Published by AS with contributions from Gerhard Waibel and Lutz-Werner Jumtow.

IMPORTANT NOTE:

The text given in this Manual (including figures, descriptions and operational or handling information) was produced by the authors with great care. However mistakes or misprint as well as misunderstanding can never be excluded. Therefore the authors must state, that juristical responsibility or guaranty or any other warranty which results from mistakes, misprints or misunderstanding cannot be given. The authors however are very grateful to accept advice for corrections.

This Flight Manual is FAA approved for U.S. registered gliders in accordance with the provision of 14 CFR Section 21.29, and is required by FAA Type Certificate Data Sheet No. G84EU and TN 07 .

0.1 Record of Revisions

Any revision of the present manual, except actual weighing data, must be recorded in the following table "Record Of Revisions" (pages 0.2/0.3) and in case of approved Sections endorsed by the LBA.

The new or amended text in the revised page will be indicated by a black vertical line in the left margin, and the Rev.No. and the Date will be shown in the box at the bottom left of the page.

Take-Off Mass	Recommended Towing Speed
300 kg (661,5 lbs)	115 km/h (62,0 kts)
400 kg (882,0 lbs)	120 km/h (64,8 kts)
500 kg (1102,5 lbs)	125 km/h (67,5 kts)

Maximum acceptable crosswind component: 25 km/h = 13,5 kts.

4.5.3 Flight

In straight flight with clean wings and at a flight mass of about 340 kg = 749,7 lbs the ASW 24 will enjoy laminar flow within a speed range of 75 km/h to 160 km/h = 40,5 kts to 86 kts. At the maximum flight mass of 500 kg = 1102,5 lbs the favourable aerodynamic range lies between 90 km/h and 190 km/h = 48,5 kts and 102,5 kts. Beyond these speed ranges, flight performance will noticeably deteriorate.
When circling, remember that the stalling speed will increase compared to that in straight flight.
As a general guideline, you should expect the stalling speed to increase by 10 % at about 30° bank, and by 20 % at about 45° bank - see also Section 5.2.2.

CAUTION: Flights in conditions conducive to lightning strikes must be avoided as the ASW 24 is not approved for such conditions.

Low Speed Flight and Stalling Behaviour

The ASW 24 behaves normally in slow and stalled flight. In all C.G. positions, flow detachment at the fuselage and a gentle oscillation about the vertical axis will give warning of an impending stall. At the foremost C.G. position, the stall character-

istics become very gentle, as the limited elevator deflection will no longer allow maximum angles of attack to be reached.
At this C.G. position, only a gentle stall warning will be experienced, but large aileron deflections can be applied without dropping a wing.

Even with rearmost C.G. position, about half of maximum aileron deflection can still be applied, with rudder centralised, to maintain the aircraft in straight stalled flight. It would, of course, be more appropriate to control the aircraft by means of rudder alone, and to leave the ailerons centered.

Violent applications of rudder or aileron would result in a spiral dive, spinning or side slipping, depending on C.G. position.

CAUTION:

! Height loss due to incipient spin from straight or circling flight depends largely on the all-up flight mass!

! Height loss from straight flight after prompt recovery action - ≈ 20 m (65,5 ft) !!

! Height loss from circling flight - up to 100 m (328 ft) !!

More specifically, the following would apply:

C.G. Position	Rudder & Aileron Co-ordinated	Rudder & Aileron Crossed
rearmost	steady spin	steady spin
center	spin, leading to spiral dive	spin, leading to side slipping
foremost	≈ half turn of spin, leading to spiral dive	side slipping

Wing drop from circling flight is not noticeably more violent than from straight flight.

4.5.4 Approach

Make the decision to land in good time and, notwithstanding the high performance, lower the wheel at not less than 150 m ≈ 500 ft agl.

For the remainder of the circuit, maintain about 95 km/h = 51 kts (yellow triangle on ASI scale).

The glider should be trimmed to between 90 and 100 km/h = 48,5 and 54 kts. In turbulence, the approach speed should be appropriately increased.

The double-paddle air brakes are normally effective in controlling the glide angle.

