


# JS3 RES

## RES Maintenance Manual



JONKER SAILPLANES

	<b>Aircraft Maintenance Manual</b>	Doc. No.: MD11-AMM-00-001
Type: <b>JS-MD Single</b>	Model: <b>JS 3 RES</b>	Issue: 05


<b>Aircraft Maintenance Manual</b>
<b>JS3 RES</b>
MD11-AMM-00-001

**Aircraft Serial No.:** .....

**Registration:** .....

The technical content of this document is approved under the authority of the DOA ref. EASA.21J.603. The airworthiness limitation section is an approved section.

This sailplane is to be maintained in compliance with the information and limitations contained herein.


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	<b>Aircraft Maintenance Manual</b>	Doc. No.: MD11-AMM-00-001
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## GENERAL

This Maintenance Manual has been prepared to provide maintenance personnel with the information for maintaining the JS-MD 3 RES. Data that is required to be furnished to the pilot and maintenance personnel by the Airworthiness Requirement CS-22 is contained in this manual. It also contains supplementary data supplied by the aircraft manufacturer.

This aircraft, with a type designation JS-MD Single (model JS-MD 3 RES) has been approved by the European Aviation Safety Agency (EASA) in accordance with CS-22.


The category of airworthiness is U (Utility).

The marketing name for model JS-MD 3 RES is the JS-3 RES and referred to in this manual as the JS-3 RES.

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## RECORD OF ISSUES

Issue:	Date:	Reason for change:
00	24.06.2021	Initial issue
01	18.05.2022	Installed RES data added
02	13.12.2022	Wingtip information for tips with and without lead added Maximum mass of Flap 4 in 18m configuration increased to 0.168 kg
03	23.04.2025	Scheduled maintenance time limits adjusted Pre-landing checks and recommended approach speeds added to placard booklet Oxygen bottle specifications updated Lubrication intervals updated
04	02.02.2026	RES Reactivation

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## SERVICE BULLETINS

This section starts with an overview table of all optional Service Bulletins (SB), in which the owner or operator should mark which SB's he voluntary implemented and which not.

All implemented optional SB's have to be printed and added to this section by the owner or operator. Not implemented SB's do not need to be added to this section.

SB no:	Rev:	Date:	Description:	SB implemented	
				Yes	No

## SERVICE BULLETINS



## Aircraft Maintenance Manual

Doc. No.: MD11-AMM-00-001


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Model: **JS 3 RES**

Issue: 05



### RECORD OF AMENDMENTS

Date of issue/revision:	Date of inspection:	Signature:

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02-00-00	0	17-Mar-26	6	Issue 05
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04-00-00	0	17-Mar-26	4	Issue 05
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35-00-00	0	17-Mar-26	6	Issue 05
39-00-00	0	17-Mar-26	16	Issue 05
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57-00-00	0	17-Mar-26	14	Issue 05
92-00-00	0	17-Mar-26	16	Issue 05
99-00-00	0	17-Mar-26	6	Issue 05

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# **CHAPTER 01 - 00 - 00**

## **INTRODUCTION**

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## 01-00-00 INTRODUCTION

### General

This Aircraft Maintenance Manual (AMM) has been prepared to provide maintenance personnel with the information for maintaining the JS-3 RES. The manual contains sufficient information in all manner of maintenance procedures and inspection. It also contains supplementary data supplied by the aircraft manufacturer.

The category of airworthiness is U (Utility).

The following manuals and documents must be used with the AMM:

1. The JS-MD 3 RES Aircraft Flight Manual
2. Any applicable Service Bulletins
3. Any applicable Technical Notes
4. Any external instrumentation or equipment not supplied by JS-MD.

### Technical information and spares from the manufacturer

Parts installed in the certified aircraft must comply with the conditions set out in 21.A.307.

The following parts must be accompanied by an EASA Form 1 issued by the manufacturer:

- Life-limited parts
- Primary structure parts (wings, fuselage, spars, etc.)
- Control system parts (including flight control surfaces)


Parts and appliances not requiring an EASA Form 1 can be installed in an aircraft whose owner has accepted responsibility for this compliance and verified the parts or appliances are:

- not life limited, nor part of the primary structure, nor part of the flight controls;
- identified for installation in the specific aircraft;

Parts and appliances not requiring an EASA Form 1, must be accompanied by a document issued by the person or organisation that manufactured the part or appliance, which declares:

- the name of the part or appliance,
- the part number,
- the conformity of the part or appliance with its design data, and which contains the issuance date

When technical information or spares are required from the manufacturer, it is important to include the serial number of the aircraft as provided on the manufacturer's data plate located in the left rear side of the cockpit.

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## Revision service

Any revision of the present manual, except actual weighing data, must be recorded in the List of Effective Chapters (LOEC) / Record of Issues (RoI) tables and in case of approved Sections endorsed by the Agency.

The new or amended text in the revised chapter will be indicated by yellow markings, and the Revision No. and the date will be shown on the bottom of the page.

## Warnings, cautions and notes

The AMM may include warnings, notes or areas in which more caution needs to be used.

**WARNING:** An operating procedure, inspection, repair or maintenance practice, which if not correctly followed, could result in personal injury, or loss in life.

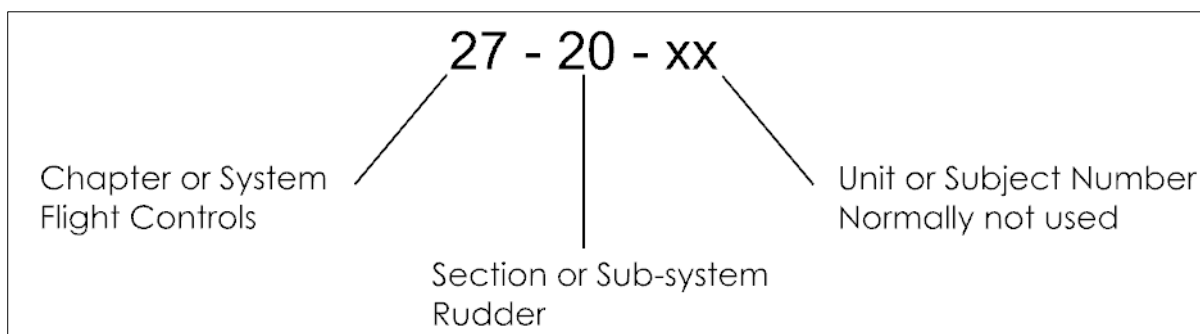
**CAUTION:** An operating procedure, inspection, repair or maintenance practice, which if not strictly observed, could result in damage or destruction of equipment.

**NOTE:** An operating procedure, inspection, repair or maintenance condition, etc., which is deemed essential to highlight.

## Manual configuration

The chapter organisation of the AMM follows the ATA iSpec2200 numbering system. Each system of the aircraft is given a chapter number. This system uses 3 pairs of numbers and the layout will be referred to as CH–SE–SU.

An example of the chapter number is as follows:




**Figure 1-1: Manual chapter numbering system**

The first group represents the aircraft system. System 27 is the Flight Controls of the aircraft. Data, descriptions and maintenance procedures required can be found there.

The second group represents the section or subsystem. Sub-system 20 is the rudder of the aircraft. Any maintenance procedures or descriptions of the rudder can be found there.

The third group represents a specific units or subject numbers. This is not used in the AMM because only complex systems would make use of the numbers.

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For ease of navigation, the chapters in this AMM have been grouped as follows:

1. Group A Introduction Chapters 01-02
2. Group B Aircraft General Chapters 03-12
3. Group C Airframe Systems Chapters 20-41
4. Group D Structure Chapters 51-57

## Page numbering system

The page numbering system of the AMM follows that of the ATA iSpec2200 page block–numbering system. The page number can be found on the bottom right of the page.

The page numbers are broken up into the various chapters and follow sequentially from the beginning until the end of the chapter.

## Figures

Figures include the chapter number and follow sequentially from the beginning until the end of the chapter.

## Tables

Tables include the chapter number and follow sequentially from the beginning until the end of the chapter.

## Record of Issues


The Record of Issues (RoI) shows when a new issue of the AMM was published. This will contain information such as the number of the issue, the date of the issue and the reason for the change.

## List of Effective Chapters

All changes to the content of the AMM must be tracked in revisions of the respective chapters. The List of Effective Chapters shows all the chapters that are applicable in the AMM as well as their latest revision number, date of issue and a reference detailing the change.


## Service Bulletins

Service Bulletins are issued when additional information or instructions are required for inspections or modifications to the aircraft.

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## Abbreviations

Any time an abbreviation is used for the first time, the complete word will first be used, and the abbreviation will follow in parenthesis e.g. (Aircraft Maintenance Manual (AMM)).

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# CHAPTER 02 - 00 - 00

## ORGANIZATION OF HANDLING OF THE MANUAL

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## 02-00-00 ORGANIZATION OF HANDLING OF THE MANUAL

### General

The AMM contains information and maintenance practices on all the systems in the JS-3 RES. Information can be found under each specific chapter.

### Revisions

When an update to a procedure or design is made, a revision of the chapters will be implemented in the AMM. In case of extensive changes, a new issue of the whole manual will be issued. The updated manual / chapters will be available as soon as the revision has been approved and accepted. Revisions can then be found in the ROI / LOEC tables.


### Service bulletins

Service Bulletins will be issued to any operational aircraft. The Service Bulletin will include the serial numbers of the applicable aircrafts and reference to a technical note that will further explain the procedure. SB's are mandatory for the applicable aircrafts.

The technical notes will contain procedures that may include inspections, maintenance, modifications or repairs.

### SI to imperial conversion table


	Metric		Conversion factor	Imperial	
	Variable (x)	Unit		Variable (Y)	Unit
Distance	Meter	m	x*3.28084	Foot	ft
	Millimetre	mm	x*0.03937	Inches	in
Speed	Kilometres per hour	km/h	x*0.53996	Knots	kts
	Meters per second	m/s	x*196.850394	Feet per minute	fpm
	Revolutions per minute	RPM	1	Revolutions per minute	RPM
Pressure	Bar	bar	x*14.50378	Pounds per square inch	psi
	Hectopascal	hPa	x*0.02953	Inch of Mercury	InHg
	Pounds per square inch	psi	x*2.03602	Inch of Mercury	InHg
Force	Newton	N	x*0.22481	Pounds	lbs
	Decanewton	daN	x*2.24809	Pounds	lbs
Weight	Kilogram	kg	x*2.20462	Pounds	lbs
Volume	Litre	l	x*0.26417	US liquid gallon	US gal
Torque	Newton meter	Nm	x*0.73756	Pound foot	lbf-ft
Temperature	Degree Celsius	°C	XX*1.8+32	Degree Fahrenheit	°F

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## Abbreviations



Common abbreviations used in the AMM are listed below:

AFM	-	Aircraft Flight Manual
AMM	-	Aircraft Maintenance Manual
AMO	-	Aircraft Maintenance Organisation
ASI	-	Airspeed Indicator
CFRP	-	Carbon Fibre Reinforced Plastics
CG	-	Centre of gravity
DC	-	Direct current
EASA	-	European Aviation Safety Authority
GFRP	-	Glass Fibre Reinforced Plastics
IGC	-	International Gliding Commission
LE	-	Leading Edge
MPC	-	Distance from hinge line to measuring point
NAA	-	National Aviation Authority
OEM	-	Original Equipment Manufacturer
RCIF	-	Rudder Control Interface Switches
RoI	-	Record of Issues
SB	-	Service Bulletin
SWR	-	Standing Wave Ratio
TC	-	Type Certificate
TCDS	-	Type Certificate Data Sheet
TE	-	Trailing Edge
T <sub>G</sub>	-	Glass transition temperature of resin system
TN	-	Technical Note
WBF	-	Wing beat frequency

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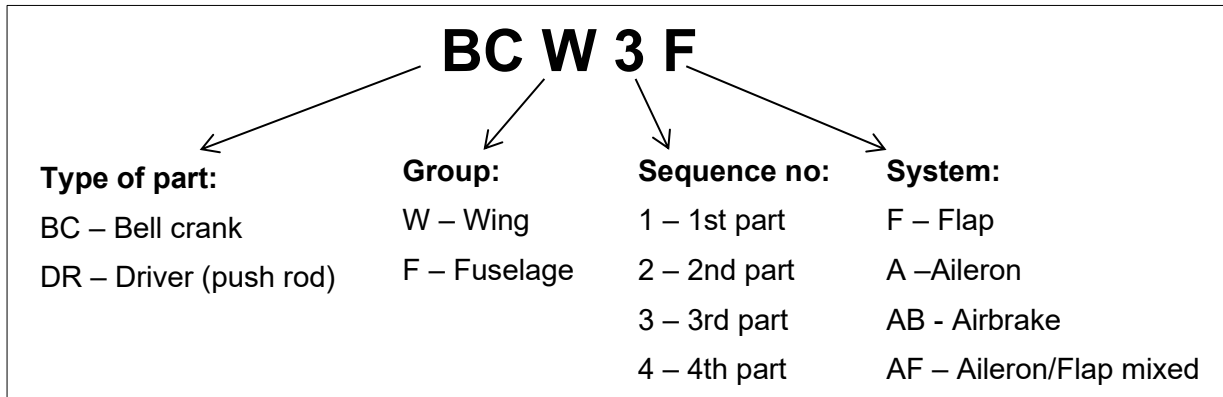
## Maintenance terminology used

Term	Description
Adjust	Correct or set to a specified position or condition, for example, adjust the control deflection.
Check	A technical name for a group of maintenance tasks, for example, the 100-hour check.
Examine	To look carefully at an item/part to ensure: <ul style="list-style-type: none"> <li>- The item/part is complete</li> <li>- Attachment is correct</li> <li>- No loose parts</li> <li>- No evidence of leaks</li> <li>- Not cracked or damaged</li> <li>- Not worn</li> <li>- Looks serviceable</li> <li>- No interference with other parts</li> </ul> For logbooks and other technical records: <ul style="list-style-type: none"> <li>- To find outstanding faults</li> <li>- To make sure they are up-to-date and correctly maintained</li> </ul>
Inspect	The procedure to compare an object with its standard or specification.
Monitor	To observe a parameter or condition for a certain time. For example, monitor the engine temperature.
Measure	Determine dimensions, capacity or quantity of an object.
Record	Note what actions were performed. For example, write the result of the test in the engine record.
Replace	To remove an unserviceable item and install a serviceable item in the same location.
Set	To put equipment into a given adjustment, condition or mode.
Test	Operations required to examine an item to make sure it adheres to the applicable specifications. For example: do an engine test.

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## Acronyms used in control system parts


Various acronyms are used for pushrods and bell cranks within in the control system. An example of the parts is as follows:



**Figure 2-1: Control system part numbering**


### Example

DRF2AB is a pushrod in the fuselage, the 2<sup>nd</sup> driver in the airbrake system (counted from the control stick).

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# **CHAPTER 03 - 00 - 00**

## **GENERAL DESCRIPTION OF THE AIRCRAFT**

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## 03-00-00 GENERAL DESCRIPTION OF THE AIRCRAFT

### General

The JS-3 RES is a high-performance single seat aircraft configured for 15 m or 18 m wingspans with full-span flaperons.

### Description

The cockpit is designed to protect the pilot in the event of a crash. Safety features include a crumple zone in the forward structure. The wing structure consists of spar caps made of carbon fibre rovings and skins of carbon fibre fabric. The wings are connected with a tongue and fork arrangement, secured with one main pin. The airbrakes are a triple blade design on the upper surface of the wing.

Boundary layer control is achieved on the main wing bottom surfaces, the horizontal stabilizer and the vertical fin. Control surface hinge gaps are sealed with Mylar strips and Teflon-coated tape.

The landing gear consists of a 5-inch retractable sprung main landing gear with a pneumatic retractable tail wheel. Two fixed wheel options are also available.

Controls are automatically connected during rigging.

A retractable electrical driven propulsion system (RES) approved for self launch or sustained flight can be fitted as an option.


### Fuselage

The fuselage shell is manufactured from 3 different fibres. The main load bearing structure is carbon fibre with carbon/ aramid hybrid in the cockpit area. The fuselage uses a single shell structure without any sandwich. The cockpit is designed to have a soft nose with a progressive increase in the structural strength to allow maximum energy absorption in a crash situation.

The fin and rudder are made from a glass/aramid fibre hybrid sandwich structure to prevent interference with the radio antenna.

The tail ballast tanks consist of an expendable tank of approximately 5.8 litres and non-expendable tanks with a combined capacity of approximately 8.9 litres.

The landing gear consists of a 5-inch retractable sprung main landing gear with a fixed or retractable, non-steering 150x30 tail wheel. A 200x50 fixed wheel may be fitted as an option.

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## Wings

The wings are manufactured from a GFRP/CFRP hard foam sandwich structure. The main spar is an I-section with flanges of carbon rovings built into the upper and lower wing skins. The wings are attached to the fuselage by means of two steel lifting pins per wing. The outer 1.5 m of the 15 m wingspan, and 3 m of the 18 m wingspan, of each wing is removable with the winglets fixed on the outer panel.

The wings are attached to each other with a tong and fork arrangement, secured with one main pin. The airbrakes are a triple blade design on the upper surface of the wing.

The main water ballast system consists of integral main tanks in the wing, each holding approximately 66 litres of water. The 18 m tip tanks each holds approximately 17 litres of water.

The flaps and ailerons consist of a pure CRP shell structure without any foam.

## Horizontal stabilizer (tailplane)

The horizontal tail surface comprises of a GFRP/CFRP hard foam sandwich construction with the elevators of an aramid fibre foam sandwich structure.


## Vertical stabilizer (fin)

The fin is manufactured from a GFRP/Aramid with hard foam sandwich structure. The rudder is constructed from an aramid fibre foam sandwich structure.

The tail ballast tanks consist of an expendable tank of approximately 5.8 litres and a non-expendable tank of approximately 8.9 litres.


## Equipment data

Table 3-1 gives the list of maintenance documents for parts, components and accessories approved independently of the aircraft.


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**Table 3-1: Equipment data**

<b>Equipment description:</b>	<b>Document description:</b>
Winter Airspeed indicators	Installation and maintenance instructions for pilot airspeed indicators
Winter Altimeters	Installation and maintenance instructions for altimeters 4FGH20, 4FGH40
TOST G88 (60.230/2)	Operating manual for Tow Release Series: Europa G88 Safety Release
TOST E22 (11.402/9 NTS)	Operating manual for Tow Release Series: Tow release E22
Wheel hub - Beringer JA-01	Wheel and Brake Assemblies Catalog - Beringer Aero
Hydraulic Disk brake - Beringer HAB02	Wheel and Brake Assemblies Catalog - Beringer Aero
Gadringer BAGU 5202, SCHUGU 2700	Gadringer-Gurte Instructions Manual

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# **CHAPTER 04 - 00 - 00**


## **AIRWORTHINESS**

### **LIMITATIONS**

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## 04-00-00 AIRWORTHINESS LIMITATIONS

### General

This aircraft, with production designation (type) JS-MD single (model JS-MD 3 RES with marketing name JS-3 RES) has been approved by the European Aviation Safety Agency (EASA) in accordance with CS-22 including Amendment AMC 22.1555 (a), AMC 22.1585 (f).

The category of airworthiness is U (Utility).

Limitations in the AMM must be obeyed by all personnel.


### Airframe time limitations

The airframe has an initial time limitation of 3000 hours. The service life can be extended to a maximum of 12000 hours of flight, following the procedures provided in CHAPTER 05 - 00 - 00


TIME LIMITS AND MAINTENANCE CHECKS.

### Life limited components

The replacement time of life limited equipment is listed in CHAPTER 05 - 00 - 00 TIME LIMITS AND MAINTENANCE CHECKS. Listed equipment must be serviced / replaced not later than the specified period of operation for that component or in accordance with the manufacturer's service data or airworthiness directives.



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# CHAPTER 05 - 00 - 00

## TIME LIMITS AND MAINTENANCE CHECKS

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## 05-00-00 TIME LIMITS AND MAINTENANCE CHECKS

### General

Fatigue tests on composite materials, including wing sections, show that composite materials are less sensitive to fatigue problems than other materials. In this light, it may be possible to increase the service life of the airframe to 12000 hours, provided that the continuous airworthiness is demonstrated according to the following inspection program.

To ensure optimum performance and life expectancy of the aircraft all the instructions in this chapter must be followed.

Time between maintenance check can be reduced if the operation of the aircraft makes it necessary but the time limits may not be extended.

The aircraft should be subjected to an annual airworthiness inspection:


1. Airworthiness inspections must be performed in accordance with the relevant laws of the NAA (National Aviation Authority refers to the country in which the aircraft is registered)
2. The manufacturer recommends performing a daily inspection, pre-flight check and cockpit checks as specified in this section. (May be performed by the pilot.)
3. The manufacturer recommends performing additional inspections in certain circumstances (such as hard landings or ground loops) as explained in this section
4. Other inspections, maintenance or modifications to the aircraft, components or systems may be classified as "Mandatory" or "Recommended" according to issued Airworthiness Directives and Service Bulletins.
5. Personnel performing inspections and maintenance must be properly qualified in accordance with the relevant laws of the country in which the aircraft is registered

Chapter 05-10-00 TIME LIMITS contains more information on the time limits of the aircraft.

Chapter 05-20-00 SCHEDULED MAINTENANCE CHECKS contains checks and checklists that need to be done on each specific time interval.

Chapter 05-30-00 FLIGHT LINE CHECKS contains important checks that need to be done to ensure pilot safety.

Chapter 05-50-00 UNSCHEDULED MAINTENANCE CHECKS contains important checks that need to be done after abnormal incidents.

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## 05-10-00 TIME LIMITS

### General

Scheduled maintenance time limits listed in this chapter must be done within the required time. This will ensure the aircraft performs optimally and ensures pilot safety.

### Scheduled maintenance time limits

#### 3000 hour inspection

When the aircraft has reached a service time of 3000 hours, an inspection must be done in accordance with the inspection program provided by the manufacturer.

If the aircraft passes the inspection or if any defects found have been duly repaired, the service life is extended to a total of 6000 hours.

#### 6000 hour inspection

When the aircraft has reached a service time of 6000 hours, the mandatory inspection in accordance with the inspection program is repeated.

If the aircraft passes the inspection or if any defects found have been duly repaired, the service life is extended to a total of 9000 hours.


#### 9000 hours to 12000 hours inspection

When the aircraft has reached a service time of 9000 hours, an inspection must be done in accordance with the inspection program provided by the manufacturer.

If the aircraft passes the inspection or if any defects found have been duly repaired, the service life is extended with another 1000 hours. A mandatory inspection is required after the completion of each subsequent 1000 hours.

The inspection procedure is provided by the manufacturer. The inspection must be completed by an approved aircraft maintenance organization.

The results of the inspections must be recorded on the inspection test report provided by the TC holder. This report must be forwarded to the TC holder for evaluation and approval of the lifetime extension.

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## 05-20-00 SCHEDULED MAINTENANCE CHECKS

### General


Persons authorized by the NAA may perform any maintenance on the aircraft unless it is specified that the operator may perform maintenance tasks.

### Maintenance Checklist

Who may perform the maintenance	Maintenance interval				
AMO/AP	3000 hrs, 6000 hrs, 9000 hrs, 10000 hrs, 11000 hrs				
AMO/AP	Every 2000 launches				
AMO/AP	Every 12 years				
AMO/AP	Every 5 years				
AMO/AP	Annual inspection				
PILOT	During rigging				

Maintenance requirements					
Perform annual inspection program using JS annual inspection checklist		X			
Lubricate items according to lubrication plan in 12-20-00	X	X	X		
Replenish brake fluid to maximum level		X			
Replace water torque tube seal.				X	
Check for wear and cracks on all control stops (aileron, elevator & rudder)			X		
Weight and balance—reweigh aircraft when required by NAA.			X		
Inspect tail valve diaphragm—replace if worn.				X	
Replace landing gear shock elements (or when damaged).				X	
Replace or maintain seat belt straps according to OEM.				X	
Replace release hook cables.					X
Service TOST™ belly and nose release hooks according to OEM.					X
Perform lifetime extension program.					X

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## Annual inspection

A mandatory annual inspection is required for the issue of the Certificate of Airworthiness.


**NOTE:** Some regulating authorities require a one year or 100 hour-interval inspection.

## General inspection guidelines


1. Inspect all bolted connections and locking devices i.e. locknuts, split pins etc.
2. Inspect all metal parts for adequate greasing and rust prevention.
3. Inspect for signs of damage.
4. Use the inspection checklist provided to perform the annual inspection.

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<b>JS-3 RES ANNUAL INSPECTION CHECKLIST</b>	<b>SIGN</b> action completed	<b>SIGN</b> checked
<b>Fuselage structure – External</b>		
Inspect external surface, gel coat, and paintwork.		
Check for skin damage, delamination/bond failures between skin and bulkheads and on the split lines.		
Check that the water drain orifices are clear behind the landing gear box and in front of tail wheel.		
Inspect nose area for evidence of damage caused by impact with the ground.		
<b>Fuselage / Wing attachment point</b>		
Inspect the lift bushes on fuselage for damage and/or corrosion—clean & lubricate.		
Inspect main pins for damage or cracks. Clean and lubricate bushes.		
Check operation and condition of main pin locks.		
<b>Main wheel</b>		
Check security of main axle.		
Examine condition of tyre—adjust pressure if required.		
Check that wheel rotates freely—clean/replace main bearings if required.		
Examine slip mark position.		
<b>Wheel brake assembly</b>		
Examine for integrity of hydraulic seals and leaks in brake system.		
Examine condition/security of hydraulic hoses (clear of controls and main wheel).		
Examine brake assemblies and security.		
Examine disc brake linings thickness and condition of brake disc.		
Examine operation of brake.		
Examine level of brake fluid and replenish to maximum level.		
<b>Undercarriage suspension</b>		
Check attachments, shock absorbers condition and locking of shock arms.		
Check smooth operation of landing gear shock absorber— lubricate slide tube if required.		
Check that shock absorber extends fully when landing gear is unloaded.		
<b>Undercarriage retraction system</b>		
Visually inspect the retraction mechanism and ensure positive lock in down position.		
Inspect landing gear handle assembly and lock spring.		
Check that handle slides smoothly on linear rail. Check that fasteners connecting the linear rail to fuselage structure are secured.		
Inspect connection between handle and driver rods and bell cranks.		
Check that pivot bolts and attachments are secured.		
Check that locking over-centre is set up correctly with no play in locked position, and rear legs lock simultaneously.		
Test landing gear warning system if installed.		

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<b>JS-3 RES ANNUAL INSPECTION CHECKLIST</b>	<b>SIGN</b> action completed	<b>SIGN</b> checked
<b>Wheel doors</b>		
Check that wheel door hinges are secured both sides, and hinges not damaged, and doors open/close fully.		
Inspect spring / tube attachment.		
Check for damage to doors (delamination, impact damage).		
Check that door seals are serviceable (if fitted).		
<b>Tail wheel</b>		
Inspect for evidence of damaged caused by hard landings or by rough surfaces.		
Remove wheel and clean mudguard if necessary.		
Check condition of bearings and replace if necessary.		
Inspect wheel, tyre and ensure tyre pressure is 2.5 Bar.		
Check that axle is secured and wheel rotates freely.		
Check that two retraction bolts (Front-Arm and Bellcrank1 M8 bolts) are secured (side of bottom fin structure)		
Inspect tail wheel cable for corrosion. Lubricate iaw lubrication instructions in 12-20-00.		
Check retract / extend operation.		
<b>Release hooks</b>		
Inspect nose and CG release hooks and controls.		
Check cable and fitting condition below seat pan.		
Check condition of release cable where entering cable housing.		
Check operation of both nose and belly (if fitted) release hooks.		
<b>Control stick</b>		
Inspect stick assembly and security of bottom pivot bolts.		
Check for free movement.		
Check that grip is fitted correctly, not fouling with trim trigger (if fitted).		
Inspect security of connections between various control rods and bell cranks from control stick to elevator and aileron pushrods.		
Check that control stops are contacting and secure.		
<b>Elevator control circuit &amp; stops</b>		
Inspect security of connections from control stick to elevator auto coupler.		
Check elevator auto-coupler for damage/cracks.		
Check security of elevator auto coupler hinge pin.		
<b>Trimmer control circuit</b>		
Inspect trimmer assembly and release/lock mechanism.		
Check that indicator/knob moves smoothly when trim is triggered.		
Check that trim lock holds with max elevator input in all trim positions (push down force approximately 3N)		

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<b>JS-3 RES ANNUAL INSPECTION CHECKLIST</b>	SIGN action completed	SIGN checked
<b>Aileron control circuit</b>		
Inspect security of connections between various control rods and bell cranks from control stick to flaperon mixer.		
<b>Flap / air brake handle assembly</b>		
Inspect flap and airbrake handle assembly and lock spring.		
Check that linear rails fastened to U-shape bracket has no play. Check that U-bracket is secured to fuselage.		
Check operation and positive lock in all settings. Inspect wear on flap lock block. Repair lock blocks if wear exceeds 2mm.		
Check condition of flap and airbrake labels.		
<b>Flap control circuit</b>		
Inspect security of connections between flap control rod and flaperon mixer.		
Inspect flaperon mixer mechanism.		
Inspect flaperon auto-coupler - secured to bracket (L&R).		
<b>Air brake control circuit</b>		
Inspect security of connections between airbrake control handle and airbrake auto-coupler		
Inspect operation of air brake damper		
<b>Auto connectors–fuselage side</b>		
Inspect the flaperon auto-couplers - secured to bracket (L&R)		
Inspect the airbrake auto-couplers - secured to bracket (L&R)		
<b>Rudder, rudder pedal assemblies, control circuits and stops</b>		
Inspect rudder pedal assemblies and adjusters		
Check that rudder pedals operate freely in all positions and stay in lock under load		
Check rudder position with pedals neutral		
Inspect condition of rudder control cables and sleeves at pedals and rudder control horns		
Check wear and security of liners and cables in “S” tubes, by adjusting pedals to the extreme settings. Pay special attention to the cable near the S-tube exits.		
Check rudder assembly, hinges, and attachments. Deflect rudder full left and perform a visual inspection on the rudder bottom hinge for corrosion.		
Verify that control stops are making contact. Check for wear and cracks on control stops every 5 years.		
Inspect rudder control horn assembly - check security of pushrod to control horn and that the hinge bolt is locked. Check for corrosion and ensure parts are lubricated.		
Check tabulator tape on fin and Mylar seals condition.		
<b>Water ballast system (fuselage)</b>		
Check water system linkages and connections to torque tube in centre section.		
Check filling points for both tail tanks and both vents on side of the fin are unobstructed.		
Check and clean dump holes of non-expendable tail tank.		

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<b>JS-3 RES ANNUAL INSPECTION CHECKLIST</b>	SIGN action completed	SIGN checked
Inspect tail valve cable for corrosion. Lubricate with grease.		
<b>Bug wiper system (if installed)</b>		
Check the operation of the bug wiper winding system. Ensure that the wipers are set to wipe no closer than 500 mm from the winglet.		
Check that both wipers seat correctly in their garages when retrieved.		
Check the condition of the wiping cable and retrieve cable.		
Check that the stabilizing leg of the wiper opens between 70° and 90°.		
<b>Ventilator</b>		
Check operation of ventilator in right side channel.		
Check operation of demisting vent.		
<b>Canopy, locks, jettison</b>		
Inspect canopy, frame and transparencies for cracks, unacceptable distortion and discoloration.		
Check operation of all locks and catches.		
Carry out an operational test of the canopy jettison system.		
Clean and lubricate lock and jettison parts.		
<b>Electrical installation/ fuses/ trips and batteries</b>		
Check all electrical wiring conditions (signs of overheating and poor connections).		
Check fuses/trips for condition and correct rating.		
Check battery mountings for security and operation of clamp.		
Check for evidence of damage caused by batteries (electrolyte spillage & corrosion).		
Check that each battery has the correct main fuse fitted.		
<b>Instrument panel assemblies, instrument/avionics and placards</b>		
Inspect instrument panel and all instruments/equipment installation.		
Check marking of all switches, circuit breakers and fuses.		
Check operation of installed equipment in accordance with manufacturer's instructions.		
Check operation of pushbuttons or controls on stick.		
Check that aircraft call sign placard is positioned near the radio.		
Check placards and/or Placard Booklet are legible and correctly positioned.		
Check manufacturer's data plates and NAA registration number plate (if required).		
<b>Pitot-static and instruments</b>		
Inspect pitot-static and total energy probes and ports, all tubing (as accessible) for security, damage, cleanliness, and condition.		
Check that static pressure ports at fuselage boom are unobstructed.		
Check that total energy multi-probe receptacle is clear.		
Lubricated the total energy multi-probe O-ring according to the manufacturer's recommendations.		

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<b>JS-3 RES ANNUAL INSPECTION CHECKLIST</b>	<b>SIGN</b> action completed	<b>SIGN</b> checked
Check that airspeed indicator is marked according to JS-MD 3 RES Aircraft Flight Manual.		
Check altimeter barometric sub scale (max. error according to NAA requirements).		
Perform pitot-static check if required by NAA regulations.		
<b>Seat / Cockpit floor</b>		
Check under cockpit floor/seat pan and in rear fuselage for debris and foreign items.		
Inspect seat and seat back for damage.		
Ensure that all seat adjusters fit and lock correctly. Lubricate seat back slide tube.		
Check that all loose cushions are correctly installed and as appropriate, energy absorbing foam cushions are fitted correctly.		
Check that stick boot is secured properly and no foreign objects inside stick area.		
<b>Cockpit general</b>		
Removable ballast: Check mountings and securing devices for condition, if fitted.		
Controls are colour coded: Check condition and correctness, as follows: Tow release: Yellow; Airbrakes: Blue; Trimmer: Green; Canopy normal operation: White; Canopy jettison: Red		
Oxygen: Inspect bottle security. If fitted, check bottle test date expiry in accordance with manufacturer's recommendations.		
Harnesses: Inspect all harnesses for condition and wear of all fastenings, webbing and fittings. Check operation.		
<b>Tail plane and elevator</b>		
Check for evidence of damage to the surface finish or structural damage, pressure marks and cracks.		
With tail plane de-rigged, check tail plane structure, elevator attachments and self-connecting control connections.		
<b>Left wing structure</b>		
Inspect main pins and lift pins.		
Check for damage around main bushes in tongue members.		
Check main plane structure externally.		
Check gel coat (or painted surface) for surface cracks or deformations.		
<b>Left wing tip junction</b>		
Check wing junction pins and bushes for cracks, rust. Lubricate pins and bushes.		
Check junction lock mechanism.		
<b>Left wing flight controls</b>		
Inspect self-connecting control devices on wing side.		
Inspect flaperons for cracks and TE splitting.		
Inspect control horn bolts - tight and play within limits.		
Inspect Driver plates between flap 2-3 and 3-4 - tight without cracks and play in limits.		

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<b>JS-3 RES ANNUAL INSPECTION CHECKLIST</b>	<b>SIGN</b> action completed	<b>SIGN</b> checked
Check that control horn fairings are secured and not interfering with flaperon controls.		
Inspect bow holes and NACA ducts. Clean if required.		
Inspect tapes and seals and turbulator tape in front of NACA ducts.		
Check that seals do not impair full range of movement.		
<b>Left wing airbrake</b>		
Inspect air brake panel operating rods, and closure springs.		
Check that all blade attachments are locked, operate freely and the clearances between blades are sufficient.		
Check the airbrakes for functioning and locking. (Over-centre action requires maximum 20daN locking force at wing root bell crank)		
Check for corrosion and lubricate as required.		
Remove any water and foreign objects in the airbrake boxes.		
<b>Right wing structure</b>		
Inspect main pins and lift pins.		
Check for damage around main bushes in fork members.		
Check main plane structure externally.		
Check gel coat (or painted surface) for surface cracks or deformations.		
<b>Right wing tip junction</b>		
Check wing junction pins and bushes for cracks, rust. Lubricate pins and bushes.		
Check junction lock mechanism.		
<b>Right wing flight controls</b>		
Inspect self-connecting control devices on wing side.		
Inspect flaperons for cracks and TE splitting.		
Inspect control horn bolts - tight and play within limits.		
Inspect Driver plates between flap 2-3 and 3-4 - tight without cracks and play in limits.		
Check that control horn fairings are secured and not interfering with flaperon controls.		
Inspect bow holes and NACA ducts. Clean if required.		
Inspect tapes and seals and turbulator tape in front of NACA ducts.		
Check that seals do not impair full range of movement.		
<b>Right wing airbrake</b>		
Inspect airbrake panel operating rods, and closure springs.		
Check that all blade attachments are locked, operate freely and the clearances between blades are sufficient.		
Check the airbrakes for functioning and locking. (Over-centre action requires maximum 20 daN locking force at wing root bell crank)		
Check for corrosion and lubricate as required.		
Remove any water and foreign objects in the airbrake boxes.		

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<b>JS-3 RES ANNUAL INSPECTION CHECKLIST</b>	<b>SIGN</b> action completed	<b>SIGN</b> checked
<b>Assembled inspection</b>		
Determine wing beat frequency by counting oscillations per minute. Note WBF:		
Check range and free play of control surfaces and record on the Control Surface Deflection Record Sheet (only if control system was disturbed in any manner).		
Check that wing tip wheels or skids are in good condition – minimum clearance between the flap in (max down deflection) and trailing edge is 10 mm.		
Check the fore and aft play of the wings and wing tip.		
Check water filling caps of main tanks and that vents are unobstructed.		
Check operation of main tanks. Add approx. 500ml in tail tank check operation.		
Check that the registration marks are correctly applied as per NAA.		
Carry out a system check flight and operationally check all systems if ground inspections are insufficient.		

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Flaperon deflections with ailerons neutral and flaps in different positions									
Flap setting	Aileron input	Deflection (°)	Distance at root fillet	Tolerance	Measured distance at root fillet				
					Left	Right			
1	Neutral	- 3°	- 12.5 mm	± 2 mm					
2	Neutral	+ 0°	- 7 mm						
3	Neutral	+ 5°	+ 2.5 mm						
4	Neutral	+ 13.5°	+ 17.5 mm	± 3 mm					
5	Neutral	+ 16.6°	+ 23.5 mm						
L	Neutral	+ 20°	+ 29.5 mm						
Flaperon deflections with the flaps in position 2									
Flap setting	Aileron input	Left flaperon				Right flaperon			
		Deflection (°)	Distance at root fillet			Deflection (°)	Distance at root fillet		
			Spec.	Tolerance	Measure		Spec.	Tolerance	Measure
2	Full left	- 14°	- 33 mm	± 3 mm		+ 11°	+ 13 mm	± 3 mm	
2	Full right	+ 11°	+ 13 mm	± 3 mm		- 14°	- 33 mm	± 3 mm	
JS-3 RES Elevator deflections									
Elevator position	Deflection (°)	MPC	Distance at tip	Tolerance	Measurement at tip				
Full up	+ 20°	45 mm	+15.6 mm	± 2 mm					
Neutral	0°		0 mm	± 0 mm					
Full down	- 20°		- 15.6 mm	± 2 mm					
JS-3 RES Elevator trim position									
Trim position	Elevator Position	Tolerance	Measurement at tip	Trim position	Elevator dist. at tip	Tolerance	Measurement at tip		
Full Forward	- 12 mm	± 3 mm		Full aft	+5 mm	± 1 mm			
JS-3 RES Rudder deflection									
Rudder position	Deflection (°)	MPC	Distance at trailing edge	Tolerance	Measurement at trailing edge				
Full left	- 30° ±2°	262 mm	-130 mm	± 9 mm					
Neutral	0°		0 mm	± 0 mm					
Full right	+ 30°±2°		+130 mm	± 9 mm					
Airbrake deflection (Distance measured from wing surface to cap)									
Airbrake input	Left airbrake				Right airbrake				
	Spec.	Tolerance	Measure	Spec.	Tolerance	Measure			
Full open	155 mm	± 5 mm		155 mm	± 5 mm				


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**LIFED Equipment as per datasheet:**

Description	Manufacturer/ Type	Serial number	Interval H–hours L–launches	Last compliance		Next due	
				H–hours L–launches	H–hours L–launches	H–hours L–launches	H–hours L–launches
4-point harness	Gadringer		12 years				
Nose release hook	TOST E22		2000 L				
CG release hook	TOST E85		2000 L				
Brake hoses	JS		On condition				

**Additional inspections:**

Description			Interval	Last check	
Weight and balance	----	----	5 years		
Airframe inspection	----	----	3000 H		
Airframe life	----	----	12000 H		
Annual inspection	----	----	1 year		

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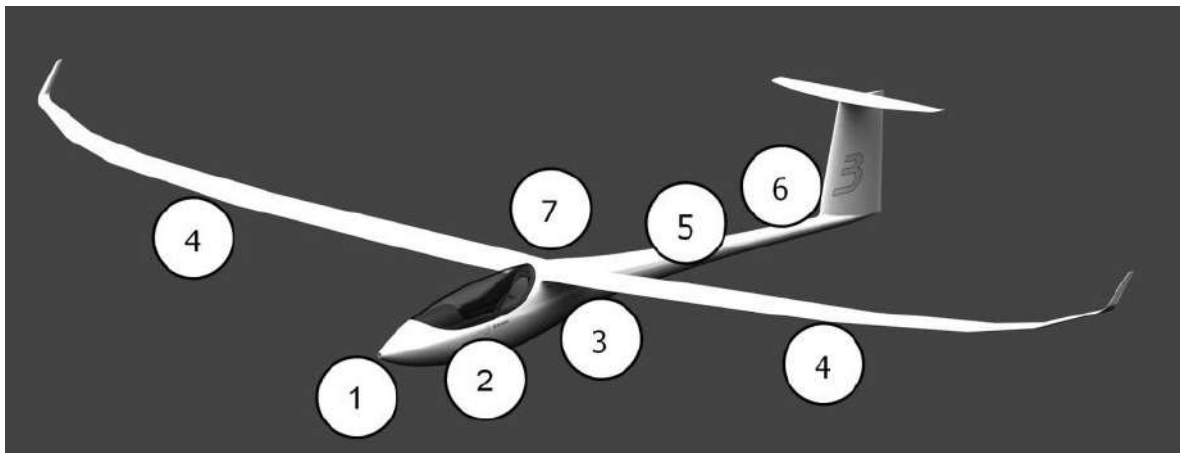
## 05-30-00 FLIGHT LINE CHECKS

### General

Always before the first flight of the day and after the aircraft has been rigged, the aircraft must be inspected carefully to ensure its airworthiness. It is necessary to ensure the daily lubrications during the inspection. Refer to AMM 12-20-00 SCHEDULED SERVICING for more information on the lubrication. Daily inspections may be performed by the pilot.

The following inspection is essential for flight safety:

**Table 5-1: General description of the JS-3 RES**

			
NO	DESCRIPTION	NO	DESCRIPTION
1	Forward fuselage	5	Fuselage
2	Cockpit	6	Empennage
3	Landing gear	7	RES
4	Wings		

### Flight line checks (daily inspections)


Pre-flight checks are important to perform before the first flight of the day. These checks indicate the condition of the aircraft.

#### Forward fuselage ①

1. Check functionality of the nose release hook.
2. Check that air intake in nose is unobstructed.

#### Cockpit ②


1. Ensure the canopy is clean.

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2. Check the canopy emergency release mechanism: pull back both jettison latches slowly. A detent should be noticeable to the touch once the mechanism reaches the end of the normal opening and the emergency release is engaged. Care should be taken not to release the canopy completely without having assistance to prevent it from falling.
3. Ensure that the main pin is secured properly.
4. Ensure the proper connection of flaperon and airbrake system:
  - With the control stick in the neutral position and the flap lever in position 3, the flaperon must be flush with the trailing edge at root rib.
  - Airbrakes must lock properly and open evenly.
5. Ensure the operation of the rudder pedals, and:
  - Move the rudder pedals fully forward and backward to check the rudder cables for signs of fraying, kinks and wear, especially near the S-tube exits.
  - Perform a visual check on the rudder pedal retention nuts by checking that they are securely in position.
6. Ensure the operation of the water system (main and tail tank valves).
7. Ensure that charged batteries are correctly installed and connected.
8. Ensure that the oxygen bottle is properly secured.
9. Ensure that the cockpit is clean, and all foreign matter is removed.
10. Ensure the condition and operation of the safety belts, especially where they pass through the seat back.

### **Landing Gear ③**

1. Visually inspect the mechanism and locks.
2. Check the condition of the shock absorbing rubbers.
3. Check the tyre pressures:
  - Main wheel - 15 m: 2.5 bar
  - Main wheel - 18 m: 3.5 bar
  - Tail wheel: 2.5 bar
4. Check the tyre slip mark position and tyre condition.
5. Check the condition of the wheel door hinges and closing springs or bungee cords.
6. Check that the CG hook manual and automatic operation works properly. Accumulated dirt or mud may lead to improper functioning of the release hook.
7. Check that the water drain orifice behind the landing gear box is clear.

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## Wings ④


1. General condition - check for evidence of damage to the surface finish or structural damage, pressure marks and cracks.
2. Check that the water drain orifices at the wing root and tip are clear.
3. Check the airbrakes for functioning and locking. Check for water or foreign objects in the airbrake boxes.
4. Check that the outer wing panel is properly locked without play.
5. Check that the flaperons move freely with no hinge play. Perform a positive control check on the inboard and outboard flap.
6. Check that wing tip wheels are in good condition—the clearance between the flap trailing edge and the ground in positive flap with maximum aileron deflection must be at least 10 mm. Check that the wheels are attached positively to the wing.
7. Check that the control surface gap seals are installed and properly adhered to the wing recesses.
8. Check that the NACA ducts on the lower surface of the flaperons are clear.
9. If the bug wiper system is installed, perform the checks given in step 10.
10. If flying with water ballast:
  - Before filling check if all the rubber seals on the dump valves are in position, and that all valves are operating correctly.
  - Check the dump rate of the main tanks with the filler caps installed. Ensure that the dump rates of the wings are equal and faster than the dump rate of the tail tank.

## Fuselage ⑤

1. General condition - check for evidence of damage to the surface finish or structural damage, pressure marks and cracks.
2. Check that the static pressure ports on the fuselage boom are unobstructed.
3. Check that the tail wheel is sufficiently inflated.
4. Check that the water drain orifice in front of tail wheel is not obstructed.

## Empennage ⑥

1. General condition - check for evidence of damage to the surface finish or structural damage, pressure marks and cracks.
2. Check that the total energy and pitot probe receptacles are clear. Drain all possible water from the receptacle (if the probe was left in position during rain) by removing the tailplane and rotate.

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3. Ensure that the total energy and pitot probes are installed correctly and pushed all the way in. The pitot probe is positioned on the right hand of the tailplane tip. Check instrument functionality by carefully blowing on the multi-probe's Pitot-, Static and TE ports.
4. Check that the expendable tail tank has no water before filling, by blowing into the filling port with the dump valve in the open position with the vent holes blocked.
5. Check the vertical tail tank valve operation. Check that the dump rate of the tail tank exceeds 1 litre per minute.
6. Check that the tank vent holes on the left-hand side of the fin are unobstructed.
7. Check that the amount of water in the vertical tail fin water ballast tank is correct in relation to wing water ballast and cockpit load.
8. Check that the horizontal stabilizer is properly installed without free play.
9. Check that the control surface gap seals are installed and properly adhered to the stabilizer and fin recesses.

**CAUTION:** Blowing into the pitot-static and total energy probes may cause permanent damage to instruments if performed incorrectly.

### Rear Electrical Propulsion System (RES) ⑦


If fitted inspect the RES in accordance with JS-MD 3 RES Flight Manual Supplement Section 3.

### Additional system: Bug Wiper

The bug wiper controls located on the left side of the cockpit in front of the trim lever.

If the bug wiper system is installed, perform the following checks before each flight:

1. Check the operation of the bug wiper winding system. Ensure the wipers are set to wipe not closer than 300 mm from the winglet.
2. Check that both wipers seat correctly in their garages when retrieved.
3. Check the condition of the wiping cable and retrieve cable.
4. Check that the stabilizing leg of the wiper opens between 70° and 80°.

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## 05-50-00 UNSCHEDULED MAINTENANCE CHECKS


### General

After the occurrence of an abnormal incident such as a crash or hard landing, it is important to follow the checks described in this section to ensure no serious or permanent damage on the aircraft.

### Checks after a hard landing

The term hard landing usually implies that the pilot still has total or partial control over the aircraft, as opposed to an uncontrolled descent into terrain (a crash) which usually results in the destruction of the aircraft. If a G-force meter is installed a landing of 3 G or higher could be considered as a hard landing. If the G-force cannot be measured the main tyre and landing gear operation could be inspected. If the tyre is compressed upon landing and the landing gear operation feels stiffer, the landing could be considered as hard landing. The following inspection must then be performed prior to the next flight:

1. Lift the fuselage and cycle the gear. Feel for smoothness. If the gear is difficult to retract or bind, it might be an indication of damage.
2. Inspect front landing gear fork attachment bolts. These bolts go through the wheel box into the cockpit. Inspect for white areas around the bolts. Feel for looseness in the bolts.
3. Inspect the areas around the rear fork hinge points in the rear of the wheel box. Inspect for white delamination marks.
4. If the retract mechanism is binding, the axle might be bent. Remove the main axle and check the straightness.
5. Check the rear hinge bolts in front of the shock absorber. Check the lugs and lock bolts for damage. Replace bolts if required.
6. Check the shock absorbing rubbers for cracks. The shock rubber must still fully extend when unloaded (90 mm).
7. Check the wheel hub for damage.
8. Check the brake calliper for damage.
9. Check the wheel doors and bungee cords for any damage.
10. Check tail wheel mountings.
11. Check wing lateral play relative to fuselage.
12. Check the wing beat frequency and compare with value in test report. It should be within 5 %.
13. Check the lift pins of the wing for damage, bending or delamination around the pins.
14. Check wing main bolt bushes of the spar tongue and fork for cracks.

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15. Check the trailing edges of all flaps and ailerons for splitting.

16. Check the tailplane attachments.


### Checks after a ground loop

After a ground loop, the following inspection must be performed prior to next flight:

1. Check the tail boom from the wing trailing edge to and including the fin for cracks. Apply a side load on the fin and listen for noises from the fuselage. This is a good check for hidden de-bonding of the structure.
2. Fill the tail tanks with water and check for leaks.
3. Check operation of tail tank valve.
4. Remove wingtips and check wingtip junctions, especially the tip wheel attachment points.
5. Check winglet base for any indication of cracks.
6. Inspect the main landing gear wheel. Check operation. If foreign material is forced between the tyre and the wheel hub, the wheel and the tyre must be removed and cleaned.

**CAUTION:** If a retractable tail wheel is fitted, ensure the tail is lifted off the ground before retracting the gear.

7. Check wing tip skids and tail wheel for damage.
8. Check the trailing edges of all flaps and ailerons for splitting.
9. Check for damage to hinges on the flap and wings side.
10. Check wing lateral play of fuselage.
11. Redo the wing beat frequency and compare with value in test report. It should be within 5 %.
12. Check the lift pins on the wing for damage e.g. cracks.
13. Check wing main bolt bushes of the spar tongue and fork for cracks.

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## Checks after landing in high crops


After landing in high crops, the following inspection must be performed prior to next flight:

1. Check the flap and aileron operation.
2. Check wingtip junction and winglet connections.
3. Check the flaps and ailerons for any damage.
4. Check the trailing edges of all flaps and ailerons for splitting.
5. Check the flap and aileron drivers and the area around the control horn attachment for cracks.
6. Check the condition of the Mylar on the bottom of the wing.
7. Check if the NACA ducts on the flap and ailerons are clear of any foreign objects.

## Checks after suspected overstress in flight


The term overstress implies that the aircraft has experience flight load exceeding the maximum approved flight loads. If a G-force meter is installed acceleration exceeding the limits provided in the JS-MD 3 RES Aircraft Flight Manual is considered as overstress. The following inspection must then be performed prior to the next flight:

1. Check wing lateral play relative to fuselage.
2. Check the wing beat frequency and compare with value in test report. It should be within 5 %.
3. Perform a pressure test on the wing tanks by applying 0.2 bar and observe if pressure is maintained. Note all valves must be closed and vents blocked.
4. Check the lift pins of the wing for damage, bending or delamination around the pins.
5. Check wing main bolt bushes of the spar tongue and fork for cracks.
6. Inspect the spar area for possible delamination.
7. Inspect the wing surface for any signs of deformation.
8. Check the trailing edges of all flaps and ailerons for splitting.
9. Check the junction connections for damage or delamination.

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# **CHAPTER 06 - 00 - 00**

## **DIMENSIONS AND AREAS**

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## 06-00-00 DIMENSIONS AND AREA

### General

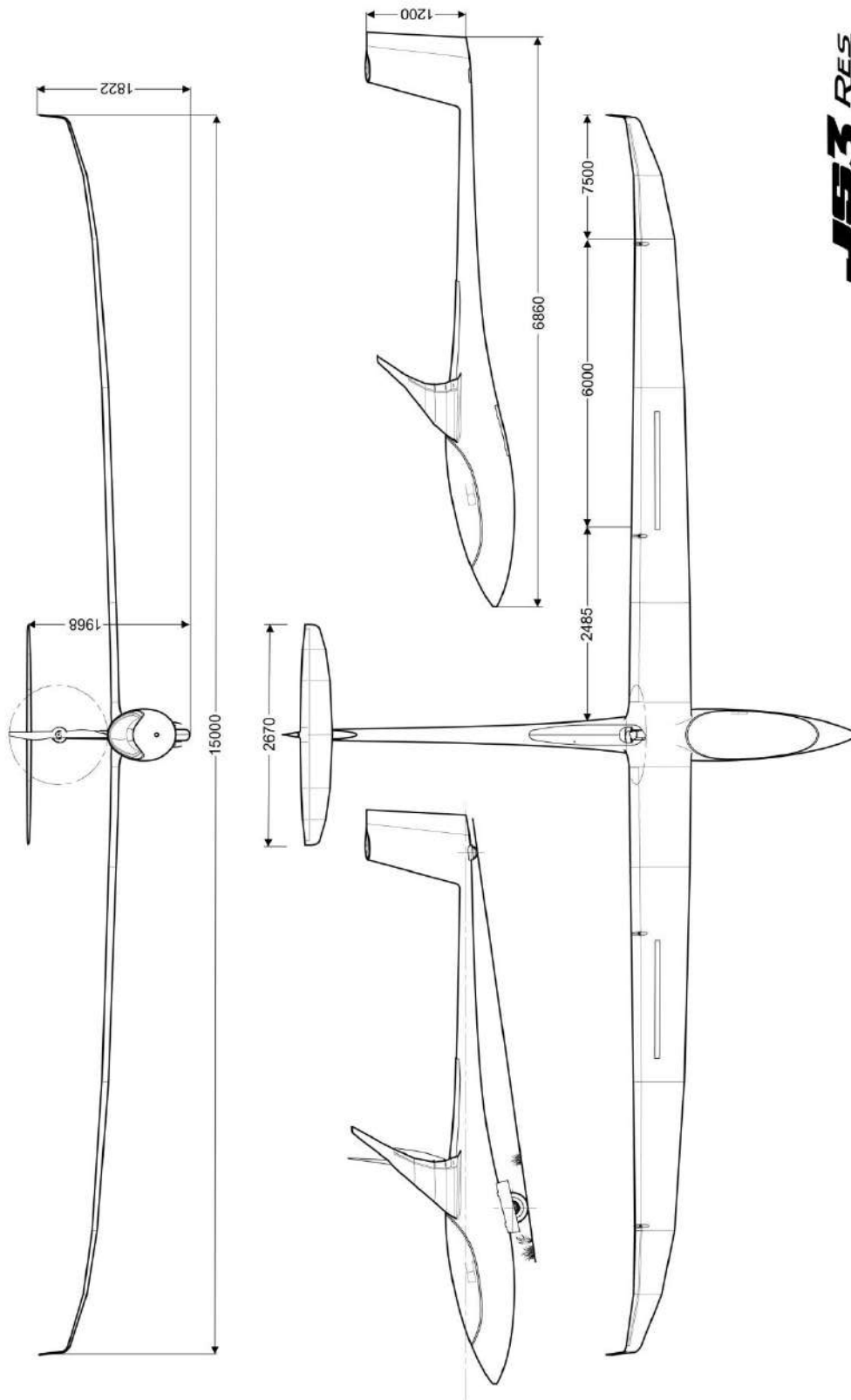
The basic dimensions and information of the JS-3 RES are given in this chapter in *Système International (SI)* measurements.

### Dimensions

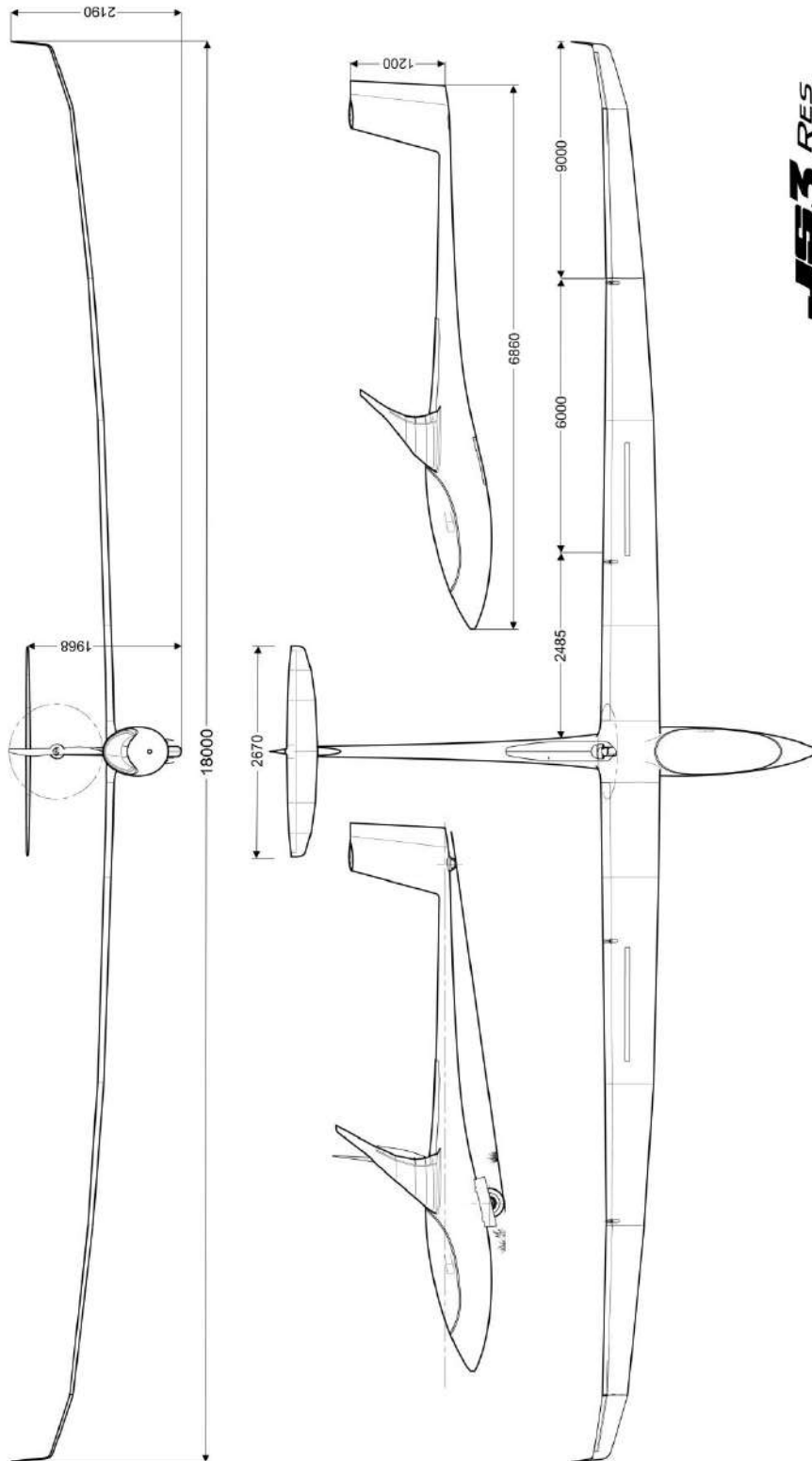
**Table 6-1: Basic dimensions of the JS-3 RES**

Geometry	JS-3 RES: 15 m	JS-3 RES: 18 m
Wing span	15 m	18 m
Wing area	8.75 m <sup>2</sup>	9.95 m <sup>2</sup>
Aspect ratio	25.4	32.8
Fuselage length	6.860 m	
Fuselage height	1.348 m	
Weight	JS-3 RES: 15 m	JS-3 RES: 18 m
Maximum weight	525 kg	600 kg
Empty weight (without RES)	± 284 kg	± 296 kg
Empty weight (RES, no HV batteries)	± 309 kg	± 320 kg
Maximum weight without water ballast	452 kg	500 kg
Minimum wing load (70kg pilot, no HV batteries)	43.3 kg/m <sup>2</sup>	39.6 kg/m <sup>2</sup>
Maximum wing load	60.0 kg/m <sup>2</sup>	60.3 kg/m <sup>2</sup>


**NOTE:** The empty weight is a theoretical weight of the pure aircraft, with minimum equipment, basic paint finish and fabric upholstery with dry tanks. This figure provides no significant limitation, provided the maximum weight without water ballast is not exceeded during flight.




**Figure 6-1: 3-View of JS-3 RES: 15 m**



**Figure 6-2: 3-View of JS-3 RES: 18 m**


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# **CHAPTER 07 - 00 - 00**

## **LIFTING AND SUPPORTING**

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## 07-00-00 LIFTING AND SUPPORTING

### General

This chapter will explain the procedures on how to safely lift the JS-3 RES for maintenance.

The wings and tailplane of the JS-3 RES is light enough to be carried by hand. At least two personnel must carry the wings to ensure that the wings do not get damaged.

The aircraft may be supported in a few ways. The approved support areas are listed in this section to safely support the aircraft without harming any personnel or the aircraft.

### Supporting points

#### Fuselage

The fuselage may be supported upright:

1. On the main wheel or the fuselage shell in front of the gear, minimum length of support 300 mm.
2. On the tail wheel or on the fuselage tail boom in front of the tail wheel, on a trestle fully padded with foam.


The fuselage may be supported upside down:

1. On a well-padded trestle across the canopy frame. (Padding must be with sufficient foam, e.g. polystyrene, to ensure that the cockpit frame surfaces are not damaged)
2. On the tail fin in front of the elevator auto-coupler. Ensure that the auto-coupler does not take any load and is not damaged.

Before turning the fuselage upside down:

1. Remove all loose items from the cockpit.
2. Remove the cushions and secure the safety belts.
3. Remove the canopy and secure the instrument console. (It may drop down when the fuselage is turned around)

**CAUTION:** Brake fluid leaking in the cockpit may cause damage to the interior.

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## Wings


The wings may be supported at the:

1. Main spar at main pin hole closest to the root rib.
2. Skin at root rib, minimum width of support 150 mm.
3. Skin at 7.5 m, minimum width of support 250 mm.

**CAUTION:** The flaperon sandwich construction can be damaged if excessive force is used and should be handled with care.


## Tailplane

The tailplane may be supported anywhere on the skin, with a minimum support width of 80 mm.

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# **CHAPTER 08 - 00 - 00**

## **LEVELLING AND WEIGHING**

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## 08-00-00 LEVELLING AND WEIGHING

### General

The following chapter describes the weighing and balancing procedures for the JS-3 RES as well as instructions for calculating the maximum and minimum cockpit loads.

08-10-00 WEIGHING AND BALANCING contains equations and procedures to ensure correct calculations have been done.

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## 08-10-00 WEIGHING AND BALANCING

### General

This section describes the weighing procedure to determine the empty Centre of Gravity (CG) position. It is necessary to re-weigh and determine the CG position after repairs, re-finishing or when new equipment is fitted. The new data must be recorded in the following place:

- Aircraft logbook/service record
- JS-MD 3 RES Aircraft Flight Manual
- Weight and balance report
- Cockpit placards

The list of equipment fitted must be listed on the CG Weight and Balance Report.

**WARNING:** The CG position is a flight critical property, and under no circumstances may the aircraft be operated outside the approved ranges.

### Weighing procedure

#### Datum point

The CG position is calculated as a distance from a datum or reference point.

The datum (reference) point is defined as the wing leading edge at the wing root rib, i.e. on the wing immediately outboard of the wing-fuselage fairing.

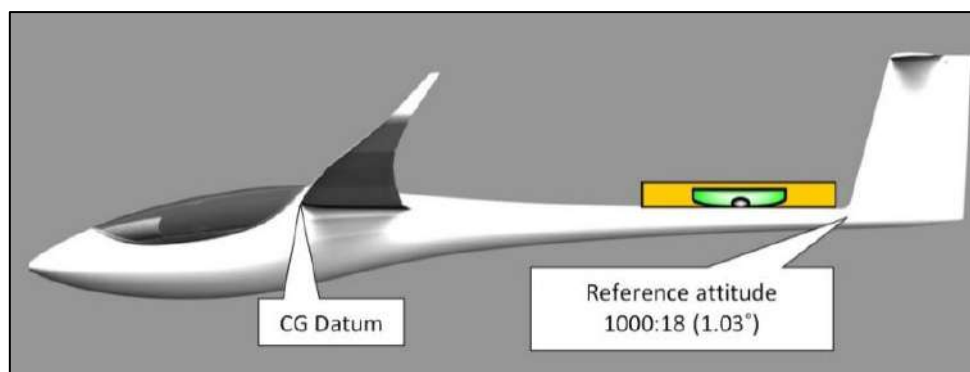



Figure 8-1: CG datum point

#### Weighing attitude

The correct aircraft attitude for weighing is defined as with the aft fuselage boom forward of the fin positioned at gradient of 1000:18 (1.03° from level).

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The attitude can be set up using a spirit level of 1 m (40") with a 18 mm (11/16") spacer on the tail boom slightly in front of the fin, as indicated in Figure 8-2.

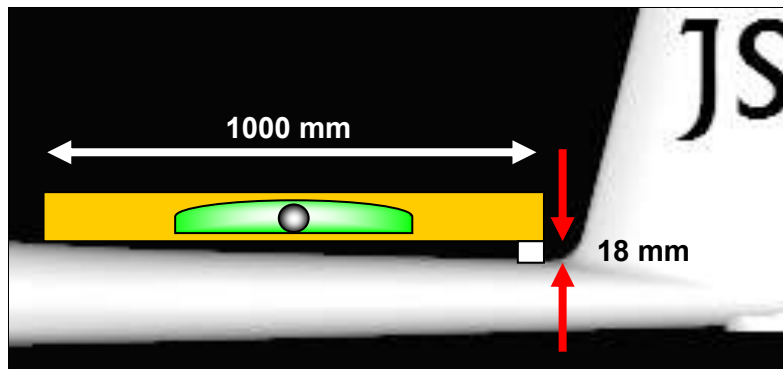


Figure 8-2: Reference attitude


### Weighing configuration

It is vital that an accurate record of the equipment and configuration of the aircraft is determined and recorded.

Ensure all equipment listed in Table 8-1 is documented. All installed equipment should be in the correctly allocated locations.

Table 8-1: Equipment list

Equipment list:	Detail:
Upholstery type	Note type: Leather or fabric
Tail wheel type	Note Retractable or Fixed type
Bug wiper motors (x2)	Note if bug wiper motors are installed
Tail wheel hub	Type of tail wheel: Aluminium / Brass
Engines	Type of engine installed
Removable antenna	Note if transponder antennas is installed
Documents	If required by the NAA to be carried
Rigging tool	Note if carried
Main 12V battery 1	Note type of battery: Pb or LiFePo
Main 12V battery 2	Note type of battery: Pb or LiFePo
Optional battery 3	Removed
Permanent ballast in fin (kg)	Note the weight of the permanent ballast installed

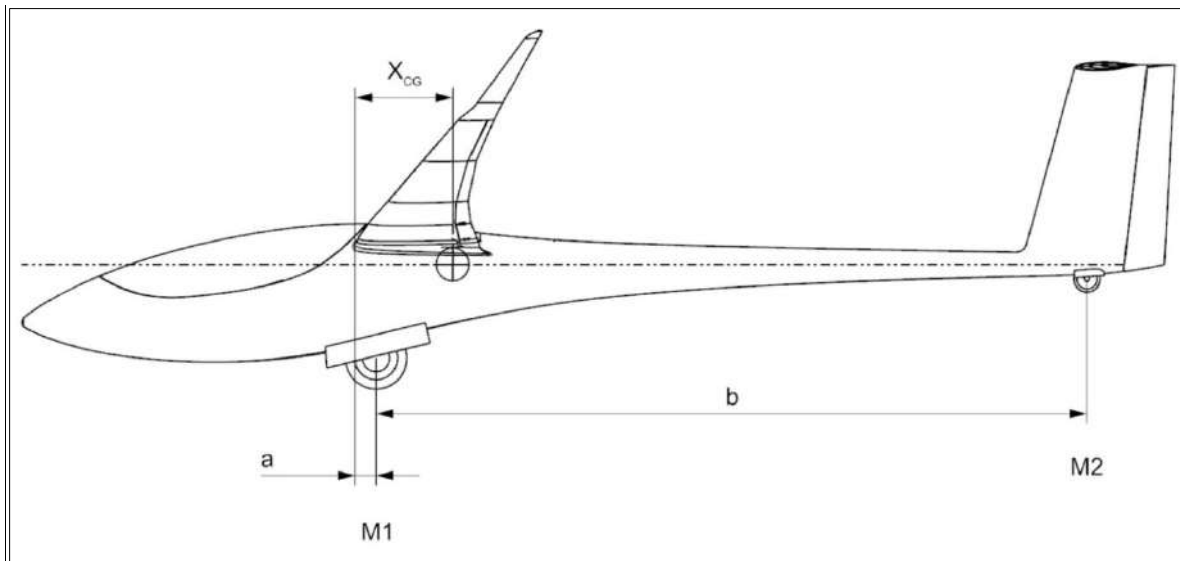
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Prepare the aircraft for weighing as follows:

1. Ensure the wing tips and tailplane are assembled correctly. Both wingspans have to be measured.
2. Remove the trim ballast in nose and tail.
3. Ensure that all water tanks are empty.
4. If a RES is fitted:
  - a. Ensure the pylon is in the retracted position
5. Remove the parachute and oxygen bottle.
6. Set the flaps to flap position 3.
7. Close the canopy.

### Weighing procedure

Position the aircraft on two scales in the correct weighing attitude and configuration.




**Figure 8-3: Reference distances**

With the wings kept level, record the following values as given in Figure 8-3.

If the CG is determined using first principal equations, distances a and b are required.

- a** The horizontal distance between the main wheel axle centre and a vertical line from the datum point, as indicated in Figure 8-3.
- b** The horizontal distance between the main wheel axle and the tail wheel axle centre, as indicated in Figure 8-3.

If the CG is determined using the Weight and Balance Calculator only distance x is required:

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- x** The distance between the main wheel axle and the tail wheel axle centre, as indicated in Figure 8-4.

Record the M1 and M2 for both wingspans:

- M1** The weight of the aircraft measured at the main wheel.
- M2** The weight measured at the tail wheel.

The allowable flying CG ranges can be determined using the Weight and Balance Calculators available from the technical website, or by means of hand calculations using equations supplied. Use the following Weight and Balance Calculator:

- JS-3 RES Weight and Balance Calculator AP.JS-094 JS3

### Calculation of the empty CG and empty weight using first principals

Once the values for a, b, M1 and M2 are determined, the empty CG is determined using the following equation:

$$x_{cg} = \frac{bM_2}{M_1 + M_2} + a$$


The empty weight of the aircraft is calculated as:

$$M_{Empty} = M_1 + M_2$$

### Determining the minimum and maximum allowable cockpit loads

Once the minimum and maximum cockpit loads have been determined, the following must be updated with the new data:

1. The Weight and Balance Record / Permitted Payload Ranges Sheet in the JS-MD 3 RES Aircraft Flight Manual.
2. The cockpit placard indicating the cockpit loads.
3. The aircraft service record / logbook.

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## Determination of the minimum cockpit load (non-expendable tail tank empty)

### 1. Pure glider (no dummy batteries installed)

$$M_{MinCockpitLoad_{15m}} = \frac{M_{Empty}(X_{CG_{empty}} - 390 \text{ mm})}{(390 \text{ mm} + 645 \text{ mm})}$$

$$M_{MinCockpitLoad_{18m}} = \frac{M_{Empty}(X_{CG_{empty}} - 398 \text{ mm})}{(398 \text{ mm} + 645 \text{ mm})}$$

### 2. Pure glider with 1 fuselage dummy battery (1 x 24.85 kg)

$$M_{MinCockpitLoad_{15m}} = \frac{M_{Empty}(X_{CG_{empty}} - 390 \text{ mm})}{(390 \text{ mm} + 645 \text{ mm})} + 11.75 \text{ kg}$$

$$M_{MinCockpitLoad_{18m}} = \frac{M_{Empty}(X_{CG_{empty}} - 398 \text{ mm})}{(398 \text{ mm} + 645 \text{ mm})} + 11.46 \text{ kg}$$

### 3. Pure glider with 2 fuselage dummy batteries (2 x 24.85 kg)

$$M_{MinCockpitLoad_{15m}} = \frac{M_{Empty}(X_{CG_{empty}} - 390 \text{ mm})}{(390 \text{ mm} + 645 \text{ mm})} + 23.49 \text{ kg}$$

$$M_{MinCockpitLoad_{18m}} = \frac{M_{Empty}(X_{CG_{empty}} - 398 \text{ mm})}{(398 \text{ mm} + 645 \text{ mm})} + 22.93 \text{ kg}$$

where:


- $M_{MinCockpitLoad}$  - Minimum cockpit load (kg)
- $M_{Empty}$  - The empty weight of the aircraft ( $M_1 + M_2$ ) (kg)
- $X_{CG_{empty}}$  - The empty Centre of Gravity position (mm)

## Determination of the minimum cockpit load (non-expendable tail tank full)

To determine the minimum cockpit loads with 8.9 kg of water in the non-expendable tank, use the  $M_{MinCockpitLoad}$  and add the following constants:

$$M_{MinCockpitLoad_{15m} (non-Exp \text{ tank full})} = M_{MinCockpitLoad_{15m}} + 35.43 \text{ kg}$$

$$M_{MinCockpitLoad_{18m} (non-Exp \text{ tank full})} = M_{MinCockpitLoad_{18m}} + 35.09 \text{ kg}$$

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### Determination of the maximum cockpit load (non-expendable tail tank empty)

Determining the maximum cockpit load can accurately be determined using the Weight and Balance Calculator or the following formula can be used to for a close estimate

$$M_{MaxCockpitLoad} = M_{MinCockpitLoad} + 45 \text{ kg}$$

where:

$M_{MaxCockpitLoad}$  - Maximum cockpit load (kg)

$M_{MinCockpitLoad}$  - Minimum cockpit load (kg)

If the calculated CG value ( $X_{CG}$ ) is higher than 115 kg column, the maximum cockpit load must be limited to 115 kg.


**NOTE:** The value “45” reflects a mass in kilogram. To use the equations given for imperial unit calculations these constants must be converted from metric to imperial units accordingly.

**NOTE:** The Weight and Balance Calculator determines the forward CG position exact. The equation given is a conservative approximation.

Table 8-2 gives the forward and rear CG limits (no payload) for different empty masses that will allow a cockpit range of 70 kg to 115 kg.

Empty mass		Empty Centre of Gravity range							
		Forward limit To allow a maximum cockpit load of 115 kg (253 lbs)				Rear limit To allow a minimum cockpit load of 70 kg (154 lbs)			
kg	lbs	15 m		18 m		15 m		18 m	
300	661.4	628	mm	628	mm	632	mm	641	mm
		24.7	in	24.7	in	24.9	in	25.3	in
310	684.0	621	mm	621	mm	624	mm	634	mm
		24.5	in	24.5	in	24.6	in	24.9	in
320	706.1	615	mm	615	mm	616	mm	626	mm
		24.2	in	24.2	in	24.3	in	24.7	in
330	728.1	609	mm	609	mm	610	mm	619	mm
		24.0	in	24.0	in	24.0	in	24.4	in
340	750.2	603	mm	603	mm	603	mm	613	mm
		23.7	in	23.7	in	23.7	in	24.1	in

Table 8-2: Verification of empty CG range

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## Calculation of the empty cg and empty weight using the cg calculator

AP.JS-094 JS3 Weight and Balance Calculator can be useful to determine the following:

1. Empty CG position and empty weight.
2. Maximum and minimum cockpit loads.
3. Weight and balance determination for selected loading cases.

