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Maintenance Handbook

GROB G 102
CLUB ASTIR III
CLUB ASTIR III b
STANDARD ASTIR III

This handbook is to be kept on board the aircraft at all times.

It refers to the serie: CLUB ASTIR IIIb

Registration: --- Factory Serial Number: 5613 Cb

Owner: Drake Aviation Ltd., Mr. Bruce Drake
P.O. Box 14051
Christchurch / New Zealand

German edition of operating instructions are approved under § 12 (1) 2. of Luft GerPO.

Published January 1981

Approval of translation has been done to our best knowledge and judgement. In any case the original text in German language is authoritative.

23.09.83

Updates:

Current number	Page	Reference	Date	Signature
1	1, 1b, 2, 28	Increase of service time (TM 306-24)	22. 2. 84	

List of effective pages

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Updates:

Current number	Page	Reference	Date	Signature
1	1, 2, 28	Increase of Service Time (TM 306-24)	22.2.84	
2	2, 17	Increase of mass balance (MSB 306-36/3)	18.04.2002	2. 5. 06. 02

Index page

Technical Advice and Airworthiness notes are to be kept behind this page.

1. Technical Data

Wings

Profile Eppler		E 603	E 603
Span	b	15.0 m	49.2 ft
Area	F	12,4 m²	133,5 sq.ft
Aspect Ratio		18,2	18, 2

Ailerons

Span	bQR	2,96 m	9,7 ft
Chord inner	ti	0,168 m	0,56 ft
outer	ta	0,127 m	0,46 ft
Area	FQR	0,873 m²	9,69 sq.ft
% of chord		20% -25%	20% -25%

Fuselage

Length (SPEED II B)	l	6,75m	22.13 ft
Width, of cockpit	b	0.65 m	2, 13t
Height of cockpit	h	0.90 m	2,95 ft
Height of tailplane	h	1.26 m	4.13 ft

Fin

Height	h	1.09 m	3.61 ft
Area	F	1, 04 m²	11, 14sq.ft
Aspect ratio		1, 14	1,14
Chord bottom	tu	1.15 m	3,77ft
top	to	0.75 m	2,46 ft

Rudder

Area	F	0, 349 m^2	3.75 sq.ft
% of fin		33-35%	33-35%

Tailplane

Span	b	3.00 m	9.84 ft
Area	F	1.44 m^2	15.5 sq.ft
Aspect ratio		6.25	6,25
Chord inner	ti	0.62 m	2.03 ft
outer	ta	0.34 m	1.12 ft

Elevator

Area	F	0.40 m^2	4.31 sq.ft
% of tailplane		27.5 %	27,5%

Brakes (Grob system)

Area (both)	FBK	0,338 m^2	3,66 sp. ft
Span	b	1,2 m	3,9 ft
Height	h	0,14m	0,46 ft

Weights

Empty	ca.	260 kg	570 lbs
Max load with water ballast		195 kg	418 ,9 lbs
Crew max.		110 kg	243 lbs
Baggage max.		10 kg	22 lbs
Ballast max.		90 kg	198,4 lbs
Minimum cockpit load		70 kg	154 lbs
Max. AUW without water ballast		380 kg	837,7 lbs
Max. AUW with water ballast		450 kg	992,1 lbs
Loading in percent AUW		42 %	
Wing loading		26,2-36,3 kg/m^2	5,5-7,4 lbs/sq.ft
Max weight of non lifting parts		250 kg	551 lbs

2. Description of Components

2. 1. Control Linkages

The flying controls of the aircraft are based on a push rod system. The control levers and sticks are welded of steel-tubes and the push rods are of aluminium tube, riveted to the connectors.

Elevator

The control stick force is transfered from the control stick via the mounting frame to the elevator push rods. A single elevator push rod leads from the join at the master frame to the elevator horn at the bottom of the fin. A vertical push rod with quick connector drives the horn in the elevator. All the components of the elevator system in the fuselage can be dismantled. The elevator horn is laminated into the elevator. Stops for the elevator are on the stick under the seat.

Aileron controls

Lateral control movements are transfered from the control stick via a short connecting rod to the aileron control bellcrank on the right side of the fuselage. Push rods lead from there to the arm on the control spider in the middle of the fuselage via an intermediate bellcrank at the main spar to the aileron lever. The aileron horns of the spider and the push rods in the wing are moved by intermediate connectors with quick-joints. The outboard aileron control differential bell crank in the wing drives the aileron directly via a short push rod. All components of the aileron linkage in the fuselage may be dismantled. The aileron control differential bell crank and the push rods in the wing may only be dismantled through an opening made in the fibre-

