Maximum permissible recovery loads

| | | |
|---|---|---|
| Max. positive load | + 5,3 g ) | at 190 km/h (103 kts) |
| Max. negative load | - 2,65g ) | |

With increasing speed the limits decrease linearly to:

| | | |
|---|---|---|
| Max. positive load | + 4,0 g ) | at 280 km/h (151 kts) |
| Max. negative load | - 1,5 g ) | |

## II.6. CREW

The crew of the ASW 20 B is one pilot.

## II.7. MASSES

According to the "Gesetz über Einheiten im Meßwesen" (Weights and Measures Act) of July 2, 1969, the term "mass" is to be used where the kilogram (kg) is the unit, as opposed to the expression "weight" formerly used.

| | | |
|---|---|---|
| Empty mass with min. equipment | ca.265 kg | ( 584 lbs) |
| Max. permissible flight mass | 525 kg | (1157 lbs) |
| Max. permissible mass of the non-lifting structural parts | 245 kg | ( 540 lbs) |
| Water ballast in the wing tanks, depending on empty mass and cock-pit load (see tables in Chapter II.9.) | up to 150 kg | ( 331 lbs) (39,6 USGal) |

## II.8. LIMITS OF C.G. POSITION IN FLIGHT

The Datum Point (= "Bezugspunkt" BP) is the leading edge of the wing root rib (disregarding the rounded part of the wing-fuselage transition).

The horizontal datum line is the center line of the fuselage tail cone, or a 100 : 45 template placed horizontally on the top surface of the fuselage tail cone (see the section "Setting-up data" in the Maintenance Manual.

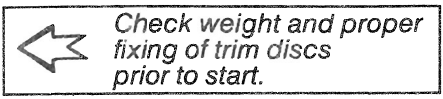
The permissible C.G. range in flight extends from 240 to 360 mm (9,45 to 14,17 in) aft of the BP.

The C.G. position in flight can be calculated from the empty C.G. position and the cockpit load (see Chapter III.2.4 in the Maintenance Manual).

## II.9. C.G. POSITION AND LOAD LIMITS BASED ON THE LAST WEIGHING

The empty mass C.G. position is determined by weighing (see Chapter III.2.2 in the Maintenance Manual). As the permissible flight C.G. position limits must not be exceeded, the empty mass and the empty mass C.G. position (see Chapter III.2.5 in the Maintenance Manual) determine the permissible pilot weight range which is entered on the following page.
For this reason the aircraft must be weighed to establish the new C.G. position after all repairs, alterations in installed instrumentation etc. (see Maintenance Manual Chapter III.2.5).

tially heavier pilot wishes to fly the aircraft, then the weights must be removed again.
The following placard must be fixed on the right cockpit wall:




Fixed trim weight above the tailskid

After the installation of heavy instrumentation or repairs to the front section of the fuselage it is expedient to fix a lead weight above the tailskid.
The weight of the lead is found by the C.G. weighing procedure. The surface area of the lead weight should be 3,3 x 20 cm (1,3 x 7,9 in) so that it fits through the aperture in the fin post. The lead is screwed to the fuselage shell using two M8 screws. The tailskid has to be removed before fitting.
As the empty mass C.G. is now further aft, the minimum load rises; the figure is calculated as detailed on Page 17 and must be entered there.
Do not forget to enter this figure on the trim plan on the right fuselage side.

The following moments can be used when calculating the C.G. position:

| | |
|---|---|
| Lightweight pilot, (65kg / 143 lbs) | $X_s$ = 625 mm (24,61 in) in front of BP |
| Heavy pilot, (115 kg / 254 lbs) | $X_s$ = 550 mm (21,65 in) in front of BP |
| Instruments in instrument panel | $X_s$ =1250 mm (49,21 in) in front of BP |
| $O_2$ bottle ( 4 l) | $X_s$ = 80 mm ( 3,15 in) aft of BP |

Loading with water ballast

The max. flight mass of 525 kg (1157 lbs) must not be exceeded; use the following table to calculate the max. possible amount of ballast:

| Airframe mass ( kg ) | Cockpit load (kg) [mass of pilot + parachute + baggage] 65 | 75 | 85 | 95 | 105 | 115 |
|---|---|---|---|---|---|---|
| 260 | full | full | full | full | full | 150+) |
| 270 | full | full | full | full | 150 | 140 |
| 280 | full | full | full | 150 | 140 | 130 |
| 290 | full | full | 150 | 140 | 130 | * |
| 300 | full | 150 | 140 | 130 | * | * |

Airframe mass see Page 17 +) litre = kg

* Such high airframe masses do not permit such high cockpit loadings, as the max. permissible mass of the non-lifting structural parts will be exceeded.