The CG calculator consists of the following sheets:

1. Data entry sheet.
2. Weight and balance report (Metric and Imperial).
3. CG Envelope (15 m and 18 m).

### Procedure to determine weight and data

1. Select wingspan options (15/18/15&18).

Registration No	GS-1234	Serial No	3.MD0XX	Built year	20XX	Span Variants	15m&18m
-----------------	---------	-----------	---------	------------	------	---------------	---------

**A. Technical data**

1. Geometry Measurement Reference Point: Wing leading edge at root rib  
2. Fuselage Attitude Reference Position: 1000:18 at top of tail cone

**B. Center of Gravity measurement setup for JS3**

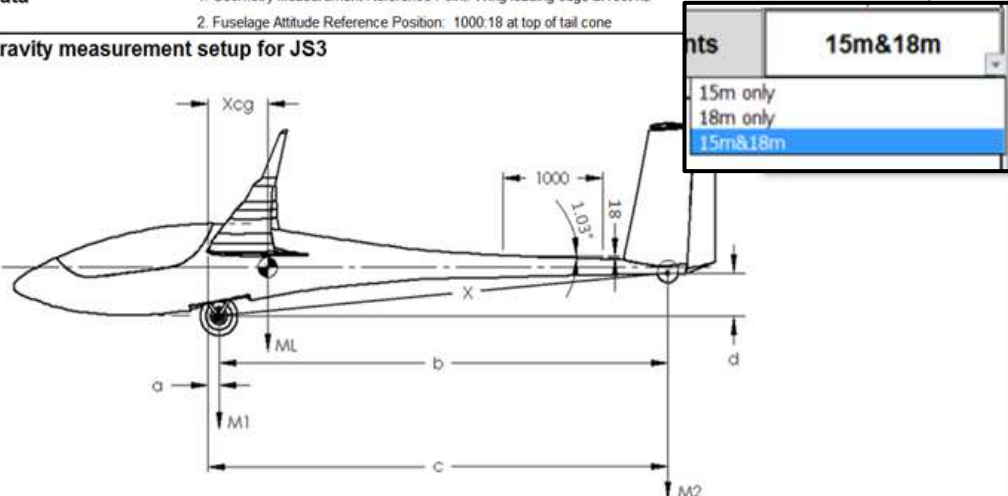


Figure 8-4

2. Determine parameters a, b, M1 and M2 and enter in the appropriate fields. Also measure component weights, as this is required to determine the weight of non-lifting parts.

Component weight		Configuration Set-up*		
Component	Weight (kg)			
Left Wing	66,7	RES system (excl batteries)	Yes	
Right Wing	66,1	Upholstery type	Leather	
Left Wingtip (15m)	5,4	Tailwheel type	Retractable	
Right Wingtip (15m)	5,4	Bug wiper motors (x2)	Yes	
Left Wingtip (18m)	16,8	Tailwheel hub	Alu	
Right Wingtip (18m)	16,8	Transponder antenna	Yes	
Tailplane	6,1	Flight Manual	No	
Fuselage*	168,6	Flight Folio	No	
		Rigging Tool	No	
		12V Main Battery 1	LiFePo	
		12V Main Battery 2	LiFePo	
		Permanent balast in fin (kg)	0	

Measured Data		15m	18m
Weight at Front Wheel:	M1=	288,0	308,0
Weight at Tail Wheel:	M2=	31,2	33,2
Distance from centre of main wheel shaft to centre of tail wheel shaft	x =	4310	

\*All items must be in the fuselage when the CG is measured as well as when the fuselage is weighed

Figure 8-5

3. Enter weight and arm length of components/weights added after the initial weighing. (This allows to perform a calculation if known weights are added at a later stage)

Measured Data		15m	18m	Constants		Right Wing		66,1
Weight at Front Wheel:	M1=	288,0	308,0	c =	4419,0	Left Wingtip (15m)		5,4
Weight at Tail Wheel:	M2=	31,2	33,2	d =	509	Right Wingtip (15m)		5,4
Distance from centre of main wheel shaft to centre of tail wheel shaft	x =	4310				Left Wingtip (18m)		16,8
						Right Wingtip (18m)		16,8
						Tailplane		6,1
						Fuselage*		168,6
								*All items must be in the fuselage when the CG is measured as well as when the fuselage is weighed

Revised calculated data		15m	18m	Inspector name &	
Weight at front wheel	M1 =	288,28	308,28		
Weight at tail wheel	M2 =	34,87	36,9		

Description of change	Mass	Arm	Affect on	
			M1	M2
Rear Permanent weight added	4,00	4121	0,28	3,72
			0,00	0,00
			0,00	0,00

Figure 8-6

4. Generate the weight and balance report.

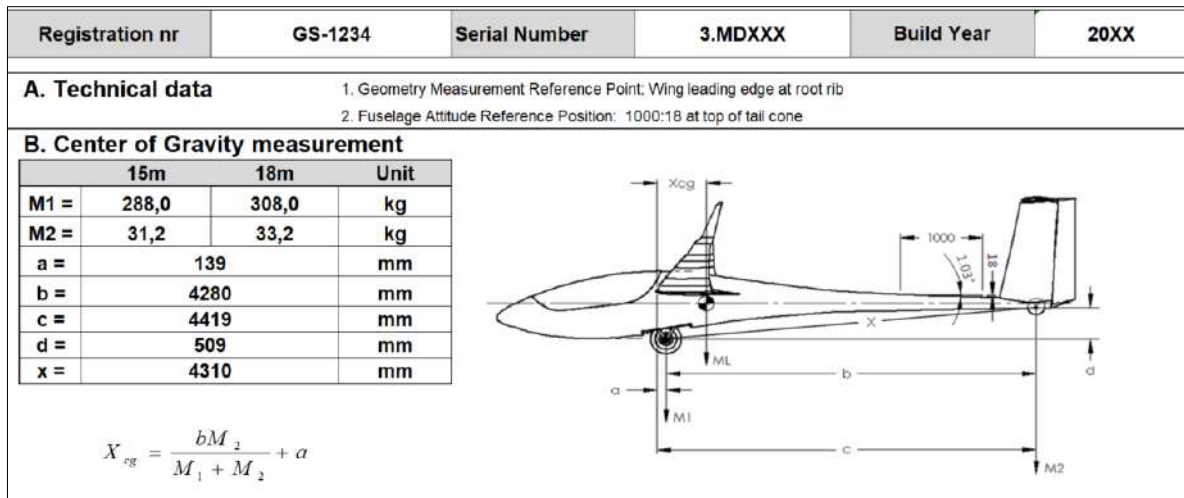


Figure 8-7

5. Transfer the required values to the AFM and placards.

Equipment installed	
RES system (excl batteries)	No
Upholstery type	Leather
Tailwheel type	Retractable
Bug wiper motors (x2)	Yes
Tailwheel hub	Alu
Transponder antenna	Yes
Flight Manual	No
Flight Folio	No
Rigging Tool	No
12V Main Battery 1	LiFePo
12V Main Battery 2	LiFePo
Permanent ballast in fin (kg)	-

Component mass	15m	18m	NLM	Unit
1 Left Wing	145.5	66.0		lbs
2 Left Wingtip 15m	10.4	-		lbs
3 Left Wingtip 18m	-	36.2		lbs
4 Right Wing	148.6	148.6		lbs
5 Right Wingtip 15m	10.3	-		lbs
6 Right Wingtip 18m	-	35.7		lbs
7 Tailplane	14.6	14.6	32.1	lbs
8 Fuselage*	377.7	377.7	832.9	lbs

- 1 Weighing done with all equipment installed incl avionics i.a.w. equipn
- 2 When any variation occurs between rigged data and individual component mass, rigged data takes precedence.

**C1. Acceptance data (15m)**

CG Data 15m	Unit
Empty mass:	<b>705.1 lbs</b>
Empty CG position:	<b>24.7 in</b>
Moment:	<b>17.4 lb.in</b>
Highest allowable take off mass:	<b>1157.6 lbs</b>
Highest allowable load:	<b>450.9 lbs</b>
Max allowable mass of non lifting:	<b>727.7 lbs</b>
Mass of non lifting components	<b>392.3 lbs</b>

Pilot ranges 15m	Min	Max	Unit
<b>Non-expendable tank/H Batteries</b>	<b>15m</b>	<b>15m</b>	
Empty	<b>0</b>	<b>162</b>	<b>254 lbs</b>
Empty	<b>1</b>	<b>188</b>	<b>254 lbs</b>
Full (8.9 l)	<b>0</b>	<b>241</b>	<b>254 lbs</b>
Full (8.9 l)	<b>1</b>	<b>266</b>	<b>254 lbs</b>

**C2. Acceptance data (18m)**

CG Data 18m	Unit
Empty weight:	<b>758.3 lbs</b>
Empty CG position:	<b>24.4 in</b>
Moment:	<b>18.5 lb.in</b>
Highest allowable take off mass:	<b>1323.0 lbs</b>
Highest allowable load:	<b>564.7 lbs</b>
Max allowable mass of non lifting:	<b>727.7 lbs</b>
Mass of non lifting components:	<b>392.3 lbs</b>

Pilot ranges 18m	Min	Max	Unit
<b>Non-expendable tank/H Batteries</b>	<b>18m</b>	<b>18m</b>	
Empty	<b>0</b>	<b>161</b>	<b>254 lbs</b>
Empty	<b>1</b>	<b>186</b>	<b>254 lbs</b>
Empty	<b>2</b>	<b>211</b>	<b>254 lbs</b>
Full (8.9 l)	<b>0</b>	<b>238</b>	<b>254 lbs</b>
Full (8.9 l)	<b>1</b>	<b>263</b>	<b>254 lbs</b>
Full (8.9 l)	<b>2</b>	<b>289</b>	<b>254 lbs</b>

Figure 8-8

6. Verify hand calculations with CG calculator values.



## Weight and Balance Calculator

Enter loading only in this column

	Loading points:	Max allowed (kg)	Arm	Actual Loading (kg)	Mass (kg)	Moment (kg.m)
<b>Tot</b>	<b>Empty aircraft</b>	<b>400.0</b>	<b>596.9</b>	<b>345.2</b>	<b>345.2</b>	<b>206.0</b>
<i>Pilot</i>	<i>Pilot + Parachute</i>	<i>115.0</i>	<i>-645.0</i>	<i>90.0</i>	<i>90.0</i>	<i>-58.1</i>
<i>WingM</i>	<i>Water ballast main (132l)</i>	<i>132.0</i>	<i>166.1</i>	<i>40.0</i>	<i>40.0</i>	<i>6.6</i>
<i>H2O Tips</i>	<i>Water ballast tips</i>	<i>34.0</i>	<i>480.0</i>	<i>34.0</i>	<i>34.0</i>	<i>16.3</i>
<i>Tail1</i>	<i>Expendable tail tank</i>	<i>5.8</i>	<i>4285.0</i>	<i>2.0</i>	<i>2.0</i>	<i>8.6</i>
<i>Tail2</i>	<i>Non-expendable tail tank (top)</i>	<i>5.0</i>	<i>4574.0</i>		<i>0.0</i>	<i>0.0</i>
<i>Tail3</i>	<i>Non-expendable tail tank (bottom)</i>	<i>3.9</i>	<i>4510.0</i>		<i>0.0</i>	<i>0.0</i>
<i>NoseW</i>	<i>Nose weights in front of pedals</i>	<i>12.0</i>	<i>-1782.0</i>	<i>5.0</i>	<i>5.0</i>	<i>-8.9</i>
<i>Bag</i>	<i>Baggage compartment</i>	<i>1.0</i>	<i>150.0</i>		<i>0.0</i>	<i>0.0</i>
<i>O2</i>	<i>O2 bottle</i>	<i>2.0</i>	<i>0.0</i>		<i>0.0</i>	<i>0.0</i>
<i>Batt1</i>	<i>RES Batteries installed</i>	<i>24.9</i>	<i>879.2</i>	<i>2</i>	<i>49.7</i>	<i>43.7</i>
<i>Other</i>	<i>Removal weight behind Seat</i>	<i>20.0</i>	<i>-225.0</i>		<i>0.0</i>	<i>0.0</i>
<b>Total Non lifting weight</b>		<b>321.3</b>	<b>Totals</b>	<b>Totals</b>	<b>565.9</b>	<b>214.3</b>

Flying condition	Mass (kg)	Wing loading (kg/m <sup>2</sup> )	Flying CG position (mm)	Moment (kg.m)
With water ballast	565.9	57.3	378.7	214.3
Expendable water ballast dumped	489.9	49.6	373.1	182.8
Pylon extended - with water balast	565.9	57.3	378.7	214.3
Pylon extended - empty	489.9	49.6	373.1	182.8

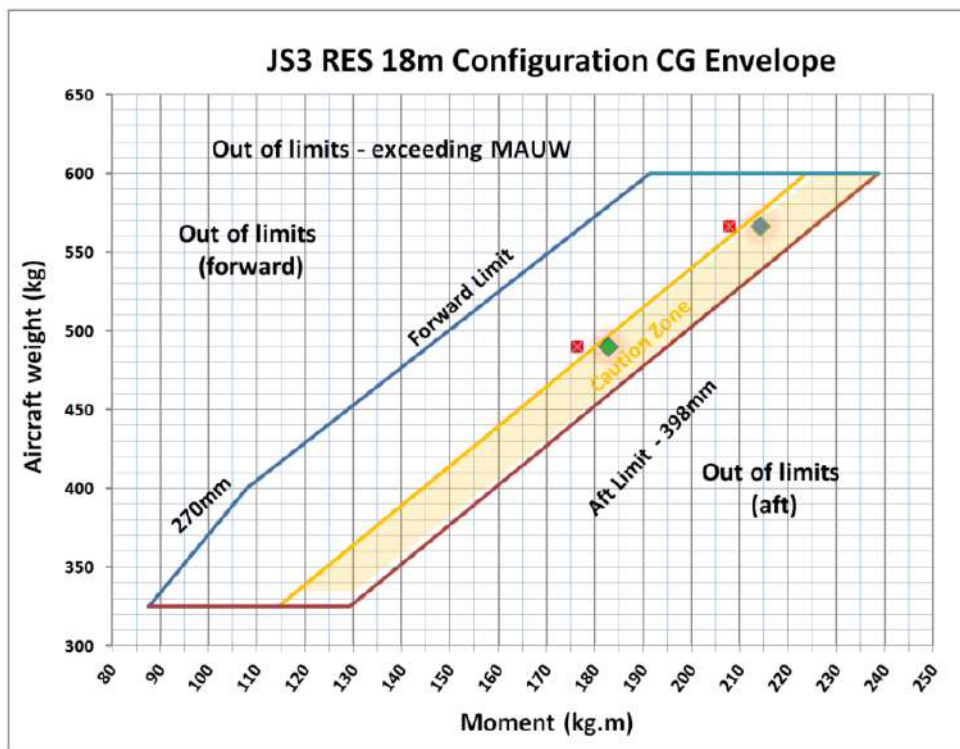



Figure 8-9

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## 08-10-00 WEIGHING AND BALANCING: MAINTENANCE PRACTICES

### Changing the empty CG

The empty CG of the aircraft can be changed by adding or removing fixed ballast.

Provision for fixed ballast is made in the rear fuselage on the bottom of the fin. A dedicated cavity designed to hold a maximum of 6 kg can be accessed through the tail wheel bay.

A fibre glass plate bonded or a threaded cap to close the cavity after lead has been added or removed. Later models are fitted with an aluminium hatch shown in red in Figure 8-10.

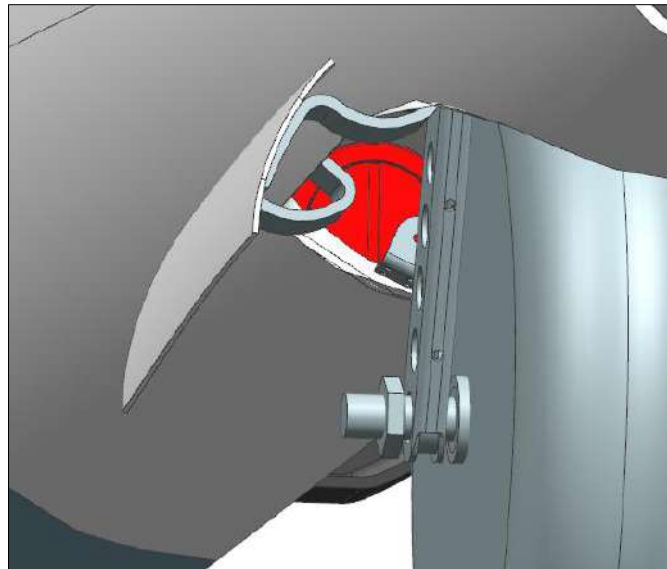



Figure 8-10: Fin lead cavity in the tail wheel bay


### Adding lead shot in the fin lead cavity

1. De-rig the aircraft.
2. Rotate the fuselage onto its side (with the fin vertical).
3. Remove the plate covering the 20 mm hole. (If a hatch is fitted, unbolt and remove it).
4. Use a stiff tube connected to a funnel to feed lead shot into the cavity through gravity. The smallest grain lead shot provides the best results for filling or removal.
5. Bolt the hatch back into place or re-bond the glass plate using instant epoxy.


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### Remove lead shot in the fin lead cavity

1. De-rig the aircraft.
2. Rotate the fuselage onto its side (with the fin vertical).
3. Remove the plate covering the 20 mm hole. (If a hatch is fitted, unbolt and remove it).
4. Remove the lead shot using a vacuum. It is recommended to use a commercial vacuum cleaner with a rigid tube fitted to the end of the vacuum pipe.
5. Bolt the hatch back into place or re-bond the glass plate using instant epoxy.


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# CHAPTER 09 - 00 - 00

## TOWING AND TAXIING

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## 09-00-00 TOWING AND TAXIING

### General

Refer to JS-MD 3 RES Flight Manual Supplement Section 2.5 for more information on taxiing.

Towing and ground handling procedures are described in this section. Chapter 09-10-00 TOWING describes the procedures for the ground handling of the aircraft.

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## 09-10-00 TOWING

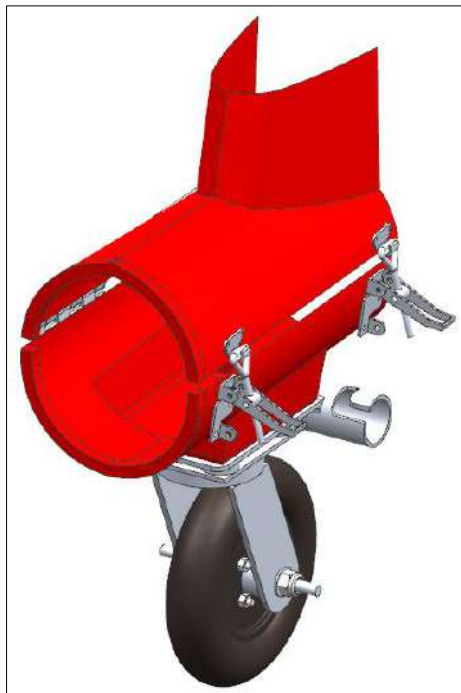
### General

This section describes the procedures for handling the aircraft and towing procedures.

### Towing procedure

#### Ground handling

The aircraft can be manoeuvred on the ground by two or more people. The wing of the aircraft should be held level. A tail or fuselage dolly can be used to ease the manoeuvring of the JS-3 RES.




**Figure 9-1: Tail dolly**

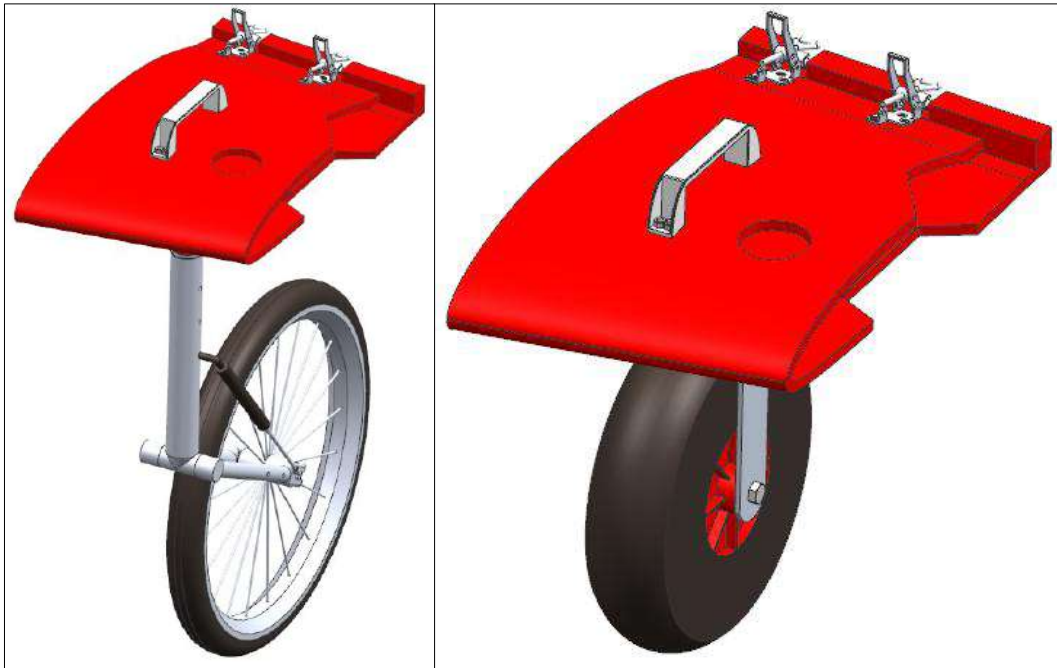
**NOTE:** Do not push or pull the aircraft on the flaps. This can damage the control systems or the flaperons.

#### Ground towing

Use either a rope or other non-metallic cable from the nose hook with someone walking with the wing tip.

Use a tow bar connected to the tail dolly and a 'wing walker' with a sprung wheel. Figure 9-2 shows the high and low type 'wing walkers'.


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**Figure 9-2: Wing walker configurations**

**CAUTION:** Do not tow the aircraft faster than walking pace.

**WARNING:** Do not push or pull on the wingtips.


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# CHAPTER 10 - 00 - 00

## PARKING, MOORING, STORAGE AND RETURN TO SERVICE

	<b>Aircraft Maintenance Manual</b>	Doc. No.: MD11-AMM-00-001
Type: <b>JS-MD Single</b>	Model: <b>JS 3 RES</b>	Issue: 05

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## **10-00-00 PARKING, MOORING, STORAGE AND RETURN TO SERVICE**


### **General**

Chapter 10 describes the processes to follow when the aircraft is parked or stored. Always follow these procedures to ensure a long service life from the aircraft.

Chapter 10-10-00 PARKING / STORAGE contains information on parking as well as procedures to follow for long and transport storage.

Chapter 10-20-00 MOORING describes how to moor the aircraft. It is recommended that these steps are followed if the aircraft is left outside over night or high winds are expected.

Chapter 10-30-00 RETURN TO SERVICE gives a description on returning an aircraft to service after short- or long-term storage.

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## 10-10-00 PARKING / STORAGE

### General

Follow the procedures in this section to minimise any damage the aircraft can sustain when being parked, transported or stored for long periods of time. When an aircraft is stored for longer than 30 days, follow the long-term storage procedures.

### Parking

If the aircraft is not in use for a few hours, ensure that the reflective cover is placed on the canopy. This will reduce the damage that can be caused and protect the interior when the aircraft is left in the sun.

Ensure the brakes are engaged to prevent the aircraft from rolling.

Ensure the aircraft is parked in such a way that the winglet tips cannot be damaged by people walking by or moving equipment or vehicles. Placing stands under the wings will reduce chances of accidental damage.


### Storage

#### Transport storage

Supporting areas for the road transport of the JS-3 RES are as follows:

1. Fuselage:
  - Tail skid or tail wheel (with tail wheel fairing removed)
  - Main wheel
  - Shell in front of landing gear, minimum length of support 300 mm
2. Wing:
  - Main spar at main pin hole closest to the root rib
  - Skin at root rib, minimum width of support 150 mm
  - Skin at 7.5 m, minimum width of support 250 mm
3. Horizontal Stabilizer:
  - Anywhere on the skin, minimum width of support 80 mm

**WARNING:** The flaperon sandwich construction can be damaged if excessive force is used and should be handled with care.

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**CAUTION:** The removable tail wheel fairing can be damaged if not removed for road transport

### Long term storage

To store the aircraft for periods exceeding 12 months, the following is recommended:

1. Remove the instruments and store separately.
2. Close all external pressure ports and inner tube ends.
3. Protect all metal parts using acid free oil spray or non-corrosive grease (Petroleum Jelly).
4. Close all orifices without preventing air circulation by means of wire cloth or similar means to prevent small animals from entering.
5. Drain all water tanks and force-ventilate water tanks until the inside of the tanks are dry. Remove water filler caps and keep valves open during storage.
6. Leave the airbrakes unlocked on the ground (either rigged or de-rigged) to avoid loading the airbrake caps.
7. Store in a dry environment.

When the aircraft is returned to service, perform an annual inspection as described in AMM Chapter 05–20–00 SCHEDULED MAINTENANCE CHECKS.

Remove all excess anti-rust material, e.g. grease, and inspect all exposed metal parts for corrosion.


Also carefully inspect wings and fuselage for small animals or nests and inspect the pneumatic system for blockage due to nests of insects.

### De-rigging

The procedures for de-rigging the wings and the horizontal stabilizer can be found in AMM Chapter 57–10–00 WING STRUCTURE and AMM Chapter 55–10–00 HORIZONTAL STABILIZER: MAINTENANCE PRACTICES respectively.

### Remove auxiliary items

1. Remove the main batteries. Lock the battery retainers back in position.
2. Remove the total energy tube and temporary equipment (e.g. logger). Install the “Remove before flight”-cover in the multi probe receptacle.
3. Remove the sealing tape on the wing-fuselage junctions, wing-wingtip junctions and tailplane-fin junctions.
4. Ensure that the non-expendable tail ballast tank is drained.


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### Retracting undercarriage

1. Roll the aircraft into the fuselage dolly. (The gear- doors should be approximately 5 cm (2") from the ramp end)
2. Lift the ramp until the main wheel is at least 5cm (2") off the ground.
3. Insert the rigging tool in the tail wheel retract lock cavity.

**CAUTION:** Failing to insert the tail wheel lock pin will result in the tail wheel being retracted with the main wheel. This will result in damage to the tail wheel doors and may damage the tail wheel retraction cable.

4. Retract the main wheel.


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## 10-20-00 MOORING

### General

The aircraft has no dedicated tie-down points. Care must be taken if straps are used on the wings. The straps may in no circumstances over the flap trailing edges. It is advisable to position wing stands under the wings inboard of the tip junction with tie down straps on the outside of Flap 4. A tie down rope across the rear fuselage boom in front of the fin should also be used to prevent the tail from lifting. It is advisable to restrain the rudder. Always tape the airbrake caps if there is a possibility of rain and remember to remove tape during the pre-flight inspection.

**NOTE:** It is recommended to use a brightly coloured tape to tape the airbrake caps.

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## 10-30-00 RETURN TO SERVICE

### General

Perform at least the same inspection as for the annual inspection found in the AMM Chapter 05-20-00 SCHEDULED MAINTENANCE CHECKS.

Inspect wings and fuselage for small animals or nests and inspect the pneumatic system for blockage due to nests of insects.

### Rigging


The JS-3 RES can be rigged by three people without rigging aids or by two people if a fuselage cradle and wing stands are available.

The procedures for rigging the wings and the horizontal stabilizer can be found in AMM Chapter 57-10-00 WING STRUCTURE and AMM Chapter 55-10-00 HORIZONTAL STABILIZER respectively.


### Install auxiliary items

1. Insert the batteries into position in the luggage compartment behind the pilot's head. Secure the batteries in position with the battery retainers.
2. Check the battery fuses on the battery connector boxes.
3. Install the total energy tube and temporary equipment (Logger etc.).
4. Seal the wing-fuselage junctions, wing-wingtip junctions, and the fin-tailplane junctions, using tape.
5. Perform the daily inspections (AMM Chapter 05-30-00 FLIGHT LINE CHECKS), including positive control check on all controls.

**CAUTION:** The convex shape of the canopy can act as a lens and is a fire hazard when the canopy is left open in the sun.


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# **CHAPTER 11 - 00 - 00 PLACARDS AND MARKINGS**

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## 11-00-00 PLACARDS AND MARKINGS


### General

This section lists the cockpit and fuselage placards of the JS-3 RES and their positions and meanings.

In the event that markings are damaged or removed for repairs or maintenance, a new set may be ordered from the manufacturer.

AMM Chapter 11-20-00 EXTERIOR PLACARDS AND MARKINGS gives a general description of the position and meanings of the exterior placards.

AMM Chapter 11-30-00 INTERIOR PLACARDS gives a general description of the interior placards.

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## 11-20-00 EXTERIOR PLACARDS AND MARKINGS

### General

The exterior placards are used to signal a warning about certain areas on the aircraft such as the open static port. Other uses are to give information such as the water level in the tail ballast tanks or a note that only water may be used in the wing ballast tanks.

This section shows the exterior placards, their locations and meanings.

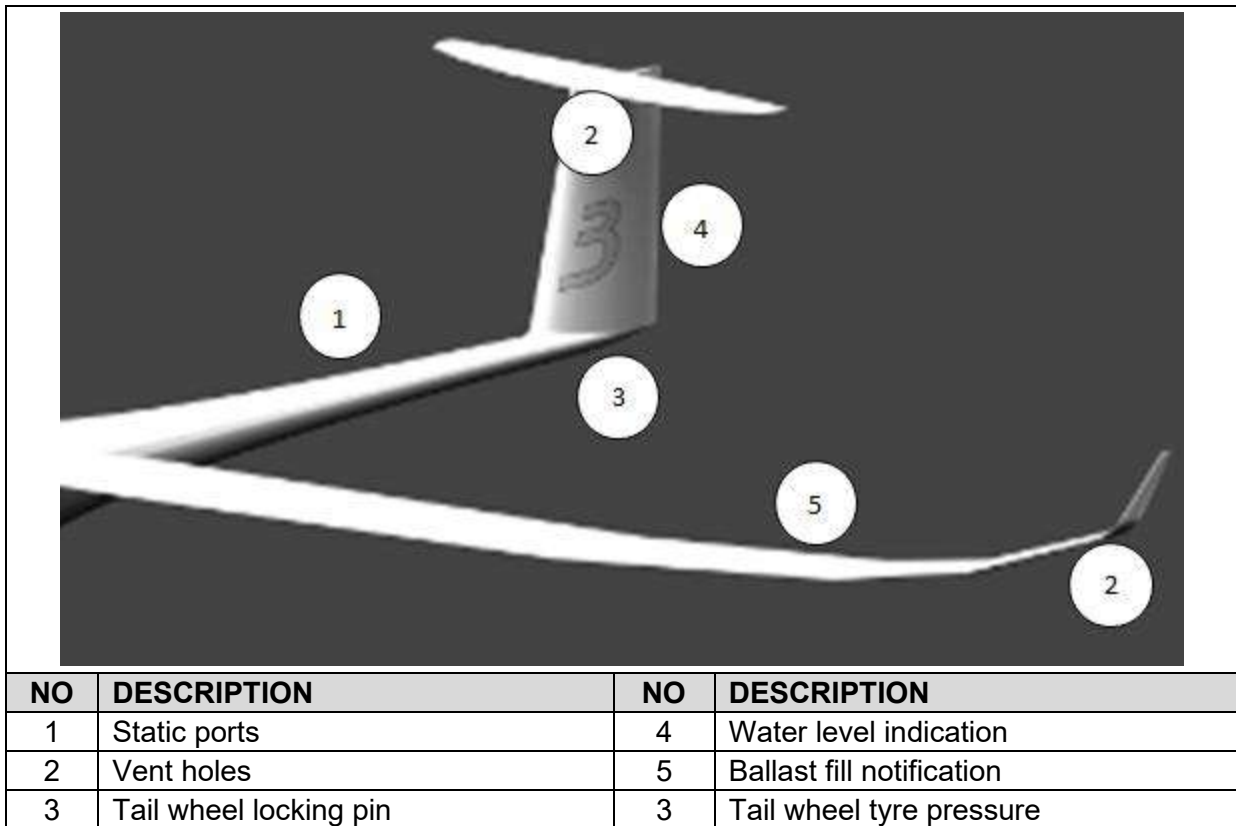


Figure 11-1: Exterior placard locations

### Static ports

The static ports located on the boom of the aircraft are marked with a red ring and must be kept unobstructed to ensure correct ASI readings.

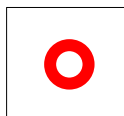



Figure 11-2: Static port marker

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## Vent holes

The vent holes can be found on the upper part of the vertical fin and on the 18 m outboard wing tips (if filler cap is not fitted). It is important to keep these holes clear to ensure the ballast filling procedures function smoothly.

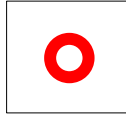


Figure 11-3: Vent hole marker

## Tail wheel locking pin

This placard indicates the hole where the locking pin must be inserted, if the tail wheel should remain extended when the landing gear is retracted (typically when transported in a trailer).

**Tail wheel lock pin**

Figure 11-4: Tail wheel lock pin placard

## Water level indication

The water level indicator is located on the tail of the aircraft. This placard only indicates the level of the water in the tail ballast tanks.

The non-expendable fin ballast tank split into two separate compartments. Figure 11-5 shows the placard for the bottom tank, while Figure 11-6 shows a portion of the upper tank's placard.



Figure 11-5: Fin bottom ballast tank placard




Figure 11-6: Fin upper ballast tank placard

## Tyre pressure

The tyre pressure placard of the main wheel is located on the left main wheel door. This placard indicates the required tyre pressure.

**15m: 2.5 bar / 36 psi  
18m: 3.5 bar / 51 psi**


Figure 11-7: Main wheel tyre pressure placard

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The tyre pressure placard of the tail wheel is located on the right tail wheel door. This placard is not required if the solid tube tail wheel is installed.

**2.5 bar / 36 psi**

Figure 11-8 Tail wheel tyre pressure placard

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## 11-30-00 INTERIOR PLACARDS

### General

The purpose of the cockpit marking is to provide information and to allow the pilot to identify and understand the operation of the secondary controls. The placards and labels give necessary information relating to the operational limits of the aircraft referred to in this manual.

Placards providing information to the pilot can either be fixed placards visible to the pilot or a removable Placard Booklet positioned on the left cockpit side wall.

If all the cockpit placards are not correctly displayed, the airworthiness of the aircraft is compromised. The Placard Booklet may replace fixed placards as indicated in the following sections.

### Manufacturer's data plate

The manufacturer's data plate reflects the model number, serial number and year of manufacturing. Refer to Figure 11-9 for an example of a data plate.

This plate is fixed to the airframe on the right rear bulkhead in the cockpit.

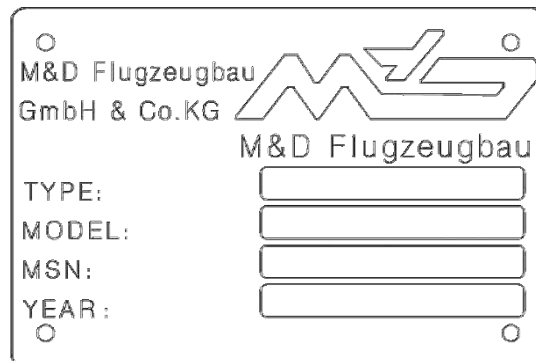



Figure 11-9: Data plate

The registration number plate is a separate plate and is preferably fitted on the left rear bulkhead in the cockpit. Refer to Figure 11-10 for an example of a registration plate.



Figure 11-10: Registration number plate

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## Limitations placard

Limitation placards can either be fixed against the side walls or instrument panel, or furnished as a single Placard Booklet located against the left-hand cockpit side wall.

The placard given in Figure 11-11 is fixed to the left side wall of the cockpit and contains the most important weight and speed limitations.


<b>JS3 RES Limit Airspeeds:</b>			
		kts	km/h
V <sub>NE</sub> Maximum Speed		145	270
V <sub>A</sub> Manoeuvring / V <sub>RA</sub> Rough Air		105	195
V <sub>W</sub> Winch Launch		81	150
V <sub>T</sub> Aero-Tow		97	180
V <sub>PE</sub> Powerplant Extended		81	150
V <sub>PO</sub> Powerplant Extension-Retracton		81	150
V <sub>LO</sub> Max Landing Gear Operating Speed		97	180
<b>Maximum Mass:</b>			
	HV batteries	lbs	kg
15m	0 / 1	1157	525
18m	0 / 1	1322	600
	2	1267	575
<b>Tyre Pressure</b>			
		psi	bar
	Main Wheel 15m	36.3	2.5
	Main Wheel 18m	50.8	3.5
	Tail Wheel 15/18m	36.3	2.5
<b>Approved Aerobatic Manoeuvres (15m and 18m):</b>			
(Restrictions in Flight Manual) Positive Loops; Chandelles; Lazy Eights; Stall Turns; Spins			

Figure 11-11: Limitations placard (JS-3 RES)

The placard in Figure 11-12 is fixed to the left side wall of the cockpit side wall and furnished in the Placard Booklet (see Figure 11-19), containing the loading limitations. The open boxes must contain the loading limits obtain from the weight and balance report and be filled in using permanent marking.

<b>COCKPIT LOADS:</b>		15m			18m		
		Number of batteries installed			Number of batteries installed		
Min cockpit weights		None	1	2	None	1	2
Non-expendable tail tank	0 L			N/A			
	8.9 L			N/A			
Max cockpit weight:				N/A			
Aircraft empty weight:				N/A			

Figure 11-12: Cockpit loads placard

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The placard given in Figure 11-13 is the  $V_{NE}$  vs. altitude placard which gives an indication how  $V_{NE}$  decreases with altitude. This is fixed on the instrument panel or canopy frame and furnished in the Placard Booklet (see Figure 11-16).

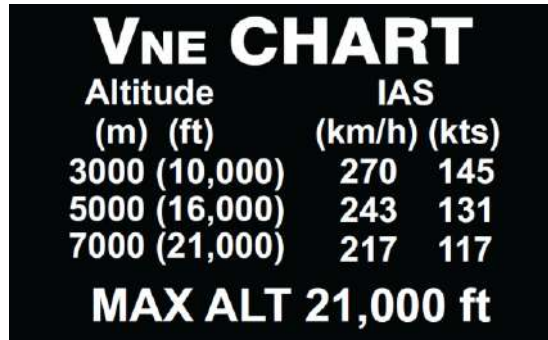


Figure 11-13:  $V_{NE}$  placard

### Pre Flight and pre take-off checks

This placard indicates the pre-flight and pre take-off checks; it is fixed to the bottom of the instrument console and only visible when the canopy is open or furnished in the Placard Booklet.

Pre Flight Checklist	Pre Take-Off Checks
Main wing bolt .....Installed and secured	Cockpit controls.....Reachable
Horizontal tail bolt.....Installed	Flight controls.....Checked
Total energy tube (LH side of tailplane).....Installed	Loading within permissible CG range.....Checked
Pitot/Static tube (RH side of tailplane).....Installed	Parachute & safety harness.....Fastened
Tail wheel lock pin .....Removed	Flight instruments.....Set
Controls .....Freedom of movement	Trim.....Set
Airbrakes .....Operation OK, fasteners are secured	Flaps 4.....Select
Water tank valves .....operation OK	(For improved roll control select flap 1 during initial ground run)
Tail tank outlet.....Clear & dumps with main tanks	Canopy.....Closed & latched
Weight & balance .....Verify within limits	Airbraked.....Closed & locked
Non-expendable tank.....Correct water quantity	Tail dolly & tail wheel lock.....Removed
Tire pressures.....Check	Landing gear handle.....Locked position
Wheel brake pressure .....Check	Wind direction.....Checked
Seat back & rudder pedals.....Adjusted	<b>Winch/Aerotow:</b> Ensure winch operator or tug pilot is familiar with speed requirements and limitations.
Instruments & avionics.....Serviceable	<b>Self Launch:</b> Refer to section H. Ensure both batteries are connected to HV bus and are sufficiently charged.
Batteries.....Check voltage & connection	
CG loading.....Set nose/tail ballast as required	


Figure 11-14: Pre-take off & pre-flight check placard

### Placard Booklet

The Placard Booklet may replace relevant fixed information placards. It is positioned in the cockpit in the holder provided for the booklet.

The information furnished in the Placard Booklet is given in Figure 11-15 to Figure 11-24.

Ensure the issue number on the Placard Booklet corresponds with the issue of the latest Maintenance Manual.

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### Pre-landing Checks

Water ballast.....Ensure dumped  
Wheel brake.....Ensure sufficient break pressure  
Landing gear.....Ensure down and locked  
Flap setting.....Select appropriate setting

**Approach and Landing Flap Settings**

	Flap
Short field landing	L
Normal landing	4
Strong crosswinds	3

### Recommended Approach Speeds

Various Conditions	Load Configuration			
	Empty		MTOM	
	km/h	kts	km/h	kts
Calm conditions	110	59.4	125	67.5
Approach in rain	120	64.8	135	72.9
Strong crosswind	120	64.8	135	72.9

**Strong wind conditions:**  
Increase the approach speed by adding half the wind speed.

Figure 11-15: Placard Booklet – Pre-landing Checks and Recommended Approach Speeds

### Airspeed Limitations

	km/h	kts
Max speed ( $V_{NE}$ )		
Sea level to 3000m (10,000ft)	270	145.8
5000m (16,000ft)	243	131.2
7000m (21,000ft)	217	117.2
Max Winch Launch ( $V_w$ )	150	80.9
Max Aero-Tow ( $V_t$ )	180	97.1
Manoeuvring Speed ( $V_A$ )	195	105.2
Max Rough Air Speed ( $V_{RA}$ )	195	105.2
Power plant Extended ( $V_{RE}$ )	150	80.9
Power plant Extension-Retracton ( $V_{RO}$ )	150	80.9
Max Landing Gear Operating Speed ( $V_{LO}$ )	180	97.1
Max altitude	7000m (21,000 ft)	

### Airspeed Limitations

Max Flap Extended speeds ( $V_{FE}$ )

Flap	Deflection	km/h	kts
1	-3°	270	145.8
2	0°	280	151.1
3	+5°	230	124.1
4	+13.5°	165	89.0
5	+16.6°	165	89.0
L	+20°	160	86.3

**NOTE:** The maximum allowable airspeeds for each flap setting are indicated on the airspeed indicator (ASI) with white triangles at the flap position number.

Figure 11-16: Placard Booklet - Airspeed Limitation Placard

### Winch launch

**Airspeed limitations:**

	km/h	kts
Maximum winch launch speed ( $V_w$ )	150	80.9
Minimum safe winch launch speed:		
No water ballast	115	62.1
With water ballast at MTOW	125	67.5

**Recommended airspeeds:**

	km/h	kts
No water ballast	130	70.2
With water ballast at MTOW	140	75.6

**Recommended loadings:**

	kg	lbs
MTOW for winch launching (15m)	475	1047
MTOW for winch launching (18m)	550	1212

Most aft CG position (recommended) 355 mm 14 in  
Recommended weak link type 750 daN (Tost #3, Red)

### Aerotow

**Airspeed limitations:**

	km/h	kts
Max aerotow speed ( $V_t$ )	180	97.1
Max assisted aerotow speed	150	81.0

Min safe aerotow speeds:

	km/h	kts
No water ballast, calm conditions	115	62.1
MTOW, calm conditions	125	67.5

**Recommended airspeeds:**

	km/h	kts
No water ballast, calm conditions	130	70.2
MTOW, calm conditions	140	75.6

**Tow rope requirements:**

Recommended length	45 - 55 m (148 - 180 ft)
Recommended weak link	600 daN (Tost #4, Blue)
Approved length	40 - 60 m (131 - 197 ft)
Rope type	Textile ropes only

Figure 11-17: Placard Booklet – Aero tow & Winch launch

### Centre of Gravity setup

Non-expendable tail tank recommended loading:

- Use the minimum cockpit weight placard with this table to determine water in non expendable tank

Non-expendable tail tank weight requirements to move cg into allowable envelope (kg)							
Pilot + Parachute	60	70	80	90	100	110	
Min cockpit weight on placard (kg) for number of HV batteries installed	55	-8.7	-0.2	2.3	4.9	7.4	9.9
	57	-3.2	-0.7	1.8	4.3	6.9	9.4
	59	-3.8	-1.2	1.3	3.8	6.4	8.9
	61	X	-1.7	0.8	3.3	5.9	8.4
	63	X	-2.2	0.3	2.8	5.4	7.9
	65	X	-2.7	-0.2	2.3	4.9	7.4
	67	X	-3.2	-0.7	1.8	4.3	6.9
	69	X	-3.8	-1.2	1.3	3.8	6.4
	71	X	X	-1.7	0.8	3.3	5.9
	73	X	X	-2.2	0.3	2.8	5.4
	75	X	X	-2.7	-0.2	2.3	4.9
	77	X	X	-3.2	-0.7	1.8	4.3
	79	X	X	-3.8	-1.2	1.3	3.8

■ Out of CG range   
■ caution range   
■ on 25% aft CG

Expendable tail tank recommended loading:

- To offset the forward CG change due to water in the main wing tanks, the expendable tail tank must be filled according to the following table:

Main tanks (ℓ)	Tail tanks (ℓ)	Main tanks (US gallons)	Tail tanks (US gallons)
0	0	0	0.0
20	1.2	5.3	0.3
40	2.4	10.6	0.6
60	3.5	15.9	0.9
80	4.4	21.1	1.2
100	5.2	26.4	1.4
120	5.8	31.7	1.5
132 <sup>1</sup>	5.8	34.9	1.5

<sup>1</sup> Refer to JS-MD 3 RES Powered Aircraft Flight Manual Table 6-5 for filling values with the optional 156 l main wing tanks.

**Figure 11-18: Placard Centre of Gravity CG and Expendable tail tank loading**

Nose ballast recommended loading:

- Use the minimum cockpit weight placard with this table to determine nose ballast required

Nose trimming weights requirements to move cg into allowable envelope (kg)									
Pilot + Parachute	55	60	65	70	75	80	85	90	95
Minimum cockpit weight on placard (kg) for number of HV batteries installed	72	8	6	4	1				
	74	9	7	4	2	0			
	76	10	8	5	3	0			
	78	11	9	6	4	1			
	80	12	9	7	5	2	0		
	82		10	8	6	3	1		
	84		11	9	7	4	2	0	
	86		12	10	8	5	3	0	
	88			11	9	6	4	1	
	90			12	9	7	5	2	0
	92	Outside CG limits			10	8	6	3	1
94				11	9	7	4	2	0
96				12	10	8	5	3	0

CG within limits - water may be added to non-expendable tail tank to optimize CG

### Recommended Flap Settings

Cruising with no water ballast (45 kg/m<sup>3</sup>)

Flap	Deflection	km/h	kts
1	-3°	180 - V <sub>NE</sub>	97.2 - V <sub>NE</sub>
2	0°	120 - 180	64.8 - 97.2
3	+5°	110 - 120	59.4 - 64.8
4	+13.5°	90 - 110	48.6 - 59.4

Cruising with max water ballast (60 kg/m<sup>3</sup>)

Flap	Deflection	km/h	kts
1	-3°	200 - V <sub>NE</sub>	108.0 - V <sub>NE</sub>
2	0°	140 - 200	75.6 - 108.0
3	+5°	125 - 140	67.5 - 75.6
4	+13.5°	105 - 125	56.7 - 67.5

Climbing (thermalling)

Flap	Deflection	Thermal type
4	+13.5°	Turbulent thermals
5	+16.6°	Smooth thermals

**Figure 11-19: Placard Booklet Nose ballast / Flap settings**

### Cockpit Loads 15 m

**Maximum cockpit weight:** 115 kg / 253 lbs

**Minimum cockpit weights:**

Non-expendable tail tank	Number of HV batteries installed		
	None	1	2
0 L			
8.9 L			

**Aircraft empty weight:**

Number of HV batteries installed		
None	1	2

### Cockpit Loads 18 m

**Maximum cockpit weight:** 115 kg / 253 lbs


**Minimum cockpit weights:**

Non-expendable tail tank	Number of HV batteries installed		
	None	1	2
0 L			
8.9 L			

**Aircraft empty weight:**

Number of HV batteries installed		
None	1	2

**Figure 11-20: Placard Booklet – Cockpit loads**

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Mass Limitations		RES Limitations	
<b>15m configuration</b>		<b>kg</b>	<b>lbs</b>
Max Take-Off Mass (MTOM)	525	1157	
without water ballast	452	996	
Max mass of non-lifting parts at MTOM	340	749	
<b>18m configuration</b>		<b>kg</b>	<b>lbs</b>
Max Take-Off Mass			
with no or single HV battery installed	600	1323	
with 2 HV batteries	575	1267	
without water ballast	500	1102	
Max mass of non-lifting parts at MTOM	340	749	
Max mass in luggage compartment	1.0	2.2	
		<b>Max Propeller RPM</b>	4350 RPM
		<b>Max Propeller RPM (rain conditions)</b>	3800 RPM
		<b>Temperature limitations</b>	<b>°C</b>   <b>°F</b>
		Max motor temperature	120   248
		Max controller temperature	85   185
		Max HV battery temperature	70   158
		Min pre take-off HV battery temperature	0   32
		Max pre take-off HV battery temperature	32   90
		<b>Dual battery</b>	<b>kW</b>   <b>hp</b>
		Max Power for take-off	40   53.6
		Max Continuous Power	25   33.5
		Time limit for Max Power	1 minute
		Min battery SoC for take-off	60%
		<b>Single battery</b>	<b>kW</b>   <b>hp</b>
		Max Power for climb	25   33.5
		Max Continuous Power	12.5   16.7
		Time limit for Max Power	4 minutes


Figure 11-21: Placard Booklet – Mass Limitations & RES Limitations

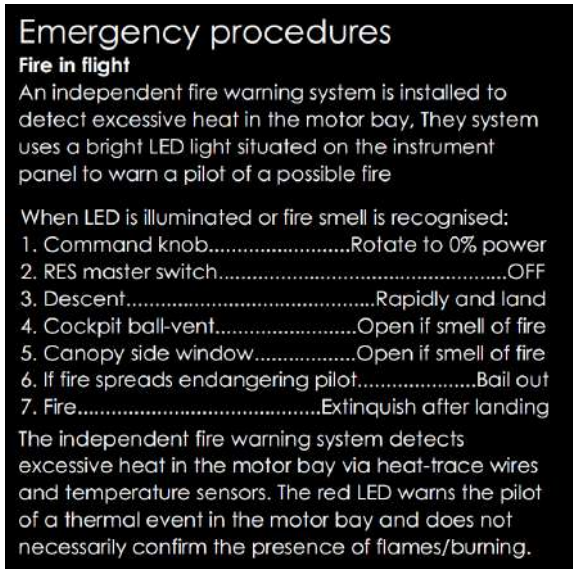
Motor Start Procedure	Emergency procedures
<ol style="list-style-type: none"> <li>RES 12V source.....Select most charged battery</li> <li>RES master switch.....ON</li> <li>Extend/Retract switch.....Push upwards to extend</li> <li>Pylon position.....Check fully extended</li> <li>Ventilation.....Open storm window and cockpit vent</li> <li>Command rotary knob.....Turn clockwise (turn until desired power setting is achieved)</li> <li>Best climb rate (<math>v_y</math>).....110 km/h (60 kts) Flap 4</li> </ol>	<p><b>Take-off abort</b> When it is required to abort a take-off the following is recommended:</p> <ol style="list-style-type: none"> <li>To remove power immediately either: <ul style="list-style-type: none"> <li>Turn command knob.....Fully anti-clockwise</li> <li>EXT/ RETR switch.....Push downward</li> </ul> </li> <li>Wheel brake.....Apply as required</li> </ol> <p><b>CAUTION:</b> If take-off must be aborted when airborne it is critical to ensure a safe approach speed is maintained while the power is cut. Immediately lower the nose of the aircraft from the powered climb attitude to the unpowered glide attitude.</p> <p><b>CAUTION:</b> The propeller will be windmilling when the guarded RES master switch is switched OFF. As a result, the drag increases significantly with a noticeably decrease in glide performance.</p>
<p><b>Motor Stop Procedure</b></p> <ol style="list-style-type: none"> <li>Command rotary knob.....Turn anti-clockwise</li> <li>Power setting.....0 %</li> <li>Propeller position.....Check vertically aligned</li> <li>Extend/Retract switch...Push downwards to retract</li> </ol>	

Figure 11-22: Placard Booklet –RES operating procedures and emergency procedures


Emergency procedures	Emergency procedures
<p><b>Pylon extended but power cannot be applied</b></p> <p>If pylon is extended but safety checks required to allow operation have not been met, it would not be possible to apply power. In this case there are two options:</p> <p>A. Retract the pylon to reduce additional drag, and continue flight as pure glider.</p> <p>B. Recycle the system in an attempt to rectify the failure mode:</p> <ol style="list-style-type: none"> <li>Safe landing field.....Select</li> <li>Speed.....Set attitude for safe flying speed</li> <li>RES master switch.....OFF</li> <li>RES master switch.....ON</li> <li>EXT/ RETR switch.....Push upwards</li> <li>Status.....Confirm "OK"</li> <li>Command knob.....Turn clockwise to apply power</li> </ol> <p>If no power is available, perform a retraction procedure or land with pylon extended</p>	<p><b>Power loss during flight</b></p> <p>If 12V supply power or HV battery power is lost during flight the propeller will windmill. The following action can be attempted to restore power:</p> <ol style="list-style-type: none"> <li>12V system power.....Change to alternate battery</li> <li>RES Master switch.....OFF</li> <li>RES Master switch.....ON</li> </ol> <p>If the HV power is restored after being powered up, the automatic propeller brake will be activated. Normal operation can then be attempted.</p> <p>If HV power is NOT restored and the propeller continues to windmill, land as soon as possible.</p> <p><b>CAUTION:</b> Drag increases significantly with the propeller windmilling.</p> <p><b>CAUTION:</b> Do not retract the pylon while the propeller is windmilling.</p>

Figure 11-23: Placard Booklet – Emergency procedures

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**Figure 11-24: Placard Booklet – Emergency procedures**

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### Cockpit labels

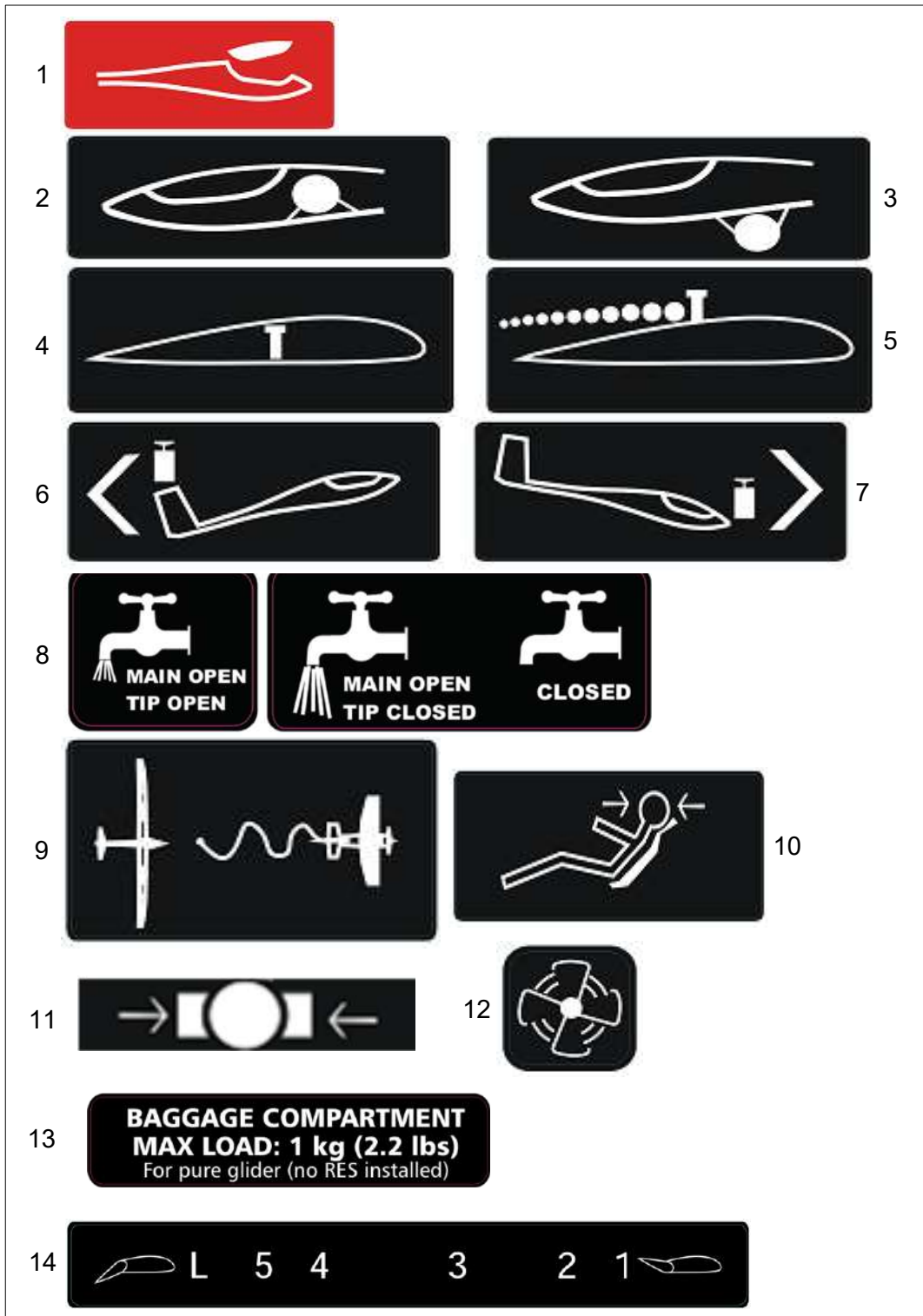


Figure 11-25: Cockpit labels


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Table 11-1 gives the positions of the labels in the cockpit.

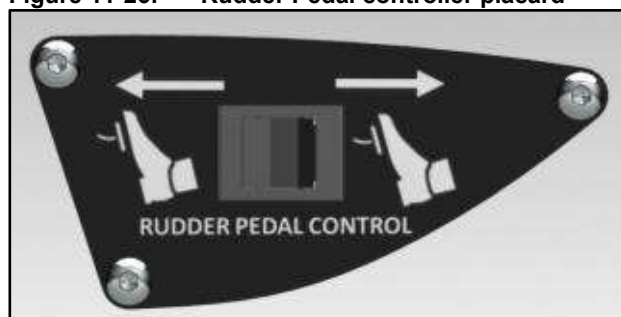
**Table 11-1: Cockpit placards**


Label number	Description	Label position
1	Canopy jettison	On both jettison handles
2	Landing gear retracted	Rear of landing gear lock plate
3	Landing gear extended	Front of landing gear lock plate
4	Airbrakes retracted	Left cockpit side, above A/B lever front position
5	Airbrakes extended	Left cockpit side, above A/B lever rear position
6	Trim-backwards	Rear of trim indicator plate
7	Trim-forward	Front of trim indicator plate
8	Main and tip water valve open and close (18 m)	Water valve lever cover plate
9	Tow release	Left cockpit side, at tow release handle
10	Seat back adjustment	Behind the seat back, above the seat back adjusters
11	Wheel brake	Rear side of brake handle
12	Ventilation	Behind the vent on the right-hand cockpit side
13	Baggage compartment load	On the baggage compartment shelve
14	Flap position placard	Aligned with the flap position indicator on the left cockpit sides

Refer to the JS-MD 3 RES Aircraft Flight Manual for illustrations of the placards' location in the cockpit.


The rudder pedal control panel is situated on the right side of the cockpit behind the eyeball air vent.

**Figure 11-26: Rudder Pedal controller placard**




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# CHAPTER 12 - 00 - 00

## SERVICING

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## 12-00-00 SERVICING

### General

This chapter describes the procedures and other details about the lubrication plan of the aircraft, as well as cleaning procedures.

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## 12-20-00 SCHEDULED SERVICING

### General

All hinge points and metal to metal contact points on the aircraft must be lubricated according to the lubrication schedule. All these points are initially lubricated during manufacturing but will need additional lubrication during the life of the aircraft. This section describes the lubricate requirements of the aircraft.

### Lubrication schedule

#### Lubricants

The aircraft must be lubricated with good quality oils and greases. The following greases are prescribed:

1. Quick Silver Marine Parts and Accessories, Multi-Purpose 2-4-C Marine Lubricant with Teflon®.
2. Super Lube® Synthetic Grease with Syncolon® (PTFE) Multi-Purpose Lubricant.
3. WD-40 water displacing penetrating oil

The following should not be used on the aircraft:


1. Thin spray penetrating oils, as these evaporate off fairly quickly.
2. Any oils and greases containing silicon.
3. Oils and greases containing Molybdenum Disulphide MoS<sub>2</sub> are unsuitable on copper and brass bearings.

#### Lubrication plan

Lubrication is done every time the aircraft is rigged, annually and every five years, as illustrated in Figure 12-1 and described in Table 12-1.

Clean and lubricate each time the aircraft is assembled and during annual inspection:

1. Main pin and bush.
2. Lift pins and bushes on wing roots.
3. All pins and bushes on wing tips.
4. All pins, attachment bolt threads and bushes on horizontal tail.

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Lubricate during the annual inspection:

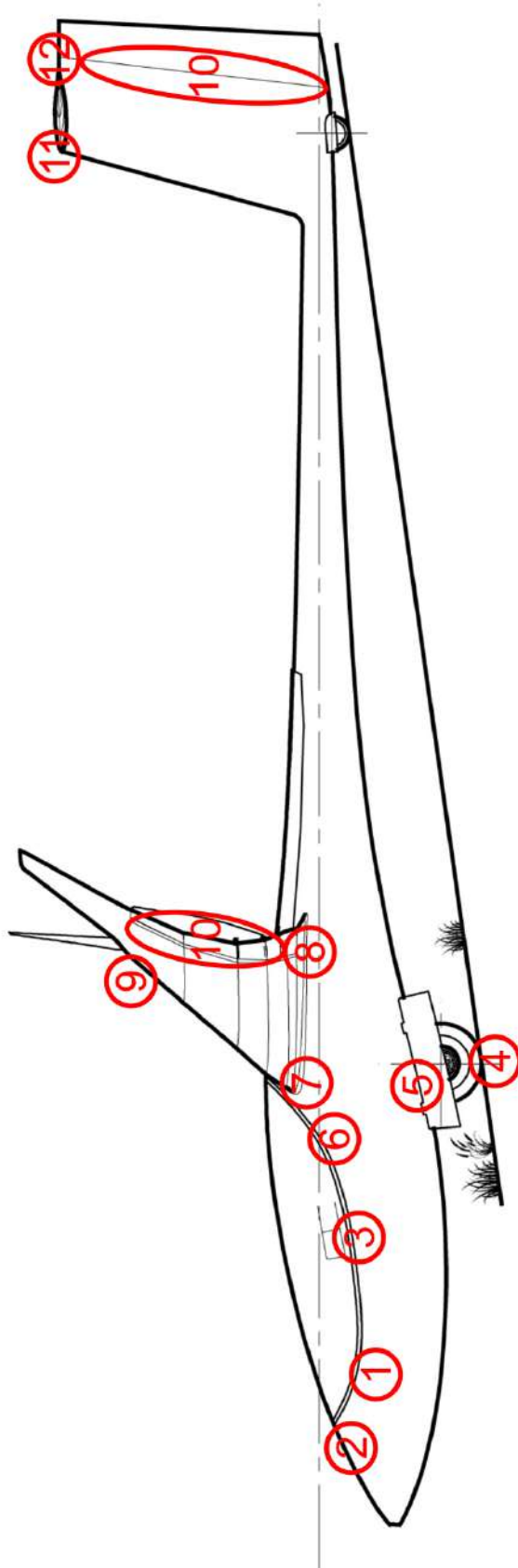
1. Canopy latches
2. Tail plane auto-coupler hinges
3. Rudder pedal slide tube
4. Lubricate tow release cable
5. Seatback adjustment slide tube
6. Tail wheel cable and tail valve cable

Inspect every 5 years and lubricate when required:


1. Landing gear slide tube on right-hand side of cockpit
2. Wheel main bearings
3. Wheel shock absorber slide tubes
4. All control surface hinges
5. Release cable

**Table 12-1: Lubrication schedule**

No.	Description	Lubrication interval	Who may perform lubrication
1	Rudder pedal slide tube	Annually	Pilot or AMO
2	Canopy latches	Annually	Pilot or AMO
3	Landing gear slide tube on right hand side of cockpit	Inspect every 5 years and lubricate when required	Pilot or AMO
4	Wheel main bearings	Inspect every 5 years and lubricate when required	AMO
5	Wheel shock absorber slide tubes	Inspect every 5 years and lubricate when required	Pilot or AMO
6	Seat back adjustment slide tube	Annually	Pilot or AMO
7	Main pins and bushes	When rigging and annually	Pilot or AMO
8	Lift pins and bushes	When rigging and annually	Pilot or AMO
9	All pins and bushes on wing tips	When rigging and annually	Pilot or AMO
10	All control surface hinges (Wings, wing tips, vertical & horizontal tail, wheel doors, engine doors)	Inspect every 5 years and lubricate when required	Pilot or AMO
11	All pins, attachment bolt thread and bushes on horizontal tail	When rigging and annually	Pilot or AMO
12	Tail plane auto-coupler hinges	Annually	AMO
13	Tail wheel cable	Annually	Pilot or AMO
14	Tail valve cable	Annually	Pilot or AMO
15	Release cable	Inspect every 5 years and lubricate when required	Pilot or AMO



**Figure 12-1: JS – MD 3 RES Lubrication location**

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## Bearings

The JS-3 RES uses the following types of bearings and bushes:

1. Deep groove sealed bearings on control circuit hinge points.
2. Sealed rod ends in the control circuit.
3. 14C6 Open self-aligning bearings.
4. Taper roller bearings for the main wheel.
5. Metal to metal bushes.
6. Linear bearing.

These bearings should be lubricated as follows:

1. Deep groove sealed bearings – No lubrication required.
2. Sealed rod ends in the control circuit – No lubrication required.
3. 14C6 Open self-aligning bearings - Factory sealed, no lubrication required.
4. Taper roller bearings for the main wheel - Bearing grease every 5 years.
5. Metal to Metal bushes - Grease whenever the bush is opened or every 5 years.
6. Linear bearings - No lubrication required.

## Canopy latches

The canopy latches should be lubricated annually with grease.


## Release hooks

Clean the release hooks with compressed air while moving the mechanism. Maintain hooks according to the TOST recommendations. See AMM Chapter 27-90-00 TOW RELEASE for hook removal.

## Control surface hinges


Although the control surface hinges only require lubricating every 5 years (Table 12-1), and requires the removal and replacement of the bottom surface Mylar and Teflon tape, this task can only be done by an approved AMO or authorised representative.

Control surfaces of the JS-3 RES are covered on top and bottom with Mylar seals, isolating the hinges from the environment. The hinges can be lubricated with the prescribe lubricants. Make sure the grease contains no MoS<sub>2</sub>, as the bushes are manufacture from brass. The Mylar strips and sealing must be removed before the hinges can be lubricated.

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**NOTE:** Replace the Mylar and sealing tape after hinge lubrication. The JS-3 RES is not allowed to fly without all the Mylar strips in position, as this might affect the flutter speed of the aircraft.

The rudder top hinge is a Vesconite bush that does not require any lubrication. If this bush gets worn, a replacement can be ordered from the manufacturer.

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## 12-30-00 UNSCHEDULED SERVICING

### General

This section describes procedures and information on cleaning the aircraft.

### Exterior cleaning

The purpose of the outer surface finish is to present a good aerodynamic surface to the air when flying, but also to protect the structure from the environment. The main enemy for the structure is UV rays and moisture. UV rays will decompose the epoxy cross links and will destroy the structural integrity of the aircraft. An Acrylic 2K paint system protects the structure. The surface coat may degrade while protecting the structure. Yellowing over time is an indication of surface coat degrading.

Clean the outside of the aircraft with water and a mild detergent. Never use acetone or lacquer thinners to remove tape residue. Rather use a silicon free polish. Immediately after washing the aircraft, dry it off with a soft chamois. Special care should be taken to not let water flow into the hinge line and airbrakes.

### Canopy cleaning

The canopy must be protected from scratches. Always wash dust off by using liberal amounts of water with a soft chamois, taking care not to let dust get between the chamois and the canopy surface. Dry with a clean chamois. The canopy can be polished with a non-abrasive canopy polish with a rating of 5000 grid or higher.


Never clean the canopy with acetone or lacquer thinners as this will instantly create micro-cracks. Contact the manufacturer for recommended canopy polishes.

### Interior cleaning

The inside of the cockpit can be cleaned with mild soap and water.

### Water tanks

See Section 41-10-00

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**WARNING:** Never use any of the following products on your aircraft:

- Trichloroethylene
- Carbon tetrachloride or similar hydrocarbon chlorides
- Any product containing silicon

### **Pins, bushes and control systems**

Bare metal surfaces that are not protected with paint must be protected with a thin film of grease.

### **Seat belt harness**

The seat belt harness must be checked regularly for frayed edges, mildew and wear.

The fittings and buckles must be checked regularly for corrosion and proper functioning. Also refer to seat belt harness manufacturer's maintenance instructions.


### **Tow release**

Clean the nose and CG regularly by means of pressured air and lubricate according to the manufacturer's prescription AMM Chapter 12-20-00      SCHEDULED SERVICING.

### **Longitudinal push rod bearings**


Linear bearings are being used throughout the wing control system for the airbrakes and flaperon, and elevator control systems.

These bearings must never be greased or oiled. The oil and grease will pick up dust and foreign matter that will destroy the soft surface of the plastic balls.

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# CHAPTER 20 - 00 - 00

## STANDARD PRACTICES

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## 20-00-00 STANDARD PRACTICES: AIRFRAME

### General


AMM Chapter 20-00-00 STANDARD PRACTICES: AIRFRAME contains all the torque values for fastening the bolts on the JS-3 RES. It is important to follow these values in order to prevent damage to the aircraft.

### Standard torque values


The maximum allowable torques values for standard bolts are given in the Table 20-1:

**Table 20-1: Standard torque values**

Thread size	Torque (Nm)	Torque (ft. lbs.)
M3	1.8	1.30
M4	3.6	2.60
M5	6.4	4.63
M6	16	11.57
M8	32	23.15
M10	57	41.32
M12	92	66.54


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# CHAPTER 24 - 00 - 00

## ELECTRICAL POWER

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## 24-00-00 ELECTRICAL POWER

### General

The main power in the aircraft is a 12V DC system, supplied by maintenance-free dry-gel type or LiFePO-4 12V batteries.

Two main batteries are fitted in the luggage/battery compartment. Batteries are identified and labelled as follows:

**Table 24-1: Battery Labelling**

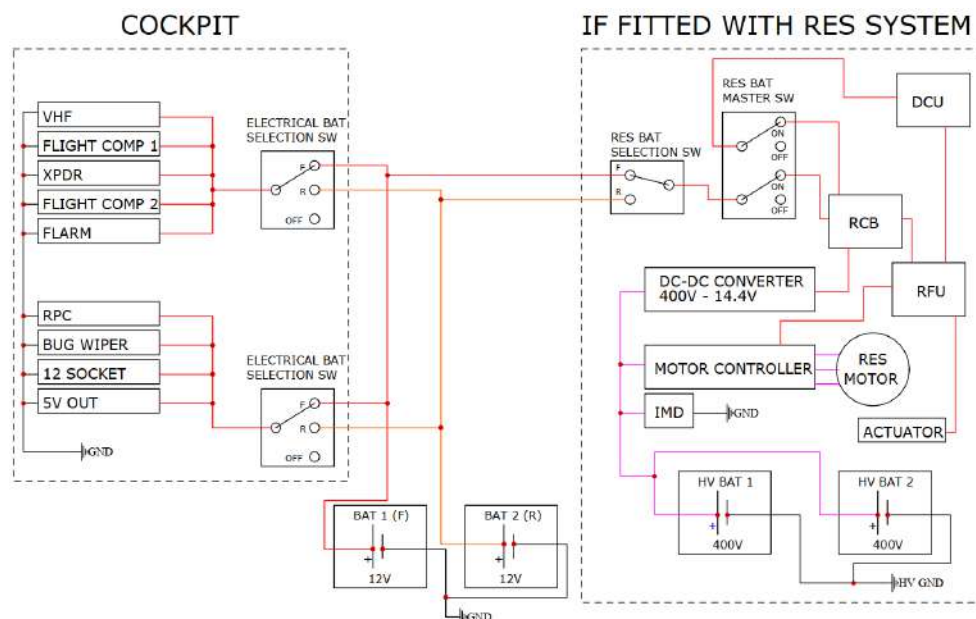
Battery name	Location in aircraft	Battery identifier used in manual	Label on selection switch
Main battery 1	Beneath seatpan	BAT 1	F
Main battery 2	Behind seatback	BAT 2	R

### System description


12V DC Power is supplied to three separate electrical systems:

1. Avionic bus
2. Electrical system (5V power supply, Bug wipers etc.)
3. RES (if fitted)

A master switch arrangement enables the pilot to supply power to three independent systems.



**Figure 24-1: Power distribution**

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Electrical wires are installed in the fuselage from the batteries to the instrument panel via looms routed through the channel on the right- and left-hand side of the cockpit.

**NOTE:** The connector pin layout is provided in AMM Chapter 92-00-00 WIRING DIAGRAMS AND CHARTS.

## Master switch arrangement

A master switch arrangement is used to switch on the avionic system and electric system.



Figure 24-2: Master switch placard

These systems can be switched ON independently.


## Power source selection

Battery selection for the avionics and electrical systems are on the switch arrangement, allowing selection between the Battery 1 (F) or Battery 2 (R).

Dividing the avionics and electrical system in separate systems allows the pilot to supply power from separate batteries or from the same source.

The following systems are typical powered by the avionics and electrical busses:

1. Avionic Bus:
  - VHF radio
  - Primary flight computer
  - Primary logger
  - Transponder (if fitted)
  - Secondary flight computer
  - Secondary logger
2. Electrical Bus:
  - Rudder pedal controller
  - Bug wiper system
  - 5V power supply
  - Warning systems (if fitted)

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### RES power source selection (if fitted)

Power to the propulsion system (RFU and RES-DCU) can be selected from either the left or right 12V battery. This is achieved by selecting the appropriate battery on the RES master switch arrangement.

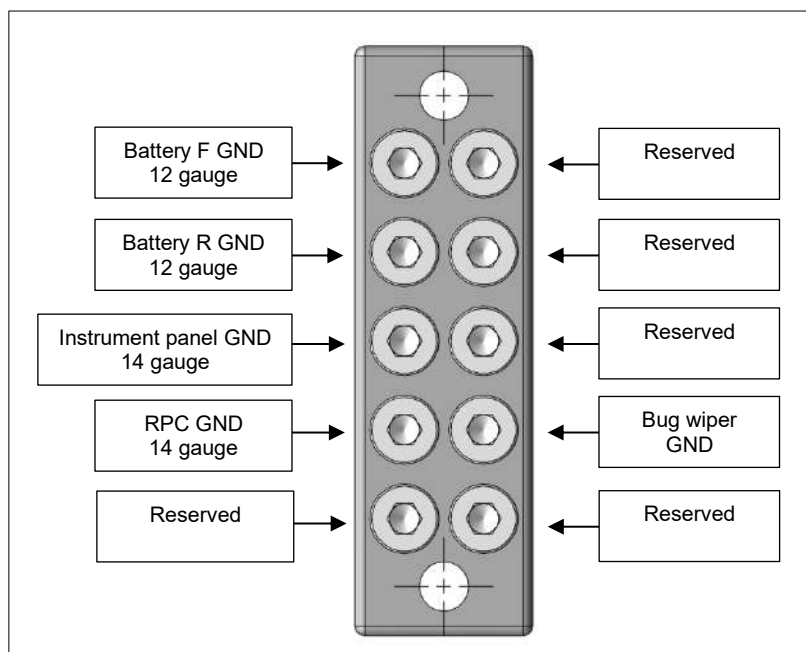


**Figure 24-3: RES Master switch and battery selector**


Refer to JS-MD 3 RES Flight Manual Supplement Section 8.2 for more information on the electrical system.

### Common ground terminal block

All the common grounds of the aircraft are connected at the ground terminal block. The common ground terminal block is located in the fuselage centre section.



**Figure 24-4: Ground block pin layout**

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## Overload protection

Each 12V main battery must be equipped with a circuit breaker box fitted on top of the battery. Refer to AMM Chapter 24-61-00 BATTERIES for details.