Rudder linkage

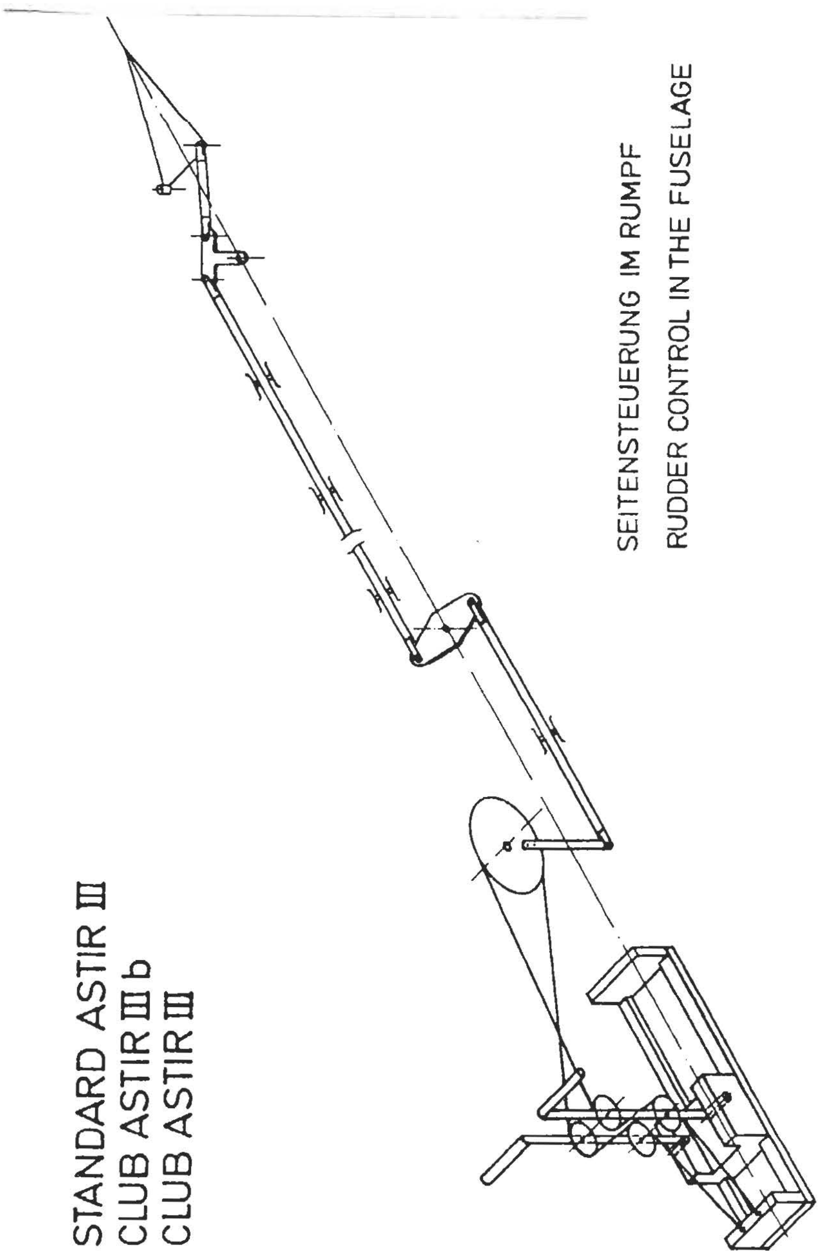
The pedals are designed for cable control and are adjusttable without preset positions. The cables are on the inside of the pedals and are routed to the stick frame where pedalforces are transferred. The whole of the rudder control system may be dismantled. The stops for the rudder are mounted to the pushrod and via a linkage leverat the main-spar and one in the tail to the rudder.

