I.6. DESCRIPTION OF THE AIRCRAFT

The ASW 20 B is a single-seat high performance glider of the FAI 15 m Class which is a further development of the successful ASW 20. It is intended for use by advanced pilots for cross-country and competition flying.
The ASW 20 B mirrors the latest state of development, featuring a redesigned wing undersurface with blow turbulators (DFVLR patents at home and abroad) and incorporating Aramid fiber/GRP sandwich construction in the control surfaces. At the same time the aircraft fulfills the internationally accepted JAR 22 Requirements at significantly higher maximum loads (max. mass 525 kg). These latest Requirements came in force in April 1982 and they reflect the experience accumulated over the last decade.
With its considerably improved flight performance at high speed - in comparison with its predecessor the ASW 20 - the ASW 20 B offers the pilot new horizons and extended possibilities which remain unforeseeable at present. For this reason the manufacturer and designer request that the aircraft should be operated with the level of circumspection and consideration expected in aviation, and that owners should cooperate with the manufacturer by exchanging experiences and offering ideas for possible alterations.

The ASW 20 B is a midwing with T-tail (elevator and stabilizer), and a sprung retractable landing gear with hydraulic brake. The wing has full-span trailing edge control surfaces which are matched to the aircraft's flying speed at each of the normal flight settings to provide minimum possible profile drag. Differential movements in the 'landing' setting produce high drag whilst retaining good controllability.
As an extra glide path control, airbrakes on the wing top

surface can be extended over the entire speed range. The aileron control system operates all the wing control surfaces; in conjunction with the large fin, the result is well-balanced control responses, light stick forces and a low drag penalty.

Specification:

Wingspan:	15,00 m	(49,2 ft)
Fuselage length:	6,80 m	(22,3 ft)
Height (fin + tailskid):	1,42 m	(4,7 ft)
Wing aspect ratio:	21,43	
Wing area:	10,50 m^2	(113 sqft)
Max. flight mass:	525 kg	(1157 lbs)
Max. wing loading:	50 kg/m^2	(10,24 lbs/sqft)
Min. wing loading:	31-36,5 kg/m^2	(6,35-7,48lbs/sqft)

(depending on equipment and pilot weight)

III. EMERGENCY PROCEDURES

III.1. PREVENTING AND TERMINATING THE SPIN

A spin can still be avoided in most cases, if, when the aircraft begins to fall off to one side, the stick and the rudder are brought to the neutral position. If the camber-changing flaps are at a positive setting, moving the flap lever to setting 3 (0°) also helps considerably towards preventing the spin.

The spin is terminated by the standard method:

1. Opposite rudder (movement opposite to the direction of rotation of the spin)
2. Short pause
3. Relax the stick (i.e. give way to the stick pressure) until the rotational movement ceases and the airflow reattaches.
4. Normal setting of the rudder, and recover gently.

Notes:

1. The standard method can be varied as follows: phase 2 "short pause" can be omitted and measures 1 "opposite rudder" and 3 "releasing the stick" can be carried out simultaneously on the ASW 20 B, which results in a more rapid end to the spin.

2. The spin is terminated more rapidly if the camber-changing flaps are brought to the negative setting. Extending the airbrakes slows the rate of rotation, but increases height loss and is, therefore, not recommended.

3. If the ASW 20 B comes out of the spin by itself, it will take up a spiral-like sideslip and pick up speed rapidly. Recovery by standard measures: opposite rudder, straighten up with ailerons, roughly half maximum control deflections.

4. Spinning in the flap setting L (landing configuration) is prohibited for reasons of structural integrity. If you enter a spin accidentally with the flaps in this setting, then the flaps must be retracted (to setting 1, 2 or 3) immediately, after which recovery from the spin should be initiated.

III.2. CANOPY JETTISONING AND EMERGENCY BAILING OUT

(1) Pull both red emergency canopy jettisoning levers and push the canopy up and off.
(2) Disconnect safety harness.
(3) When bailing out, push yourself away from the aircraft strongly. Be sure to avoid the tailplane !

III.3. OTHER EMERGENCIES

(1) Jammed elevator control

If the camber-changing flap control system jams, then the ASW 20 B becomes an aircraft with fixed airfoil. If the elevator control system jams, on the other hand, the pilot will not always realize that he still has at least some degree of pitch control via the camber-changing flaps; by using the flaps he can bring the aircraft into a more favorable position for bailing out, or can perhaps avoid the necessity altogether.

(2) Emergency landing with retracted landing gear

We cannot recommend carrying out an emergency landing with landing gear retracted, as the ability of the fuselage to absorb loads is many times less than that of the sprung landing gear. If the landing gear cannot be extended, then the ASW 20 B should be set with camber-changing flaps at the L setting (landing), and, if possible, with airbrakes retracted and at minimum forward speed.

(3) Ground looping
If it seems likely that the aircraft will run past the end of the intended landing area when landing, the pilot should initiate a controlled ground loop, at the latest about 40 m (130 ft) before the end of the landing area.

a) If possible, turn into the wind !
b) At the same moment as the wing touches the ground, push the stick forward and apply opposite rudder !

(4) Emergency landings in water
Using a glider with a fuselage of similar shape to that of the ASW 20 B, a water landing was attempted with the landing gear retracted. This experience showed that the fuselage does not "water-ski", but instead the entire cockpit is forced under water. In water depths less than 2 m (6,6 ft) the pilot is in the utmost danger. For this reason an emergency landing on water can only be recommended with landing gear extended, but even then only as the last resort.

(5) Flight with defective water release system
The multiple security measures (double-wall tank containers, tank operation by a single lever, simultaneous filling of both tanks) to a great extent rule out a failure or accidental operation of the water ballast system.

As a severely asymmetrical water ballast load has a slight but nevertheless detectable influence on the aircraft's slow flight characteristics (including stalling and spinning behaviour and also a tendency towards ground loop during landing), the flight must be continued with extreme caution if the pilot detects this situation: a tendency to "crab" at high speed, and increasing aileron movements in the direction of the lighter wing as speed decreases. The pilot must maintain an adequate safety margin above the minimum speed. Stalling and spinning with asymmetrical loading is not permissible. Turning with the heavier wing down should be especially avoided.

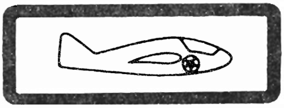
At the same time you should continue to attempt to open the water outlet valves, to achieve a symmetrical loading.
This measure will help to remedy the following conceivable faults:

1. Unequal water release due to a twisted waterbag, or reduced outlet area on one side caused by dirt or icing.

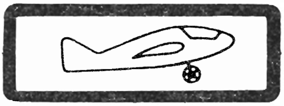
2. Gradual water loss from one side due to a leak in the water ballast system.

If it should prove impossible to achieve symmetrical loading by releasing the water ballast, then the flight should be terminated with due regard to the conditions listed above, and bearing in mind that the heavier wing will drop after the landing during the ground roll.

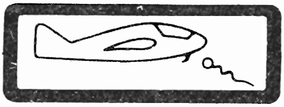
Tail-heavy trim



Landing gear retracted: pull back the lower black handle on the left cockpit wall.

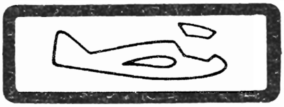


Landing gear extended.



Tow release: yellow knob at left next to the control column.

To open canopy: white handles to the left and right on the canopy frame; pull them back.



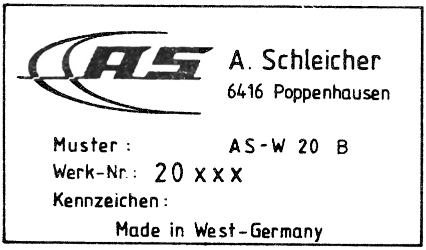
Emergency canopy jettison: pull the red grips to left and right on the canopy frame.

Ventilation: knob above the instrument panel; pull to open !

Supplementary ventilation: flap in canopy window.

Water ballast: right-hand lever on cockpit wall; Move forward to open valves.

<u>Anchoring point for parachute static line:</u>
Red ring on main bulkhead.



Serial number and type placard:
on main bulkhead to the right behind the pilot.

S.No. 20 xxx

Component placard on each component.

<u>IV.3. DAILY INSPECTIONS AND</u>

<u>IV.4. PRE-FLIGHT CHECK</u>

Rigging and de-rigging is carried out according to the instructions in the Flight Manual, pages 51 thru 53.

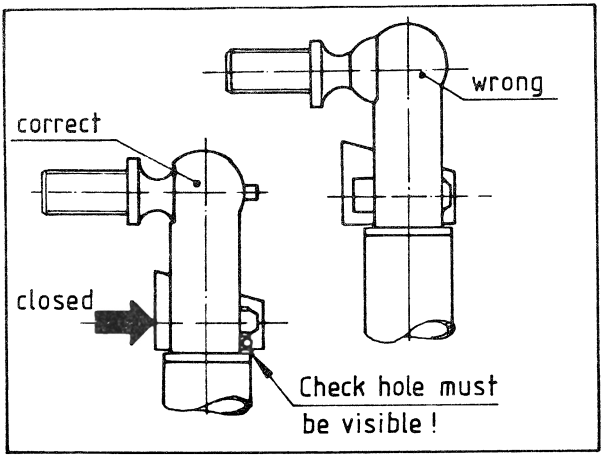
After rigging, check all control surfaces and check the airbrakes and wheel brake.
Check tire pressure: main and tail wheel 2,3 - 2,5 bar (33 - 36 psi).
An aircraft stored in a hangar must also be subjected to a control surface check and a careful inspection. Aircraft stored in a hangar are subject to damage from <u>shunting incidents</u> and <u>small animals</u>.

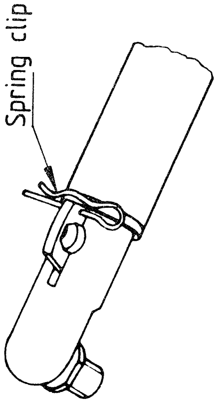
VI. RIGGING AND DE-RIGGING

VI.1. RIGGING AND LOADING WITH WATER BALLAST

Rigging the ASW 20 can be carried out by three persons without mechanical assistance, and by two persons with the use of a fuselage stand and a wing support.

1. Clean and grease all bolts and bushings and all control system connections.
2. Set up the fuselage and hold it vertical. If the wheel is lowered, check that the landing gear is locked.
3. Set the camber-changing flap lever in the fuselage to setting 2 so that the pushrod ends projecting from the wings do not foul the mixer and become bent.
4. Fit the right wing (forked spar stub) into the fuselage from the side, then fit the left wing and bring the main bolt eyes into line. Press in the main bolt and lock. At this point only the wingtip supports can be removed.
5. Connect the ailerons, camber-changing flaps and airbrakes, and satisfy yourself by pulling on the pushrods away from the heads that the six ball connectors are locked. If the aircraft should not be de-rigged for a long period of time, it is worthwhile securing the connectors with spring clips which are available from Alexander Schleicher.





6. After cleaning and lightly greasing the plug-in elevator connections, the tailplane is fitted onto the fin from the front. Both elevator panels must be fitted into their connectors simultaneously. The tailplane is now pushed back until the Allan bolt at the leading edge can be screwed in; this should be screwed in tightly until the spring retainer snaps securely into place.

7. Taping up all the slots of the non-moving components at the wing separation points, using plastic adhesive tape, provides a considerable gain in performance for little effort. Even the access hole cover on the fuselage as well as the tailplane/fin transition should be sealed in this way. The slot between the horizontal stabilizer and the elevator actuator on the fuselage should also be taped up (with the elevator control linkage at full "down"). The canopy must not be taped up, otherwise emergency jettisoning of the canopy will be more difficult.
   We recommend that the areas to be taped should be thoroughly waxed beforehand, so that the strips of tape

II.1.2 Fuselage

The fuselage is of FRP construction. In the cockpit region it is of double-skin construction, reinforced with CFRP bands. This two-skin design fully justifies the designation "safety cockpit", as experience with the ASW 20 has shown.

II.1.3 Tail surfaces and control surfaces

The fixed portion (stabilizer) of the T-tailplane is a FRP shell construction. All control surfaces, including the flaps, are made of SFRP - rigid foam - sandwich construction.