Side slipping with the ASW 24 is very effective and may therefore also be used for controlling the glide angle.
Side slips can be peformed between 90 km/h and 120 km/h IAS (49 to 65 kts) by gently applying rudder and opposite aileron control at the same time. With increasing speed less aileron deflection is necessary to achieve a straight flight path despite the rudder is fully deflected. The yaw angles and consequently the additional drag decrease with increasing speed. In a stationary side slip the ASI reading is not usable as it reads between 50 km/h (27 kts) and zero. The correct flying speed is controlled by pitch altitude. The upper edge of the instrument panel must not rise above a horizon position as known from thermal flight altitude.

If the ASW 24 is operated with winglets installed, in side slips greater yaw angles associated with lower bank angles are observed. Associated negative rudder control force gradients and rudder lock can be easily overcome by moderate pedal forces or by easing the control stick into a more neutral position.

NOTE: Side slipping should be practised from time to time at a safe height!

4.5.5 Landing

In an emergency (e.g. abandoned take-off), structural strength will prove adequate to a landing at maximum all-up mass.
However in normal operation it is strongly recommended that the water ballast is jettisoned before landing, in order to increase the safety margin.
Remember to round out in time to allow a clean 2-point touch-down.
Immediately before touching down, the airbrake setting may be reduced so as to avoid touching down with wheel brake too firmly applied.
During the ground run the stick should be held fully back; this gives better directional stability in crosswinds, and prevents the tail from lifting due to hard application of the wheel brake.

Jettisoning of Water Ballast.

To jettison water ballast, the waterballast switch in the cockpit is turned UP and the two green LEDs in the upper row should now light up. Every time any water is let off, it is most important to look at the wing trailing edges to check that the water is draining at an equal rate from both the opened valves!

We distinguish between two distinct types of circumstance in which ballast is normally released.

1. Partial reduction of wing loading:
   The mean rate of drainage amounts to 0.5 l/sec, higher if tanks are full, less if they are nearly empty. After an appropriate lapse of time the valves should be closed.

2. Rapid ballast jettison:
   The full tanks take about 5 1/2 minutes - about 340 seconds - to drain. The first half of the ballast will drain in about 2 minutes, while the remainder will take about another 3 1/2 minutes.

Should the ballast fail to drain as intended, the valves should be closed immediately (switch down, the lower red LEDs flashing); try again to achieve even drainage by operating the valves again or, if icing is suspected, try again after descending into warmer air.

If you do not succeed after several attempts the situation should be regarded as an emergency, and instructions in Section 3.7, (4) (Other Emergencies) should be followed.

4.5.7 High Altitude Flight

Flutter tests were carried out at about 2000 m = 6562 ft msl. As the ASI under-reads at increasing altitude, but since flutter limits for light aircraft are determined by the true air speed, the following limitations apply to high altitude flights :

Altitude msl.	VNE Indicated
0-3000 m (9843 ft)	280 km/h (151 kts)
5000 m (16404 ft)	250 km/h (135 kts)
7000 m (22966 ft)	225 km/h (121 kts)
9000 m (29528 ft)	200 km/h (108 kts)
11000 m (36089 ft)	175 km/h (94 kts)
13000 m (42651 ft)	150 km/h (81 kts)

If these indicated air speeds are observed above 3000 m = 9843 ft altitude, the true air speed will remain constant at 325 km/h = 175,5 kts. Therefore, in spite of considerably lower indicated speeds, the actual speed achieved relative to the ground will be adequate for penetrating even against strong head winds at greater altitudes.

Only effective for U.S. registered gliders !
Placard for speed limits high altitude:

VNE Speed Limit high altitude	
Altitude msl. (ft)	VNE IAS (kts)
< 10.000	151
< 16.500	135
< 23.000	121
< 29.500	108
< 36.000	94
< 42.500	81

This placard has to be installed near the ASI !

the upper part of the fin where trim ballast, for instance in the form of a battery, may be fitted. If any trim ballast is mounted in the fin, the minimum cockpit load will of course be increased ! This increased minimum cockpit load must also be shown in the DATA and LOADING PLACARD in the cockpit. The lower permissible cockpit load without trim ballast in the fin will be shown only on page 6.4 of the Flight Manual.