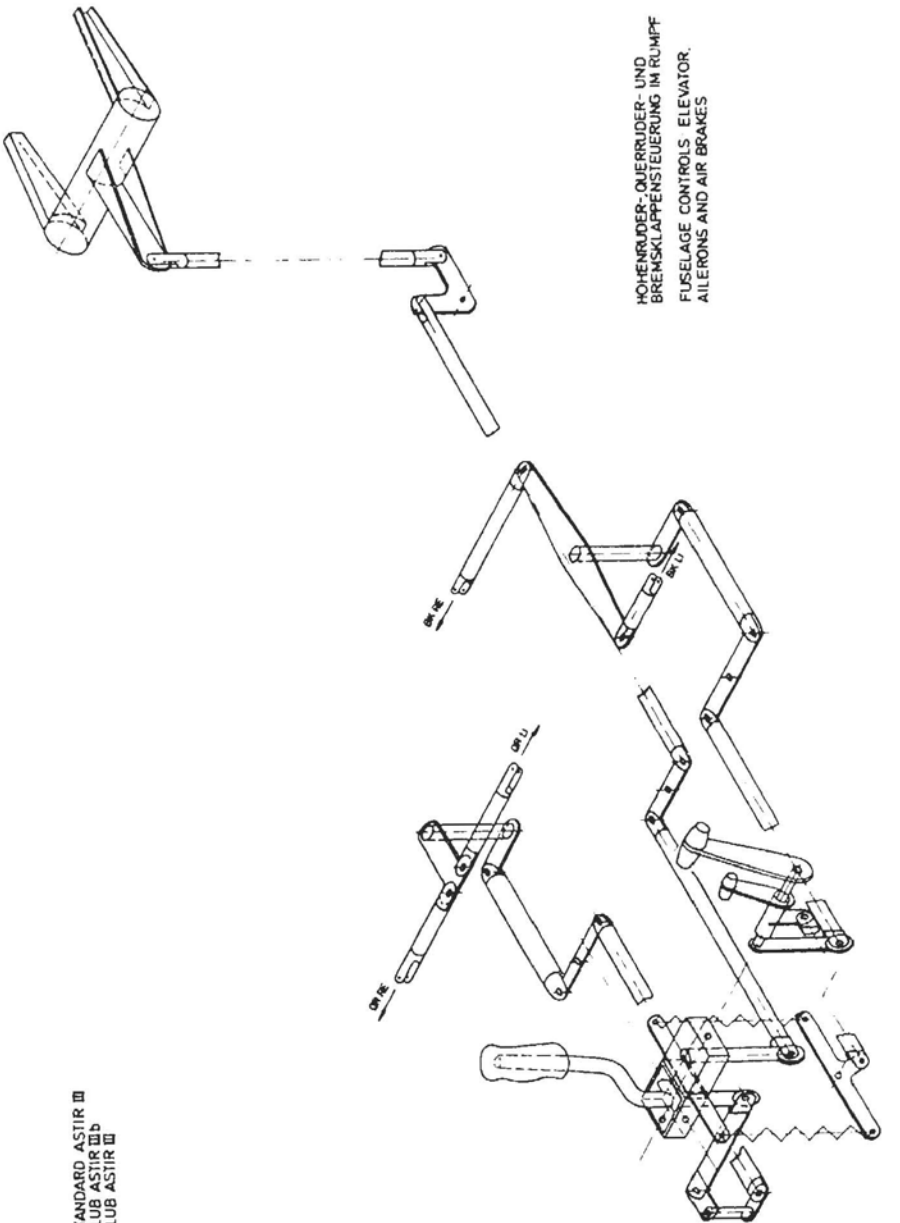
Airbrakes

Movements of the airbrake lever on the left of the cockpit are carried by control rods with an intermediate bell crank at the master frame t the lower horn of the control spider. The push rods in the wing are driven by the upper horns of the spider. An inverting bell crank is mounted inboard in the wing. from which push rods drive the two pivoted arms in the airbrake box which carry both brake plates. All parts of the airbrake control system in the fuselage can be removed. The inverting and transfer bell cranks and the internal push rods in the wing can only be reached by opening the skin of the wing.

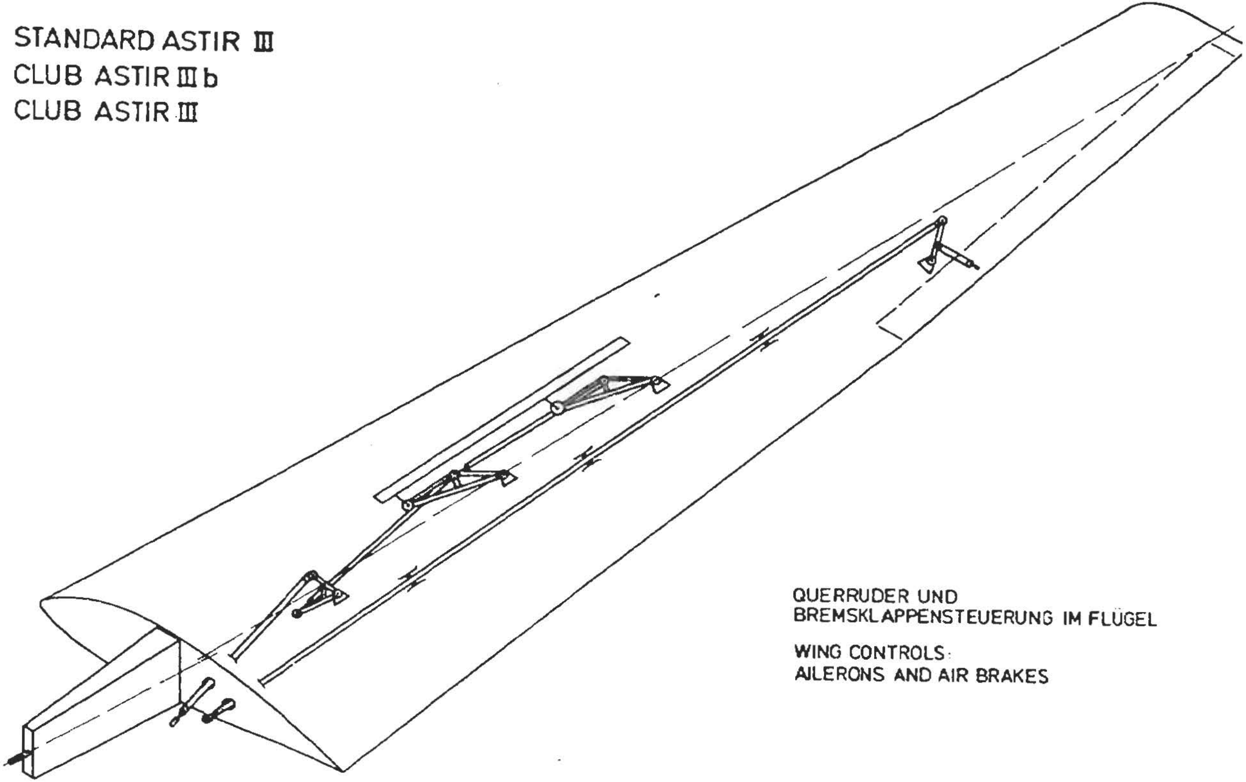
Undercarriage of Standard Astir III

Movements of the undercarriage lever on the right of the cockpit are carried by a control rod to the locking gear at the side of under-carriage box. Another control rod carries to the transfer bellcrank at the knee joint of undercarriage.


SEITENSTEUERUNG IM RUMPF
RUDDER CONTROL IN THE FUSELAGE
STANDARD ASTIR III
CLUB ASTIR III b
CLUB ASTIR III


HÖHENRUDER-, QUERRUDER- UND
BREMSKLAPPENSTEUERUNG IM RUMPF
FUSELAGE CONTROLS ELEVATOR,
AILERONS AND AIR BRAKES
STANDARD ASTIR III
CLUB ASTIR IIIb
CLUB ASTIR III