II.2. CONTROL SYSTEMS

All control surfaces, including the flaps, are actuated by means of pushrods, with the exception of the rudder. Some of the bellcranks and the short pushrods are of welded steel construction. The long pushrods are of aluminium tube, with connecting elements rivetted into them. The remaining bellcranks are machined from aluminium sheet material. All pushrods are supported in roller bearings or longitudinal ballrace guides. Rubber bellows are fitted to form a seal where a pushrod passes through a wing rib. The aluminium pushrods are resistant to corrosion, and are, therefore, not surface-treated.

II.2.1 Elevator control system

The control column is seated on a universal joint. A short pushrod runs from the front side of the column tube, driving a 180° dural bellcrank. The other end of the bellcrank lies adjacent to the right-hand fuselage side wall, and from there two intermediate pushrods run to roughly the wing root trailing edge point. From that point a long aluminium pushrod runs to the 90° dural bellcrank in the fin. From this bellcrank a fairly heavy plastic pushrod, which contributes to the elevator mass balancing system, runs through the fin to a further crank,

from which a short pushrod runs to the elevator actuator. When the tailplane is fitted to the aircraft, the elevator is pushed into this actuator and is automatically connected.
The elevator stops are located at both ends of the 180° bellcrank on the control column bulkhead.

II.2.2 Elevator trim system

The 180° bellcrank in the elevator control linkage carries the spring plunger for the trim, which is connected at its other end again to a dural bellcrank; from the left-hand end of this bellcrank run two pushrods: the rod with the trim indicator, and the friction rod, which passes through the trim locking brake. This brake is operated by the trim knob on the control column via a bowden cable.
The trim is set up so that, when the elevator is at 0°, the trim indicator slides to the front quarter of the gate when the trim knob is pressed. The trim is adjusted by adjusting the joint head on the trim spring plunger.

II.2.3 Aileron control system

The aileron control linkage starts at the universal joint at the bottom end of the control column with a short pushrod driving a 90° dural bellcrank. From the outer end of this crank at the right-hand fuselage side, a divided pushrod runs to the large aileron rocker. The rocker is located immediately in front of the aileron-flap mixer and is also connected to the mixer via two aluminium rods which superimpose the flap movement onto that of the ailerons. When the aircraft is rigged, the pushrods from the wings are connected to this rocker arm by means of Hotellier-type quick-release connectors. The quick-release connector is located on a wing-mounted pushrod which runs to the aileron bellcrank via a long aluminium pushrod and a further steel rod. From this bellcrank a short steel pushrod, terminating in a joint head, runs to the aileron.

The aileron stops are located at the right-hand end of of the first 90° bellcrank on the control column bulkhead.
Further stops are fitted inside the wing which prevent excessive control linkage movements when the control linkage is not connected (e.g. during road transport); these stops double as limits for aileron movement at flap setting 1 (high-speed flight).

II.2.4 Camber-changing flap control system

The camber-changing flap control lever is located on a pushrod on the left fuselage side wall, and is able to rotate. From there three pushrods run to the mixer located aft of the rear torque tube in the wing connection area. The mixer superimposes aileron and camber-changing flap movements for the wing control surfaces, and provides for the washout of the wing at the landing setting. When the aircraft is rigged, the two steel pushrods from the wings are connected by means of Hotellier-type connectors; the connecting heads for these are also located on the rocker situated in front of the mixer; the rocker also carries the aileron connecting heads. In the wing the linkage continues with an aluminium pushrod followed by a steel pushrod running to a bellcrank. From the latter a short steel pushrod, incorporating a joint head, runs to the camber-changing flap.
The limit stops of the camber-changing flap system are the ends of the control lever gate. When de-rigged, the camber-changing flap moves upward until its leading edge touches the wing structure; a stop in the wing prevents excessive downward movements.

II.2.5 Rudder control system

The rudder is operated by means of cables (Ø 3,2 mm = 0,126 in; LN 9374). The cables are anchored to a perforated plate which is attached on each side to a fitting in the fuselage nose. This plate provides a means of

correcting minor inaccuracies in cable length, and of setting the pedal rake angle. From this perforated plate the control cables run through the "S"-shaped pedal guides, and from the top end of the guides into nylon tubes which guide the cables into the fin. At that point the cables are attached directly to the lower rudder fitting by a pin locked with a split-pin.
The cables are held taut on the rudder pedals by means of springs. To increase the rigidity of the rudder linkage and thus avoid any tendency to rudder flutter, the springs are more powerful than normal; they must not be replaced by weaker springs.
The rudder limit stops are located on the lower rudder fitting in the fin.

II.2.6 Airbrake control system

From the operating grip on the left fuselage side two pushrods run to levers mounted on a welded torque tube mechanism. Pushrods run from either side of this mechanism to two 90° bellcranks which are pivotted on a plate at the sub-floor at the wingroot level. The connecting heads for the Hotellier-type connectors are located on these bellcranks. When the wings are fitted, the airbrake pushrods from the wings are connected at this point.
These pushrods run via a steel pushrod to the toggle levers. The levers lock at one end-point, and hold the airbrakes closed. From the toggle lever a rod operates the airbrake parallelogram, which consists of two levers, a linking rod, and the airbrake itself.
The master cylinder of the wheel brake serves as stop for the airbrake linkage.

II.3. LANDING GEAR

II.3.1 Main landing gear

The sprung main landing gear consists of one 5.00-5 wheel,

fitted with a hydraulically-operated disc brake. The landing gear swinging arms are damped and sprung by two hollow rubber springs type TO 55/55 Core N RTE II, made by the firm of MGW, at Hannoversch Münden.
The rim: Cleveland 40 78B.
Brake: Cleveland wheel brake cylinder 30-9 and master cylinder 10-20.
Main wheel: tire with tube, 5.00-5, 6ply rating.
Tire pressure: 2,2 - 2,4 bar (31,3 - 34,1 psi) at flight masses around 360 kg (794 lbs).
2,4 - 2,6 bar (34,1 - 37 psi) at flight masses around 500 kg (1102 lbs).

II.3.2 Tailskid / tail wheel

The aircraft is usually supplied with a tailskid of integral foam fitted with a metal rubbing plate.
Tail wheel:
As an option the skid can be replaced by a fixed tailwheel (210 x 65; tire pressure 2,5 bar = 35,6 psi) or by a skid with polyamid roller.

II.3.3 Braking system

The master cylinder for the hydraulic disc brake system is located on the right-hand 90° bellcrank of the airbrake control system, which is on the fuselage sub-floor. it is set at an angle above the landing gear. The wheelbrake is actuated at the same time when the airbrakes are extended. A flexible high-pressure pipe runs from the master cylinder directly to the wheel brake cylinder. The capacity flask is screwed to the spar support next to the master cylinder.

CAUTION: Use only ESSO UNIVIS I-13 or Aerosheel Fluid 4 ! It is absolutely essential that a brake fluid based on mineral oil is used. Standard brake fluid, as used for cars, is based on Ester; such fluids will destroy the seals and tubes in a short space of time.

II.4. WATER BALLAST SYSTEM

The water ballast system in the ASW 20 B makes it possible to load up the aircraft to a wing loading of 50 kg/m^2 (10,24 lbs/sqft). The two double-walled plastic bags are independent of each other and can accomodate around 150 l (39,6 US.gal.) of water. The exact quantity to be used depends on the empty mass and the useful load of the glider (see Flight Manual). The water ballast tanks are connected to the pipework system in the fuselage by means of a quick-release connector when the wings are connected to the fuselage; the ventilation pipes (instrument tubing) from each wing also have to be connected above the baggage compartment.
The two valves are operated by a single lever to ensure that both wing tanks are always emptied simultaneously. The valves are standard backpressure valves made by the firm of GF, which have been fitted with an extra stainless locking spring.

Notes:

- A severely asymmetrical ballast arrangement can lead to failure of the wing skin during spinning. For this reason it is essential to maintain the water ballast system thoroughly, as described in Chapter III.9.4 .
- Clean water must be used for filling the ballast tanks: either approved, tested water, or water filtered through a mesh as used for fuel filtering, with the filter placed in the filling connector.
- As damp can cause long-term damage on structures involving an epoxy resin matrix (e.g. waviness of the wing skin and degradation of the airfoil section, we recommend very strongly that the water bags should be checked for leaks after every flight with water ballast. If the tanks are not

The instructions in the following chapter are applicable under normal circumstances.

III.1.1 Jacking points and ground transport

The aircraft has to be jacked up for the repeated bending frequency test, otherwise the suspension of the landing gear will falsify the results. The jacking points for the The jacking points for the bending tests are as follows:

1. Tailskid or tailwheel
2. Fuselage front section on a trestle in the region of the control column bulkhead (roughly at the instrument panel station), or instead by means of the fuselage dolly from the trailer, fitted in front of the landing gear doors.

Supports can be placed under the wings at the root rib position, and at about 2/3 of the wingspan. The supports should be cushioned or covered with foam rubber or similar material. When jacking up, take care to avoid control surfaces and fairings. The fuselage is supported on suitable trestles in the cockpit region.
If the fuselage is to be stored inverted, a support should be placed under the canopy frame. Place foam rubber or similar material under the fin tip. Take care not to damage the automatic elevator connection system! Before inverting the fuselage, remove the canopy and either fix the instrument binnacle in place, or fold it up as far as possible.

Ground transport

The wings can be supported at the spar stub, the root ribs and the wingtips.

III.2. DETERMINING THE CENTER OF GRAVITY

III.2.1 Notes on weighing and C.G.

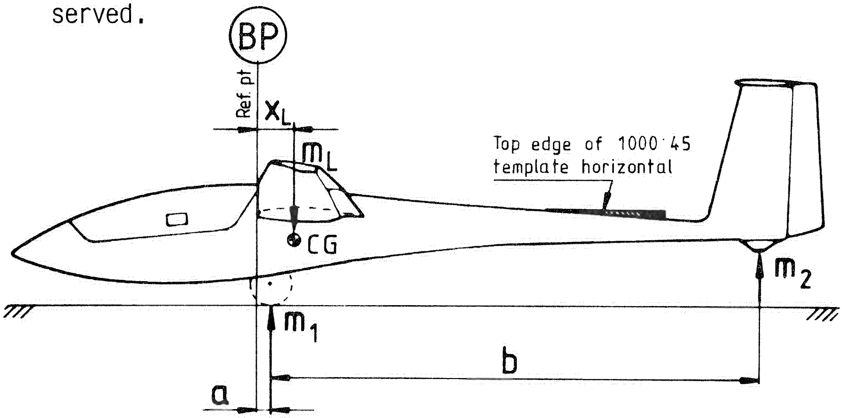
The in flight C.G. position has a great influence on the flying characteristics of the aircraft, and for this reason it is vital to keep within the prescribed limits (see Chapter II.8. in the Flight Manual). If the C.G. is too far aft, the aircraft's stalling behaviour and spinning characteristics deteriorate dangerously, and the sensitivity of the elevator control is increased.

If the C.G. is too far forward, performance deteriorates; flying at maximum lift is no longer possible, especially for steeply-banked circling flight.

After repairs, after the fitting of additional equipment, after painting etc., a check should be carried out to establish that the empty mass C.G. remains within the permissible limits. Datum point and datum line for weighing are as stated in Chapter II.9. of the Flight Manual, which details "operation values and limits".

III.2.2 Empty weight C.G. position

The diagram on page 29 shows the permissible empty weight C.G. position range. If these empty weight C.G. limits are observed, then you can be certain that the in flight C.G. (flying mass C.G.) will remain within the permissible limits even when the aircraft is carrying water ballast, provided that the correct loading plan is observed.



Formula:

$$x_L = \frac{m_2 \cdot b}{m_L} + a \quad \text{behind BP}$$

last, the in flight C.G. will be as follows:

$$x_S = \frac{619 \cdot 266 - 592 \cdot 87 + 190 \cdot 4 + 240 \cdot 80}{357 + 80}$$

$$= 304{,}6 \text{ mm } (11{,}99 \text{ in})$$

at a flight mass of 437 kg (963,59 lbs).

The in flight C.G. moves forward by an insignificant amount of 14 mm by the addition of the 80 kg of water ballast; this movement will slightly increase the aircraft's longitudinal stability.

III.3. TABLE OF TIGHTENING TORQUES

The table below shows the maximum permissible tightening torques of screw fasteners for standard items.

