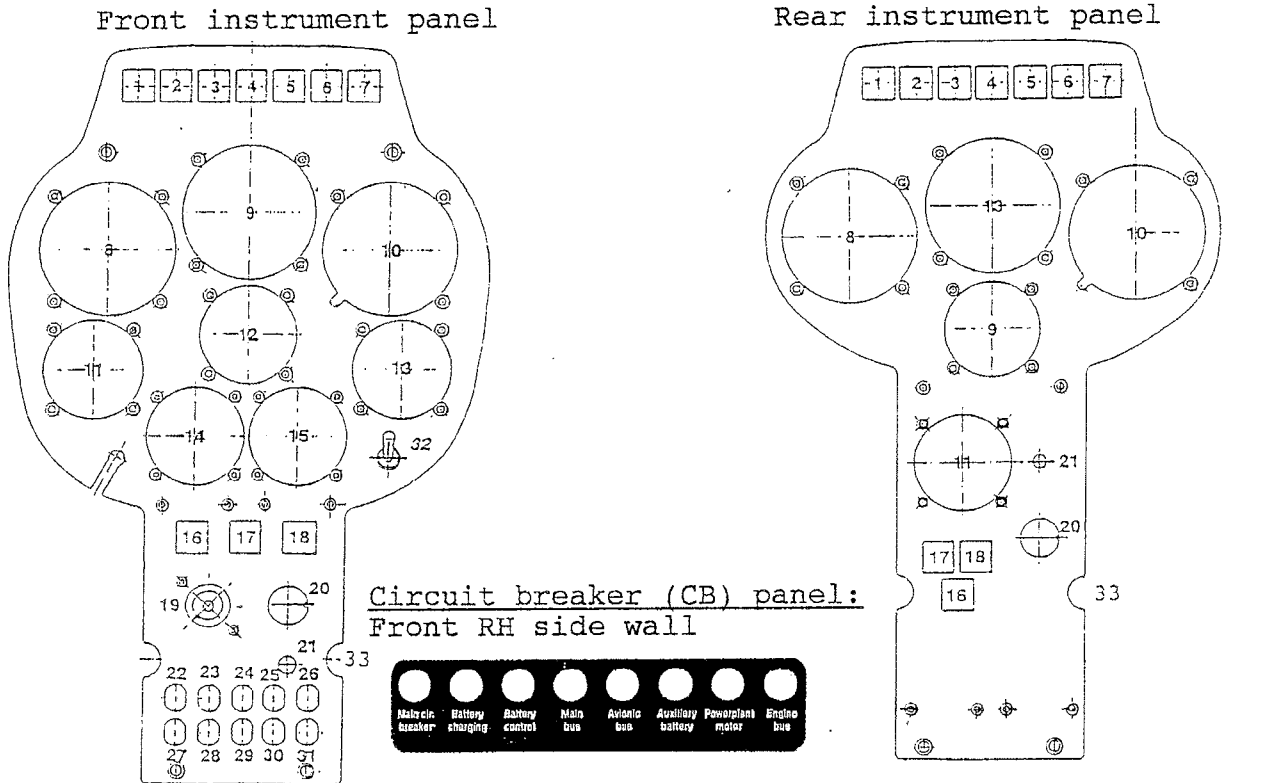
A fuel drain valve is installed on the RH underside of the fuselage near the main landing gear. The fuselage tank is vented through a hose to a point near the fuel drain valve.

The tank contents are indicated on the engine monitoring instrument on the front and rear cockpit instrument panels. An amber flashing LED indicates when 8 liters (2.1 US gal / 1.76 imp. gal) of fuel are left (1/2 hour flying time). The amount of non-useable fuel is approximately 2 liters (0.53 US gal / 0.44 imp. gal).

As standard only for variable pitch propeller:

In addition to the fuselage fuel tank, a wing tank with a capacity of 47 l (12.4 US gal / 10.3 imp. gal) is installed in the LH wing. The tank is vented and drained through a line in the wing which connects to an outlet tube on the underside of the wing. The wing tank is connected to the fuselage tank by a fuel line. A hose coupling is used at the fuselage to wing joint. The fuel runs to a fuel filter and then to the electrical pump. A timer switch in the instrument panel can be used to pump the required amount of fuel from the wing tank to the fuselage tank. The electrical fuel pump has a delivery rate of approximately 3 l/min (0.8 US gal/min / 0.66 imp. gal/min). The pump is automatically activated when the required amount of fuel is selected. The pushbutton "FUEL PUMP TRANSFER" indicates the function of the pump visually on the instrument panel. It is also possible to transfer fuel "manually" by holding the pushbutton "FUEL PUMP TRANSFER" pressed until the required amount of fuel has been transferred. If the fuselage tank is completely full, the fuel transfer is interrupted until the fuel quantity in the fuselage tank decreases to 28 l (7.40 US gal / 6.16 imp. gal). Then the rest of the selected quantity will be transferred. There is no timer switch in the rear cockpit.

2.7 Front and Rear Instrument Panels



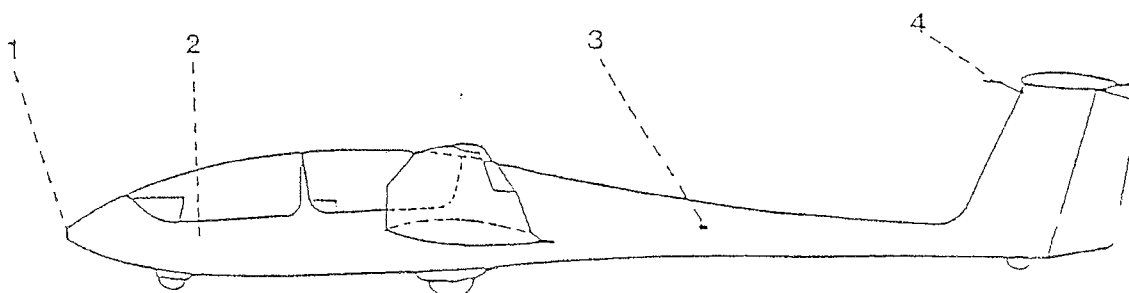
- | | | | |
|----|------------------------------|----|---------------------------------|
| 1 | Master switch | 18 | Display select |
| 2 | Engine electrics | 19 | Timer switch for tank *) |
| 3 | Avionic switch | 20 | Ignition lock |
| 4 | Intercom | 21 | "Ignition active" light |
| 5 | "Powerplant extended" light | 22 | CB - Main bus control |
| 6 | Propeller TAKE-OFF *) | 23 | CB - Avionic bus control |
| 7 | Propeller CRUISING *) | 24 | CB - COM + electrical VSI |
| 8 | Airspeed indicator | 25 | CB - ATC |
| 9 | Electrical VSI | 26 | CB - Generator |
| 10 | Altimeter | 27 | CB - Engine monitoring inst. |
| 11 | Engine monitoring instrument | 28 | CB - Fuel pump |
| 12 | Turn/horizon/slip indicator | 29 | CB - Engine ext/retr control |
| 13 | Mechanical VSI | 30 | CB - Var. pitch prop. motor*) |
| 14 | COM | 31 | CB - Var. pitch prop. control*) |
| 15 | Transponder | 32 | Static pressure change-over |
| 16 | Powerplant retraction | 33 | T-grip for powerplant extension |
| 17 | Fuel pump transfer *) | | |
- *) only for variable pitch propeller