STANDARD ASTIR III
CLUB ASTIR III b
CLUB ASTIR III



QUERRUDER UND
BREMSKLAPPENSTEUERUNG IM FLÜGEL

WING CONTROLS:
AILERONS AND AIR BRAKES

2.2 **Installation of Radio**

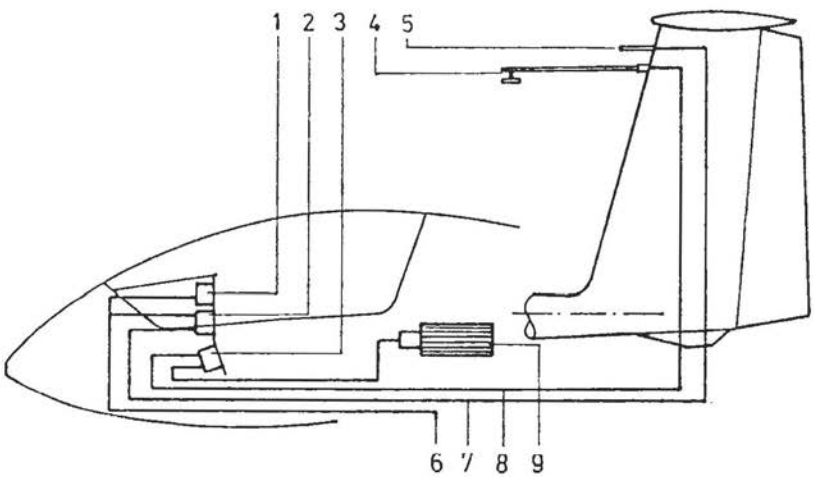
The instrument panel may be obtained in two layouts which can accomodate rectangular instruments of 60 x 80 mm. and 146 x 47 mm. The speaker should be mounted in the baggage compartment. A "Swan neck" microphone boom can be attached to the cockpit frame to the right of the pilot. Batteries can be mounted on the shelf of the baggage compartment. Drawings for installation of the radio unit can be obtained by request from the manufacturer or his agents.

2.3 **Installation of Oxygen equipment**

An Oxygen cylinder may be mounted at the top of the baggage area. Drawings for installation of Oxygen equipment may be obtained from the manufacturer or his agents on request.

At every additional mounting of equipment, which influences the centre of gravity, a new weighing has to be carried out, to guarantee, that the centre of gravity is within the allowed range.

2.4 **Pressure tubing and connections to the instruments**



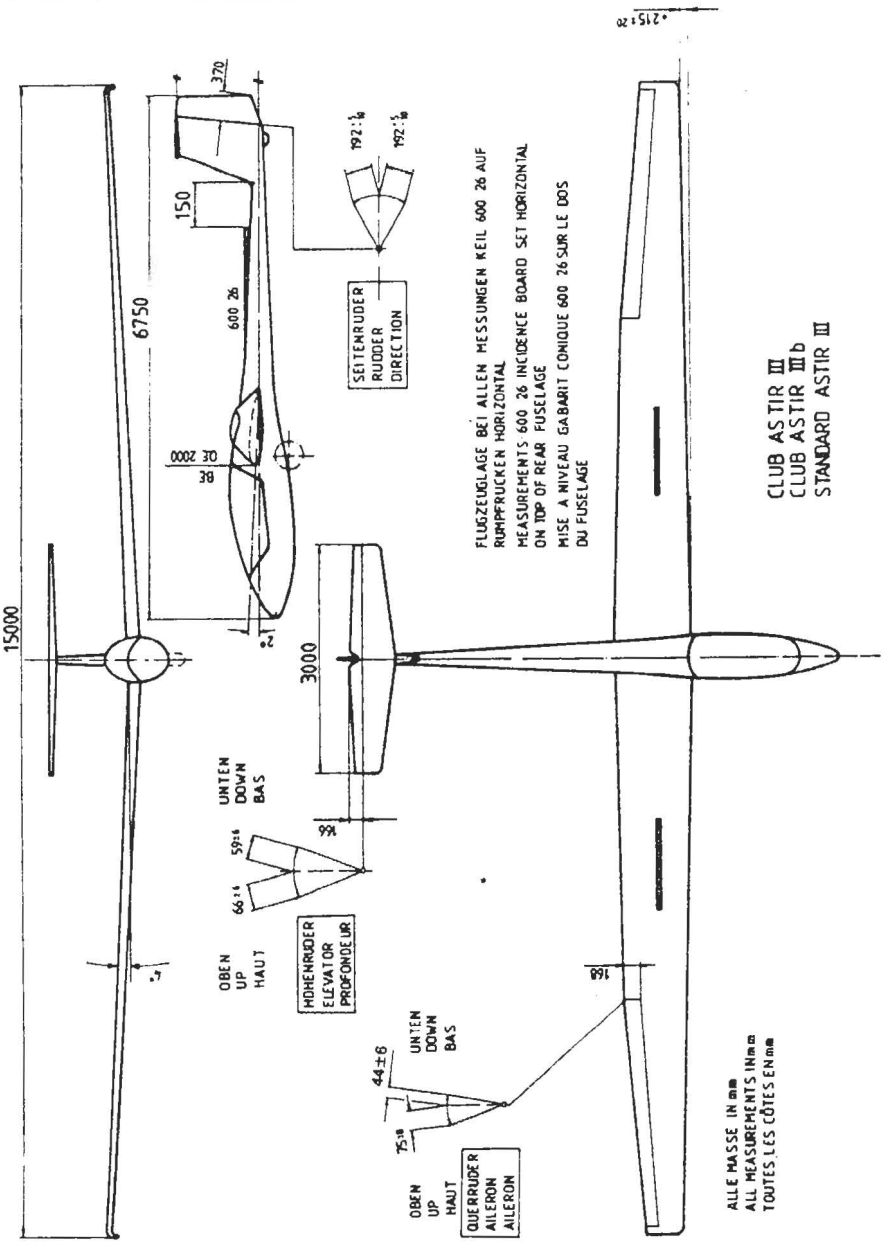
1. Altimeter
2. Air speed indicator
3. Variometer
4. Total energy tube
5. Pitot tube
6. Static pressure (colourless)
7. Pitot pressure (green)
8. Total energy (red)
9. Flask (blue)

The position of the "Total energy tube" is at the fin or on the top of the rear fuselage.