Overload protection is provided for each electrical system by means of circuit breakers. The circuit breakers rating for each system must comply with the specifications of the equipment manufacturer. The schematic wiring diagram of the electrical system is given in AMM Chapter 92-00-00 WIRING DIAGRAMS AND CHARTS.

## Toggle switch definition

Toggle switches used in the aircraft are listed in Table 24-2.

**Table 24-2: Toggle switch configuration**

Description	Switch type	Switch configuration	Amps rating	Locking
Avionics master switch	DPDT	ON-ON-ON	6A	Yes, Blue
Electric master switch	DPDT	ON-ON-ON	5A	Yes, Silver
RES master switch	SPDT	ON-OFF	20A	No, Silver
RES Battery selection switch	DPDT	ON-ON	5A	Yes, Silver
Bug wiper controller switch	SPDT	(ON)-OFF-(ON)	5A	-

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## 24-30-00 SOLAR PANELS AND DC VOLTAGE REGULATION

### General

The electrical system power supply mainly operates on 12V batteries that are charged externally. An optional Solar panel can be installed to extend battery capacity.

### Solar charging system

An optional solar panel is installed to charge the batteries. A selector switch allows the regulated current to be directed to a selected battery.


Solar voltage regulation is provided by a regulator fitted in the instrument panel.

### USB charging port

Optional USB external charging port is rated at 2.1 A per port with 12V input and 5V output.



**Figure 24-5: Dual USB Charging Port**

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## 24-61-00 BATTERIES

### General

Batteries used in the aircraft must be of a sealed type.

### Description

The following are recommended battery types used in the JS-3 RES aircraft:

**Table 24-3: 12V Battery types**

Battery type:	Main battery (front)	Main battery (rear)
Dimensions	80 mm x 54 mm x 138 mm	190 mm x 143.6 mm x 36 mm
Fuse	25 A	25 A
Recommended types	12V Sealed lead acid battery (minimum 7Ah); OR 12V LiFePO4 (capable of delivering 30A for short periods and sustained 10A.)	

Installation and type of replacement batteries must comply with CS-STAN SC034a. Cells used in LiFePo4 batteries must comply with the following standard:

- RTCA DO-347 (Certification Test Guidance for Small and Medium Sized Rechargeable Lithium Batteries and Battery Systems);
- UL 1642, (Standard for Lithium Batteries), or
- UL 2054 (Standard for Household and Commercial Batteries)

Additionally limitations for the use of LiFePO4 batteries:

- The battery shall have an integrated battery management system provided by the battery manufacturer
- The battery shall have a maximum capacity of 160Wh

Batteries are equipped with circuit breaker enclosures fitted on top of the battery. Battery circuit breakers provide protection to the electrical cables routed to the instrument panel or RES.


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Figure 24-6 and Figure 24-6 provide the pin layout for the two possible battery connectors. Other connectors are allowed to be installed provided that the maximum current rating can be maintained.

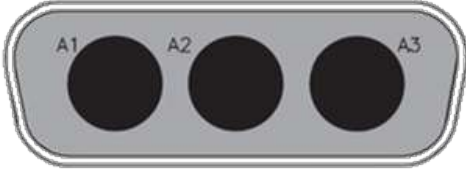
			
Battery 1 (front)		Battery 2 (rear)	
A1	RES (+) (AWG 14)	A1	RES (+) (AWG 14)
A2	Avionics (+) (AWG 14)	A2	Avionics (+) (AWG 14)
A3	GND (AWG 12)	A3	GND (AWG 12)

Figure 24-6: Battery connector pin layout – D-sub connectors

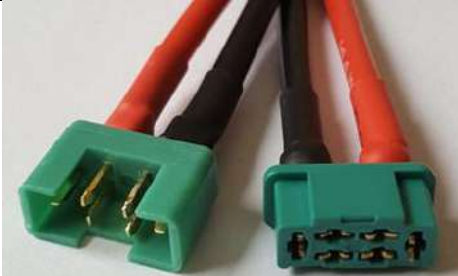


			
Battery 1 (front)		Battery 2 (rear)	
RED	RES (+)& Avionics (AWG 14)	RED	RES (+)& Avionics (AWG 14)
BLACK	GND (AWG 12)	BLACK	GND (AWG 12)

Figure 24-8: Battery connector pin layout – MPX connectors

**WARNING:** Only use the batteries supplied with the aircraft or supplied by the manufacturer's representative. No battery that vents any gas is allowed in the aircraft according the airworthiness requirements of CS-22. Circuit breakers fitted near the terminals protects the batteries and power cables in the event of a short circuit.


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# **CHAPTER 25 - 00 - 00**

## **EQUIPMENT / FURNISHING**

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## 25-00-00 EQUIPMENT / FURNISHING

### General

AMM Chapter 25-00-00 EQUIPMENT / FURNISHING describes the maintenance practices of the pilot's seat and gives more information about the approved safety harness that must be used in the aircraft.

### Miscellaneous


#### Safety harness

A 4-point safety harness is part of the minimum equipment list. The recommended safety harness is shown in Table 25-1.

**Table 25-1: Approved safety harnesses**

Manufacturer	Model	TSO	Service life
Gadringer Gurte GmbH	BAGU 5202; SCHUGU 2700	40.070/32; 40.071/05	12 years

**NOTE:** Contact the manufacturer if you wish to use a different harness than the one specified in Table 25-1.

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## 25-10-00 COCKPIT

### General

The pilot seat adjuster is located behind the seat pan. The procedure to adjust the pilot's seat is discussed in AMM Chapter 25-10-00 COCKPIT: MAINTENANCE PRACTICES.

### Description

Figure 25-1 shows a breakdown of the pilot seat adjuster.

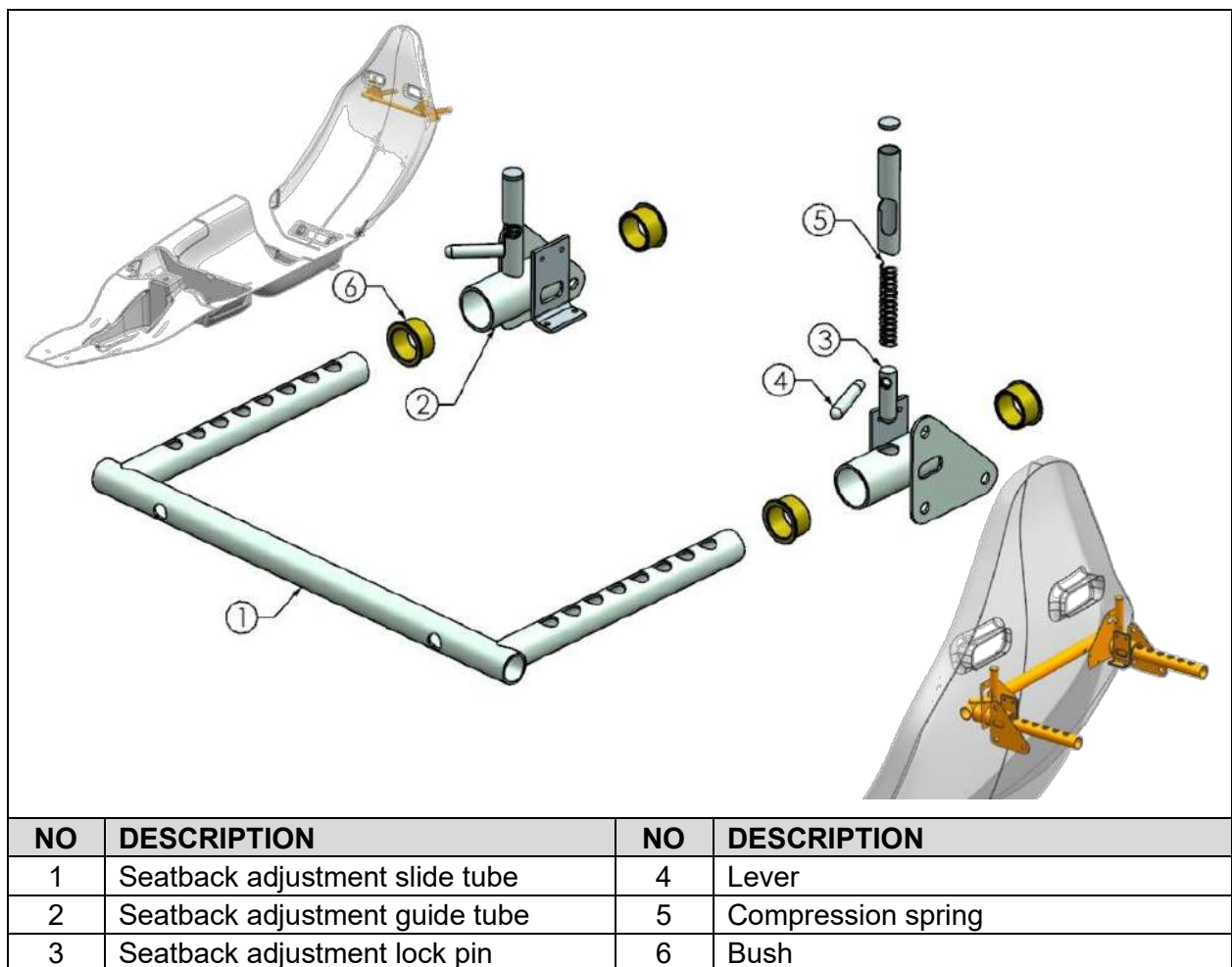



Figure 25-1: Seat adjuster breakdown

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## **25-10-00 COCKPIT: MAINTENANCE PRACTICES**

### **General**


The seat is manufactured from glass fibre, reinforced with aramid fibre for improved crash resistance.

### **Adjust pilot's seat**

The seatback is adjustable on the ground with two thumb screws attaching the base to the seat. The reclined position of the seatback is adjustable by changing the slide tube (Figure 25-1, Item 1) position.



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# **CHAPTER 27 - 00 - 00**

## **FLIGHT CONTROLS**


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## 27-00-00 FLIGHT CONTROLS

### General

The control system of the JS-3 RES, with exception of the rudder system, uses pushrods for control surface actuation. The rudder uses a pull-pull cable system connected to a bell crank linked to the rudder with a pushrod system. Pushrod control tubes are 15.8 mm steel tubes with the only exception the elevator and rudder pushrod in the fuselage which is a 16 mm aluminium tube. The elevator pushrod in the fin is made of aramid fibre to avoid radio interference.

Pushrods are supported by maintenance free roller ball bearings. Other bearings are sealed except for the self-aligning bearings that are grease packed and sealed in with a rubber seal to keep dust out.

**NOTE:** Parts referred to throughout this document are for reference only

AMM Chapter 27-10-00 FLAPERONS gives a more detailed description of the system as well as maintenance practices on the flaperons of the aircraft.

AMM Chapter 27-20-00 RUDDER gives a more detailed description of the system as well as maintenance practices on the rudder of the aircraft.

AMM Chapter 27-30-00 ELEVATOR gives a more detailed description of the system as well as maintenance practices on the elevator of the aircraft.

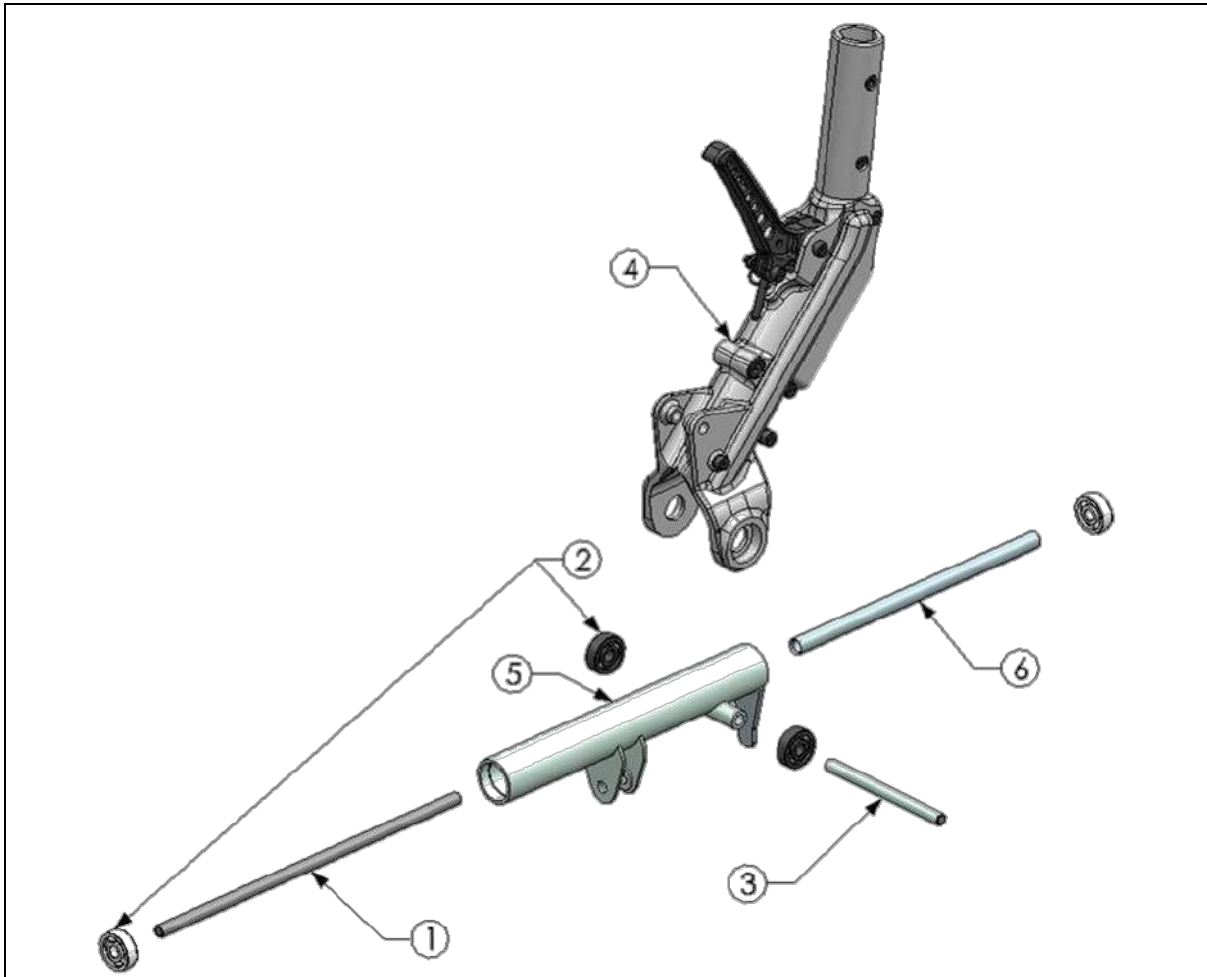
AMM Chapter 27-60-00 AIRBRAKES gives a more detailed description of the system as well as maintenance practices on the airbrakes of the aircraft.

AMM Chapter 27-90-00 TOW RELEASE gives a more detailed description of the system as well as maintenance practices on the tow release system of the aircraft.

### Description


The control stick (Figure 27-1, Item 4) actuates both the elevator and aileron circuits. A 6 mm shaft (Figure 27-1, Item 1) bolted to the bulkhead below the seat pan is connected to the stick with sealed roller bearings (Figure 27-1, Item 2).

The main wheel brake master cylinder is housed in the control stick. Provision is made for the push-to-talk button on the stick, or a stick grip with integrated avionic buttons may optionally be fitted.



NO	DESCRIPTION	NO	DESCRIPTION
1	Aileron hinge stud	4	Stick assembly
2	Bearing	5	Stick roll assembly
3	Elevator hinge stud	6	Bearing compression pipe

Figure 27-1: Control stick breakdown

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## 27-10-00 FLAPERONS

### General

The JS-3 RES is equipped with full span flaperons, i.e. ailerons and flaps that are combined. Aileron input from the control stick is mixed with the flap input from the flap handle. The mixed function is transferred to the wings using an automatic connection unit.

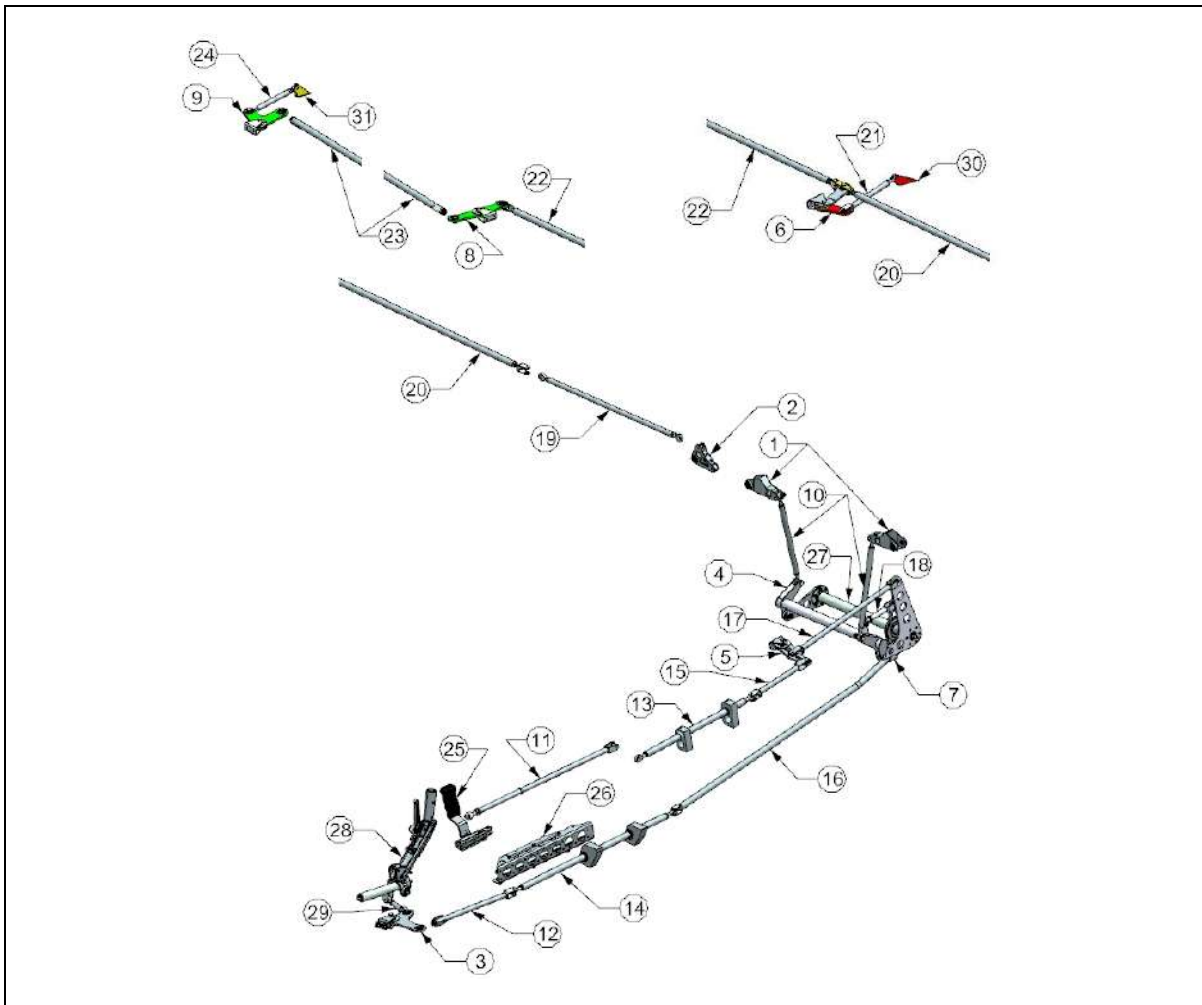
### Description

The mixer unit is located in the fuselage behind the wheel box. The mixer system is designed to give differential aileron throw. The differential increases as the flaps are changed to more positive positions.

Figure **27-2** shows the flaperon system in the fuselage and the right wing. The left-wing system is a mirror copy of the right wing.


The flaperon system in the wing consists of 3 bell cranks (Figure **27-2**, Item 6, 8, 9) and 6 pushrods (Figure **27-2**, Item 19-24). The system is designed and set up that the outer flaperons and the inner flaperons move together without any deflection differences.

The final pushrods in the flaperon system, (Figure **27-2**, Item 21, 24), respectively drive the inner and outer flaperon control surfaces.



NO	DESCRIPTION	NO	DESCRIPTION
1	Auto coupler bucket	17	DR4F
2	Wing-side auto coupler	18	DR5A
3	BC1A	19	DRW1F
4	BC1AF	20	DRW2F
5	BC1F	21	DRW3F
6	BCW1F	22	DRW4F
7	BC2A	23	DRW5F
8	BCW2F	24	DRW6F
9	BCW3F	25	Flap handle assembly
10	DR1AF	26	Flap/airbrake indent plate
11	DR1F	27	Mixer rear arms
12	DR2A	28	Stick
13	DR2F	29	DR1A
14	DR3A	30	BCW4F
15	DR3F	31	BCW5F
16	DR4A		

**Figure 27-2: Flaperon system breakdown**

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## 27-10-00 FLAPERONS: MAINTENANCE PRACTICES

### Flaperon deflection measurements

Table 27-1 gives the required flaperon deflections for the JS-3 RES. The measurement position is at the inboard flap position at the root fillet as shown in Figure 27-3. Measurements are taken at this position as all the flaps and ailerons move together.

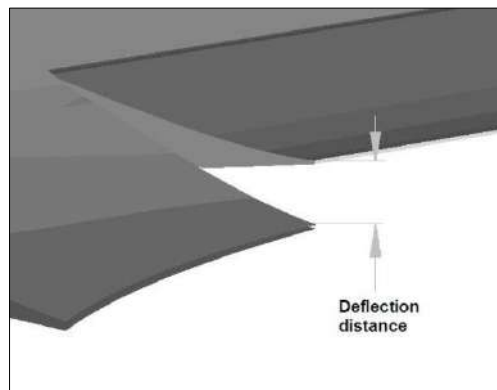


Figure 27-3: Flaperon Deflection


The measurement of the flaperon deflections are measured at the wing root from the top of the fairing to the top of the flaperon TE.

Deflections are measured with a ruler or vernier calliper as a direct distance between the flaperon and root fairing. Table 27-1 gives the flaperon ranges measured. Both Flap setting and aileron deflections are measured:

1. Flap deflections are measured with the stick in the centre position.
2. The aileron deflections are measured with the Flaps in position 2.

Table 27-1: Flaperon deflections

Flap setting	Flap angle	Aileron neutral	Tolerance	Aileron full deflection	Tolerance
1	-3°	-12.5 mm	±2 mm	-	-
2	0°	-7 mm	±2 mm	-33/+13 mm	± 3 mm
3	5°	2.5 mm	±2 mm	-	-
4	13.5°	17.5 mm	±2 mm	-	-
5	16.7°	23.5 mm	±3 mm	-	-
L	20°	29.5 mm	±3 mm	-	-

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## Aileron stop adjustment

If the measured aileron deflections are outside the tolerances given in Table 27-1, the aileron stop adjustment procedure should be followed.

### Tools required

- 1.5 mm Hex key
- 3 mm Hex key
- Size 8 spanner

### Procedure

1. Remove the upholstery.
2. Remove the control cover.
3. The aileron stops are shown in Figure 27-4. Adjust both stops until the aileron deflections in both flap settings at full left and right stick conforms to the tolerances given in Table 27-1.

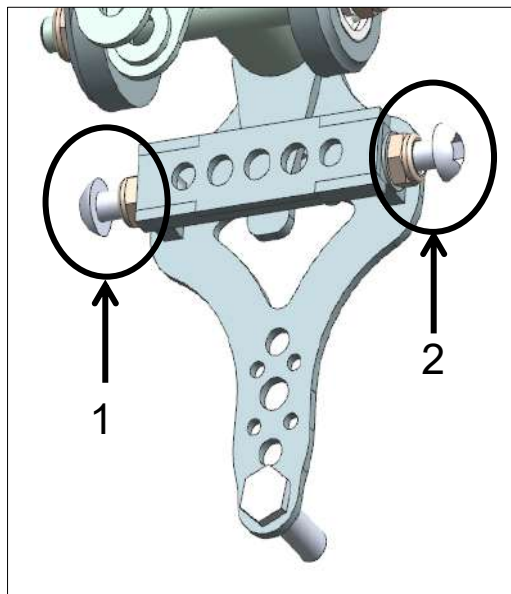



Figure 27-4: Aileron stop location

4. Lock the stop locknuts.
5. Reinstall the control cover.

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## Adjustment of flap 1 relatively to flap 2


To set up flap 2 relative to flap 1, use the following procedure:

1. Set flaps to zero position (flap setting 2).
2. Place an inclinometer next to the control horn on flap 1.
3. Set the inclinometer to zero.
4. Place inclinometer next to the control horn on flap 2.
5. Adjust the rod end of the flap 2 driver by turning clockwise or anti-clockwise until the inclinometer displays zero.
6. When inclinometer displays zero, apply Loctite on the bolt and tighten the locknut.

## Correction of flap deflection with an incorrect offset over the flap range

Table 27-1 gives the required flaperon deflections for the JS-3 RES. If the flaps deflections are out of limits with a similar offset, the following corrective procedure can be followed:

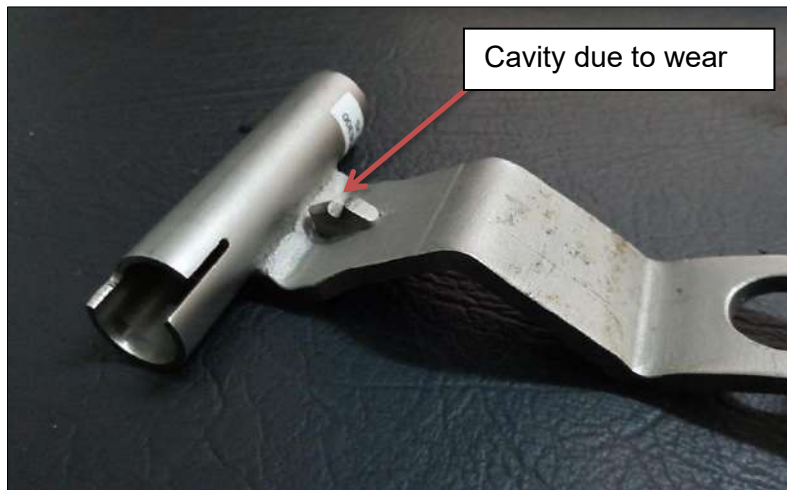
1. Ensure the stick is held in the centre position and will not move during the measuring process.
2. Measure the flap deflections using the procedure provided in Flaperon maintenance practises.
3. Determine what adjustment to the flap output is required (more positive or less positive flap setting for a specific selected flap).
4. De-rig the wings.
5. Disconnect DRW1F (Figure 27-2, Item 19) from the Wing Side Auto Coupler (Figure 27-2, Item 2) on both wings.
6. If more positive flap is required for every selected flap setting, turn the rod end connected to DRW1F out.
7. Perform the same action on the other wing, adjusting the rod-end in the same manner.
8. Bolt the rod end to the Wing Side Auto Coupler (Figure 27-2, Item 2) – perform action for both wings.
9. Rig the wings.
10. Select Flap position 2 and measure the deflection. Set the deflection in Flap position 2 as near as possible to the centre of the allowable range, provided that the other settings are within the allowable ranges.
11. Repeat the adjustment until flap deflections are within the tolerances.
12. Ensure all disturbed control systems are locked and checked.

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## Repair of wear on flap handle lock

The flap handle will wear during operation. An annual inspection is required to ensure the wear is not excessive and positive locking in all flap positions is possible.

The figure below shows an example of excessive wear on the flap handle lock block. If the cavity exceeds 2 mm, the following corrective actions should be applied.



**Figure 27-5: Wear on flap handle lock block**


The following corrective procedure can be followed:

1. Prepare cockpit for a welding operation inside the sailplane.
2. Fill cavity with ER70S-2 or ER80S-D2 using Tig welding process as shown in the figure below.



**Figure 27-6: FH Lock block after weld**


3. Make use of a metal file to file the flap handle lock block to original shape and to file away all rough edges. Figure 27-7 shows an example of a correctly repaired FH lock block.

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**Figure 27-7: Example of correctly repaired FH lock block**

4. Test that the flap plate locks positively in all flap settings.
5. Lubricate the flap lock block with a thin layer of grease to prevent rust developing on the repaired area.

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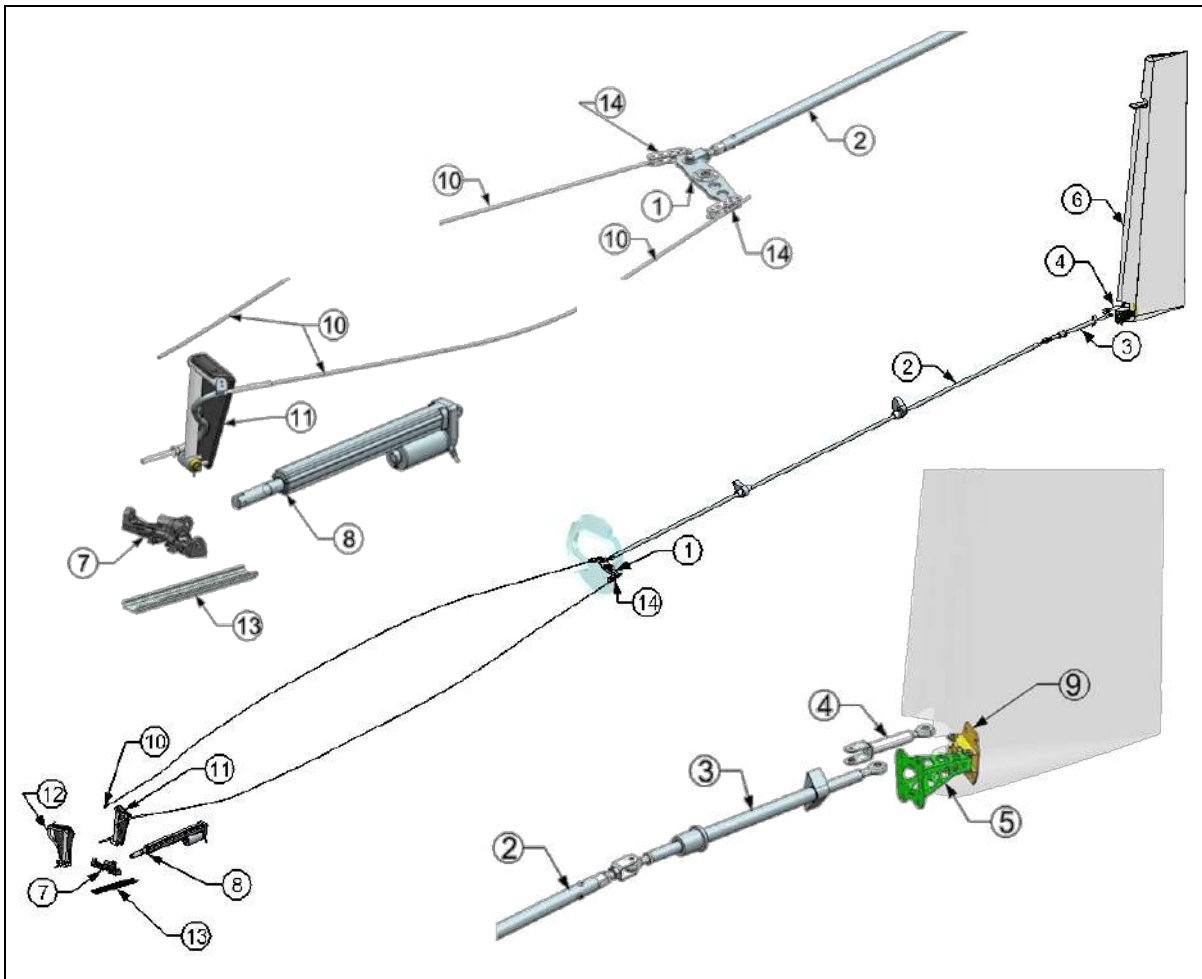
## 27-20-00 RUDDER

### General

The rudder is controlled by the rudder pedals in the front section of the fuselage. Pushing either pedal deflects the rudder in the desired direction.

### Description

The rudder pedals are connected to the rudder with a combination of cables and pushrods as illustrated in (Figure 27-8). Two 3.2 mm (1/8") steel cables link the pedals to a bell crank behind the wheel box. Cable tension is provided by two torsion springs housed inside the rudder pedals, pulling the pedals forward. From the bell crank a series of pushrods drive the rudder.




NO	DESCRIPTION	NO	DESCRIPTION
1	BC1R	8	Linear actuator
2	DR1R	9	Rudder bottom hinge
3	DR2R	10	Rudder cables
4	DR3R	11	Rudder pedal left
5	Fin bottom hinge	12	Rudder pedal right
6	Rudder	13	Slide rail
7	Rudder pedal mount	14	Turnbuckle

**Figure 27-8: Rudder system breakdown**

### Rudder pedal adjustment

The rudder pedals are adjustable to allow for different pilot lengths by an electric linear actuator (Figure 27-8, Item 8), operated via the control panel positioned on the right-side channel. Refer to AMM Chapter 92-00-00 WIRING DIAGRAMS AND CHARTS for details.

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## 27-20-00 RUDDER: MAINTENANCE PRACTICES

### General

The maintenance procedures for measuring the rudder deflection and replacing the rudder control cables are discussed in this section.

### Rudder deflection measurement

The rudder deflection information and measurement procedure are given in this section.

The rudder deflection is measured at the trailing edge on the bottom of the rudder as illustrated in Figure 27-9. Verify the distance of measuring point to the centreline as given in Table 27-2.

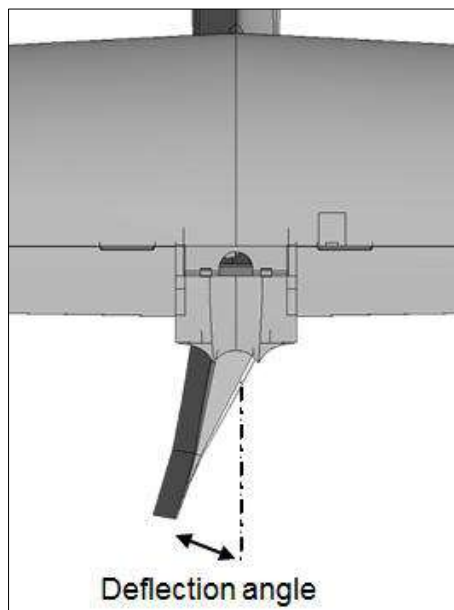



Figure 27-9: Rudder deflection

The rudder deflections are measured by projecting the rudder trailing edge vertically onto the floor with the rudder centred, on the left stop and right stop. This action should be performed by lining up a straight edge tool with the rudder TE and marking the points on the floor. The throw is measured by using a ruler as the distance between the centre mark, and the left and right marks.

Table 27-2: Rudder deflections

Rudder position	Deflection	MPC	Distance at trailing edge	Tolerance
Full left	- 30° ±2°	262 mm	-130 mm	± 9 mm
Neutral	0°		0 mm	± 0 mm
Full right	+ 30°±2°		+130 mm	± 9 mm

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## Rudder stop adjustment

If the measured rudder deflections are outside the tolerances given in Table 27-2 the rudder stop adjustment procedure should be followed.

### Tools required

- 6 mm Hex key
- Size 13 spanner
- Size 13 socket with ratchet

### Procedure

1. If RES is installed, extend pylon to obtain access to B9 where the rudder stop adjustment can be accessed.
2. The locations for the control stops of the rudder system are given in Figure 27-10 .

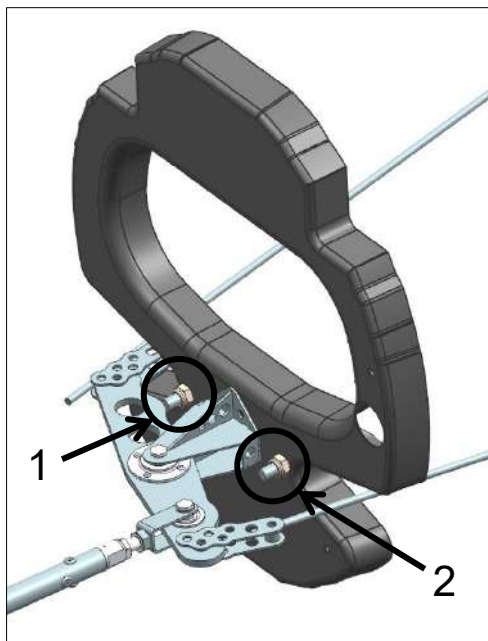



Figure 27-10: Rudder control stop locations

3. If the tolerance is not met when the rudder is in the full left position, number 1 (Figure 27-10) should be adjusted to a more forward position and vice versa for the tolerance not made to the lower limit.
4. If the tolerance is not met when the rudder is in the full right position, number 2 (Figure 27-10) should be adjusted to a more forward position and vice versa for the tolerance not made to the lower limit.
5. Adjust the stop (or stops) in question until the rudder deflection tolerances in Table 27-2 are met.

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6. Lock the stop in position by fastening the locknut.
7. If RES is installed, retract pylon.

### Permissible play

The maximum permissible value of play at the top and bottom hinge pins of the rudder is 1.5 mm or 0.06”.

If there is more play than this tolerance, the source of play must be identified on the hinge parts and worn parts must be replaced.


### Replacement the rudder control cables

#### Tools and materials required

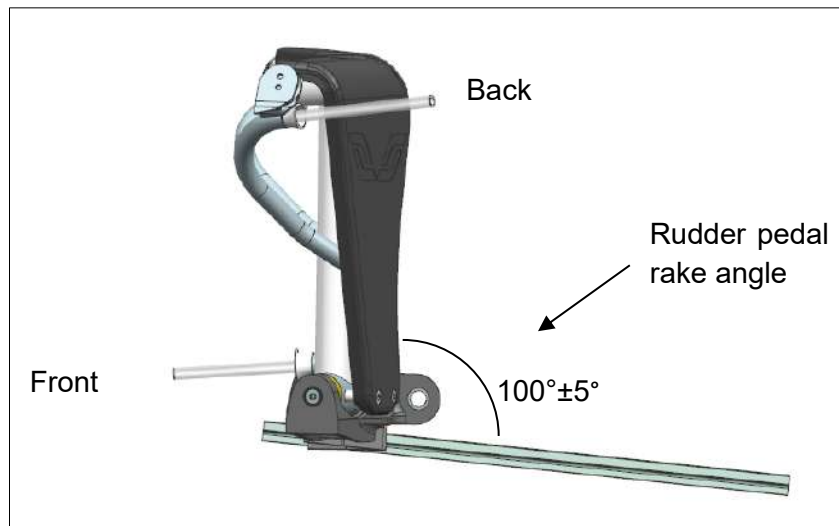
- Ferrule swaging (crimping) tool
- Steel cable cutting tool
- 10 mm ring spanner
- 10 mm open end spanner
- Soldering iron
- Rudder control cables (Stock code 6.5.04, galvanised lubricated)
- 2 x Thimbles (Stock code 4.9.02, for galvanised cable)
- 2 x Cable ferrules (Stock code 4.9.04, clamp (Nicopress) zinc-plated copper)
- 2 x M6 nyloc nuts (Stock code 4.4.10)
- 2 x Rudder pedal sleeve (Part no. 1A-1.21.20.16)
- Masking tape
- Flux cored solder
- Spot marking paint

#### Procedure

1. Remove the ferrules from the adjuster plates located on the rudder bell crank behind B9.
2. Cut both cables close to the ferrules. Refer to AC43.13-1B Sub-part 7-147b for instructions on cutting cables.
3. Remove the B2 cover in the nose.
4. Remove the old rudder cables by pulling them through the B2 access hole.


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5. Route the new cables (6.5.04) through the sleeves in B2.
6. Pull both new rudder cables backwards into the cockpit area.
7. Replace plastic tube inserts in S-tubes.
8. Ensure the new cable end is cut clean, without any loose strands. (Using a soldering iron with flux-cored solder, solder the tip of rudder control cable to secure any loose strands. Once soldered, sand off any excess, and then sand the tip into a conical shape, to allow the cable to easily slide into the S-tube). Feed the end of the new rudder cable through the S-tubes from front to back as depicted in Figure 27-11.
9. Route the cables to the engine bay by feeding the cable through the housings located on the side channel.
10. Centralise the rudder accurately to the centreline of the fuselage. Secure the rudder in position with masking tape applied diagonally on either side from rudder to the tail plane.
11. Feed a new ferrule onto the cable, wrap the cable around a new thimble and pass the free end of the cable back through the ferrule according to AC43.13-1B Sub-part 7-148.
12. Temporarily secure the rudder cables to the adjuster plates on the bell crank using the middle adjustment hole in the adjuster plates.
13. Working on each cable in turn, slide the cable through the ferrules and around the thimbles and tighten until both rudder pedals are approximately centred and at the correct rake angle as depicted in Figure 27-11.



**Figure 27-11: Pedal rake angle**

14. Remove the bolts and sleeves at the rudder cable adjustment plates and carefully remove the rudder cable end. Permanently crimp according to AC43.13-1B Section 7-148. Repeat for the other cable.
15. Secure the rudder cables to the adjuster plates using new M6 nyloc nuts. Refer to AC43.13-1B Sub-part 4: Nuts.

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16. Check that the rudder pedals are centralised with the rudder centralised.
17. Check that the rudder deflection is within the limits prescribed in Chapter 27–20–00, with rudder pedals adjusted both fully forward and rearwards.
18. Verify the integrity of the ferrule swages using the terminal gauge according to AC43.13-1B Sub-part 7-148.
19. Spot mark the newly installed nyloc nuts with spot marking paint.
20. Ensure that all tools and discarded items are accounted for; remove any rag or tissue from the cockpit area and complete the required documentation.

## Rudder bottom hinge replacement

### Tools Required

- ¼" ratchet with a long extension and a 10 mm socket

### Procedure

1. Remove the rudder in accordance with AMM Chapter 55–40–00 RUDDER: MAINTENANCE PRACTICES.
2. Remove the four nyloc nuts attaching the bracket to the composite as shown in Figure 27-12 using a ¼" ratchet with an extension and a 10 mm socket.

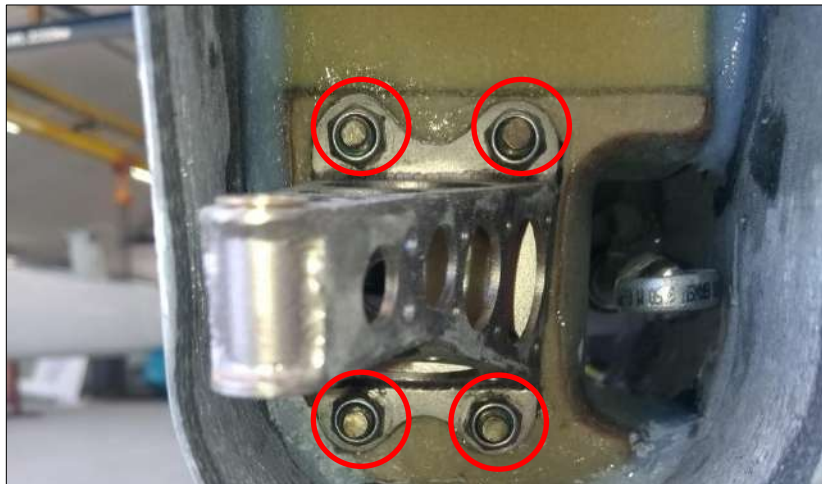



Figure 27-12: Rudder bottom hinge nyloc nuts

3. Remove the bracket.
4. Remove the brass bush from the old bracket as shown in Figure 27-13 by pushing it from the bottom until a grip can be found on the top, it can then be pulled out the top.


**CAUTION:** Do not use metal tools to remove the bush or it will be damaged

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**Figure 27-13: Brass bush removal**

5. Place the new bracket, FIN BOTTOM HINGE (233 91 000 00), on the studs and fasten with new M6 nyloc nuts.
6. Place the brass bush from the old bracket into the new bracket.
7. Reinstall the rudder in accordance with AMM Chapter 55-40-00 RUDDER: MAINTENANCE PRACTICES.

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## 27-30-00 ELEVATOR

### General

The elevators are actuated by the forward/aft movement of the control stick.

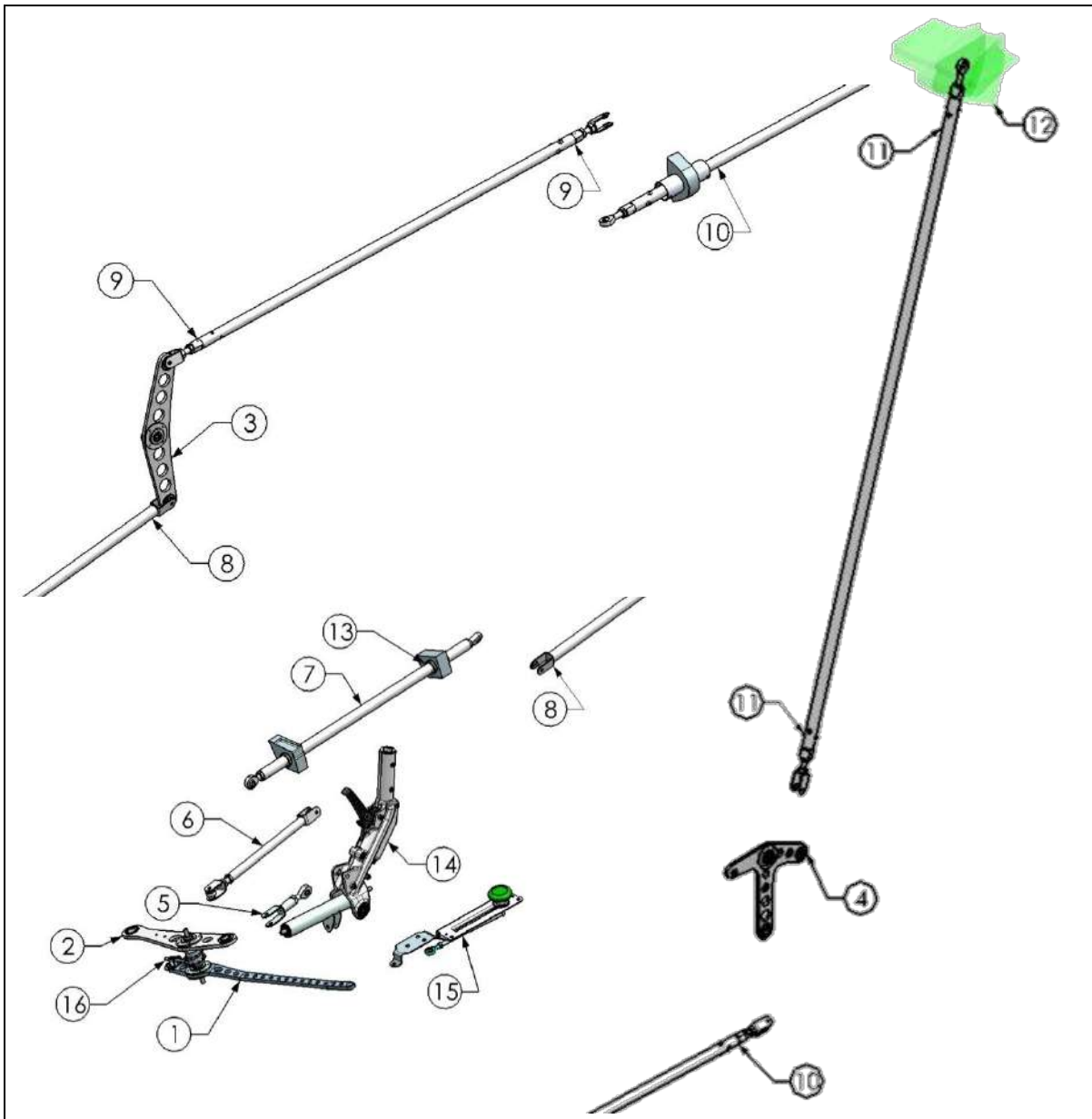
### Description

The control stick is mechanically connected to the elevators through various pushrods and bell cranks. The pushrods in the cockpit and centre fuselage section are situated on the right-hand side of the cockpit (Figure 27-14). Access to these components is possible by removing the control cover on the seat pan and inspection hatch covers on the right-side channel.

The aluminium pushrod in the tail boom (Figure 27-14, Item 10) is connected to a steel pushrod in the centre section (Figure 27-14, Item 8) via a bell crank (Figure 27-14, Item 3), firmly supporting the pushrod (Figure 27-14, Item 10).


The glass fibre pushrod (Figure 27-14, Item 11) in the fin is connected to the aluminium pushrod in the tail boom via a counter massed bell crank (Figure 27-14, Item 4), bolted to the fin bottom rib. The rod end bearing connected to the elevator auto coupler is adjusted to obtain the designed elevator deflections.

Figure 27-14 shows a breakdown of the elevator assembly used in the JS-3 RES.



NO	DESCRIPTION	NO	DESCRIPTION
1	BC1TR	9	DR5E
2	BC1E	10	DR6E
3	BC2E	11	DR7E
4	BC3E	12	Elevator auto coupler
5	DR1E	13	Polymer bearing
6	DR2E	14	Stick assembly
7	DR3E	15	Trim lever assembly
8	DR4E	16	Trim spring

**Figure 27-14: Elevator system breakdown**

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## 27-30-00 ELEVATOR: MAINTENANCE PRACTICES

### General

The maintenance procedures for measuring the elevator deflection are discussed in this section.

### Elevator deflection measurement

Table 27-3 gives the required control surface deflections for the JS-3 RES. The elevator deflections are measured on the surfaces using an inclinometer (Figure 27-15).

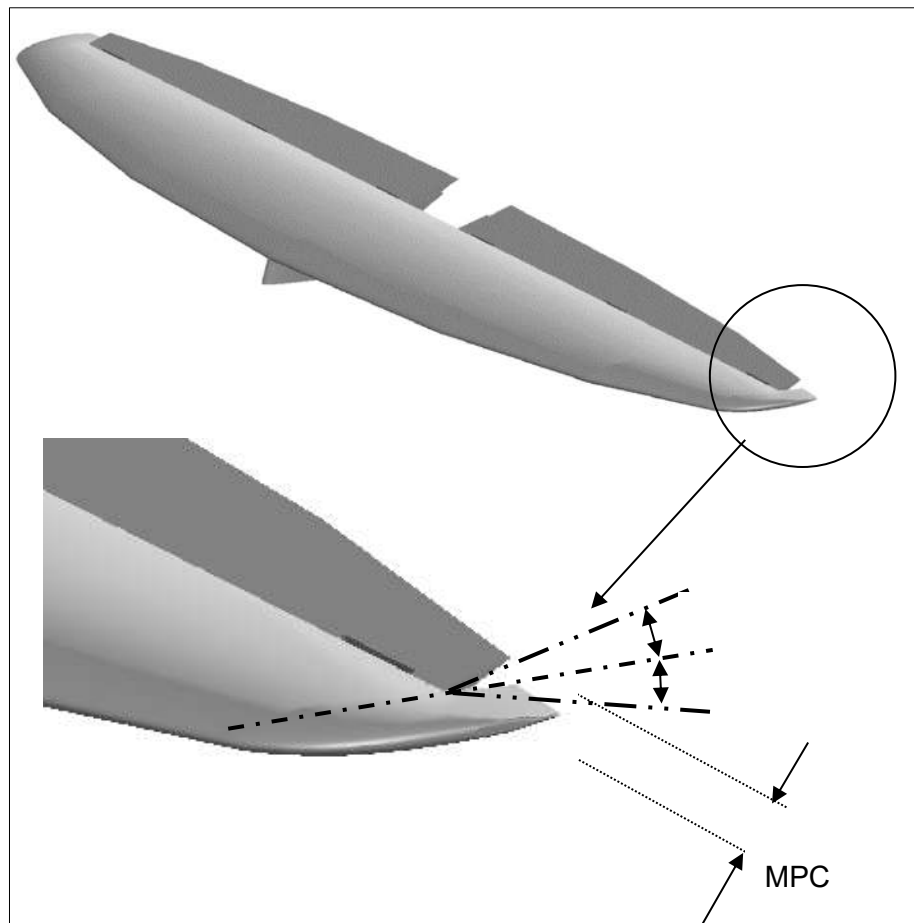



Figure 27-15: Elevator deflection

Set the elevators in the centre position, with the elevator profile matching that of the tailplane tips. Align the inclinometer on the top surface and note the reference angle. Measure the maximum up and down travel.

Measurement of the elevator deflections can also be measured at the tip of the elevator, using the same method as for the flaperon deflections (AMM Chapter 27-10-00FLAPERONS).

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**Table 27-3: Elevator deflections**

Elevator position	Deflection	MPC	Distance at tip	Tolerance
Full up	+ 20°± 3°	45 mm	+15.6 mm	± 2 mm
Neutral	0°		0 mm	± 0 mm
Full down	- 20°±3°		- 15.6 mm	± 2 mm

The maximum permissible value of play at hinge pins of the elevators is 1.5 mm or 0.06”.

### Elevator stop adjustment

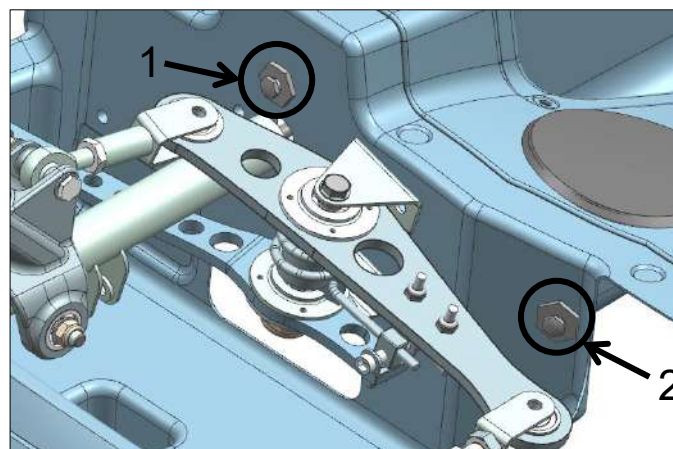
If the measured values are not within the measured tolerances given in Table 27-3, the elevator stop adjustment procedure should be followed.

#### Tools required


- 1.5 mm Hex key
- Size 8 spanner x 2
- Loctite 243

#### Procedure


1. Remove the upholstery.
2. Remove the control cover.
3. The elevator stops are shown in Figure 27-16. If the upper limit tolerance is not met according to Table 27-3 when the elevator is in the full up position, stop number 1 (Figure 27-16) should be adjusted to a more aft position and vice versa for the tolerance not made to the lower limit.



**Figure 27-16: Elevator Stop Location**

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4. If the upper limit tolerance is not met according to Table 27-3 when the elevator is in the full down position, stop number 2 (Figure 27-16) should be adjusted to a more aft position and vice versa for the tolerance not made to the lower limit.
5. Loosen the locknut on the stop (or stops) in question.
6. Adjust the stop (or stops) in question until the specified tolerances in Table 27-3 are satisfied.
7. Mark the correct position on the stop bolt and remove the bolt completely.
8. Clean the bolt and locknut.
9. Apply Loctite 243 to the bolt and locknut and reinstall it to the mark made in step 7.
10. Lock the stops in position by fastening the locknut.

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## 27-31-00 ELEVATOR TRIM

### General

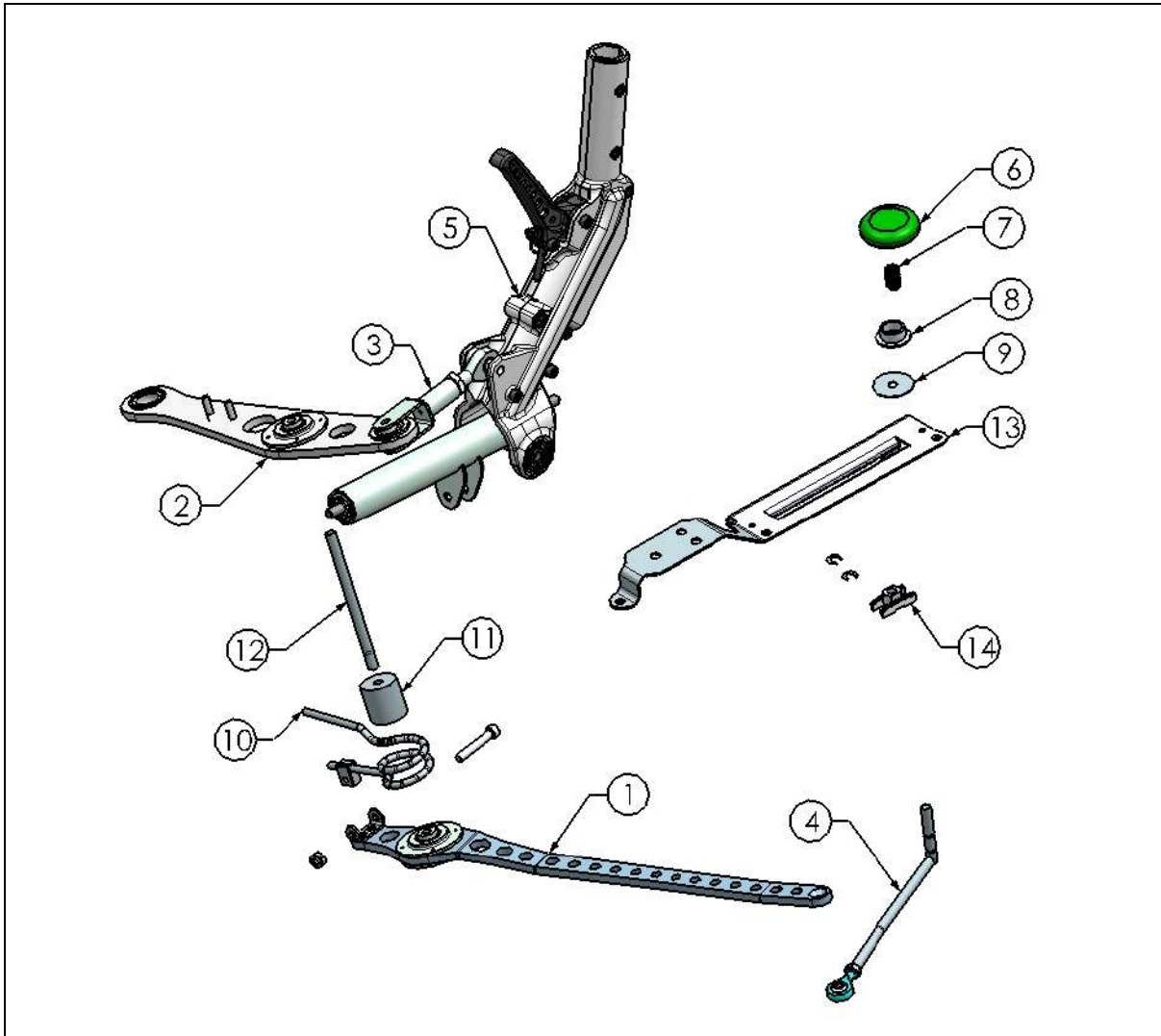
The JS-3 RES has an elevator trim that allows you to trim the aircraft depending on the CG. The trim uses a mechanical system located in the cockpit near the control stick.

### Description

The trim system is fitted below the seat pan and comprises of a trim spring made of “piano wire”-spring steel. The trim bell crank is connected to the elevator bell crank with a spring, as indicated in (Figure 27-17, Item 10).


The trim is set by pressing the trim indicator (green knob), (Figure 27-17, Item 6) down and sliding it to the desired position. When the knob is released, the trim automatically locks into the set position.

The trim slider-knob is located on the left side of the cockpit below the airbrake lever and is connected to the trim bell crank.



NO	DESCRIPTION	NO	DESCRIPTION
1	BC1TR	8	Trim spring housing
2	BC1E	9	Vesconite washer
3	DR1E	10	Trim spring
4	DR1TR	11	Trim spring bush
5	Stick assembly	12	Trim hinge axle
6	Trim adjuster head	13	Trim plate
7	Trim adjuster spring	14	Trim lock block

**Figure 27-17: Elevator trim system breakdown**

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## 27-31-00 ELEVATOR TRIM: MAINTENANCE PRACTICES

### General

The maintenance procedures for the trim and stick setup are described in this section.


### Trim setup

#### Tools required

- Size 8 spanner
- 3 mm Allen key
- Loctite 243

#### Procedure

1. Rig the tailplane.
2. Set the elevator to  $+2 \pm 2_0$  mm from the neutral position.
3. Place the trim adjuster in the aft most position of the trim plate.
4. Adjust the length of DR1TR (Figure 27-17, Item 4) until its rod end can be connected to BC1E (Figure 27-17, Item 2).
5. Place trim handle in the maximum forward position.
6. Check that BC1E is against its forward stop and the elevator is  $15 \pm 1$  mm below neutral.
7. If the above specifications are not met use the adjustment block on BC1TR (Figure 27-17, Item 1) to correct the offset.
8. Lock locknut on DR1TR with Loctite 243.

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## Stick setup

### Tools required

- Size 10 spanner
- Ratchet with size 10 socket
- Loctite 243

### Procedure

1. Close the binnacle.
2. Adjust DR1E (Figure 27-17, Item 3) until the brake lever clears all switches on the instrument panel by  $5 \pm 1$  mm in the most forward stick position.
3. Lock locknut on DR1E with Loctite 243.

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## 27-60-00 AIRBRAKES

### General

The airbrake control lever is located on the left side of the cockpit. This lever deploys the three-blade airbrakes on the wing.

### Description

Figure 27-19 shows the airbrake system layout in the fuselage and the right wing. The left-wing system is a mirror copy of the right wing. The airbrake blades are not shown.

The aileron and airbrake control systems are transferred to the wings via the auto couplers, (Figure 27-19, Item 19). The auto couplers on the fuselage side (female) are adjusted to remove play in the coupling.

The airbrake lock bell crank, BCW1AB (Figure 27-19, Item 5) is located in the airbrake box in the wing. The airbrakes can thus be locked when the aircraft is de-rigged.

During high speed deployment the aerodynamic sucking force cause high acceleration of the brakes which results in a high force and acceleration experienced on the control lever in the cockpit. Often the pilot is not able to control this acceleration of the handle because the force is too high. The airbrake system uses a damper (Figure 27-19, Item 7) to ensure that the airbrake opens at a constant speed, resulting in a much more controlled input.

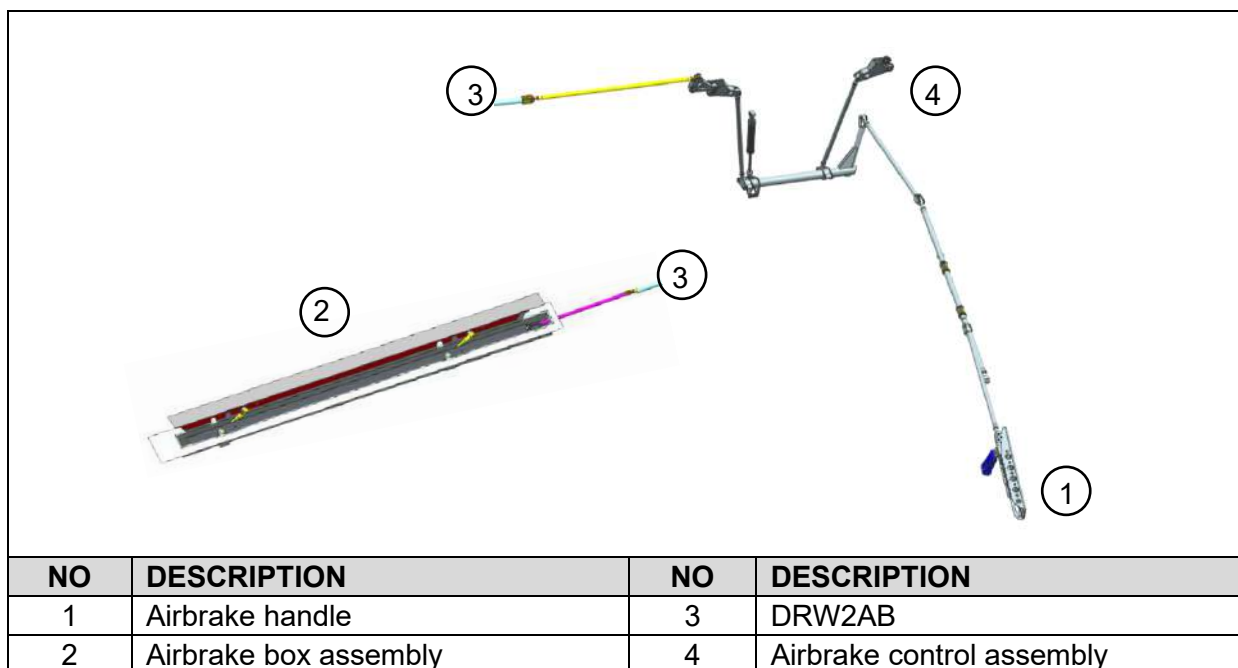
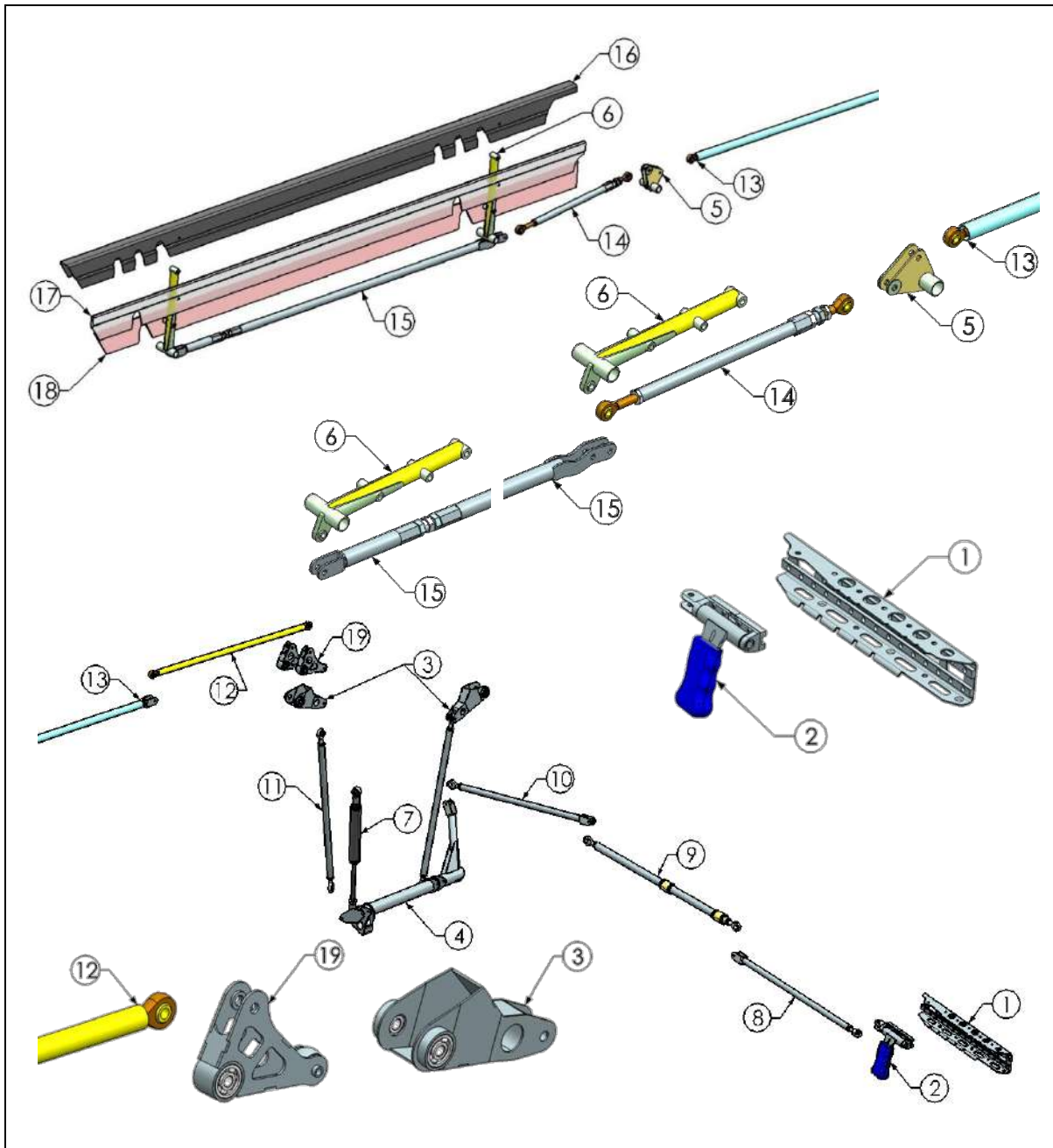



Figure 27-18: Airbrake system assembly



NO	DESCRIPTION	NO	DESCRIPTION
1	Flap/airbrake indent plate	11	DR4AB
2	Airbrake handle assembly	12	DRW1ABF
3	Auto coupler bucket	13	DRW2AB
4	BC1AB	14	DRW3AB
5	BCW1AB	15	DRW4AB
6	BCW2AB	16	Airbrake blade 1
7	Gas damper	17	Airbrake blade 2
8	DR1AB	18	Airbrake blade 3
9	DR2AB	19	Wing-side auto coupler
10	DR3AB		

Figure 27-19: Airbrake system major components

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## 27-60-00 AIRBRAKES: TROUBLESHOOTING

### Airbrake locking forces

The airbrake locking and unlocking forces are too high or low.

1. The forces required to lock and/or unlock the airbrake system become less during operational life.
  - Inspect system for any loose, unlocked or damaged parts
  - Perform “Airbrake in wing setup procedure”.
2. The forces required to lock and/or unlock the airbrake system are excessive after repair or maintenance.
  - Possible disturbance of control system
  - Perform “Airbrake in wing setup procedure”.

### Airbrake cap seating


The airbrake cap does not sit flush with the surrounding wing surface on the ground or during flight.

1. Contamination or paint on the cap landing area (after rework or repairs) prevents the cap from seating properly.
  - Ensure that the airbrake cap landing area is clean and free of contamination.
  - Perform “Airbrake in wing setup procedure”.
2. The airbrake system setup is incorrect.
  - Perform “Airbrake in wing setup procedure”.
3. Damage to airbrake blade 1.
  - Perform “Airbrake blade 1 repair and replacement” procedure.

### Airbrake cap sucked out during high speeds

The airbrake cap can dislodge from the locked position during high speed flight.

1. The airbrake is not seated properly.
  - Perform “Airbrake in wing setup procedure”.
2. The locking force is less than required.
  - Perform “Airbrake in wing setup procedure”.


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## Airbrake blade fouling

There is interference between the airbrake blades and/or the airbrake cap recess, preventing the airbrake system from retracting fully.


1. Compound manufacturing tolerances cause the bottom edge of airbrake blade 3 to move over the edge of the airbrake cap recess when the aerodynamic forces are sufficiently high.

Perform “

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- Airbrake blade 3 fouling” procedure.
2. High temperatures cause airbrake blade 3 to warp, creating interference with airbrake blade 1.

Perform “Airbrake blade 3 warping” procedure.

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## 27-60-00 AIRBRAKES: MAINTENANCE PRACTICES

### Airbrake deflection measurement

The deflections of the airbrakes and procedures to measure the deflection are described in this section.

Table 27-4 gives the required control surface deflections for the JS-3 RES. The airbrake deflections are measured from the wing surfaces using a linear ruler.

The airbrake lever on the left side of the cockpit controls the airbrake deflection.

**Table 27-4: Airbrake deflection**

<b>Airbrake position</b>	<b>Distance from wing surface</b>	<b>Tolerance</b>
Maximum airbrake deflection	155 mm	± 5 mm


This deflection is measured from wing top surface to the top of the airbrake blade with the airbrake fully extended. Figure 27-29 illustrates the measuring of the airbrake deflection.

### Airbrake in wing setup procedure

The setup procedure for the airbrake in the wing is described in this section.

#### Tools required

- M6 H7 reamer
- Size 10 spanner
- Ratchet with size 10 socket
- Loctite 603
- AB Lock unlock setup tool (Tool number TA 231 06 000 00 V1, see AMM Chapter 99-00-00 SPECIAL TOOLS)
- Modelling clay
- Vernier calliper
- Circlip pliers
- Long nose pliers
- Load cell, calibrated scale or similar

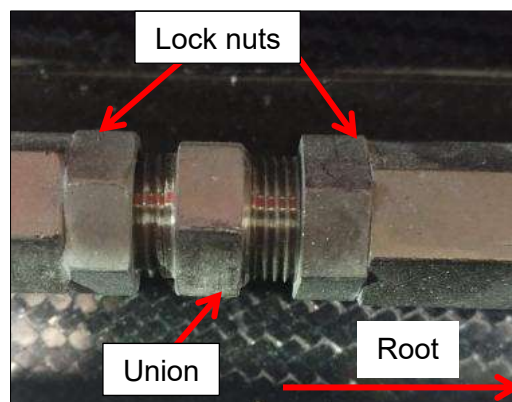
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## Procedure

1. Open the airbrakes fully until they come to a hard stop.
2. Remove airbrake blades, 1, 2 and 3 by removing the split pins, washers and pins.
3. Remove the airbrake cap from airbrake blade 1.
4. Check that the airbrake cap fits into the cavity without obstruction. Remove any material preventing a good fit.
5. Adjust the length of DRW4AB (Figure 27-19, Item 15) if the lifting arms are not synchronized. The length is adjusted by turning the union (Figure 27-20).

**NOTE:** The union has two different thread pitches on each side, allowing for a 0.25 mm/rev adjustment. To adjust the length of DRW4AB:


- Unlock both lock nuts.
- To decrease the length, turn the adjustment insert clockwise (standing at the root).
- To increase the length, turn the adjustment insert anti-clockwise (standing at the root).

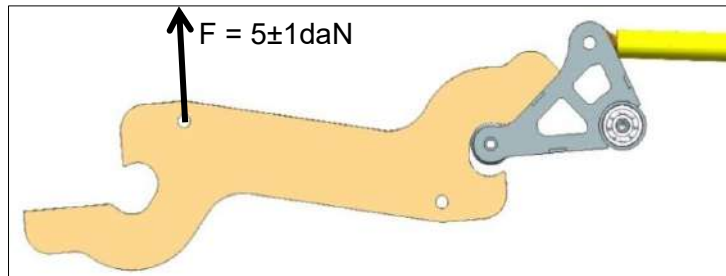


**Figure 27-20: Adjustment insert**

**NOTE:** In the locked position, the two arms must be as low as possible, with the outside arm (left on left wing and right on right wing) touching DRW4AB.

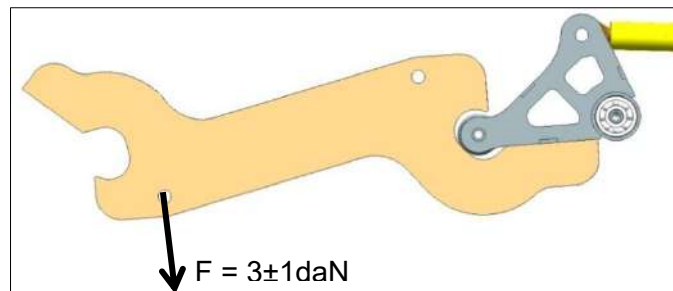
6. Set the locking force as in Figure 27-21, by adjusting DRW3AB (Figure 27-19, Item 14). The locking force must be between 4 and 6 daN when measured with the airbrake locking force tool. Figure 27-21 shows the tool position.

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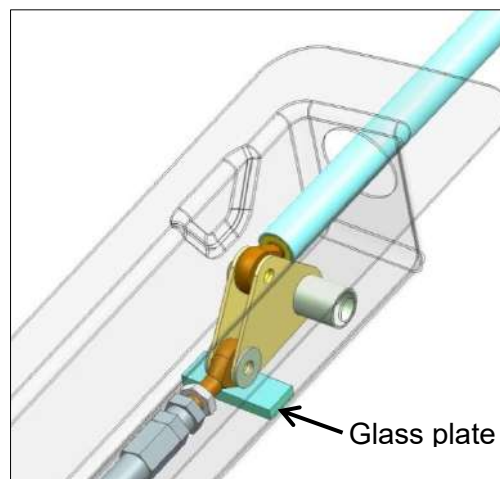
**Figure 27-21: Measuring locking force**

7. Measure the unlocking force. The unlocking force should be between 2 and 4 daN.




**Figure 27-22: Measuring unlocking force**

- If the unlocking force is too high, first place a thin spacer on top of the existing plate (Figure 27-23) and measure the force. If the force is still too high, increase the thickness until a satisfactory value is obtained. Measure the thickness of the spacer used and bond a glass plate of the same thickness to the top of the glass plate.