Optional equipment and LBA approved instruments are contained in the List of Available Equipment in Section 8.

2.8 Pitot and Static Lines and Connections to Flight Instruments

The pitot and static pressure and the pressure for the compensated vertical speed indicator (VSI) are measured by probes installed at three different positions on the aircraft:

- Pitot pressure is measured by a pitot tube installed next to the nose tow hook.
- Static pressure is measured by ports on the fuselage
- Compensated static pressure is measured by a TEK probe on the vertical stabilizer



The pressure lines are color-coded as follows:

- Green pressure line : pitot pressure (1)
- Blue pressure line : compensating tank for VSI (2)
- Transparent pressure line: normal static pressure (3)
- Red pressure line : compensated static pressure (4)

The lines are connected to the flight instruments in the front and rear instrument panel as follows:

- Pitot pressure : airspeed indicator (ASI)
- Normal static : ASI / altimeter / (VSI)
- Compensated static pressure: VSI / compensating tank (max. qty 3)

A static pressure change-over switch is installed in the RH side of the front cockpit instrument panel. When the switch is set from powered flight to gliding, the static pressure supply is switched from normal to compensated static pressure. A compensating tank for the VSI is installed in the RH side of the fuselage near the front pilot's seat (an additional tank is necessary for the installation of an electrical VSI). A second compensating tank is installed in the rear cockpit instrument panel. A blue pressure line is connected to the VSI in each instrument panel. The front and rear instrument panels are connected by branch connections of the red, green and transparent pressure lines.

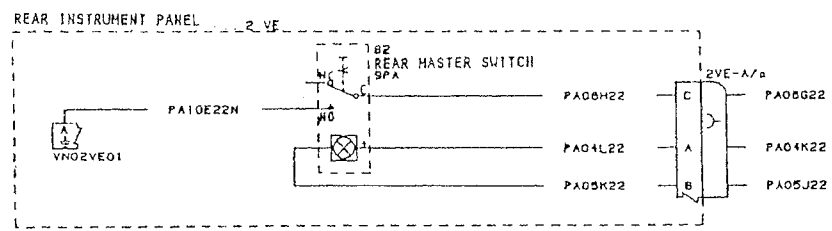
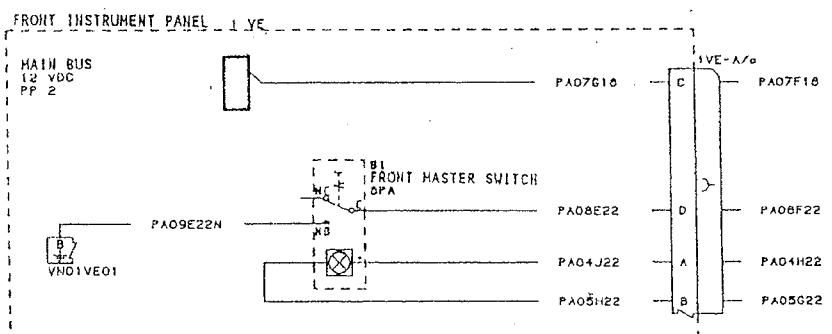
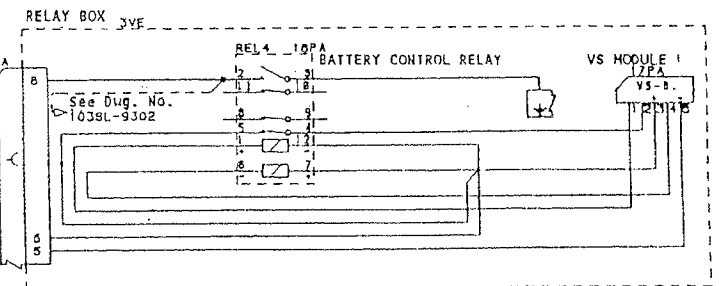
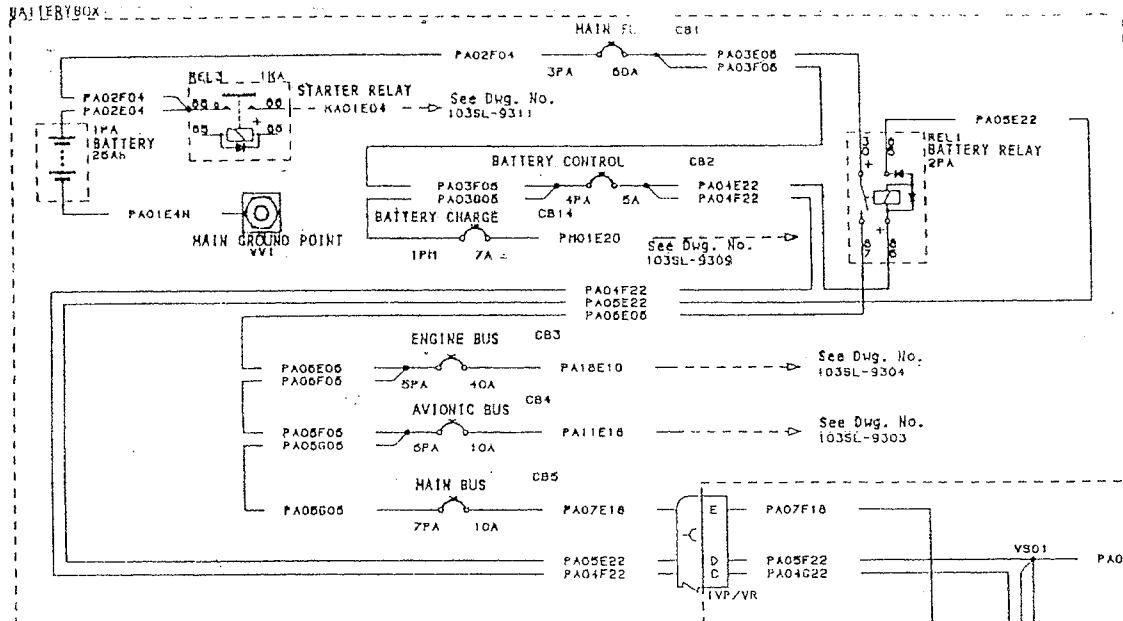
2.9 Electrical System