3. Rigging data

Adjustment	Reference line	Value	Tolerance
Wing – incidence angle	Angle between the centre line of the wing and the longitudinal axis of the fuselage	2°	+ 15′ — 15′
Wing – sweep back	Distance of the line joining the wing tips from the reference line	215 mm (8,49 in)	20mm ± (0,79in)
Wing – dihedral	Angle between the top surface of the wing and horizontal	4 deg	+ 30′ — 30′
Tailplane – incidence angle	Angle between the chord of the tailplane and the longitudinal axis of the fuselage	0 deg	+ 15′ — 15′
Reference line	Front of the wing at root rib	QE 2000 (78,7in)	

Control deflections	Upwards (Right)		Downwards (Left)		Measurement point from centre of rotation
	Value	tolerance	Value	tolerance	
Aileron (both)	75	+ 8 - 8	44	+ 6 - 6	168 mm (6,6 in)
Elevator	68	+6 —6	59	+6 —6	166 mm (6.54 in)
Rudder	192	+5 —10	192	+5 —10	370 mm (14,6 in)


15000
6750
3000
150
600 26
370
SEITENRUDER
RUDDER
DIRECTION
192:1⅛
192:1⅛
UNTEN
DOWN
BAS
OBEN
UP
HAUT
HÖHENRUDER
ELEVATOR
PROFONDEUR
59±6
66±6
44±6
75±8
QUERRUDER
AILERON
AILERON
FLUGZEUGLAGE BEI ALLEN MESSUNGEN KEIL 600 26 AUF RUMPFRUCKEN HORIZONTAL
MEASUREMENTS 600 26 INCIDENCE BOARD SET HORIZONTAL ON TOP OF REAR FUSELAGE
MISE A NIVEAU GABARIT CONIQUE 600 26 SUR LE DOS DU FUSELAGE
CLUB ASTIR III
CLUB ASTIR IIIb
STANDARD ASTIR III
ALLE MASSE IN mm
ALL MEASUREMENTS IN mm
TOUTES LES CÔTES EN mm

4. Components with a limited life time

Tow hooks

The standard tost tow hooks have a life of 36 months, after which they must be checked (time counted from time of installation in the aircraft), or a maximum of 2000 launches.

Oxygen Equipment

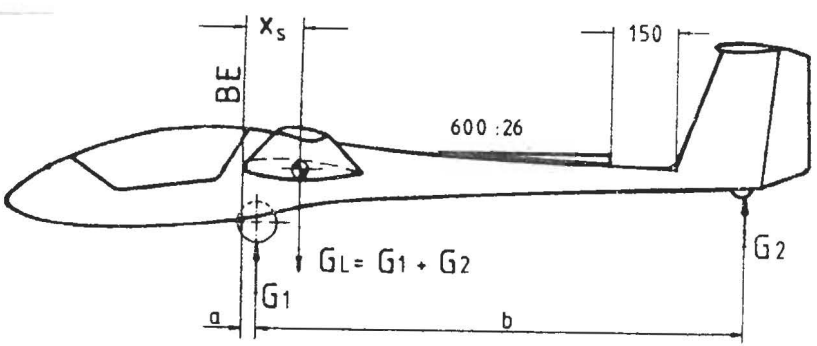
Overhaul times for specific Oxygen equipment is given in their test certificates.

Oxygen bottles must also be checked by the technical service every 5 years or according to the local laws on use of pressurized gases.

5. **Measurement of centre of gravity position**

The determination of the center of gravity is made with the undercarriage lowered and the glider supported on two scales at heights such that an incidence board of 600 : 26 angle is set horizontal on the back of the fuselage.

The reference plane lies at the front of the wing at the root. The distances a and b measured with the help of a plumb line. The empty weight is the sum of the two weights G_1 and G_2.



Datum line: Front edge of the wing at the root rib (BE)

Level means: With a 600 : 26 incidence board set up horizontal on the top of the rear fuselage.

Weight on main-wheel	G_1 =	kg / lbs
Weight on tail-skid	G_2 =	kg / lbs
Empty Weight G_L = G_1 + G_2	=	kg / lbs
Distance to main-wheel	a =	mm / inches
Distance to tail-skid	b =	mm / inches

Empty weight C. of G.

$$X = \frac{G_2 \times b}{G_L} + a = \frac{\quad}{\quad} + = \quad \text{mm/inches behind datum line}$$

The measurements to determine the empty weight, the empty weight C of G and the loading limitations must always be taken with the glider empty of water ballast and without removable ballast weights.

	from	to	multiply with
Convertion	kg	lbs	2.2
	mm	inches	0.0394

If the limits of the empty weight C of G positions and the loading limitations chart are adhered to, the C of G of the loaded glider will be within the permitted range.

STANDARD and CLUB ASTIR III

Empty Weight kg	Range of C. of G. behind Datum (mm)	
	Forward	Aft
250	702	769
255	693	763
260	685	758
265	677	753
270	670	748
275	648	743
280	626	738

It should be noted that to make use of the maximum load the minimum admissable load for non lifting parts must not be exceeded.

The weight of the non lifting parts is the sum of the fuselage, tailplane, and maximum load in the fuselage and must not exceed 250 kg 551 lbs) or the maximum load permitted in the fuselage must be correspondingly decresed. This refers to the load of the fuselage.