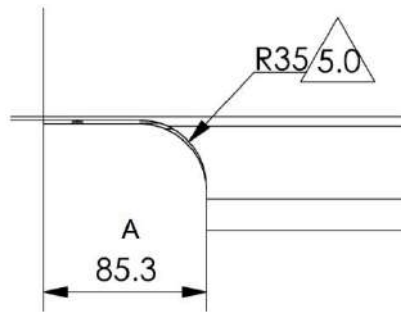


**Figure 27-23: Glass plate**

- If the unlocking force is too low, sand away at the existing glass plate and test the unlocking force frequently. Repeat this process until a satisfactory value is obtained.
8. Lock all the adjustment rods with Loctite 243 and ensure the forces are still within limits.

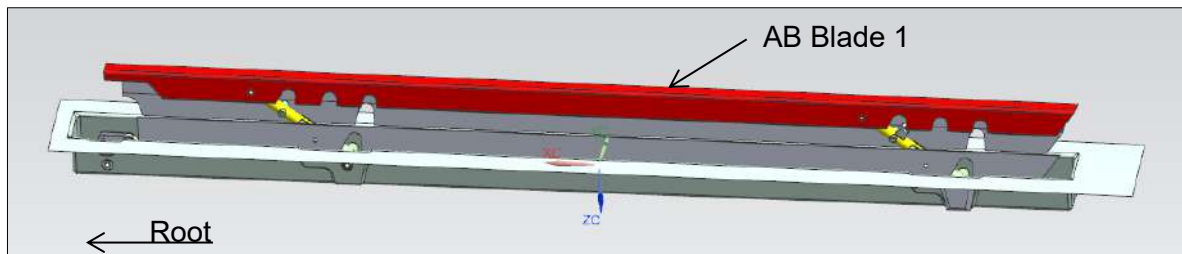
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- Ensure that AB Blade 2 is trimmed according to drawing D1A-2.06.11 V5.0 or later. Figure 27-24 is a representation of drawing version 5.0.



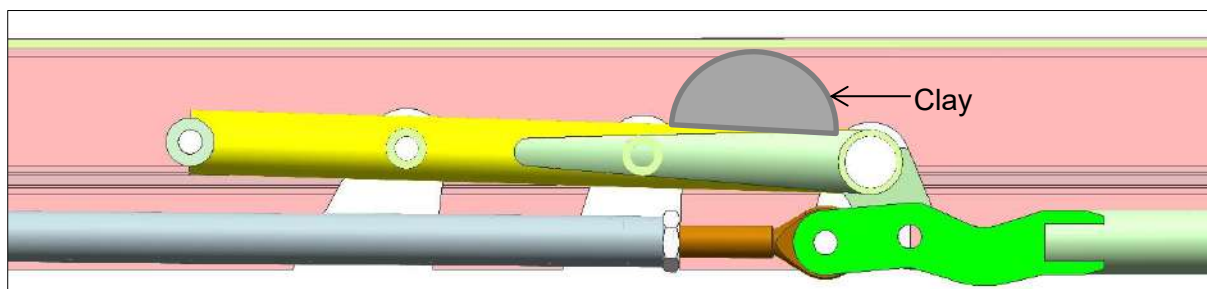
**Figure 27-24: AB Blade 1 Tip side**

- Reinstall airbrake blade 1 as in Figure 27-25 using the lock pins. Do not lock.




**Figure 27-25: AB Blade 1 installation position**

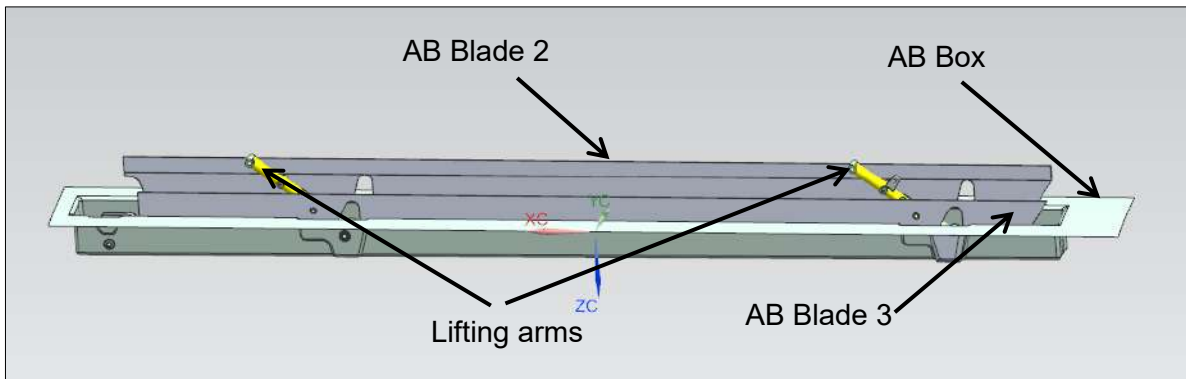
- Check that the pitch of the locking holes is acceptable in the full-open position, and that the movement is not stiff during the operation. Slot the holes if required.
- Check that airbrake blade 1 goes fully down during locking. Check for interference between the airbrake blade 1 stiffener and the inner airbrake lifter using modelling clay (Figure 27-26). Remove maximum 1 mm material on the stiffener if required.



**Figure 27-26: Modelling clay position**

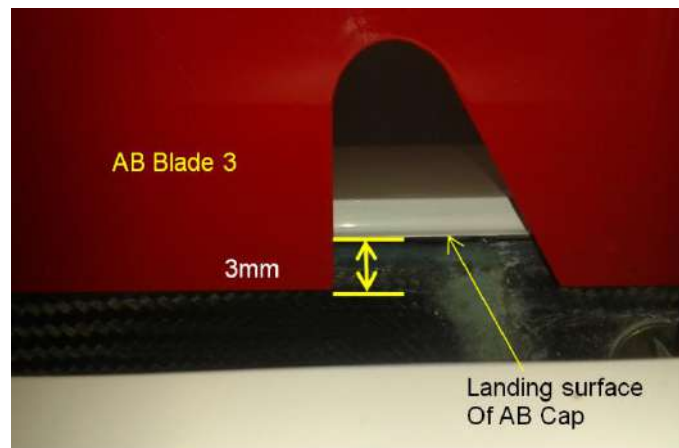
- Measure the depth between the cap landing area and the centre of the airbrake blade 1 when locked. Note measurement on the inner and outer areas. Airbrake blade 1's centre should be between 9 and 12 mm from the cap landing area.
- Install airbrake blade 2 and blade 3 on the lifter arms as in Figure 27-27.

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**Figure 27-27: AB Box**

15. Open the airbrakes to the stop—check that blade 3 is a minimum of 3 mm into the AB box as in Figure 27-28, to prevent the blade from jamming in the open position.




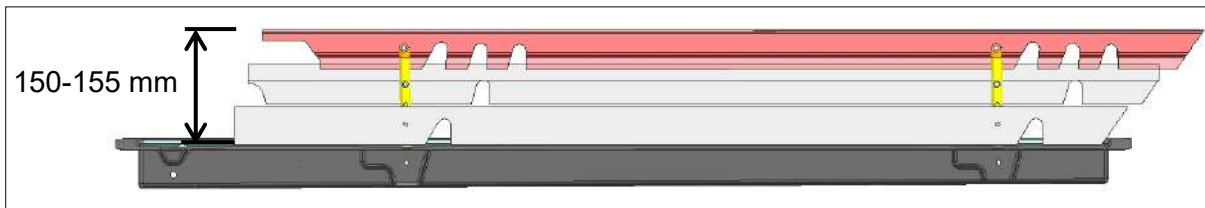
**Figure 27-28: Blade 3 AB Box overlap**

16. Lock the airbrakes. Check that Airbrake Blade 3 does not prevent airbrake blade 1 to retract fully – the bottom of the box may be touched, but not with excessive force.
- If the touching force is too high the blade should be sanded on the bottom edge using the belt sander.
  - Repeat the previous check if the bottom of blade 3 was sanded to ensure a 3 mm overlap is still available.
17. Ensure that blade 3 does not bend inward to interfere with blade 1. If this is the case, remove blade 3 and slightly bend it in the opposite direction in order to achieve a natural curve outward.
18. Check with the airbrakes locked that blades 2 and 3 are approximately 3 mm below the landing surface of the airbrake cap. Trim the top of the blades lower if required.
- Note: If Blade 2 is too high with the airbrakes locked it may lift the airbrake cap during flight.
19. Open airbrakes fully. Blade 1 and blade 2 should overlap at least 2 mm in the front.

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20. Apply modelling clay on airbrake blade 1 next to the lifter arms connection points. Lock the brakes and push the cap fully down. Measure and compare the gap between airbrake blade 1 and the cap to the measure value in Step 12. If the values do not correspond, airbrake blade 3 is still interfering with the system and step 16 needs to be repeated.
21. Check that the airbrake cap fits through the drilled holes in airbrake blade 1. Ensure that there is a slight forward/aft play in between the cap and cap recess, if not, remove airbrake blade 1. Ream the holes as follows:
- Top of blade: 7.5 mm – File holes with 7 mm file slightly oval in the required direction.
  - Stiffener area: 12 mm – De-burr with 12 mm round nose bit.
22. Install the springs (10mm x 40mm x1.0mm compression rings) and washers, starting with a 0.7 mm M6 washer (it may be required to replace the existing washers) on the airbrake blade 1 side, followed by the 10mm x 40 mm compression spring. Do not use a washer between the nut and spring. Adjust the bolts to allow a space 2 mm more than the gap measured in the previous step to ensure the springs will not bottom out.
23. Install only a washer and split pin on the root side pin (short pin), do not reinstall the spring.
24. Install airbrake blade 1 and check operation during locking. Check that the locking forces from the root side are acceptable.
- The locking forces should be between 8 and 12 daN.
    - If the locking forces are too high, loosen the springs on the cap and blade 1.
    - If the locking forces are too low, tighten the springs on the cap and blade 1.
  - The unlocking forces should be between 4 and 6 daN.
  - If the cap is stiff near the root end, remove the split pin and washer from the short pin on the cap. If this solves the problem, blade 1 has not been trimmed according to the drawing, or it might be necessary to trim the blade further increasing the length (Figure 27-29).
25. Check that the cap seats properly. If not, the cap bolts may not align fully and some holes may have to be reamed to fit.
26. Install blades 2 and 3 and check operation.
27. Check that the AB achieves full operating range to the open position. The fully open position is more than 150 mm and there is no interference between the blades and the wing as shown in Figure 27-29.

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**Figure 27-29: AB Open fully**

28. Install blade 2 and 3 and secure in position with the M6 pins, washers and nuts. Lock the nuts using Loctite 243.
29. Clean the cap landing area
30. Test operation of the airbrake system

### **Airbrake blade 1 repair and replacement**


The root side of airbrake blade 1 is modified to the shape of a flat plate acting as a leave spring. This part of blade 1 creates a downward force on the airbrake cap on the root side, improving seating during flight. When the downward force on the root side is insufficient or the flat section of blade 1 has been damaged, blade 1 can be replaced or an additional carbon leave spring may be added to perform the required downward force.

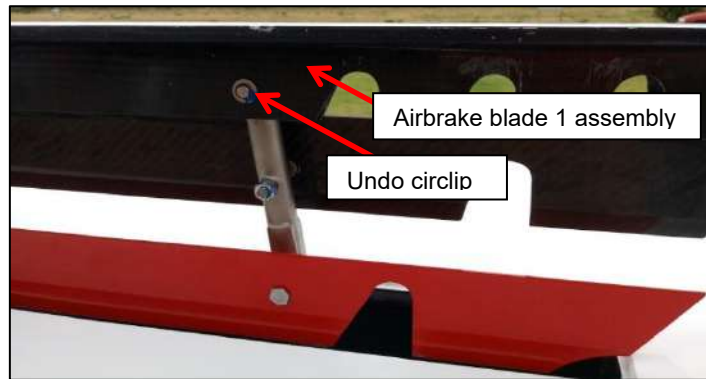
#### **Repair airbrake blade 1**

The following materials are required to repair airbrake blade 1 (per blade):

- 9 x M6 locknuts
- 1 x 2 mm Thick carbon plate 120x17 mm
- 3 x 1 mm Thick M6 washers
- 1 x Split pin
- 2 x Circlips

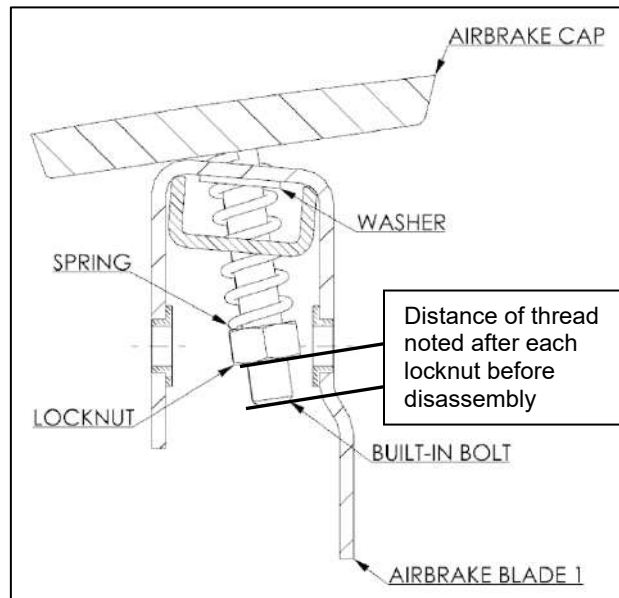
With the aircraft de-rigged, extend the airbrakes fully. Remove the bolts fastening the airbrake blade 1 assembly onto the wings and remove the assembly (Figure 27-30).

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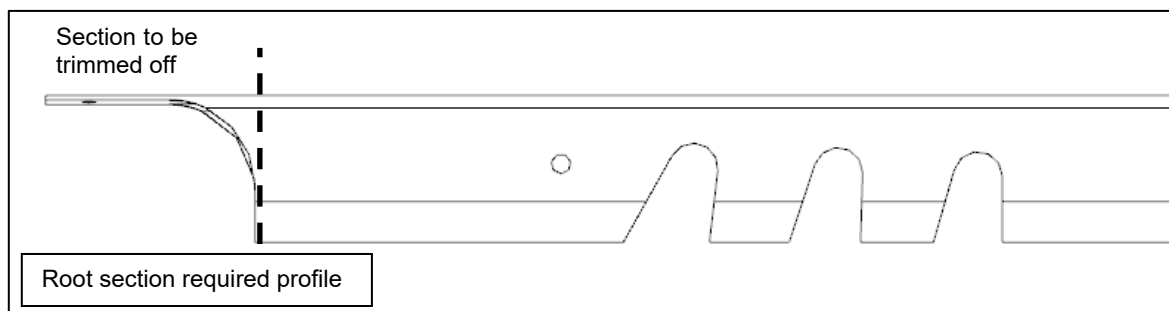
**Figure 27-30: Remove airbrake blade 1 assembly**

Carefully note the thread depth sticking out after each locknut on the airbrake cap bolts (Figure 27-31). Remove the locknuts and disassemble the airbrake blade 1 assembly. Do not discard any of the fasteners or washers.




**Figure 27-31: Note thread depth after each locknut**

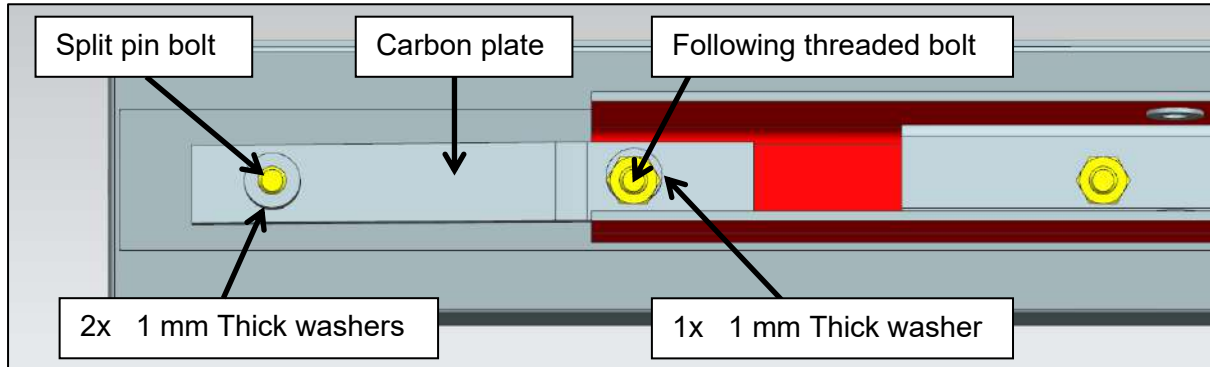
Ensure that the root section of airbrake blade 1 is trimmed off and assemble the blade back onto the airbrake cap (Figure 27-32).



**Figure 27-32: Cut off airbrake blade 1 root section**

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Add a 2 mm thick carbon plate over the split pin bolt and following threaded bolt (Figure 27-33). Apply one washer (1 mm thick) over the threaded bolt and two washers (each 1 mm thick) over the split pin bolt. Install the original spring over the threaded bolt with a new M6 locknut to the depth noted before disassembly (Figure 27-31) and install the new split pin through the split pin bolt.



**Figure 27-33: Install carbon plate over airbrake cap bolts**

Re-perform the airbrake setup procedure in accordance with the procedure provided in the Maintenance Manual.


Apply the original springs and washers to the remaining 8 bolts with new M6 locknuts according to the depths noted before disassembly. Assemble the airbrake blade 1 assembly onto the wing with new circlips. Test the airbrake locking and unlocking operation.

### Replace airbrake blade 1

The following materials are required to replace airbrake blade 1 (per blade):

- 9 x M6 locknuts
- 1 x Airbrake blade 1 left or right
- 1 x Split pin
- 2 x Circlips

Follow the same procedure to remove and disassemble airbrake blade 1 as per “Repair airbrake blade 1” procedure. Replace airbrake blade 1 and follow the same procedure to reassemble the airbrake as per “Repair airbrake blade 1” procedure using the original springs and washers with new lock nuts, split pin and Circlips.

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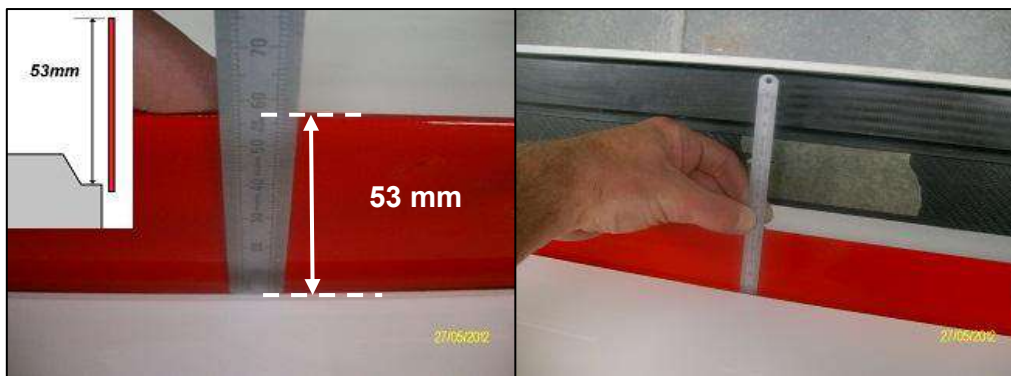
## Airbrake blade 3 fouling

### Materials required

- 4x M6 Half locknuts
- 4x M6H12/37
- 6x Aluminium tabs
- 12x MS 20426AD3-5 rivets

### Airbrake cap recess measurement

With the aircraft de-rigged, extend the airbrakes fully against the mechanical stop (inside the airbrake box).




**Figure 27-34: Airbrake cap recess measurement**

The measurement should be taken, in the middle of the airbrake, from the surface of the airbrake cap recess to the top edge of airbrake blade 3, as illustrated in Figure 27-34. If this measurement exceeds 53 mm, airbrake blade spacers need to be installed.

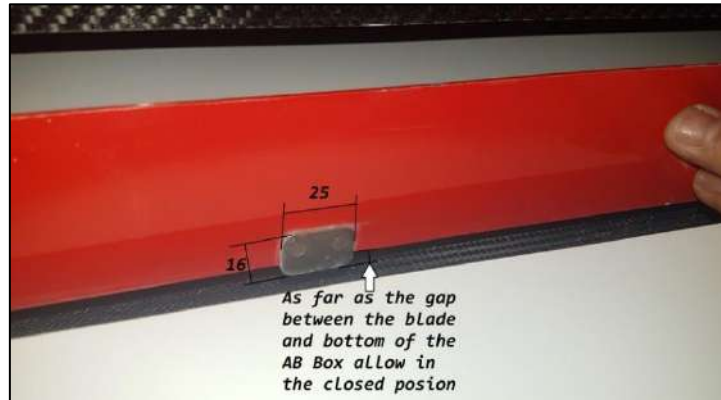
### Airbrake blade spacers

With the aircraft de-rigged, extend the airbrakes fully against the mechanical stop (inside the airbrake box).

1. Apply clay to the bottom surface of the airbrake box to the areas where the metal tabs are bolted onto airbrake blade 3 according to Figure 27-39.
2. Fully retract the airbrakes to imprint the clay. Fully extend the airbrakes and measure the displaced clay. Subtract 0.5 mm from each measurement to allow for spacing between the metal tabs and the bottom surface of the airbrake box.

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- Apply double sided tape to the metal tabs and stick onto airbrake blade 3 according to Figure 27-39. The tabs must be displaced according to the measurements taken (Figure 27-35).



**Figure 27-35: Metal tab depth determined by airbrake box bottom surface**

- Test operation and ensure that airbrake blade 3 does not jam.
- Remove airbrake blade 3 by releasing the locknuts from the peened M6H12/37 bolts and remove the bolts. Take note where each brass spacer, as illustrated in Figure 27-36, is installed as they have to be reinstalled in the same position.




**Figure 27-36: Brass spacer and bolt tightening**

- Mark the drilling holes on airbrake blade 3, remove the tabs and drill through the airbrake blade at the marked tab holes.
- Rivet the tabs onto airbrake blade 3 (Figure 27-37) with MS 20426AD3-5 rivets.



**Figure 27-37: Metal tabs riveted onto airbrake blade 3**

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8. Re-install the airbrake blade using the supplied M6H12/37 bolts and the original brass spacers.
9. Lock the bolts (Figure 27-36), while allowing sufficient free movement of the blade.
10. Use the supplied M6 half locknuts to lock the bolts to the airbrake lifters as illustrated in Figure 27-38.



**Figure 27-38: Bolt airbrake blade 3 onto airbrake lifters**

11. Trim the ends of the bolts if they protrude by more than 1½ threads.
12. Test operation and ensure that there is no interference between any blades and bolts.

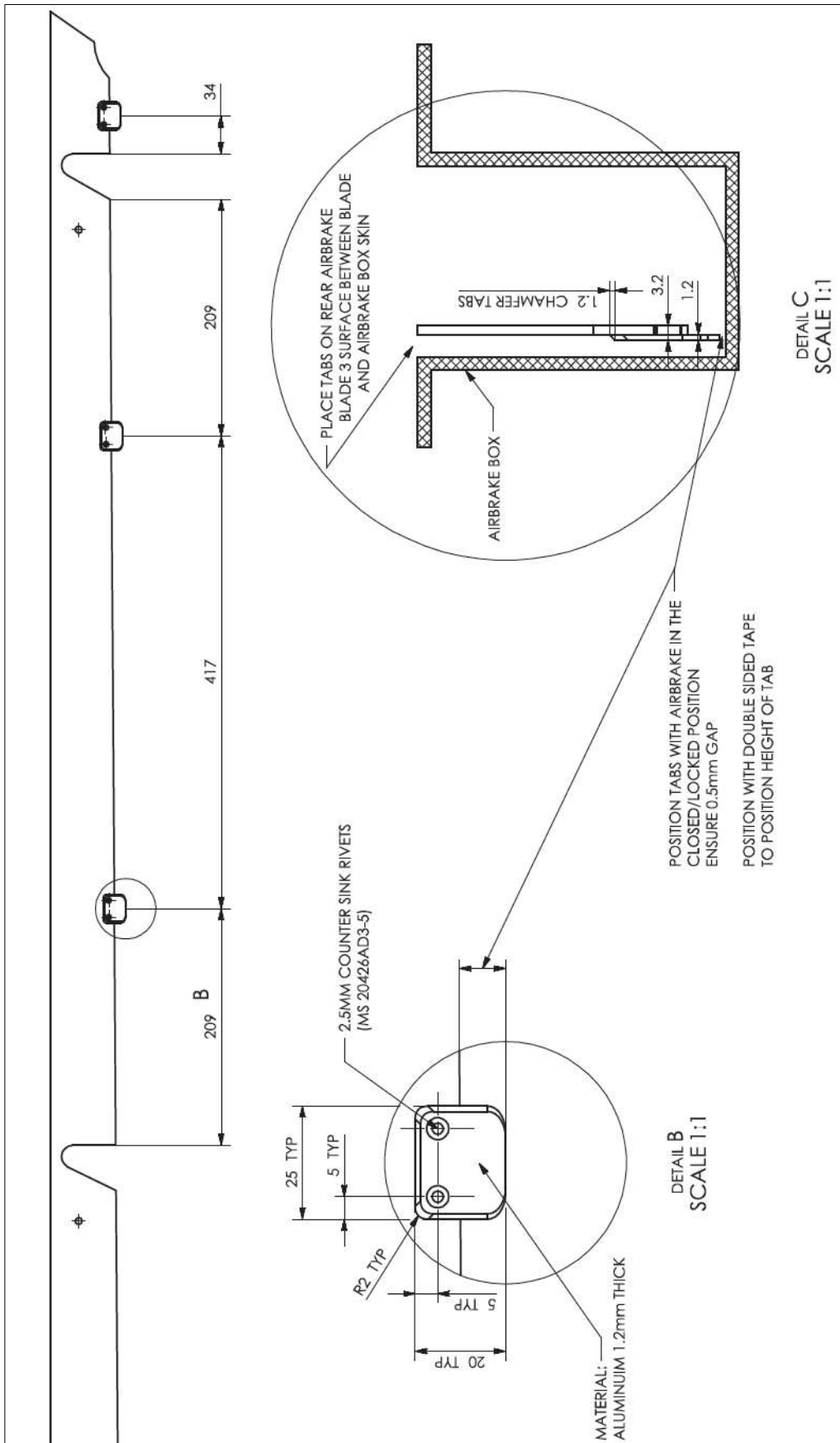



Figure 27-39: Airbrake blade 3 fouling inserts

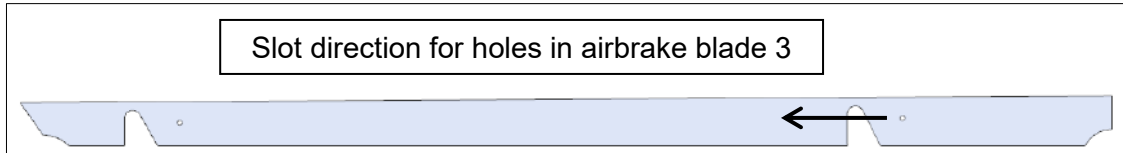
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## Airbrake blade 3 warping

High outside air temperatures can cause airbrake blade 3 to warp, causing it to shift into the travel path of airbrake blade 1 creating interference.

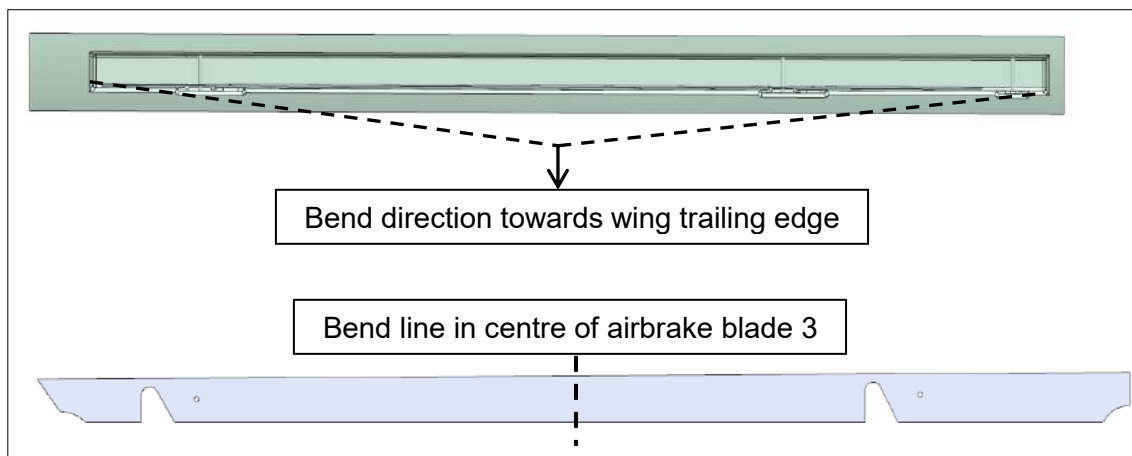
Follow the procedure described in “” to remove airbrake blade 3.

1. Lightly slot one of the holes until the blade is no longer bent (Figure 27-40).



**Figure 27-40: Slot holes towards airbrake blade 3 outer edges**


2. Carefully bend the blade in the centre to form a gentle curve (Figure 27-41). The curve must face towards the trailing edge of the wing (towards the rear wall of the airbrake box).



**Figure 27-41: Bend airbrake blade 3 in the centre**

**CAUTION:** Do not excessively bend airbrake blade 3. An excessive bend can cause airbrake blade 3 to interfere with the airbrake cap recess.

Follow the procedure described in “

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- Airbrake blade 3 fouling” to reassemble airbrake blade 3 onto the airbrake system.

### Removal and installation of the airbrake damper


- If installed, remove the RES batteries according to JS-MD 3 RES Maintenance Manual Supplement. The damper can be accessed through the hole in bulkhead B8.
- Allow the airbrake handle (Figure 27-19, Item 2) to move freely for maximum access to the damper bolts.
- Loosen the nyloc nut from the damper bolts and disconnect the damper by removing the bolts.
- Installation is the reverse of removal, with the following:
  - The damper must be set up correctly before installation
  - The bolts may be used again if no visible damage has occurred
  - The nyloc nuts must be replaced on principle
  - Install the damper with the piston downward, i.e. connected to the bell crank



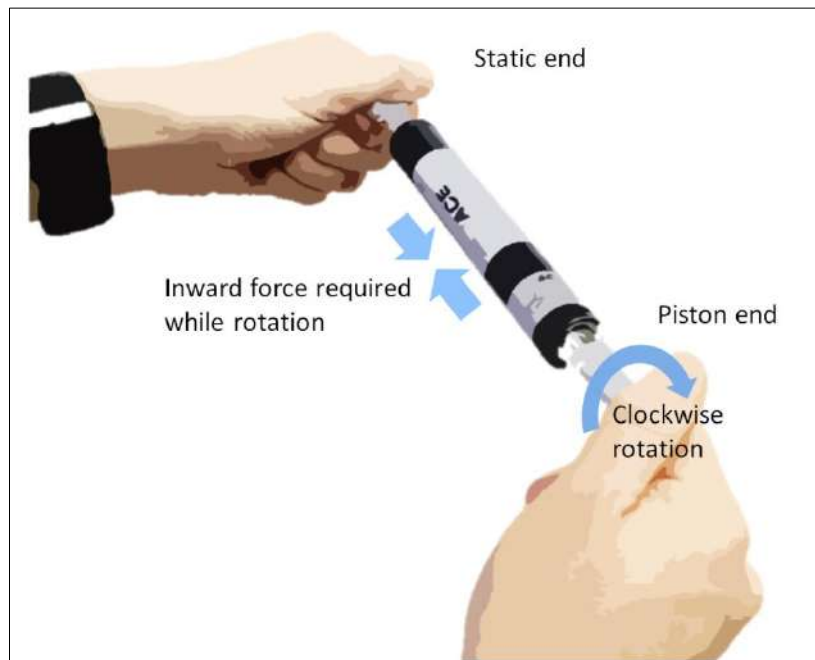
Figure 27-42: Airbrake damper

### Airbrake damper setup

The damper is an adjustable type and its damping coefficient can be adjusted.


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1. Press the piston inward up against the stop.
2. Rotate the piston anti-clockwise while applying inward pressure. Keep on rotating it until the rotational stop has been reached.
3. Rotate the piston  $6\frac{3}{4}$  turns in a clockwise direction while applying inward pressure.



**Figure 27-43: Damper Adjustment**

**NOTE:** The piston can be rotated freely without influencing the damping coefficient unless it is fully depressed in.

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## 27-90-00 TOW RELEASE

### General

The nose and CG hooks are operated simultaneously when the release handle is pulled towards the pilot.

### Description

The aircraft is fitted as standard with a nose release hook, and optionally with a CG release hook for winch and ground launches. The following hooks are approved:

1. Nose release hook: TOST Europa G88 (Datasheet # 60.230/2)
2. CG Release hook: TOST E22 (Datasheet # 11.402/9 NTS)

The nose release hook (Figure 27-44, Item 2) is located in the nose cone and is bolted to the bulkhead in the nose cone. The CG release hook (Figure 27-44, Item 3) is fitted in front of the landing gear.

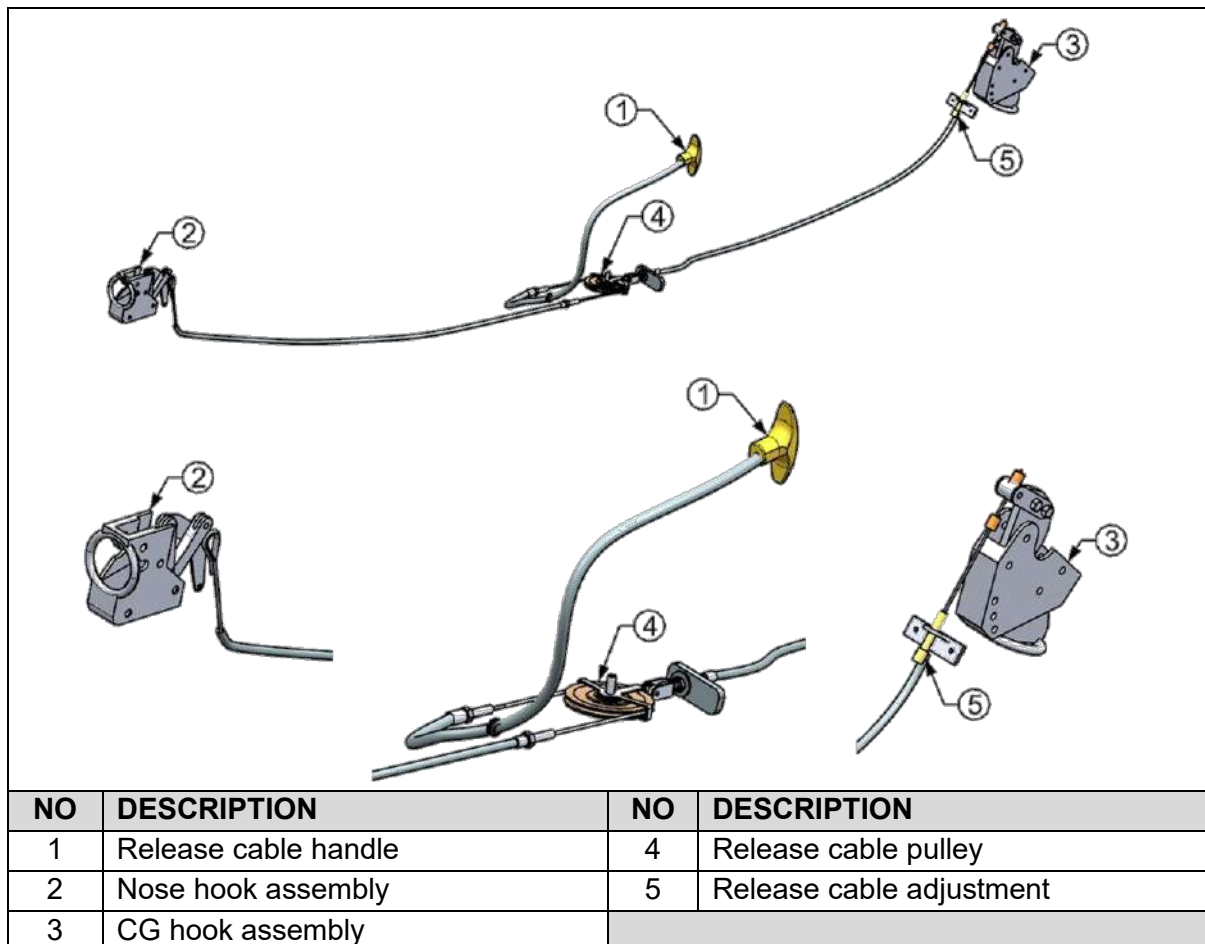




Figure 27-44: Tow Release System Breakdown

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The nose release hook (Figure 27-44, Item 2) is connected by a 3/32" cable, which runs under the seat pan and through the turn-around pulley (Figure 27-44, Item 4) to the release handle (Figure 27-44, Item 1). From the turn-around pulley bracket, another 3/32" cable runs under the seat pan, back to the CG release hook (Figure 27-44, Item 3).

The release cable is adjustable at the turn-around pulley (Figure 27-44, Item 4) and at the CG release hook sleeve in such a way that both release hooks can open fully, and to ensure that there is no tension on the cable when the handle is released.

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## 27-90-00 TOW RELEASE: MAINTENANCE PRACTICES

### General

The nose release hook and belly hooks are connected with a 3/32" cable via a turn-around pulley as indicated in Figure 27-44.

The nose release hook can be accessed through the B2 hatch (Figure 27-45) which is situated behind the rudder pedals. The CG release hook can be accessed through the landing gear doors. Access to the turn-around pulley can be gained by removing the seat pan centre table (Figure 27-45).

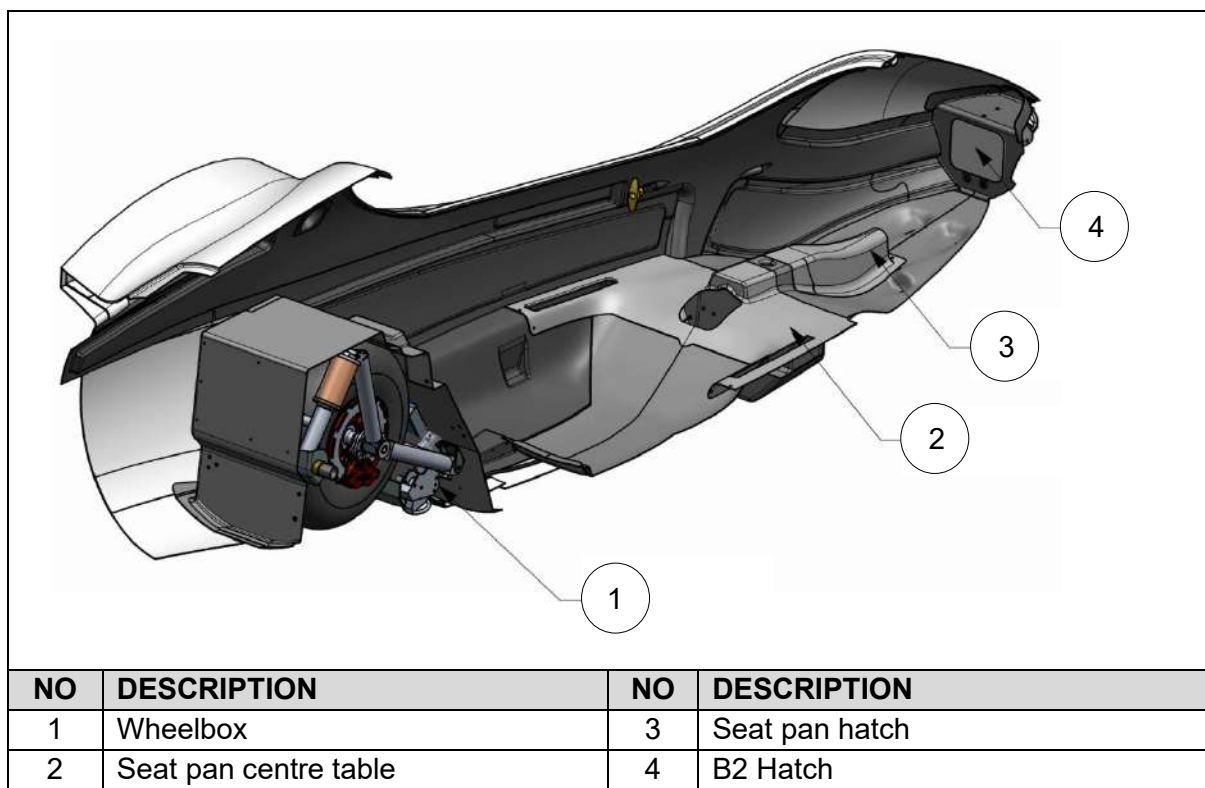


Figure 27-45: Cockpit breakdown

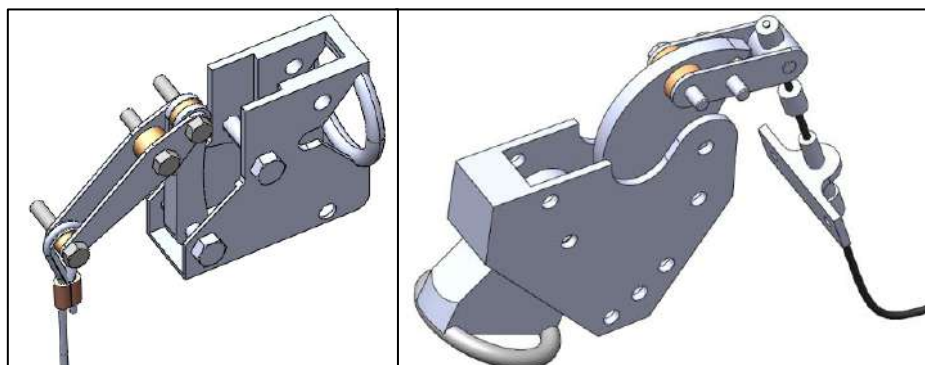



Figure 27-46: Release hook TOST E22 (left) and TOST G88 (right)

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## Servicing the nose release hook

The nose hook (TOST E22) must be serviced according to the manufacturer's specifications. Refer to Owner Folio documents - TOST Operating Manual - Tow Release E22\_Issued October 2002\_revision 1\_May 2003 or Latest available revision.

Preferably, the service should only be performed by an AMO, or a JS-MD authorised person.

## Removing the nose hook

1. Move the rudder pedals towards the seat to maximise access.
2. Remove the hook cover plate between the rudder cable anchor points.
3. Undo the four M6 bolts that bolt the hook brackets onto the front bulkhead B1.
4. Undo the release cable.
5. Slide the hook through the inspection hole.

## Servicing the belly hook


The belly hook (TOST G88) must be serviced according to the manufacturer's specifications. Refer to Owner Folio documents - TOST Operating Manual - Europa G 88 Safety Releases\_Issued February 1989\_revision 4\_March 2001 or latest available revision. Preferably, the service should only be performed by an AMO, or a JS-MD authorised person.

## Removing the belly hook

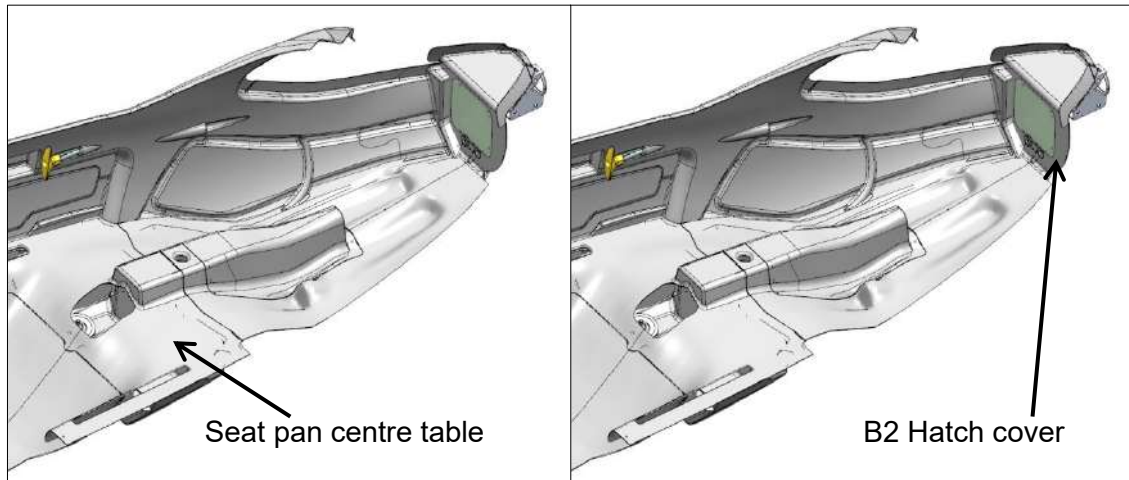
1. Undo the release cable.
2. Lift the fuselage on a trestle or turn the fuselage upside down. (Note when turning fuselage upside down, ensure that the breather hole for the brake fluid reservoir is sealed)
3. Undo the fuselage front arms, bolted through the front of the wheel box.
4. Remove the three nuts bolting the belly hook to the belly hook side brackets.
5. Slide the hook backwards and up to remove.

## Release system lubrication

The release system cable can be lubricated using WD-40 lubricant to reduce friction for smoother operation. Apply lubricant while operating the release handle until the release force is approximately 10 daN.

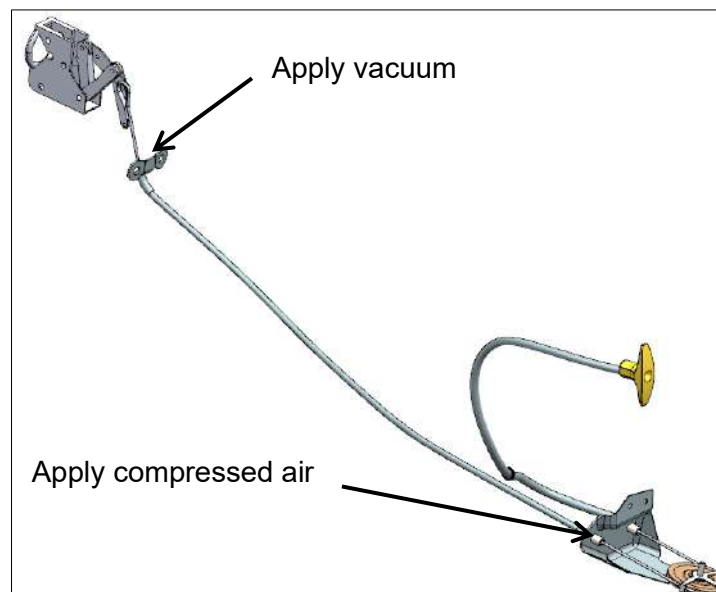
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1. Remove the seat pan centre table to access the release system pulley, and the B2 hatch cover to access the nose hook.




**Figure 27-47: Cover removal to access release system**

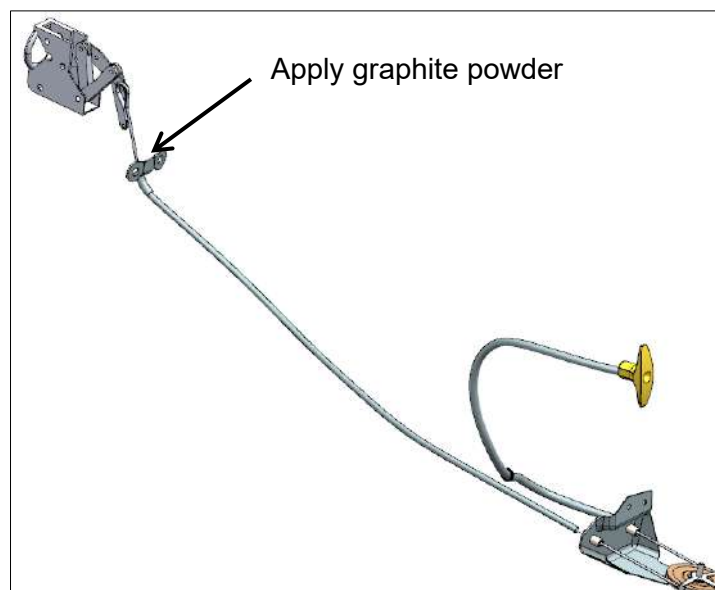
2. Place a vacuum at the front metal fitting and apply compressed air at the inlet of the cable under the seat pan to clean out any contamination.



**Figure 27-48: Clean release system cable housing**


3. Feed graphite powder into the system from the front metal fitting and operate the hook to distribute the lubricant. Repeat until the release operation is smooth or until satisfactory.

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**Figure 27-49: Feed graphite powder into the release system cable housing**

4. Reinstall the seat pan centre table and B2 hatch cover.

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# CHAPTER 31 - 00 - 00

## INDICATING SYSTEMS

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## 31-00-00 INSTRUMENTS AND PANELS

### General

The information in this section describes instruments only specific to the JS-3 RES and lists approved instruments. For information on other instruments see the manufacturer's manuals of each individual system.

AMM Chapter 31-10-00 INDICATING SYSTEM AND INSTRUMENT PANELS gives an illustration and a description of the instrument panel of the JS-3 RES.

AMM Chapter 31-11-00 STANDARD INSTRUMENTATION lists all the standard instruments of the aircraft as well as an indication of how it is used.

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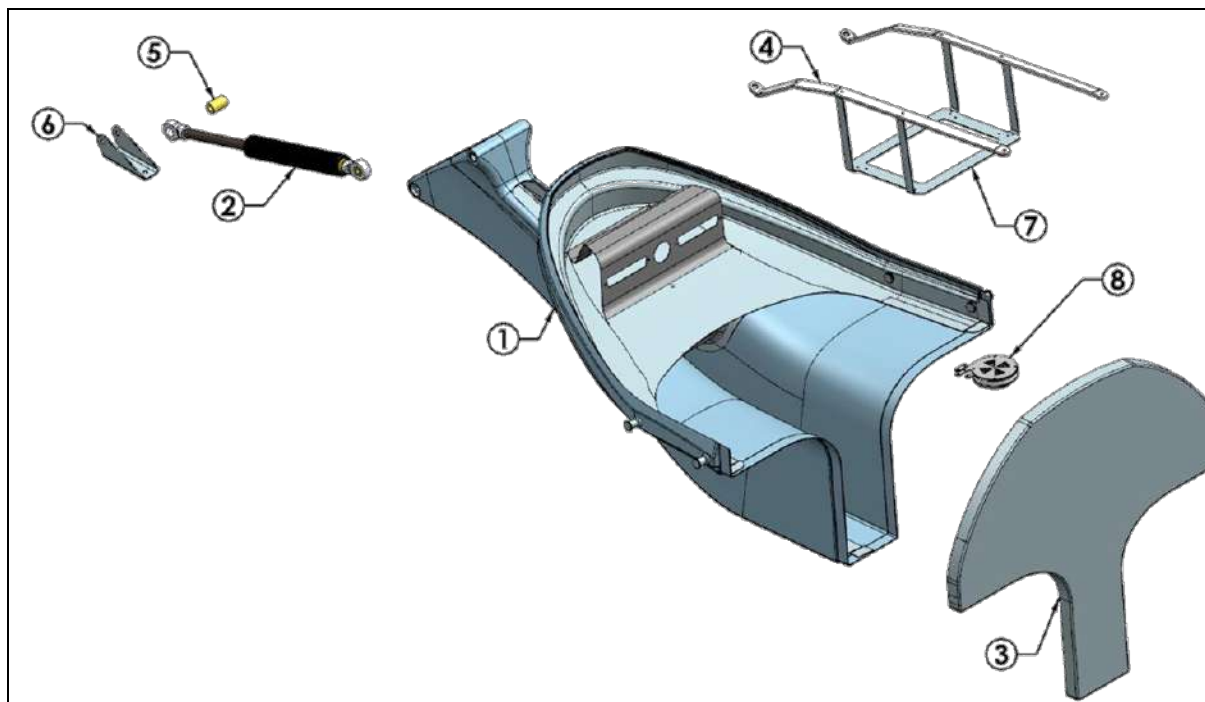
## 31-10-00 INDICATING SYSTEM AND INSTRUMENT PANELS

### General

The instrument console is integrated with the front canopy. A single gas strut (Figure 31-1, Item 2) enables the canopy to stay in the fully open position. The reaction forces of the gas strut are transferred through the hinge and lug.


The instrument panel is attached to the front of the instrument console and is supported by two aluminium braces (Figure 31-1, Item 4).

### Description



NO	DESCRIPTION	NO	DESCRIPTION
1	Instrument binnacle	5	Gas strut bush
2	Varilift gaslift 600 N	6	Gas Strut bracket
3	Instrument panel	7	Mounting bracket
4	Instrument panel support strut	8	Ventilation flap

Figure 31-1: JS-3 RES Instrument Console

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## 31-11-00 STANDARD INSTRUMENTATION

### General

The equipment approved in the minimum list of equipment is given in this section. Other instruments (not listed) may also be installed as part of the minimum equipment, provided that they are certified for the application, comply to the TCDS of the JS-3 RES, AND comply with the requirements given in the minimum equipment section.

Equipment that is not included in the minimum equipment list may be installed under the following conditions:

1. The installation must comply with the electrical and pitot-static diagrams given in AMM Chapter 92-00-00 WIRING DIAGRAMS AND CHARTS and AMM CHAPTER 34 - 00 - 00 PITOT-STATIC AND INSTRUMENTS respectively.
2. Instruments listed in the minimum equipment list must not be adversely affected.
3. Flight and navigation instruments must be clearly arranged and plainly visible to the pilot.
4. Equipment installed must be securely mounted and must not compromise the safety of the aircraft.
5. Mountings for equipment must be able to withstand loadings likely to be encountered in flight.


### Airspeed indicator

The airspeed indicator must have a scale range to at least  $1.05 V_{NE}$  (283.5 km/h or 153.1 kts). The airspeed indicator markings and their colour code significance must be clearly indicated as given in Table 31-1.







The maximum allowable airspeeds for each flap must be indicated on the airspeed indicator (ASI) with white triangles next to the flap position number, as indicated in Table 31-2.

**NOTE:** When referring to  $V_{SO}$  and  $V_{S1}$ :

- $V_{SO}$  is the stall speed at maximum weight, in the landing configuration, with the CG in the most unfavourable position.
- $V_{S1}$  is the stall speed at maximum weight, in a specific selected configuration, with the CG in the most unfavourable position.

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**Table 31-1: Airspeed indication**

Marking		IAS		Significance
		15 m	18 m	
White arc		97 to 160 km/h		Positive Flap Operating Range. (Lower limit is 1.1 V <sub>S0</sub> in landing configuration at maximum weight. Upper limit is maximum speed permissible with flaps extended positive.)
Green arc		103 to 195 km/h		Normal Operating Range. (Lower limit is 1.1 V <sub>S1</sub> at maximum weight and most forward CG with flaps neutral. Upper limit is rough air speed.)
Yellow arc		195 to 270 km/h		Maneuvers must be conducted with caution and only in smooth air.
Red line		270 km/h		Maximum speed limit for all operations.
Blue line		Refer to JS-MD 3 RES Flight Manual Supplement Section 2.2		Best rate-of-climb speed V <sub>Y</sub> (if RES is fitted).
Yellow triangle		110 km/h		Approach speed at maximum weight without water ballast.

**Table 31-2: Maximum flap airspeed**


Flap setting	Deflection	V <sub>FE</sub>
1	-3°	270 km/h
2	+0°	
3	+5°	230 km/h
4	+13.5°	165 km/h
5	+16.6°	165 km/h
L	+20°	160 km/h

When markings are on the cover glass of the instrument, there must be means to maintain the correct alignment of the glass cover with the face of the dial and each arc and line must be wide enough and located to be clearly visible to the pilot and not mask any portion of the dial. (According to CS 22.1543)

The recommended airspeed indicators are given in Table 31-3.

**Table 31-3: Approved airspeed indicators**

Manufacturer	Model	TSO	Scale range
Winter	7 FMS 443	TS 10.210/19	0-200 kts
Winter	7 FMS 441	TS 10.210/19	0-350 km/h
Winter	7 FMS 443	TS 10.210/19	0-165 kts
Winter	7 FMS 441	TS 10.210/19	0-305 km/h

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## Altimeter

The recommended altimeters are given in Table 31-4:

**Table 31-4: Approved altimeters**

Manufacturer	Model	TSO	Scale range
Winter	4 FGH 40	TS 10.220/48	0–20 000 ft
Winter	4 FGH 20	TS 10.220/47	0–10 000 m

## Compass


A compass or magnetic direction indicator is part of the minimum equipment list if the aircraft is fitted with an engine. Installation must be in such a way that it can be compensated in level flight to  $\pm 10^\circ$  and to  $\pm 15^\circ$  when transmitting with the radio.

Unless the deviation is less than  $5^\circ$  on all headings, the deviation values for magnetic headings in not more than  $30^\circ$  increments must be placard near the magnetic direction indicator.


**NOTE:** Compass swing must be performed according to NAA requirements.

## Outside air temperature gauge

When flying with water, means of determining the outside air temperature must be installed.



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# **CHAPTER 32 - 00 - 00**

## **LANDING GEAR**


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## 32-00-00 LANDING GEAR


### General

The JS-3 RES has a mechanical landing gear with a tail wheel, and a tip wheel on each wing. This chapter covers maintenance practices and descriptions of the landing gear of the aircraft.

AMM Chapter 32-10-00 MAIN LANDING GEAR AND DOOR gives a general description of the main landing gear. More detail and maintenance practices are given for the tail wheel and wing tip wheel in AMM Chapter 32-11-00 RETRACTABLE TAIL WHEEL AND DOORS and Chapter 32-12-00 WINGTIP WHEELS respectively.

AMM Chapter 32-30-00 EXTENTION AND RETRACTION gives a description of the retraction system and general maintenance practices follows thereafter.

AMM Chapter 32-40-00 WHEELS AND BRAKES gives a description of the brake system and general maintenance practices follow thereafter.

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## 32-10-00 MAIN LANDING GEAR AND DOOR

### General

This AMM chapter 32-10-00 MAIN LANDING GEAR AND DOOR gives a general description and maintenance practices for the main landing gear.

### Description

The landing gear is operated with an actuating handle, located on the right-hand side of the cockpit. The wheel is extended when the handle is in the forward position.

The mechanism is designed to have a low initial retraction force. As the landing gear is being retracted, the retraction force increases, but reduces again significantly towards the retracted position. The landing gear mechanism is designed to lock over-centre in both the down and up positions.

The wheel doors are closed by steel springs attached to the front arms of the landing gear. The landing gear is damped and sprung. Two polyurethane rubber shock absorbers (Figure 32-1, Item 12), in the rear arms absorb the shock loads.

### Main wheel and brake system

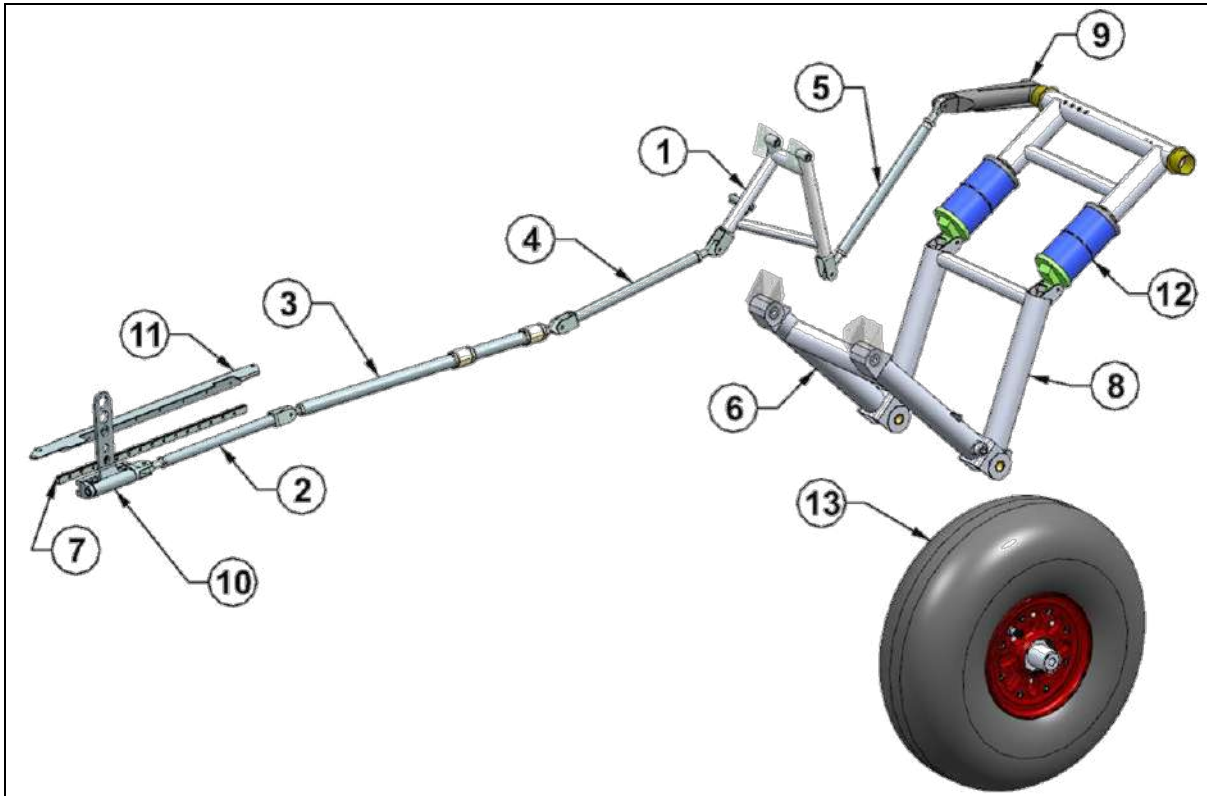
The wheel consists of the following:

1. Hub: Beringer JA-01
2. Hydraulic disk brake: Beringer DSC-006
3. Tyre: Goodyear 5.00-5, 10pr with 5.00-5 tr67A tube, or any 5.00-5

Tyre pressures: Main wheel: 2.5 bar (15 m)


3.5 bar (18 m)

The master cylinder is integrated into the control stick. The wheel brake is actuated by activating the brake lever mounted on the stick.



NO	DESCRIPTION	NO	DESCRIPTION
1	BC1LG	8	RA1LG
2	DR1LG	9	RA2LG
3	DR2LG	10	LG handle assembly
4	DR3LG	11	LG handle lock plate
5	DR4LG	12	Shock absorber
6	FA1LG	13	Wheel assembly
7	LG handle slide rail		

**Figure 32-1: Main landing gear system major components**

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## **32-10-00 MAIN LANDING GEAR AND DOOR: TROUBLESHOOTING**

### **Gear operation**

#### **Main gear difficult to get into final lock position**


1. Inspect and ensure that the tail wheel over-centre adjustment bolts are secured and that the tail wheel moves across centre.
2. Ensure main landing gear shock elements are not compressed. If compressed, remove shock assembly and clean.
3. Ensure that the main landing gear and tail gear mechanisms are free of dirt to avoid obstruct locking.
4. Check that the tail wheel cable tension is not exceeding the forces specified in the tail wheel cable setup procedure. If this is the case, re-perform tail wheel setup procedure.
5. Check that the thimble linking the tail wheel cable in the wheel box area is not twisted, because this will reduce the effective tail wheel cable length.

#### **Main gear not retracting completely**

1. Ensure main landing gear shock elements are not compressed. If the shock absorbers do not extend fully, the shock pistons may need lubrication, or the shock elements need replacement.
2. Ensure that the main landing gear and tail gear mechanisms are free of dirt to avoid obstruct retraction.

#### **Retraction load high during operation**

1. Ensure that the main landing gear and tail gear mechanisms are free of dirt to avoid obstruct retraction.
2. Ensure that moving parts are lubricated.
3. Ensure that bolts securing mechanisms at pivoting points are not over tight.

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## **32-10-00 MAIN LANDING GEAR AND DOOR: MAINTENANCE PRACTICES**

### **General**

The complete landing gear system in the wheel well must be inspected annually and after every off-field landing as per AMM Chapter 05-20-00 SCHEDULED MAINTENANCE CHECKS.

If there is mud or dirt in this area, the entire wheel well can be sprayed clean with water as the wheel well is sealed from the rest of the fuselage.

The main wheel bearings must be cleaned and lubricated every 5 years or after landing when excessively exposed to sand or mud, with the prescribed lubrication.

The shock absorber slide tubes must be cleaned and lubricated every year as per AMM Chapter 12-20-00 SCHEDULED SERVICING.


### **Removal of main wheel**

The following procedure must be followed in the removal of the wheel if a tyre change is to be done. This procedure is best performed with the fuselage on the fuselage dolly on the trailer rails:

1. Remove the brake calliper.
2. Unbolt the wheel main axle and slide out. A slight tap with a wooden block might be required.
3. Slide the wheel out of the landing gear fork.
4. Clean and lubricate main wheel bearings as described in AMM Chapter 12-00-00 SERVICING.

### **Removal of landing gear shock absorber**

1. Remove the main wheel as per "Removal of main wheel".
2. Remove the rear hinge bolts below the shock absorbers.
3. The shock absorber units can now be removed by turning them out of the top arm structure.
4. Remove the top nut and piston on the shock unit.
5. Slide the shock element of the slide tube.
6. Lubricate the slide tube as per AMM Chapter 12-00-00 SERVICING.

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7. Reassemble the shock unit.

**NOTE:** Using a Stillson Wrench to loosen the Shock Assembly Bottom Cap may damage the Bottom Cap beyond conformance. The bottom cap has two parallel flat sides to allow a 30 mm open end spanner to turn the shock absorber

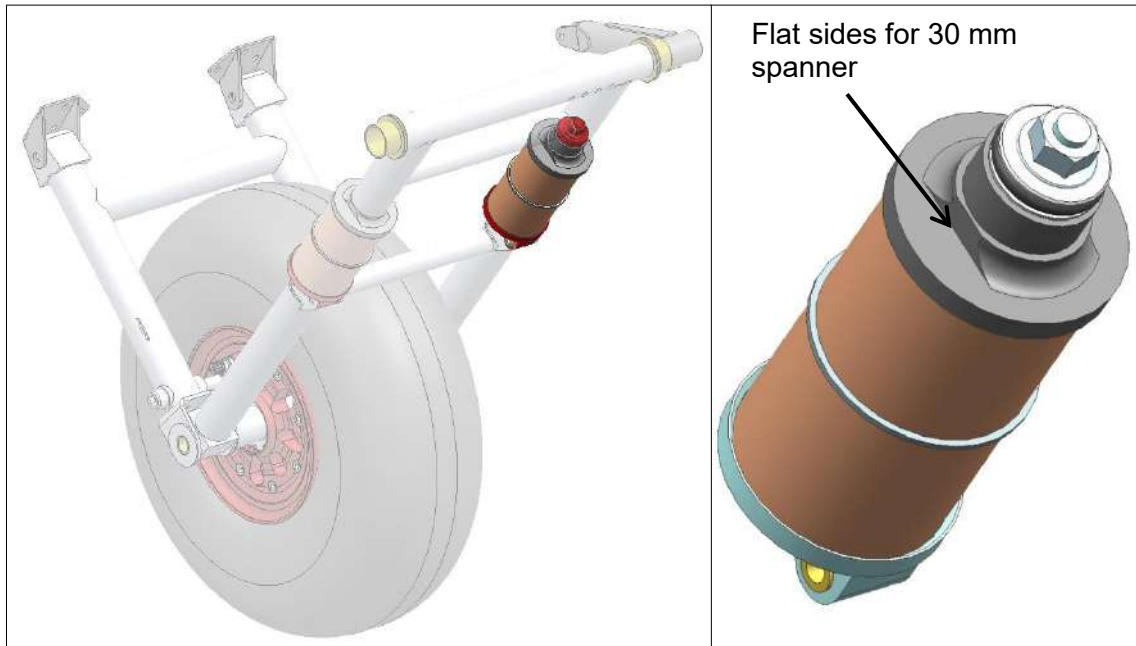



Figure 32-2: Shock absorber

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## 32-11-00 RETRACTABLE TAIL WHEEL AND DOORS

### General

Follow the procedures given in this chapter to perform maintenance on the tail wheel system.

### Description

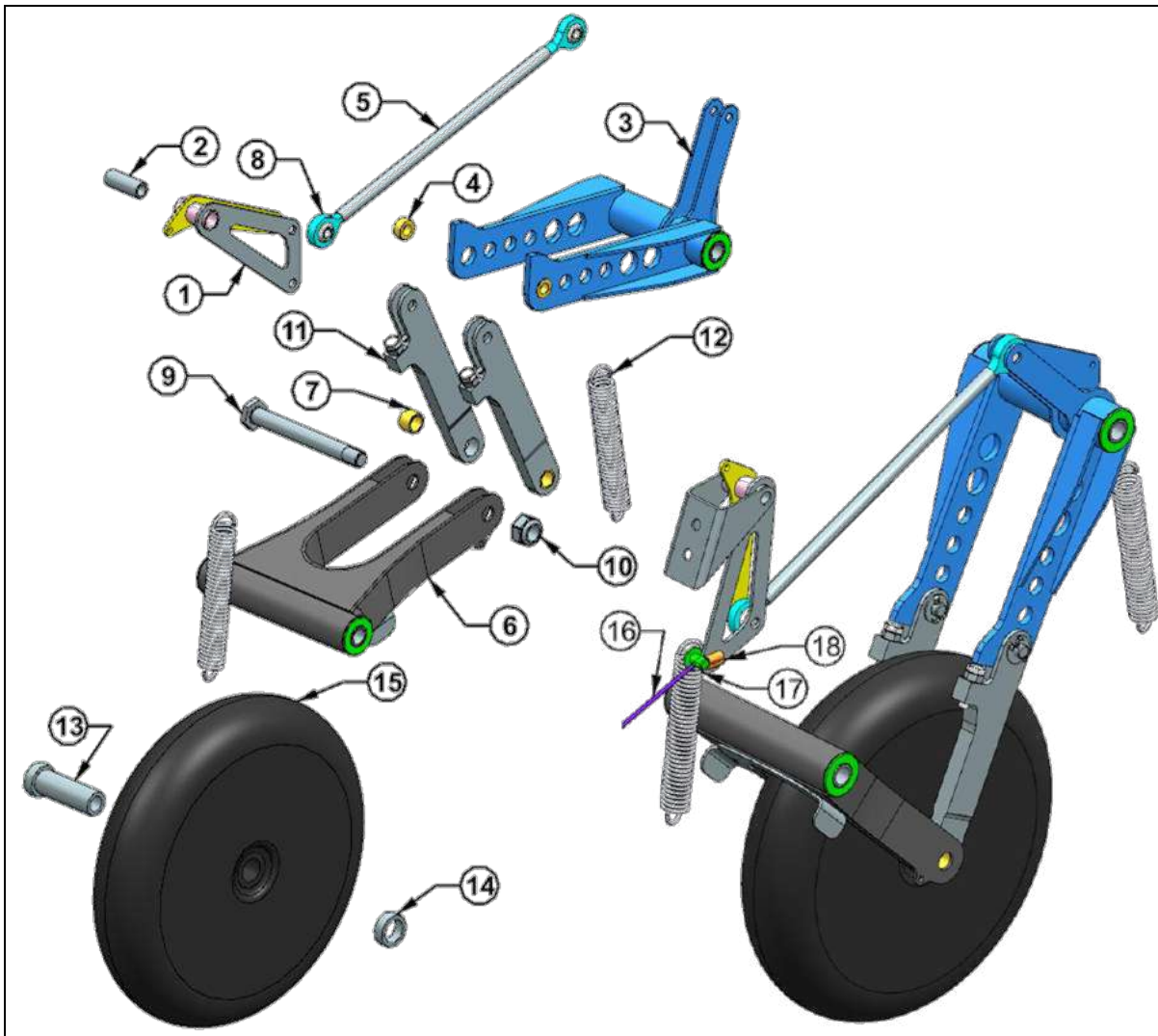
The tail wheel is retractable and non-steering. The tail wheel is retracted by two springs (Figure 32-3, Item 12) anchored to the tail boom and the fin false spar, and acting on two bell cranks; the tail wheel is extended by a cable (Figure 32-3, Item 16) connected to the main landing gear bell crank (Figure 32-3, Item 1).

The tail wheel can be locked by inserting a 6 mm pin from the left side of the fuselage while the tail wheel is fully extended. This will prevent the tail wheel from retracting when the main landing gear is retracted and allows the tail wheel to be used for ground handling and storage.

The following wheels may be used for the retractable tail wheel:


1. Tost Aero Mini 150: # 031501 with adapted valve bore
2. Tost Aero Mini 150 F: # 031582 with foam-filled tyre

Tyre pressure–Tail wheel: 2.5 bar



NO	DESCRIPTION	NO	DESCRIPTION
1	BC0TW	10	M8 nyloc nut
2	BC0TW compression bush	11	RL2TW
3	BC1TW	12	Tension spring OD12 x 40
4	BC1TW bush	13	TW axle bush
5	DR1TW	14	TW axle spacer
6	FA1TW	15	Wheel assembly 150 x 30
7	FA1TW bush	16	TW cable
8	M5 male rod end	17	Clevis pin: OD5 x 4
9	M8H60/70 F3	18	Nicopress 1/16"

**Figure 32-3: Retractable tail wheel**

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## 32-11-00 TAIL WHEEL AND DOOR: MAINTENANCE PRACTICES

### General

The tail wheel system must be inspected annually and after every off-field landing as per AMM Chapter 05-20-00 SCHEDULED MAINTENANCE CHECKS.


### Tools required

- 7 mm spanner x 2
- 8 mm spanner
- 10 mm spanner
- 13 mm spanner
- Ratchet with 8 mm, 10 mm and 13 mm sockets
- Pliers
- Ruler 150 mm or similar straight edge
- Cable tension adjustment tool

### Removal and installation of tail wheel

The tail wheel must be removed if a tyre change is to be done. The tail wheel bearings are sealed and must be replaced if damaged. The tail wheel must also be removed to provide access to the tail valve.

1. Lower the landing gear by pushing the LG handle all the way forward. Ensure the landing gear is locked.
2. Insert the tail wheel lock pin from the left side of the fuselage.
3. Remove the nyloc nut (Figure 32-3, Item 10) and M8H60/70 F3 (Figure 32-3, Item 9). Refer to Figure 32-4.
4. Remove the tail wheel by sliding downward (Figure 32-4).
5. Remove the TW axle bush (Figure 32-3, Item 13) and TW axle spacer (Figure 32-3, Item 14). Refer to Figure 32-4.
6. Installation is the reverse of removal. Ensure to install M8H60/70 F3 from the right, with the M8 nyloc nut on the left (Figure 32-4).