The attached wiring diagrams serve as a description for the electrical system:


Page	Drawing No.	Drawing Name
2.11	UP 103 SL - 9300	Bus Structure Diagram
2.12	LP 103 SL - 9301	Battery Control
2.13	LP 103 SL - 9306	Engine Monitoring

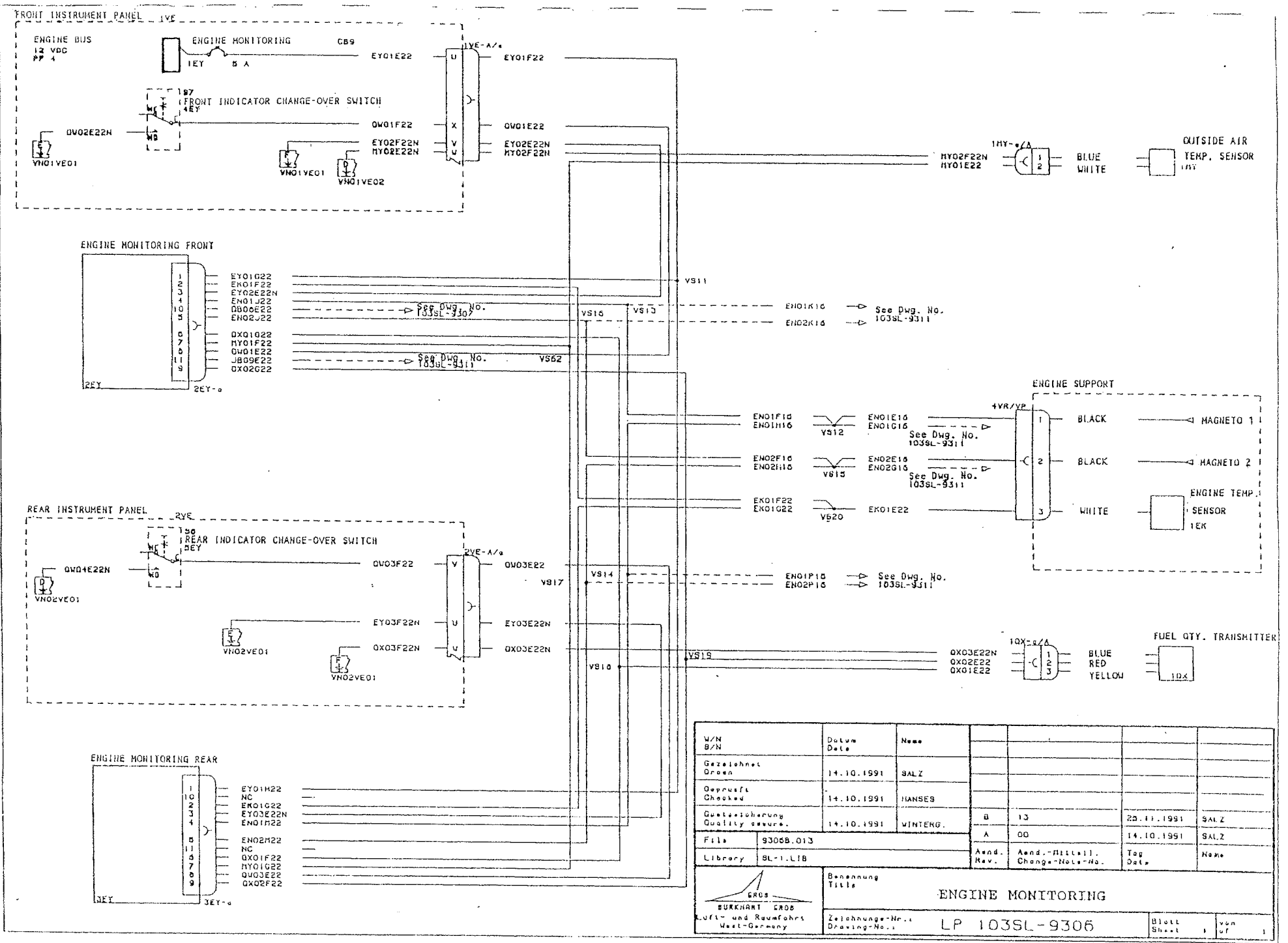
Should any serious electrical problems arise, contact the manufacturer.

Date of Issue: December 1991
Revision:



W/N S/N	Datum Date	Name			
Gezeichnet Drawn	12.10.1991	BALZ			
Geprüft Checked	14.10.91	<i>[Signature]</i>			
Qualitätsicherung Quality assure.	14.10.91	<i>[Signature]</i>			
File	9301A.LPL		A	00	12.10.1991
Library	SL-1.L1B		Aend. Rev.	Aend.-Mittel. Change-Note-No.	Tag Date


 Benennung Title: **BATTERY CONTROL**
 Zeichnungs-Nr. Drawing-No.: **LP 103SL-9301**
 Blatt Sheet: **1** von of: **1**