The Centre of Gravity should be rechecked after repair, repainting, the installation of additional equipment or when a period of 4 years has elapsed from the time of last weighing.

The empty weight, empty weight C of G position and the maximum load should be recorded after each weighing on page 10 of the Flight Handbook.

To find out the Center of Gravity of the loaded sailplane:

- C. of G. of the pilot is located 552 mm in front of the datum line
- C. of G. of the water ballast is located 276 mm behind the datum line

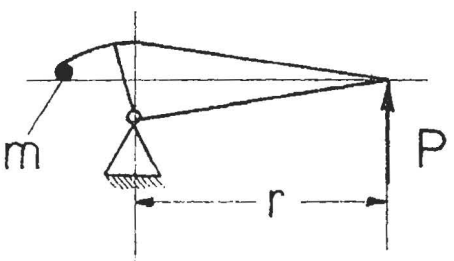
6. Weights and moments of the control surfaces:

Control surface moments

After repainting or repairs the moments and weights of the control surfaces must not exceed the following values:

	Weight	Moment
Elevator	2,80 kg - 3,60 kg	85 Ncm - 108 Ncm
	2,50 kg – 2,80 kg	**75 Ncm – 90 Ncm**
Rudder	5,6 kg + 8 % - 10 %	8,0 kgcm + 4 % - 15 %
Aileron	5,00 kg - 6,60 kg	- 45 Ncm - -15 Ncm

The control surface must be removed to measure the moments. To determine the moment M = P x r the surface should be mounted at the hinge line with the minimum friction possible. The force P can be measured, for example using a letter scale. If these values are exceeded the mass balance should be increased. Before carrying out repairs which for example involve changing the mass balance on a surface or his repair agent should be consulted.



7. Checks

Check lists

See Flight Handbook for daily inspection and pre flight checks.

Checks in specific cases.

After a heavy landing:

Check the undercarriage mechanism under the seat, check the undercarriage mountings in the wheel box, check the spar and root rib for white patches in the glass fibre reinforced plastic (GFK).

Check the wing fittings in the fuselage and in the root rib.

After a ground loop:

Check the undercarriage mounting, check the rudder control rod and bellcrank behind the wheel box. Check the GFK tube at the base of the fin. Check the wing fittings in the fuselage and the connecting pins in the root rib.

Check the T-tail fittings

8. Regular service

The following schedule of service should be carried out regularly, and at the minimum during the annual airworthiness inspection.

1. The entire glider should be inspected for cracks, dents and bumps.
2. All fittings should be inspected for satisfactory condition (play, scores and corrosion).
3. All metal parts should be examined for corrosion, cracks, deformation and if necessary reconditioned and freshly protected.
4. Ceck that there is no play in the wing and tailplane to fuselage fittings.

5. The controls including the brakes should be submitted to a functional test and the control deflections checked.
6. The control linkages (Bearings, stops, horns, hinges and control cables) should be inspected and replaced if there is evidence of bending or corrosion.
7. If the controls do not move freely throughout their range, search for the cause and correct.
8. The undercarriage should be inspected and the wheel and brake checked to be in good condition.
9. Tow hooks should be treated in accordance with their appropriate maintenance manual.
10. Check that the pitot for the ASI is clear and that all tubing to the instruments is in good condition and free of kinks or leaks.
11. The condition and calibration of all instruments should be checked and any other equipment inspected.
12. The wing bending mode has to be established and checked with the figure stated at the approval report (Stückprüfbericht). The glider has to be supported at mainwheel and tail. The tire pressure must be 2,5 bar (36 psi)
13. Equipment and Instruments should be checked against the equipment list.
14. After repair or change of equipment, particularly after addition of a radio or Oxygen equipment, the weight table should be updated with the new empty weight and C of G by weighing or calculation.

9. **Lubrication chart** and undercarriage with brake

Ball bearings

All ball bearings installed are sealed with a permanent grease filling. Greasing of bearings is therefore unnecessary.

Sliding bearings

All the sliding bearings in the control runs need no maintenance or lubrication, except for those in the wing root and fin which should be washed off with petrol when dirty and relubricated.

Lubrications areas

The pins and bushes on the wing fittings should be regreased when necessary during rigging. The pins on the tailplane fittings and the screw thread should be lubricated periosically. The hinge and catches of the canopy should be oiled occassionally. Dirty release hooks are best cleaned using a brush and compressed air whilst operating the mechanism. The belly hook is accessible from inside and can be lubricated with spray oil or similar.

Undercarriage with dicsbrake

1. Changing the brake shoes.

   a) Remove the wheel housing.
   b) Loosen the 2 M8 screws in order to remove the brakes. The brake hose must not be taken off at the same time, otherwise it will be necessary to bleed the system.
   c) Remove the two split pins from outside and change the brake linings. The old brake linings can be used again after cleaning with steel brushes, if their dust grooves are still clearly visible.
   d) Re-install in reverse order.

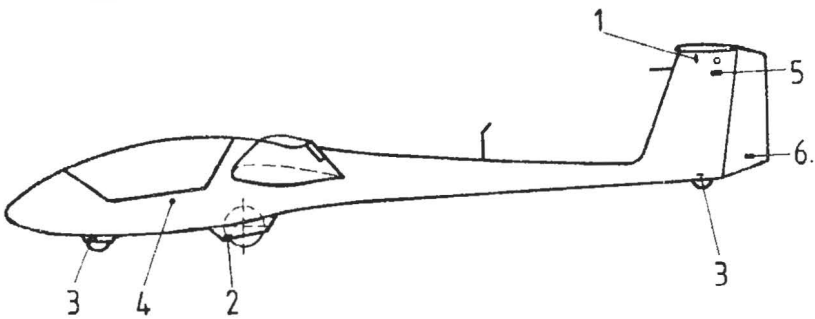
2. Bleeding the brake system.

   a) Attach a clear plastic tube to the bleed screw, with the other end dipped in a container of brake fluid.
   b) While using the brake lever to force the fluid through the system via the brake cylinder, loosen the bleed screw.
   c) The bleeding process is completed when no more air bubbles are visible in the plastic tube.