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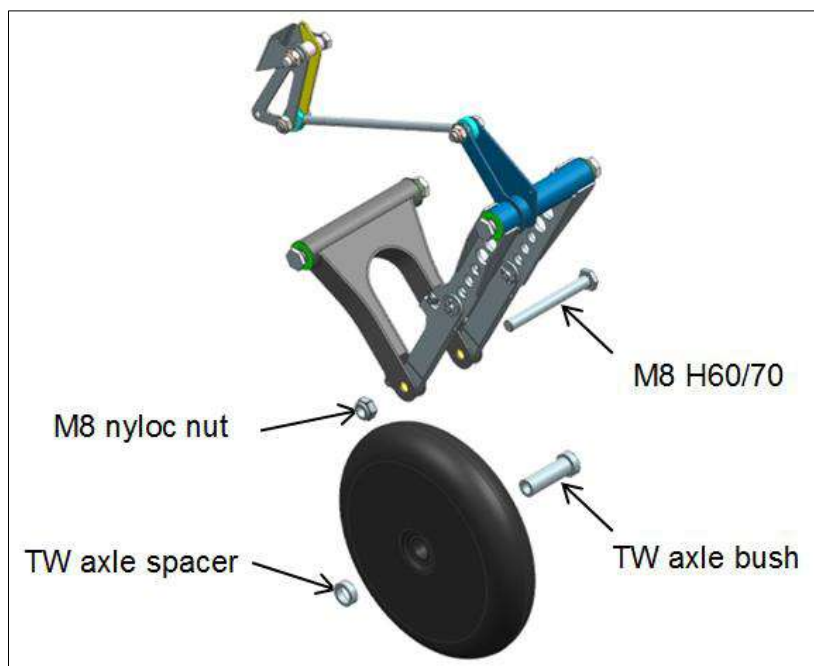


Figure 32-4: Tail wheel removal and installation

### Removal and installation of tail wheel doors

1. Lower the landing gear by pushing the LG handle half way forward. Allow the tail wheel to be moved by hand.
2. Remove the tail wheel doors by pulling forward until the hinges disconnect, then down (Figure 32-5)

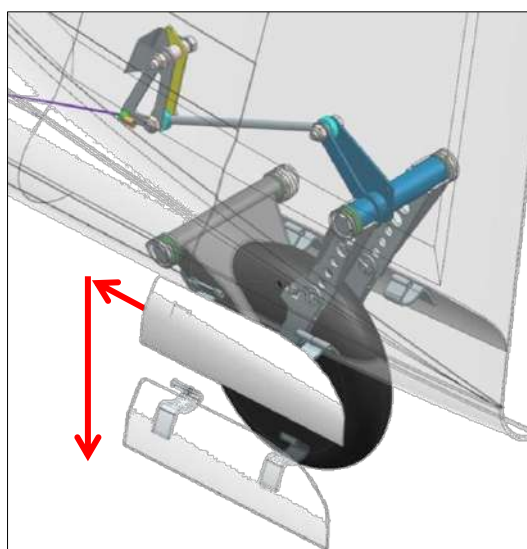



Figure 32-5: Tail wheel doors removal and installation

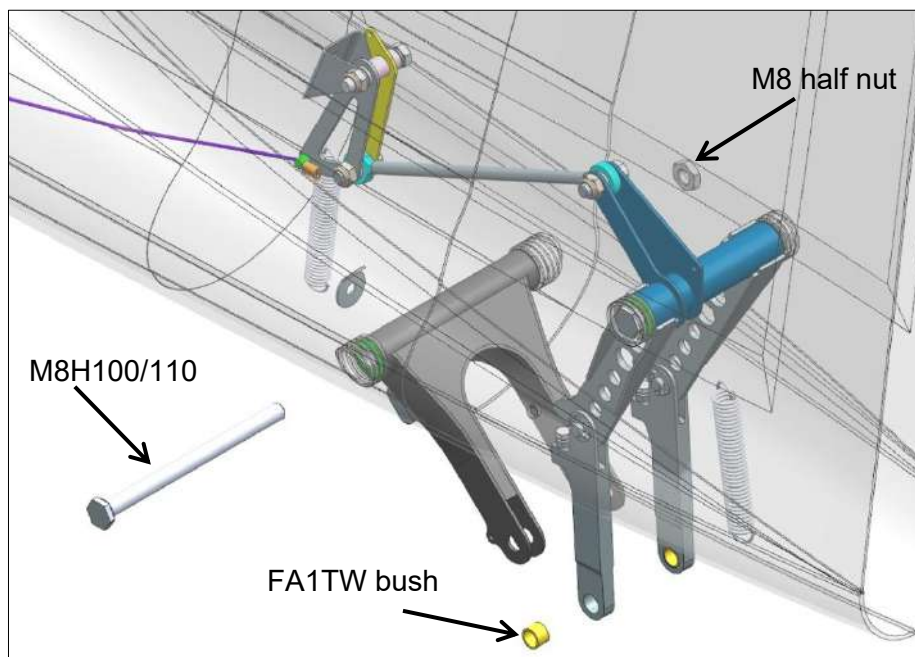
**NOTE:** The doors are mounted on a door frame instead of directly onto the fuselage. This door frame may be removed to allow better access to the tail wheel well. The doors may be reattached to the door frame for storage.

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3. The doors may be left hanging by their springs, or they may be removed by disconnecting the springs from either FA1TW (Figure 32-3, Item 6) or the doors.
4. Installation is the reverse of removal. The front and rear hinge pins are different in length to ease installation. Ensure that both pins are fully engaged.


### Removal and installation of retractable tail wheel system

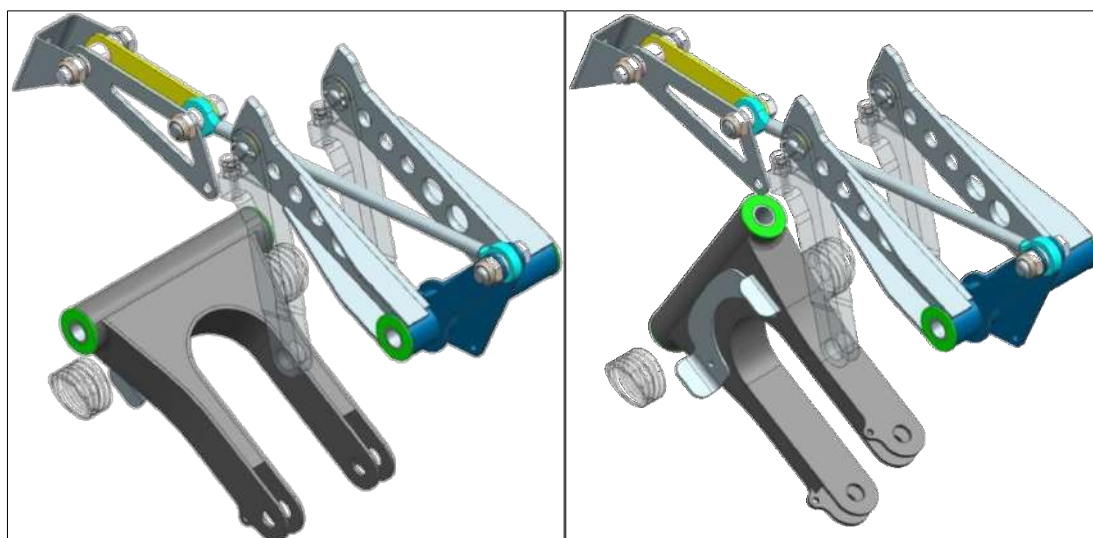
1. Lower the landing gear by pushing the LG handle all the way forward. Ensure the landing gear is locked.
2. Insert the tail wheel lock pin from the left side of the fuselage.
3. Remove the tail wheel according to "Removal and Installation of Tail Wheel".
4. Remove the tail wheel doors according to "Removal and Installation of Tail Wheel Doors".
5. Remove the half nut and M8H100/110 (Figure 32-6).
6. Disconnect FA1TW (Figure 32-3, Item 6) from RL2TW (Figure 32-3, Item 11) by sliding RL2TW out (Figure 32-6).



**Figure 32-6: FA1TW to fuselage**

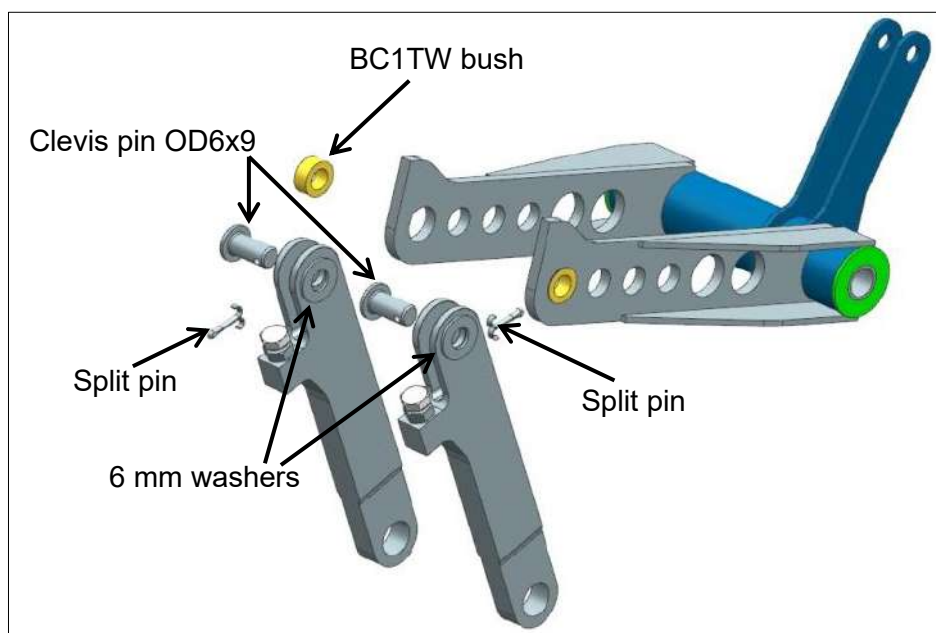
7. Remove FA1TW (Figure 32-3, Item 6) by moving FA1TW upward to clear the fuselage bushes, then turning FA1TW sideways. Retrieve the FA1TW bushes (Figure 32-3, Item 7). See Figure 32-7.

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**Figure 32-7: Turn FA1TW sideways to remove or install**

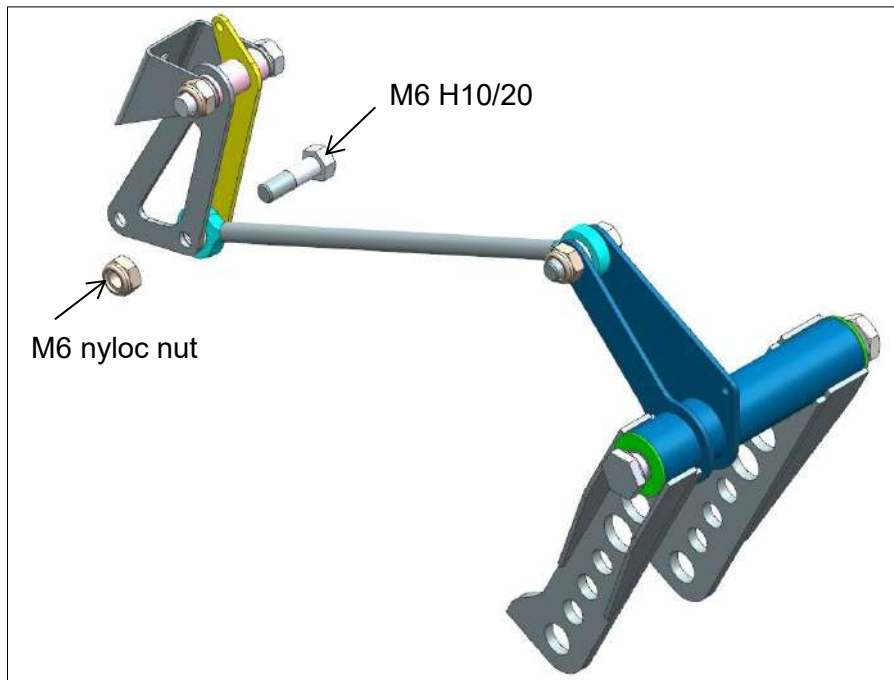
8. Retract the landing gear. Pull down on BC1TW (Figure 32-3, Item 3), remove the lock pin and allow the tail wheel to retract gently.
9. Disconnect the rear tension spring (Figure 32-3, Item 12).
10. Disconnect RL2TW (Figure 32-3, Item 11) from BC1TW (Figure 32-3, Item 3) by removing the split pins and the Clevis pins. Remove RL2TW and recover the BC1TW bushes (Figure 32-3, Item 4) and washers (Figure 32-8).



**Figure 32-8: Clevis pins inserted from the right-hand side**

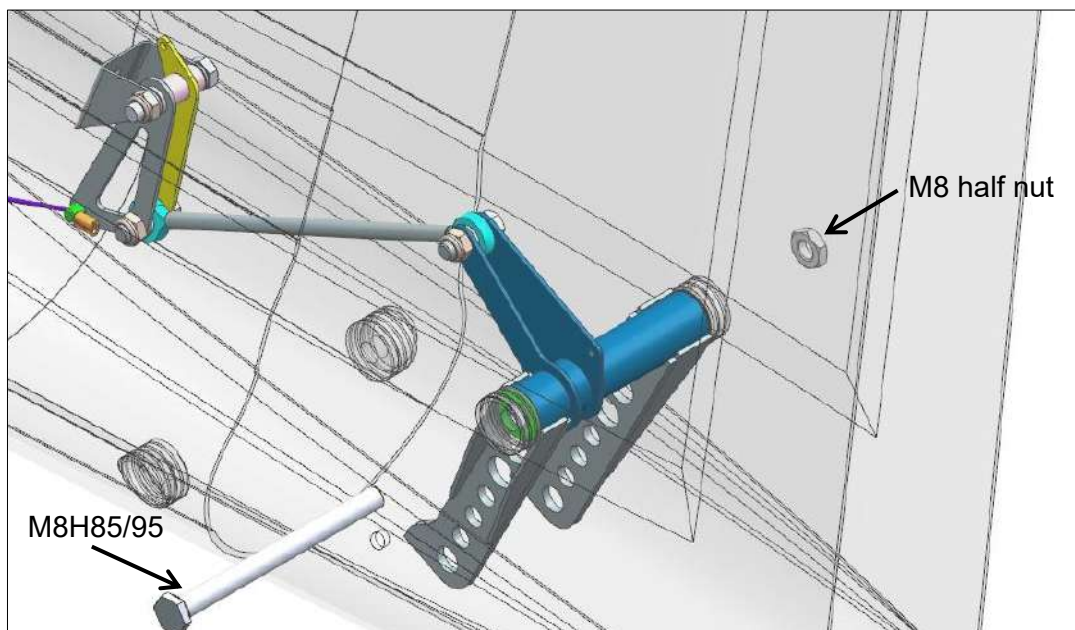
11. Disconnect DR1TW (Figure 32-3, Item 5) from BC0TW (Figure 32-3, Item 1) by removing the nyloc nut and M6H10/20 (Figure 32-9).

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**Figure 32-9: DR1TW to BC0TW**

12. Remove the M8 half nut and M8H85/95 to disconnect BC1TW (Figure 32-3, Item 3) from the fuselage (Figure 32-10).



**Figure 32-10: BC1TW to fuselage**

13. Remove the BC1TW/DR1TW assembly from the fuselage.
14. Installation is the reverse of removal.
  - When connecting RL2TW to BC1TW, ensure that the Clevis pins are inserted from the right, and the split pins and washers are on the left (Figure 32-8).

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## Retractable tail wheel cable

The tail wheel is extended by means of a 1.6 mm (1/16") steel cable connected to BC1LG (Figure 32-1, Item 1). The cable is adjusted with a turnbuckle. The cable and turnbuckle can be accessed through the engine bay compartment.

## Set up tail wheel over-centre

If BC1TW or RL2TW were replaced, the over-centre needs to be adjusted. The over-centre is adjusted with the tail wheel system installed in the fuselage.

1. With the tail wheel fully extended, remove the wheel (Figure 32-3, Item 15). Connect FA1TW (Figure 32-3, Item 6) to RL2TW (Figure 32-3, Item 11) with M8H60/70 (Figure 32-3, Item 9). See Figure 32-11.

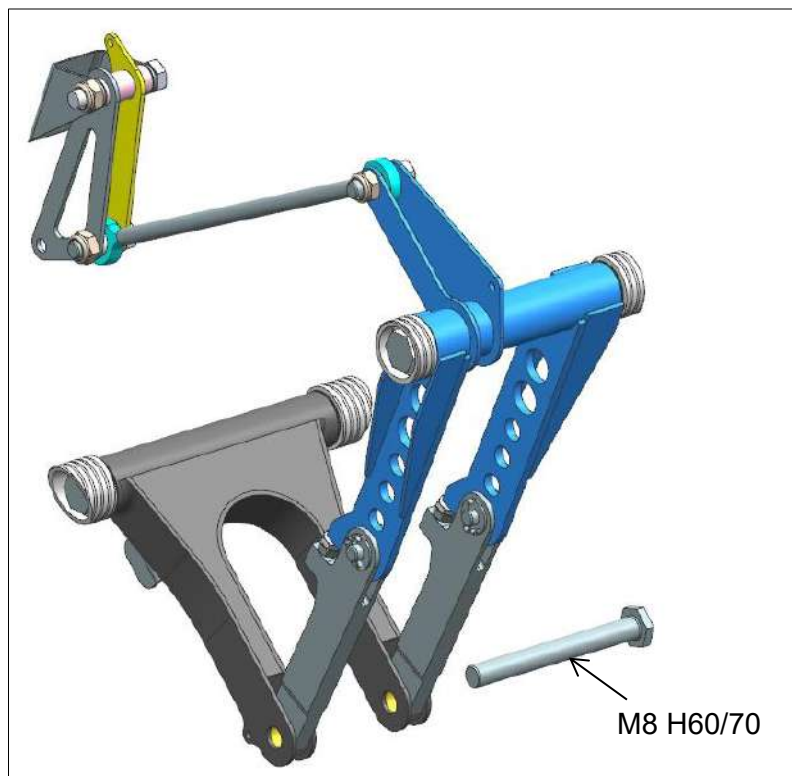

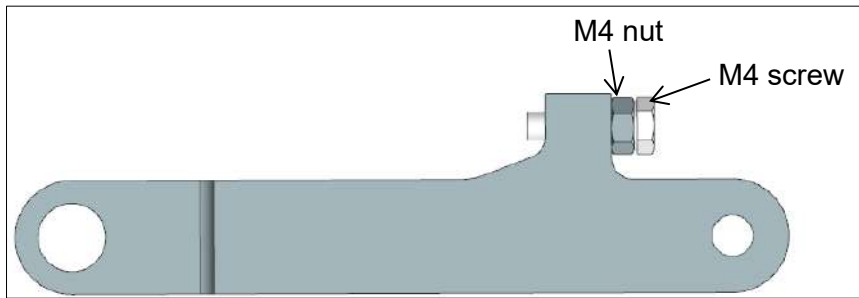


Figure 32-11: FA1TW to RL2TW

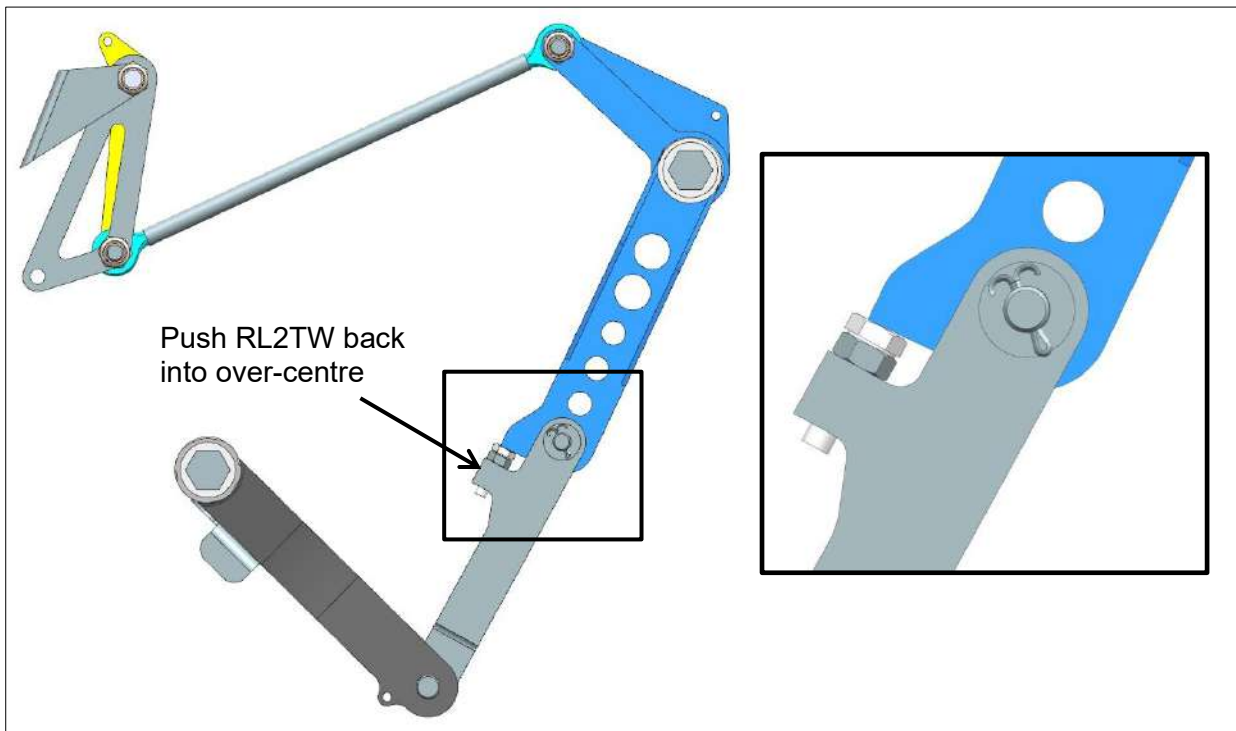
2. If necessary to reduce the retraction spring force, disconnect DR1TW (Figure 32-3, Item 5) from BC0TW (Figure 32-3, Item 1) by removing the nyloc nut and M6H10/20 (Figure 32-9). It may also be useful to disconnect the rear spring (Figure 32-3, Item 12)
3. Turn the M4 screw and M4 nut by hand until flush with RL2TW (Figure 32-3, Item 11). Apply Loctite 243. Do not use spanners (Figure 32-12).

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**Figure 32-12: RL2TW with M4 screws and nuts flush**

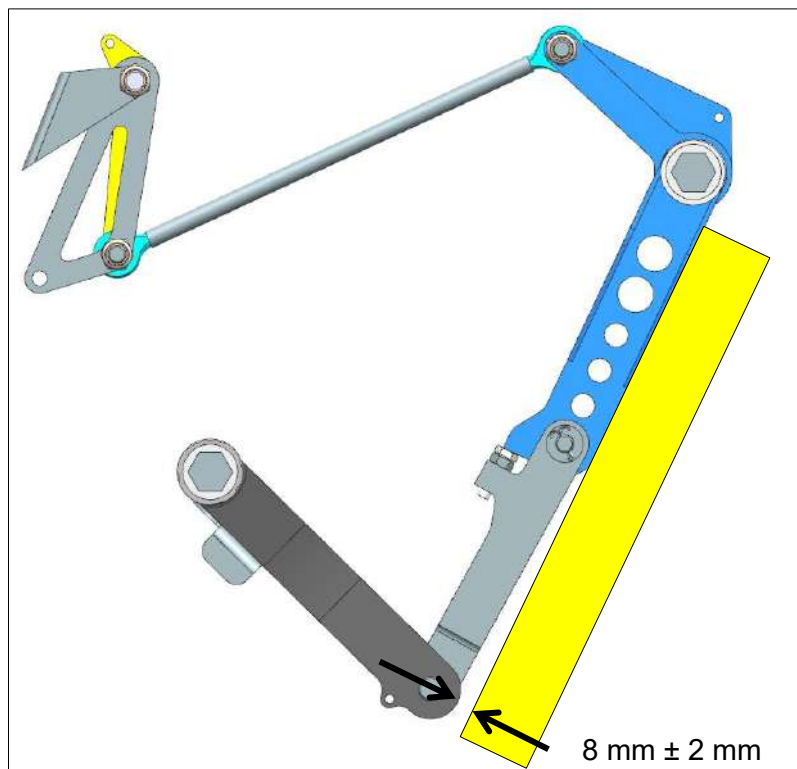
4. Push back on RL2TW until BC1TW bottoms out on RL2TW's M4 screws.



**Figure 32-13: TW in over-centre**

5. Check that both RL2TW bottom out against BC1TW (Figure 32-3, Item 3) by sliding a piece of paper between BC1TW and RL2TW. If a gap exists between one of RL2TW and BC1TW, gently adjust the screw outwards by hand until both legs bottom out. Do not use spanners.
6. Place a ruler or similar straight edge against BC1TW to measure the over-centre. The edge of FA1TW should be at least 6 mm away from the ruler (Figure 32-14).

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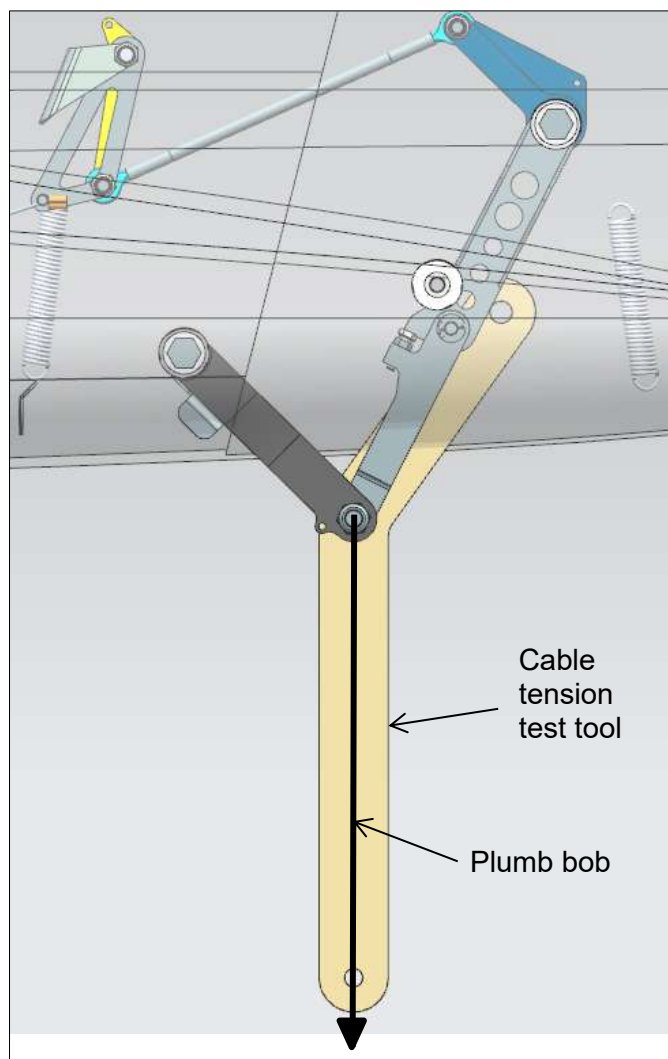
**Figure 32-14: Measuring the over-centre**

7. Once both M4 screws have bottomed out against BC1TW simultaneously, hold the screw with a spanner. Tighten the lock nut against RL2TW with a spanner, taking care not to turn the screw. Lock the other M4 lock nut.
8. If the rear spring was disconnected in Step 2, reconnect the rear spring. If DR1TW (Figure 32-3, Item 5) was disconnected from BC0TW (Figure 32-3, Item 1), connect DR1TW to BC0TW (Figure 32-9). Replace the nyloc nut; do not reuse the nyloc nut.

### **Adjust tail wheel cable tension**

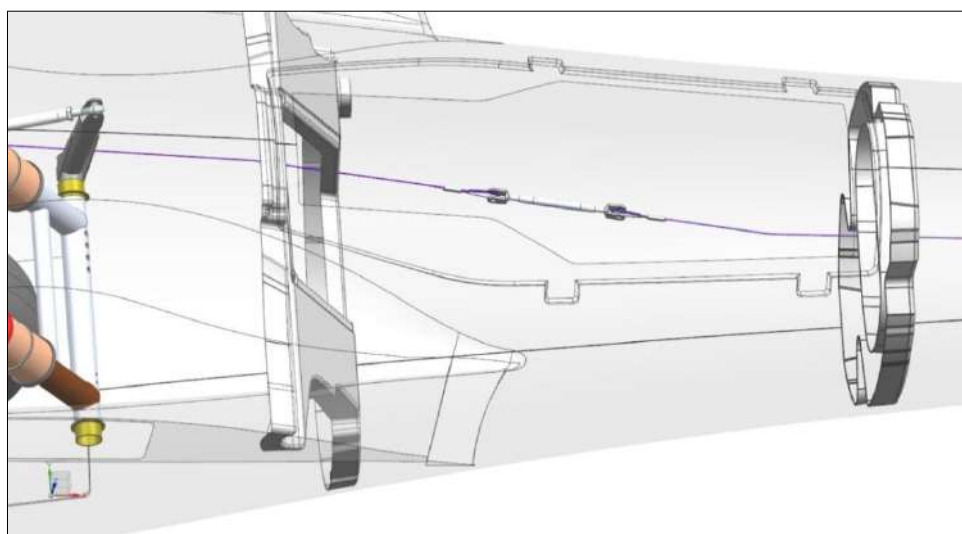
1. Extend the tail wheel, and secure in the extended position with the rigging multi tool, or a lock pin, on the left.
2. Remove the tail wheel according to procedure "Removal and installation of retractable tail wheel system".
3. Insert the cable tension tool with the result that the transverse pin presses against the back of BC1TW (Figure 32-3, Item 3), and hinge around FA1TW and RL2TW with the shaft M8H60/70\_F3 (Figure 32-3, Item 9). Refer to Figure 32-15.
4. Hang a plumb bob, or a piece of string with a weight at the end, from the shaft (Figure 32-15).

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**Figure 32-15: Cable tension setup**

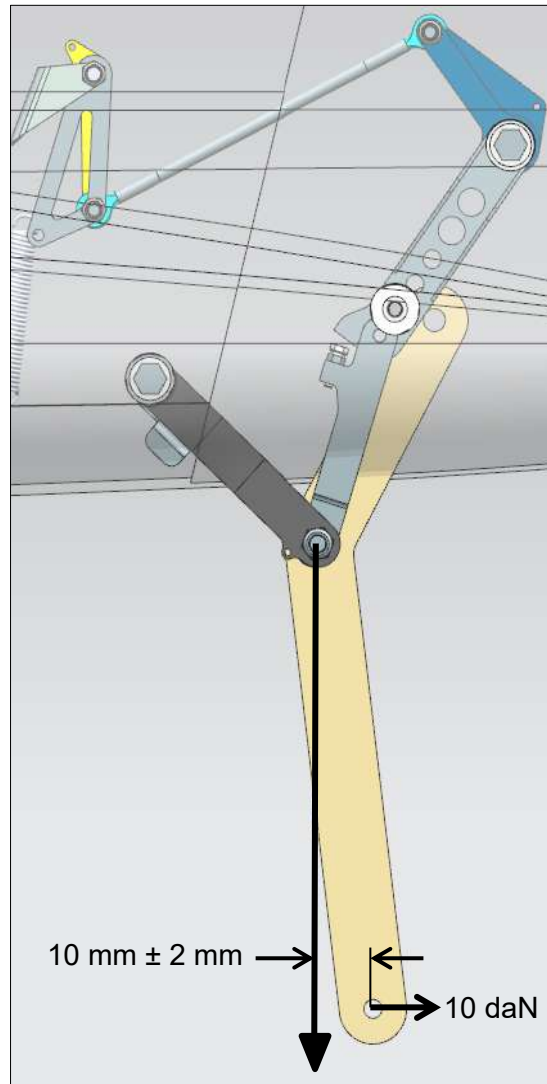
5. Tighten the turnbuckle one turn at a time until the tail wheel bottoms out in the over-centre position (Figure 32-16).



**Figure 32-16: Turnbuckle in engine bay**


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- Remove the lock pin to free the wheel. Test the cable tension by pushing rearwards on the lever. A 10 daN (10 kg) force should deflect the lever approximately 10 mm. Tighten the turnbuckle half a turn at a time until force requirement is met (Figure 32-17).



**Figure 32-17: Cable tension specification**

- Remove the cable test tool. Lock the turnbuckle with locking wire and cover with heat shrink. The tail wheel can now be installed.

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## 32-11-01 FIXED TAIL WHEEL 150x30

### General

Follow the procedures given in this chapter to do maintenance on the tail wheel system.

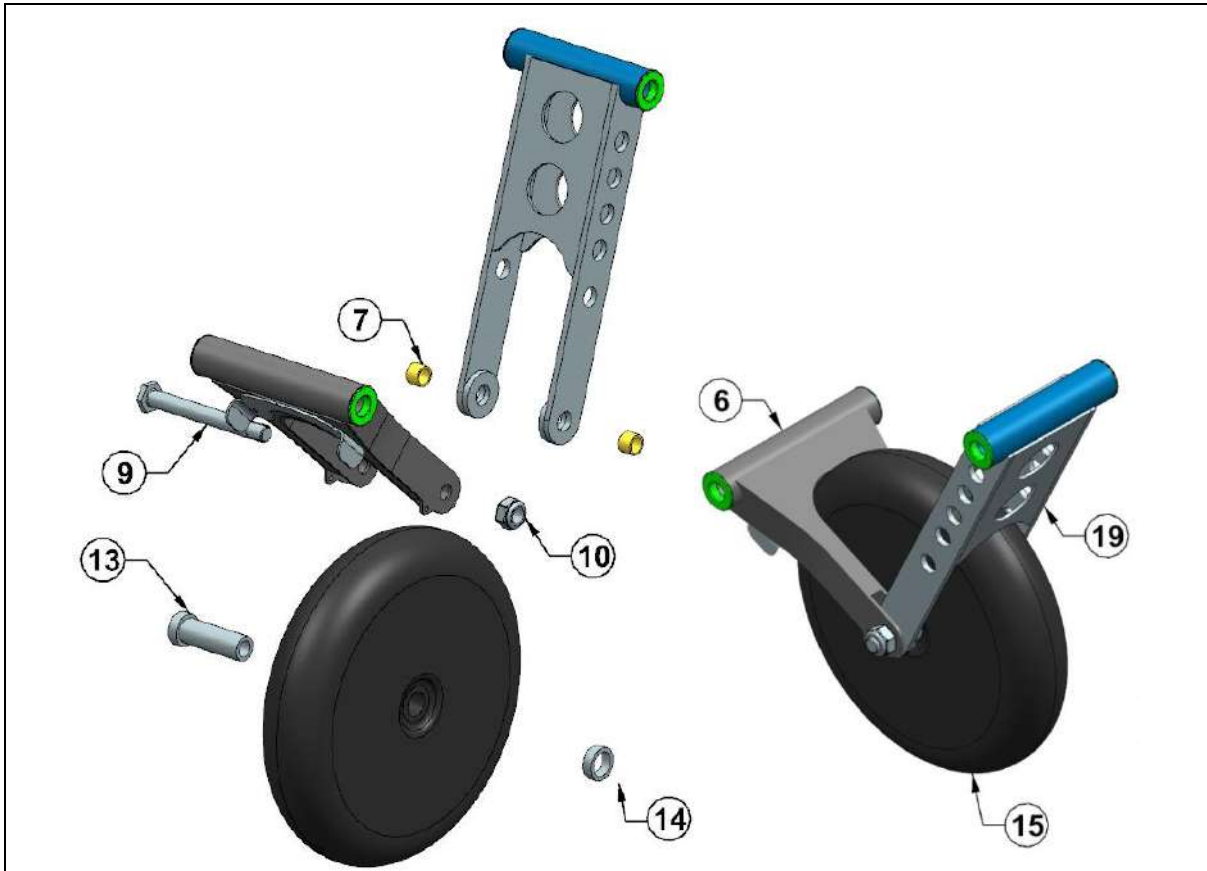
### Description

The retractable tail wheel may be converted to a fixed tail wheel by removing the collapsible rear arms (Figure 32-3, Item 3 and Item 11) and substituting a single rigid arm (Figure 32-18, Item 19). The tail wheel doors are also removed, and a fairing is installed

The following wheels may be used for the 150x30 fixed tail wheel:


1. Tost Aero Mini 150: # 031501 with adapted valve bore
2. Tost Aero Mini 150 F: # 031582 with foam-filled tyre

Tyre pressure–Tail wheel: 2.5 bar



NO	DESCRIPTION	NO	DESCRIPTION
6	FA1TW	13	TW axle bush
7	FA1TW bush	14	TW axle spacer
9	M8H60/70 F3	15	Wheel assembly 150 x 30
10	M8 nyloc nut	19	RL1TW

**Figure 32-18: 150x30 Fixed tail wheel**

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## 32-11-01 FIXED TAIL WHEEL 150x30: MAINTENANCE PRACTICES

### General

The tail wheel system must be inspected annually and after every off-field landing as per AMM Chapter 05-20-00 SCHEDULED MAINTENANCE CHECKS.

### Installation of 150x30 fixed tail wheel

1. Remove the tail wheel as per AMM Chapter 32-11-00 RETRACTABLE TAIL WHEEL AND DOORS "Removal and installation of tail wheel".
2. Remove the tail wheel doors as per AMM Chapter 32-11-00 RETRACTABLE TAIL WHEEL AND DOORS "Removal and installation of tail wheel doors".
3. If possible, disconnect the rear spring (Figure 32-3, Item 12).
4. Remove the retractable tail system as per AMM Chapter 32-11-00 RETRACTABLE TAIL WHEEL AND DOORS "Removal and installation of retractable tail wheel system", Steps 1 to 7.
5. Remove the BC1TW/RL2TW assembly from the wheel well by turning sideways (Figure 32-19). If not done already, disconnect the rear spring (Figure 32-3, Item 12).

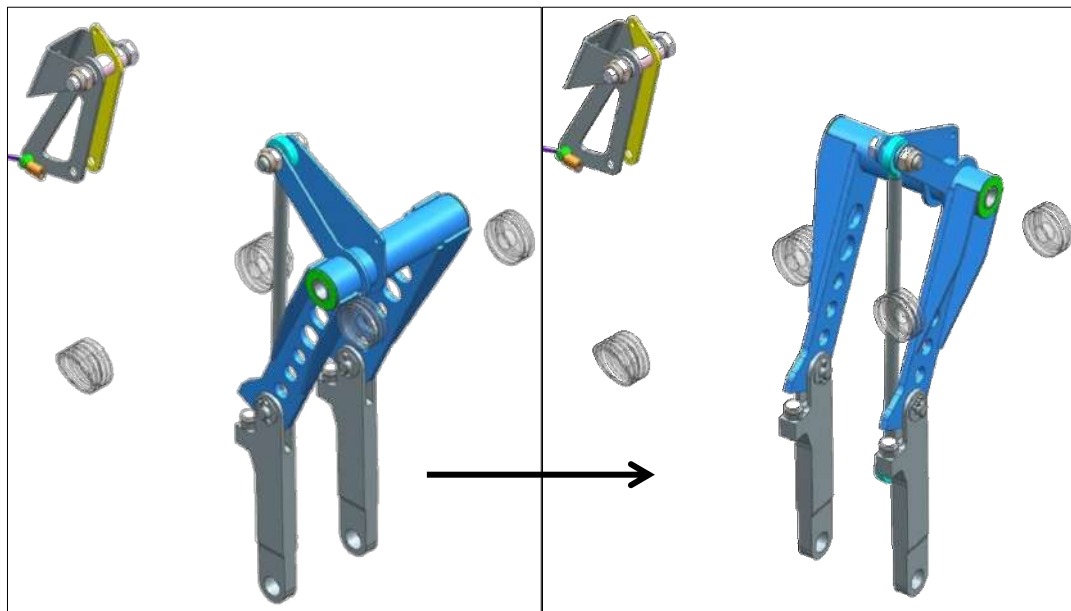

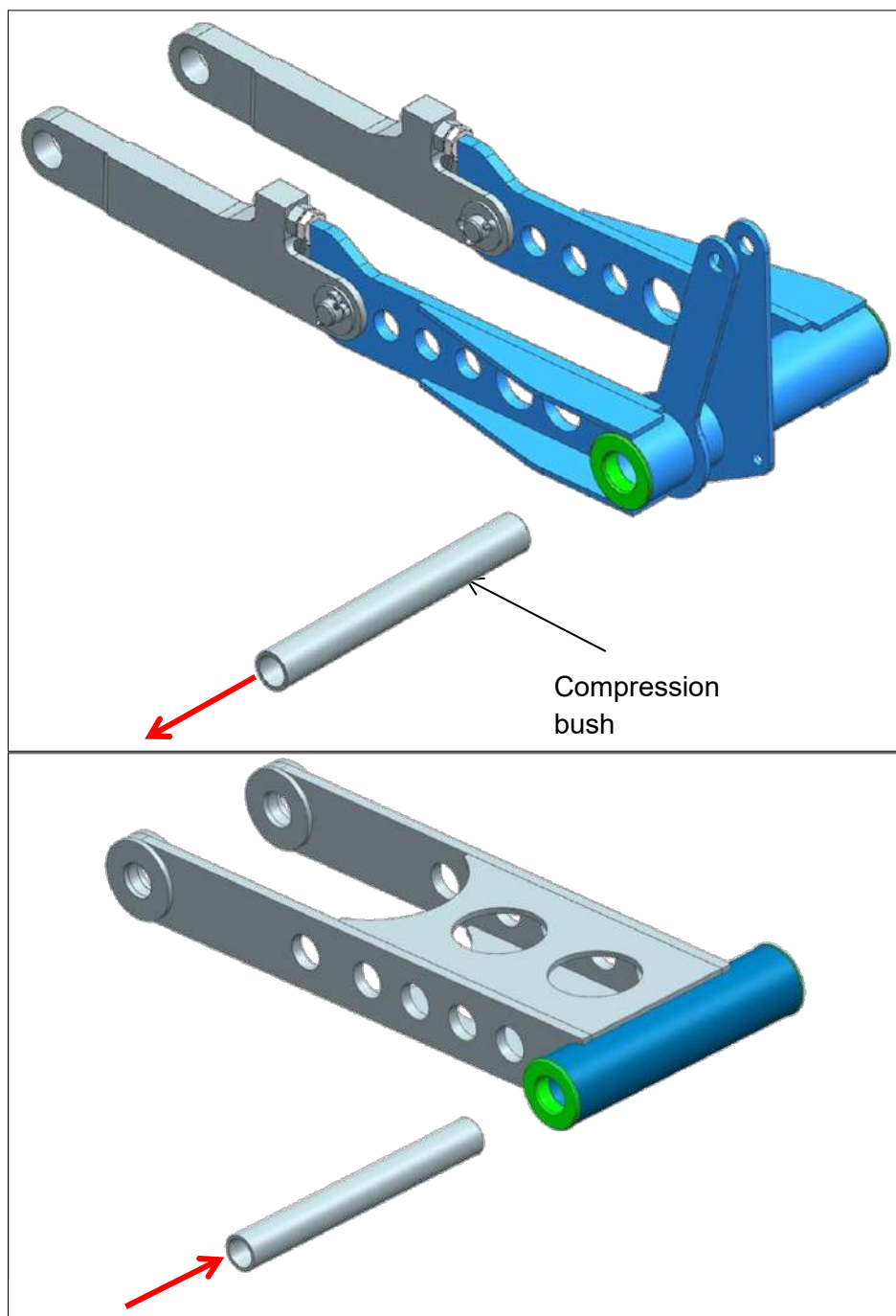


Figure 32-19: Removing BC1TW/RL2TW assembly


6. Retrieve the compression bush from BC1TW (Figure 32-3, Item 3) and insert into RL1TW (Figure 32-18, Item 19). See Figure 32-20.

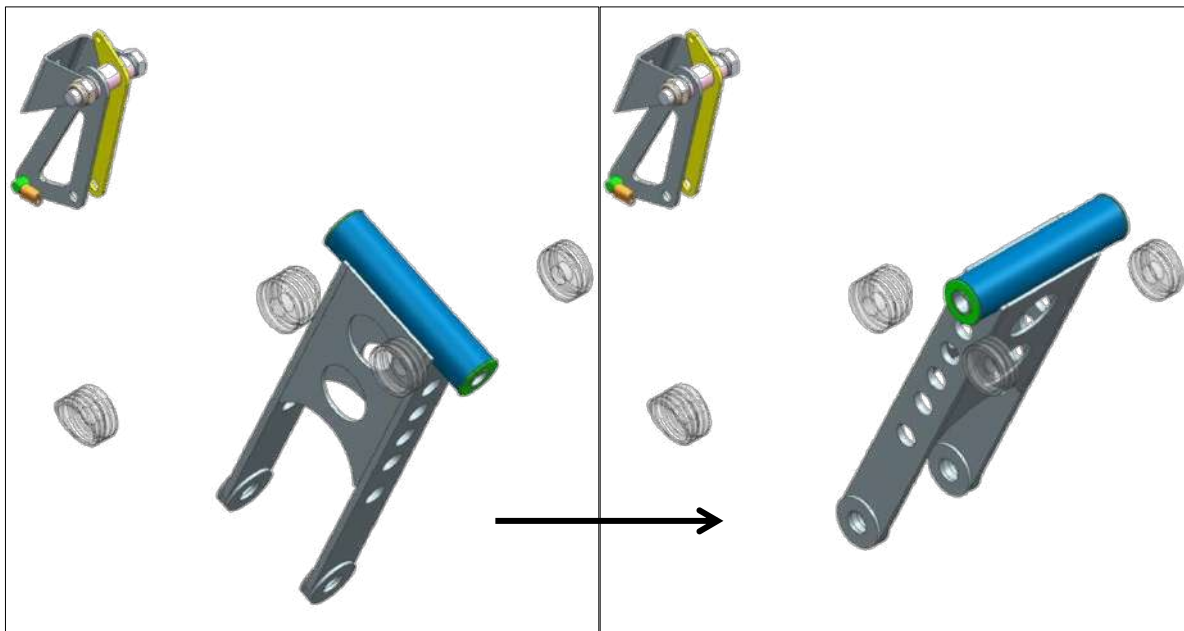
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**Figure 32-20: BC1TW and RL1TW compression bush**

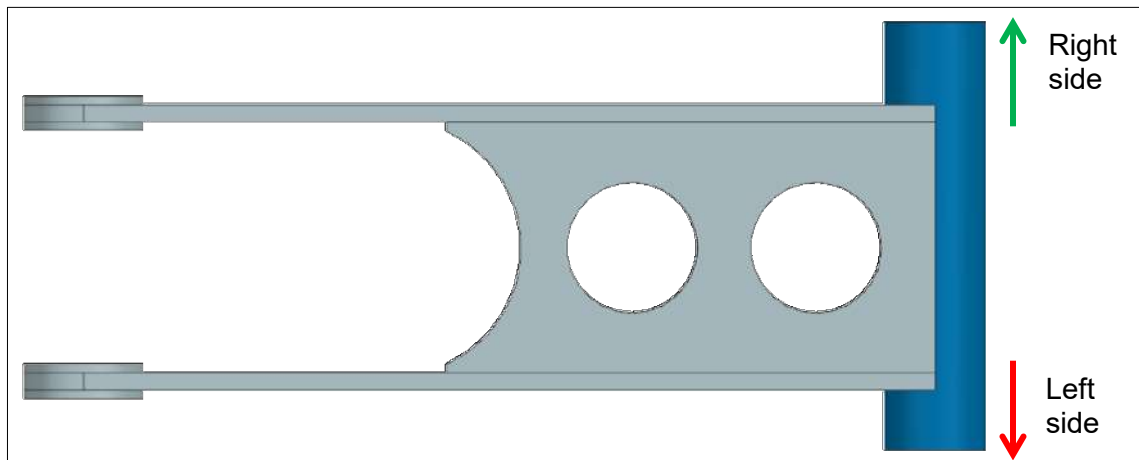
7. Install RL1TW (Figure 32-18, Item 19) into the wheel well by twisting sideways (Figure 32-21).

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**Figure 32-21: Installing RL1TW**

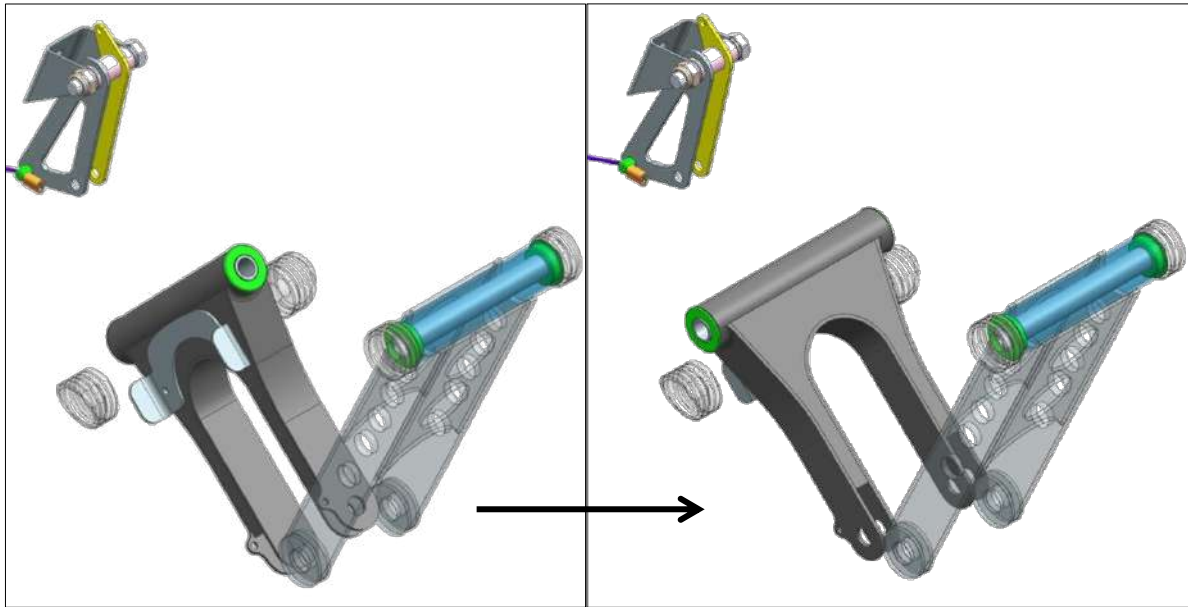
**NOTE:** The tail wheel is offset to the left by 2 mm to clear the rudder driver and the right side. Ensure that the narrow tube of RL1TW is on the left side.



**Figure 32-22: Offset provided for clearance**

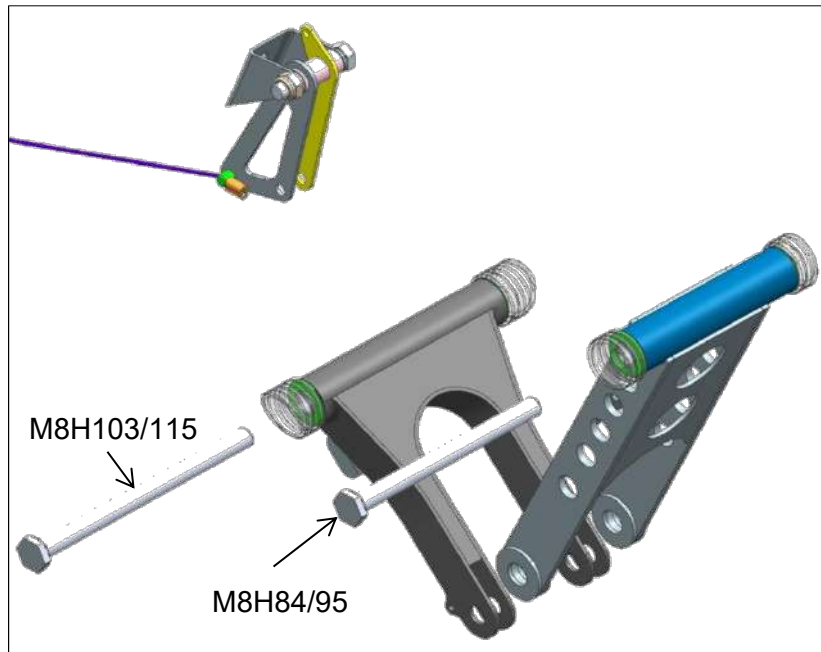
8. Reinstall FA1TW (Figure 32-18, Item 6) by twisting sideways (Figure 32-23).

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**Figure 32-23: Reinstall FA1TW**

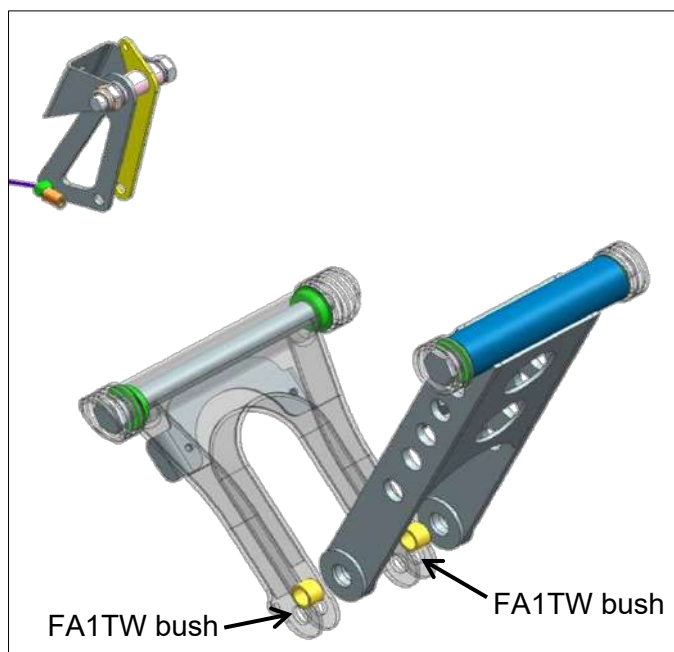
9. Reinstall M8H110/110 from the left to connect FA1TW to the fuselage. Reinstall M8H85/95 from the left to connect RL1TW to the fuselage (Figure 32-24). Secure with M8 half nuts on the right.



**Figure 32-24: Reinstalling the tail wheel arm bolts**

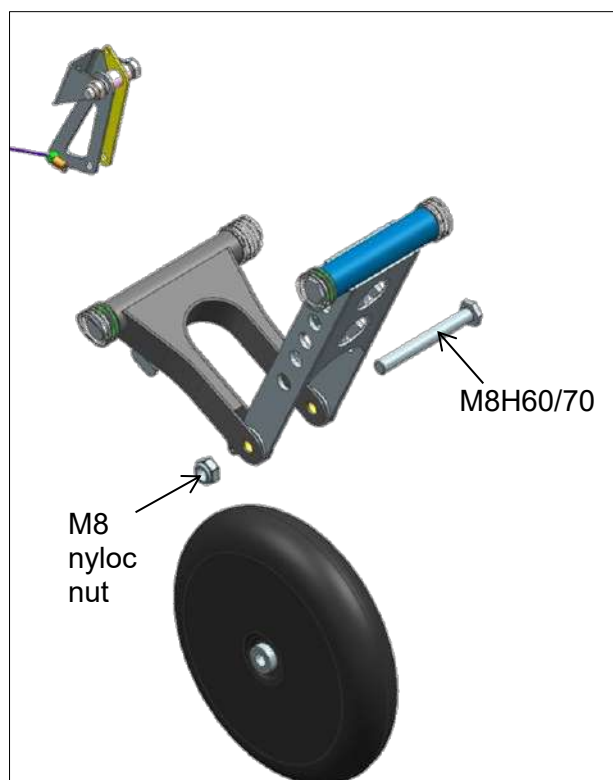
10. Install the FA1TW bushes (Figure 32-18, Item 7), retrieved from RL2TW (Figure 32-3, Item 11) earlier. See Figure 32-25.

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**Figure 32-25: Reinstall FA1TW bushes**

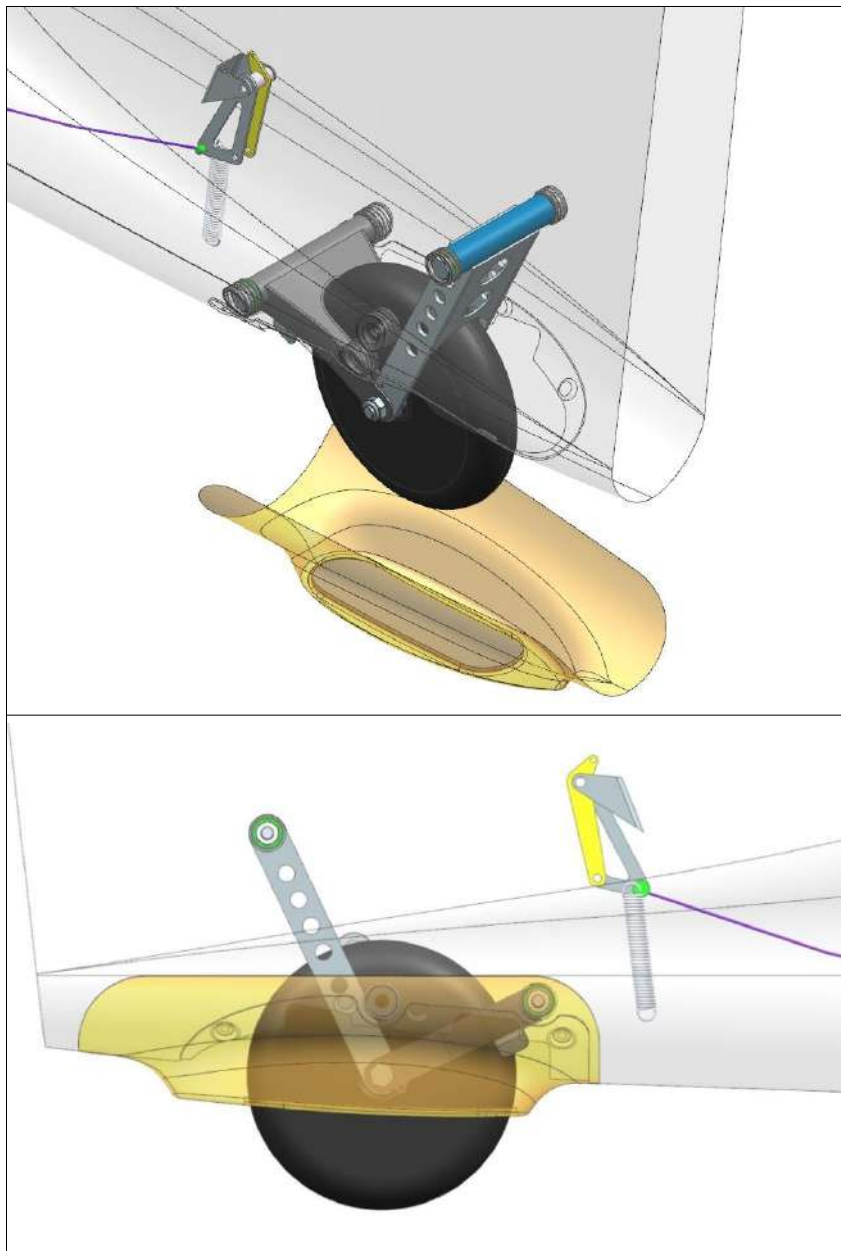
11. Slide the arms of RL1TW into FA1TW to secure the FA1TW bushes.
12. Install the tail wheel (Figure 32-18, Item 15) from below. Install M8H60/70 to connect the tail wheel to FA1TW (Figure 32-18, Item 6) and RL1TW (Figure 32-18, Item 19). Secure the wheel with a M8 nyloc nut.



**Figure 32-26: Installing the tail wheel**


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13. Install the tail wheel fairing from below. Secure the fairing to the fuselage with electrical tape (Figure 32-27).



**Figure 32-27: Tail wheel fairing installed**

14. Removal is the reverse of installation.

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## 32-11-02 FIXED TAIL WHEEL 200x50

### General

Follow the procedures given in this chapter to do maintenance on the tail wheel system.

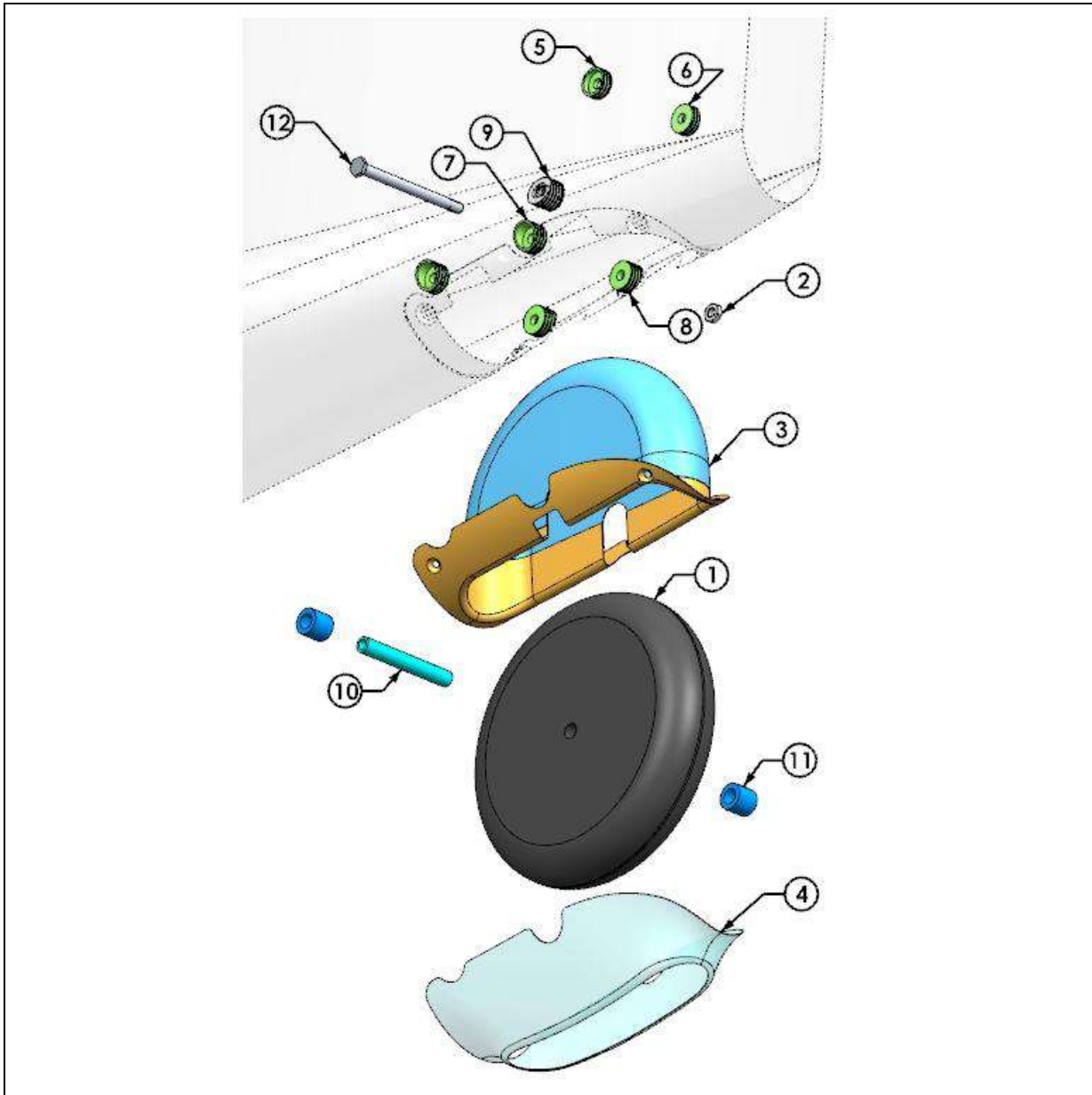
### Description

All SN have the capacity to accommodate a 200x50 fixed tail wheel for improved shock absorption when operating on rough surfaces. The retractable tail wheel or 150x30 fixed tail wheel systems must be completely removed to allow the installation of the 200x50 tail wheel, mud guard and fairing. The tail wheel doors and door frame are also removed to allow the mud guard to be secured to the fuselage.

The following wheels may be used for the 200x50 fixed tail wheel:


1. Tost Aero Max II 200x50: # 033912 with tyre
2. Tost Aero Max II F 200x50: # 033812 with foam-filled tyre

Tyre pressure–Tail wheel: 2.5 bar



NO	DESCRIPTION	NO	DESCRIPTION
1	Wheel assembly 200x50	7	Tail wheel bush 2
2	M8 half nut	8	Tail wheel bush 2 with thread
3	200x50 mud guard	9	Tail wheel locking pin bush
4	200x50 fairing	10	200x50 tail wheel compression bush
5	Tail wheel bush 1	11	200x50 tail wheel spacer
6	Tail wheel bush 1 with thread	12	M8H91/102 F3

**Figure 32-28: 200x50 Fixed tail wheel**

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## 32-11-02 FIXED TAIL WHEEL 200x50: MAINTENANCE PRACTICES

### General

The tail wheel system must be inspected annually and after every off-field landing as per AMM Chapter 05-20-00 SCHEDULED MAINTENANCE CHECKS.

### Removal and installation of 200x50 tail wheel

The tail wheel must be removed if a tyre change is to be done. The tail wheel bearings are sealed and must be replaced if damaged. The tail wheel must also be removed to provide access to the tail valve.

1. Remove the tail wheel fairing by removing the electrical tape securing the fairing to the fuselage (Figure 32-29 and Figure 32-30).

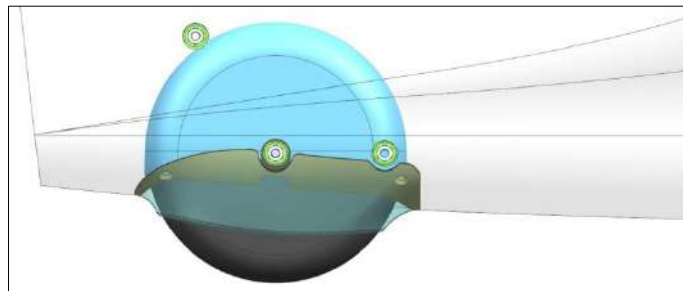


Figure 32-29: Tail wheel fairing installed

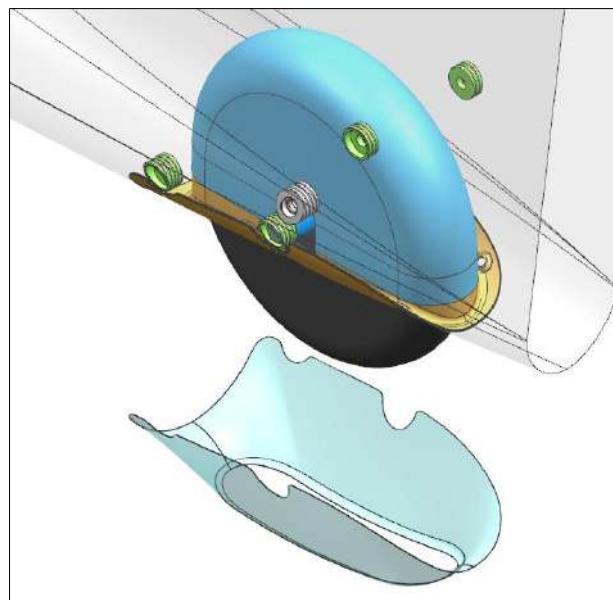

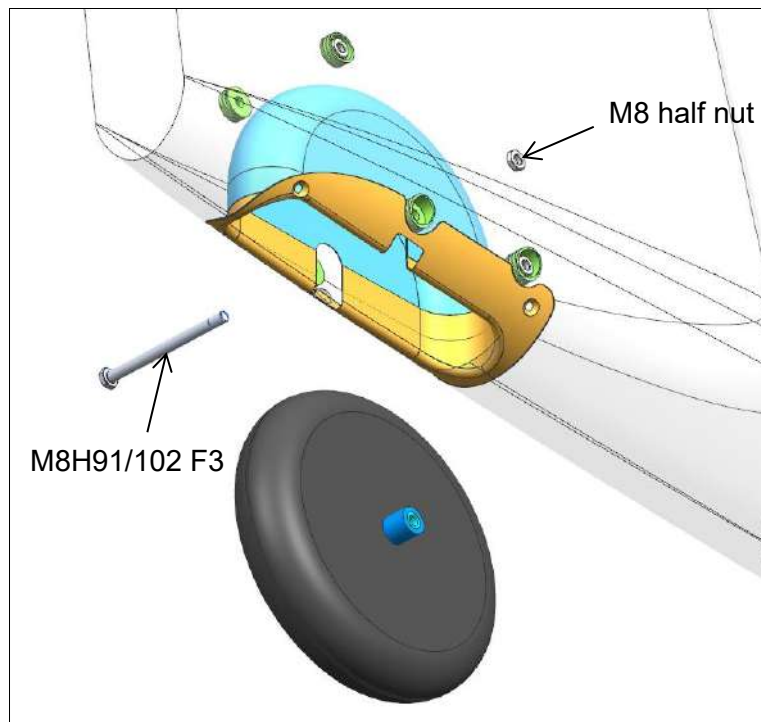


Figure 32-30: Tail wheel fairing removed

2. Remove the M8 half nut on the right (Figure 32-31).

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- Remove the bolt M8H91/102 on the left and remove the wheel downwards (Figure 32-31).



**Figure 32-31: Removing the 200x50 tail wheel**


- Installation is the reverse of removal. Install the bolt M8H91/102 from the left and the M8 half nut on the right. Secure the fairing to the fuselage with electrical tape (Figure 32-29 and Figure 32-30).

**NOTE:** The tail wheel bushes on the right of the fuselage are threaded, while the bushes on the left are not (Figure 32-28).

### Removal and installation of 200x50 tail wheel system

The retractable tail wheel or 150x30 fixed tail wheel systems must be removed completely to allow installation of the 200x50 fixed tail wheel system. The 200x50 tail wheel and mud guard must also be removed to provide access to the tail valve.

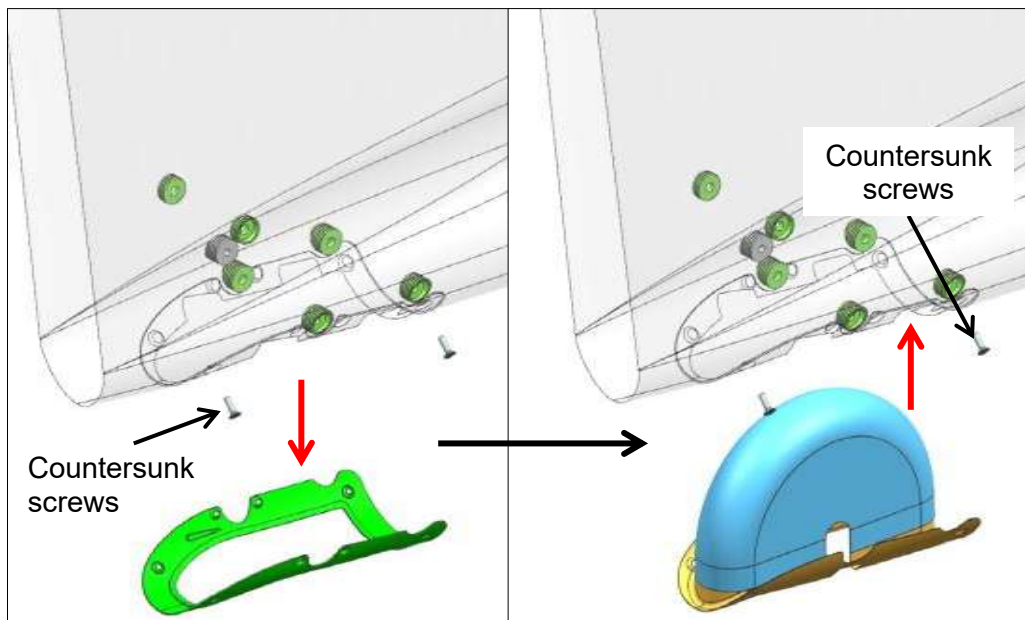
- Remove the tail wheel as per AMM chapter 32–11–00 RETRACTABLE TAIL WHEEL AND DOORS “Removal and installation of tail wheel”.
- Remove the tail wheel doors as per AMM chapter 32–11–00 RETRACTABLE TAIL WHEEL AND DOORS “Removal and installation of tail wheel doors”.
- Remove the tail wheel door frame by undoing the countersink screws securing the frame to the fuselage. Retrieve the screws for the mud guard (Figure 32-32).
- If the retractable tail wheel system is installed, remove the retractable tail wheel system in accordance with 32–11–00RETRACTABLE TAIL WHEEL AND DOORS “Removal and installation of retractable tail wheel system”. If the 150x30 fixed tail wheel is

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installed, remove the 150x30 fixed tail wheel system accordance with 32-11-01 FIXED TAIL WHEEL 150x30 "Installation of 150x30 fixed tail wheel" and the rest of the system accordance with 32-11-00 RETRACTABLE TAIL WHEEL AND DOORS "Removal and installation of retractable tail wheel system".

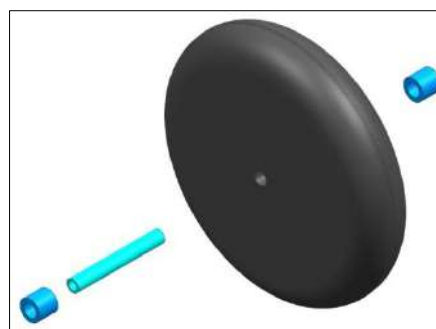
**NOTE:** The mud guard (Figure 32-28, Item 3) is designed to not interfere with BC0TW (Figure 32-3, Item 1) during normal operation. However, due to manufacturing variation it is possible that interference may occur. To allow safe operation of the main landing gear, BC0TW must be in the extended position before installing the 200x50 mud guard.

5. Extend the main landing gear.
6. Install the mud guard (Figure 32-28, Item 3) in the wheel well from below and secure using the screws retrieved from the tail wheel door frame in step 3 (Figure 32-32).




**Figure 32-32: Installing 200x50 mud guard**


7. Assemble the 200x50 wheel (Figure 32-28, Item 1), compression bush (Figure 32-28, Item 10) and two spacers (Figure 32-28, Item 11).



**Figure 32-33: 200x50 Wheel assembled**

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8. Install the wheel into the fuselage from below according to “Removal and Installation of 200x50 Tail Wheel”.

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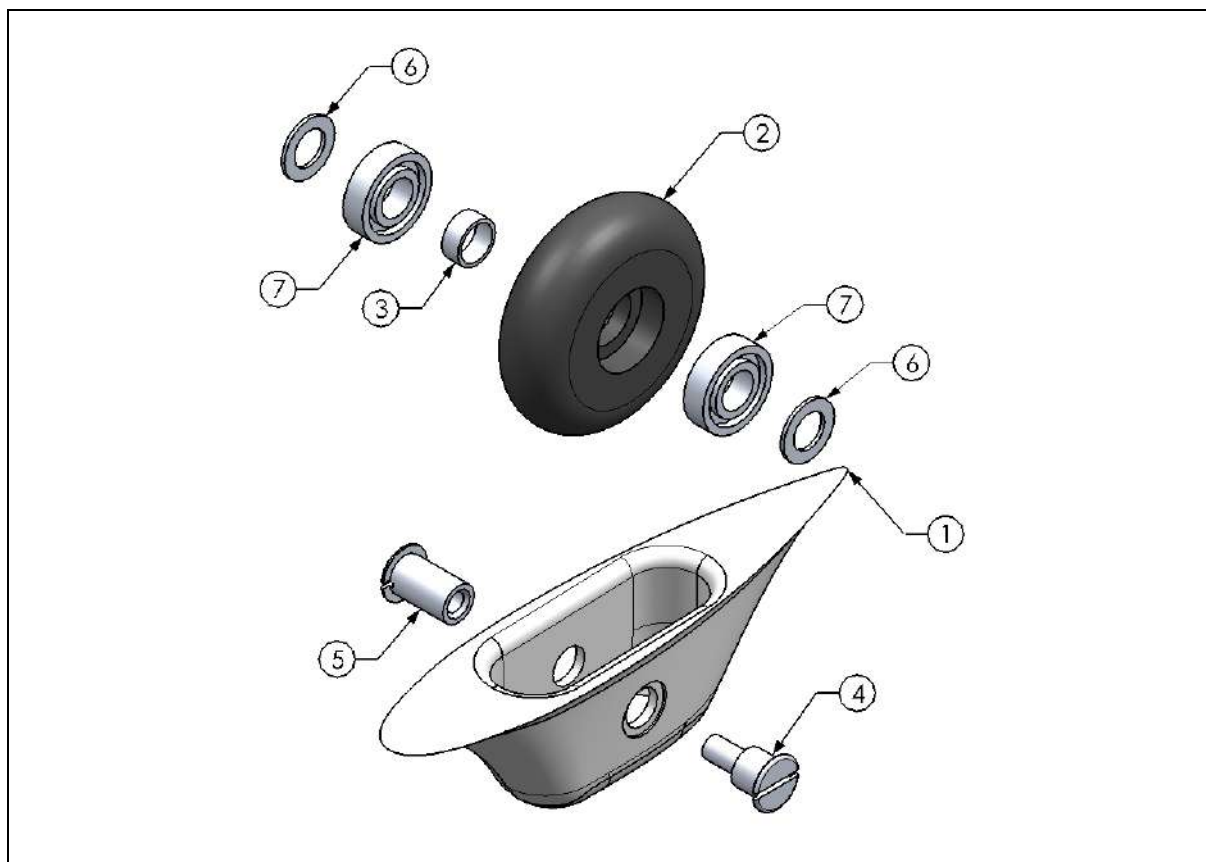
## 32-12-00 WINGTIP WHEELS

### General

The wingtip wheels are attached to the tips of both wings. They are permanently secured with epoxy adhesive.


### Description

The wing tip wheels are bonded to the wing tips with epoxy adhesive.



NO	DESCRIPTION	NO	DESCRIPTION
1	Wing tip wheel housing	5	Female axle bolt
2	Wheel	6	Compression bush
3	Axle spacer	7	Bearing
4	Male axle bolt		

Figure 32-34: Wing tip wheel breakdown

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## 32-30-00 EXTENTION AND RETRACTION

### General

General procedures and the description of the landing gear retraction system can be found in this chapter.