W/N B/N	Datum Date	Name			
Gezeichnet Drewn	14.10.1991	SALZ			
Geprüft Checked	14.10.1991	HANSES			
Geprüft Quality assure.	14.10.1991	WINTERG.	B	13	22.11.1991
File	9308B.013		A	00	14.10.1991
Library	BL-1.L1B		Rev.	Aend.-Mittel. Change-Note-No.	Tag Date
 BURKHART CAD Luft- und Raumfahrt West-Germany		Benennung Title ENGINE MONITORING		Zeichnungs-Nr. Drawing-No.: LP 103SL-9306	
		Blatt Sheet		von of	

3. Adjustment Data

3.1 Rigging Data and Control Surface Adjustment

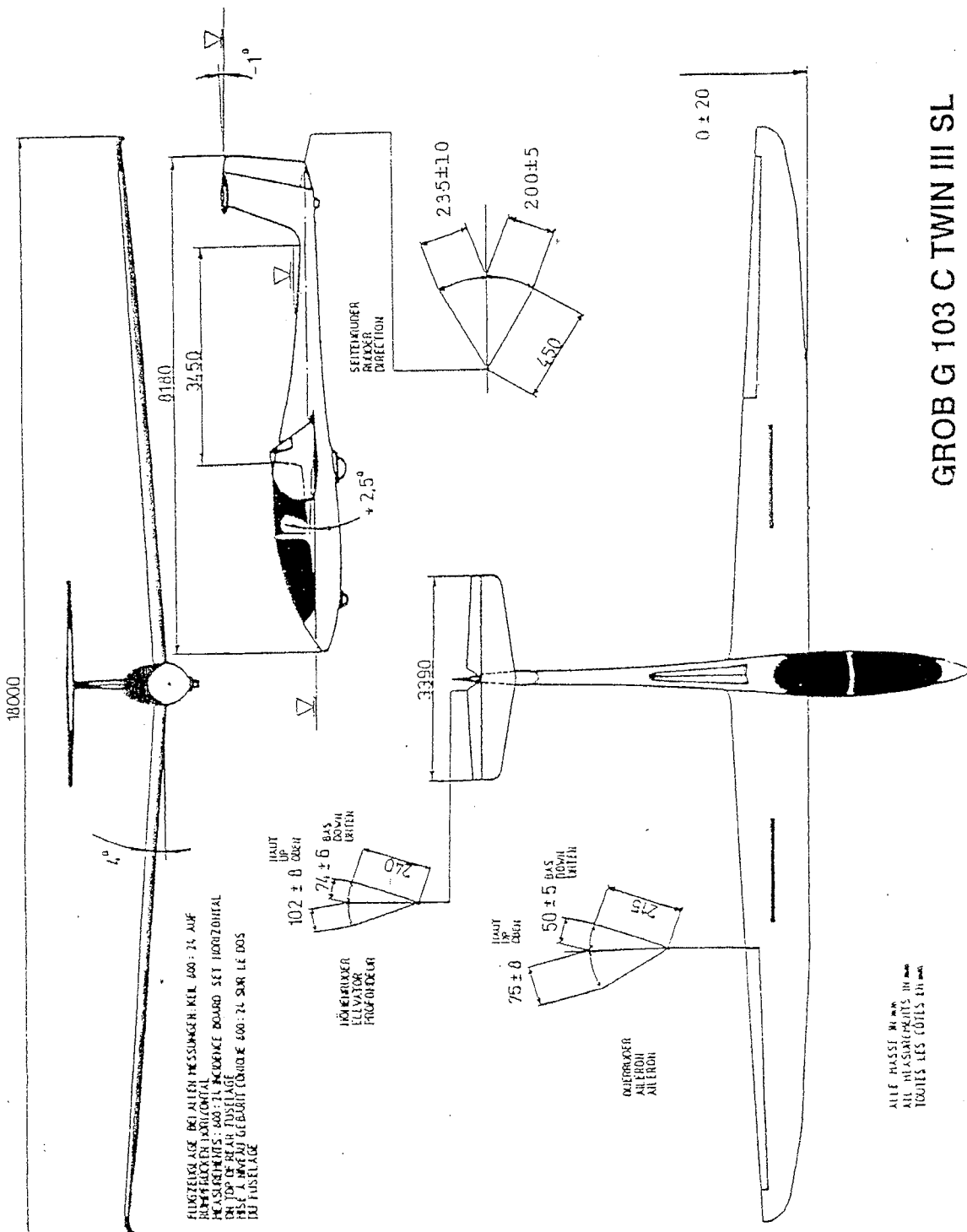
Adjustment	Reference Line	Nominal Value	Tolerance
Wing Angle of Incidence	Angle between wing chord and longitudinal axis of the fuselage	2° 30'	± 15'
Wing Sweep	Distance of wing leading edge connecting line at BMET 4500 to datum	0	± 20 mm (0.79 in.)
Wing Dihedral	Angle between upper wing surface and horizontal	4°	± 30'
Horizontal Stab. Angle of Incidence	Angle between horizontal stab chord and longitudinal axis of the fuselage	- 1°	± 30'
Datum	Wing leading edge at the root rib	QE 2980	

Control Deflections	Upwards		Downwards		Measuring Point from Hinge Line
	Nom.	Tol.	Nom.	Tol.	
Aileron left [mm] [in.] right [mm] [in.]	75	± 8	50	± 5	215
	2.95	± 0.31	1.97	± 0.20	8.46
	75	± 8	50	± 5	215
	2.95	± 0.31	1.97	± 0.20	8.46
Elevator [mm] [in.]	102	± 8	74	± 6	240
	4.02	± 0.31	2.91	± 0.24	9.45
Rudder [mm] [in.]	200	± 5 (LH)	235	± 10 (RH)	454
	7.87	± 0.20	9.25	± 0.39	17.87

QE = longitudinal station (QE 0 = 480 mm/18.89 in. from fuselage nose)

ME = centerline (ME 0 = separation plane center of fuselage)

BMET = reference centerline wing (considering wing dihedral)
(BMET 0 = ME 0)



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3.2 Adjustment of Towing Hooks, Airbrake Locking and Trim

Towing Hook	Tension of return spring 0.5 - 1 daN (1.124 - 2.248 lbf) Max. release force under load 7 daN (15.7 lbf)
-------------	--

Airbrake Locking	max. 15 - 20 daN (33.7 - 45 lbf) at the front operating lever
------------------	--

Trim Adjustment

- trim lever to fully "nose down"
- elevator control fully pulled

Operating force at the front control stick must be 6 daN (13.5 lbf)
Tolerance : $\pm 1\%$