Thread	daNm (mkp)	(ftlbs)
M4	0,18	1,3
M5	0,36	2,6
M6	0,64	4,6
M8	1,60	11,6
M10	3,20	23,1
M12	5,70	41,2
M14	9,20	66,5

III.4. RIGGING ANGLES AND CONTROL SURFACE DEFLECTIONS

Wing incidence angle	Horizontal tailplane chord	+1,5°
	Fuselage tail boom axis	+2,0°
Horizontal tailplane incidence angle	Wing chord	-1,5°
	Fuselage tail boom axis	0°

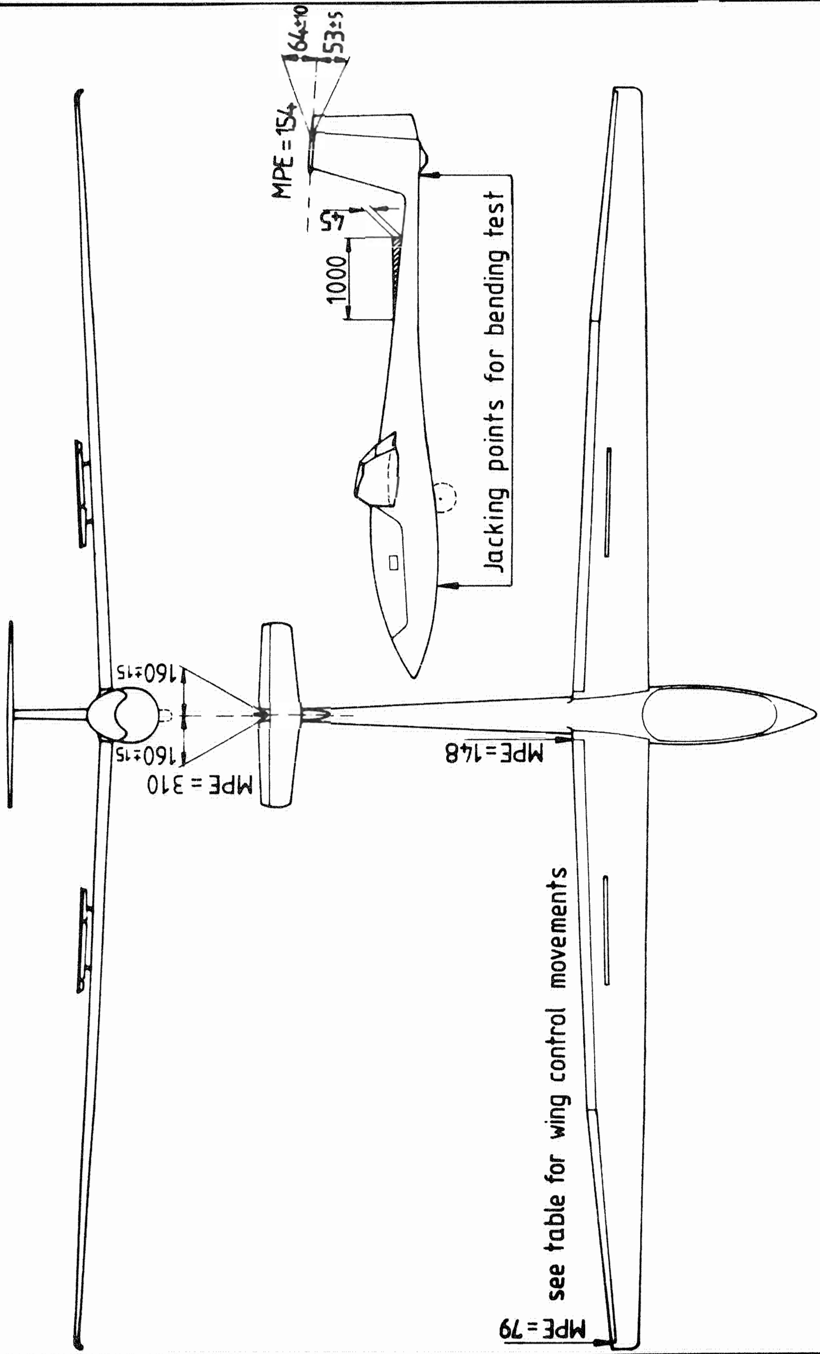


Fig. 3.4-1 Control surface movements

DATE:	AUTHOR:	CORRECTION:	
June 2, 1983	Heide	30.08.83 TN no.15	

Control surface movements. ASW 20 B/BL/C/CL (Dimensions in m.m.) Table dated 07.04 83

Flap lever setting	Control stick position	STARBOARD WING Aileron MPE=79mm specified	actual	STARBOARD WING Flap MPE=148mm specified	actual	PORT WING Flap specified	actual	PORT WING Aileron specified	actual
1 -12°	Right	- 30 ±3		- 39 ±5		- 23 ±5		- 3,5 ±3	
	Neutral	- 16,5 +1,5		- 31 +2,5		- 31 +2,5		- 16,5 +1,5	
	Left	- 3,5 ±3		- 23 ±5		- 39 ±5		- 30 ±3	
2 -6°	Right	- 29 ±3		- 27 ±5		- 3 ±5		+ 11 ±3	
	Neutral	- 8 ±1,5		- 15,5 ±2,5		- 15,5 ±2,5		- 8 ±1,5	
	Left	+ 11 ±3		- 3 ±5		- 27 ±5		- 29 ±3	
3 0°	Right	- 22 ±3		- 12 ±5		+ 12 ±5		+ 19 ±3	
	Neutral	0 ±1,5		0 ±2,5		0 ±2,5		0 ±1,5	
	Left	+ 19 ±3		+ 12 ±5		- 12 ±5		- 22 ±3	
4 +9°	Right	- 11 ±3		+ 11 ±5		+ 35 ±5		+ 27 ±3	
	Neutral	+ 10 ±1,5		+ 23 ±2,5		+ 23 ±2,5		+ 10 ±1,5	
	Left	+ 27 ±3		+ 35 ±5		+ 11 ±5		- 11 ±3	
L -8° Ail +38° Flap	Right	- 29 ±4,5		+ 87 ±7,5		+106 ±7,5		+ 5,5 ±4,5	
	Neutral	- 11 ±1,5		+ 96,5 ±5		+ 96,5 ±5		- 11 ±1,5	
	Left	+ 5,5 ±4,5		+106 ±7,5		+ 87 ±7,5		- 29 ±4,5	

	MPE		specified	actual
Rudder	MPE*=310mm	Right	160 ±15	
		Left	160 ±15	
Elevator	MPE=154mm	up	-64 ±10	
		down	+53 ± 5	

Datum

Serial No

Signature

* MPE (Meßpunktentfernung zur Drehachse) = Distance from measuring point to pivot axis (m.m)

Juw

Control surface movements: ASW 20 B/BL / C/CL — Table dated: 07.04.83

Flap lever setting	Control stick position	STARBOARD WING Aileron MPE=79mm specified	STARBOARD WING Aileron actual	STARBOARD WING Flap MPE=148mm specified	STARBOARD WING Flap actual	PORT WING Flap specified	PORT WING Flap actual	PORT WING Aileron specified	PORT WING Aileron actual
1 -12°	Right	- 22° ± 2°		- 15° ± 2°		- 9° ± 2°		- 2,5° ± 2°	
	Neutral	- 12° + 1°		- 12° + 1°		- 12° + 1°		- 12° + 1°	
	Left	- 2,5° ± 2°		- 9° ± 2°		- 15° ± 2°		- 22° ± 2°	
2 -6°	Right	- 21° ± 2°		- 10,5° ± 2°		- 1,5° ± 2°		+ 8° ± 2°	
	Neutral	- 6° ± 1°		- 6° ± 1°		- 6° ± 1°		- 6° ± 1°	
	Left	+ 8° ± 2°		- 1,5° ± 2°		- 10,5° ± 2°		- 21° ± 2°	
3 0°	Right	- 16° ± 2°		- 4,5° ± 2°		+ 4,5° ± 2°		+ 14° ± 2°	
	Neutral	0° ± 1°		0° ± 1°		0° ± 1°		0° ± 1°	
	Left	+ 14° ± 2°		+ 4,5° ± 2°		- 4,5° ± 2°		- 16° ± 2°	
4 +9°	Right	- 8° ± 2°		+ 4,5° ± 2°		+ 13,5° ± 2°		+ 20° ± 2°	
	Neutral	+ 7,5° ± 1°		+ 9° ± 1°		+ 9° ± 1°		+ 7,5° ± 1°	
	Left	+ 20° ± 2°		+ 13,5° ± 2°		+ 4,5° ± 2°		- 8° ± 2°	
L -8° Ail +38° Flap	Right	- 21° ± 3°		+ 34° ± 3°		+ 42° ± 3°		+ 4° ± 3°	
	Neutral	- 8° ± 1°		+ 38° ± 2°		+ 38° ± 2°		- 8° ± 1°	
	Left	+ 4° ± 3°		+ 42° ± 3°		+ 34° ± 3°		- 21° ± 3°	

	MPE		specified	actual
Rudder	MPE*=310mm	Right	30°±3°	
		Left	30°±3°	
Elevator	MPE=154mm	up	-24°±3,5°	
		down	+20°±2°	

Datum: ____

Serial No: ____

Signature ____

* MPE (Meßpunktentfernung zur Drehachse) = Distance from measuring point to pivot axis (mm)

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DATE:	AUTHOR:	CORRECTION
June 2, 1983	Heide	30.08.83 TN no.15

III.4.1 Maximum permissible control surface play

The maximum permissible play can also be measured at the Measuring Points (MPE) at which the control surface deflections are measured. To do this, lock the controls in the cockpit so that they cannot move.

	MPE (mm / in)	Permissible play (mm / in)
Rudder	310 / 12,2	4,5 / 0,18
Elevator	154 / 6,06	3,0 / 0,12
Aileron	79 / 3,11	1,75 / 0,07
Camber-changing flap	148 / 5,83	2,75 / 0,11

III.5. CONTROL SURFACE WEIGHTS AND TAILHEAVY MASS BALANCE MOMENTS

If control surfaces or flaps are repaired or repainted, it is essential to check that the weight and tailheavy moment remain within the permissible limits. If the limits are exceeded, contact SCHLEICHER direct.
The permissible control surface weights and tailheavy mass balance moments are:

	Mass (kg)*	Moment (daNcm)
Rudder	2,25 - 2,65	6,57 - 9,13
Elevator (one panel)	0,70 - 0,90	1,70 - 2,20
Elevator actuator	0,21 - 0,27	1,00 - 1,20
Aileron	1,76 - 2,10	1,88 - 2,53
Camber-changing flap	3,64 - 4,46	7,07 - 9,23

When weighing these items, make sure that the pivots are as friction-free as possible. When removed from the aircraft, the longer control surfaces such as the camber-changing flaps or the ailerons may flex either forward or back, according to temperature, when viewed from the leading edge. This will falsify results considerably when examining the moments. The suspension points of these components must then be chosen in such a way that this influence is minimized. If a control surface, for

(*The table in lbs and inlbs is given on page 34a.)

III.4.1 Maximum permissible control surface play

The maximum permissible play can also be measured at the Measuring Points (MPE) at which the control surface deflections are measured. To do this, lock the controls in the cockpit so that they cannot move.

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If control surfaces or flaps are repaired or repainted, it is essential to check that the weight and tailheavy moment remain within the permissible limits. If the limits are exceeded, contact SCHLEICHER direct.
The permissible control surface weights and tailheavy mass balance moments are:

	Mass (lbs)	Moment (inlbs)
Rudder	4,96 - 5,84	5,70 - 7,92
Elevator (one panel)	1,54 - 1,98	1,48 - 1,91
Elevator actuator	0,46 - 0,60	0,87 - 1,04
Aileron	3,88 - 4,63	1,63 - 2,20
Camber-changing flap	8,02 - 9,83	6,14 - 8,01

When weighing these items, make sure that the pivots are as friction-free as possible. When removed from the aircraft, the longer control surfaces such as the camber-changing flaps or the ailerons may flex either forward or back, according to temperature, when viewed from the leading edge. This will falsify results considerably when examining the moments. The suspension points of these components must then be chosen in such a way that this influence is minimized. If a control surface, for example, flexes forwards, then it is best to choose suspension points far enough outboard to ensure that the spacing of the mass balance in the control surface leading edge is roughly compensated (see also Figs. 3.5.-1 and 3.5.-2 here).