### Description

The landing gear is operated with an actuating handle, located on the right-hand side of the cockpit. Two compatible options are available:

- LG handle lever option 1
- LG handle lever option 2 (handle more backwards for improved ergonomic characteristics)

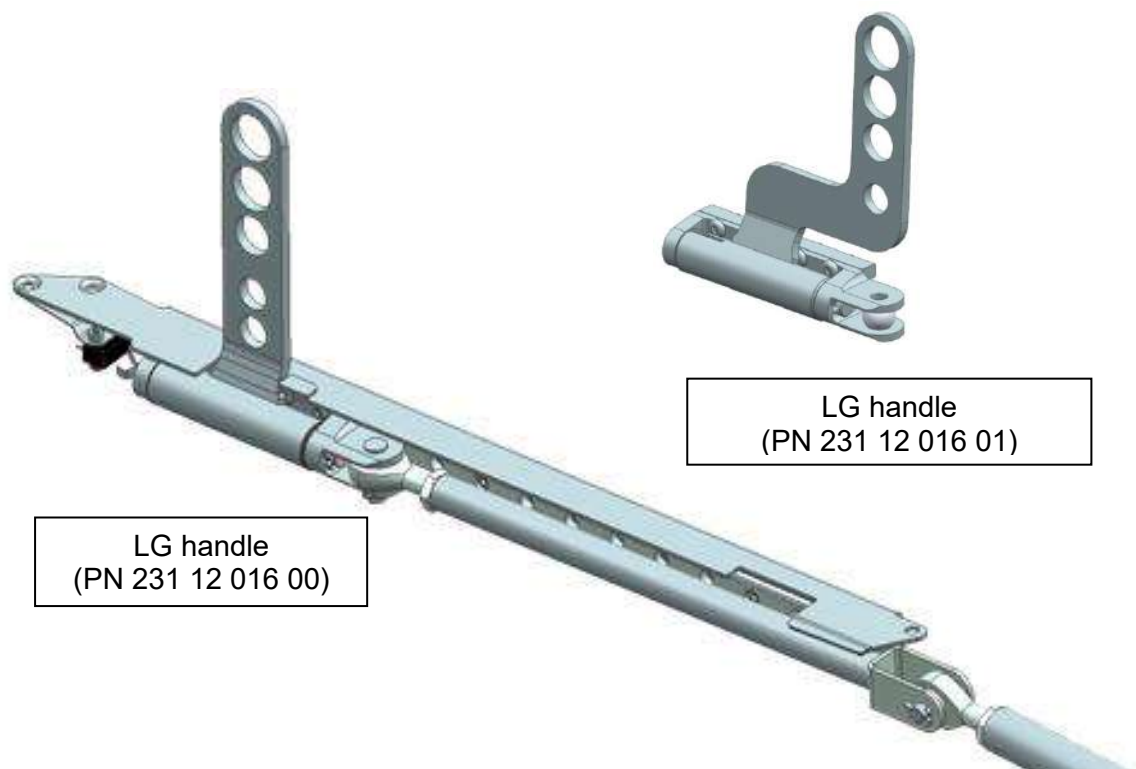
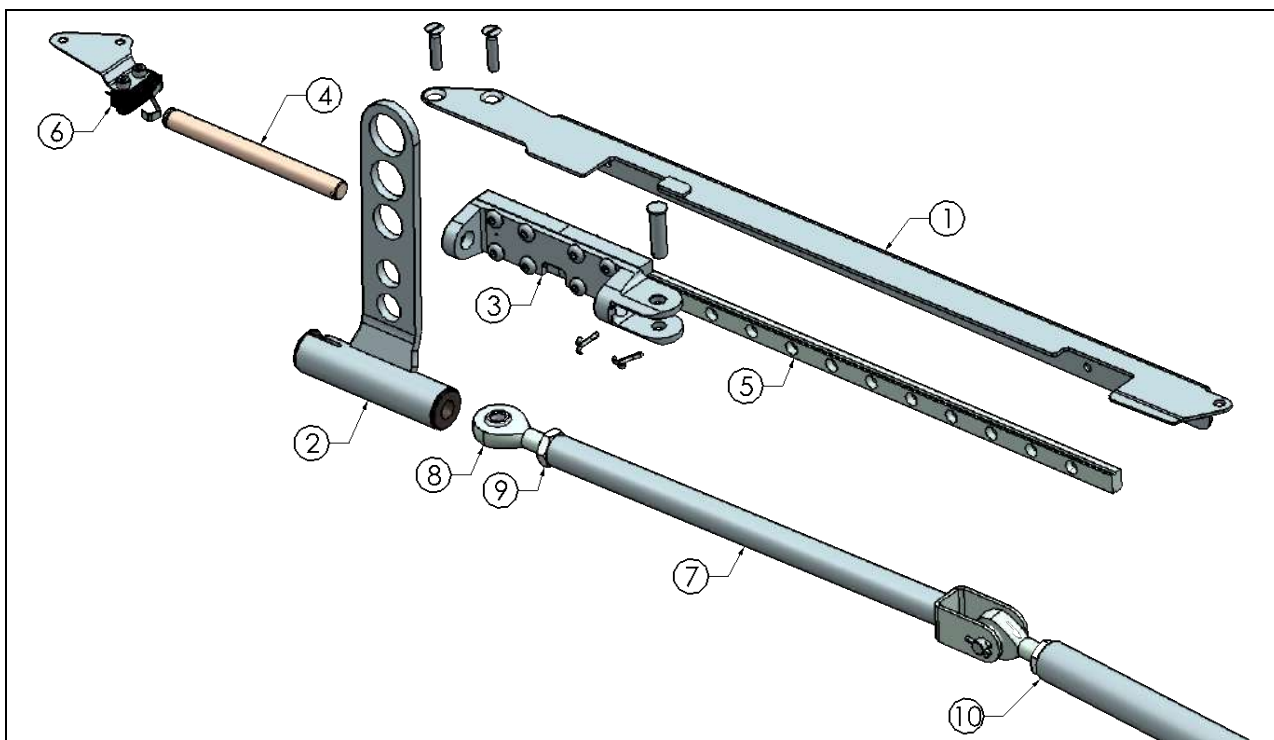



Figure 32-35: Landing gear retraction lever



Item no	Description	Item no	Description
1	LG lock plate	6	LG limit switch assembly
2	LG handle lever	7	DR1LG
3	LG handle bracket	8	DR1LG rod end
4	LG handle shaft	9	Locking nut
5	LG handle slide rail	10	DR2LG

**Figure 32-36: Landing gear retraction system**

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## **32-30-00 EXTENTION AND RETRACTION: TROUBLESHOOTING**

### **Gear operation**

#### **Main gear difficult to get into final lock position**

1. Inspect and ensure that the tail wheel over-centre adjustment bolts are secured and that the tail wheel moves across centre.
2. Inspect and ensure that the tail wheel mechanisms are clean and lubricated.
3. Inspect and ensure that the main wheel mechanisms are clean and lubricated.


#### **Main gear handle difficult to slide forward and back**

1. Inspect and ensure that the tail wheel over-centre adjustment bolts are secured and that the tail wheel moves across centre.

### **Gear Lever Locking**

#### **Main Gear Lever Do Not Stay in Locked Position When Exposed to Loads**

1. Inspect the contact faces on both the handle lever (Figure 32-36 Item 2) and the lock plate (Figure 32-36 Item 1).
2. If the faces are worn in such a way to promote an unlocking force, the landing gear may collapse during operation.
3. Correct or place the contact faces as described AMM Chapter 32-30-00 EXTENTION AND RETRACTION: MAINTENANCE PRACTISES.
4. Inspect the fasteners securing the rail and the handle bracket and fastened if loose as illustrated in Figure 32-48.

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## 32-30-00 EXTENTION AND RETRACTION: MAINTENANCE PRACTISES

### General

The landing gear retraction system must be inspected annually and whenever the play or operation difficulties are observed.

The landing gear lock plate and handle must also be inspected for wear.

The following maintenance practises are provided in this section:


1. Removing of the landing gear handle
2. Disassembling the Landing Gear handle
3. Inspecting and securing the fasteners
4. Inspecting the Landing Gear handle lever and locking plate for wear
5. Correcting the Landing Gear handle lever and lock plate

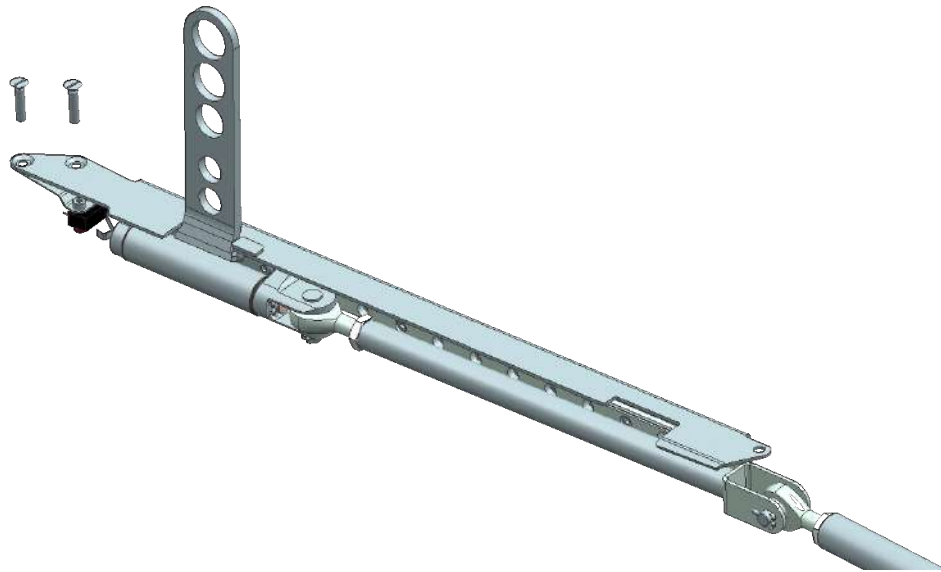
### Tools required

- 1 x Metric 13mm spanner
- 1 x Long nose pliers
- 1 x 2.0mm hex key
- 1 x 2.5mm hex key
- Marine grease
- Medium-strength thread locker
- Metal file or similar abrasive
- Ruler or similar to measure the change in gap size

### Removing the Landing Gear handle

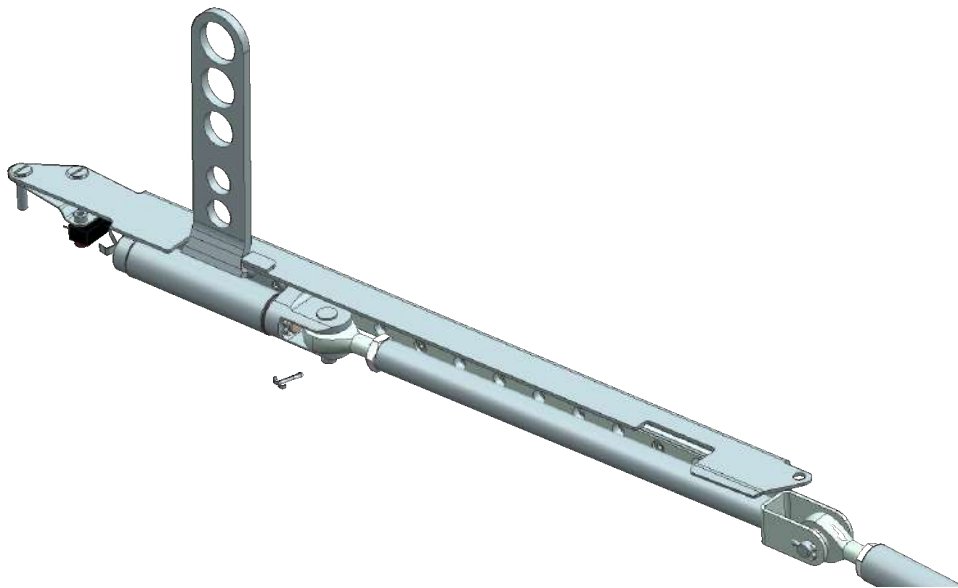
1. Set the aircraft on stands such that the landing gear can be retracted or extended freely without bearing the weight of the aircraft.
2. Remove the seat pan centre section.
3. Remove the screws securing the top of the lock plate (Figure 32-36 Item 1) to the side channel.

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**Figure 32-37: Screws securing the lock plate to the airframe**

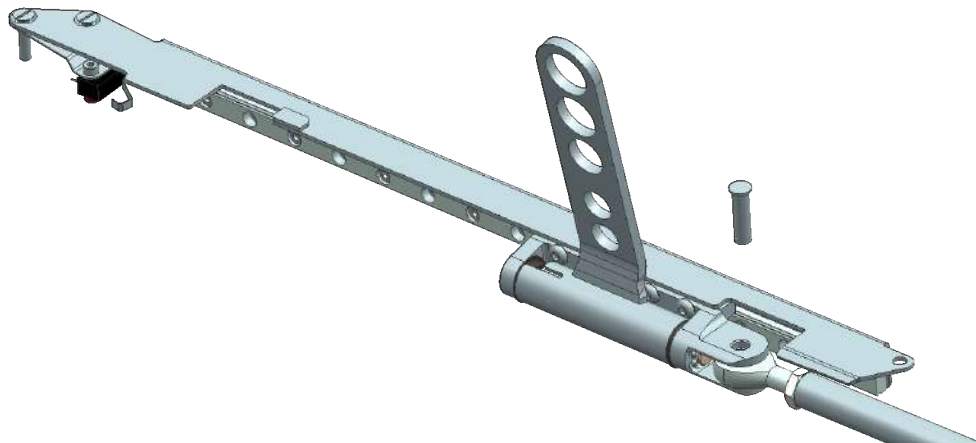
4. With the landing gear handle towards the front, removing the split pin below the handle unit.



**Figure 32-38: Rod end connection split pin**

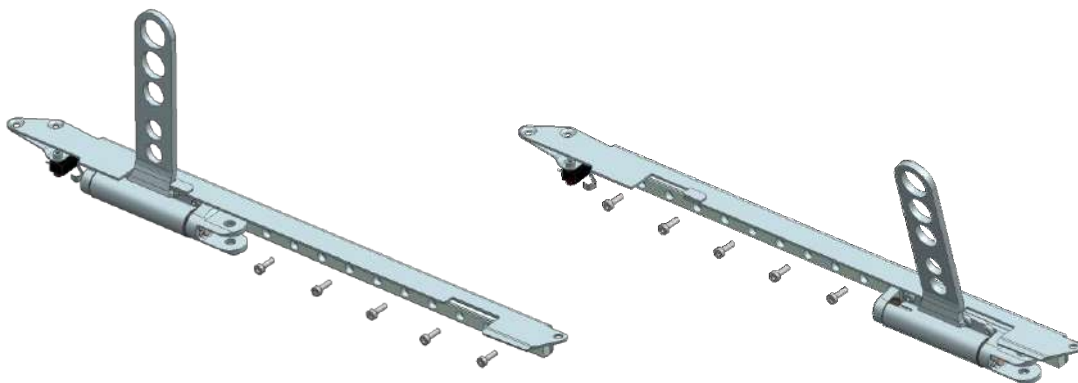
5. Move the handle (Figure 32-36 Item 2) towards the rear until the clevis pin can be removed upwards.

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**Figure 32-39: Rod end clevis pin**

6. Move the handle to and fro to remove the hex recess screws securing the linear rail (Figure 32-36 Item 5) to the fuselage.




**Figure 32-40: Screws securing the linear rail to the fuselage**

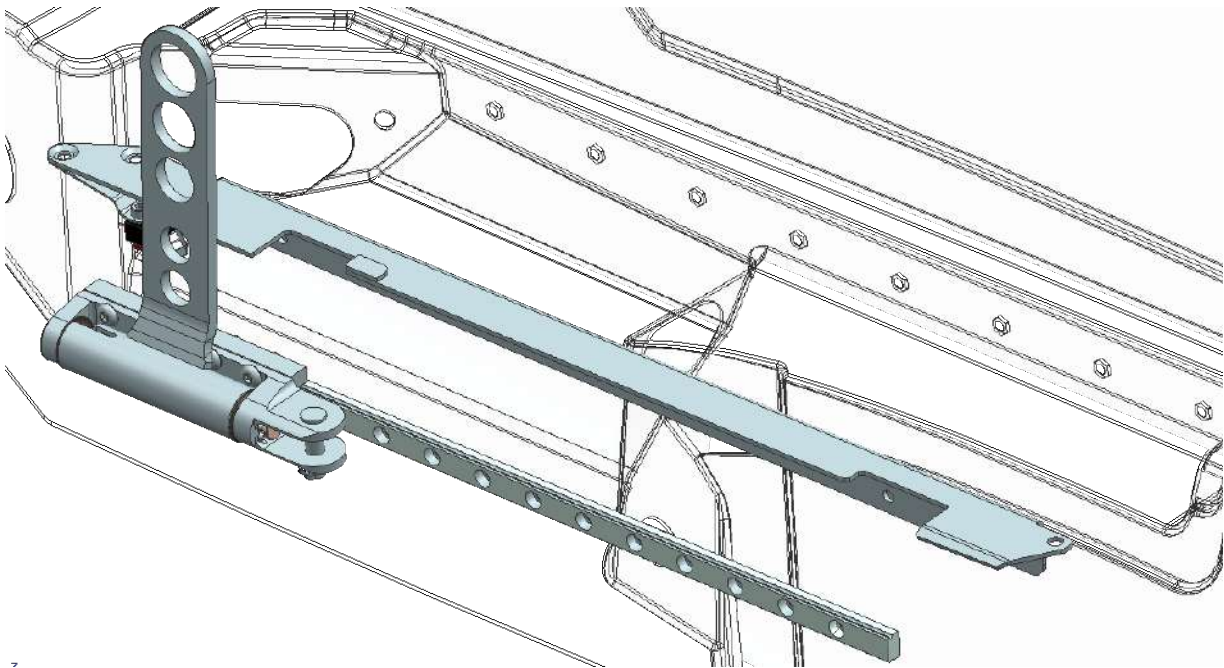
**NOTE:** Take note of the direction of the rail (Figure 32-36 Item 5) before removal.

**CAUTION:** Take note of the position of each screw, as these are different length and could potentially only be installed one way. Turning the screws in the wrong positions may cause damage to the structure, or may cause premature binding against the structure, preventing the proper securing of the rail to the structure.

7. The lock plate, handle assembly and linear rail are now free and can be removed and disassembled.

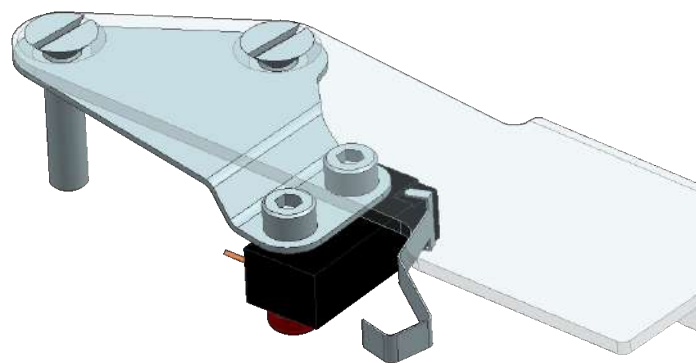
**CAUTION:** Do not separate the linear rail (Figure 32-36 Item 5) and the handle assembly (Figure 32-36 Items 2 and 3), as this will cause the linear roller bearings to come apart. Reassembling the linear ball bearings is difficult, time-consuming and the bearing balls may introduce a flight risk to the aircraft.

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**Figure 32-41: Removal of LG handle with rail, and LG lock plate**


**NOTE:** The limit switch (Figure 32-36 Item 6) at the front of the lock plate is mounted on a separate bracket, which is secured with the lock plate (Figure 32-36 Item 1) using the front screws. Be careful to not damage the wiring or the switch when removing the lock plate.



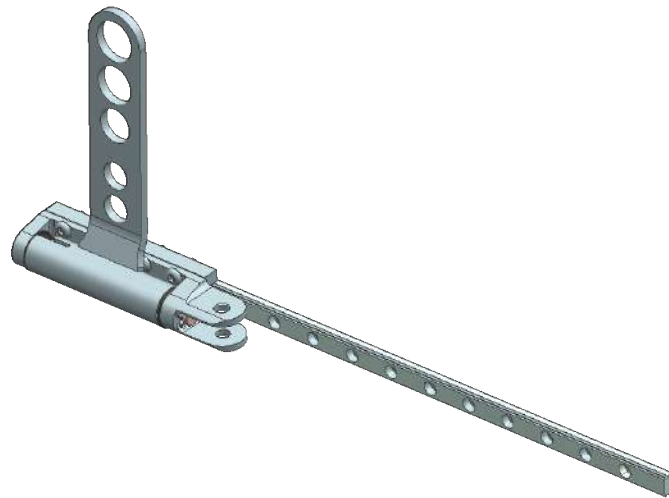
**Figure 32-42: LG limits switch assembly secured with LG lock plate**

8. Installation is the reverse sequence of removal procedure.

**NOTE:** Secure all fasteners with medium-strength thread locker

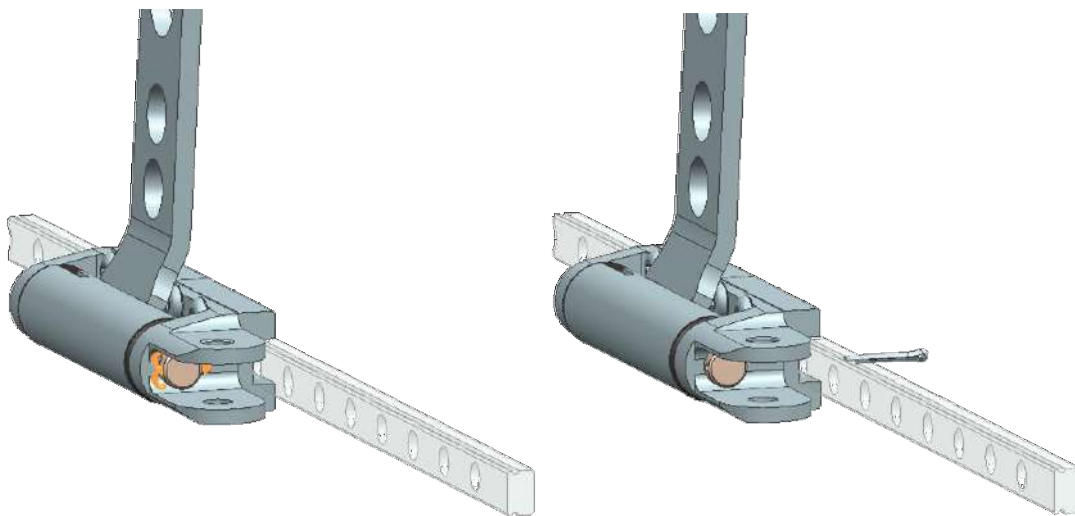
	<b>Aircraft Maintenance Manual</b>	Doc. No.:	MD11-AMM-00-001
		Type: <b>JS-MD Single</b>	Model: <b>JS 3 RES</b>

## Disassembling the Landing Gear handle




**Figure 32-43: Landing gear handle with rail**

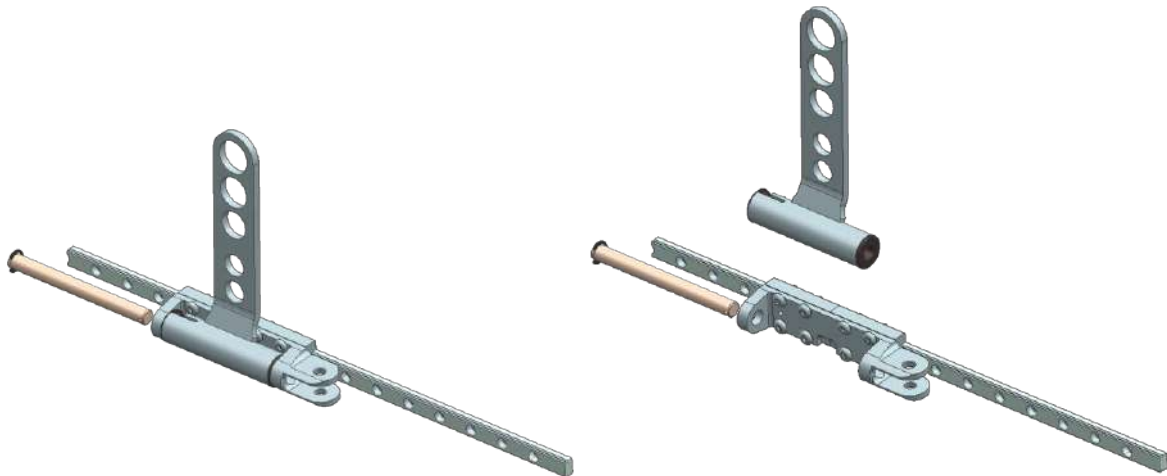
1. Remove the split pin from the shaft, at the connection end of the handle bracket (Figure 32-36 Item 3).



**Figure 32-44: LG shaft split pin**

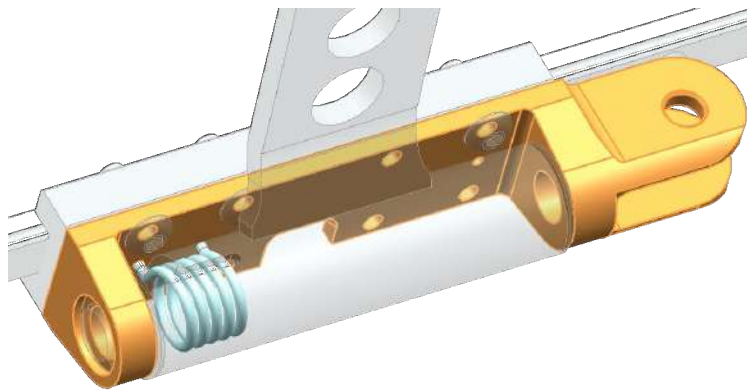
2. Pull the shaft (Figure 32-36 Item 4) out to separate the handle lever (Figure 32-36 Item 2) from the handle bracket (Figure 32-36 Item 3).

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**Figure 32-45: Disassembly of LG handle**

1. Installation is the reverse sequence of removal procedure.
2. Ensure that the handle spring locates in the hole in the handle frame.




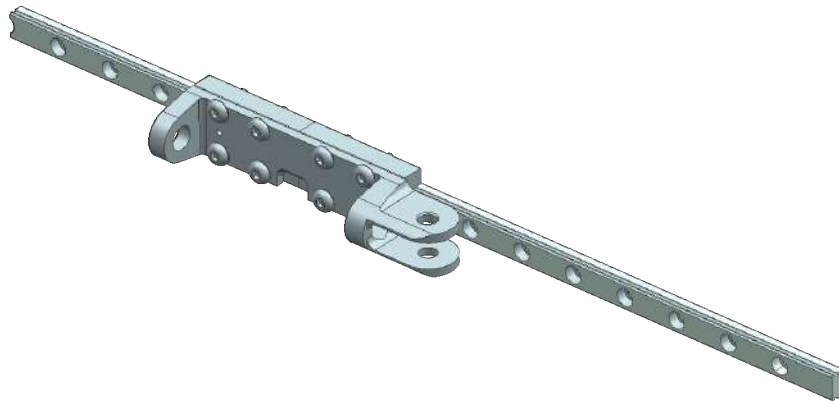
**Figure 32-46: LG handle spring and bracket**

3. Apply a light coating of marine grease before reassembling the shaft and the handle lever.

### **Inspecting and securing the fasteners**

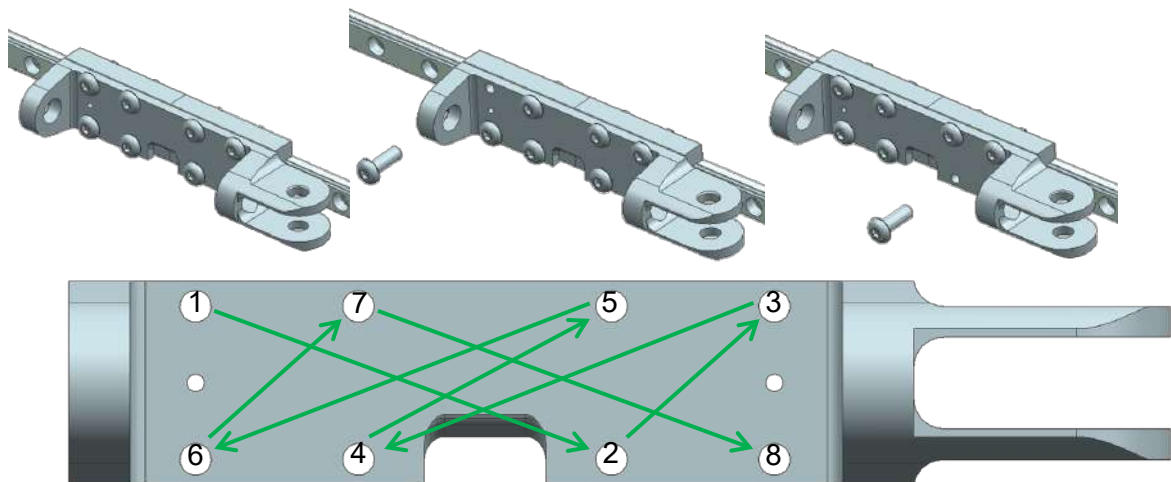
The fasteners securing the rail and the handle bracket must be inspected and fastened if loose.

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**Figure 32-47: LG handle bracket and rail**


1. To inspect the thread to determine if it is damaged, fasten the screws one at a time using the torque values listed in Table 20-1: Standard torque values. The screws should bottom out on the handle frame at the required torque.
2. Turn the screws out one at a time, apply medium-strength thread locker, and fasten again. Take care not to misalign the frame to the slider.

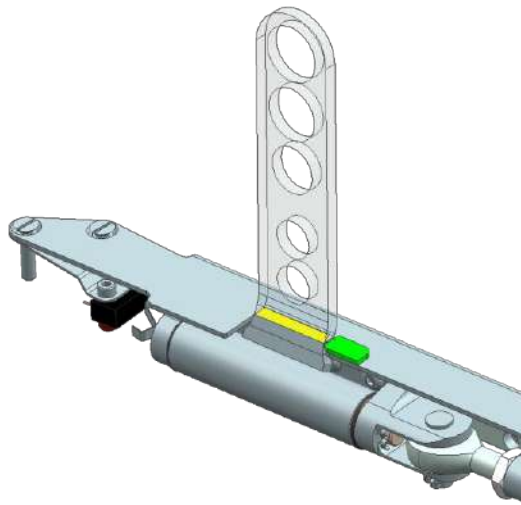


**Figure 32-48: Screw tightening sequence**

### Inspecting the Landing gear handle lever and locking plate for wear

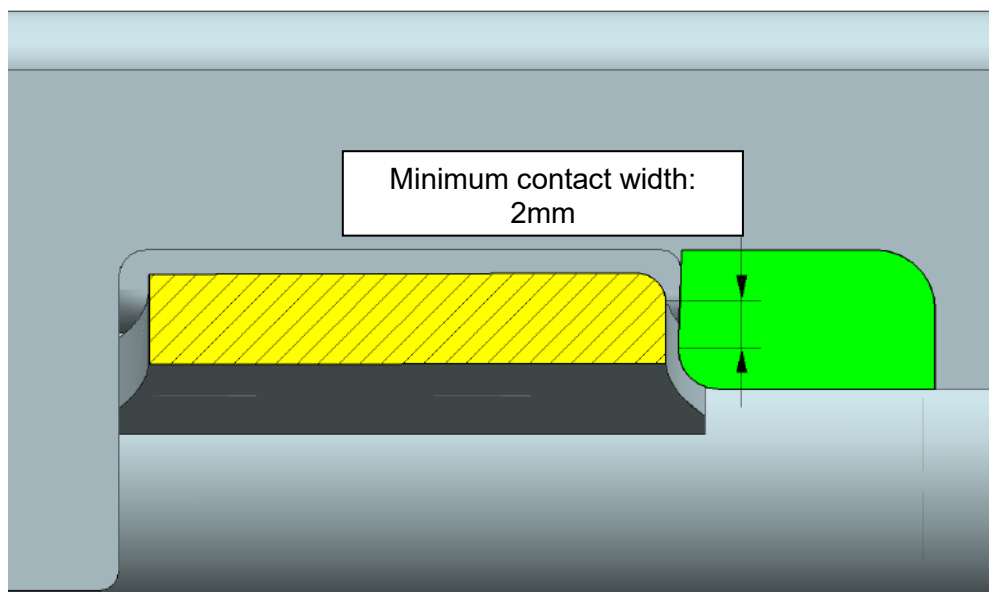
This section describes the criteria for the landing gear handle to remain in service.

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**Figure 32-49: Virtual section of LG handle lever / lock plate interface**

- The landing gear handle (Figure 32-36 Item 2) engages in the fully forward position with the lock plate (Figure 32-36 Item 1). There must be at least 2 mm overlap between the flat faces of the lever and the lock plate.

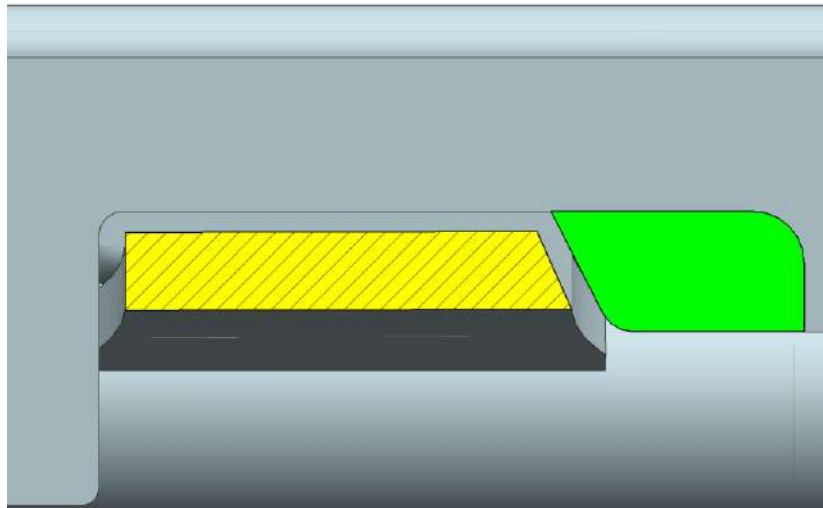


**Figure 32-50: Minimum interface contact width**

**NOTE:** Figure 32-50 illustrates a virtual section through the landing gear handle lever (Figure 32-36 Item 2), shown in yellow, and the lock plate doubler (Figure 32-36 Item 1), shown in green.

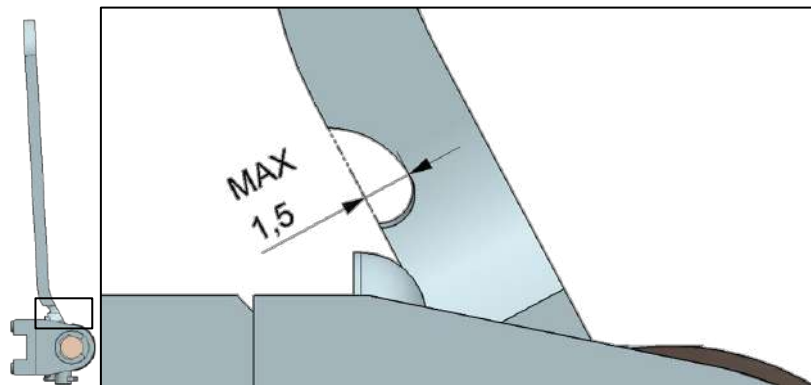
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6. The contact faces on both the handle lever (Figure 32-36 Item 2) and the lock plate (Figure 32-36 Item 1) must be perpendicular to the direction of the landing gear handle's motion. If the faces are worn in such a way to promote an unlocking force, the landing gear may collapse during operation.




**Figure 32-51: Lock plate and handle lever worn to an unsafe angle**

7. The wear groove in the handle lever (Figure 32-36 Item 2) may develop during operation but may not exceed a depth of 1.5 mm.



**Figure 32-52: Wear groove depth on lever**

**NOTE:** The handle has a high factor of safety with regards to the bending moment imparted by the pilot. The minimum length of the worn-out section of the handle lever is therefore not a limiting factor.

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## Correcting the Landing Gear handle lever and lock plate

This section describes the criteria for the landing gear handle to remain in service. When excessive wear has been detected, either the following procedure can be followed:

1. Rework LG handle lever and lock plate.
2. Replace parts with an improved design.

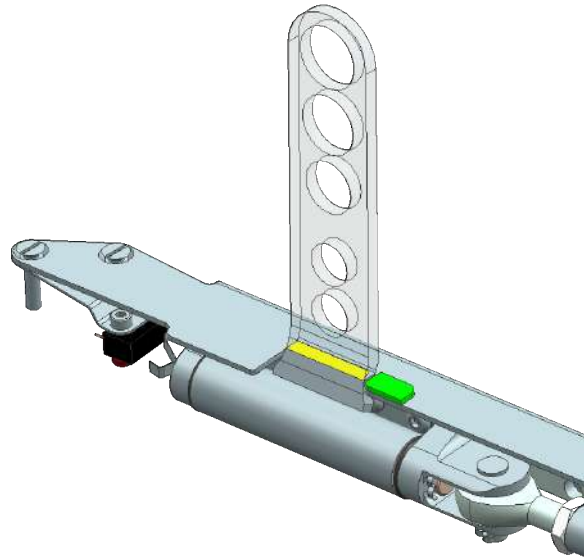


Figure 32-53: Virtual section of LG handle lever / lock plate interface

## Rework the Landing Gear handle lever and lock plate

1. The lock plate (Figure 32-36 Item 1) face and the handle lever (Figure 32-36 Item 2) must be ground/filed until the contacting surfaces are perpendicular to the direction of travel if:
  - a. The overlap of the contact surfaces is less than 2 mm.
  - b. The contact surfaces are oblique to the direction of travel.

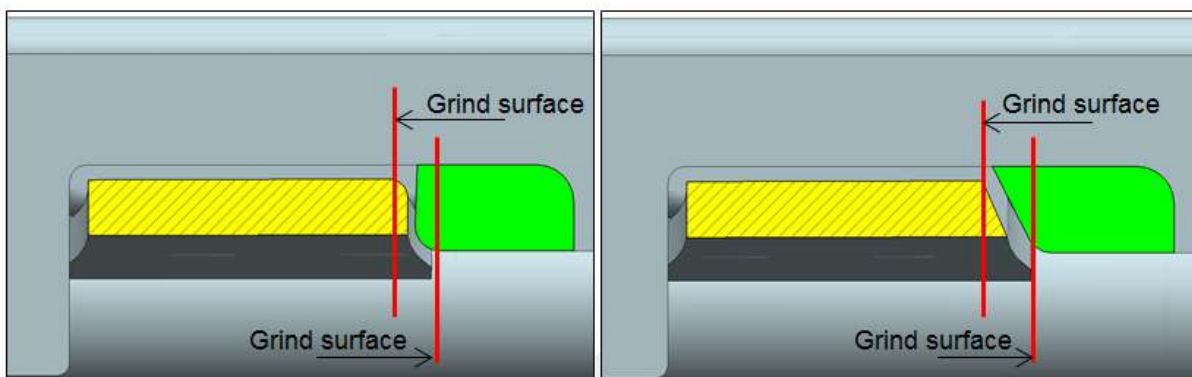

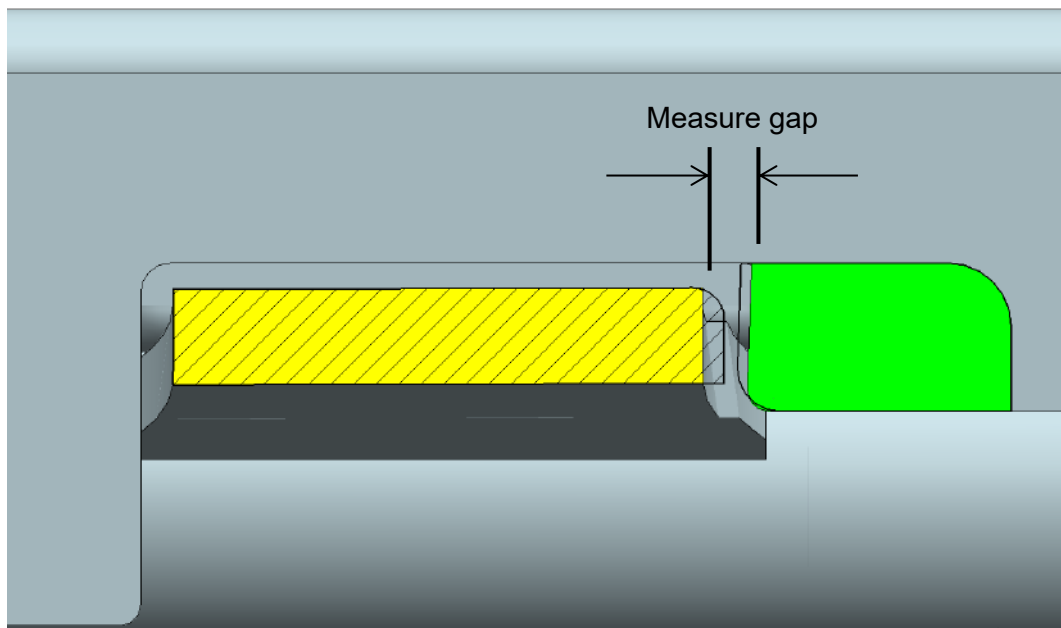


Figure 32-54: Restoring the interface direction

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**NOTE:** Grinding the surfaces will increase the gap between the lever and the lock plate. The landing gear will have to be set up afterwards.

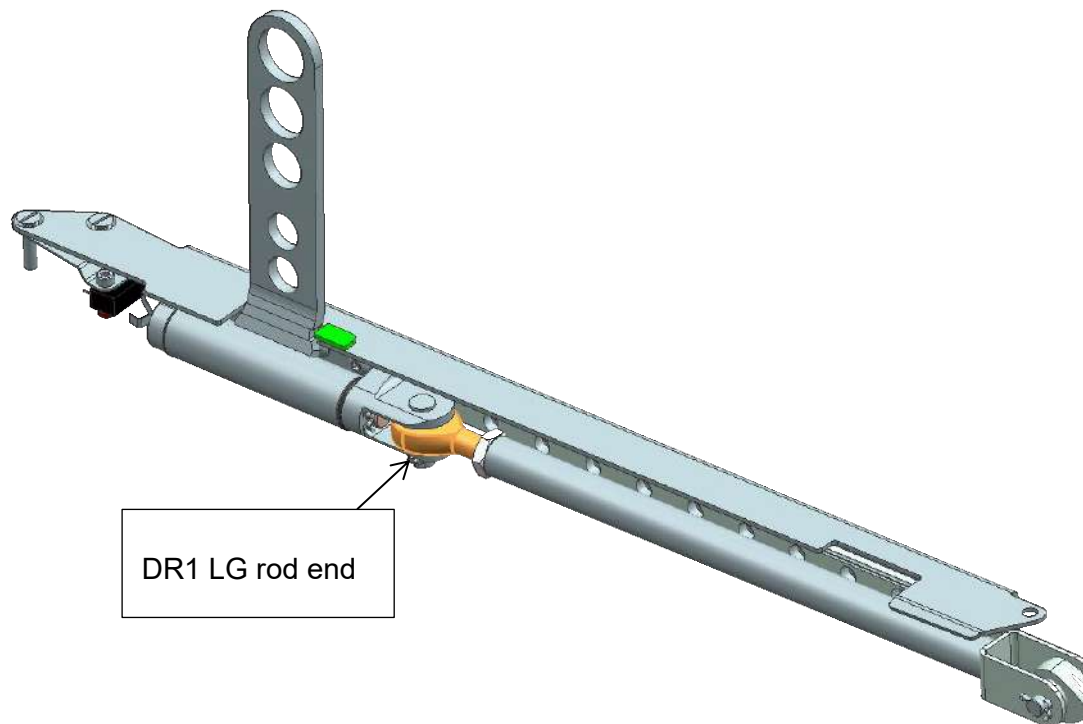
2. After the lock plate and the handle lever have been ground flat and square, measure the gap between the lever and the lock plate. This should preferably be done with the landing gear deployed and loaded.



**Figure 32-55: Offset of interface after grinding**


**NOTE:** The landing gear handle bracket (Figure 32-36 Item 3) is connected to the landing gear drivers (Figure 32-36 Items 7 and 10) by means of an M8 rod end (Figure 32-36 Item 8) with a thread pitch of 1.25 mm. A half-rotation results in a displacement of 0.63 mm. By grinding the lock plate and landing gear handle lever until the gap between them is a multiple of 0.63 mm, the entire landing gear setup can be corrected by only adjusting the first rod end in half-rotation increments.

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**Figure 32-56: Rod end adjusting landing gear locking force**

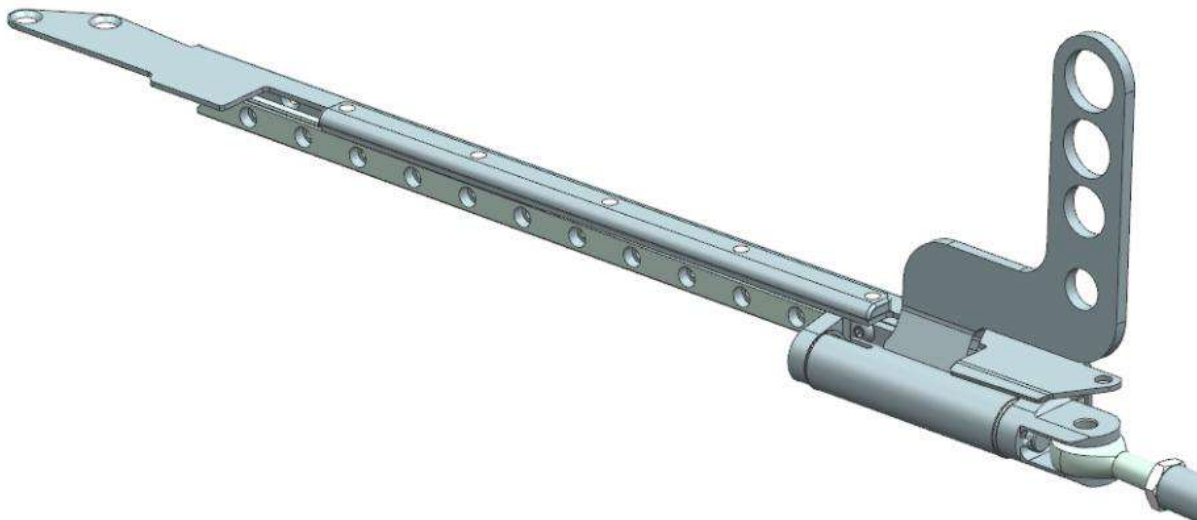
3. Loosen the lock nut on the DR1LG rod end (Figure 32-36 Item 8). Adjust the rod end in half-rotation increments to take up the gap between the lock plate and the handle lever. Temporarily install the lock plate (Figure 32-36 Item 1) and landing gear handle assembly (Figure 32-36 Items 2 and 3) in the fuselage and connect DR1LG to the landing gear handle to check the gap.
4. Grind the lock plate or the handle lever lightly until the lever can engage with the lock plate with an acceptable force meeting the tail wheel cable tension requirements.
5. Installation is the reverse sequence of removal procedure.

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## Replacement the Landing Gear handle lever and lock plate

This section describes how to replace the LG handle lever and lock plate. In case of excessive wear, both parts can be replaced:

1. Remove the Landing Gear handle and lock plate as described previously.
2. Install the new Landing Gear handle (PN 231 12 016 version 00 or 01).
3. Install the new lock plate.
4. Adjust the locking force.
5. Adjust the landing gear limit switch.
6. Test operation on the ground with both gears lifted off the ground.

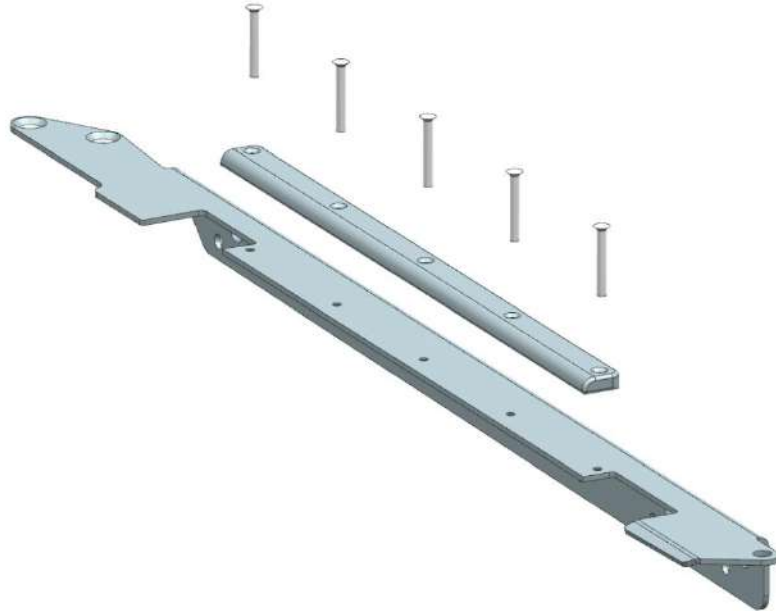


**Figure 32-57: Replacement locking plate and landing gear handle lever**

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## Replacement the slide strip of Landing Gear Lock Plate

This section describes how to replace the slide surface of the LG handle lever. In case of excessive wear, both parts can be replaced:



**Figure 32-58: Replacement locking plate slide surface**

1. Remove the Landing Gear handle and lock plate, as described previously.
2. Remove the worn strip plate (PN 221 12 025 00) by drilling the rivets out with a 2.5 mm drill.
3. Secure the replacement part with 2.4 mm aluminium sold rivet (MS20426AD3-10).
4. Install the lock plate.
5. Adjust the locking force.
6. Adjust the landing gear limit switch.
7. Test operation on the ground with both gears lifted off the ground.

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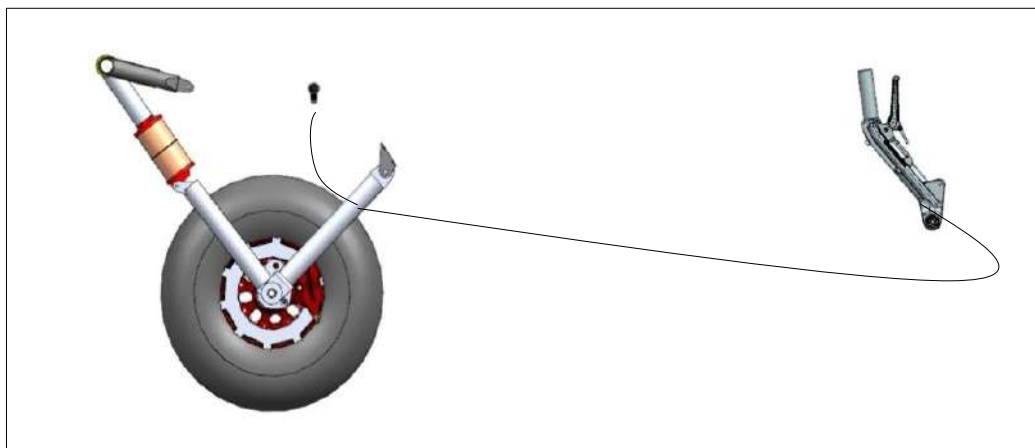
## 32-40-00 WHEELS AND BRAKES

### General

General procedures and the description of the brake system can be found in this chapter.

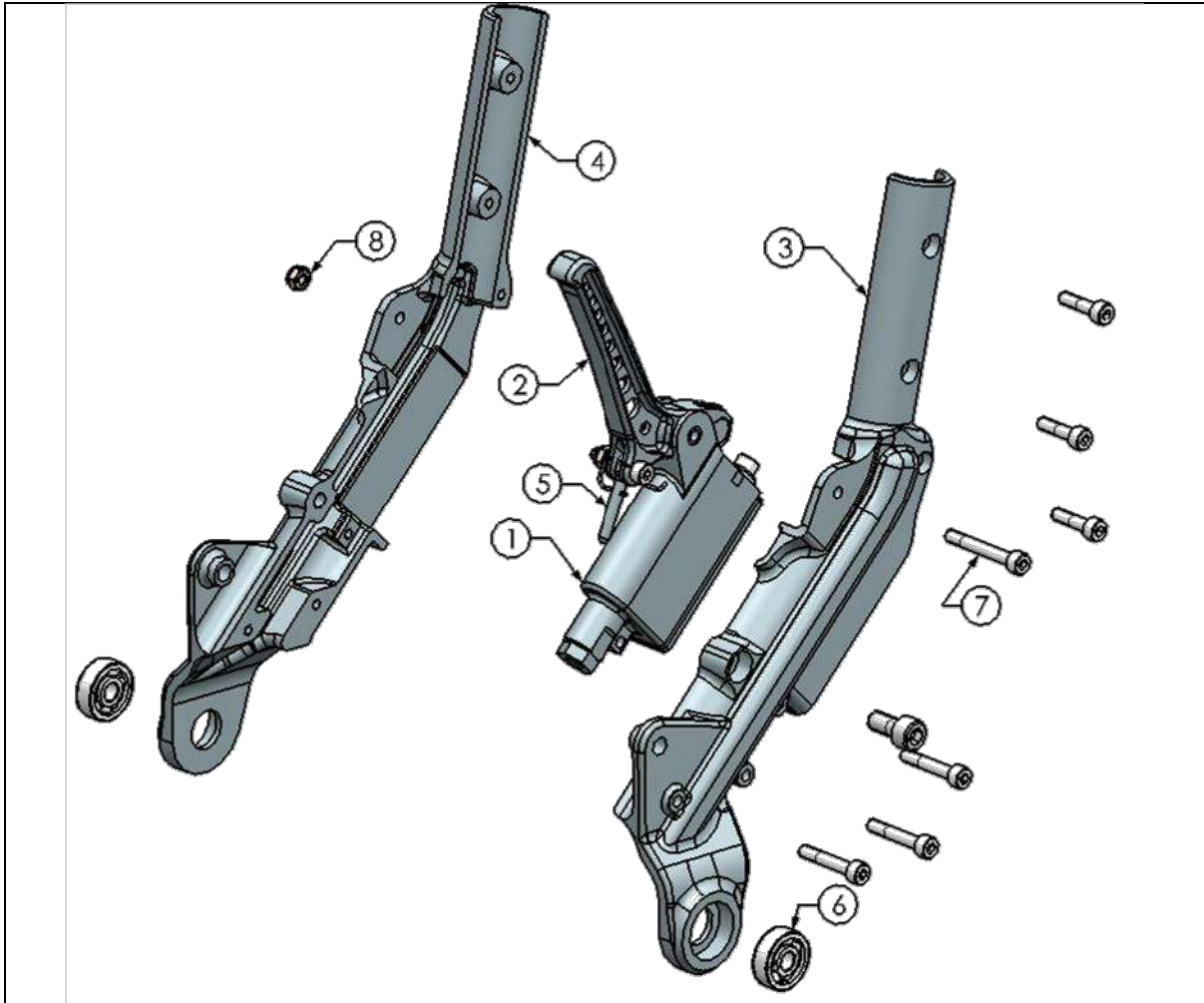
### Description

Figure 32-59 shows an overview of the wheel brake system. The wheel brake master cylinder is actuated by the lever on the control stick (Figure 32-60).



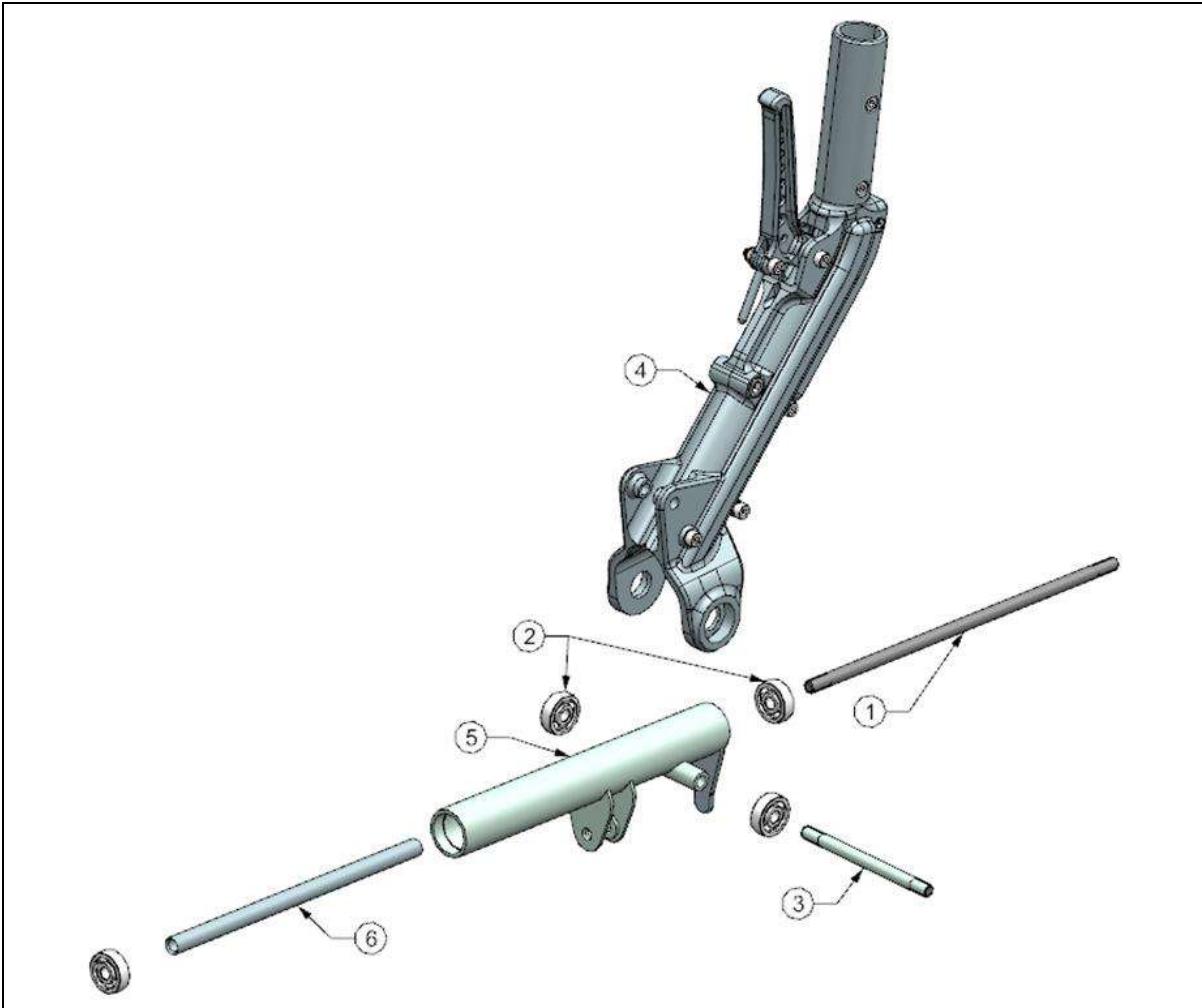
**Figure 32-59: Wheel brake system**

If the braking power seems to be inadequate, the system may need adjustment, as detailed in the steps listed in the “32-40-00 WHEELS AND BRAKES: TROUBLESHOOTING” section.




NO	DESCRIPTION	NO	DESCRIPTION
1	Brake master cylinder	5	<i>Discontinued</i>
2	Brake lever	6	Bearing
3	Stick left shell	7	Cap screw
4	Stick right shell	8	Nyloc nut

Figure 32-60: Wheel brake master cylinder inside control stick



NO	DESCRIPTION	NO	DESCRIPTION
1	Aileron hinge stud	4	Stick assembly
2	Bearing	5	Stick roll assembly
3	Elevator hinge stud	6	Bearing compression pipe

**Figure 32-61: Control stick major components**


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## 32-40-00 WHEELS AND BRAKES: TROUBLESHOOTING

### General

Possible causes of low braking power:

1. Worn brake lining that needs replacement. The minimum thickness of the lining is 2.5 mm (0.1").
2. Worn brake disk. The disk must be replaced if the thickness is 4.2 mm (0.167") or less.
3. Air in the brake line that requires bleeding of the system.
4. Too little or no brake fluid in the system.
5. Wrong type of brake fluid used that negatively influenced the brake lines and valve seals. This requires the entire brake line to be replaced and the master cylinder to be refurbished, and finally the correct type of fluid to be used in the system.

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## 32-40-00 WHEELS AND BRAKES: MAINTENANCE PRACTICES

### General

The procedures in this section describe the process of bleeding the brakes of the JS-3 RES, changing the brake linings as well as replacing the high-pressure wheel break hose.

**NOTE:** Only use Aeroshell Fluid 41 or Esso Univis I-13 for brake fluid. Only mineral oil-based brake fluids are allowed.

**CAUTION:** Do not use ester-based brake fluids (DOT4 automotive type brake fluid). The O-ring seals in the system are not compatible with these types of brake fluids. Observe safety precautions as given on the MSDS.

### Replenishing the reservoir


#### Tools required

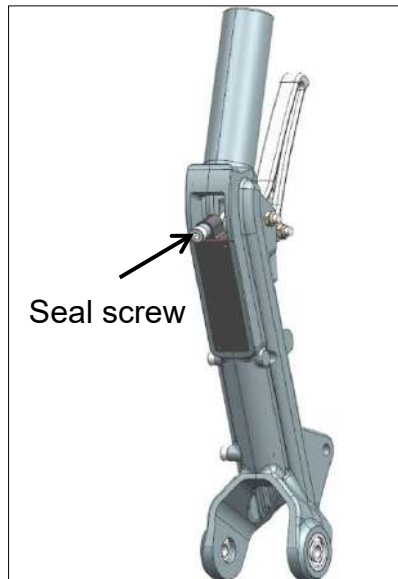
- 1.5 mm Hex key
- 2.5 mm Hex key
- 3 mm Hex key
- 5 mm Hex key
- M10 Spanner x 2

#### Procedure

If the brake fluid needs to be replenished, the following procedure should be followed:

1. Remove the upholstery from cockpit.
2. Remove the handle grip if interfering with the seal screw.
3. Fill a small syringe with brake fluid.
4. Remove the seal screw from the master cylinder (Figure 32-62).

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**Figure 32-62: Seal screw location**

5. Pull the brake lever to its most aft position.
6. Insert the syringe into the bleeding hole.
7. Slowly inject brake fluid into the reservoir while slowly releasing the brake lever. Both should be done at a rate that does not allow air to be sucked into the reservoir.
8. Repeat steps 9, 10 and 11 until fluid starts leaking out of the bleed hole at step 9.
9. Reinstall the seal screw.
10. Check operation.
11. If the brake is not working properly the bleeding procedure should be followed.

## Bleeding the brakes


### Tools required

- 1.5 mm Hex key
- 2.5 mm Hex key
- 3 mm Hex key
- 5 mm Hex key
- M10 Spanner x 2

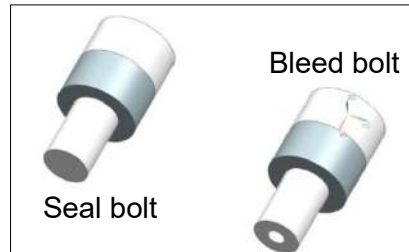
### Procedure

If the brake fluid needs to be replaced or air is trapped in the brake system, the following procedure should be followed:

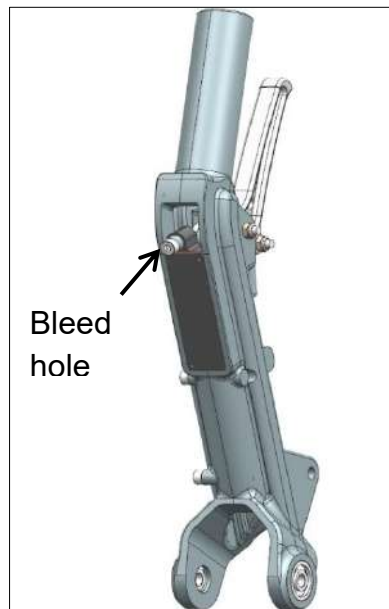
1. Remove the upholstery from cockpit.

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2. Remove the handle grip if interfering with the seal screw.
3. Attach fluid supply line to bleeder screw on the calliper side.
4. Remove the seal screw from the master cylinder on the stick assembly and replace it with the bleed screw. Refer to Figure 32-63 for the screws and Figure 32-64 for the location of the bleed hole.




**Figure 32-63: Master cylinder filler hole screws**



**Figure 32-64: Brake bleed hole location**

5. Attach a length of clear pipe (bubbles exiting the master cylinder should be visible) to the bleeder bolt that dumps excess brake fluid into a container. (This container should preferably be placed outside the cockpit to prevent oil spills in the cockpit)
6. Loosen bleeder screw on calliper.
7. Apply pressure to the fluid in the external container to fill the system from the bottom. A syringe filed with Fluid41 or a recirculating automotive/ motorcycle bleeding kit is recommended.
8. Keep applying pressure until fluid starts to exit the master cylinder into the clear pipe.
9. Keep adding fluid to the system until no air bubbles exit the master cylinder.
10. Keep adding fluid again until no air bubbles exit the master cylinder.
11. Close bleeder screw tight and remove fluid supply, ensuring that no air flows back into the reservoir.

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12. Replace the bleeding bolt on the master cylinder with the seal bolt.
13. Check operation.
14. Repeat process if brake is not working properly.


**NOTE:** If excess air is trapped in the system, it might be necessary to keep the stick inverted while bleeding the system. If this is required, remove the stick using the following procedure:

### **Bleeding the brakes while keeping the control stick inverted**

1. Remove the control cover located under the control stick.
2. Remove elevator hinge stud (Figure 32-61, Item 3) assembly.
3. Remove the stick assembly (Figure 32-61, Item 4) from the stick roll assembly (Figure 32-61, Item 5) by removing one of the bearings in the stick. With the bearing removed the stick can be removed as one piece.

**NOTE:** There are electric wires and a brake hose connected to the stick assembly. Use minimal force to prevent damage to these wires and hose.

4. Rotate the stick assembly to a fully inverted orientation. This will ensure that the cavity in the piston will fill up with fluid.
5. Loosen bleeder screw on calliper.
6. Apply pressure to the fluid in the external container to fill the system from the bottom. A syringe filed with Fluid41 or a recirculating automotive/ motorcycle bleeding kit is recommended.
7. Keep applying pressure until fluid starts to exit the master cylinder into the clear pipe.
8. Keep adding fluid to the system until no air bubbles exit the master cylinder.
9. Rotate the stick assembly upright.
10. Keep adding fluid again until no air bubbles exit the master cylinder.
11. Close bleeder screw tight and remove fluid supply.
12. Replace the bleeding bolt on the master cylinder with the seal bolt.
13. Check operation.
14. Install the control stick and elevator hinge stud.
15. Install the nuts that secure the elevator hinge stud.
16. Install the control cover.

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## Replacement of high-pressure wheel brake hose

### Materials required

- 1x Brake hose 7 mm: KN600 (JS Part number 105 03 004 00)
- 1x Elbow female/ male 1J9-0404 (JS Part number 105 03 007 00)
- 2x Cable ties

### Procedure

1. Place the fuselage on a belly stand.
2. Ensure the main landing gear is extended and locked.
3. Drain the brake fluid from the wheel brake system as per AMM Chapter 32-40-00 WHEELS AND BRAKES.
4. Remove the seatback in the cockpit as per AMM Chapter 25-10-00 COCKPIT, for access on the left-hand side of B5.
5. Open the access hole by removing the oxygen bottle holder.
6. Ensure that the straight side of the high-pressure hose 90° elbow (105 03 006 00 Elbow Male-Male Long: 6J9-0404) is parallel to the bulkhead lip, facing toward the top of the aircraft. Do not remove or loosen any hoses from the access hole side.

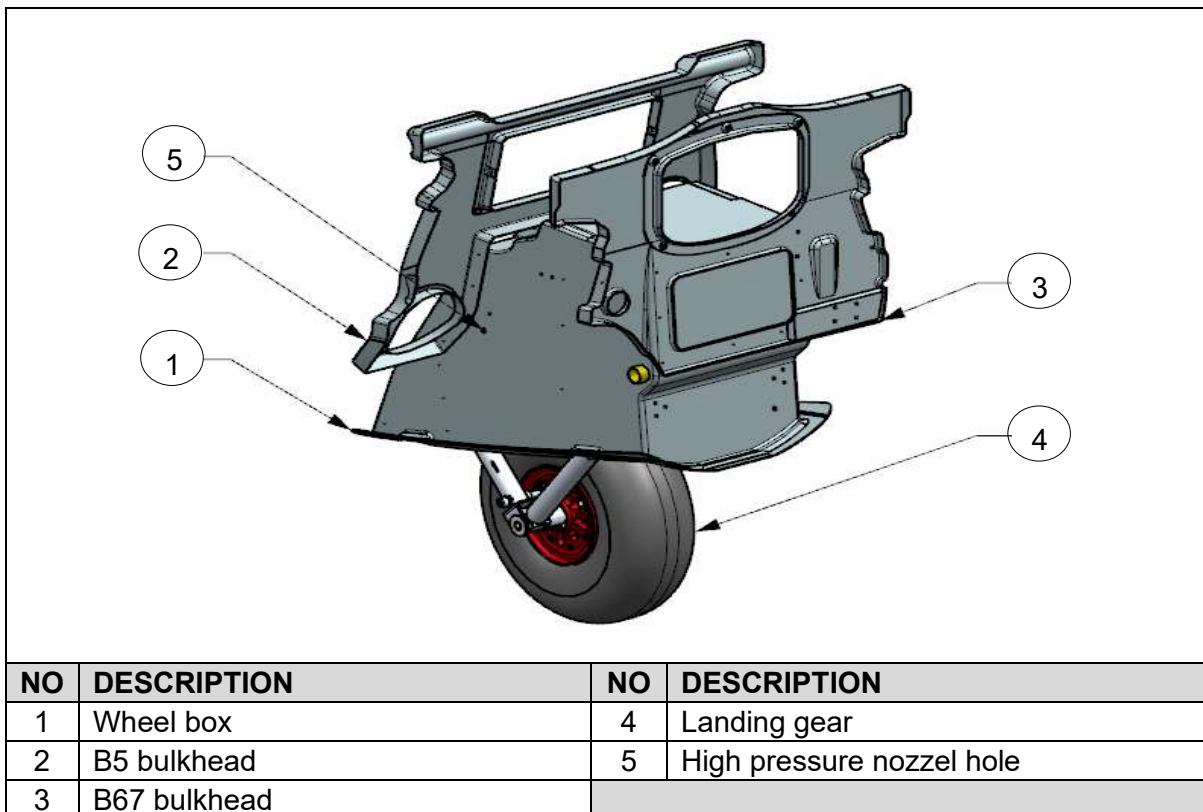

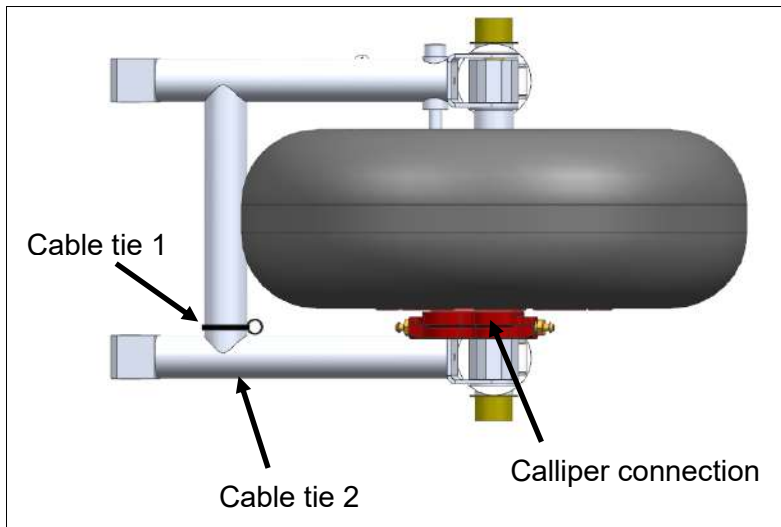


Figure 32-65: Brake fitting locations

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7. Hold the elbow (105 03 006 00) in position from the access hole from cockpit side, using a spanner, and secure the elbow with the anchor nut from the inside of the wheel box. Ensure it is tight enough to prevent the elbow straight side from rotating. If the elbow still rotates after tightening contact JS-MD.
8. Hold the wheel box mounted elbow (105 03 006 00) through the access hole from cockpit side, using a spanner. Remove the flexible hose at the elbow (105 03 007 00), then at the calliper.




**Figure 32-66: Brake tie-down locations**

9. Still holding the wheel box-mounted elbow (105 03 006 00) through the access hole from the cockpit side, adjust the angle of the elbow inside the wheel box (105 03 007 00 Elbow Female/Male: 1J9-0404), pointing toward the top of the aircraft and slightly forward, inclined approximately 60° relative to the seat back adjustment tubes, or approximately parallel to the belly hook brackets. Once the angle is set correctly, tighten the inner elbow's union (105 03 007 00).
10. With the landing gear extended, route the high-pressure brake flexible hose (105 03 004 00 Brake hose 7 mm: KN 600) from the inner elbow (105 03 007 00), upward in the wheel box, across the landing gear arms, then down toward the brake calliper. Leave sufficient clearance to allow the flexible hose (105 03 004 00) to rotate with the landing gear arms without touching the wheel box or the tyre.

**NOTE:** Figure 32-59 of the wheel brake system is for illustrative purposes only and does not depict the routing accurately.

11. Connect the flexible hose (105 03 004 00) securely to the elbow (105 03 007 00), and lightly to the calliper. Counter twist the flexible hose a small amount, and then secure the flexible hose to the calliper. The flexible hose must be untwisted after installation.
12. Apply the cable ties as shown in Figure 32-66. Tie one cable tie loosely around the crossbar. Secure the flexible hose (105 03 004 00) to the first cable tie with a second cable tie, and then secure the first cable tie to the landing gear arm.
13. Retract and extend the landing gear slowly and check that the flexible hose (105 03 004 00) moves freely and without any tight bends or kinking.

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14. Close the access hole by inserting the oxygen bottle holder.
15. Reinstall the seatback (1A-1.02.30) in cockpit as per AMM Chapter 25-10-00 COCKPIT.
16. Bleed and test wheel brake system according to the AMM Chapter 32-40-00 WHEELS AND BRAKES.

### Changing of brake linings

Brake linings should be replaced when the thickness is 2.5 mm (0.1") or less. Brake linings can be obtained from the manufacturer. JS-3 RES uses Beringer PQT-003 / PQT-004 brake pads.


The following procedure can be followed to replace it:

1. Fully extend the wheel and remove the two ¼in bolts on the rear end of the calliper. These bolts have locking wire on them.
2. Remove the inner brake lining with backing plate. Do not remove the brake pipe line otherwise the brakes will have to be bled again.
3. Remove the outer brake lining with backing plate. Do not operate the airbrake as this will close the calliper.
4. Replace the liners with backing plates, replace bolts, secure bolts and lock with locking wire.

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# **CHAPTER 34 - 00 - 00**

## **PITOT-STATIC AND INSTRUMENTS**

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## 34-10-00 NAVIGATION AND PITOT-STATIC SYSTEMS

### General

This section describes the pitot-static system and the colour convention used.

### Description

The aircraft pitot-static system consists of:

1. Static pressure PSTAT for ASI and altimeter
2. Dynamic pressure PTOT for ASI
3. Static pressure for variometer from tailplane right hand probe
4. Total energy (T.E.) pressure from tailplane left-hand probe

The pneumatic piping/tubing is made of PVC or Polyurethane (ø8 mm x 1.25 mm) or Nylon/PELD (ø5 mm x 0.8 mm) and colour coded as follows:

**NOTE:** The ASI must use the static sources located in the rear fuselage tube. The airspeed calibration values are based on these static port readings

**Table 34-1: Pneumatic system identification**

Description	Colour
Static pressure for ASI (from fuselage boom)	<b>Blue</b>
Pitot pressure for ASI from fin multi-probe	<b>Green</b>
Static pressure for electronic flight computer from fin multi-probe	<b>White or Transparent</b>
Total energy pressure from fin multi-probe	<b>Red</b>
Mechanical variometer capacity	<b>Yellow</b>

**CAUTION:** Do not blow into the pitot-static system. This can damage the system and lead to inaccurate readings.

Figure 34-1 shows the instrument layout on the aircraft.