- trim lever to fully "nose up"
- elevator control fully pushed

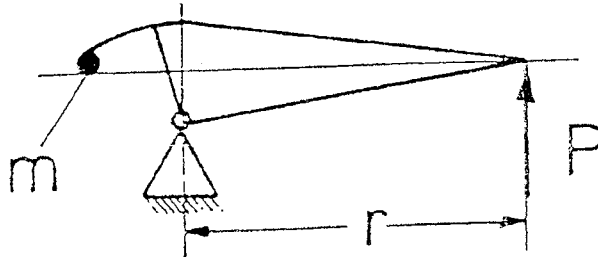
Operating force at the front control stick must be 3 daN (6.7 lbf)
Tolerance : $\pm 1\%$

The trim gradients must be set with the following configuration:

- horizontal stabilizer installed
- elevator deflections adjusted

3.3 Moments and Masses of the Control Surfaces

After repainting or repair, the moments and masses of the control surfaces must be checked and, if necessary, corrected. For measuring of the control surface moments, the surfaces must be removed. For determination of the control surface moment $M = P * r$, the control surface must be pivoted at the fulcrum (as frictionless as possible). Force P can be measured using, for example, a letter scale.



If the residual moments are exceeded, the mass balance m must be supplemented. Mass balance material such as circular material made of steel or lead is inserted into the tubes of the control surfaces and fixed with M5 screws (at least every 100 mm / 3.94 in.). If the mass values have been exceeded, the mass of the control surface must be reduced (e.g. by sanding). In particular, weight reduction is worthwhile near the trailing edge because at this point the moment is at its maximum and it may be possible to remove additional mass balance material.

The moments and masses of the control surfaces must be within the following range:

	Residual Moment	Mass	Mass Balance (included)
Elevator	140 - 195 Ncm 12.39-17.25 in.lbs	3.60 - 4.80 kg 7.93-10.58 lbs	0.78 kg 1.72 lbs
Rudder	0 - 115 Ncm* 0.00-10.18 in.lbs	4.40- 5.40 kg 9.70-11.91 lbs	2.50 kg 5.51 kg
Aileron	20 - 30 Ncm 1.77- 2.65 in.lbs	5.20- 6.40 kg 11.46-14.11 lbs	1.95 kg 4.30 lbs

* This range must be reduced to 0 - 100 Ncm (0.00-8.85 in.lbs), if Service Bulletin TM 869-14 is included.

Mass balance must be installed in the specified sections:

- Aileron : Starting at 2/6 up to and including 4/6 of the aileron span in outboard direction
- Rudder : Above the upper rudder bearing
- Elevator : In elevator tips

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3.4 Play in the Flight Controls

With the front control stick and the front rudder pedals locked, no play at the control surfaces is permitted.

Bearings and hinges with play must be replaced or a request made to the manufacturer for means of repair.

Other reasons for excessive play must be checked and removed.

Note: Control elasticity is permitted.

3.5 Wing Linkage Play

Tangential play of the wings (movement of wing tips fore and aft) is usually cleared by hand tightening the slide sleeves of the wing linkage tubes.

Wear of the slide sleeves could result in the minimum value of 1 mm no longer being available (see also Pilot's Operating Handbook, Sec. 4.2) or in the worst case, the guide pins could bottom at the end of the milled slot. In this case it may not be possible to compensate the play.

For clearing this play, either replace the slide sleeves or use oversize balls in the wing linkage tubes.
Detailed repair instructions are available from GROB.

Note: Excessive play in the wing linkage tubes is mainly caused by pushing or pulling the aircraft at the wing tips.

3.6 Main Bolt Torque

The permissible torque for the main bolts is 75 Nm (55.3 lb.ft).

4. Inspections

4.1 Mandatory Inspections of Component Parts

- Rudder Cables

Every 200 operating hours and at every annual inspection, the rudder cables must be checked at the front pedal assembly; especially in the area of the pulleys. In case of damage (including the thimbles and clamps), wear or corrosion, the rudder cables must be replaced.
Single strand wear of max. 50% is permitted.

- Towing Hooks

Perform the inspections in accordance with the Operating Manual for Towing Hooks (see also Sec. 10).

- Nose Wheel Steering

Check nose wheel steering for cleanliness and proper function and clean if necessary.

- Instruments

The instructions of the applicable manufacturers are valid for the inspection of the installed instruments and equipment.

- GROB-Type Quick-Locks

Check the quick-locks of the flight control connectors for cleanliness. For cleaning these parts, use oil sprays only. Lubrication is not necessary.
Tolerances: The axial play of the ball part must not exceed
0.10 mm + 0.15 mm/-0 mm
(0.004 in. + 0.006 in./-0 in.).

- Gas Struts

If gas struts are installed to hold open the canopies, check them for cleanliness and sufficient thrust.

- Oxygen Installation

Perform inspections in accordance with Section 11.3.

Note: See also Life Limit Items (Section 11.3).

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4.2 Powerplant Inspections

4.2.1 Daily / Pre-Flight Inspection

Refer to POH Sec. 4.3 and 4.4.

4.2.2 Every 25 Flying Hours, at least Annually

- Check air filter for contamination
- Change spark plugs
- Change fuel filter
- Check fuel lines for general condition and leaks
- Check engine screws for tightness
- Check Bowden cables and mechanisms for smooth operation
- Lubricate control gear for propeller actuating lever
- Lubricate control gear for powerplant retraction system
- Check electrical wiring and connections
- Check ignition timing
- Clean carburetor cover
- Check engine idling speed and adjust if necessary
- Clean the engine
- Torque cylinder head nuts (only at first 25 h inspection)
- Check and lubricate starter gearing
- Check play of the bearing of the upper belt drive pulley
With propeller and toothed belt removed, no notable play may be detected by shaking on the upper belt drive pulley.
- Check grooved nut at the upper pulley wheel for a tight fit (torque: 20 Nm (14.7 lb.ft)) and securing plate for proper condition

Note: After loosening the grooved nut, a single check is mandatory after 5 engine hours!

- Power Lever Adjustment
Inspect the power lever friction screw for correct function. Noticeable resistance to power lever movement must be felt in all positions.