In the cockpit, an additional placard is to be affixed:

REDUCED MINIMUM COCKPIT LOAD WITHOUT TRIM BALLAST IN THE FIN: SEE FLIGHT MANUAL - PAGE 6.4 !

Sight apertures in the fin make it easy to check whether any trim ballast has been fitted. Clear view through the fin means: No trim ballast fitted! See also Section 7.11.

MASS AND BALANCE FORM

Date of Weighing	Empty mass 1)	Empty mass C.G. 2) aft of RP	Pilot mass incl. chute 1) min.	Pilot mass incl. chute 1) max.	Load in baggage compart.* 1)	Inspector's stamp and signature

* Permissible Load in baggage compartment = 230 kg = 507 LBS less empty mass of non-supporting parts less pilot mass less mass of parachute: BUT not more than 25 kg = 55 lbs (15 kg = 33 lbs in upper compartment, and 10 kg = 22 lbs in lower compartment) !!

1) For U.S.-registered sailplanes show lbs.
2) For U.S.-registered sailplanes show inches.
Other countries may use metric or SI units.

Maximum Permissible Loading with Water Ballast

Empty Mass kg (lbs)	Pilot mass + parachute + baggage kg and (lbs) : 75 kg (165,5)	85 kg (187,5)	95 kg (209,5)	105 kg (231,5)	115 kg (253,5)
220 (485)	full	full	full	full	full
230 (507)	full	full	full	full	155 (342)
240 (529)	full	full	full	155 (342)	XXXX
250 (551)	full	full	155 (342)	XXXX	XXXX
260 (573)	full	155 (342)	XXXX	XXXX	XXXX

XXXX: These combinations are precluded as they would cause the maximum permissible mass of non-lifting parts to be exceeded!

The water ballast bags fitted in the wings as standard equipment have a total capacity of 130 liters = 34,3 US.Gal.

An approved special version with a capacity of about 155 Liters = 41 US.Gal. can be supplied on request.

Example of load / C.G. calculation:

A weighing gave the following results:
Empty Mass m_L = 235 kg (518.09 lbs)
Empty Mass C.G. x_L = 0.626 m (24,65 inches)

A second weighing with a removeable trim ballast of 6 kg (13,23 lbs) in the fin showed:
Empty Mass m_L = 241 kg (531.31 lbs)
Empty Mass C.G. x_L = 0.715 m (28.15 inches)

The MASS AND BALANCE FORM in page 6.4 must be filled in according to the following example :

Date of Weighing	Empty mass 1)	Empty mass C.G. 2) aft of RP	Pilot mass incl. chute 1) min.	Pilot mass incl. chute 1) max.	Load in baggage compart.* 1)	Inspector's stamp and signature
	235 kg 518.09 lbs. without trimballast in the fin	626 mm 24,65 in.	70 kg 154 lbs		25 kg 55 lbs	
				115 kg 409 lbs	13,4 kg 29.5 lbs	
XX.XX.90	241 kg 531.31 lbs. with 13 lbs trimballast in the fin	715 mm 28.15 in.	95 kg 209 lbs		25 kg 55 lbs	X X X
				115 kg 409 lbs	13,4 kg 29.5 lbs	

