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"WARNING"

means that the non-observation of the corresponding procedure leads to an immediate or important degradation of the flight safety.

"CAUTION"

means that the non-observation of the corresponding procedure leads to a minor or to a more or less long term degradation of the flight safety.

"NOTE"

draws the attention on any special item not directly related to safety, but which is important or unusual.

1.4 Descriptive Data

The ASW 24 is a high performance single-seater the design of which was orientated to the FAI Standard Class specification.
The ASW 24 is suitable for record breaking and competition flying. Not least, its pleasant flying characteristics make the ASW 24 suitable for use in performance-orientated clubs.

The ASW 24 is a shoulder wing glider with stabilised T-tail (tailplane-plus-elevator) and sprung, retractable landing gear with hydraulic disc brake.

Optional operation of the ASW 24 with 0,3m (about one foot) high winglets is approved.

Technical Data:

	(metric system)
Span	15.00 m
Fuselage length	6.55 m
Height (Fin and Tail Wheel)	1.30 m
Max.Take-Off Mass	500.00 kg
Wing chord (mean aerodynamic)	0.71 m
Wing area	10.00 m^2
Height of winglet	0.30 m
Wing loadings -	
- min.	30.5 kg/m^2
- max.	50.0 kg/m^2

	(British system)
Span	49.22 ft
Fuselage length	21.49 ft
Height (Fin and Tail Wheel)	4.27 ft
Max.Take-Off Mass	1102.00 lbs
Wing chord (mean aerodynamic)	2.33 ft
Wing area	107.64 ft^2
Height of winglet	11.81 inches
Wing loadings -	
- min.	6.25 lbs/ft^2
- max.	10.24 lbs/ft^2

SECTION 4

4.1 Introduction

Section 4 provides checklist and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in Section 9.

4.2 Rigging and Derigging

To rig: The ASW 24 can be rigged without use of rigging aids by three people, or by two people if a fuselage cradle and wing trestle are used.

Note: Exchange the winglets for the wingtip only after rigging the wings to the fuselage!

1. Clean and lubricate all pins, bushings and control connections.

2. Support fuselage and keep upright. If the wheel is lowered, check that the landing gear is securely locked down.

3. Insert right wing spar fork into fuselage and support the wingtip with a trestle, if available. While rigging, the airbrake paddles should be retracted and the ailerons slightly raised.

4. Insert left wing spar root and line up the main pin bushings. Insert and lock main pins. Only now - and not before - may the wing weight be relaxed. If the aircraft is still supported in a fuselage cradle, it is recommended that the

landing gear should be extended at this stage, and rigging completed with the aircraft standing on its wheel.

5. After cleaning and lightly lubricating the elevator studs and sockets, the tailplane is pushed onto the fin from the front. Each half-elevator must be guided into the elevator connections. The elastic lip seal covering the elevator gap must be placed on top of the elevator control tongue. Now push the tailplane home until the hexagon socket head bolt at the leading edge will engage its thread. The bolt must be fully and firmly tightened. It is secured by means of a spring ball catch, whose ball must engage in the grooves on the side of the bolt head.

6. A considerable performance improvement can be achieved with little effort by taping all gaps at the wing junctions with plastic self-adhesive tape (on the non-moving parts only). The fin-tailplane junctions should also be taped up. The canopy rim must not be taped over, so as not to impair bail-out.
   It is recommended that appropriate areas should be thoroughly waxed beforehand, so that the adhesive tape can afterwards be cleanly removed without lifting the paint finish.

7. Connect both vent tubes from the wing tanks to the openings at top of the baggage compartment.

8. Now use the Check List (see the following para. 4.4) to carry out the pre-flight check. Under

Point 3. "(Control gaps in flight direction must have a clearance of min. 1.5 mm = 1/16 in)", check that the ailerons have that minimum clearance from the inboard and outboard cut-out edges.
This clearance is necessary to ensure that these surfaces do not foul the wing cut-out edges when deformed under load in flight.

9. Optional, the winglets may be exchanged for the wingtips, must be safetied (twisting DZUS-fastener) and taped.

To de-rig: proceed in the reverse order of rigging. We would add the following suggestions:

1. Drain all water ballast. Ensure that all the water has emptied out by putting down alternative wingtips several times.

2. If the tailplane is very firmly located in its rear seating, it will be more easily dismantled by two people alternately pushing it forwards by the tips.