4.2.3 300 Hour Inspection

The engine must be returned to the manufacturer's for general overhaul. When the TBO is reached, GROB is to be contacted without delay. The engine will be stripped at Mattsies and forwarded to ROTAX for general overhaul.

4.2.4 Torque Loading Table for Engine Components

Spark plug	:	28 Nm (20.6 lb.ft)
Cylinder head nuts	:	20 Nm (14.7 lb.ft)
Magnet flywheel	:	100 Nm (73.8 lb.ft)
Drive pulley	:	50 Nm (36.9 lb.ft)
Grooved nut	:	20 Nm (14.7 lb.ft)
Housing bolts M12	:	50 Nm (36.9 lb.ft)
Screws M12	:	57 Nm (42.0 lb.ft)
Screws M10	:	32 Nm (23.6 lb.ft)
Screws M8	:	24 Nm (17.7 lb.ft)

4.3 Scheduled Inspections

At regular intervals, but not later than the annual inspection or the 100 hour inspection (depending on the national requirements), at least the following maintenance work must be performed:

The flight control system (see Appendix A1 and A2) is accessible as follows:

- Flight Controls in the Wing

The aileron drive is accessible through the root rib and the inspection panels on the bottom.
The airbrake drive is accessible through an inspection panel and the airbrake box.

- Flight Controls in the Fuselage

After removing the seats and the shear force floor above the main wheel, the entire control system installed in the front fuselage is accessible. The bellcrank levers in the rear fuselage and the elevator connection are accessible through inspection panels and by removing the rudder.

- Elevator Drive

The drive is accessible after the horizontal stabilizer has been removed.

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After cleaning the complete aircraft perform the following checks:

1. Check the complete aircraft for damage such as cracks, holes, buckling and delamination.
2. Check connection fittings for condition (play, scoring, corrosion) and proper attachment to the adjacent structure.
3. Check all metal parts for corrosion. Rework and re-protect them if necessary.
4. Check connections of wing and horizontal stabilizer to fuselage are free of play.
5. Check all components (bearings, fittings, stops, control cables) of the flight control system for condition.
6. Perform functional test of flight control system including airbrakes; check control surface deflections.
7. If the controls do not move freely, determine the cause and clear the fault.
8. Check the three landing gear wheels for condition and lateral play. Check condition and braking effect of the wheel brake.
9. Treat the towing hooks in accordance with the applicable operating and maintenance instructions.
10. Check the pressure probes and ports of the airspeed indicating system for cleanliness. Check the pressure lines for leaks.
11. Check all instruments, equipment and other system components for condition and correct functioning.
12. Determine wing bending oscillation number and compare it to the value in the acceptance report. The aircraft stands on its main and tail wheels for this test. Tire pressure must be 2.5 bar (36 psi).
13. Check installed equipment and instruments against the equipment list.
14. After repairs or change of equipment, determine the empty mass and center of gravity position by calculation or weighing. Enter the data into the weighing record.

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For the purposes of extension of the service life the following inspections (visual inspection, tapping) at the wing connecting bolts and at the main spar spigots must be conducted at 9500, 10500 and 11500 flying hours:

- a. wing root external:
 - wing/ fuselage attachment fittings secure in laminate
 - wing connecting bolts: wear, corrosion, deformation

- b. spar stub:
 - main spar spigot
 - spar pin fitting tight in laminate

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4.4 Unscheduled Inspections

- Inspection Check List

Daily inspection and preflight check: see Pilot's Operating Handbook Section 4.3 and 4.4.

- Unscheduled Inspections

• After heavy landing:

Check wheels. Check fuselage shell in the vicinity of the landing gear. Check spar stubs at the root rib for white patches in the laminate.

Check wing connections inside the fuselage and check bolts in the root rib.

Check all control surface bearings. Check all mass balance weights in the control surfaces.

• After ground loop:

Check the fuselage shell in the vicinity of the landing gear. Check rudder control linkage and bellcranks.

Check wing connections inside the fuselage and check bolts in the root rib.

Check attachment of horizontal stabilizer.

• After exceeding the permissible speed limits or manoeuvring load factor:

Check the aircraft for white patches in the laminate of wing, fuselage and horizontal stabilizer connections. Check for surface cracks, creases or buckling. Check for unusual difficulty during rigging and for unusual bending oscillation number.

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5. Maintenance

5.1 Airframe Maintenance

Under normal operating conditions the airframe is maintenance-free between annual inspections.

Re-lubrication, other than the connecting points for wings and horizontal stabilizer is not required.

Depending on the degree of contamination, clean and lubricate the towing hooks and the wheels as necessary.

5.2 Powerplant Maintenance

Because maintenance on the powerplant is associated largely with removal/installation work, this work is described in Section 6.6. The scheduled inspections are described in Section 4.2.

Note: After installation of a new or overhauled powerplant, it is possible, that after the running-in time, engine overspeed in the range of 6800 to 7000 RPM could be detected during climb with $V_Y=90$ km/h (48 kts). This overspeed can be removed by adjustment of the powerplant or propeller. It is advisable to contact GROB for instructions.

5.3 Damage

In cases where it is unclear as to the significance of damage, always consult a composite structures expert for damage survey.

Minor damage of the secondary structure which does not affect the airworthiness of the motorglider may be repaired by the operator if he has the appropriate authorization. Minor damage includes paint damage and scratches and small cracks in the plexiglass canopies.

Repair of major damage and damage of the primary structure - this includes virtually all parts of the motorglider - may be performed by an authorized repair shop only.

Repair instructions for minor damage are provided in the appendix.

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5.4 Lubrication Schedule

All roller bearings are provided with a permanent lubrication and are sealed. They do not require re-lubrication.

All plain and roller bearings in the flight control system are maintenance-free and do not require re-lubrication. The plain bearings in the root ribs and the horizontal stabilizer must be washed out with gasoline when dirty and re-lubricated.

Before rigging the motorglider, re-lubricate the bolts and bores of the wing joint if necessary. The bolts of the horizontal stabilizer attachment and the thread of the fixing screw must be re-lubricated from time to time.

The canopy locking and canopy jettison linkages must be re-lubricated from time to time.

Dirty towing hooks are best cleaned by using compressed air and a brush and by operating the mechanism.

The winch launching hook is accessible from inside the cockpit and can be lubricated with oil sprays or similar.