III.6. LANDING GEAR

III.6.1 Main landing gear

Maintenance of the main landing gear is limited to a visual check of tires, wheels, the disc brake and the damper elements. If severely soiled, then the landing gear should immediately be cleaned. Do not forget to clean and grease the landing gear bearings, but the hollow rubber springs are to be kept grease-free.

III.6.2 Tailskid / tailwheel

The tailskid plate should be renewed by welding on extra steel plate material, or by replacing with a new one, before wear becomes severe. The tailskid plate must be removed for welding work, and the welding seams must be rounded off.

Important: Do not leave grooves or humps on which a tow cable could catch.

The rubber tailskid is designed to tear away from the fuselage under severe sideloads. It can be glued back in place or repaired using contact adhesive (Pattex). It is important to apply adhesive tape over the glued joint between rubber and fuselage to prevent the rubber peeling off and long grass getting jammed in the joint. It is not permissible to fit a tailskid made of harder rubber compound.

If a tailwheel is fitted, then the tire and wheel should be checked visually.

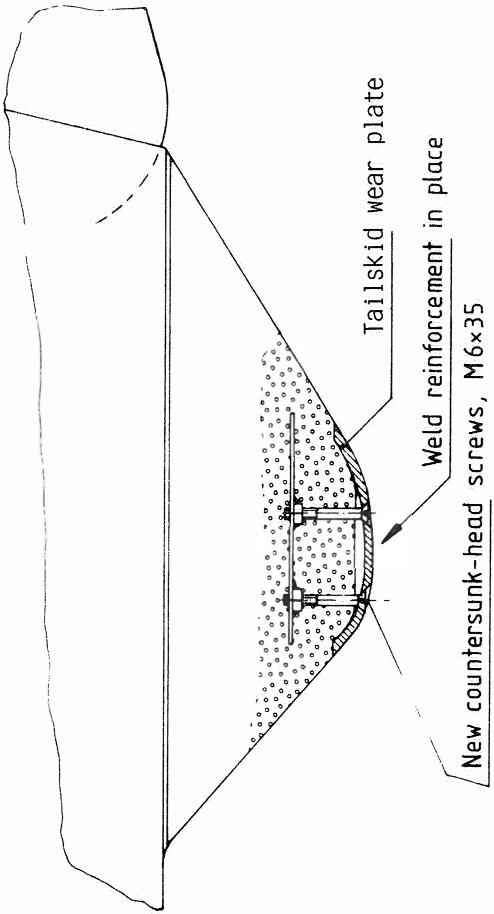

Tailskid wear plate
Weld reinforcement in place
New countersunk-head screws, M6×35

Fig. 3.6-1

III.6.3 Tires

The tire pressure must be checked fairly often. At a flight mass around 360 kg (793,8 lbs) the pressure should be between 2,2 and 2,4 bar (31,3 and 34,1 psi), whilst at flight masses around 525 kg (1157,63 lbs), i.e. carrying water ballast, the pressure should be between 2,4 and 2,6 bar (34,1 and 37,0 psi). If tire pressure is low, suspension movement may be excessive which can lead to damage.

When the contact surface of the tire is worn out, the tire must be replaced. Do not allow any type of grease and oil to contact the tire, as the rubber material is attacked and destroyed by such substances.

Sizes:

Main wheel: tire with tube 5.00-5; 6-ply rating.
Tail wheel: tire with tube 210 x 65.

Air pressures:

for flight mass 360 kg (793,8 lbs),		
main wheel:	2,2 - 2,4 bar	(31,3 - 34,1 psi);
tail wheel (if fitted):	2,5 bar	(35,6 psi);
for flight mass 525 kg (1157,63 lbs),		
main wheel:	2,4 - 2,6 bar	(34,1 - 37,0 psi);
tail wheel (if fitted):	2,5 bar	(35,6 psi).

III.6.4 Braking system

None of the fairings need to be removed to carry out maintenance on the wheel brake; access to the master cylinder is through the fuselage wing root apertures and through the hand-hole (with wings detached).

If you find the wheel brake ineffective, there are the following possible causes:

1. Brake linings worn out; they must be renewed.
2. Air in the system; the braking system will need to be bled to eliminate air.
3. No brake fluid in the system; check braking system for leaks, fill with brake fluid and bleed the system.

Note: The master cylinder is connected to the airbrakes, and the wheel brake must be adjusted so that it acts as the airbrake stop (see Fig. 3.6.-2 here).

III.6.5 Bleeding the brake system

The brake system is arranged in such a way that there is a rising line from the wheelbrake cylinder to the master cylinder and the brake fluid compensation vessel. This ensures that the procedure for bleeding the brake system, as described in Chapter III.6.6, is straightforward.

III.6.6 Initial filling or replacing of the brake fluid

Caution: Only use brake fluid based on mineral oil (see also Chapter II.3.3 here); the fluid is poisonous, do not spill it !

Brake fluid is filled from the bottom towards the top, to avoid air bubbles. For a simple filling arrangement you will need about 2 m (6,56 ft) of instrument tubing with a funnel at the top end, filled with about 1/4 l (0,07 US Gal.) of brake fluid. The wheel brake cylinder has a bleeder screw at the bottom, and the bottom end of the tubing is fitted onto the bleeder screw; open the bleeder screw.
Hold the funnel as high as possible so that the brake fluid can flow in under pressure. Great care should be taken to avoid air bubbles in the fluid, and that no air bubbles are allowed to enter the system. For this reason there must always be sufficient fluid in the funnel. Pour in the fluid until the supply tank is about 2/3 full.
The bleeder screw can now be closed again, and the filling arrangement removed. Replace the dust cap again !!

Carry out a check of the braking system for leaks, correct operation and effectiveness !!

Adjusting the wheel brake,

Unscrew screw 1, loosen nut 2.

Fold airbrake bellcrank over,

Unscrew the clevis

(brake applied earlier)

Screw in clevis

(brake applied later)

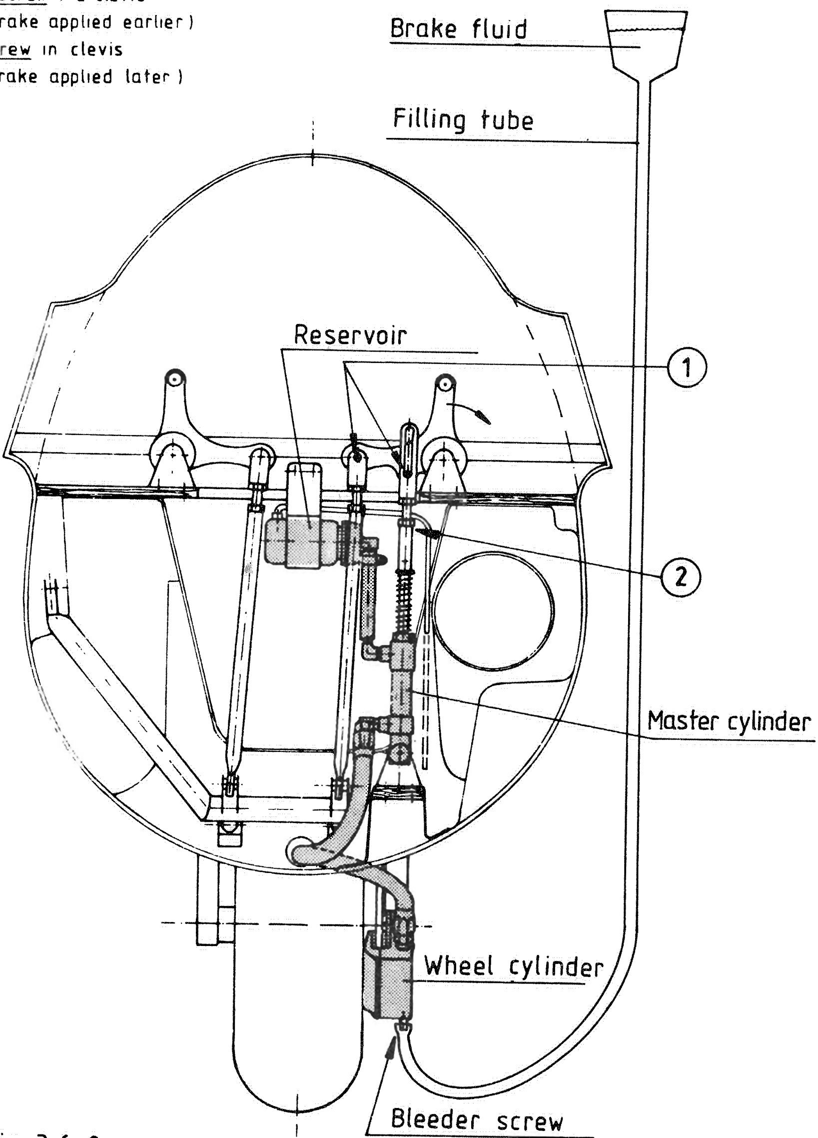


Fig. 3.6-2

III.6.7 Replacing the brake linings

With the landing gear extended, the wheel brake cylinder is visible on the right side of the hub. There are two 1/4" screws on the rear end of the cylinder, which are locked with wire. Remove the safety wire and undo both screws completely. The inner brake lining holder can now be removed, and the wheel brake cylinder can be pulled off from the hub.
The brake hose must remain connected at all times, otherwise it will be necessary to bleed the brake system. The brake (master cylinder) must not be operated while the brake is removed from the wheel.
As the two brake lining holders can be removed from the wheel brake cylinder completely, the latter can be left attached to the brake hose.
The linings must be exchanged before they are worn down to the rivets (remaining thickness of brake linings 3mm = 0,12in), otherwise the brake disc will be damaged and the braking effect severely reduced. Rivetting new brake linings in place is best carried out with a rivetting tool designed for the purpose. In an emergency, however, the job can be carried out using a hammer, a center punch and a drift with a point diameter of at least 6 mm (0,24 in). Replace the brake lining holders, tighten the two 1/4" screws, and re-lock the screws with wire.

The brake linings and the corresponding rivets can be obtained from (amongst other suppliers): Van Dusen, Aircraft Supplies Division, D-6073 Egelsbach, or from Alexander Schleicher. The brake linings must match the Cleveland 30-9 brake unit.

III.7. LUBRICATING PLAN

Ballraces:

The grooved ballraces used are grease-filled and encapsulated; further greasing is not required.

III.9.3 Canopy and emergency jettisoning mechanism

The canopy has to be removed for certain procedures; for example, to gain access to the instruments. This is easily carried out by one or - better - two persons, by folding the two red emergency jettisoning levers backwards. The canopy can now be lifted off upwards.
The emergency jettisoning system should be free-moving and easy to operate at all times, and should therefore be regularly greased. It is best to employ two pairs of hands to re-fit the canopy; the canopy is fitted onto the instrument binnacle, the attachment points brought into line, and then the emergency jettisoning levers moved back until the retaining springs engage.

III.9.4 Fitting and removing the water ballast tanks; maintenance instructions

On the underside of the wingtip there is a hole, covered with an FRP disc and sealed with a piece of self-adhesive film. Uncover this opening; now fish around inside the wingtip with a length of wire until you find the water ballast tank fixing cord. This cord should be pulled right out of the wingtip; continue pulling until the washer knotted into the cord comes into view. This washer serves as limit stop at a small hole in the wingtip rib, to ensure that the ballast tank is held in the correct position by the cord; this washer is now untied from the cord and put in a safe place.
Now unscrew the grey union nut to remove the quick-release connector from the thicker water hose, and press both tubes (the vent tube and the filler tube) through their holes in the root rib in the wing. Thread them out again through the large hole in the root rib. The water ballast tank can now be pulled out of the wing by means of the two tubes. Untie the cord from the tank, and be sure to leave it inside the wing !

Check also that there is a sufficient length of cord projecting out of the wing so that the ballast tank can be pulled back into position. If the cord is broken, or pulled right out of the wing by mistake, you will need plenty of skill and patience to thread it through again, using a long length of steel wire.

When fitting the water ballast tank back into place, follow the reverse procedure. Do not forget that the washer has to be tied back into the cord, under light tension, so as to act as a stop !

Inspecting the valves

Referring to Fig. 3.9-1, unscrew the valve at the union nut and clean it; check the seal, the ball and the spring. If necessary, replace the seal and ball. Reassemble the valve.