3. Do not forget to disconnect the ballast tank vent tubes before de-rigging the wings!
If installed, exchange winglets for wingtips and safety (twisting DZUS-fastener).

4.3 Daily Inspection

Before commencing flying operations, the aircraft must be thoroughly inspected and its controls checked; this also applies to aircraft kept in the hangar, as experience shows them to be vulnerable to hangar-packing damage and vermin.

1- Open canopy and check canopy jettison.

- Main pins home and secured?

- Check positive control connections - ailerons, elevator and airbrakes - in fuselage/wing mounting area.

- Check cockpit and control runs for loose objects or components.

- Check full, free and stress-free operation of all controls.
  Hold controls firmly at full deflection while loads are applied to control surfaces.

- Check ventilation opening and - if installed - pitot tube (optional extra) in fuselage nose.

- Check condition and operation of towing hook(s). Release control operating freely ? Don't forget release checks!

- Check wheel brake for operation and leaks. With airbrake paddles fully extended the resilient brake pressure from the main brake cylinder should be felt through the brake handle.

2- Check both upper and lower wing surfaces for damage.

3- Ailerons:
  Check condition and full and free movement (control surface clearances). Check linkage fairing for clearance.

- If installed: Are the winglets undamaged and safetied?

4- Airbrake paddles:
Check condition and control connections. Do both sides have good over-center lock?

5- Check inflation and condition of tires:

Main wheel : 2.5 bar +/- 0.1 bar
(= 35,6 psi +/- 1,5 psi)

Tail wheel : 2.5 bar +/- 0.1 bar
(= 35,6 psi +/- 1,5 psi)

6- Check fuselage, especially underside, for damage.

7- Check that static ports in the fuselage tail boom are unobstructed.

8- Check the pressure port in the fin :
is the probe properly seated and tight ?

9- Check that the tailplane bolt is tight and locked.

10- Check that rudder, tailplane and elevator are correctly fitted, and for damage or excessive play.

The numbers against the above points correspond with those in the following illustration "Tour of Inspection".

T/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.

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.

If winglets are installed, stall warning as well as transition into stalled attitude are more distinctly noticeable.

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.

For operation with winglets installed no significant change of spin behaviour has been observed.

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.

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

Before landing, water ballast must be jettisoned.

In an emergency (e.g. abandoned take-off), structural strength will prove adequate to a landing at maximum all-up mass.

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.

WARNING:

Flights in icing conditions are not advised, especially if the aircraft is wet before climbing through icing level. Experience suggests that drops of moisture on the surface will be blown back, lodge in the control gaps, and there dry comparatively slowly.

This may cause the controls to become stiff to operate, or in extreme cases, jam them. A single climb through icing level with a previously dry aircraft, on the other hand, is not likely to impair the use of the controls even if heavy icing-up of wing and tail unit leading edges occurs.

When carrying water ballast, avoid flying above icing level due to the danger of iced-up outlet valves, or in extreme cases bursting of wings due to ice formation.

4.5.8 Flight in Rain

Rain drops, frost and ice impair the aerodynamic qualities and also alter the flying behaviour. Therefore the quoted minimum speeds for straight and circling flight should, in such conditions, be increased by some 10 km/h = 5,5 kts. Air speeds should not then be allowed to drop below these values.

Rain drops should be removed from a wet aircraft before take-off.

Do not fly into icing conditions with a wet aircraft. In this context, see also para 4.5.7. above.

4.5.9. Aerobatics (only approved <u>without</u> winglets installed)

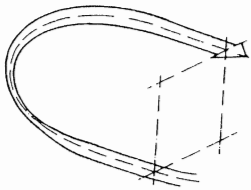
In accordance with JAR-22.3 some simple aerobatic maneuvers may be permitted for the Utility Category, provided they are demonstrated by appropriate substantiation in the course of type approval tests.
As a steady spin is only possible with aft C.G. positions, the spin is not a suitable aerobatic maneuver. This is because with central and forward C.G. positions the ASW 24 cannot be held in a spin.

The following maneuvers have been demonstrated and are approved:

Lazy Eight:

This figure may be flown at entry speeds of 150 km/h = 81 kts and more at the point of intersection. It is, however, easier to fly this maneuver at an entry speed of about 180 km/h = 97 kts, and it will also look better. A woollen thread on the canopy is very useful in avoiding side slipping.