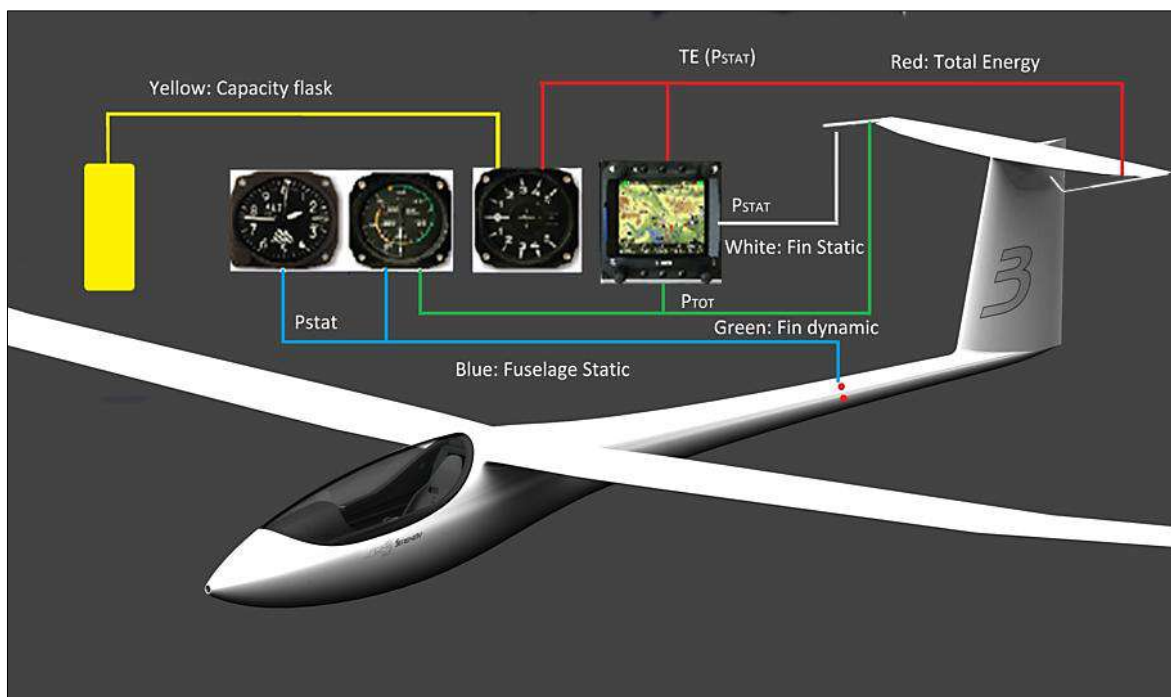


Figure 34-1: Instrument connection to flight environmental data

### Fin Pitot-static connection

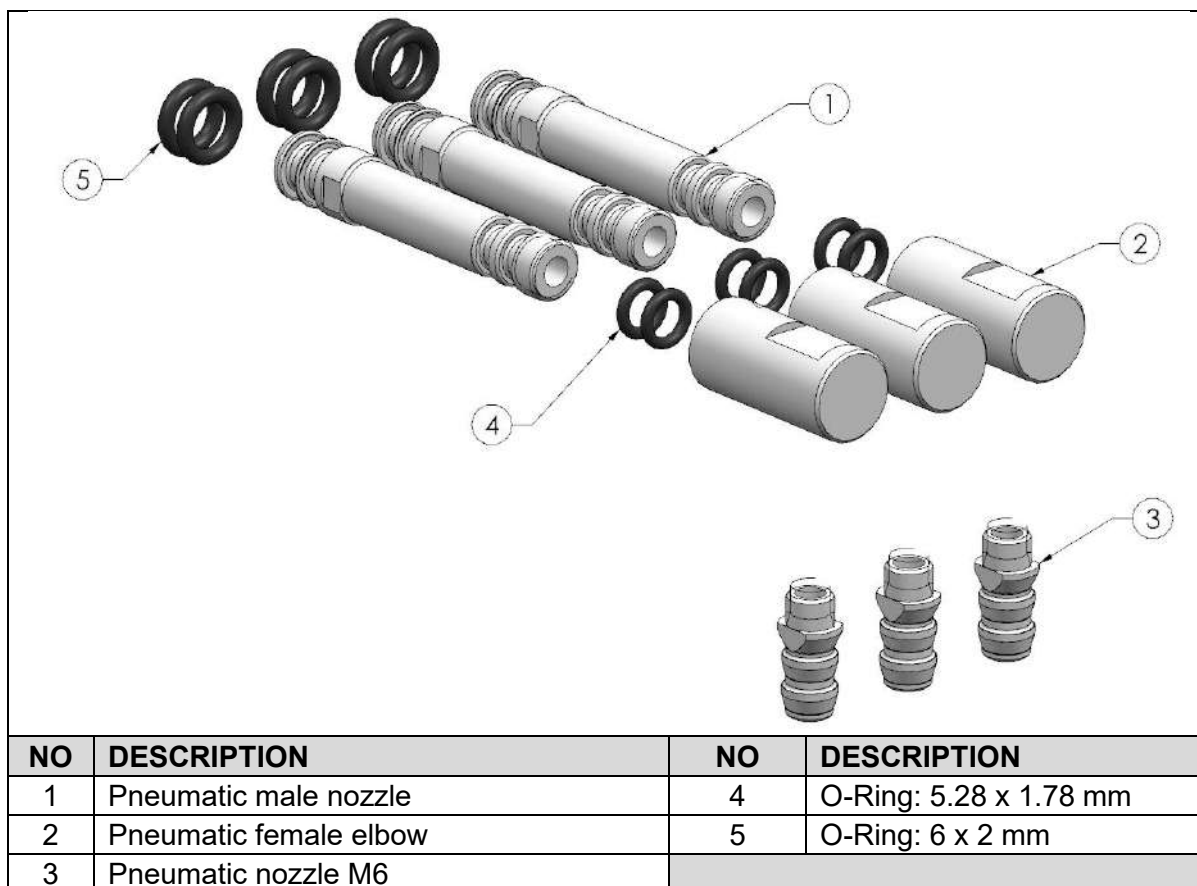

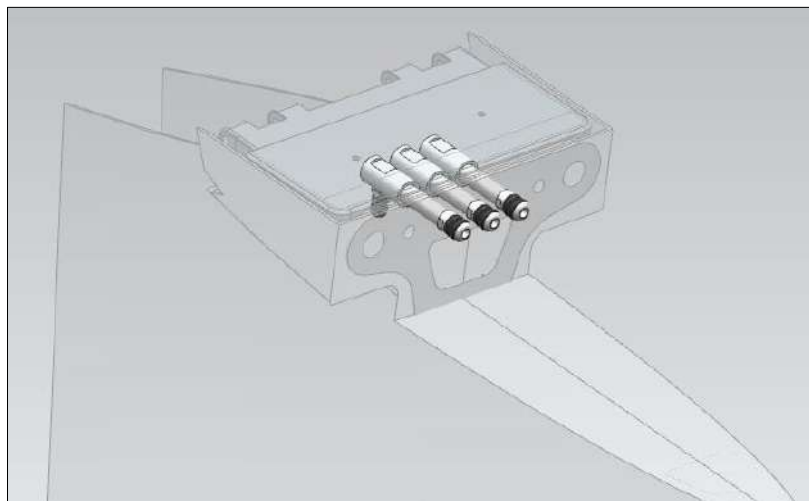


Figure 34-2: Fin pitot-static connection breakdown

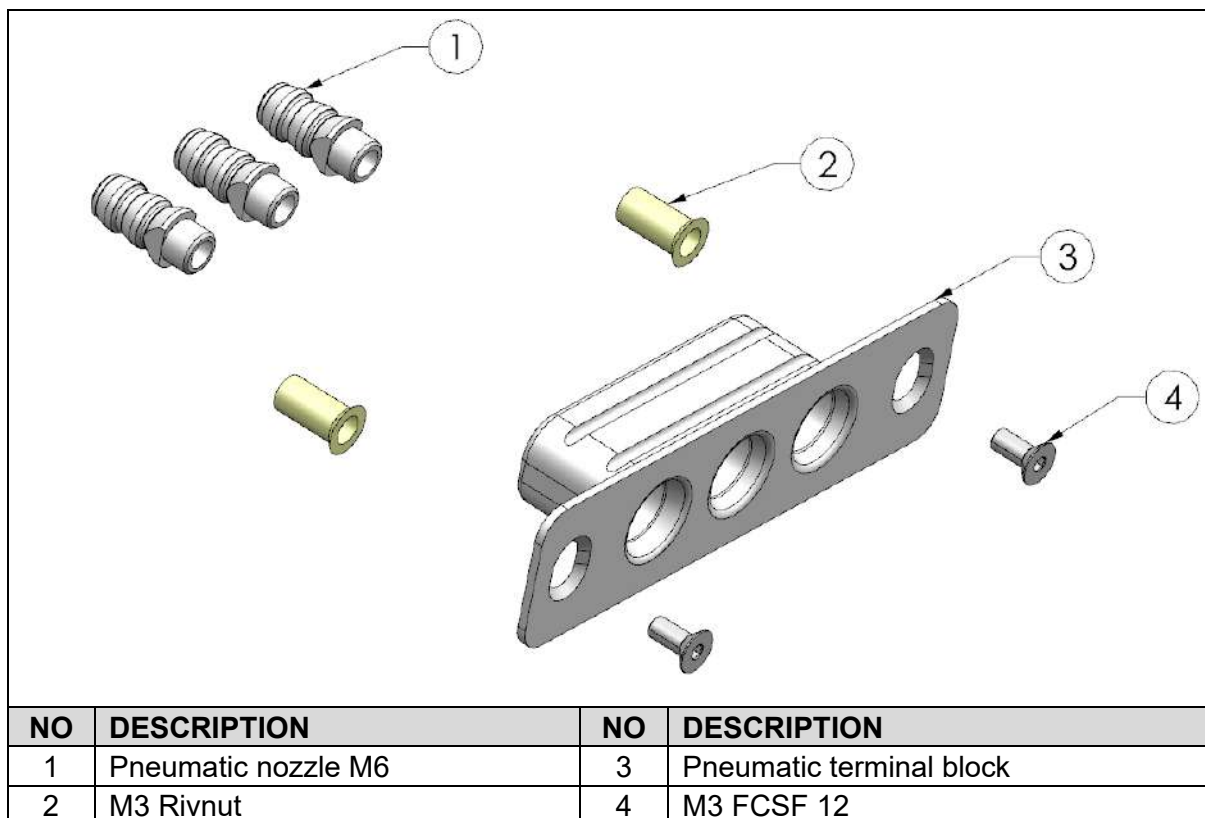
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The fin pitot-static connection is located within the T-plate on the top part of the fin.





**Figure 34-3: Pitot-static connection in fin**

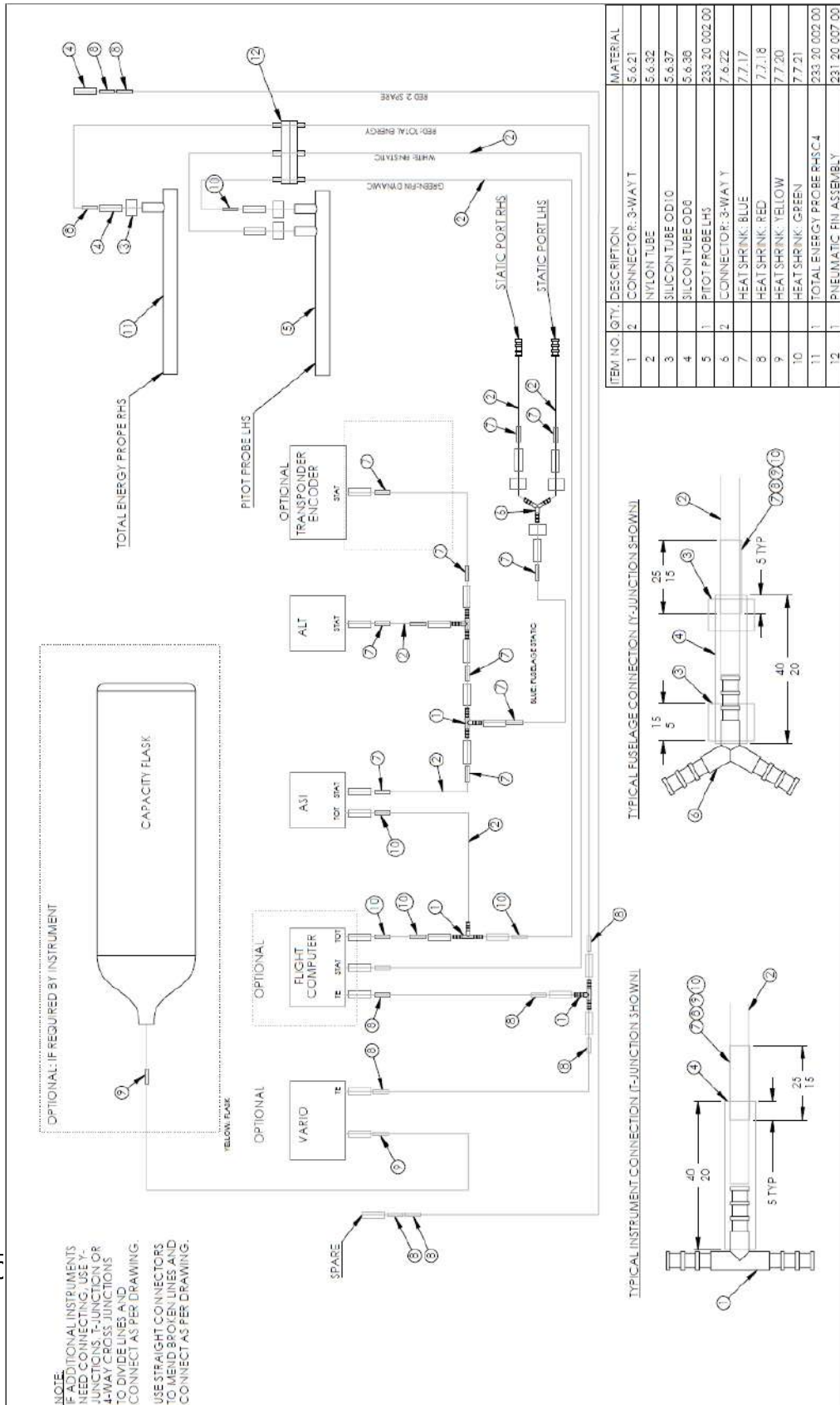
### Tailplane Pitot-static connection





**Figure 34-4: Tailplane pitot-static connection breakdown**


A detailed diagram of the JS-3 RES pneumatic system is shown in Figure 34-5.

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**Figure 34-5: Pneumatic diagram**

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## 34-10-00 PITOT-STATIC SYSTEM: MAINTENANCE PRACTICES

### General

The two air data probes installed on the JS-3 RES include the total energy probe (Type RU/ST) and the pitot-static probe (Prandtl tube: PR/ST2), both supplied by ESA Systems.

### Remove / install the Pitot-static probe

1. To remove either probe, pull the probe forward in the direction of flight.
2. Installation is the reverse of removal. Take note of which probe to install into which receptacle. The service life of the O-rings can be maximised by gentle yet thorough cleaning, followed by light lubrication with Vaseline or silicone grease. Refer to the manufacturer's operating manual for more information.

### Replace the Pitot-static probe O-Rings

The O-rings on the air data probes may become damaged or worn due to poor lubrication, pinching during installation or continuous use.

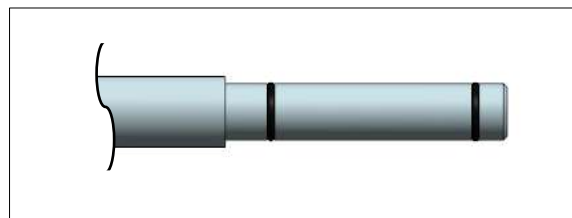


Figure 34-6: Total energy probe end

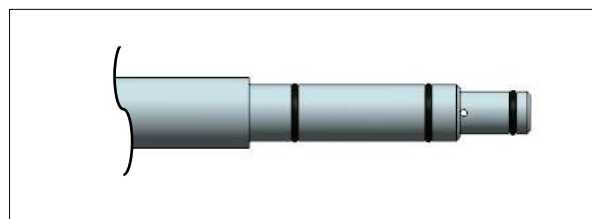



Figure 34-7: Pitot-static probe end

The pneumatic probes require the following O-rings:


1. Total energy probe:
  - 2x NBR70 5.5x1.5 mm (alternatively 5.0x1.5 mm)
2. Pitot-static probe:
  - 2x NBR70 5.5x1.5 mm (alternatively 5.0x1.5 mm)

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- 1x NBR70 3.0x1.5 mm


### Procedure

1. Remove the damaged/ worn O-rings.
2. Lubricate the new O-rings with Vaseline or silicone grease and install onto the probe end.
3. Make sure that the O-rings are fully seated in their respective grooves before installing the probes onto the aircraft.

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# **CHAPTER 35 - 00 - 00**

## **OXYGEN**

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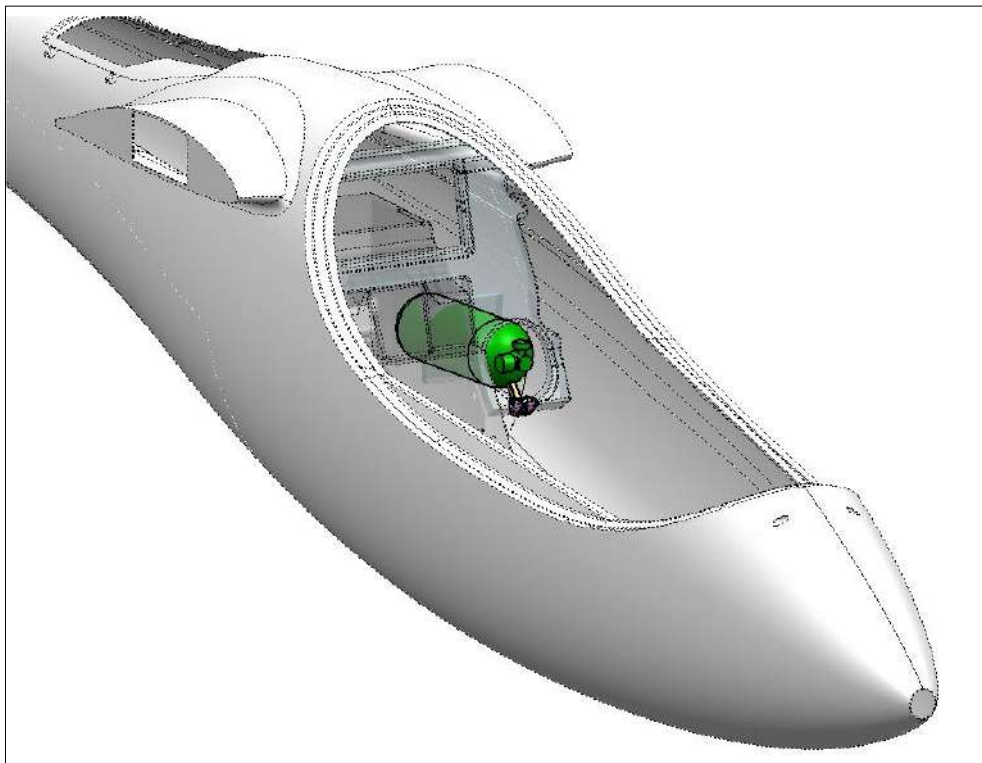
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## 35-30-00 PORTABLE OXYGEN

### General

Provision is made for an oxygen bottle cylinder fitting in a tube sleeve installed through the bulkhead on the left-hand side of the wheel box. The maximum diameter of the oxygen bottle is 114 mm (4.5").


The tube is removable and is designed to accommodate the Mountain High CFF-480 bottle. The oxygen tube is also able to accommodate slightly smaller bottles such as the Mountain High AL-248 by applying three felt liner strips to the interior wall of the tube and a semi-rigid foam spacer block to the bottom end of the tube such that the bracket (latch) functions properly.



**Figure 35-1: Oxygen bottle location**

The oxygen bottle must be correctly secured with the bracket provided. Oxygen equipment installed:

1. Must be approved.
2. Must be free from hazards in itself, in its method of operation, and its effect upon other components.
3. Must have means to allow the pilot to readily determine, during the flight, the quantity of oxygen available.
4. Must allow the pilot to safely monitor and operate the system.

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## 35-30-00 PORTABLE OXYGEN: MAINTENANCE PRACTICES

### General

This section describes the installation and removal of the Mountain High CFF-480 oxygen bottle from the oxygen holder provided by JS-3 RES.

**NOTE:** For maintenance of the oxygen system, refer to the manufacturer's manuals.

### Installation and removal of the oxygen bottle

#### Installation

**NOTE:** Refer to the manufacturer's manuals for safe practices.

To install the oxygen bottle into the compartment, follow these instructions:

1. Slide the closed end of the bottle into the tube. The bottle will push down the sprung lock lever (Figure 35-2).
2. Slide the bottle all the way to the end of the tube. Ensure that the lock lever rises to engage with the valve end of the bottle (Figure 35-3).

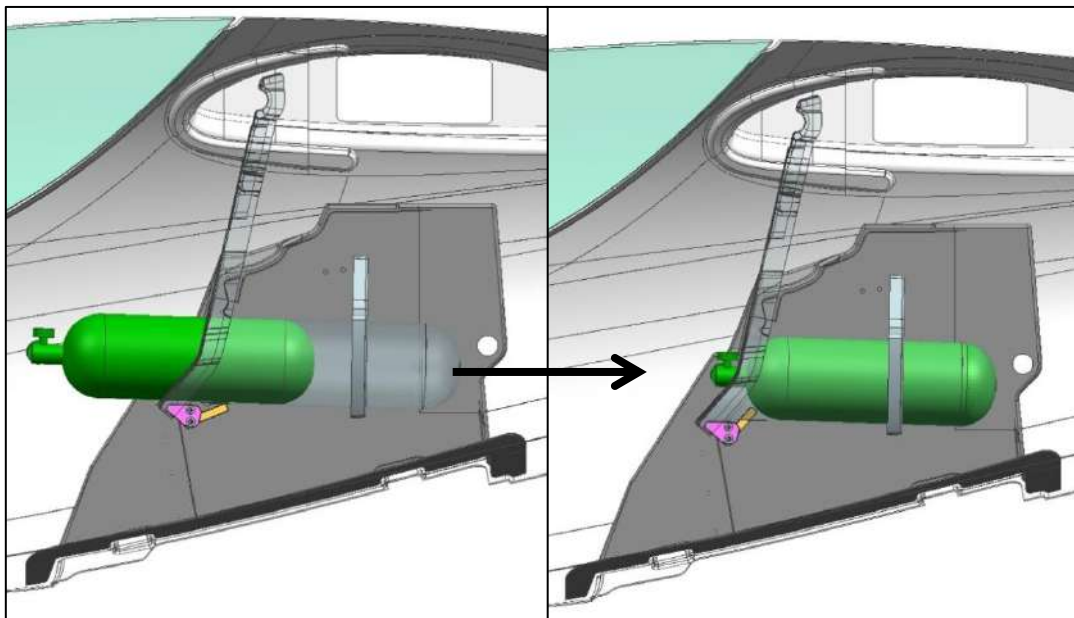



Figure 35-2: Oxygen bottle installation

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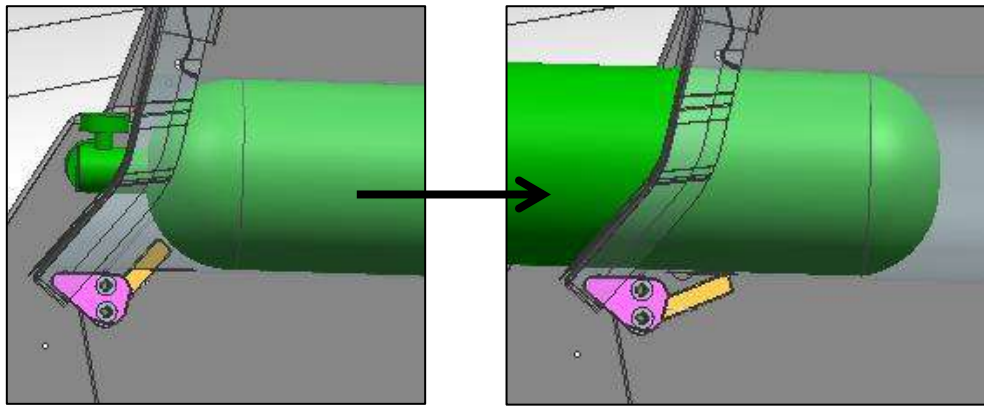



Figure 35-3: Oxygen bottle lock


## Removal

To remove the oxygen bottle from the compartment, follow these instructions:

1. Press the lock lever down below the surface of the tube (Figure 35-3)
2. Slide the bottle out of the tube far enough for the bottle to keep the lock lever pressed down (Figure 35-2).
3. Slide the bottle all the way out of the tube.


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# CHAPTER 39 - 00 - 00

## ELECTRICAL / ELECTRONIC SYSTEMS & INSTRUMENT PANELS

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## **39-00-00 ELECTRICAL SYSTEMS**


### **General**

This chapter describes the electrical systems and the racks for electrical systems installed in the JS-3 RES, which function separately from the instrumentation and communication systems described in AMM Chapter 31-00-00 INSTRUMENTS AND PANELS.

### **System description**

The electrical system consists of:

1. Rudder pedal controller
2. Bug wiper system
3. 5V power supply
4. Warning systems (if fitted)

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## 39-00-01 RUDDER PEDAL CONTROLLER

### General

The rudder pedal controller (RPC) controls the position of the rudder pedals.

### Description

The RPC is powered from the electrical master switch and the control input is provided from the rudder control interface switches (RCIS). A 12V signal is supplied to the rudder pedal actuator when pedal adjustment is required. Polarity is reversed to facilitate movement in the opposite direction.

Electrical power connection is from the instrument console connector-power (ICC-P) situated in the instrument console.

Figure 39-1 provides the schematic layout for the RPC.

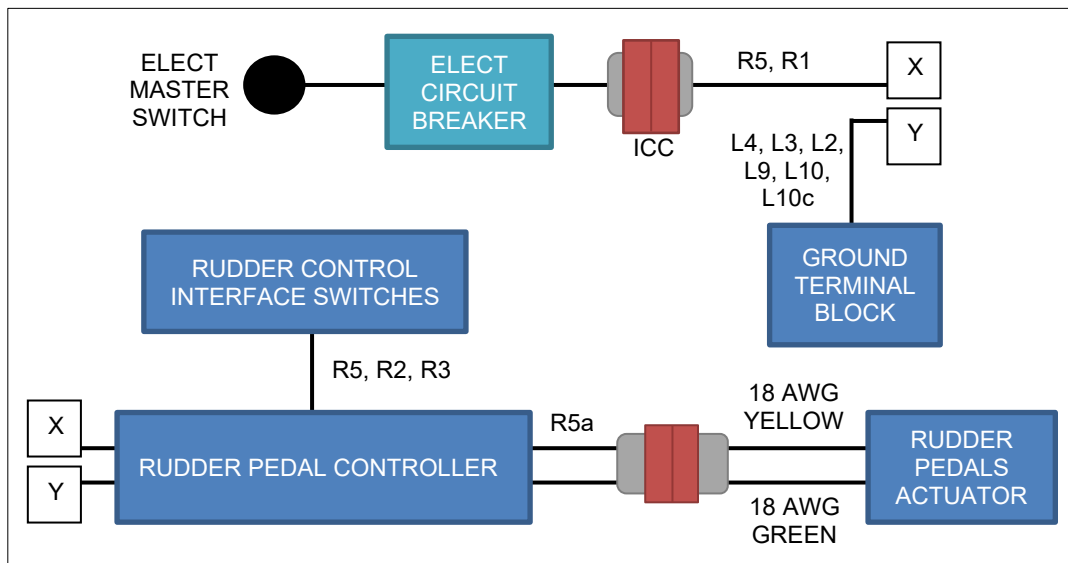

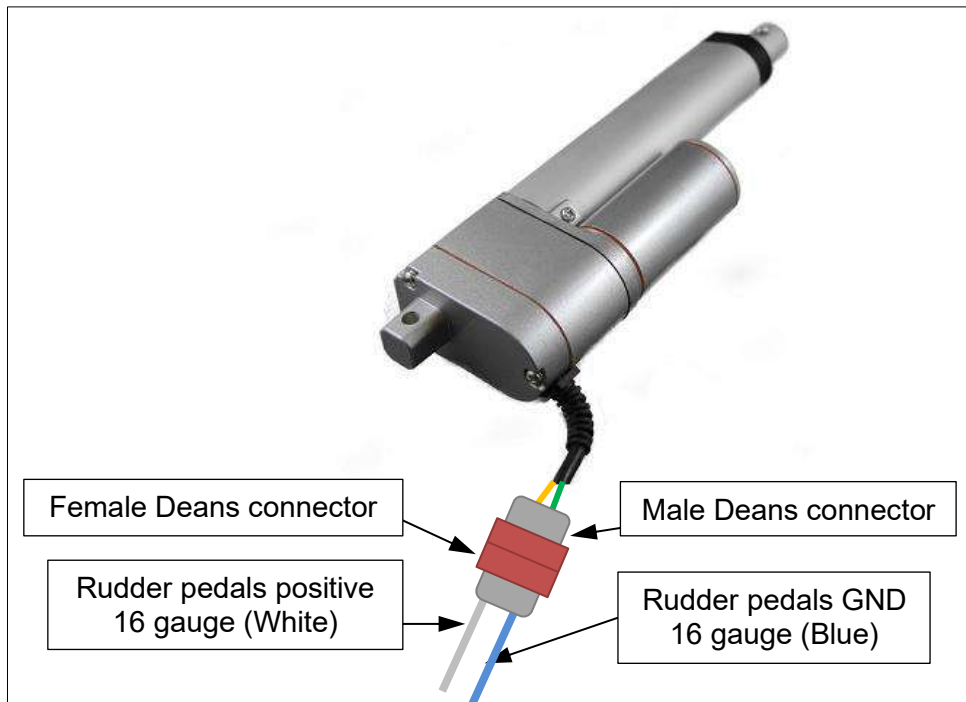


Figure 39-1: Rudder pedal controller diagram


Overload protection is provided by a 5A fuse inside the RPC enclosure.

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**Figure 39-2: Rudder pedal actuator wiring**

The Deans connector on the actuator can be unplugged and connected directly to a 12V power supply for a functional test.


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## 39-00-01 RUDDER PEDAL CONTROLLER TROUBLESHOOTING

### Electrical rudder pedal adjustment stops working

In case the rudder pedal adjustment does not respond when activated, perform the following fault finding procedure:

1. Ensure charged batteries are installed and appropriate charged battery is selected on the ELECT master switch.
2. Test the actuator operation by pushing the rudder control interface switch (RCIS) to the forward and rear positions.
3. If there is no response, proceed with the fault find procedure below.
4. Switch off the ELECT master switch.
5. Switch the ELECT master switch on while listening for the sound of a relay closing in the RPC near the control stick area.
6. If there is no indication that the relay is activated when switching the system ON, the following possibilities may cause the failure:
  - a. The fuse inside the PRC has failed. Replace the fuse to rectify.
  - b. Relay(s) on the RPC has failed.
  - c. Power supply to the RPC has been interrupted.
7. If the relay in the RPC is activated when switched on, the following possibilities may cause the failure.
  - a. The rudder control interface switch has failed.
  - b. The connections to the actuator failed.
  - c. The actuator failed.
8. Refer to AMM Chapter 39-00-01 RUDDER PEDAL CONTROLLER: MAINTENANCE PRACTISES for instructions to test the RPIS or actuator.

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## 39-00-01 RUDDER PEDAL CONTROLLER: MAINTENANCE PRACTISES

### Removal / installation of the RPC unit

The RPC is situated in the cockpit, under the seat pan centre table.

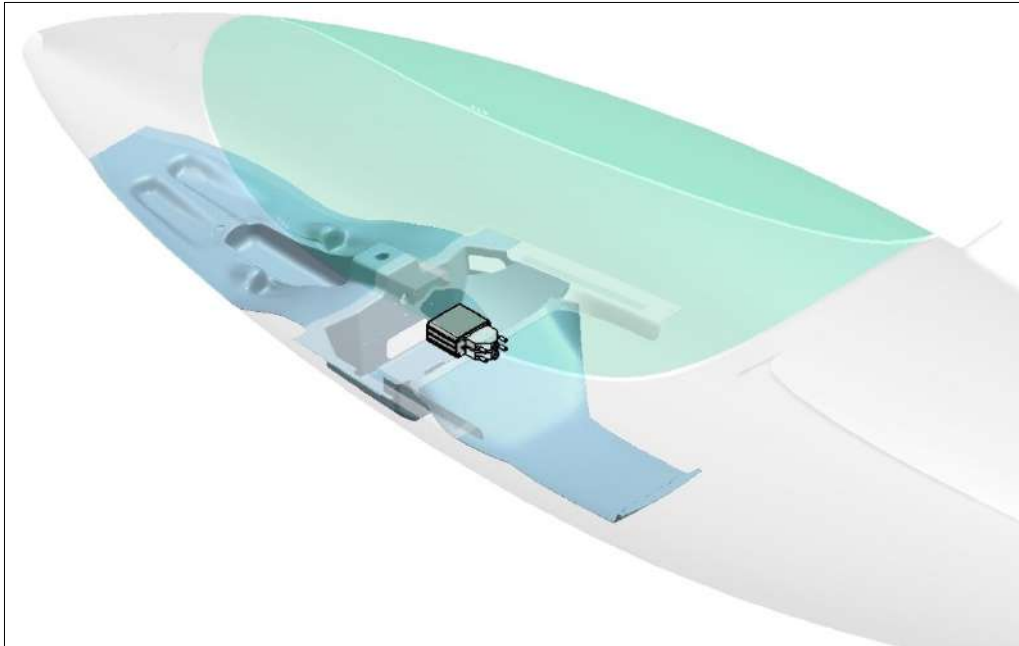

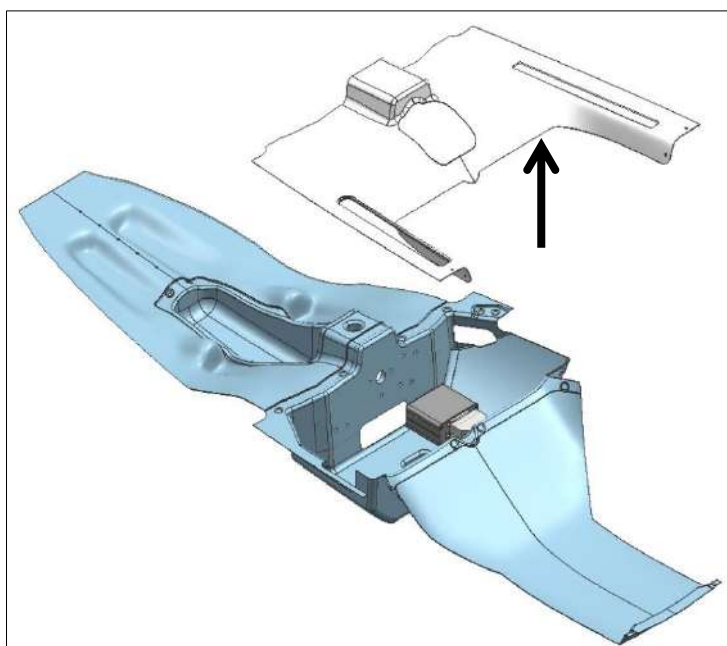


Figure 39-3: Rudder pedal controller inside JS-3 RES cockpit

### Remove all M4 bolts form the seat pan centre table.

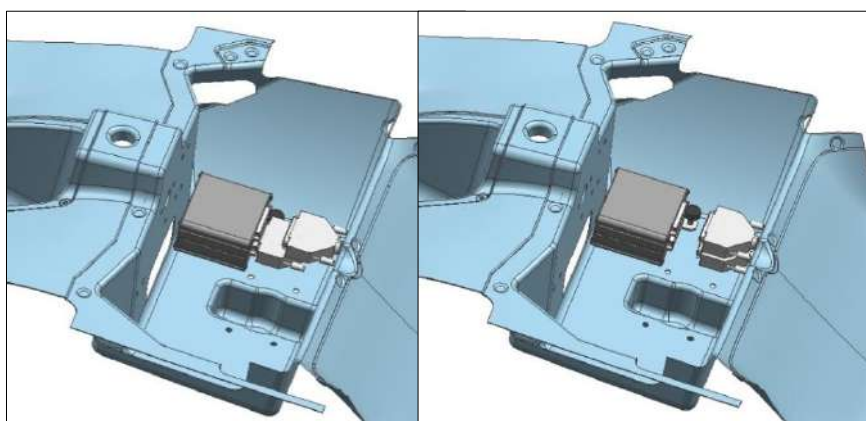
1. Remove the stick boot from the seat pan centre table.
2. Remove the seat pan centre table from the seat pan.

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**Figure 39-4: Seat pan centre table removed**

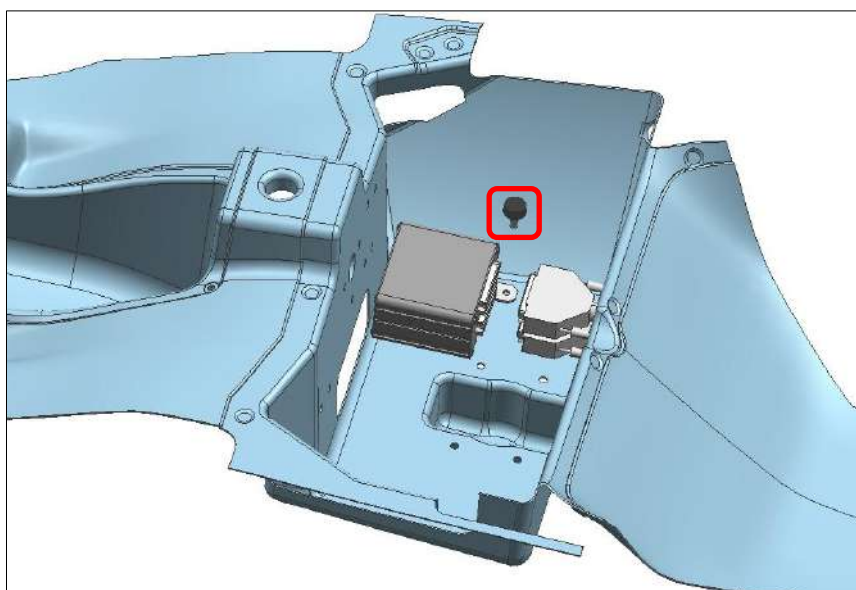
3. Disconnect the D-sub connectors from the control unit.



**Figure 39-5: D-sub connectors disconnected**

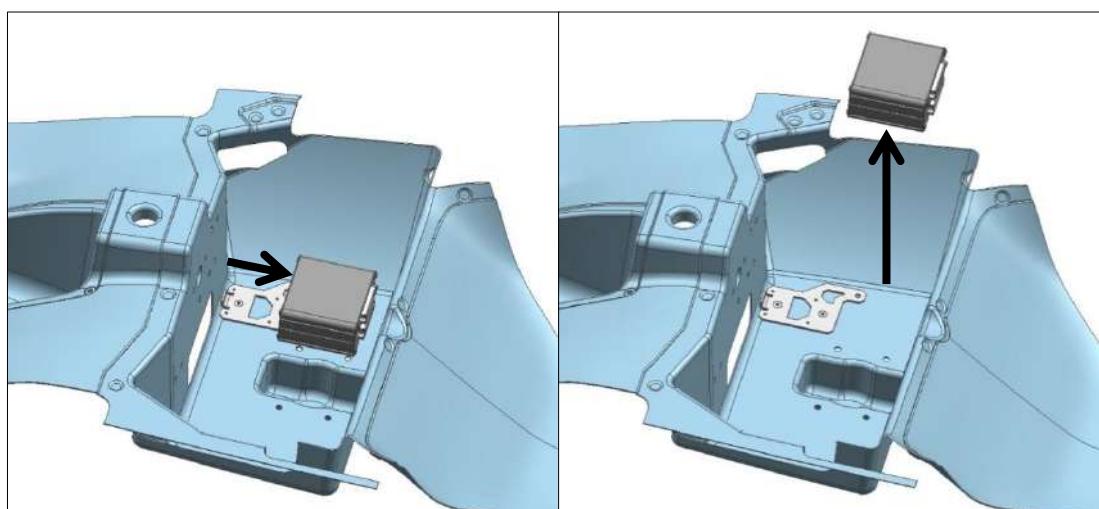
4. Remove the thumb screw to free the control unit.

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**Figure 39-6: Thumb Screw Removed**


- Slide the control unit rearwards until the grooves disconnect from the bracket, then pull upward to remove.



**Figure 39-7: Control unit removed**

- Installation is the reverse of removal.

**NOTE:** Take care when connecting the D-sub connectors. Do not use excessive force as this may result in the small connector pins bent or otherwise damaged.

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## Replacing the RPC fuse

The RPC fuse is replaced as part of the fault finding procedure if the rudder pedals adjustment failed.

1. Remove the RPC as described in the previous paragraphs.
2. Open the PRC enclosure referring to the diagram provided in Figure 92-9: Rudder pedal controller assembly.
3. Replace the 5A fuse.
4. Close the enclosure, connect the cable and test unit.

## Testing the Rudder Control Interface Switch (RCIS)


Testing of the RCIS is required when a switch failure is expected.

1. Remove the RCIS as described in AMM Chapter 39-10-00 INSTRUMENT AND CONTROL PANELS.
2. Check if the RCIS is functional by measuring for continuity between the centre terminal and the other terminals while activating the switch.
3. Replace the switch or the RCIS if faulty.
4. Test the unit.

## Testing the rudder actuator

The rudder pedal actuator is tested as part of the fault finding procedure or to adjust the rudder pedals temporarily to a fixed position.

1. Open the inspection hole above the rudder pedal actuator.
2. Undo the Deans connector as illustrated in Figure 39-2 and apply direct 12V. Reversing the polarity will activate the actuator in the opposite direction.
3. If the actuator can be set in a specific position as a temporary measure if the RPC has failed.

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## **39-00-03 BUG WIPER ELECTRICAL WINDERS**

### **General**


Leading edge cleaning devices can be mechanically controlled by making use of mechanical winders or electrical winders.

This section describes the requirements for the electrical installation of winders supplied by third parties.

### **Description**

Provision for supplying 12V DC power to an electrical bug wiper is provided. Refer to the wiring diagram for electrical connections available for an electrical bug wiper.

The aircraft only supplies the bug wiper controller with two power connectors situated within the luggage/ battery compartment, as well as signal wires supplied with the bug wiper controller.

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## 39-00-04 12V OUTPUT SOCKET

An optional 12V output port can be selected as part of the electrical system. This socket can power any 12V device requiring a rating not exceeding 5A.

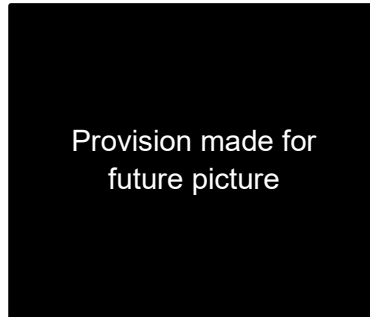



Figure 39-8: Provision made for future picture

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## 39-10-00 INSTRUMENT AND CONTROL PANELS

### General

This section describes controls and switches installed on the instrument panel and in the cockpit.

### Description

Switches and selections are positioned on the instrument panel and the rudder pedal control panel on the right side of the cockpit. The bug wiper controls on the left side near the trim control are explained at the relevant systems.

**Table 39-1: Bug wiper panel**

From		Wire			To		
Plug / Component	Pin	Marking	Gauge	Loom Path	System	Plug / Component	Pin
BWC-SB	1	Green	22	L5, L3, L2, L9, L10	BWC	BWC-LS	Provisional
BWC-SB	2	Orange	22	L5, L3, L2, L9, L10	BWC	BWC-LS	Provisional
BWC-SB	3	Blue	22	L5, L3, L2, L9, L10	BWC	BWC-LS	Provisional
BWC-SB	3	Blue	22	L5, L3, L2, L9, L10	BWC	BWC-RS	Provisional
BWC-SB	4	Orange	22	L5, L3, L2, L9, L10	BWC	BWC-RS	Provisional
BWC-SB	5	Green	22	L5, L3, L2, L9, L10	BWC	BWC-RS	Provisional

### Instrument panel

The instrument panel has the following switches/controls:

1. Master switch arrangement
2. RES power / battery selection switch arrangement (if RES is fitted)
3. Fire warning light and test button (if RES is fitted)
4. Circuit breakers

### Rudder Pedal Control Interface Switch

The Rudder Pedal Control Interface Switch (RCIS) is illustrated in the following figures:


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Figure 39-9: Rudder pedal control panel

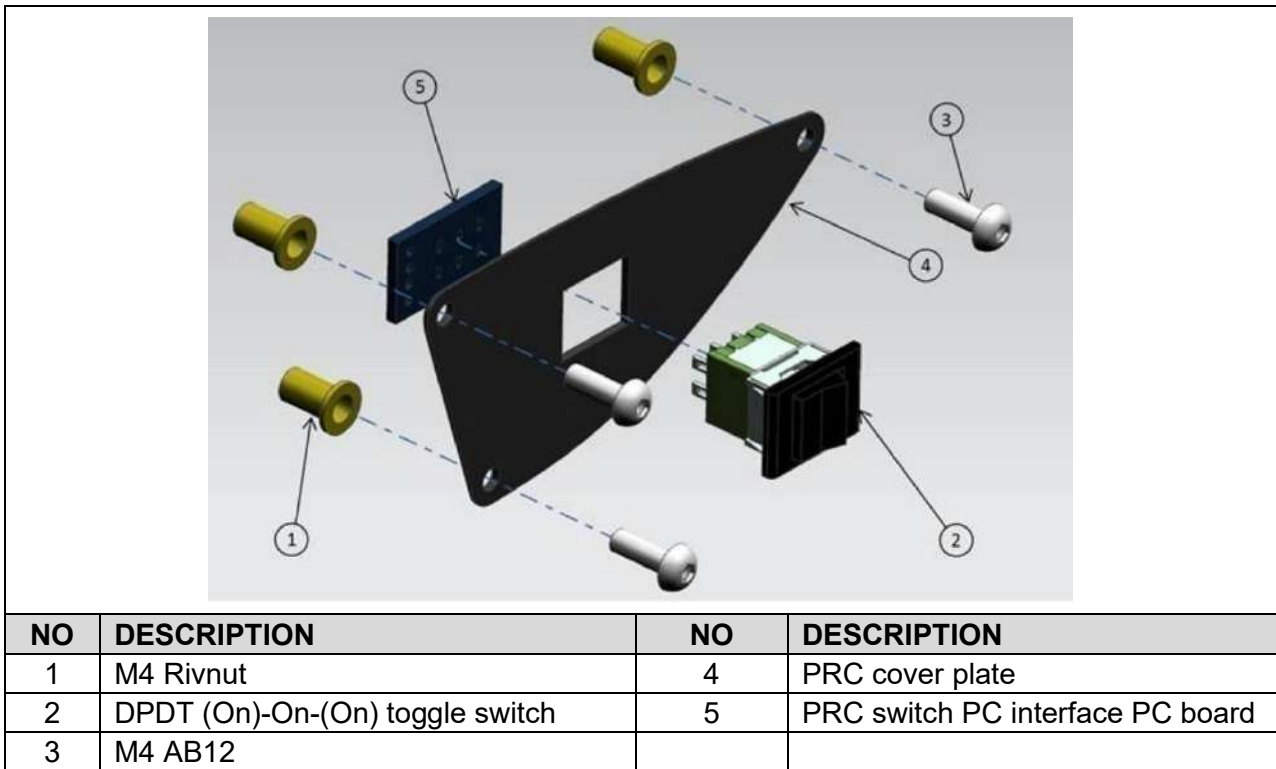



Figure 39-10: Rudder control interface switch

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## 39-20-02 BUG WIPER UNIT RACK

### General

JS-3 RES makes provision for the installation of a bug wiper system, which is deployed in flight to remove insect contamination from the leading edge of the wing.

### Description

The bug wiper system comprises two retractable leading-edge wipers. These wipers traverse the leading edge of the wings to remove insect contamination. While the wipers move towards the wing tips under aerodynamic loads. Electric motors or mechanical winders are required to retract the wipers.

JS-3 RES provides a means for installing and powering electrical motor units inside the cockpit, behind the pilot.

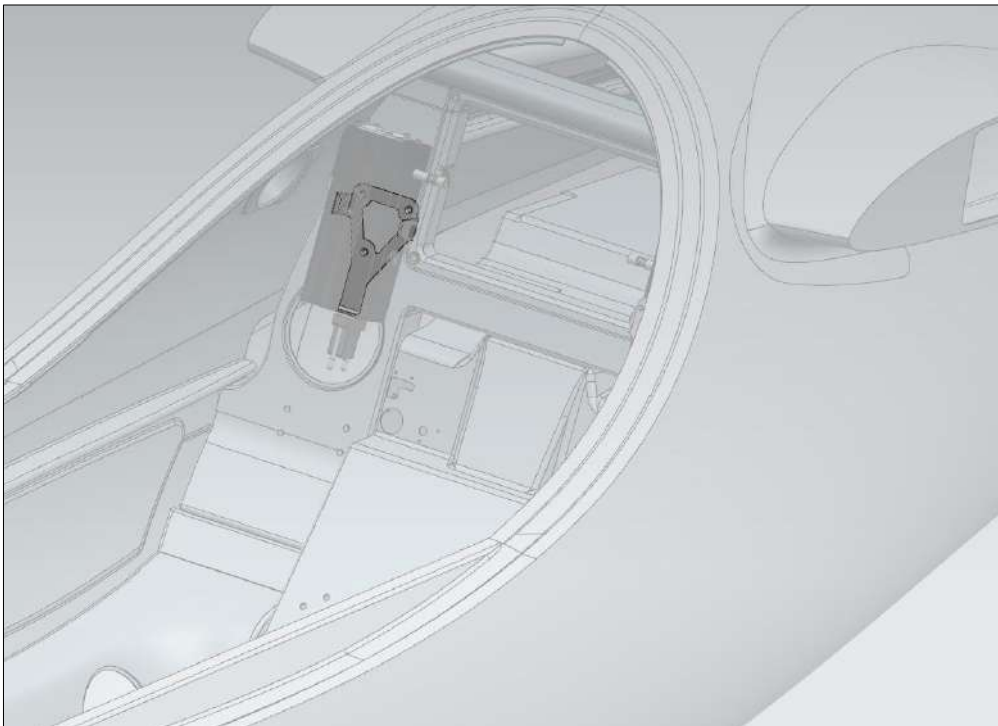
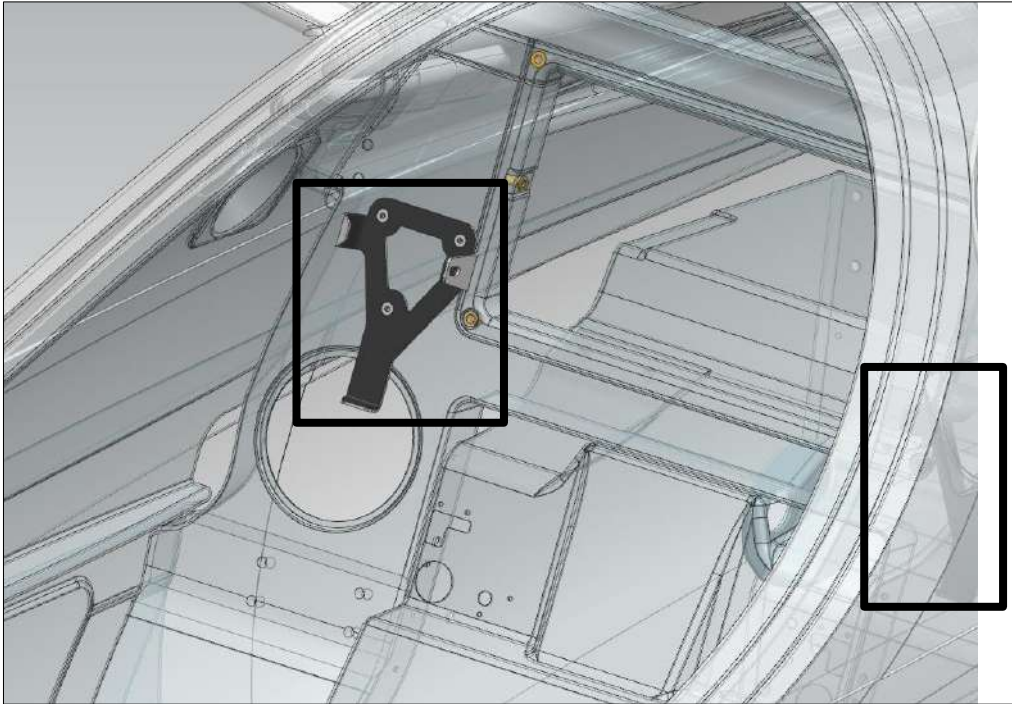




Figure 39-11: Bug wiper motor system inside JS-3 RES cockpit. Right side shown, left side is identical



**Figure 39-12: Bug wiper motor mounting brackets**



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# **CHAPTER 41 - 00 - 00**

## **WATER BALLAST**


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## 41-00-00 WATER BALLAST

### General

Water ballast may be added to the aircraft to improve its high-speed performance, or to adjust the mass balance. AMM Chapter 41-00-00 WATER BALLAST describes the layout and maintenance of the water ballast system.


AMM Chapter 41-10-00 WATER TANKS gives further information on the storage procedures and descriptions of the water ballast system.

AMM Chapter 41-20-00 WATER BALLAST SYSTEM describes dumping processes as well as other maintenance practices.

### Description

The water ballast system allows the weight of the aircraft to be increased to a maximum of 600 kg for the 18 m and 525 kg for the 15 m configuration. The water tanks are of the integral type in the wings. Each main tank has a capacity of approximately 66 litres (or 78 litres optional) of water. Each 18 m tip tank has a capacity of approximately 17 litres of water. The 15 m wing tips do not have water tanks.

There is also provision for two tail tanks to control the CG accurately. The tail tanks consist of a 5.8 litre expendable tail tank and an 8.9 litre non-expendable tank, used to compensate for different pilot weights.

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## 41-10-00 WATER TANKS

### General

This chapter describes the layout and locations of the water ballast tanks and their systems.

### Description

There are water ballast tanks in each of the main wings and each of the 18 m tips. The fuselage houses water tanks in the fin to allow the aircraft to be balanced according to pilot weight.

### Main wing

The main tanks are integrated in the D-box area of the main wings (inboard section), spanning the entire length of the wing. Figure 41-1 shows the water tanks in the main wing.



Figure 41-1: Main wing tanks (blue)


The main wings have the following orifices:

1. Dump valve on the bottom surface of the wing, actuated by the torque tube in the centre section of the fuselage.
2. Water tanks caps with one-way venting valves.
3. Pressure relieve valve installed on the junction rib.
4. Drain plug near leading edge on root rib.

The main wing dump valve is located on the bottom surface of the wing. Refer to Figure 41-13.

Main tanks are filled through the main wing water tank orifice as illustrated in Figure 41-2. Two ball check valves are fitted to the filler cap to restrict water flowing out the filler cap when wings are not horizontal.

An O-ring seals the filling cap to the main wing.

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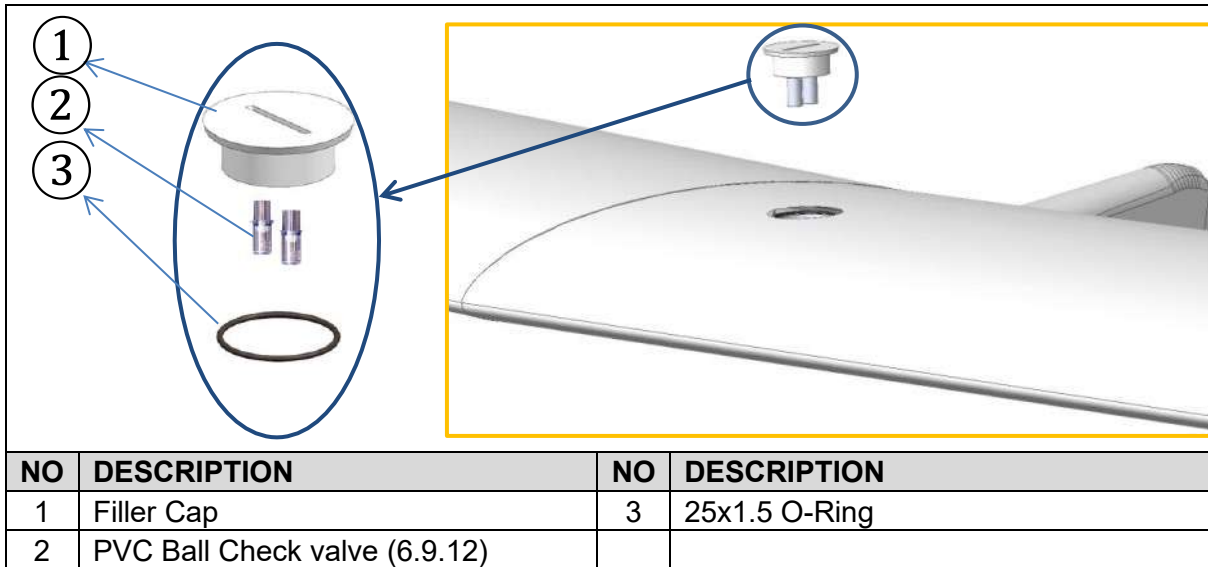


Figure 41-2: Main wing water tank filler orifice and filler cap

A drain plug fitted in the main wing root as illustrated in Figure 41-3.

Root drain plugs should be removed when the aircraft is de-rigged to allow small quantities of trapped water to be dispensed.

Refer to AMM Chapter 41-10-00 WATER TANKS: MAINTENANCE PRACTICES “Draining procedure” and “Drying the tanks” for maintenance practises to reduce the effect for profile deformation with prolonged exposure to moist tanks.

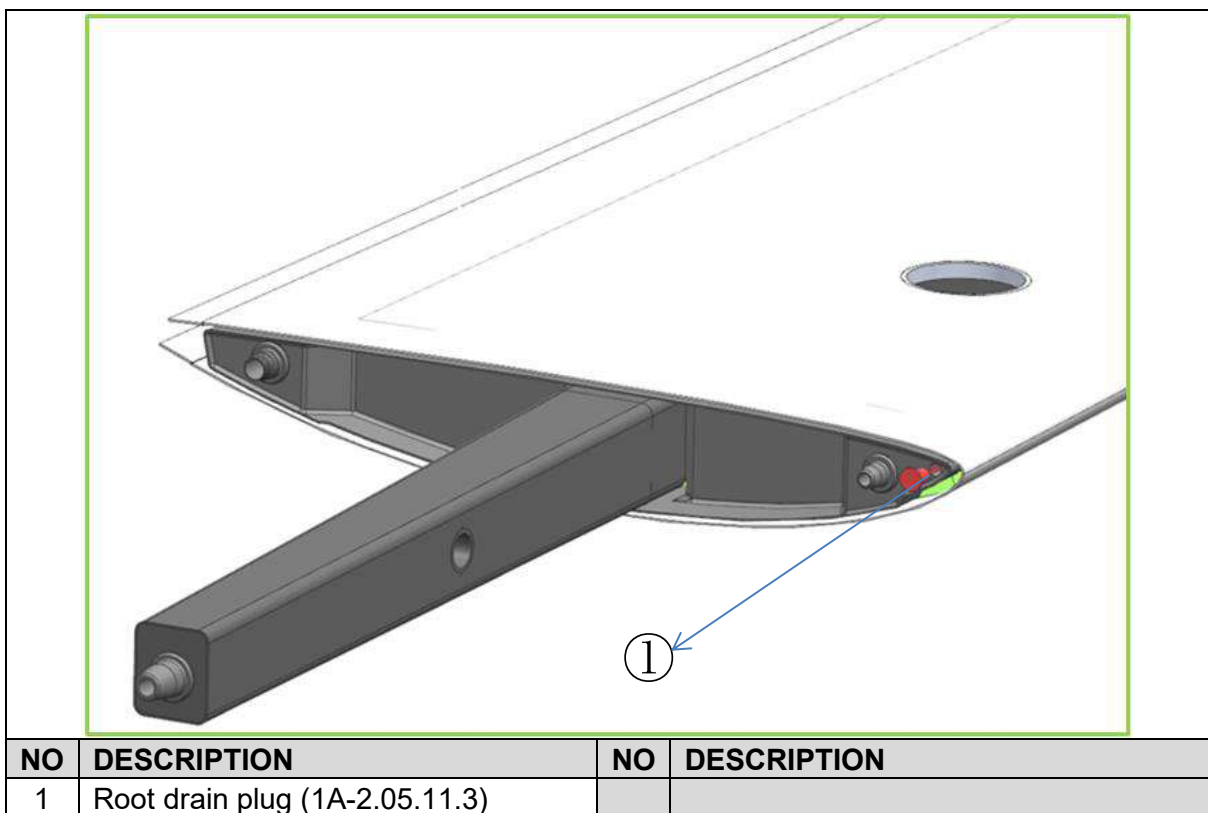



Figure 41-3: Drain plugs

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## 18 m wingtips

The 18 m wingtips have integrated water tanks in front and behind the spar, spanning the entire length of the wingtip as illustrated in Figure 41-4.

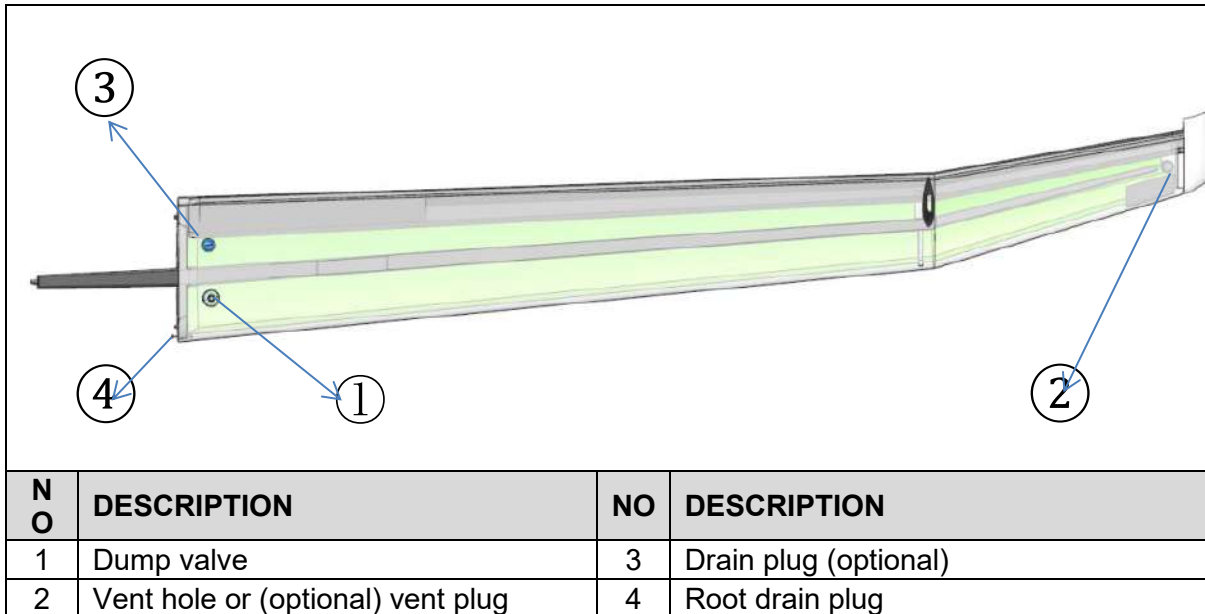



Figure 41-4: Tip wing tank (green)

The 18 m wing tips have the following orifices:

1. Dump valve on the bottom surface of the wing.
2. Vent hole or (optional) vent plug on top surface near winglet.
3. Drain plug on the bottom of the wing.
4. Drain plug near leading edge on root rib.

The wing tip dump valve is located on the bottom surface of the wing. Refer to Figure 41-15 for an illustration of the tip dump valve.

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A filler cap is fitted as standard on the top surface near the winglet.

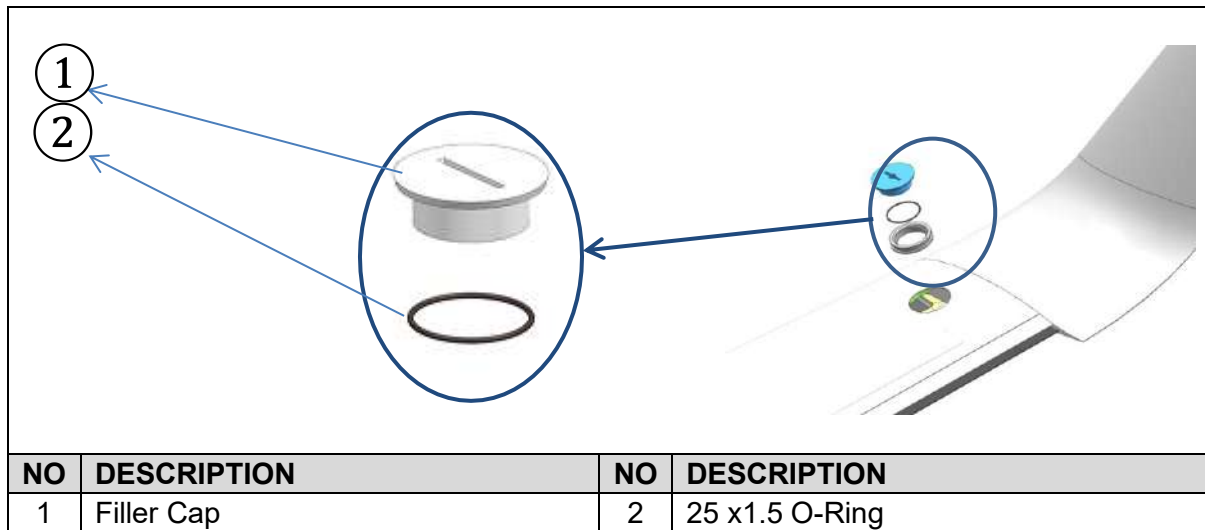


Figure 41-5: Wing tip removable filler cap

Two drain plugs are fitted in the 18 m wingtips as illustrated in Figure 41-6. All the drain caps are similar dimensions, but each plug is profiled and fit best at its original position. A replacement drain plug must be profiled for optimized aerodynamic performance.

Root drain plugs should be removed when the aircraft is de-rigged to allow small quantities of trapped water to be dispensed.

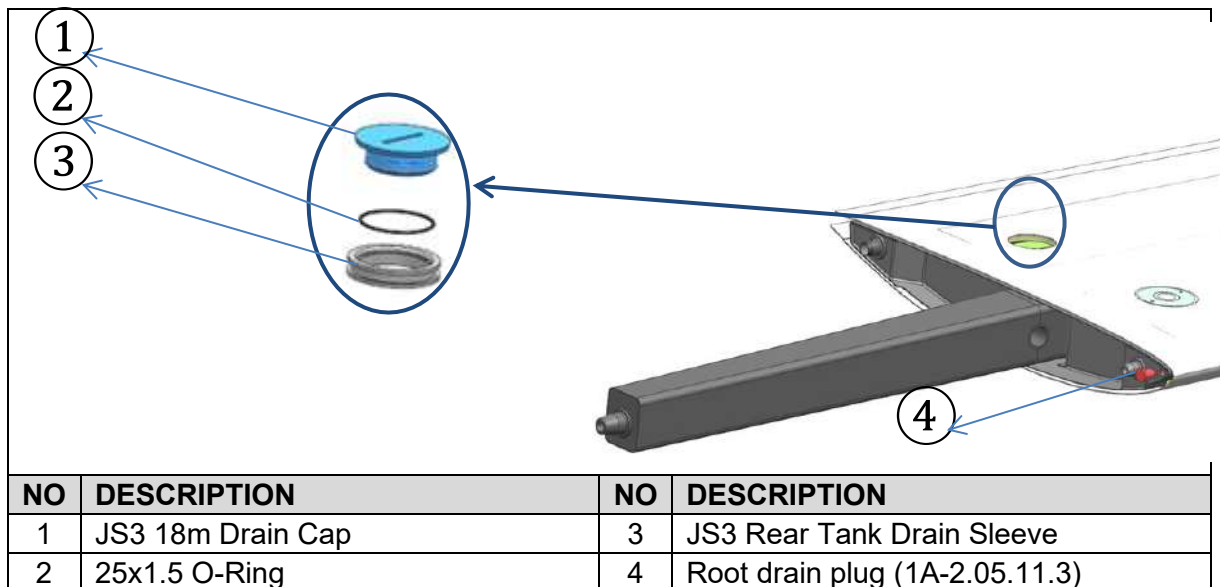



Figure 41-6: Root drain plug and red sticker

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### Tail tanks and tail valves

Two tanks are positioned in the fin, one in the fin leading edge and the other between the false spar and shear web. The tank in the fin leading edge holds the expendable water, with the dump valve positioned above the tail wheel. The tail tanks have separate vents, where the rear tank vent is positioned opposite the filling hole and the front tank vent is positioned above the filling hole.

Due to concerns about the pressure head of the non-expendable tail ballast, the non-expendable tank is divided into two separate tanks at the fin rib (Figure 41-7).

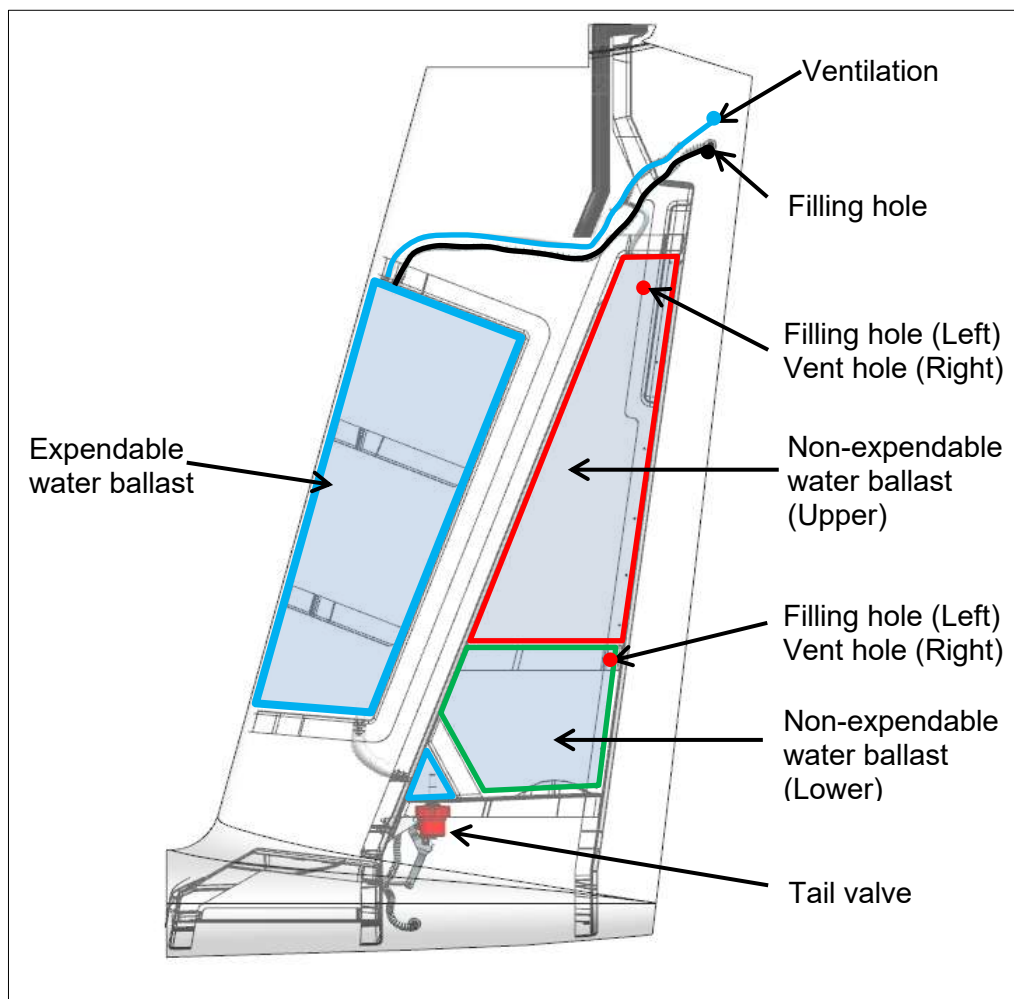



Figure 41-7: Tail valve and fin ballast breakdown with split non-expendable tanks

The tail tank dump valve is accessible when removing the tail wheel.

### Fuselage ballast tank and valve

Not applicable.

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## 41-10-00 WATER TANKS: MAINTENANCE PRACTICES

### General

The draining, drying and filling procedures for each of the water ballast systems, as well as any maintenance procedures are presented in this section.

### Draining procedure

After the water has been dumped on the ground or in flight a small quantity of water will remain in the main tanks. This water will over time be absorbed in the composite structure via the bonding areas and will result in a slight deformation of the wing in sandwich structure areas. This deformation has no structural impact but may affect performance if poor care is taken.

To reduce or prevent water absorption the following actions should be applied to the main wings and the 18m outboard tips:


1. Remove the outboard tips from the main wings.
2. Remove the main wings from the fuselage.
3. Remove the 4 mm water plug on the root rib near the leading edge (both main tanks and 18 m outboard tip).
4. Rotate the wings with the leading edge facing downwards at an angle to allow excess water to drain through the water plug.
5. Once all water is drained, open the filling hole, and the rear dump plug positioned on the bottom of the wing, positioned approximately 1 m from the root.
6. Open main valves by removing the spring from the water torque tube located at the root rib.
7. Leave the filling hole and dump valve open when the aircraft is not in operation.

### Drying the tanks

The aircraft should always be stored with the wing tanks open to ventilate when not in operation.

It is highly recommended to put a small electrical fan on top of the wing surface over the water filler hole to force ventilation in the tank. This will allow the structure to dry completely and prevent any issues due to moisture absorption.

In case that water absorption has affected the wing profile in the water tank areas, the wings must be dried over a prolonged period using the forced ventilation process.

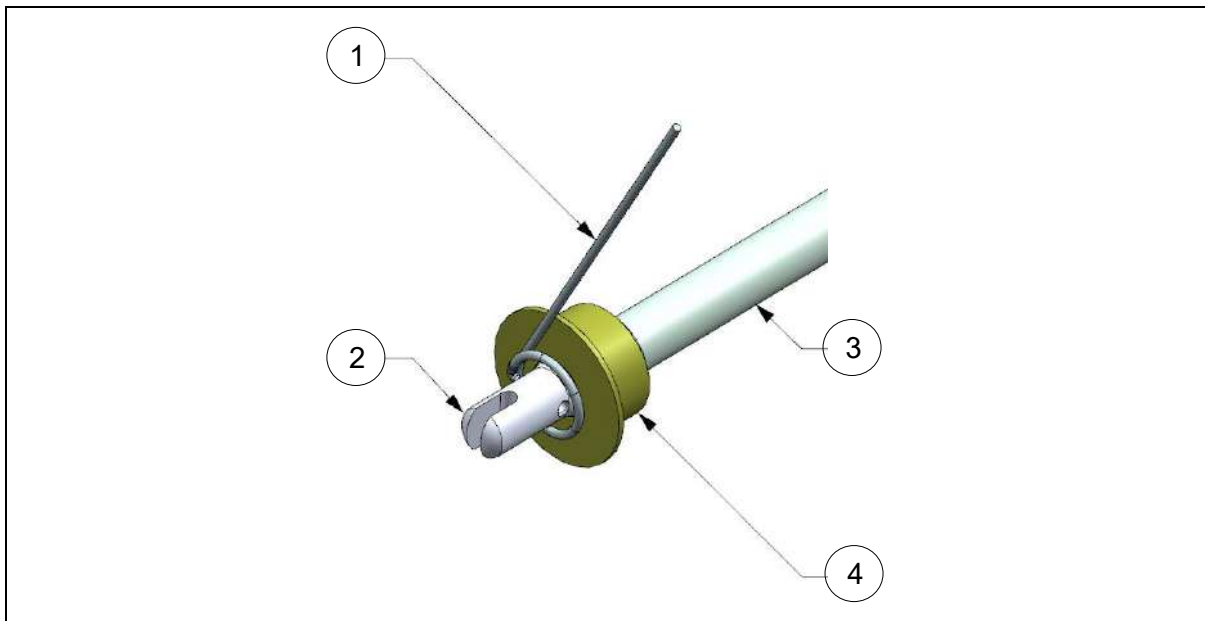
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## Replacement of water system root bush

### Tools required

- Number 2 screw driver
- Concentrated heat element (Small welding torch, heat gun, etc.)
- Chisel
- Rubber hammer
- New 10 x 2.5 mm O-ring
- Slow bonding epoxy, e.g. SP Gurit Spabond 345 extra slow (Tgultimate 106, apply without sag, suitable for metal/composite bonding.)