Checking the seal of the water bags when removed from the aircraft

Connect about 5 m (16,4 ft) of instrument tubing to the vent connector and arrange the tubing as shown in Fig. 3.9-2. Fill with water.

Using an air pump or compressed air - and the appropriate degree of caution - pump up the water bag to about 0,2 bar (2,8 psi) or to 2 m (6,56 ft) water column, i.e. 2 m height difference between the two water levels in the instrument tubing. If after five minutes there has been no drop in pressure, then you can assume that the tank is water-tight. Check both tanks for leaks.

If you encouter difficulties, contact Schleicher direct.

been added. The wax layer only needs to be renewed once a year in normal operations.
For care of the paintwork, do not use agents which contain silicone (e.g. 1 Z-Special Cleaner -D2, made by W.Sauer & Co., D-5060 Bensberg; or Lesonal cleaning polish).

Adhesive residues from adhesive tapes are removed with cleaning spirit (car petrol is poisonous !) or paint thinners. Re-apply wax to the cleaned areas.
Caution: The anti-collision paintwork as well as the ornamental paintwork are applied in nitro- or acrylic paint; hence no paint thinners must be allowed to contact these areas. Even cleaning spirit should not be left on these surfaces for longer than necessary.

The acrylic glass canopy (Plexiglass or Perspex) should be cleaned only with either a specialized cleaning agent (e.g. Plexiklar), or with copious amounts of clean water. On no account use a dry cloth or similar to remove dust and clean the surface.

The safety harness must be constantly checked for tears, rough patches and wear respectively corrosion of the fittings and locks. The locks must also open properly - even under a simulated load - and this needs to be checked occasionally.

III.13. SPECIAL INSPECTION PROCEDURES

III.13.1 After hard landings

- -Check the landing gear attachment at the forward main bulkhead !
- -Check the wheel fork for deformation, also the angled struts, the axle supports and the landing gear toggles !
- -Are the rubber landing gear suspension buffers still in order ?
- -Check the spar forks and tongue for white areas !
- -Check the wing connections at the fuselage !

-Check the cross tube at the forward main bulkhead !
-Measure the repeated wing bending frequency and compare with the value in the latest inspection report. For any variation of more than 5 % contact Schleicher direct. See Fig. 3.4.-1 for jacking points.

III.13.2 After ground loops

-Check the fuselage/fin transition area, and the tail-plane fixings on the fin !
-Check wing/fuselage connections !
-Check the horizontal thrust wall in the fuselage (between forward and rear main bulkheads) !

III.13.3 After a landing with retracted landing gear

After a landing with the landing gear retracted, remove the seat pan to allow you to check the condition of the glued joints involving the control bulkheads and the tow release bulkheads, and to allow FRP components to be examined for damage. If damage is found, it must be repaired before the next flight. See Maintenance Instruction H in the Appendix for details of repairing the glued joint at the tow release bulkhead.

III.13.4 After flying with water ballast

When de-rigging the aircraft, hold the wings up high at the outboard end for a few moments, and check whether any water sprung from the water bags collects behind the root rib. If you find water, then the water bag must be inspected for leaks. Do not forget to allow the wing to dry out !
Non-sealing, dripping valves require servicing as detailed in Chapter III.9.4. Store the aircraft with valves open.

V.3. DETAILS AND SUPPLIERS OF COMPONENTS REQUIRING REPLACEMENT

V.3.1 Landing gear components

Main wheel, tire with tube:	5.00-5, 6-ply rating;
Wheel :	Cleveland wheel 40 78 B, 5.00-5, type III;
Wheel brake cylinder:	Cleveland 30-9
Brake disc:	Cleveland 164 01700
Master cylinder:	Cleveland 10-20
Brake linings:	Cleveland 66-2
Foam tailskid:	Schleicher
Foam tailskid with nylon roller:	Schleicher
or	
Pneumatic tailwheel:	210 x 65, Continental.

The Cleveland components are obtainable via Schleicher or from van Dusen, Aircraft Supplies Division, a worldwide international company.

V.3.2 Tow release mechanism

The towing hooks "Europa G 72" or "Europa G 73" are manufactured and serviced by:

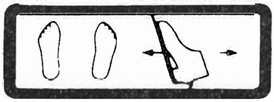
Tost GmbH
Thalkirchner Str. 162
8000 München 2.

V.4. SPECIAL TOOLS

Special tool, not supplied with the aircraft:
special spanner for dismantling the water ballast valves. This either has to be home-made (see Fig. 3.9-1), or it can be obtained from Schleicher.

V.5. NOTICE PLACARDS AND THEIR LOCATION

All the placards are illustrated and explained in the Flight Manual Chapters II.12. and IV.2. The running numbers indicate their location in the aircraft (see Fig. 5.4.-1).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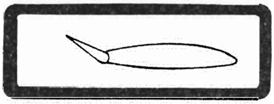
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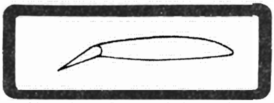
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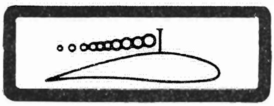
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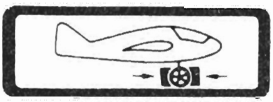
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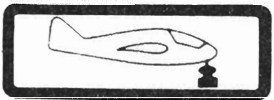
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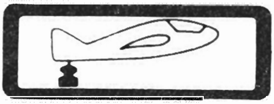
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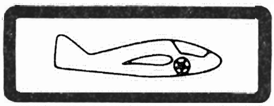
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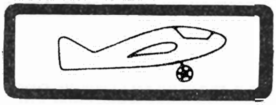
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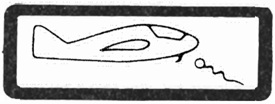
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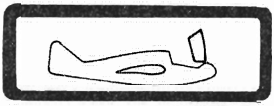
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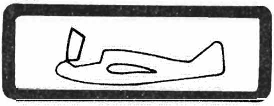
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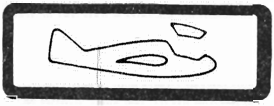
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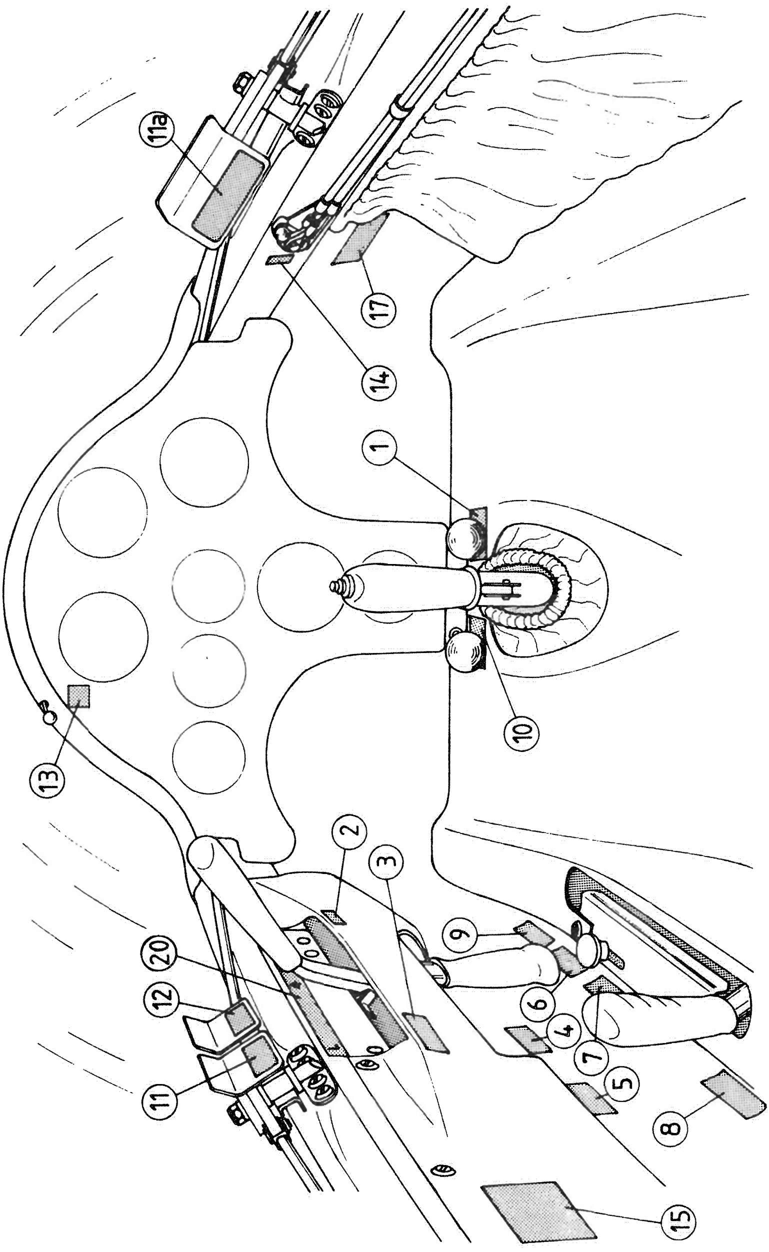


Fig. 5.4-1

DATE:	AUTHOR:	CORRECTION:	
June 2, 1983	Heide	30.08.83 TN no.15	

V.6. APPARATUS WITH SERVICE LIFE LIMITS

Tow release mechanisms:
The Tost tow mechanisms installed as standard have a service life of 36 months before inspection, calculated from the date of installation in the aircraft, and/or a maximum of 2000 launches.

Instruments
The flight monitoring instruments do not normally have service life restrictions; as a general rule, abide by the manufacturer's instructions.

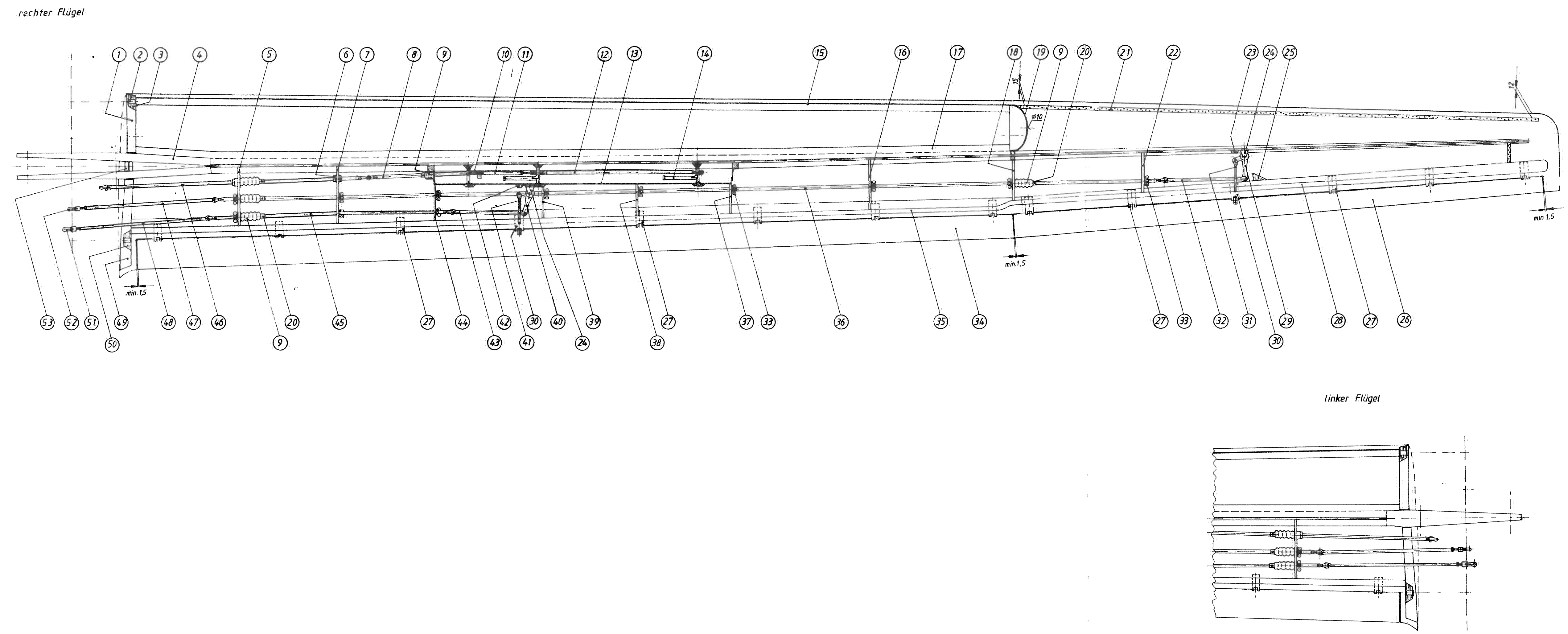
Oxygen installations
For permanent oxygen installations the relevant section of the detailed inspection certificate states the overhaul time limit. Over and beyond this, oxygen bottles must be reinspected by a technical inspection institute every five years in accordance with pressure vessel regulations. (This procedure applies to F.R.Germany registered gliders; for other countries equivalent procedures have to be regarded.)