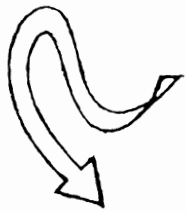
Chandelle (climbing):



Recommended entry speed is V_A = 205 km/h = 110,5 kts (end of the green arc on the ASI scale), but not less than 190 km/h = 102,5 kts. Vertical climb must be reached by ≈ 160 km/h = 86,5 kts. At this speed and in that flight attitude

it becomes necessary to start applying forward pressure on the stick and begin rolling out to get the wings level to avoid the maneouver ending in a stall.

Stall Turn:



For the stall turn the recommended entry speed is also V_A = 205 km/h = 110,5 kts. While pulling up vertically full rudder must be applied at the latest by the time the indicated air speed has reduced to 135 km/h = 73 kts to ensure a clean Stall Turn and not fall into a slipping tail slide.

Steep turns: in a steep turn at 75° bank the minimum speed is 140 km/h = 75,5 kts and an acceleration of 4 g is imposed. It is therefore recommended that steep turns should be carried out with not more than 60 to 70° of bank at about 160 km/h = 86,5 kts to avoid flow detachment at the wing (High Speed Stall).

Loop (positive):

A positive loop may be flown at an entry speed at the lowest point from 180 km/h = 97 kts, but a speed of 200 km/h = 108 kts is recommended.
The required g-load is well below the permissible maximum value of 5.3 g.

Winglets improve the flight performance only for the low speed range but not at very high speeds. They also increase the directional stability. Both qualities are not desirable for aerobatics. Therefore, winglets were not tested and consequently not approved for aerobatics.

8.4 Ground Handling / Road Transport

(1) Parking

Parking of the aircraft in the open can be recommended only if forseeable weather conditions remain suitable. It should be seriously considered whether the secure picketing, covering, and cleaning of the aircraft before the next flight may not demand more effort than de-rigging and re-rigging would have done.

For tying-down the wings, trestles (perhaps from the trailer) should be used which ensure that the ailerons cannot be stressed by the picketing ropes.

NOTE: Parking in the open without protection against weather or light will reduce the life of the surface finish. Even after only a few weeks without intensive care the polyester paint finish can become brittle and develop cracks.

If the aircraft is parked in the hangar for protracted periods, it is recommended to cover only the perspex canopy with a dust cover, as dust covers retain moisture in wet weather for long periods. Moisture can impair the dimensional stability and even the strength of all fiber reinforced composites.
For this reason, protracted periods of parking with water ballast on board are also inadmissible !

For longer parking periods, also inside hangars as well as during road transport of the sailplane, the winglets must be derigged. Because of flutter safety reasons they have to be built extremely lightweight and therefore may be easily damaged during rough ground operation.

When parking, carefully remove any remainders of provisions (chocolate, sweets &c), as experience shows this would attract vermin which could cause damage in and to the aircraft.

(2) Road Transport

Messrs. Alexander Schleicher GmbH can supply dimensioned drawings of the glider which will provide all the measurements needed for building a closed trailer.
We can also supply the names and addresses of reputable trailer manufacturers.

Above all, it is important to ensure that the wings are supported in properly shaped and fitted wing cradles, or at the very least, that the spar ends are securely supported as closely as possible to the root ribs.
Re-inforced points of the fuselage are the main wheel (but remember the suspension springing !), and tail wheel; also possibly the drag spar pins (make up support seatings from plastic material like Nylon!), and the area under the canopy arch.

For an aircraft of this quality and value, an open trailer, even with tarpaulin, cannot be recommended. Only a closed trailer of plastic or metal construction, or with heavy tarpaulin cover, may be considered suitable, which in any case should have light coloured surfaces and be well ventilated also while stationary so as to avoid high internal temperatures or humidity.

Road transport with water ballast on board is not admissible!

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SECTION 1

1.1 Introduction

This Maintenance Manual was produced because the safety and airworthiness of an aircraft depends to a large measure also on the careful maintenance of all its components. Its airworthiness can be assured only if the ASW 24 is maintained and operated in the manner laid down in the Manuals.

1.2 Description of the Sailplane

The ASW 24 is a single-seater mid-wing glider with T-tail unit, retractable sprung landing gear with hydraulic disc brake, and including water ballast system. Automatic connections for elevator, aileron and airbrakes controls have been developped for this design. The double-paddle dive brakes with spring loaded sealing caps extend on the top surface only.