## II.10. TOW ROPE WEAK LINK

For winch and aero tow a weak link of maximum 680 daN (1500 lbs) and minimum 540 kg (1190 lbs) nominal load is to be used, e.g. the new weak link 4 (blue paint finish; 600 daN ± 60 daN / 1323 lbs ± 132 lbs).

## II.11 EXTREMES OF PILOT SIZE

Tall pilots can fly without the backrest, but they must use a purpose-made stiff cushion which bridges the edge between the C.G. tow release and the main bulkhead. In the same way tall pilots should fly with sports shoes or

## 1.3. SPECIFICATION

### Wings

Wing section FX-62-K-131 mod. and
FX 60-126 mod. at the wingtip.

| | | |
|---|---|---|
| Wingspan: | 15,00 m | ( 49,21 ft) |
| Wing area: | 10,50 $m^2$ | (113,02 sqft) |
| Wing aspect ratio: | 21,43 | |
| Flap settings: | -12°, -6°, +0°, +9°, +38° | |
| Dihedral: | 2,33° (top surface of spar) | |
| Sweep angle (quarter-chord line): | 0° | |

### Fuselage

| | | |
|---|---|---|
| Fuselage length: | 6,80 m | ( 22,31 ft) |
| Height at fin: | 1,42 m | ( 4,66 ft) |
| Cockpit width: | 0,64 m | ( 2,10 ft) |

### Vertical tailplane

| | | |
|---|---|---|
| Height above top surface of fuselage: | 1,10 m | ( 3,61 ft) |
| Area: | 1,00 $m^2$ | ( 10,76 sqft) |
| Section: | Wortmann FX 71-L-150/30 13,50 % thickness | |

### Rudder

| | | |
|---|---|---|
| Rudder chord ratio: | 33,00 % | |
| Area: | 0,30 $m^2$ | ( 3,23 sqft) |

### Horizontal tailplane

| | | |
|---|---|---|
| Span: | 2,20 m | ( 7,22 ft) |
| Area: | 0,997$m^2$ | ( 10,73 sqft) |
| Aspect ratio: | 4,85 | |
| Section: | Wortmann FX 71-L-150/30 12,00 % thickness | |

| | | |
|---|---|---|
| Elevator | | |
| Area: | 0,2991m$^2$ | (3,22 sqft) |
| Control surface chord ratio: | 30,00 % | |
| Airbrakes | Schempp-Hirth, top surface only. | |
| Length: | 1,36 m | (4,46 ft) |
| Area (both): | 0,256m$^2$ | (2,76 sqft) |
| Height: | 0,094 m | (0,31 ft) |
| Masses | | |
| Empty mass: | approx. 270 kg | (595 lbs) |
| Useful load: | max. 115 kg | (254 lbs) |
| Mass of non-lifting structural parts: | max. 245 kg | (540 lbs) |
| Max. flight mass: | 525 kg | (1157 lbs) |
| Wing loading: | 32,4 - 50,0 kg/m$^2$ | (6,64 - 10,24 lb/sqft) |

## II. DESCRIPTION OF SYSTEMS

### II.1. THE ASW 20 B GLIDER

Midwing single-seat glider, featuring camber-changing flaps, T-tailplane, retractable landing gear and water ballast system. The dive brakes feature resilient sealing bands, and extend from the top surface of the wings only.

#### II.1.1 Wings

Two-part wing with FRP- rigid foam sandwich surface. The I-spar consists of fiberglass caps with FRP - hard foam webs. The wings are attached to the fuselage by means of a tongue and fork joint and two cylindrical main pins. The area of the wing leading edge which accommodates the water ballast bags has extra reinforcement in the form of FRP lugs in the nose section and at the step between spar cap and wing sheel. This provides additional ability to withstand internal pres- (from the water ballast system).