V.8. MAINTENANCE INSTRUCTIONS

The following Maintenance Instructions have been written over the long period of service of the ASW 20 to meet the problems which have arisen. In dealing with the maintenance of the ASW 20 B, we can in many cases fall back on the experience gained with the ASW 20. Results of this experience have naturally been incorporated in the ASW 20 B as standard; e.g. Maintenance Instruction A no longer applies, as a very effective disc brake system has been fitted to the ASW 20 B. Similarly, the Tesamoll tape strips, the installation of which is covered in Maintenance Instruction B, are now fitted as standard; a check needs to be made from time to time that the strips still fit closely against the control surfaces; for this reason Maintenance Instruction B is now presented as the instructions for renewing the Tesamoll seal. It should be noted that the installation procedures in Maintenance Instruction H (tow release rake and wedge-shaped plywood blocks) have also been incorporated as standard in the ASW 20 B. Maintenance Instruction F concerns repair workshops abroad (Repair instructions for replacing a wing).

Maintenance Instruction B	dated 02.10.78
Maintenance Instruction C	dated 15.02.79
Maintenance Instruction D	dated 25.06.79
Maintenance Instruction E	dated 28.06.79
Maintenance Instruction F	dated 15.07.80
Maintenance Instruction G	dated 13.01.81
Maintenance Instruction H	dated 30.08.81
Maintenance Instruction I	dated 09.09.82
Maintenance Instruction J	dated 24.04.87

This series of Maintenance Instructions will be extended and supplemented as and when required.



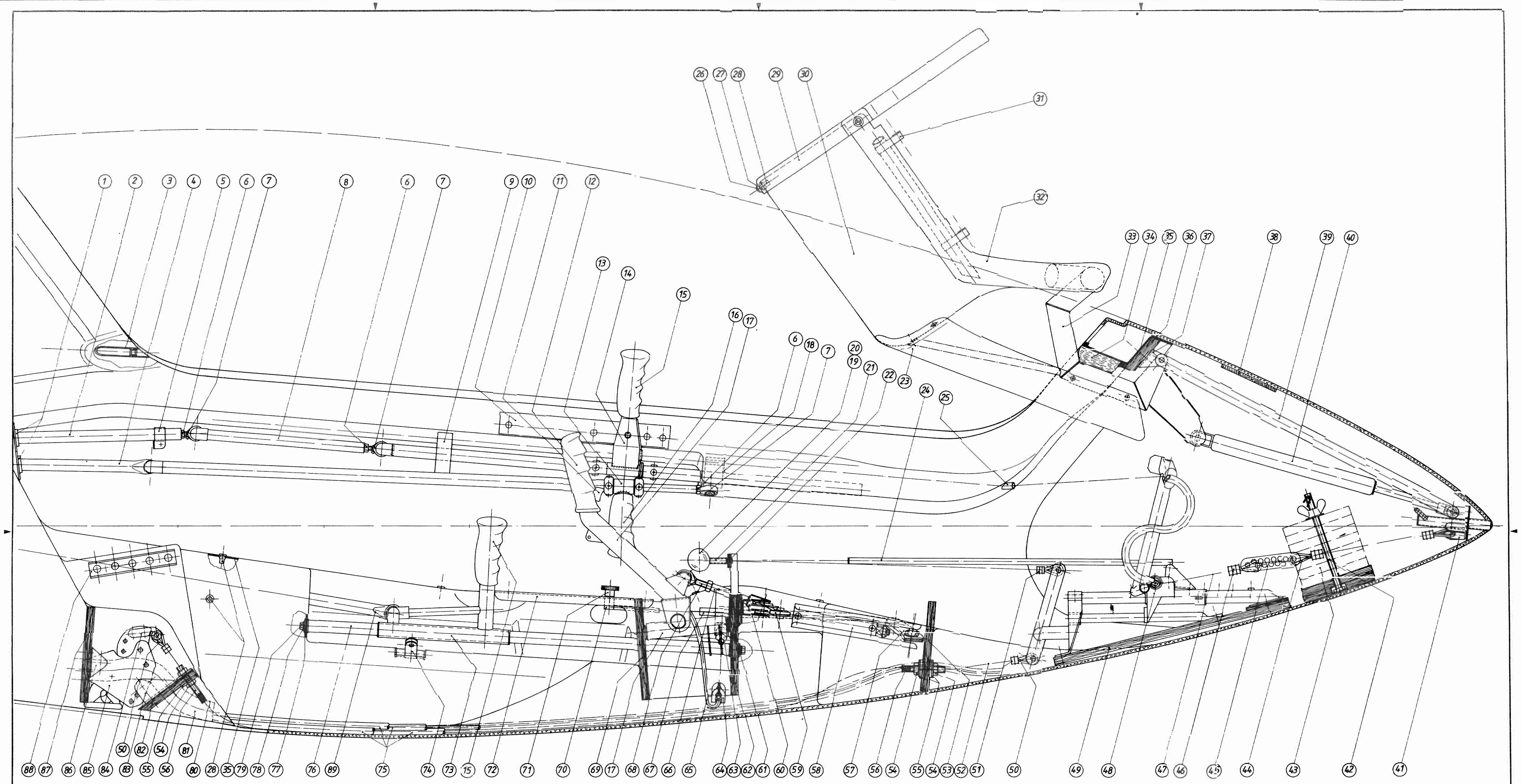
St	Benennung	Lfd Nr.	Werkstoff	Rohmaße Teil- oder DIN-Nr	Bemerkung
1	mittlere Wurzelrippe, rechts	53		201. 52. 0161	
2	Gelenkkopf 9.41, M10x1, verstellbar	52		200. 41. 0010	99 000 2351
2	Gelenkkopf 12.41, M10x1, verstellbar	51		200. 45. 0016	99 000 2350
2	Klotz f. Querkraftauge, hinten	50		200. 51/52. 0101	
2	hintere Wurzelrippe	49		201. 51/52. 0152	
2	Stoßstange IV f. WK-St	48		201. 45. 0017	
2	Stoßstange IV f. QR-St	47		201. 41. 0012	
2	Stoßstange IV f. BK-St.	46		201 43. 0010	
2	Stoßstange V f. WK-St	45		201. 45. 0018	
2	Rippe 3	44		201. 51/52. 0104	
2	Stoßstange VI f. WK-St	43		201. 45. 0019	
2	Anschlag f. WK-Umlenkhebel	42		201 51. 0113	
2	Stoßstange VII f. WK-St	41		200 45. 0022	
2	Umlenkhebel f. WK	40		201. 45/46 0032	
2	Rippe 4	39		201. 51/52 0105	
2	Rippe 5	38		201 51/52. 0106	
2	Rippe 6	37		201. 51/52. 0107	
2	Stoßstange V f. QR-St	36		201. 41. 0013	
2	Blaskanal, Teil I, innerer	35		201. 51/52 0158	
2	Wölbklappe, kompl.	34		201. 53/54. 1001	
24	Stoßstangenführung	33		200. 51. 0010	99 000 2090
2	Stoßstange VI f. QR-St.	32		201. 41. 0014	
2	Stoßstange VII f. QR-St.	31		201. 41. 0016	
4	Festlager Ø6 f. QR u. WK-Antrieb	30		200. 51. 0165	99 010 4621
2	Umlenkhebel f. QR	29		201. 41/42. 0022	
2	Blaskanal, Teil II, äußerer	28		201. 51/52. 0159	
24	Loslager Ø6 f. QR u. WK	27		200. 51. 0166	99 010 4622
2	Querruder, kompl.	26		201. 31/32. 1001	
2	Anschlag II f. QR-Umlenkhebel	25		201. 51/52 0112	
4	Lagerbock, schräg m. Lasche	24		200 51. 0008	
2	Anschlag I f. QR-Umlenkhebel	23		201. 51. 0111	
2	Rippe 9	22		201. 51/52. 0110	
	Styroporleiste	21			
10	Faltenbalgbeschlag I	20			99 000 2140
2	Rippe 8, vorne	19		201. 51/52. 0154	
2	Rippe 8, hinten	18		201. 51/52. 0109	
2	untere Holm-Flügelschale-Verstärkung	17		201. 51/52. 0156	entfällt bei ASW 20 C
2	Rippe 7	16		201. 51/52 0108	
2	Nasensteg	15		201. 51/52 0153	entfällt bei ASW 20 C
4	Hebel f. BK	14		200. 43/44. 0014	
2	Klappenkasten	13		200. 51/52. 0155	
2	Stoßstange VII f. BK-St	12		200. 43. 0021	
2	Stoßstange VI f. BK-St	11		200. 43. 0015	
2	Kniehebel f. BK-St.	10		200. 43/44. 0013	99 000 3438
10	Faltenbalg	9			
2	Stoßstange V f. BK-St i. Fl.	8		201. 43. 0012	
2	Rippe 2	7		201. 51/52. 0103	
4	Rohrbuchse mit Filzführung	6		201. 51. 0114	99 010 5471
2	Rippe 1	5		201. 51/52. 0102	
2	Helm, kompl.	4		201. 51/52. 1001	
2	Klotz f. Querkraftauge, vorne	3		200. 51/52. 0100	
4	Querkraftauge	2		200. 51. 0005	99 332 0082
2	vordere Wurzelrippe	1		201. 51/52. 0151	

	Datum	Name	Typ	Benennung	Maßst.
Bearb	26.05.83	Juw	ASW 20 B C	Flügel - Übersicht	1:10
Gepru					
Norm					

A. Schleicher Segelflugzeugbau 6416 Poppenhausen	Zeichnungsnummer L-314 201. 51/52 S 3	Blatt Bl
Zust / Änderung / Datum / Na / Urspr	Ers f	Ers d