Note

The brake fluid DOT 3 (amber) is available everywhere at garages. It is standardized within Europe

10. Markings



1 Control Markings for the correct mounting of the elevator

2 Lable of Tire pressure and weak link strength

3 Lable of Tire pressure

4 Red rings around static pressure port

5 Placard for elevator fastening

6 " Don`t push or lift here "

11. Placards and signs

Maximum weight	kp	lbs
without water ballast:	380	836
with water ballast: *	450	990

Airspeed limits	km/h	m.p.h.	kts
Never exceed	250	155	135
In rough air	250	155	135
Manoeuvering	170	105	92
On aerotow	170	105	92
On winch tow	120	74	64
Airbrakes	250	155	135
Gear extension	250	155	135

cockpit *(no valid for CLUB ASTIR III and IIIb)

Payload (pilot and parachute)
The maximum weight must not be exceeded.

Minimum payload: 70 kp, 154 lbs.
Less weight must be compensated with ballast in the seat. or in the ballast box

Maximum load 110 kg 243 lbs

The maximum weight must not be exceeded.

cockpit

Check before launch

Wing and tailplane connections checked?
Full and free movement of controls?
Parachute secured?
Straps tight and locked?
Pedals adjusted and locked?
Brakes closed and locked?
Trim correctly adjusted?
Altimeter adjusted?
Canopy locked?
Cable on correct hook?

Beware: – Crosswind! – Cable break!

cockpit

Simple aerobatics maneuvers

Recommended entry speed	km/hr	knots	mph
Loop	180	97	112
Stall turn	180	97	112
Chandelle	150	81	93
Lazy eight	120	65	75
Spins	--	--	--

Aerobatics with waterballast is not allowed.

Cockpit

TIRE: 2, 5 bar (36 psi)

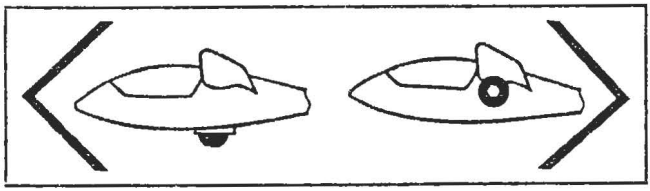
Nose and Tail wheel cover

Weak links for towing
500 kp, 1100 lbs. max.
Tire: 2, 5 bar 36 psi.

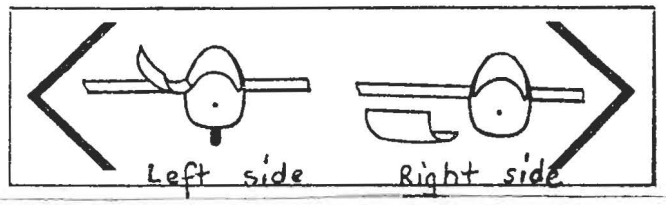
wheel cover

Number of ballast weights		
Weight of pilot (parachute incl)	55 - 69,9 kg	70 - 110 kg
Number of weights	1	0
1 ballast weight 8,6kg		

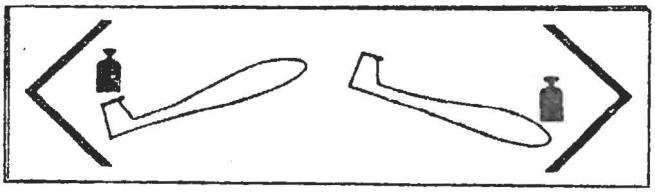
cockpit



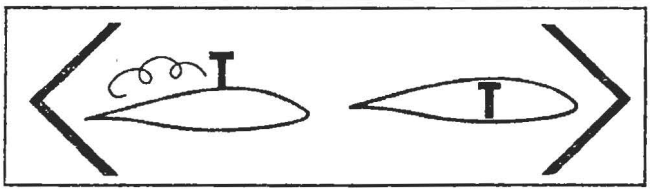
Undercarriage lever (only Stand. Astir III)



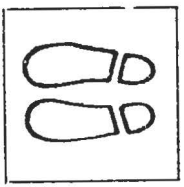
Canopy catch



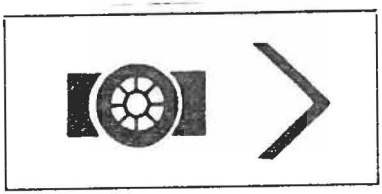
Trimmer green lever (left side of fuselage)



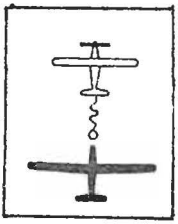
Airbrake lever



Rudder pedal adjustment (Instrument panel)



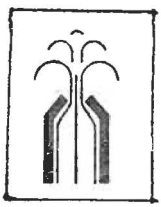
Wheel brake (Airbrake lever)



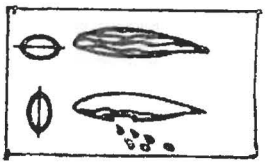
Cable Release
(Instrument panel)

Baggage maximum
22 lbs 10 kg

(luggage compartment)



Ventilation
(Instrument panel)