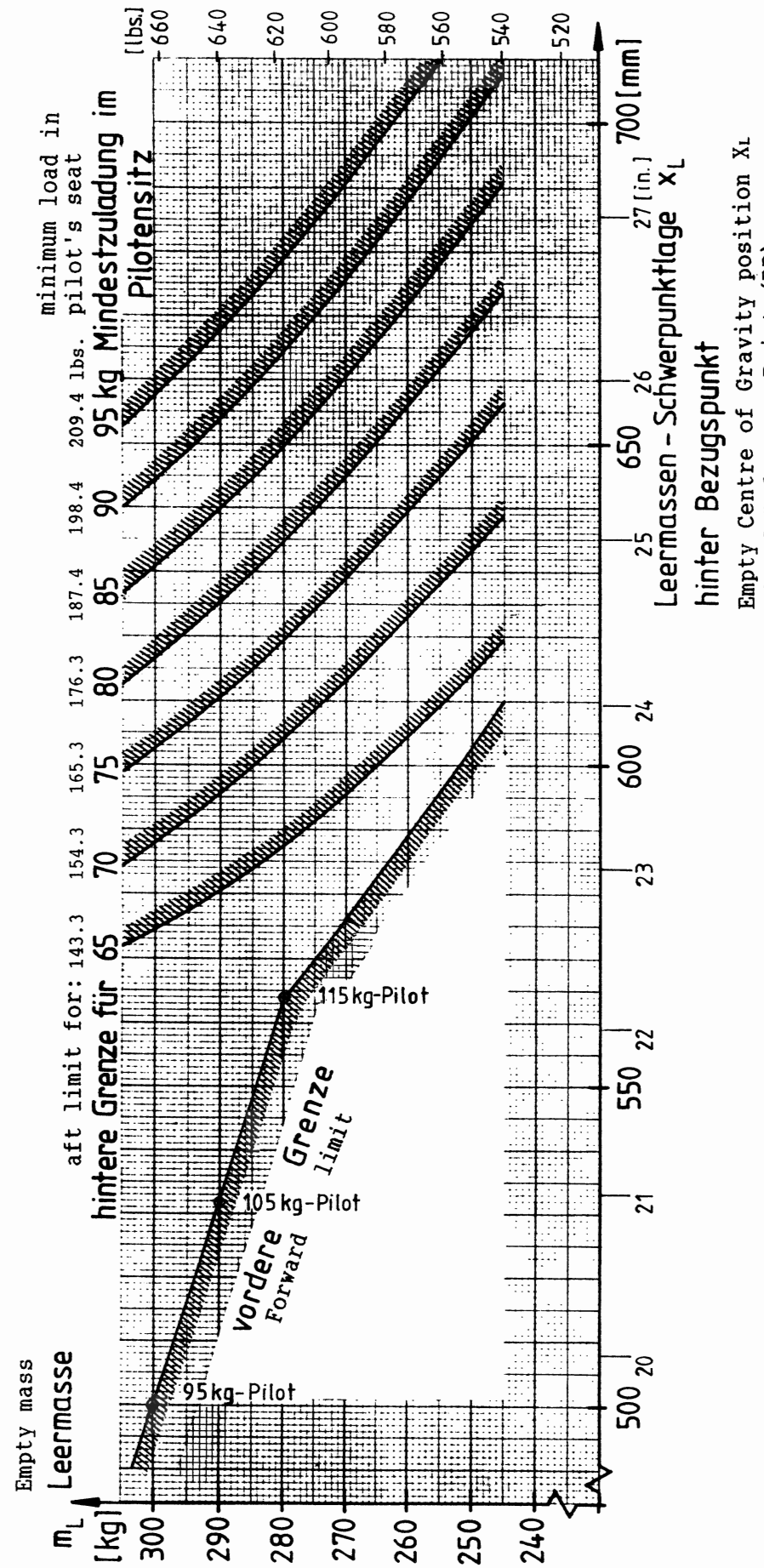



Fig.
Bild 3.2.-1

| DATE: | AUTHOR: | CORRECTION: TN-no.35 of 30.01.90 |
|---|---|---|
| June 2, 1983 | Jumtow | |

Reading off the graph 3.2.-1, you will see that the minimum load in the pilot's seat is now 70 kg (154,35 lbs). The new values must now be entered in Chapter II.9. to update the current state of the aircraft, by a person licensed to do this (e.g. building inspector of any licensed repair station).

3. Example of calculating the flight mass C.G. position:

a) An ASW 20 B with an empty mass of $m_L$ = 266 kg (586,53 lbs) and an empty mass C.G. position $x_L$ = 619 mm (24,37 in), is to be flown by a pilot weighing 85 kg (187,43 lbs) including parachute. He takes 2 kg (4,41 lbs) of rations with him in the cockpit, plus 4 kg (8,82 lbs) of baggage (e.g. barograph, retaining straps, canopy cover, rainwear etc.) in the baggage compartment.
What will the in flight C.G. position be ?
In this case the cockpit payload will be:

$m_P$ = 85 kg; i.e. 187,43 lbs (pilot + parachute) + 2 kg; i.e. 4,41 lbs (rations) = 87 kg; i.e. 191,84 lbs.

Following the formula given in Chapter III.2.4 , the calculation runs as follows:

$$x_S = \frac{x_L \cdot m_L + x_P \cdot m_P + x_G \cdot m_G}{m_L + m_P + m_G}$$

$(m_W = m_{O_2} = 0)$

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

= 319 mm (12,56 in).

The in flight C.G. is now in the rear third of the permissible range, which is a very favorable position.

b) If the aircraft, equipped as in example 3.a), takes on a a further load of 80 l (21,14 US Gal.) water bal-

## 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 |
| Repair Instruction K | dated 18.05.84 |
| Maintenance Instruction L | dated 26.01.90 |

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