Fig. II.1-1

DATE	AUTHOR	CORRECTION
02 JUNE 1983	JUMTOW	



St	Benennung	Lfd Nr	Werkstoff	Rohmaße Teil- oder DIN-Nr	Bemerkung
1	Stoßstange für Fahrwerk	89		200. 21.0006	99.000.7152
2	Rasle für Sitzlehne	88		200. 11.0040	99.000.5146
1	Spant II f. SP-Kupplung	87		200. 11.0413	99.010.8165
2	Winkel f. SP-Kupplung	86		200. 11.0021	99.000.9691
1	Tost-Sicherheitskupplung Europa G 73	85		Geräte-Nr 60.230/2	
2	Kupplungsplättchen II	84		200. 11.0039	99.000.3471
1	Bock f. SP-Kupplung	83		200. 11.0017	99.000.1001
1	Spant I f. SP-Kupplung	82		200. 11.0412	99.010.8164
2	Verstärkung f. Spant I SP-Kuppl.	81		200. 11.0129	
1	Kunststoffrohr FF Kol	80		ø 23	
	Sechskantschraube M 6 × 25	79		DIN 933 - 8.8	
2	Federring B 6	78		DIN 127	
	Scheibe A 6,4	77		DIN 9021-St	
1	Führungsstange f. FW-Handgriff	76		200. 21.0005	99.000.2057
	Instrumentenschläuche	75		ø 8 × 1,5	
2	Bauchgurtbeschlag	74		200. 11.0022	99.000.1070
1	FW-Handgriff	73		200. 21.1003	
1	Kulisse f. FW u. Trimmung	72		200. 11.0056	
1	Rändelschraube f. Trimmung	71		200. 49.0002	
1	Zugstange f. Trimmung	70		201. 49.0001	
1	hinterer Steuerspant	69		200. 11.0111	99.010.8162
1	Gelenkkopf M8 × 40	68		ø 6 - 14	SKF 36580
1	Klemmstange f. Trimmung	67		201. 49.0016	
1	Stoßstange I f. HR-St	66		200. 48.0003	99.000.7500
	Bowdenzug	65			
1	Spannbock f. Bowdenzug Trimm.	64		201. 49.0018	99.000.7400
1	Arretierung f. Trimmung	63		201. 49.1002	
1	vorderer Steuerspant	62		200. 11.0110	99.010.8161
	Blitzschutz komplett	61		200. 11.1001	
	Lagerbock	60		200. 11.0024	99.000.4130
1	Schwinghebel f. HR-St	59		200. 48.0004	99.000.7155
1	Trimmfeder	58		200. 49.1001	
1	Umlenkhebel f. Trimmung	57		201. 49.0017	
2	Spannschraube f. Kupplungszug	56		200. 11.0026	99.333.0004
4	Scheibe A 8,4	55		DIN 9021-St	
	Sechskantmutter M8	54		DIN 439-6	
1	Spant I FS-Kupplung	53		200. 11.0415	99.010.8163
	Flugzeugseil ø 2,4	52		LN 9374	
3	Seilklemme Nicopress	51		28-2-6	ø 2,4
3	Kausche 2,5	50		DIN 6899	
1	Grundplatte f. Fußsteuer	49		200. 11.0101	
1	Fußsteuer	48		200. 47.1001	
	Flugzeugseil ø 3,2	47		LN 9374	
6	Seilklemme Nicopress	46		28-3-M	ø 3,2
4	Seil-Ausgleichsblech	45		200. 47.0007	
6	Kausche 3,5	44		DIN 6899	
	Trimmplatte 1 kg	43		200. 05.0003	99.000.7863
1	Trimmgewicht - Halterung	42		200. 05.1001	wahlweise
1	Nasenbeschlag	41		200. 11.0007	99.000.4736
1	Gasdruckfeder	40			4000 N
2	Zugband f. Gasdruckfeder	39		200. 11.0032	99.000.9797
1	Anschlag II f. Haubengelenk	38		200. 11.0154	
1	Lagerbock f. Haubengelenk	37		200. 11.0003	99.000.4027
1	Verstärkung f. Lagerbock Haubeng.	36		200. 11.0128	
1	Hauptspant m. Cockpitverkl. II	35		200. 11.0168	
1	Anschlag I f. Haubengelenk	34		200. 11.0109	99.010.0065
1	Haubengelenk	33		201. 11.0001	99.000.2650
1	Instrumentenpilz Oberteil	32		201. 11.0168	
2	Haubenrohbauwurf Teil I	31		201. 11.0009	99.000.2661
1	Instrumentenpilz - Unterteil	30		201. 11.0169	
1	Instrumentenbrett	29		201. 11.0155	
	Blindnietmutter	28		M5 × 7 - 11,5	
	Rosette ø 5mm	27		DIN 17670 Ms	
	Senkschraube M5 × 16	26		DIN 964 - MS	
2	Tecalanrohr 80 ø 8×1 - 6200	25		DIN 73 387 - PA 11h	
1	Pedalverstellung	24		200. 47.1003	99.000.2230
1	Kabelkanal f. Haubengelenk	23		200. 11.0181	
1	Führung f. Kuppl.- u. Pedalseil	22		200. 11.0025	99.000.2033
2	Distanzschlauch ø 8 × 1,5	21	PVC	ca. 22 lang	transparent
1	Kugelgriff f. Kupplung	20		200. 11.0130	versteckt hinter Pos. 19
1	Kugelgriff f. Pedalverstellung	19		200. 47.0101	
1	Stoßstangenführung I f. WK-St	18		200. 11.0105	
1	Steuerknüppel m. Kardangelenk II	17		201. 48.1002	
1	Griff f. BK	16			blau
2	Griff f. WK u. FW-Handhebel	15			schwarz
1	Handhebel f. WK-St	14		200. 45.1002	
1	Handhebel f. BK-St	13		200. 43.1001	
1	Griff f. Steuerknüppel	12		201. 48.0101	99.010.2602
1	Betätigungshebel f. Trimmung	11		201. 49.0005	99.000.1000
1	Kulisse f. WK-St	10		200. 11.0052	
1	Stoßstangenführung II f. WK-St	9		200. 11.0106	
1	Stoßstange II f. WK-St	8		200. 45.0005	
3	Gelenkkopf SMX C 6	7		ø 6, M 6 × 40	Fa. Hirschmann
	Sechskantmutter M6	6		DIN 439-6	
1	Anschlagschelle f. WK-St	5		200. 45.0031	99.000.0200
1	Stoßstange II f. BK-St	4		200. 43.0006	99.000.7501
2	Buchse f. Verriegelung abn. Haube	3		200. 11.0019	99.333.0005
1	Stoßstange III f. WK-St	2		200. 45.0006	
2	Führungsflansch f. BK u. WK-St	1		200. 11.0126	99.306.0006

Zust.	Änderung	Datum	Na.		Datum	Name
				Bearb.	14.09.83	M. Münch
				Geprü.		
				Norm		

Typ	Benennung	Maßst.
ASW 20 B C	Zusammenbauzeichnung Rumpf-Vorderteil	1:2,5

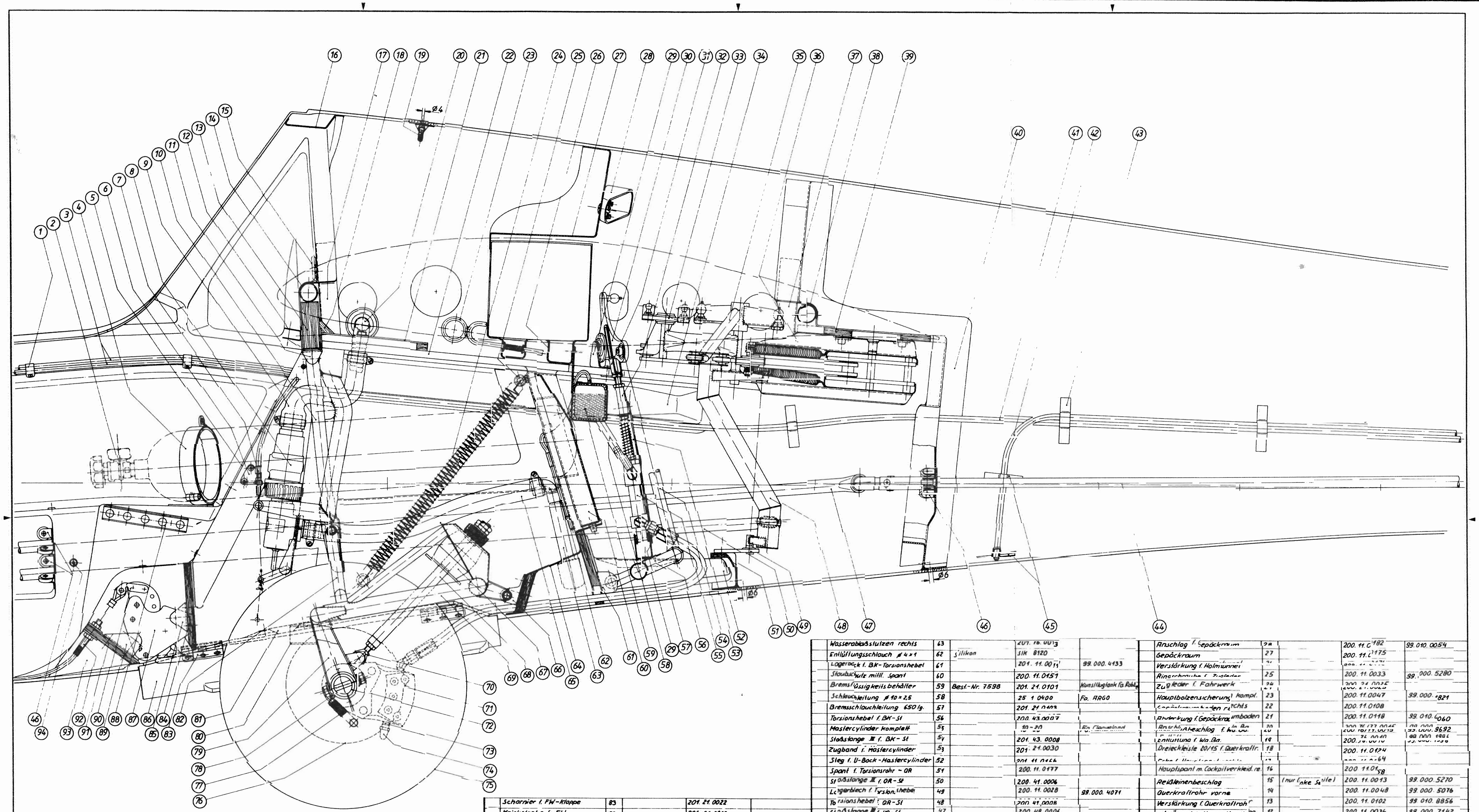
A. Schleicher
Segelflugzeugbau
6416 Poppenhausen

Zeichnungsnummer L-314
201 11. S2 TM-Nr 15

Blatt | Bl.
Urspr. | Ers. f. | Ers. d.

Fig. II. 1-2

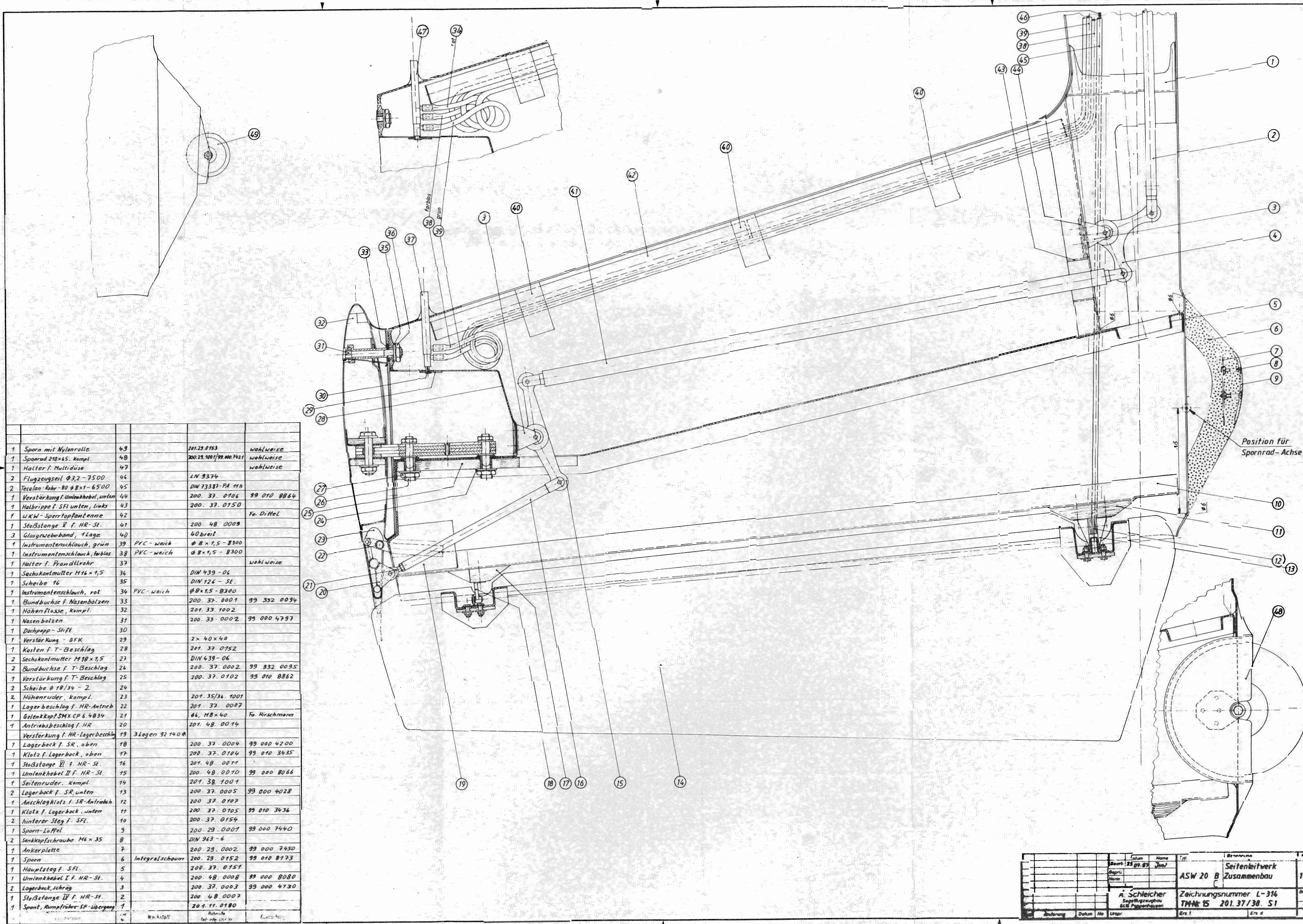
DATE	AUTHOR	CORRECTION
02 JUNE 1983	JUMTOW	Only ASW 20 B - 30 08 83 TN no 15