1.2.1 Wings

The 2-part wing is of GRP/SRP hard foam sandwich construction. The I-section spar consists of carbon fiber caps with GRP/hard foam web. The wings are assembled in the fuselage by means of a tongue-and-fork joint and two cylindrical main pins.

If the ASW 24 is equipped with detachable winglets, these are installed by inserting the two steel pins into the wing end rib, and safetied by a DZUS-fastener.

1.2.2 Fuselage

The fuselage shell construction employs hybrid materials technology. The mixture of glass, carbon and aramide fibers provides a light, rigid structure capable of protecting the pilot even in the case of an accident. The additional stiffening provided in the cockpit area further increases pilot safety.
The fin is made up from GRP/SRP hard foam sandwich and (as of s/n 24041) GRP/SRP skin respectively, so as not to impede signal transmission from the VHF radio aerial.

1.2.3 Tail Unit and Aileron

The stabilizer of the horizontal (stabilizer-plus-elevator) T-tail unit is of GRP/SRP/CRP sandwich construction. The elevator is a GRP/SRP skin, the rudder is of GRP/SRP/sandwich construction and the aileron is again a GRP/SRP skin.

SRP = Synthetic fiber Re-inforced Plastics
CRP = Carbon fiber Re-inforced Plastics

1.3 Primary and Secondary Structures

Primary structures include:

- wing spars and root ribs
- wing shells
- fuselage tail boom from wing mounting area to fin
- fin and horizontal stabilizer
- all rigging fittings and control linkage parts

Secondary stuctures are:
- all tail units and control surfaces
- fuselage in the cockpit area
- all doors, airbrakes and fairings.

1.4 Specifications

Wings

Span	15.00 m	(49.22 ft)
Wing area	10.00 m²	(107.64 ft²)
Aspect Ratio		22.50
Dihedral (spar top surface)		3.25°
Sweepback (both inner wing tapers)		0°
(outboard wing taper)		+0.78°
Airfoil section		DU 84-158

Winglet

Height	0.30 m	(11.81 in.)
Area	0.03 m²	(0.33 ft²)
Aspect Ratio		≈2.5
Sweep back (leading edge)		30°
Airfoil section		DU 86-084/18

Fuselage

Length	6.55 m	(21.49 ft)
Height at T-tail incl. tail wheel	1.30 m	(4.27 ft)
Cockpit width (inside)	0.64 m	(2.1 ft)
Cockpit height	0.81 m	(2.66 ft)

Vertical Tail

Height above tail boom top edge	1.20 m	(3.94 ft)
Surface area	0.95 m²	(10.23 ft²)
Airfoil Section		DU 86-131/30

2.9 Jacking Points and Ground Transport

Jacking Points

For wing bending frequency tests, the aircraft must be jacked up so that the main wheel springing should not distort the results.

Jacking points for the wing bending frequency tests are:

1. In front of the tail wheel
2. Front part of fuselage in the region of the lap belt anchoring points, on a support trestle.

The jacking points are also illustrated in Fig. 3.0-1.

The wings may be supported on trestles positioned in the area of the root ribs and at approx. 2/3ds span. The trestles should be padded, or cushioned with foam rubber or similar resilient underlay. When jacking up wings, avoid stress or damage to control surfaces and linkage fairings.
The fuselage may be propped up in the cockpit region by means of suitable supports.

Before inverting the fuselage, remove the canopy. The instrument pod should be either fixed in place or hinged up to its fullest extent.

The elevator actuator must be protected from damage. A wooden block of appropriate height must be laid under the fin-stabilizer attachment area.

When the fuselage is turned back, check the wheel box whether any brake fluid has leaked out from the reservoir via the vent tube, wipe up any spilt fluid and if necessary clean with spirit. Afterwards check the brake fluid level !

Ground Transport

The wings may be supported at the spar stubs, root ribs and wingtips.
If installed, derig the winglets first.