Water ballast jettison
(Instrument panel)
(Standard Astir III)

Dont push or lift here

Fin
(both sides)

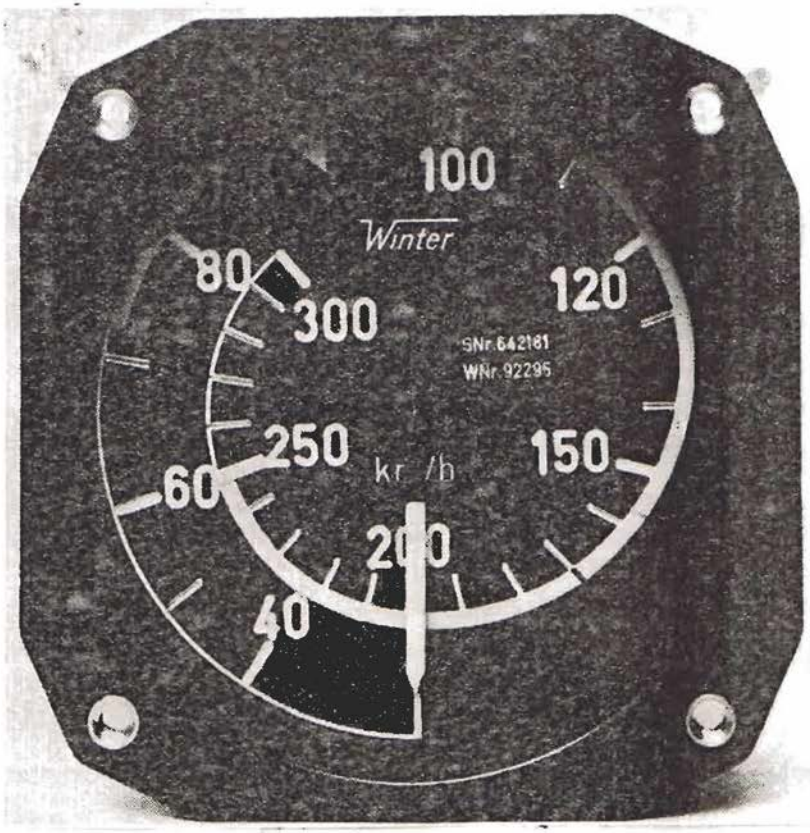
Elevator quick lock connected
Markings notice
Rotating knob turned in
Tailplane secured (cover closed)

Tailplane checklist
(Fin)

12. **Air Speed Indicator Markings**

km/h	knots	mph	Marking	Significance
72-170	39-92	45-105	Green arc	Normal range of flying speed
170-250	92-135	105-155	Yellow arc	Range of flying speeds to be used with care
250	135	155	Radial Red line	Maximum speed (VNE)
90	49	56	Yellow triange	Minimum recommended landing speed at maximum all up weigh

72 km/h(39 kts/45 mph) = Vs 1,1 under max. flight weight conditions



13. General care

Dampness

As far as possible the glider should be protected from damp. All the metal parts of the glider, with the exception of the wing and tailplane fittings are protected against damp. However, this will not prevent corrosion during extended exposure to moisture. Following any flights in rain any water which has entered the glider should be dried up and the exterior surfaces dried with a chamois leather. Polished metal parts should be regreased. Beware of condensation.

Sunlight

All structural parts of GFK gliders should have white surface to avoid heating up in sunlight.

Protection of the finish

The Gelcoat surface layer is very resistant and can therefore be cleaned using a mild detergent. Ingrained dirt, such as dead flies and grease, is best removed with a SILICONE FREE polish such as 1 Z Spezial-Reiniger – D 2, Fa. W. Sauer and Co., 5060 Bensberg, or "Reinigungspolish", Fa. Lesonal, Stuttgart. Sticky tape used for sealing the wing and tailplane joints may be removed using petrolium thinners (Beware thinners may remove the markings).

Cleaning the canopy

The canopy should only be cleaned using a soft clean cloth and a mild soap solution. It should be rinsed with clean water and dried with a clean chamois leather. "Plexipol" is a suitable polish. Never rub perspex with anything dry.

14. Inspection Procedure for Increase of Service Time

1. **General**

   The results of fatigue tests of wingspar sections have demonstrated recently that the service time of FRP gliders and motorgliders may be extended to 6000 hours, if for each individual glider (in addition to the obligatory annual inspections) the airworthiness is demonstrated according to a special multi-step inspection program particularly with regard to the service life.

2. **Dates**

   When the glider has reached a service time of 3000 hours, an inspection must be done in accordance with the inspection program mentioned under point 3. If the results of this inspection are positive or if any defects found have been duly repaired, the service time of the glider is extended by another 1000 hours to a total of 4000 hours (first step).

   The above inspection program must be repeated when the glider has reached a service time of 4000 hours. If the results of this inspection are positive or if any defects found have been duly repaired, the service time of the glider is extended to 5000 hours (second step).

   When the glider has reached a service time of 5000 hours, the above inspection program again must be repeated. If the results of the inspection are still positive or if any defects found have been duly repaired, the service time may be extended to a total of 6000 hours (third step).

   For a possible service time exceeding 6000 hours procedures will be evaluated in the future.

3. In each case the latest issue of the inspection program which will be updated according to incoming inspection results, has to be ordered from the manufacturer.

4. The inspection must only be done by the manufacturer or by a licensed repair station or inspector.

5. The results of the inspections have to be recorded in an inspection test report wherein comments are required for each inspection instruction. If the inspections are done outside the manufacturer's facilities, a copy of the records must be sent to the manufacturer for his evaluation and information.

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