Caution: All utilized lubricants, solvents or other fuels and materials must be stored in separate containers and disposed of in accordance with national regulations.

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5.5 Care

- Moisture

As far as possible, protect the motorglider against moisture. Although all metal parts, except for the wing and horizontal stabilizer fittings, are surface-protected, corrosion cannot be avoided during extended exposure to moisture. After any flights in rain, dry off penetrated water and dry the external surfaces with a chamois leather. Re-grease any bright fittings to prevent the formation of condensed water.

- Sunlight

To prevent the surfaces from heating up, all members of the primary structure of composite sailplanes shall have a white surface.

- Finish Protection

The swab-applied wax coat is very resistant. Clean it with a mild detergent. Heavy dirt such as grease or dead flies are best removed with a silicone-free polish (e.g. "1 Z - Spezialreiniger D 2", Messrs. W. Sauer & Co., D-5060 Bensberg or "Reinigungspolish", Messrs. Lesonal, Stuttgart). Residual adhesive tape at wing and horizontal stabilizer joints may be removed with gasoline. The paint in the vicinity of the wing tank (as standard only for variable pitch propeller) is an anti-static paint. This paint is applied directly on to the primer and is then covered with a protective layer of top coat paint. The layer of anti-static paint (green layer) must not be damaged! The care of the finish should be carried out according to the instructions "Pflege für UP-Beschichtungen an Segelflugzeugen" GROB - AKZO Ident-Nr. 4319H dated 13.07.89.

- Cleaning of the Plexiglass Canopies

Clean the canopies with soft fabric or a sponge and a mild cleaner only. Use clear water and dry the canopies with a chamois leather. "Plexipol" is a suitable polish.

- Parking

Parking sailplanes or motorgliders in the open air should be avoided. The airplane should only be stored or parked in well ventilated buildings. However, if the glider is parked outside with the horizontal tail dismounted, protect the elevator push-pull rod against damage by moisture by means of a suitable cap.

6. Removal/Installation and Maintenance Instructions

6.1 Removal and Installation of the Rudder

- Removal

Before removing the rudder, remove the adhesive film from the rudder slot.

The rudder is only fixed by a M6 socket head cap screw at the LH side of the vertical stabilizer. Remove the stop nut and the socket head cap screw so that a second person can slightly lift the rudder and remove it from the upper guide pivot. The M6 screw of the rudder drive rod can be unscrewed after the stop nut has been removed.

- Installation

When installing the rudder it is advisable to connect the rudder drive rod first and then engage the rudder at the top. Insert the socket head cap screw and provide it with a stop nut. Seal the rudder slot with adhesive film. Check rudder for free movement.

- Note:
- Always use new stop nuts when installing the rudder.
 - When removing the fixing screw prior to lifting the rudder from the upper guide pivot or when installing the screw after the rudder has been replaced, take special care not to damage the upper rudder bearing.
 - Bear in mind that adhesive film contracts after fitting. Allow sufficient slack for full and free rudder movement after contraction.

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6.2 Removal and Installation of Elevator and Aileron

- Removal

Removal is best done with the wings or horizontal stabilizer de-rigged.
Remove adhesive film first.

Remove the M6 screws of the aileron drive rods.

Now remove the spiral clamping pins from the control surface bearings using a pin punch (diameter 1.8 mm). Move the close-tolerance bolts to one side to remove the corresponding control surface.

- Installation

Installation is in reverse order.

Note: Observe from which bearing the close-tolerance bolts were removed from and install them at the same location (clamping pin bores are made during control surface assembly).

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6.3 Removal and Installation of the Tow Hooks

- Winch Launching Hook

Due to the location of the winch launching hook in front of the main wheel it is subject to heavy contamination. The hook must be regularly inspected for damage and kept cleaned and lubricated.

• Removal

The winch launching hook is accessed easily after the rear seat has been removed. By removing the two front transverse fixing screws of the hook and the two rear connecting screws of the hook attachment, the winch launching hook can be removed. Remove the screw of the hook cable fixing to take out the hook.

• Installation

Installation is in reverse order. After installing the winch launching hook conduct an inspection in accordance with instructions of the hook manufacturer.

Note: Care should be taken to avoid losing the small parts.

- Nose Tow Hook

The tow hook is installed in the fuselage nose. The hook must be regularly inspected for damage and kept cleaned and lubricated.

• Removal

To facilitate removal it is advisable to remove the front instrument panel cover.

By releasing the four fixing screws on the front tow hook frame, the hook together with the fairing can be pulled slightly backwards. Now remove the screw of the cable line.

• Installation

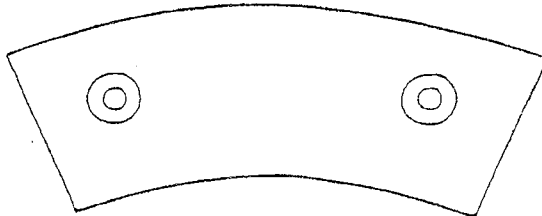
Installation is in reverse order. After installing the nose tow hook conduct an inspection in accordance with instructions of the hook manufacturer.

Note: Ensure that the bearing pedestal of the guide pulley is secured by the bottom screws.

6.4 Landing Gear and Hydraulic Brake

Maintenance of the Brake System

- Replacement of the brake linings
 - a) Remove the wheel fairing
 - b) Release the 1/4" hex screws (wrench size 11 mm) to remove the brake. Do not remove the brake hose otherwise the brake system must be bled.
 - c) Remove the two parts to which the two brake linings are rivetted.
 - d) Drill the old rivets; remove old brake linings.
 - e) Rivet the new brake linings.
Assembly is in reverse order.
 - f) Shape of the brake linings:



66-30
M1:1

- Bleeding of the brake system
 - a) Put one end of a transparent plastic tube onto the bleed screw and the other into a container filled with brake fluid.
 - b) Loosen the bleed screw when the brake is pressing the brake fluid through the brake via lever and brake cylinder.
 - c) Bleeding is completed when no more air bubbles are visible in the plastic tube.

Note:

The brake fluid DOT 3 (color amber) is available in motorcar shops. DOT 3 meets the standard everywhere in Europe. The main brake cylinder and the brake fluid reservoir are located below the rear seat.

Caution: Avoid spilling brake fluid.