0.2 List of Effective Pages

Section	Page	Date
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	0.3	07.03.89
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	0.5	25.04.94
	0.6	07.03.89
1	1.1	07.03.89
	1.2	18.08.92
	1.3	07.03.89
	1.4	18.08.92
	1.5	07.03.89
	1.6	08.02.90
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	2.8	07.03.89
	2.9	07.03.89
	2.10	07.03.89
	2.11	07.03.89
	2.12	07.03.89
	2.13	07.03.89
	2.14	07.03.89
	2.15	07.03.89
	2.16	07.03.89
	2.17	07.03.89
	2.18	07.03.89
	2.19	07.03.89
	2.20	27.04.90
2	2.21	07.03.89
	2.22	27.04.90
	2.23	07.03.89
	2.24	07.03.89
	2.25	07.03.89
	2.26	07.03.89
	2.27	27.04.90
	2.28	07.03.89
	2.29	07.03.89
	2.30	07.03.89
	2.31	07.03.89
	2.32	07.03.89
	2.33	07.03.89
	2.34	07.03.89
	2.35	18.08.92
3	3.1	07.03.89
	3.2	07.03.89
	3.3	08.02.90
	3.4	07.03.89
4	4.1	25.04.94
	4.2	07.03.89
	4.3	07.03.89
	4.4	07.03.89
	4.5	27.04.90
	4.6	25.04.94
	4.7	25.04.94
5	5.1	07.03.89
	5.2	07.03.89
	5.3	07.03.89
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	6.7	08.02.90
	6.8	25.04.94
	6.9	08.02.90
	6.10	07.03.89
	6.11	07.03.89
	6.12	08.02.90
	6.13	08.02.90
	6.14	08.02.90
	6.15	08.02.90
	6.16	08.02.90
	6.17	08.02.90
7	7.1	07.03.89
	7.2	07.03.89
	7.3	07.03.89
	7.4	07.03.89
	7.5	07.03.89
	7.6	27.04.90
8	8.1	07.03.89
	8.2	07.03.89
	8.3	07.03.89
	8.4	07.03.89
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	9.2	07.03.89
	9.3	07.03.89
	9.4	07.03.89
	9.5	07.03.89
	9.6	07.03.89
10	10.1	07.03.89
	10.2	07.03.89
	10.3	07.03.89
	10.4	07.03.89
	10.5	07.03.89
	10.6	07.03.89
11	11.1	07.03.89
	11.2	07.03.89
12	12.1	07.03.89
	12.2	07.03.89
	12.3	07.03.89
	12.4	07.03.89
	12.5	07.03.89
	12.6	07.03.89
	12.7	27.04.90

SECTION 4

4. Information on Service Life Limitations and Operating Intervals

4.1 Inspection Program to extend Service Life

4.2 Special Servicing Procedures and Equipment subject to Service Life Limitations

4.3 Airworthines Limitations
(Only effective for U.S. registered gliders!)

4. Information on Service Life Limitations and Operating Intervals

4.1 Inspection Program to extend Service Life

Introduction

Fatigue tests on CFRP wings and CFRP wing spars have shown that a service life expectancy of 6000 hours may be achieved for these components without problems. However, as this test program did not examine an entire aircraft made of CFRP and GRP, this service life span of 6000 hours can be achieved only if the long-term airworthiness of each glider is demonstrated in a special multi-stage inspection program (over and above the mandatory annual C of A inspection).

Time Limits

1st Stage:
When the glider has reached a service life of 3000 hours an inspection must be carried out in accordance with the inspection program laid down by Messrs.Schleicher, from whom details must be obtained. If the results of this inspection are positive, or if any defects discovered have been correctly repaired, the service life of the glider is increased by 1000 hours, i.e. to a total of 4000 hours.

Instruments

The flight monitoring instruments are not normally subject to service life limitations. As a general rule, the makers' instructions should be complied with.

Oxygen Installation

Oxygen systems and oxygen supply must comply with JAR 22.1441 and 22.1449 !
For oxygen systems fitted, the relevant section of the appertaining Inspection Release Certificate states the overhaul time limit. Over and beyond this, the oxygen bottles must be re-inspected by a technical inspection institute every five years in accordance with pressure vessel regulations.

Water Bags

Water bags as per TN no.3 have a preliminary service life of 6 years. Prior to the expiry of this time limit the customer should contact SCHLEICHERS and check whether it is possible to increase this service life by means of a special Inspection Program.

Only effective for U.S. registered gliders !

4.3 Airworthiness Limitations

The Airworthiness Limitations Section is FAA approved for U.S. registered gliders in accordance with the provisions of 14 CFR section 21.29. in addition, this section is required by FAA Type Certificata Data Sheet No. G..EU and it specifies maintenance required under 14 CFR sections 43.16 and 91.163, unless an alternative program has been FAA approved.