St.	Benennung	Lfd. Nr.	Werkstoff	Rohmaße Teil- oder DIN-Nr.	Bemerkung
	Blindnietmutter	94		M5 x 7 - 4,5	
	Verstärkung f. Spant I SP-Kuppl.	93		200.11.0029	
	Spannschraube f. Kupplungszug	92		200.11.0026	99.333.0004
	Spant I f. SP-Kupplung	91		200.11.0112	99.0[illegible]
	Kupplungsplättchen II	90		200.11.0039	99.000.3471
	Bock f. SP-Kupplung	89		200.11.0017	99.000.1001
	Raste f. Sitzlehne	88		200.11.0040	99.000.5146
	Tost-Sicherheitskupplung Europa G 73	87		Geräte-Nr. 60.230/2	
	FW-Klappe	86		201.21.0151	
	Winkel f. SP-Kupplung	85		200.11.0021	99.000.9691
	Spant II f. SP-Kupplung	84		200.11.0113	99.010.8165
	Scharnier f. FW-Klappe	83		201.21.0022	
	Knickstrebe f. FW	82		201.21.0002	
	FW-Anschlag	81		200.11.0016	99.000.2058
	FW-Schwinge re.	80		201.21.0018	
	FW-Schwinge li.	79		201.21.0019	
	Halter f. Zugfeder	78		201.21.0010	
	Zugfeder f. FW-Klappe	77		201.21.0012	
	Bremsscheibe	76		164 01700	Fa. Cleaveland
	Reifen mit Schlauch	75		5.00-5,6-ply rating	Fa. Goodyear
	Schutzkappe f. Entlüfterschr.	74			
	Entlüfterschraube	73			
	FW-Achse	72		201.21.0021	
	Radbremszylinder	71		30-9	Fa. Cleaveland
	Gelenkkopf SMX 8.5640	70		ø 8, M8 x 40	Fa. Hirschmann
	Radgabel	69		201.21.0007	
	Federstrebe f. FW	68		201.21.0017	
	Gummi-Hohlfeder	67	70 55/55 Kern N RTE II	201.21.0102	Fa. MGU
	Fahrwerksbeschlag	66		200.11.0015	99.000.2059
	Ablaßschlauch f. WaBa	65	PVC-weich	ø 27 x 4	Fa. Gummiroller
	mittl. Spant	64		201.11.0161	
	Wasserablaßstutzen rechts	63		201.76.0013	
	Entlüftungsschlauch ø 4 x 1	62	Silikon	SIK 8120	
	Lagerbock f. BK-Torsionshebel	61		201.11.0011	99.000.4133
	Staubschutz mittl. Spant	60		200.11.0151	
	Bremsflüssigkeitsbehälter	59	Best.-Nr. 7598	201.21.0101	Kunstflugtank Fa. Robbe
	Schlauchleitung ø 10 x 2,5	58		25 1 0400	Fa. ARGO
	Bremsschlauchleitung 650 lg.	57		201.21.0[illegible]	
	Torsionshebel f. BK-St	56		200.43.0007	
	Mastercylinder komplett	55		10-20	Fa. Cleaveland
	Stoßstange III f. BK-St	54		201.43.0008	
	Zugband f. Mastercylinder	53		201.21.0030	
	Steg f. U-Bock-Mastercylinder	52		201.11.0166	
	Spant f. Torsionsrohr - QR	51		200.11.0177	
	Stoßstange II f. QR-St	50		200.41.0006	
	Lagerblech f. Torsionshebel	49		200.11.0028	99.000.4071
	Torsionshebel f. QR-St	48		200.41.0008	
	Stoßstange III f. HR-St	47		200.48.0006	
	Stoßstangenführung	46		200.11.0023	99.000.2090
	Schlauchschelle I	45		200.11.0172	99.000.8201
	Stoßstange IV f. HR-St	44		200.48.0007	
	Schlauchschelle II	43		200.11.0172	99.010.8202
	Instrumentenschlauch	42		ø 8 x 1,5	transparent
	Tecalanrohr 80 ø 8 x 1 - 6200	41		DIN 73387 - PA 11h	
	hinterer Spant rechts	40		200.11.0162	
	Haltebrett f. Mixer	39		200.11.0123	
	Querkraftrohr hinten	38		200.11.0049	99.000.5077
	Ecke f. hinteren Spant rechts	37		200.11.0174	
	Mixer f. QR- u. WK-St komplett	36		201.45.1001	
	Antriebshebel II f. WK-Mixer	35		201.45.0015	
	Lüftungskanal rechts	34		200.11.0160	
	Antriebshebel f. QR-St	33		200.41.0009	
	Gewindebuchse f. Mastercyl.	32		201.21.0028	99.000.2348
	Langloch-Verstellkopf	31		201.21.0027	99.000.4030
	Umlenkhebel f. BK-St re.	30		201.44.0009	
	Lagerbock f. Umlenkh. u. Mastercyl.	29		[illegible]	99.000.4130
	Anschlag f. Gepäckraum	28		200.11.0182	99.010.0054
	Gepäckraum	27		200.11.0175	
	Verstärkung f. Holmtunnel	26		[illegible]	
	Ringschraube f. Zugfeder	25		200.11.0033	99.000.5280
	Zugfeder f. Fahrwerk	24		200.21.0025	
	Hauptbolzensicherung kompl.	23		200.11.0047	99.000.[illegible]821
	Gepäckraumboden rechts	22		200.11.0108	
	Abdeckung f. Gepäckraumboden	21		200.11.0118	99.010.[illegible]060
	[illegible]beschlag f. Wa.Ba.	20		200.76/77.0015	99.000.9692
	Entlüftung f. Wa.Ba.	19		200.76.0010	99.000.1996
	Dreieckleiste 20/15 f. Querkraftr.	18		200.11.0124	
	Ecke f. Hauptspant rechts	17		200.11.0164	
	Hauptspant m. Cockpitverkleid. re.	16		200.11.0158	
	Reißleinenbeschlag	15	(nur linke Seite)	200.11.0013	99.000.5270
	Querkraftrohr vorne	14		200.11.0048	99.000.5076
	Verstärkung f. Querkraftrohr	13		200.11.0102	99.010.8856
	schräger Schultergurtbeschlag	12		200.11.0036	99.000.7142
	Doppel-U-Bock f. FW	11		200.11.0006	99.000.1214
	H-Strebe	10		201.21.0001	
	Schlauchkrümmer	9		C64 [illegible]	Fa. [illegible]
	Ablaßventil komplett	8		201.76.1001	
	Stellschraube M 6 x 30	7			
	Halter f. Bowdenzug	6		201.76/77.0003	
	Abdeckung rechts f. Hauptspant	5		200.11.0131	
	Ring f. O_2-Flasche	4		200.11.0027	
	Bowdenzug Wa Ba	3			
	Sauerstofflasche 4l	2		ø 100 mm	
	Befestigungslasche f. Bowdenzug	1		200.11.0050	

Zust.	Änderung	Datum	Na		Datum	Name	Typ	Benennung	Maßst
				Bearb.	25.10.83	H. Münch	ASW 20B C	Zusammenbau-Rumpf Mittelteil rechts	1:25
				Gepr.					
				Norm					
				A. Schleicher Segelflugzeugbau 6416 Poppenhausen			Zeichnungsnummer L-314 201 11.S4 TM-Nr. 15		Blatt
				Urspr.			Ers. f.	Ers. d.	

Fig. II. 1-3



1	Sporn mit Nylonrolle	49		201.29.0153	wahlweise
1	Spornrad 210×65, kompl.	48		200.29.1001/99.000.7421	wahlweise
1	Halter f. Multidüse	47			wahlweise
2	Flugzeugseil ϕ3,2 - 7500	46		LN 9374	
2	Tecalan-Rohr-80 ϕ8×1-6500	45		DIN 73387-PA 11h	
1	Verstärkung f. Umlenkhebel, unten	44		200. 37. 0106	99 010 8864
1	Halbrippe f. SFl unten, links	43		200. 37. 0150	
1	UKW-Sperrtopfantenne	42			Fa. Dittel
1	Stoßstange V f. HR-St.	41		200. 48. 0009	
3	Glasgewebeband, 1 Lage	40		40 breit	
1	Instrumentenschlauch, grün	39	PVC-weich	ϕ 8 × 1,5 - 8300	
1	Instrumentenschlauch, farblos	38	PVC-weich	ϕ 8 × 1,5 - 8300	
1	Halter f. Prandtlrohr	37			wahlweise
1	Sechskantmutter M16 × 1,5	36		DIN 439 - 06	
1	Scheibe 16	35		DIN 126 - St.	
1	Instrumentenschlauch, rot	34	PVC-weich	ϕ8×1,5 - 8300	
1	Bundbuchse f. Nasenbolzen	33		200. 37. 0001	99 332 0094
1	Höhenflosse, kompl.	32		201. 33. 1002	
1	Nasenbolzen	31		200. 33. 0002	99 000 4797
1	Dachpapp-Stift	30			
1	Verstärkung - GFK	29		2× 40×40	
1	Kasten f. T-Beschlag	28		201. 37. 0152	
2	Sechskantmutter M18 × 1,5	27		DIN 439 - 06	
2	Bundbuchse f. T-Beschlag	26		200. 37. 0002	99 332 0095
1	Verstärkung f. T-Beschlag	25		200. 37. 0102	99 010 8862
2	Scheibe ϕ 18/34 - 2	24			
2	Höhenruder, kompl.	23		201. 35/36. 1001	
1	Lagerbeschlag f. HR-Antrieb	22		201. 37. 0007	
1	Gelenkkopf SMX CP 6.4834	21		ϕ6, M8×40	Fa. Hirschmann
1	Antriebsbeschlag f. HR	20		201. 48. 0014	
	Verstärkung f. HR-Lagerbeschlag	19	3 Lagen 92 140 *		
1	Lagerbock f. SR, oben	18		200. 37. 0004	99 000 4200
1	Klotz f. Lagerbock, oben	17		200. 37. 0104	99 010 3435
1	Stoßstange VI f. HR-St.	16		201. 48. 0011	
1	Umlenkhebel II f. HR-St.	15		200. 48. 0010	99 000 8066
1	Seitenruder, kompl.	14		201. 38. 1001	
2	Lagerbock f. SR, unten	13		200. 37. 0005	99 000 4028
1	Anschlagklotz f. SR-Antriebsh.	12		200 37. 0107	
1	Klotz f. Lagerbock, unten	11		200. 37. 0105	99 010 3436
2	hinterer Steg f. SFl.	10		200. 37. 0154	
1	Sporn-Löffel	9		200. 29. 0001	99 000 7440
2	Senkkopfschraube M6 × 35	8		DIN 963 - 6	
1	Ankerplatte	7		200. 29. 0002	99 000 7450
1	Sporn	6	Integralschaum	200. 29. 0152	99 010 8173
1	Hauptsteg f. SFl.	5		200. 37. 0151	
1	Umlenkhebel I f. HR-St.	4		200. 48. 0008	99 000 8080
2	Lagerbock, schräg	3		200. 37. 0003	99 000 4730
1	Stoßstange IV f. HR-St.	2		200. 48. 0007	
1	Spant, Rumpfröhre-SF-Übergang	1		201. 11. 0180	
	[illegible]	Pos. Nr.	Werkstoff	Rohmaße Teil- oder DIN Nr.	Bemerkung

Fig. II. 1.- 4