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- Removal of the Main Wheel

To remove the wheel for cleaning, lubrication or tire replacement, release the M8 Poly stop nuts and push the wheel axle out to the left. Extract the spacer tube (diameter 42 x 2 mm) to the right. Remove the wheel downwards, clean all parts and apply a coat of grease before installation.

Ensure that no washers or sleeves get lost. Clean all parts and grease those parts that are accessible.

Note: Neither remove the hydraulic brake hose nor operate the brake while the cylinder assembly is removed from the brake disk.

- Installation of the Main Wheel

Installation is in reverse order.

6.5 Removal and Installation of the Nose Wheel

- Removal of Nose Wheel

Note: Before removing the nose wheel ensure that the rudder is in the neutral position.

- a) Remove wheel fairing.
- b) Remove cotter pin and castle nut from the axle bolt.
- c) Remove axle bolt.

Caution: Two spacer bushes are installed on the LH side of the wheel and one bush on the RH side. These bushes fall out when the wheel is removed. Ensure that the bushes are not interchanged!

- d) Remove the nose wheel downwards.

- Installation of Nose Wheel

Installation is in reverse order.

The adjustment of the nose wheel steering to $\pm 2^\circ$ is achieved by turning the LH or RH turnbuckle of the control cables on the rudder pedals.

6.6 Removal and Installation of the Powerplant

- Removal

Before removing the engine, read and observe the notes in section 8.4 "Engine Preservation and Storage" in the manual for the ROTAX engine Type 505 A.

In addition it is recommended that the propeller be removed (see Section 6.7) before removing the engine.

- Remove the LH and RH engine cover plates.
- Remove the exhaust system.

Caution: Take extreme care when disconnecting or removing electrical wiring and Bowden cables. Electrical wiring must never be cut through.

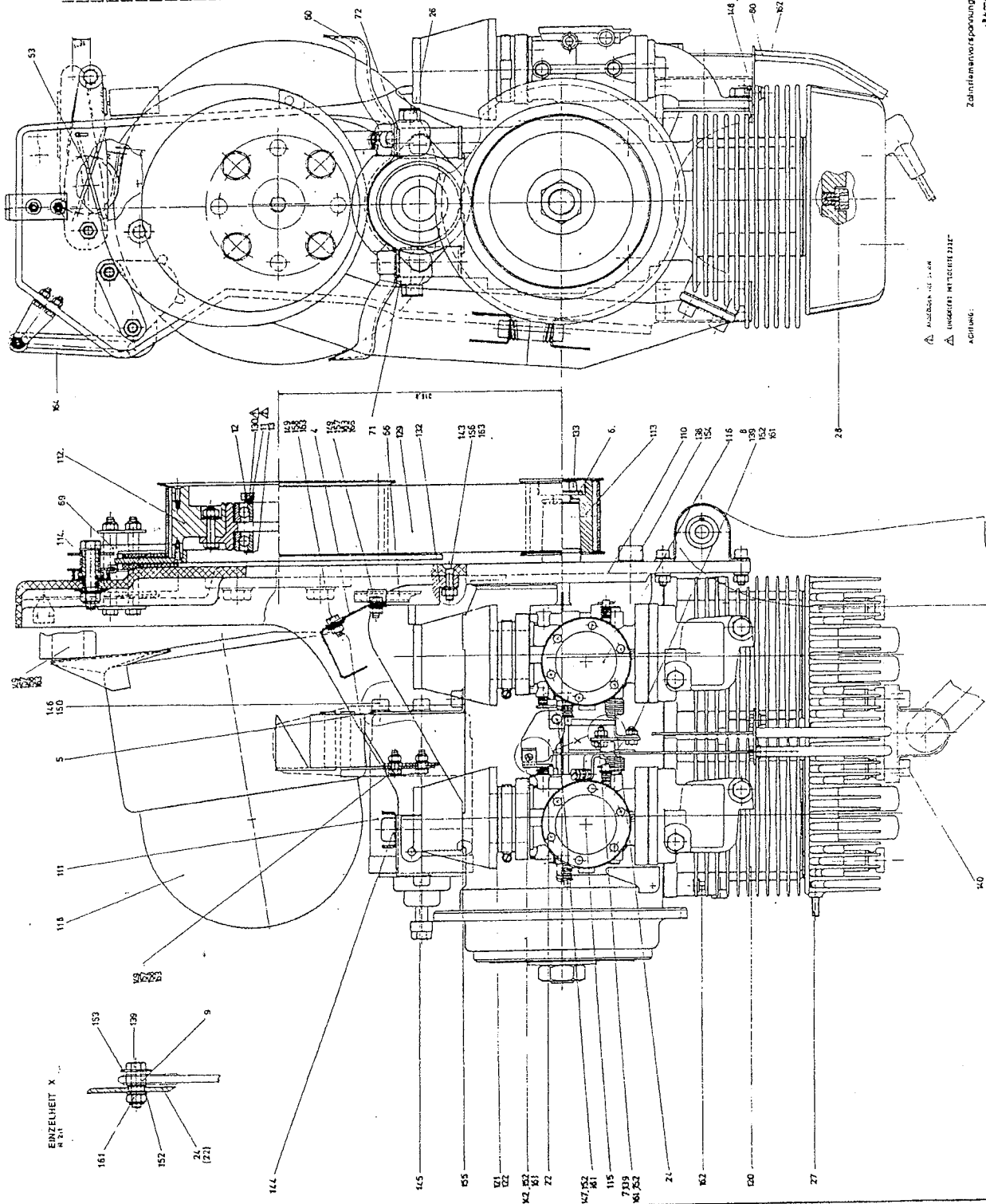
- Electrical Wiring:

- Disconnect the plug-in connectors (red and black) on the connecting wire for the motor of the variable pitch propeller. Then remove the wiring holder from the bracket.
(only for variable pitch propeller)
- Remove the ground wire from the cylinder head.
- Carefully cut open the heat-shrink sleeve on the plug-in connectors of the wiring for the cylinder head temperature sensor and for the generator. Then disconnect the plug-in connectors.
- Disconnect the wiring from the starter motor.
- Disconnect the wire from the limit switch of the detent for the variable pitch propeller. (only for variable pitch propeller)

The following illustration of the engine assembly will provide better understanding and assistance.

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