Only effective for U.S. registered gliders !
Log of Revisions for the Airworthiness Limitation Section

Revisions No.	Pages affected	Description	LBA approval signature	Date

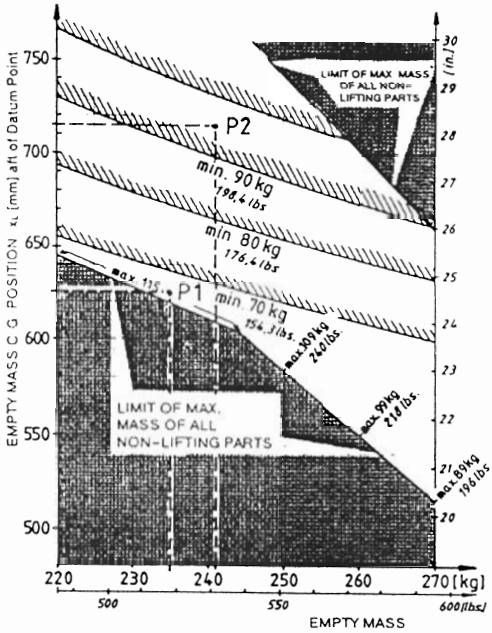
If removeable trim ballast is provided in the fin, the increased minimum cockpit load which results from the trim ballast, must be entered into the Mass and Balance Form for safety reasons.
By a placard next the Mass and Balance Form it has to be notified that Flight Manual page 6.4 has to be regarded where the lower minimum cockpit load without trim ballast in the fin is shown.

In the following pages two examples of how to evaluate the weighing results are given.

EXAMPLES :

(1) A weighing in accordance with Section 6.2 gave the following results:
Empty Mass m_L = 235 kg (518.09 lbs)
Empty Mass C.G. x_L = 0.626 m (24,65 inches)

By use of the diagram Fig.6.4-1 it is found that:



Point P1 is below the line giving 70 kg (154 lbs) minimum cockpit load in the seat, and above the line limiting maximum cockpit load to 115 kg (253,53 lbs).
It follows that:
The sailplane is within the required limits and may therefore be flown by a pilot weighing 70 kg (incl. parachute), and with water ballast up to a total take-off mass of 500 kg (1102,50 lbs).

(2) A second weighing with a removeable trim ballast of 6 kg (13,23 lbs) in the fin showed:

m_L = 241 kg (531,31 lbs) and
x_L = 0.715 m (28,15 inches)

In the diagram, point P2 is <u>above</u> the line of minimum cockpit load of "90 kg (198,42 lbs)" near 95 kg but below the line of 100 kg (220,46 lbs). Therefore, the "Mass and Ballance Form" placard in the cockpit must show a min. cockpit load of 95 kg (pilot incl. parachute) and the following placard must be fixed in addition :

REDUCED MINIMUM COCKPIT LOAD <u>WITHOUT</u> TRIM BALLAST IN THE FIN: SEE FLIGHT MANUAL - PAGE 6.4 !

The MASS AND BALANCE FORM in the Flight Manual page 6.4 must be filled in according to the following example :

Date of Weighing	Empty mass 1)	Empty mass C.G. 2) aft of RP	Pilot mass incl. chute 1) min.	Pilot mass incl. chute 1) max.	Load in baggage compart.* 1)	Inspector's stamp and signature
	235 kg 518.09 lbs. <u>without</u> <u>trimballast</u> <u>in the fin</u>	626 mm 24,65 in.	70 kg <u>154 lbs</u>	 <u>115 kg</u> <u>409 lbs</u>	25 kg <u>55 lbs</u> 13,4 kg <u>29.5 lbs</u>	
xx.xx.90	241 kg 531.31 lbs. <u>with</u> 13 lbs <u>trimballast</u> <u>in the fin</u>	715 mm 28.15 in.	95 kg <u>209 lbs</u>	 <u>115 kg</u> <u>409 lbs</u>	25 kg <u>55 lbs</u> 13,4 kg <u>29.5 lbs</u>	X X X