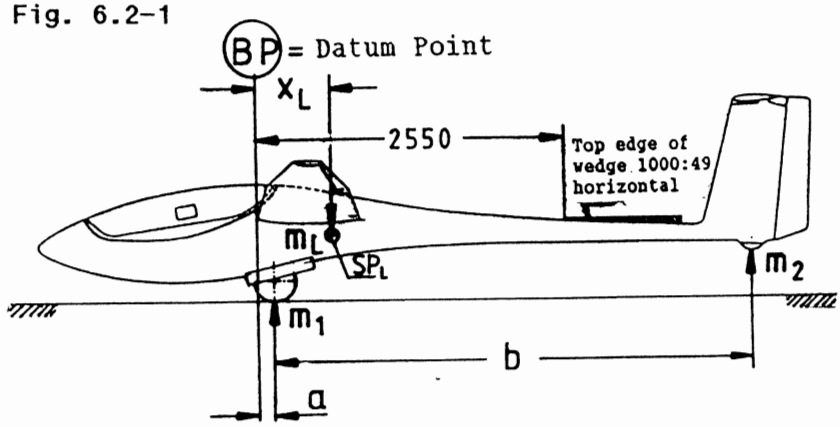
2.10 Tow Release Couplings

The tow release coupling fitted at the C.G. is model TOST "Europa G 73". (Data Sheet No:60.230/2). Model TOST "Europa G 72 or G 88" may be used as a replacement tow release coupling.

The tow release coupling fitted at the fuselage nose is model TOST "E 72" or "E 75" or "E 85". (Data Sheet No:60.230/1).

The replacing of tow release couplings is described in Section 10.4.

Fig. 6.2-1



Formula: $X_L = \frac{m_2 * b}{m_L} + a$ aft of Datum

$m_L = m_1 + m_2$

The sailplane must be prepared for weighing as follows:-

1. Landing gear extended
2. Flight instruments fitted and canopy closed
3. With seat backrest, and seat cushion or equivalent in place
4. Aircraft log book and Flight Manual in place
5. Without fin mounting ballast (battery) if supplied
6. Without removable trim ballast in the front cockpit if supplied
7. Without parachute
8. Without oxygen bottle if supplied
9. Without winglets (if installed) but with the detachable wingtips fitted.

6.3 Weighing Record

The weighing results must be stated in a weighing record which includes a list of equipment fitted at the time, and which must be incorporated in the aircraft service record map.

6.4 Basic Empty Mass and Moment

The empty mass and the empty mass moment can be established by weighing as described under 6.2, or may be taken from the currently valid inspection report.

The maximum and minimum permissible cockpit load in the pilot seat can now be determined by means of the diagram overleaf.

If necessary, the glider must be trimmed with permanently fitted ballast either in the fuselage nose or above the tailwheel so that its empty mass C.G. remains within the permissible range of the following diagram Fig.6.4-1.

7. All controls including the airbrakes must be checked for satisfactory operation, and their deflections measured.

8. If any control linkage does not move freely over the whole range of its movement, investigate and remedy the cause.

9. The condition of the main landing gear and tail wheel including tires (tail skid with its wear plate respectively) and of the brake linings and brake disc must be checked.

10. Examine the pitot and static sources in the fuselage and fin for blockages and leaks.

11. Check condition and proper functioning - and, if appropriate, permitted service life span - of all instruments, and VHF transceiver.

12. The condition and proper functioning of the TOST tow release coupling fitted at the C.G. and the tow release coupling fitted at the fuselage nose should be checked. The release actuating cable must have free movement and some play when the tow release coupling is closed and locked, so that they are not under any tension.

13. The canopy jettison release must be operated and examined for corrosion and burrs etc., if necessary, rectified and in any case freshly lubricated !

14. The water ballast bags and valves must be checked for leaks and proper operation (see Section 2.4).

15. The wing bending frequency should be measured and compared with that shown in the latest inspection report. For this test the fuselage must be rigidly supported in two supports in order to obtain comparable values. For the positions of the supports, see Fig. 3.0-1 !
If installed, the winglets must be exchanged for the wingtips!

16. Compare equipment and instrumentation with that shown in the equipment list.

17. After repairs or changes in equipment fitted, the empty mass and C.G. position should be redetermined by calculation or weighing, and **recorded in the Mass And Balance Form,** in Section 6.2 of the Flight Manual.

18. Check all control surface gaps for correct sealing. It is important that the proper sealing of the gap under the elastic fairing strip is ensured by the Teflon tape. This is especially important at the upper wing surface and the top surface of the horizontal tail. Air flow through the control surface gaps can initiate flutter!

19. The elastic fairing strip at the upper and lower wing surface gaps and at the horizontal tail top surface must have a good, lightly tensioned seating on the surfaces of the controls. Raised strips impair performance. Further notes on para. 18 and 19 will be found in Section 12.6 in Maintenance Instruction A.