### Procedure



NO	DESCRIPTION	NO	DESCRIPTION
1	Spring	3	Wing torsion tube
2	Wing torsion tube	4	Root bush

Figure 41-8: Water system parts at root rib with aluminium bush


1. De-rig the aircraft according to instructions given in AMM Chapter 10–10–00 PARKING / STORAGE.
2. Lay the wing on stands with the tip side to the bottom, allowing the excess water to flow to the tip.
3. Remove the spring from the wing torsion tube.
4. Cover the main beam with a blanket to create a heat barrier.
5. A heat gun and a chisel will be required to remove these bushes.

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6. Use the concentrated heat element to apply heat locally to the root bush area until the bush slightly moves. In case a heat gun is used, rotate the heat gun regularly around the bush to ensure evenly distributed heat. Use just sufficient heat to change to bonding resin to a flexible state and take care not to cause heat damage to the rib.
7. Insert the chisel under the bush flange and use the rubber hammer to tap the bush free. Care should be taken to not damage the rib. (The area could be heated again if the bush does not want to release)
8. Remove and replace the damaged 10 x 2.5 mm O-ring from the wing torsion tube.

**NOTE:** Take care not to damage the new O-ring when installing the root bush.

9. Sand and clean the surface of the rib where the flange section of the Root bush will fit.
10. Sand and clean the surface of the bush to ensure proper bonding.
11. Mix the slow bonding epoxy according to the datasheet.
12. Apply the slow bonding epoxy to the bush and press the bush into position into the hole on the rib over the wing torsion tube. (Take care not to let the sleeves slip off)
13. Check that the valve body and rubber seal are seated correctly.
14. Scrape off any excess slow bonding epoxy.
15. Rig the aircraft while the slow bonding epoxy is still wet and allow curing in rigged position.
16. Ensure that the water system is in closed position inside the cockpit; however, it must not be in the locked position.
17. When cured, de-rig and re-install the spring.
18. Test for leakages.

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## 41-20-00 WATER BALLAST SYSTEM

### General

The water ballast system provides activation of the dump valves from the cockpit.

The dumping procedure described in this section is only applicable for maintenance purposes. Dumping procedures for flying purposes can be found in the JS-MD 3 RES Aircraft Flight Manual 4.5.7.2.

### Description

Figure 41-9 illustrates the water system layout in the fuselage and the right wing. The lever operates on a pull knob action and is held in one of three positions by a lock plate. The left-hand wing system is a mirror copy of the right-wing system.

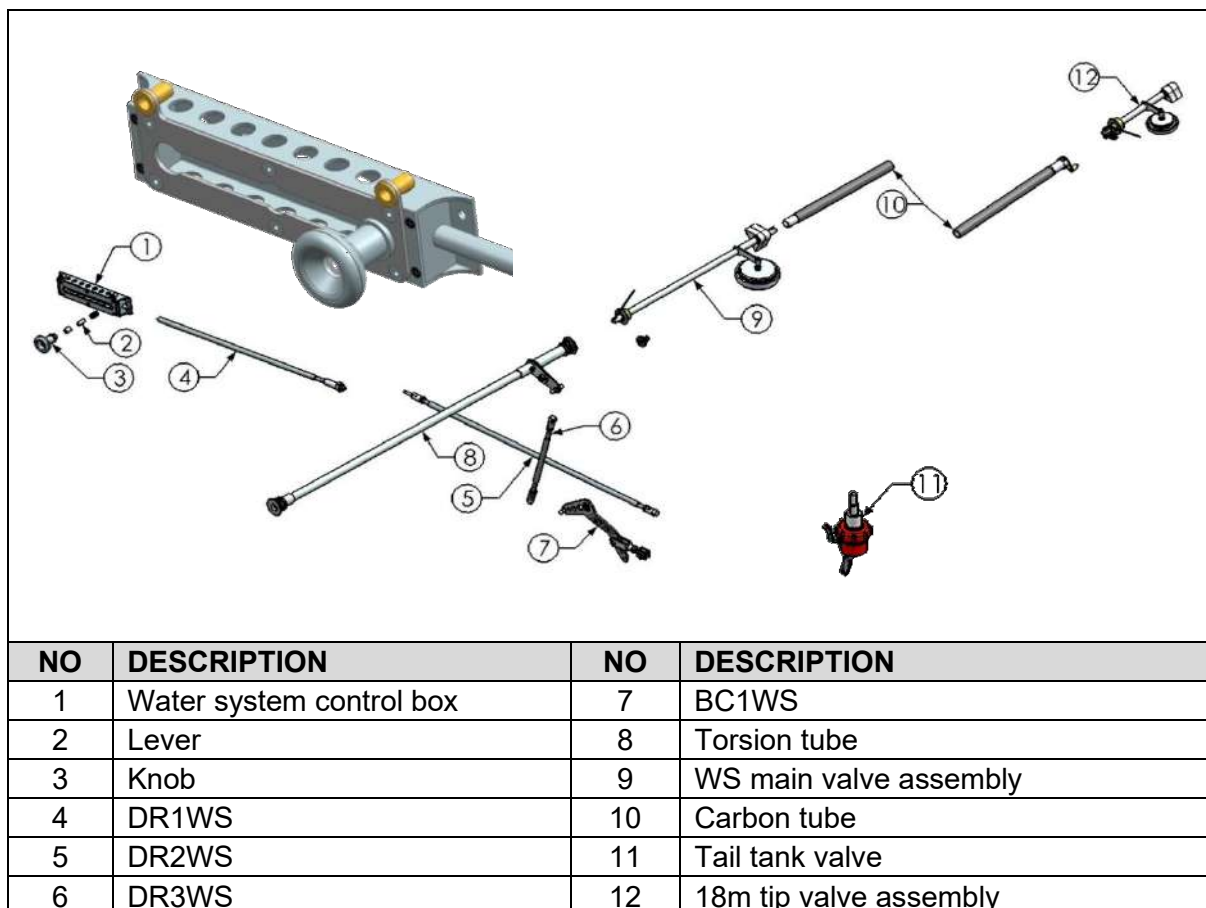



Figure 41-9: Water system breakdown

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## Actuation lever

The water system is actuated by a lever on the right-hand side of cockpit as illustrated in Figure 41-10.

By moving the lever to the middle position, the main water tank dump valves are opened by the rotation of the torque tube, and the tail valve is activated by means of a cable, but the tip tank valves are still closed.

By moving the lever to the forward position, the tip tanks are opened by the rotation of the lift plate in the junction area.

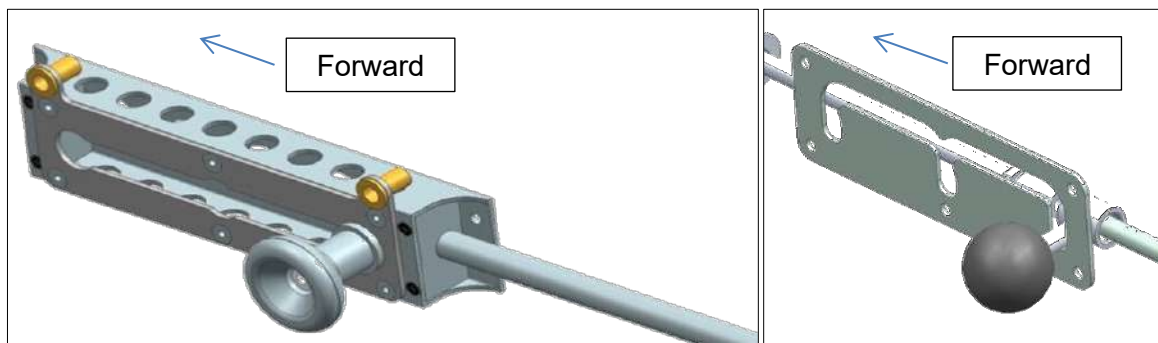



Figure 41-10: Dump valve actuation levers (left: Knob and slider; right: bolt action)

Table 41-1: Valve positions

Lever position	Main wing tank	Wing tip tank	Expendable tail tank
Rear	Close	Close	Close
Middle	Open	Close	Open
Forward	Open	Open	Open

**NOTE:** The different water system actuation options are illustrated in Figure 41-10. It is not possible to interchange between the two systems.

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### Torsion tube (fuselage)

The torsion tube transfers the linear lever action into a torsion action connected to the wing water dump system.

Figure 41-11 provides the detail of the components used in the actuation system.

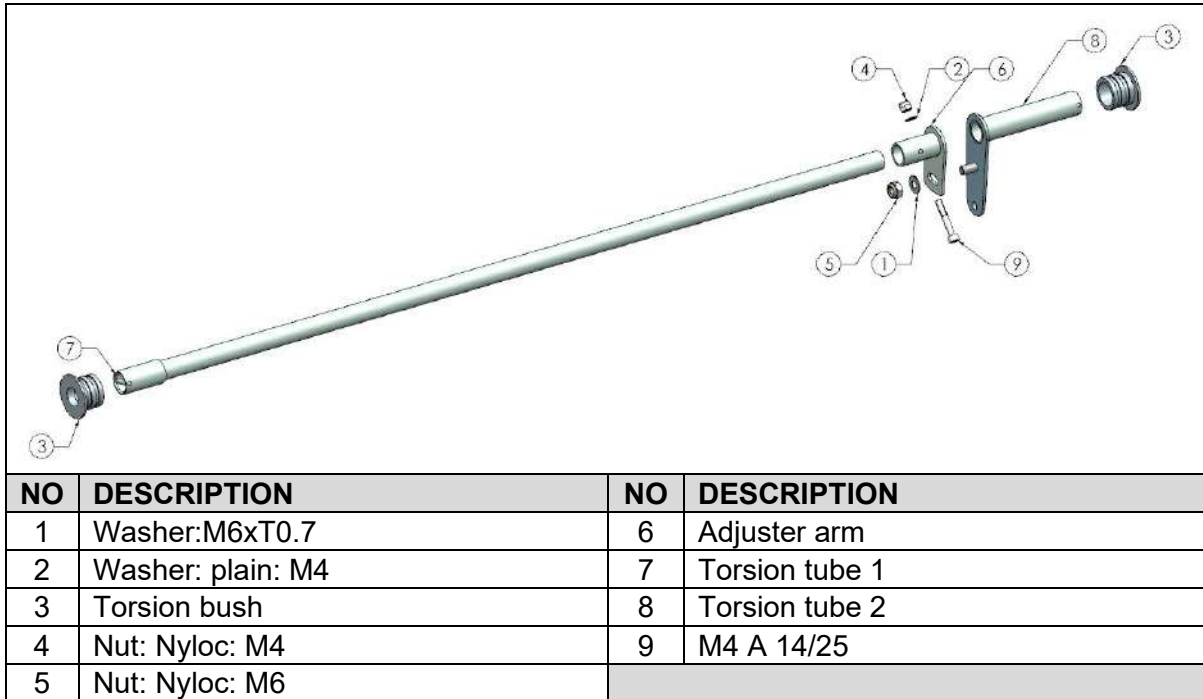



Figure 41-11: Actuating system breakdown

### Main valve assembly

The main valve assembly is activated by a rotation action from the torque tube inside the fuselage.

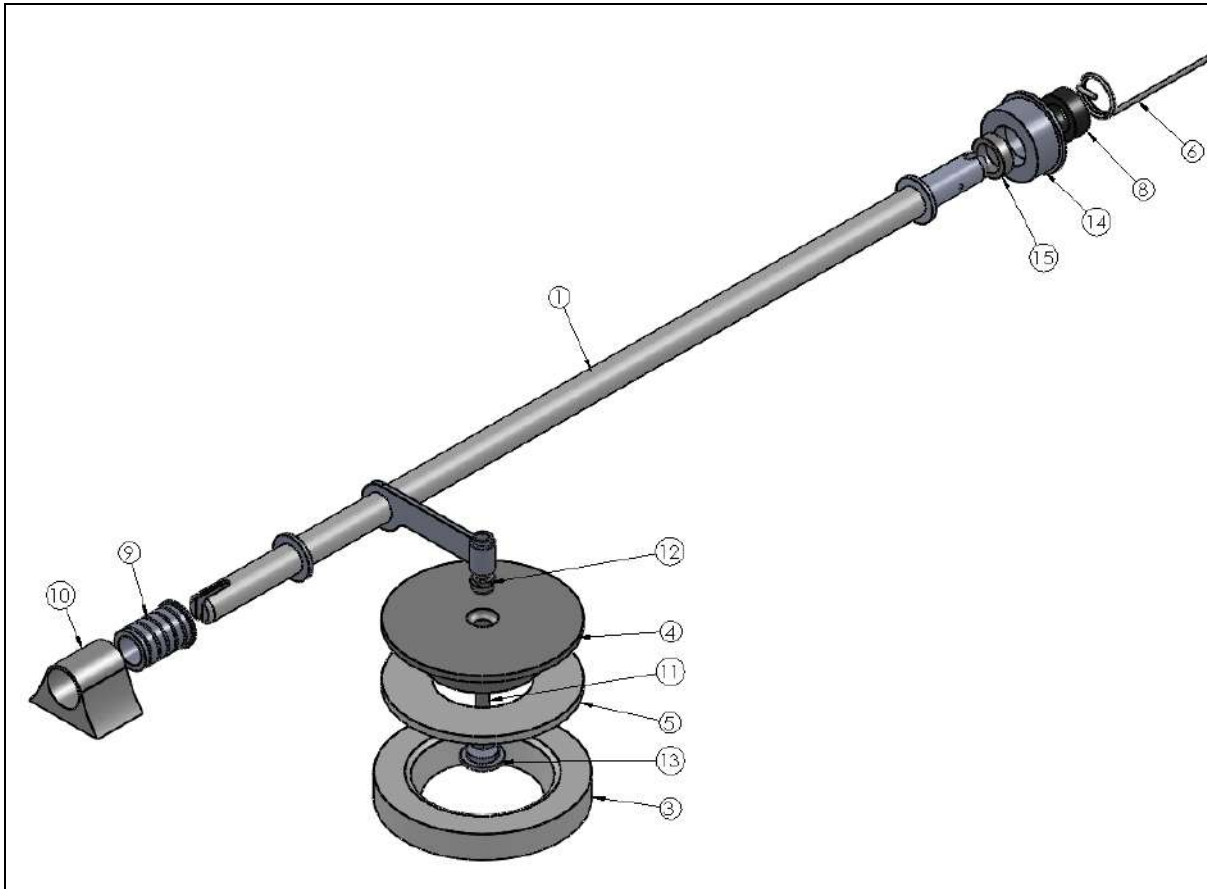
Water from the main tanks is dumped through the main valve as illustrated in Figure 41-12.

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**Figure 41-12: Main wing water valve**

The valve is a grease-free design and most lubricants will destroy the silicon-based Main Valve Rubber Seal.



NO	DESCRIPTION	NO	DESCRIPTION
1	Torsion tube L	9	Valve bush
2	Torsion tube R	10	Bush cover
3	Valve seat	11	Cap screw
4	Valve body	12	Hex nut
5	Rubber seal	13	Valve body plug
6	Valve spring L	14	Root bush
7	Valve spring R	15	Bush sleeve
8	Seal		

**Figure 41-13: Main tank dump valve system breakdown**

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### 18 m tip dump valve assembly

The wing tip dump valve, located on the bottom surface of the wing is actuated by the torque tube transferred from the inner wing.

A torque spring positioned outside of the main rib, keeps the valve normally closed.

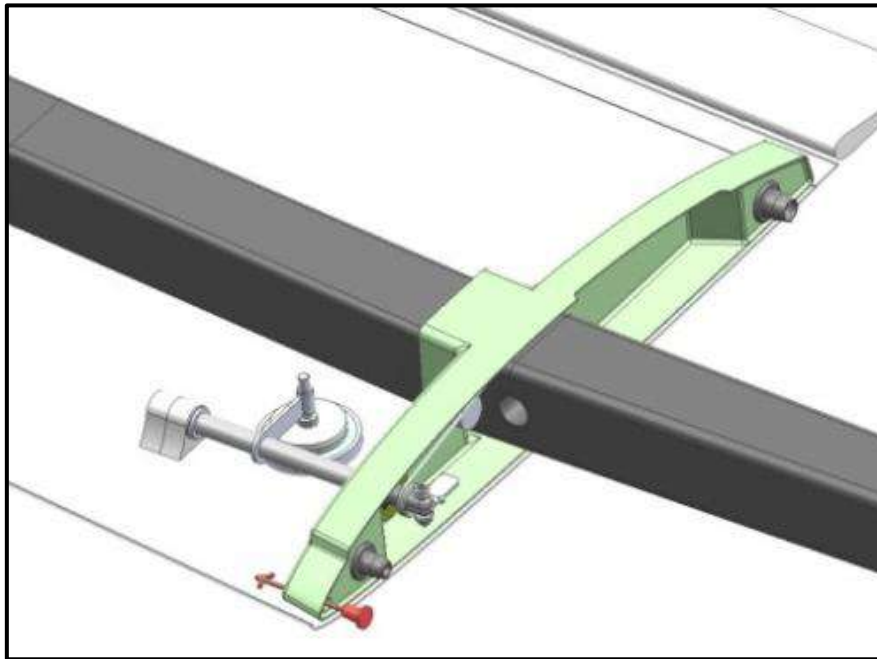
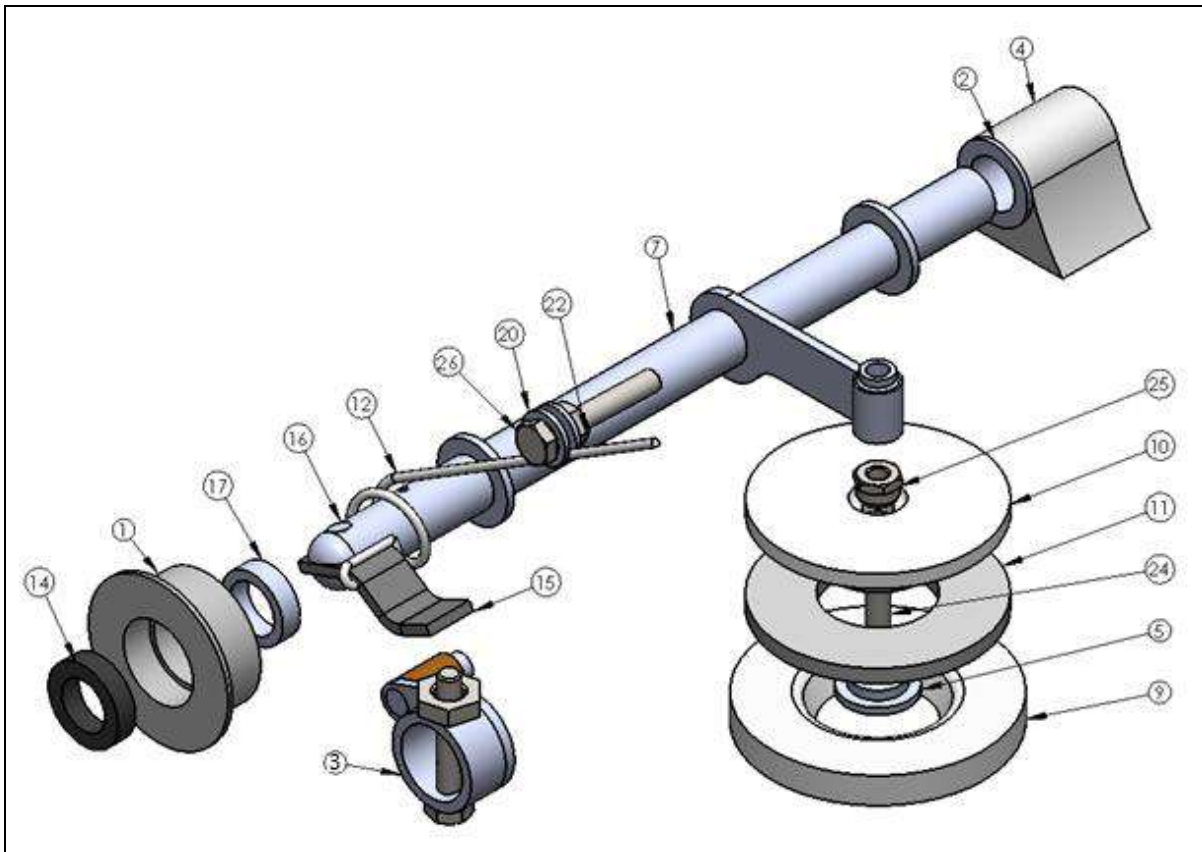



Figure 41-14: 18m tip valve breakdown



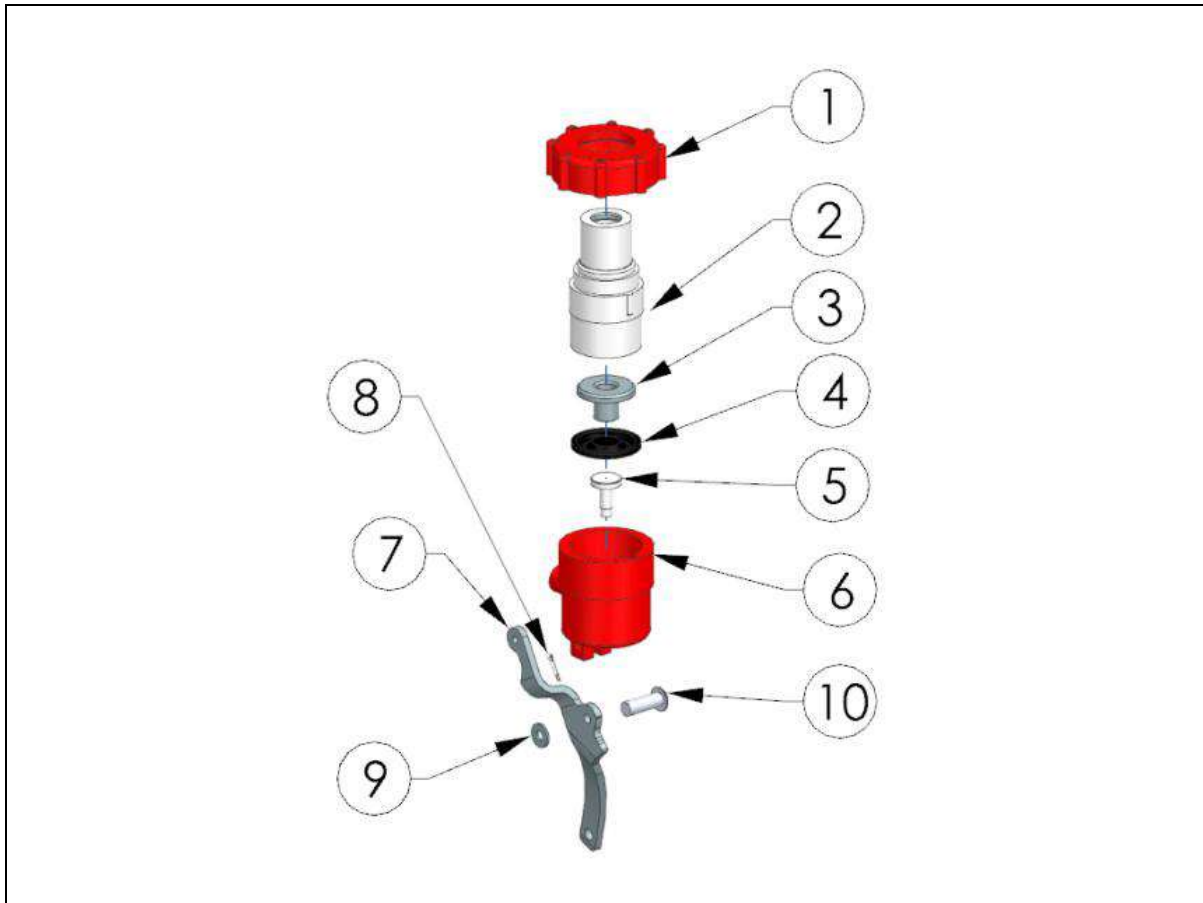
NO	DESCRIPTION	NO	DESCRIPTION
1	Root bush	12	Valve spring 18 m tip
2	Valve bush	14	Oil seal 16x10x6
3	Actuator 18 m tip	15	Lift plate 18 m tip
4	Bush cover	16	Grub screw
5	Valve body plug	17	Bush sleeve
7	Torsion tube 18 m tip	20	Washers
9	Valve seat 18 m tip	22	M5 Hex nut
10	Valve body 18 m tip	24	M4H12\30
11	Rubber seal 18 m tip	26	M5H20

**Figure 41-15: 18m Tip valve breakdown**

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### Tail tank dump valve

The tail tank dump valve, located above tail wheel, is actuated by a steel cable linked to the activation system in the centre fuselage section.



NO	DESCRIPTION	NO	DESCRIPTION
1	Tail valve grip nut	6	Tail valve tank
2	Tail valve housing	7	Tail valve lever
3	Tail valve plunger	8	Pin: Split: 1.6x20
4	Tail valve diaphragm	9	Tail valve lever spacer
5	Valve pin	10	JS3 tail tank valve pin

Figure 41-16: Tail valve system breakdown

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## 41–20–00 WATER BALLAST SYSTEM: TROUBLESHOOTING

### Main tank dump valve


The valves for the main tanks are situated on the bottom skin of the inboard wing and are activated when the dump lever in the cockpit is advanced to the middle or forward position.

1. The valve does not open evenly activating the dump lever.
  - Perform “Synchronization adjustment of water ballast system”.
2. The valve does not close properly with the valve in the close position.
  - Perform “Synchronization adjustment of water ballast system”.
3. The valve leaks significantly in the closed position.
  - Inspect for any contamination including grease of Vaseline on the landing surface of valve.
  - Check if rubber seal is still in position – the seal might become undone if the valve seat is contaminated with grease or Vaseline.
  - Remove and clean rubber seal. Inspect and replace if damaged or worn.

### 18 m tip dump valve

The valves for the 18m tanks are situated on the bottom skin of the outboard wing wheel and are activated when the dump lever in the cockpit is advanced to the forward position. The valve may need maintenance, or the system requires adjustment when:



1. The valve does not open when activating the dump lever.
  - Observe for any contamination including grease of Vaseline on the landing surface of valve.
  - Perform “Synchronization adjustment of water ballast system”
2. The valve does not close properly with the valve in the close position.
  - Perform “Synchronization adjustment of water ballast system”.
3. The valve leaks significantly in the closed position.
  - Perform “Synchronization adjustment of water ballast system”
  - Check if rubber seal is still in position as it might become undone if the valve seat is contaminated with grease or Vaseline.

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## Tail tank dump valve

The valve for the expendable tank is situated above the tail wheel and is activated by the single dump lever in the cockpit. The valve may need maintenance when:

1. Water dumping rate too slow when activating the dump lever.
  - Check that outlet orifice is clear of any obstructions or dirt.
  - Check that activation lever in the tail wheel area is activated correctly.
  - Check the condition of the activation cable.
  - Remove tail valve and clean valve and filter.
2. The valve does not close properly with the valve in the close position.
  - The activation cable is damage or corroded and not releasing fully with the actuator in the rear position.
  - The valve lever may interfere with any tail wheel mechanical parts.
  - Tail valve spring may be damaged or disconnected.
3. The valve does not dump water when activating the dump lever.
  - The activation cable may be broken.
  - The connections of the activation cable may be defective.
  - The tube connecting the outlet of the valve to the orifice of the fuselage may be blocked or kinked.
  - Valve dump arm connection faulty or jam against tail wheel mechanism.

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## 41-20-00 WATER BALLAST DUMP SYSTEM: MAINTENANCE PRACTICES

### General

The water system is actuated by the water dump lever on the right-hand side of the cockpit. By moving the lever forward, the main water tank dump valves are opened by the rotation of the torque tube, and the tail valve is pulled open by means of a cable.

General maintenance practices as well as dumping procedures can be found in this section.


### Synchronization adjustment of water ballast system

If the main dump valves are not opening in synchronization, or one valve not closing completely, the system can be adjusted to rectify the problem.

1. Remove the right battery box to gain access to the water system adjustment bolt.
2. Move dump lever to the close (rear) position.
3. Check if right wing main dump valve closes completely.
4. If dump valve does not close completely:
  - Undo the locking bolt between the adjuster plates.
  - Unlock the ball link connecting the torque arm to the actuating pushrod.
  - Adjust the ball link rod end until valve closes.
  - Lock the ball link connector.
5. Set up the left dump valve by rotating the torque arm until the valve closes completely.
6. Lock the adjuster plates with the M6 nut (16 Nm torque).

### Adjustment of water ballast system

1. Place the water dump slider in the middle setting. Both tip valves should be closed.
2. Move the lever slowly forward and observe for water flowing out of each tip.
3. At 6 mm  $\pm$  1 mm from the middle setting position the water should start dripping out.
4. In the event the water does not start to drip or the water drips before the 6 mm position, do the following:
  - Bend the lift plate (Figure 41-15, Item 15) up or down depending on what is required.
  - Bending the plate down will increase dumping rate.

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- Bending the plate up will reduce dumping rate.
5. Repeat the steps until both tanks start to drip at 6 mm.

### Checking dumping rate procedure

1. Fill all tanks in accordance with the JS-MD 3 RES Aircraft Flight Manual.
2. Open the valves by shifting the dump valve lever to the full forward position. The combined dump rates of the main tanks are approximately 60 litres per minute. The dump rate will slow down with approximately 20% of water left.
3. To dump the ballast only partially, move the dump valve lever to the centre position.

**CAUTION:** Use clean water without any additives to avoid damage to the structure and rubber seals.

**WARNING:** Never apply more than 0.1 bar of water pressure (filling funnel height no more than one metre above the wing) because of possible damage to the structure.

**NOTE:** The dumping procedure described to check the dump rate is for maintenance procedures only. Dumping procedures for flying purposes can be found in the JS-MD 3 RES Aircraft Flight Manual 4.5.7.2.


### Removal of main tank valve

The main tank valves on the bottom surface of the wing can be serviced or replaced. This may be required if the valve body is damaged.

1. Remove the bottom seating ring in the wing-skin (white plastic part). Two holes in the seating ring allow it to be screwed out to give sufficient access (The holes could be drilled according to the applicable drawing, if not already drilled).
2. Remove valve spring at root rib.
3. Remove root bush. Drill holes into the bush according to the drawing and screw out.
4. Remove valve body by unscrewing the M5H25 from the threaded lock sleeve, which is welded to the arm on the torsion tube.
5. Remove the valve mechanism by first sliding it approximately 25 mm towards the wing root, and then back. It can be removed through the dump hole.

### Removal of tip tank valve

The tip valve could be removed according to the procedure of the main tank valve, with the only difference that the lifting plate also needs to be removed before the root bush removal.

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## Removal of tail valve

The tail tank valve in the tail wheel area can be serviced or replaced. This may be required if the valve's operation is not satisfactory or not sealing properly.

1. Remove the tail wheel system.
2. Undo the lever by removing the split pin and hinge pin.
3. Remove the silicon tubing from the valve body.
4. Remove the tail valve by rotating the valve anti-clockwise.

## Installation of tail valve

1. Ensure that the water valve is assembled correctly and functioning correctly.
2. Apply PVC thread tape on the inlet thread. Use exactly enough to seal the tank. Excess sealing tape will prevent the valve to seat correctly.
3. Install valve by turning clockwise until it bottoms out onto the bottom rib.
4. Turn the valve backwards until the outlet faces forward.
5. Re-install lever with hinge pin.
6. Connect tension spring.
7. Re-Attach the silicon tubing to the valve outlet.
8. Test the tail valve for any leakages.
9. Test dump valve to ensure complete closure in the closed position, and that the maximum water dump rate conforms to the specification.


## Clean and Inspect tail valve internally

1. Inspect and clean the inlet filter. If the filter is damaged, carefully remove the filter and replace.
2. Disassemble the valve and remove any foreign objects trapped inside.
3. Inspect and replace the diaphragm if required.
4. Re-assemble the valve.

## Test tail tank dump rate

The following inspection must be performed during the daily inspection (if the tail tank will be filled) and during the annual inspection:

1. Fill the expendable water tank (bottom tank) to maximum capacity.
2. Lift the tail slightly and position a bucket below the tail valve outlet.

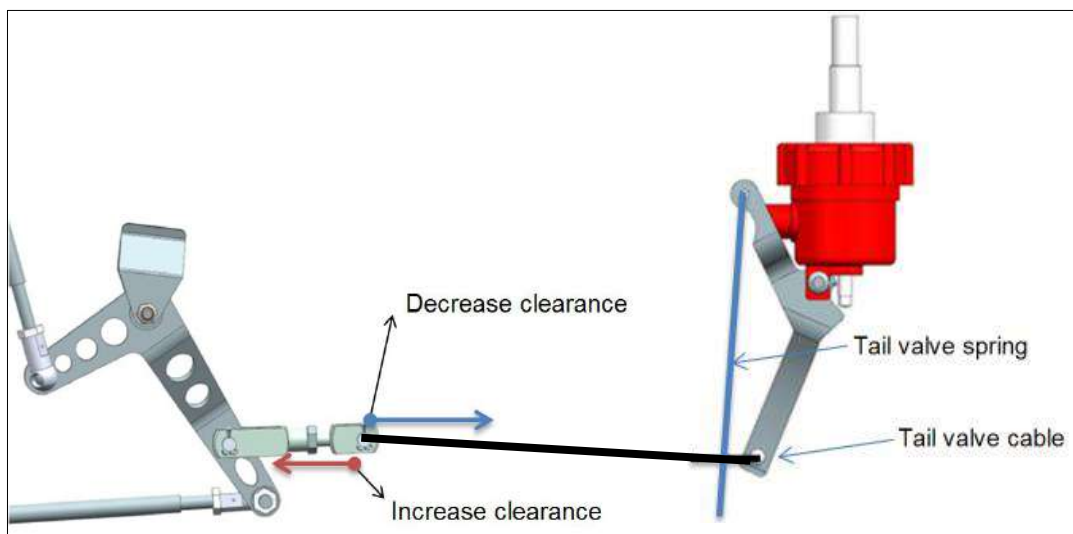
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3. Open the dump valve lever in the cockpit for 1 minute.
4. Measure the water quantity after 1 minute. If less than 1 litre has been dumped in the first minute, maintenance actions are required to locate the fault.

### Correct a slow dump rate


If the tail valve dump rate is too slow (less than 1 litre has been dumped in the first minute) the following actions are required:

1. Check the water outlet located on the tail boom for mud or sand clogs.
2. Extend the tail wheel.
3. Remove the tail wheel and axle.
4. Check the pipe connecting the tail valve to the water outlet for mud or sand clogs.
5. Check that there is play (0.2–1 mm) between valve pin and the lever when dumping water.
6. The cable can be adjusted to ensure clearance between the valve pin and the lever.



**Figure 41-17: Clearance adjustment between valve pin and lever**

7. Remove the tailplane and disconnect the elevator auto coupler pushrod, rotating it to the top to rest on the shear web.
8. Check the vent pipe (will be fastened to the pipe tied to the filling pipe) for clogs.
9. If no clogs are found, fill the tank with water and confirm through listening that sufficient airflow is present at the vent inlet while dumping the tank.
10. If the dump rate is still slower than specified after performing all previous steps, remove the tail valve, clean and inspect the valve internally.
11. Install the tail valve and test dump rate.

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## Inspection of tail valve activation cable

### Tools and materials required

- Size 13 Spanner
- Size 13 Socket and ratchet
- Long nose pliers
- Grease, Quick Silver Marine Parts and Accessories, Multi-Purpose 2-4-C Marine Lubricant with Teflon® or Super Lube® Synthetic Grease with Syncolon® (PTFE) Multi-Purpose Lubricant.
- Nut: Nyloc: M8 – 104 04 010 00

### Procedure

1. Extend the landing gear.
2. Remove the tail wheel by removing the tail wheel axle and nyloc nut as described in AMM Chapter 32–11–00 TAIL WHEEL AND DOOR: MAINTENANCE PRACTICES “Removal and installation of tail wheel” procedure.
3. Place the water system lever in the closed position as shown in Figure 41-18.

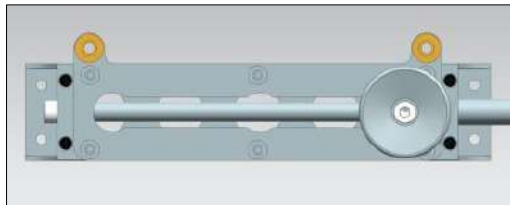


Figure 41-18: Water system lever in the closed position

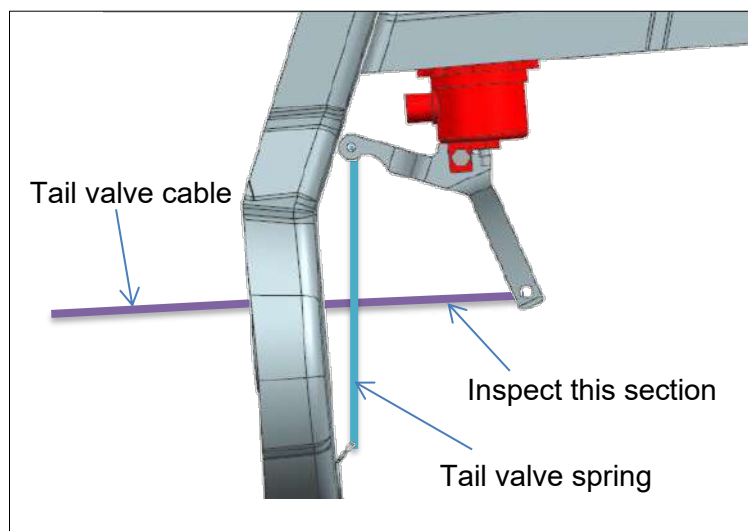



Figure 41-19: Exposed cable section inspection

4. Inspect the exposed section of cable for damage or corrosion.

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5. If excessive damage or corrosion is detected refer to "Replacement of tail valve activation cable".
6. If no damage or corrosion were detected, lubricate the cable section inspected in step 4 lightly with grease and remove the excess.
7. Install the tail wheel.

## Replacement of tail valve activation cable


When tail valve activation cable is broken, damaged or excessively corroded the cable must be replaced using the following procedure:

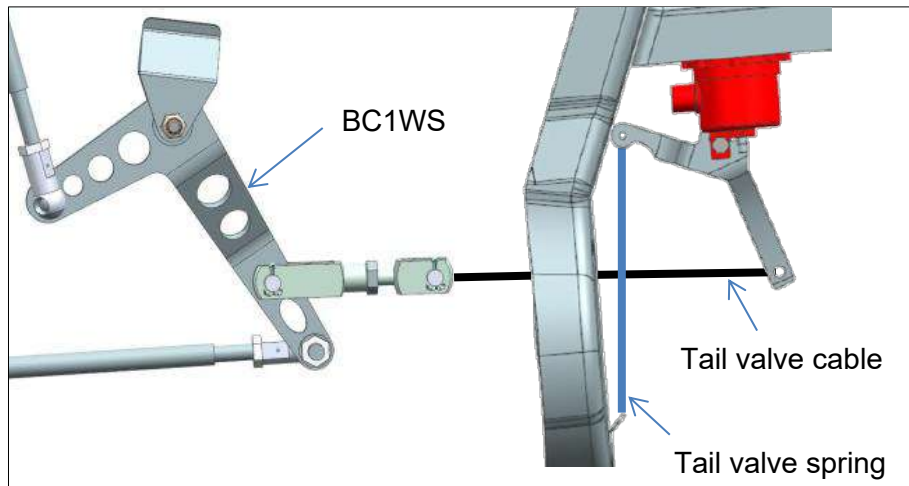
### Tools and materials required

- Size 13 Spanner
- Cable cutter
- Long nose pliers
- Cable: Control: SS: 1.6 (1/16") – 106 05 005 00
- Nut: Nyloc: M8 – 104 04 010 00
- Pin: Split: 1.6x20 – 104 07 013 00
- Nicopress: 1.6 (1/16") – 104 09 020 00

### Procedure

1. Extend the landing gear.
2. Remove the tail wheel by removing the tail wheel axle and nyloc nut as described in AMM Chapter 32-11-00 RETRACTABLE TAIL WHEEL AND DOORS.
3. Move the water system lever to the closed position as shown in Figure 41-18.
4. Remove the luggage box in the fuselage centre section.
5. Cable runs in a sleeve behind the right stiffener.
6. Remove the pin and split pin shown in Figure 41-20 and cut the cable with a cable cutter behind the thimble and crimp.

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**Figure 41-20: Tail valve cable and spring removal**


7. Remove the tail valve spring (Figure 41-20).
8. Remove the pin and split pin holding the tail valve lever.
9. Remove the tail valve lever and remove cable from the aircraft.
10. Cut the tail valve cable between the thimble on the tail valve lever and the cable crimp.

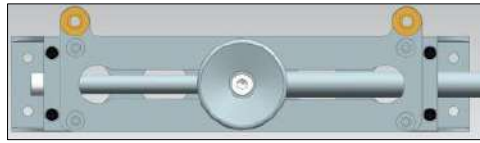
**CAUTION:** Take care not to damage the thimble, as this forms part of the tail valve lever.

11. Crimp the cable sleeve to secure the cable to the thimble (tail valve side of cable).
12. Route the un-crimped end of the cable through the plastic guide tube.
13. Reinstall the tail valve lever, pin and split pin.
14. Reinstall the tail valve spring.
15. Reinstall the pin removed through a thimble.
16. Feed the un-crimped end of the stainless steel cable through the Nicopress and around the thimble.
17. Mark the position of the sleeve.
18. Crimp the thimble to the cable.

**NOTE:** Due to space limitations it is normally necessary to remove the pin and crimp the sleeve and perform the crimping outside of the fuselage. Access through the wing root opening is recommended.

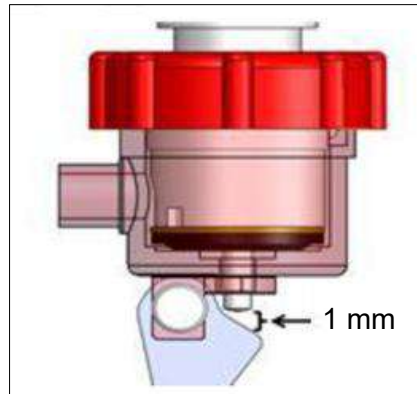
19. Reinstall the cable, pin and split pin.
20. Position the water system lever in the centre as shown in Figure 41-21.

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**Figure 41-21: Water system lever in the centre position**

21. Test the functionality of the system. With the water system lever in the centre position the tail valve should be fully open with the gap between the tail valve pin and lever as shown in Figure 41-22.




**Figure 41-22: Gap between tail valve pin and lever**

22. If there is no gap in the check in step 21, the gap can be adjusted by adjusting the male clevis.



**Figure 41-23: Adjust gap between tail valve pin and lever**


23. With the system lever in the rear position there should be no force present on the tail valve lever from the tail valve cable (cable should have slight slack).

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# **CHAPTER 51 - 00 - 00**


## **STANDARD PRACTICES:**

### **STRUCTURES**

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## 51-00-00 STANDARD PRACTICES: STRUCTURES

### General

The chapter provides the aircraft's major structural breakdown diagram.

### Primary structure

The Primary structure is defined as the following:

1. Wing spar
2. Wing root ribs
3. Wing skin
4. Fuselage shell from wing lift pins to fin including the fin
5. Horizontal tail
6. All rigging pins, bolts and all control system links

### Secondary structure


The Secondary structure is defined as the following:

1. All control surfaces
2. Cockpit area
3. All doors, airbrakes and fairing
4. Water ballast plugs

### Repairs


The JS-MD 1 Aircraft Repair Manual, MD01-ARM-00-001, provides basic repair instructions for minor damage to GFRP and CFRP aircraft manufactured by JS-MD.

Repair of major damage falls outside the scope of the repair manual and may only be done by approved repair organizations rated to perform repairs on composite aircraft structures.

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The sections discussed in the repair manual are:

1. The repair process (flow chart)
2. Materials used in the repair process
3. Damage detection
4. Preparing parts for repair
5. General repair guidelines and directions
6. Repair classification and procedure
7. Re-profiling
8. Pre-lamination

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## 51-60-00 CONTROL SURFACE BALANCING

### General

Control surfaces masses and moments must be within limits to ensure that the flutter properties are not adversely affected.

After any control surface has been repaired or refinished, it must be re-weighed and the moments re-determined. The manufacturer can be contacted to obtain the latest revision of document S.JS-060, Mass and Balance Standard, for the detailed procedure on weighing and balancing of the aircraft.

### Allowable masses and moments

Table 51-1 gives the allowable masses and moments of the control surfaces.

Table 51-1: Control surface allowable mass and moments

Control surface	Allowable mass (kg)	Allowable moment (daN.m)
Rudder	2.118	0.137
Elevators (sum of L&R)	1.100	0.032
Flaperon 1 - L&R	2.509	0.0888
Flaperon 2 - L&R	0.788	0.0241
Flaperon 3 15 m - L&R	0.276	0.0048
Flaperon 4 15 m - L&R	0.138	0.0018
Flaperon 3 18 m - L&R	0.730	0.0125
Flaperon 4 18 m - L&R	0.168	0.00192

**NOTE:** Certain masses and moments were selected conservatively. Contact the TC holder for assistance if limits are exceeded.


### Determining the control surface moment

To determine the control surfaces moments, the following procedure is used:

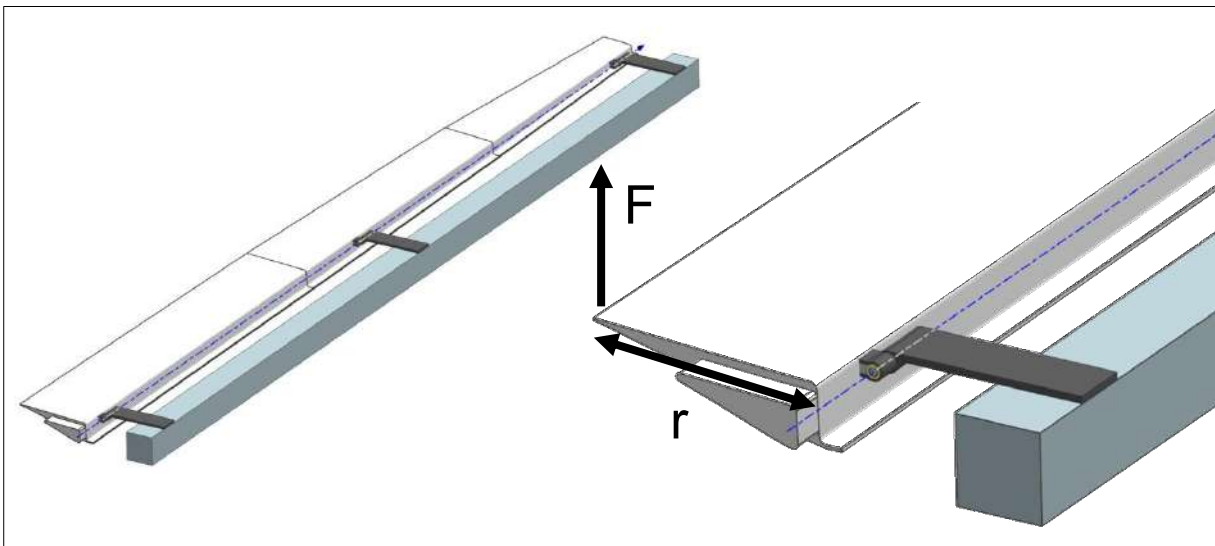
1. Remove the control surface from the primary structure.
2. Weigh the part.

**NOTE:** The long flaps are very flexible in its longitudinal axis. The parts may be weighed with a single scale on the longitudinal CG with the tips drooping down, without getting damaged.

3. Support the part on two hinges, as given in Figure 51-1.

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- With the centreline of the part horizontal, measure the mass at the trailing edge, and the moment arm length (r), to the measuring point (Figure 51-1).




**Figure 51-1: Determining control surface moments**

- Calculate the moment using the formula  $M = F \times r$ , with


- F** - Measured in daN
- r** - Measured in m
- M** - Given in daN.m

**NOTE:** Take care to set up the controls surfaces in such a manner that the friction is as low as possible.

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# **CHAPTER 52 - 00 - 00**

## **CANOPY / DOORS**

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## 52-00-00 CANOPY AND DOORS

### General

The JS-3 RES has two types of doors. The canopy is where the pilot can get into the aircraft and system specific doors such as the landing gear doors and the engine doors.

The latter can be found in the chapters where the systems are discussed. Only the canopy related maintenance practices will be discussed.

### Description

The canopy is made from 3 mm polymethyl methacrylate (PMMA) or Plexiglas bonded to a carbon frame.

**CAUTION:** The convex shape of the canopy can act as a lens and is a fire hazard when the canopy is left open in the sun.

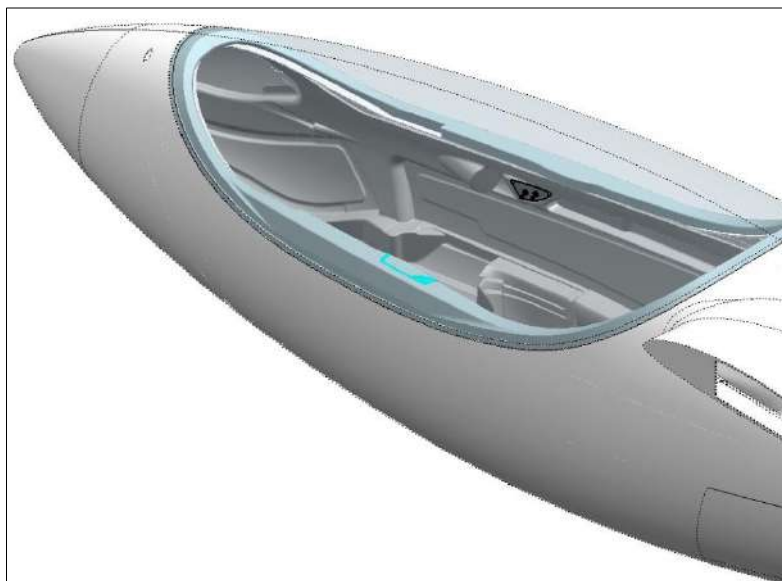



Figure 52-1: Canopy assembled onto fuselage

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## 52-00-00 CANOPY: MAINTENANCE PRACTICES

### Canopy cleaning

The canopy must be protected from scratches. Always wash dust off by using liberal amounts of water with a soft chamois, taking care not to let dust get between the chamois and the canopy surface. Dry with a clean chamois.

The canopy can be polished with a non-abrasive canopy polish with a rating of 5000 grid or higher.

**CAUTION:** Never clean the canopy with acetone or lacquer thinners as this will instantly create micro-cracks. Contact the manufacturer for recommended canopy polishes.

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## 52-10-00 CANOPY LOCKING AND JETTISON MECHANISM

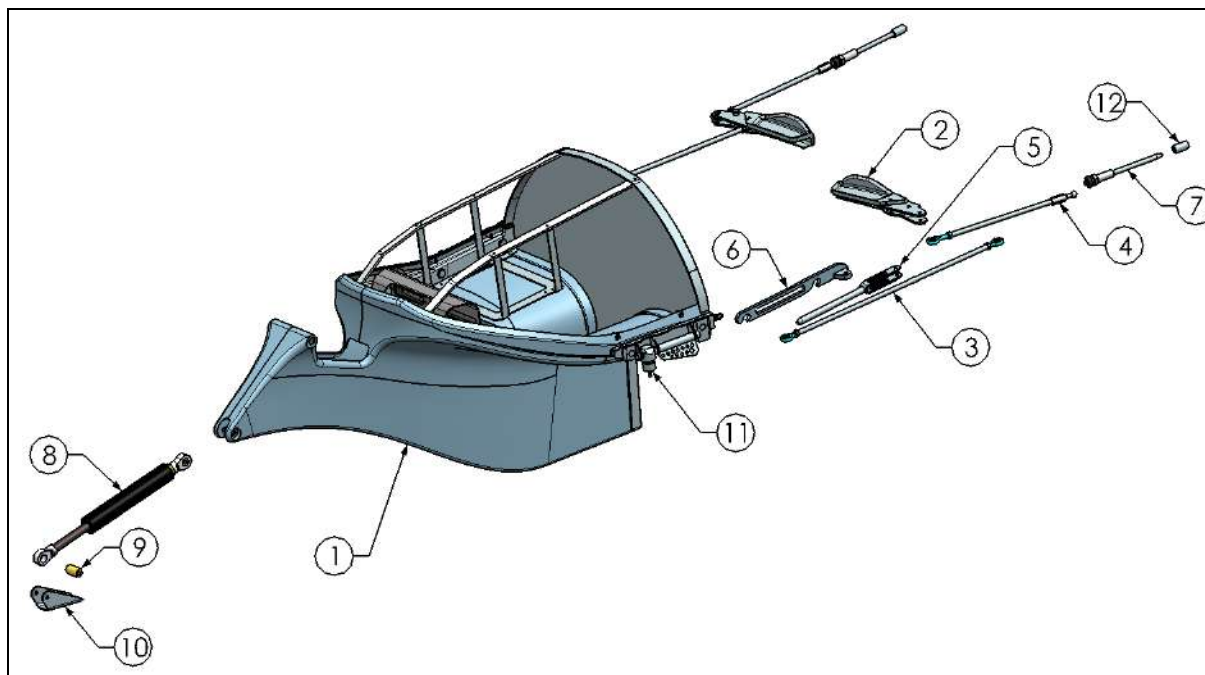
### General

The canopy jettison mechanism attaches the canopy to the instrument console. The jettison handle (Figure 52-2, Item 2) is linked to the inner latch handle (Figure 52-2, Item 6) that connects to the instrument console.

The canopy is locked when closed by the release handle that is connected to the locking rod (Figure 52-2, Item 5).



### Description

The canopy latching mechanism has two adjustable vertical posts at the front of the cockpit, through which the latching pins engage. The latching pins at the rear engages with rigid bushes in the cockpit frame, aligned tangentially with the cockpit frame (Figure 52-2).



NO	DESCRIPTION	NO	DESCRIPTION
1	Instrument binnacle	7	Rear latch pin
2	Canopy handle	8	Gas strut
3	DR1CL	9	Gas strut front bush
4	DR2CL	10	Gas strut bracket
5	Front latch pin	11	Fuselage front latch
6	Front inner latch	12	Fuselage rear latch

Figure 52-2: Canopy locking mechanism (from SN010)

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## 52-10-00 CANOPY SYSTEM: MAINTENANCE PRACTICES

### General

The maintenance procedures for the canopy system are discussed in this section.

### Röger hook

If fitted, the Röger hook must be inspected annually to ensure a lifting force of 8-15 kg.

### Reset Röger hook wire

The Röger hook wire is designed to be removable. To reset the wire to the desired force, the pin plate needs to be removed and the wire should be adjusted.

1. Removal of pin plate and wire adjustment.
  - Heat the pin plate carefully to approx. 150 °C, using a miniature mobile small gas flame, e.g. miniature mobile gas soldering iron.


**WARNING:** Take care not to apply the heat for long periods. The composite structure around the pin plate will be damaged if exposed to excessive heat.

- Lift pin plate from its cavity with a sharp object.
  - Adjust wire to a force of 8-15 kg by bending the two ends of the wire.
2. Bonding of pin plate.
    - Clean the area where the pin plate seats with a mini grinding tool.
    - Ensure there are no obstructions between the pin plate and cockpit frame.
    - Clean the pin plate bonding side.
    - Prepare surfaces with epoxy and bond the pin plate back into its cavity.

If it is not possible to reset the wire to a force of 8-15 kg, the wire should be replaced. A replacement part can be ordered from the manufacturer.

### Canopy gas strut replacement

The canopy is raised by a single gas strut, which is connected to the instrument binnacle and the front bulkhead of the airframe. The gas strut is a maintenance-free component, but it may lose its ability to provide the lifting force required for the canopy over time.

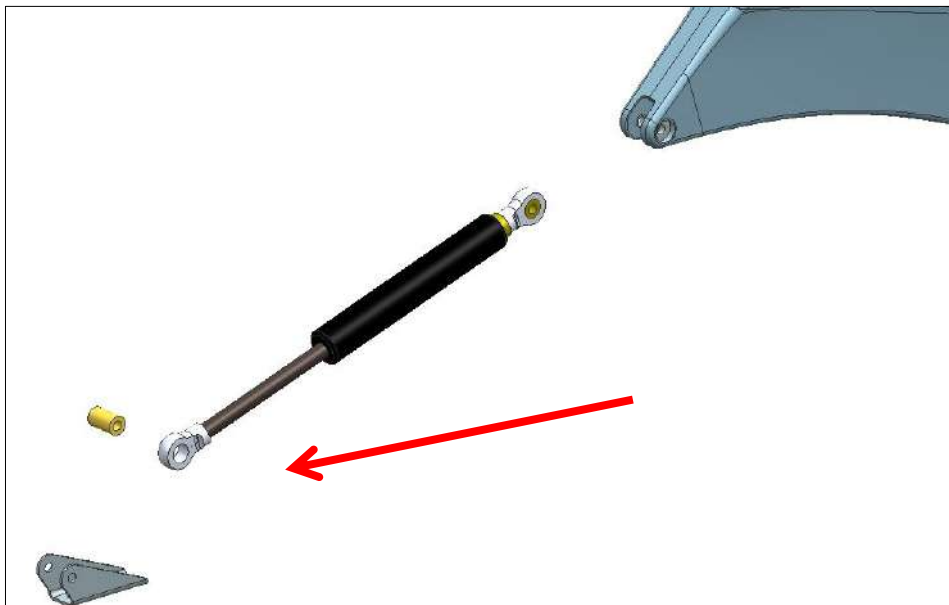
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To replace the gas strut:

1. Remove the canopy from the binnacle.
2. Support the binnacle in its lifted position.
3. Remove the two M6 bolts and nuts on either end of the gas strut.
4. Remove the gas strut.
5. Remove the rod ends from the old gas strut. Install the rod ends onto the new gas strut.


**NOTE:** Ensure that the positions relative to the piston are correct:

- The rod end with the brass bush pressed in must be attached to the piston.
  - The rod end without the brass bush must be attached to the body of the gas strut.
6. Reinstall the gas strut ensuring that the rod end with the bush is facing forward relative to the fuselage (Figure 52-3).



**Figure 52-3: Canopy gas strut system**

7. Reinstall the two M6 bolts and secure with new nyloc nuts.
8. Test canopy closing forces. If the forces are too high:
  - a. Identify 2 mm Allen Key screw on side of gas strut.
  - b. Slowly undo screw to deflate the gas strut slightly.
  - c. Regularly test to closing force - take care not to deflate the gas strut.

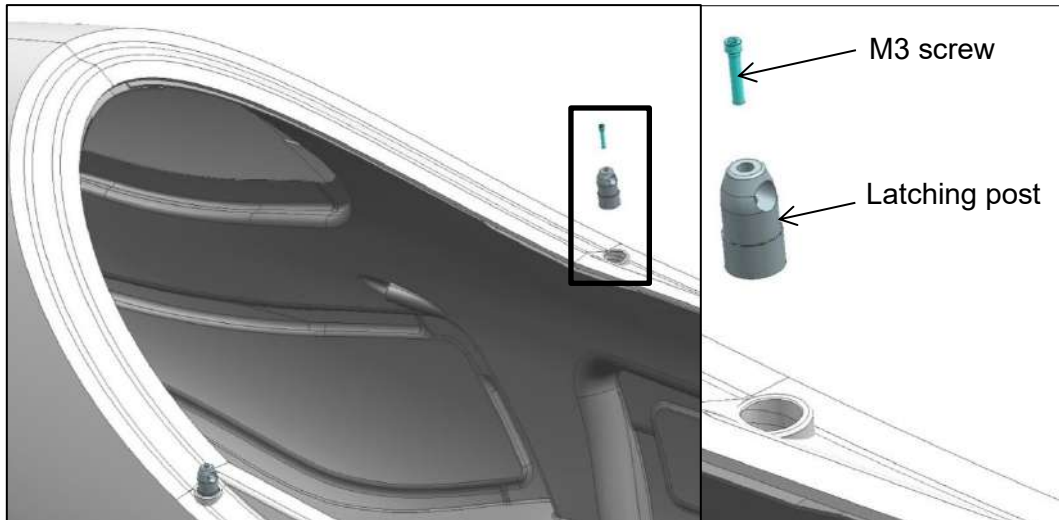
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## Canopy height adjustment

If repairs were made to the canopy or the fuselage, it may be necessary to adjust the height of the canopy, as this influences the effectiveness of the canopy sealing.

To adjust the canopy height:

1. Remove the M3 locking screw from inside the fuselage pin. The screw can be accessed through the hole in the top of the pin (Figure 52-4).




**Figure 52-4: Canopy vertical latch adjustment**

2. Adjust the pin's height by rotating it. The pin may be rotated in increments of half a turn, which will increase or decrease the height by 0.5 mm.
3. Latch the canopy fully to check the fit as well as align the pin to the latch internal mechanism.


**NOTE:** The M3 locking screw may not be returned until the canopy has been successfully latched, as there may be misalignment causing damage to occur.

4. Return the M3 locking screw.

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# **CHAPTER 53 - 00 - 00**

## **FUSELAGE**

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## 53-00-00 FUSELAGE

### General

The JS-3 RES has a monocoque, structural skin, supported by bulkheads required to support the structure in various critical areas.

Structural loads are supported through the external skin.

### Description

The fuselage shell is manufactured from three different fibres. The main load bearing structure is carbon fibre with carbon/aramid hybrid in the cockpit area. The fuselage uses a single shell structure without any sandwich.

The tail ballast tanks consist of an expendable tank of approximately 5.8 litres and a non-expendable tank of approximately 8.9 litres or optional battery compartment.

The fuselage structure is divided into four sections, namely the cockpit area, centre section, tail boom and fin.

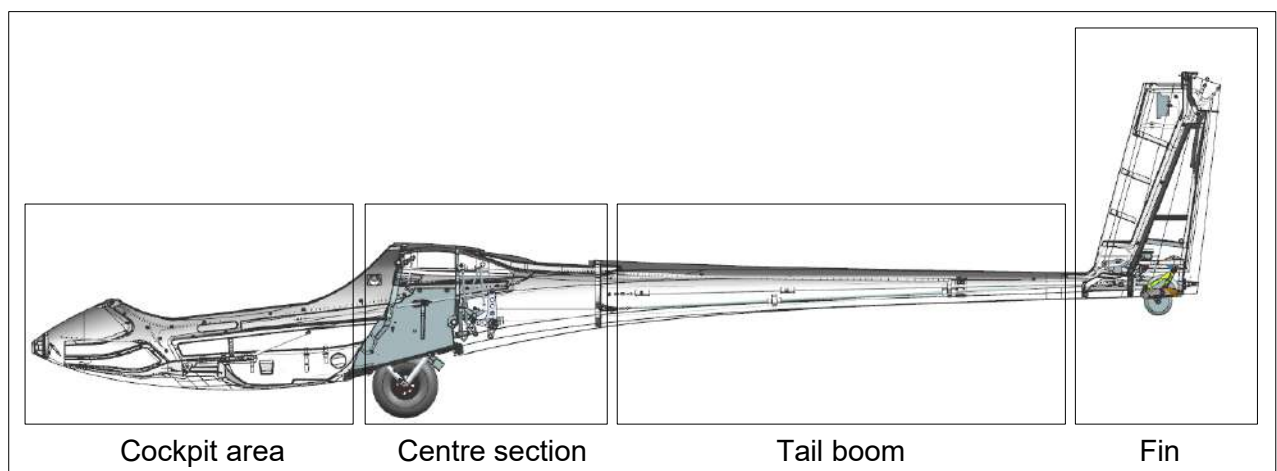



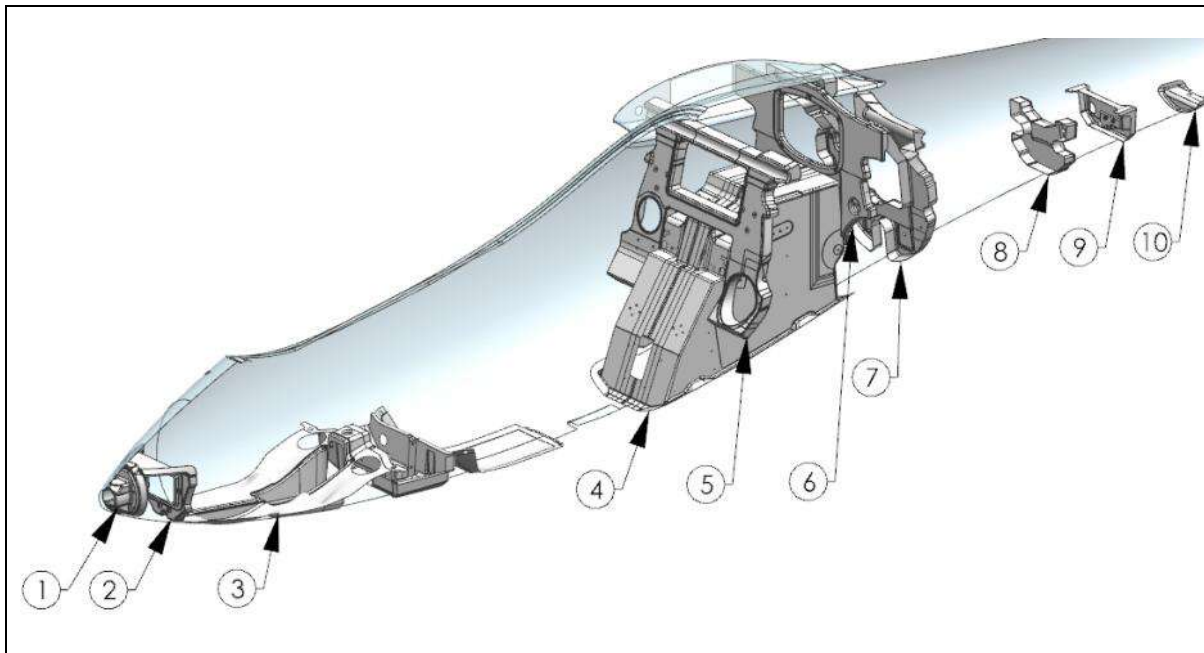
Figure 53-1: Fuselage structure breakdown

### Cockpit area

The cockpit is designed to have a soft nose with a progressive increase in the structural strength with the result to allow maximum energy absorption in a crash situation.

Cockpit composite monocoque is supported by four bulkheads, B1 to B4, the cockpit left and right-side channels and the integrated seat pan to provide the required structural integrity to withstand flight and crash loads.

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NO	DESCRIPTION	NO	DESCRIPTION
1	Bulkhead B1	6	Bulkhead B6/7
2	Bulkhead B2	7	Bulkhead B8
3	Seat pan	8	Bulkhead B9
4	Wheel box	9	Bulkhead B9_1
5	Bulkhead B5	10	Bulkhead B9_2

Figure 53-2: Fuselage bulkhead layout

### Centre section

The centre section is designed to transfer flight and landing loads to the structure. Bulkheads 5 to 8, the wheel box structure and the engine box re-enforcements support the composite structure.

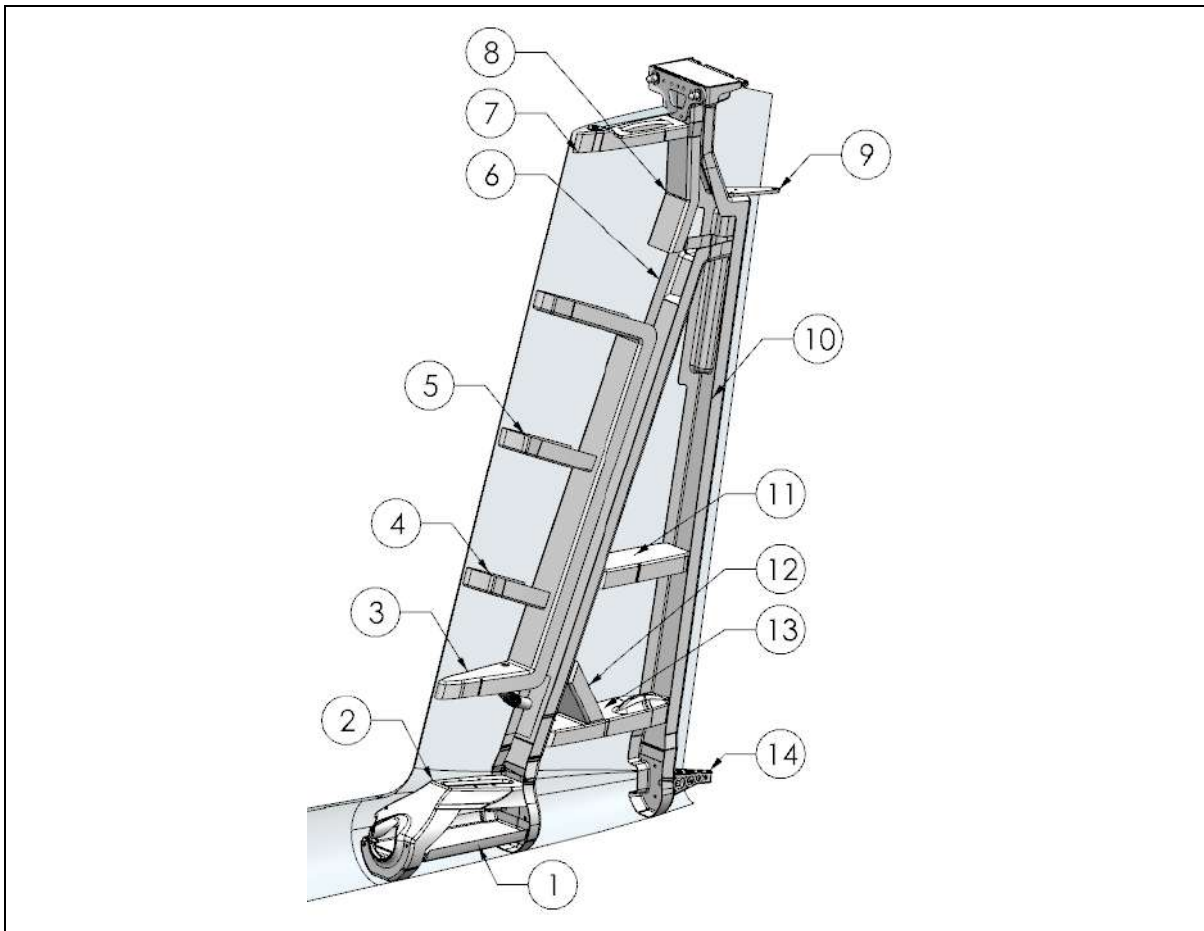
### Tail boom

The tail boom consists mainly of a combination of unidirectional carbon layers for the bending loads and bidirectional carbon at 45° orientation for the torsional loads. No supporting bulkheads or formers are installed in this area.

### Fin area


The fin is made from a glass/ aramid fibre hybrid sandwich structure to prevent interference with the radio antennas installed in this area.

The fin structure is supported by two bulkheads, a main shearweb, a false spar (rear spar) and ribs to support the water pressure head when flying with water.



NO	DESCRIPTION	NO	DESCRIPTION
1	Bottom rib lead cavity	8	Top shear web assembly
2	Fin bottom rib	9	Fin top hinge
3	Front water tank rib	10	Fin false spar
4	Front water tank bottom baffle	11	Bottom water tank middle rib
5	Front water tank top baffle	12	Bottom water tank baffle
6	Bottom shear web	13	Bottom water tank rib
7	Top rib	14	Fin bottom hinge

**Figure 53-3: Fin internal structure**

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## **53-10-00 FUSELAGE: MAINTENANCE PRACTICES**


### **General**

This section contains procedures to maintain the fuselage.

### **Fin lead cavity**


Additional weight in the tail may be required to achieve an acceptable CG for safe flight. The fin lead cavity is accessible through the tail wheel bay and can be filled or emptied as required.

Refer to AMM Chapter 08-00-00    LEVELLING AND WEIGHING for installation details.

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# CHAPTER 55 - 00 - 00

## STABILIZERS

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## 55-00-00 STABILIZERS

### General

The JS-3 RES uses a T-tail empennage system. The tailplane, elevators and rudder can be removed.

AMM Chapter 55-10-00 HORIZONTAL STABILIZER gives a general description of the tailplane as well as the rigging and de-rigging procedures.

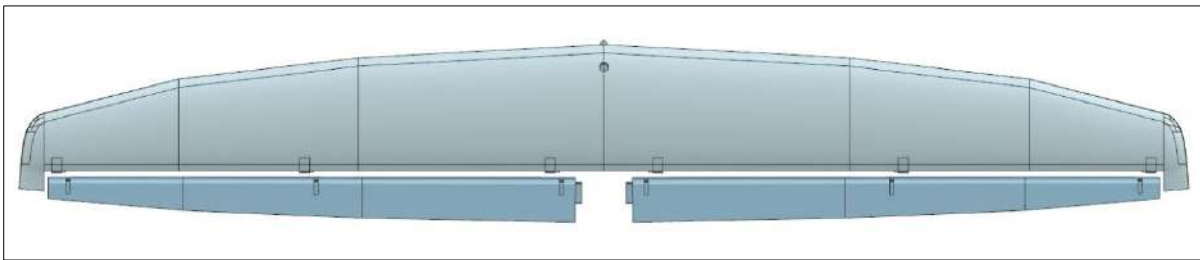
AMM Chapter 55-40-00 RUDDER describes the rudder of the JS-3 RES and the rigging and de-rigging procedures can be found here.

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## 55-10-00 HORIZONTAL STABILIZER

### General

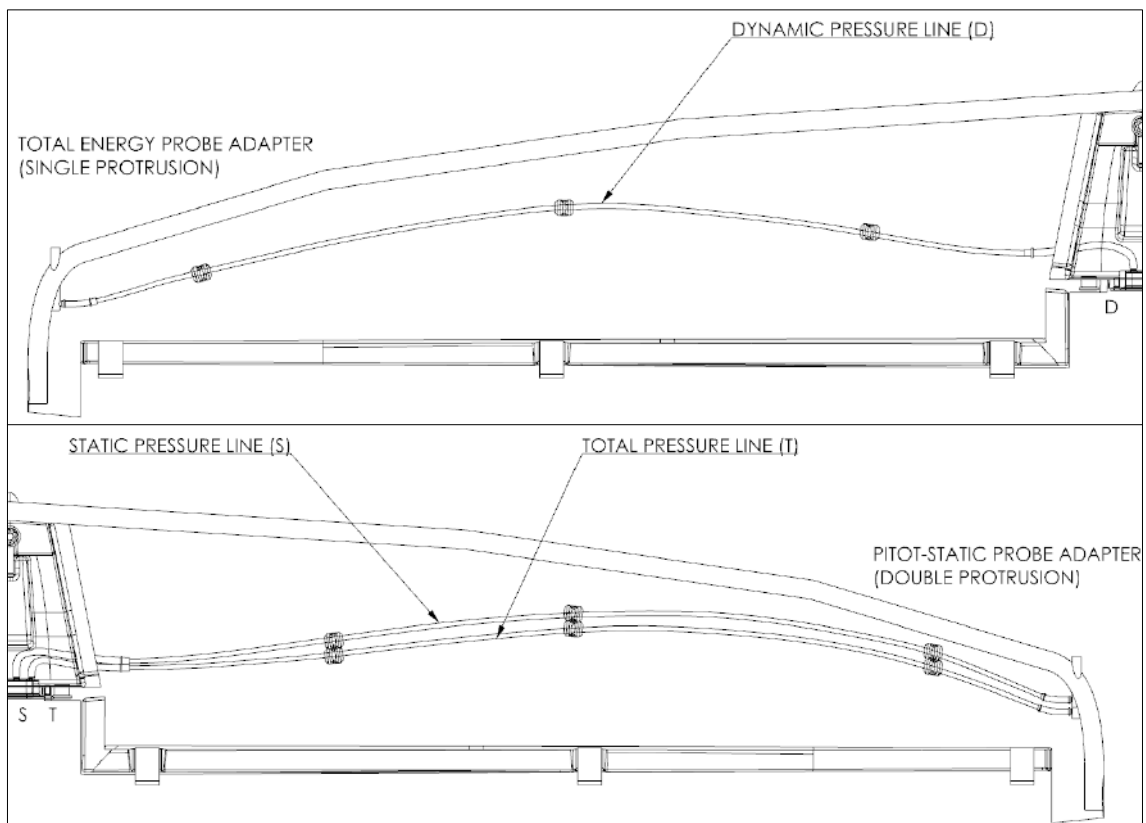
The horizontal stabilizer (tailplane) of the JS-3 RES consists of the main tailplane with two separate elevators connected automatically to the elevator driver. The elevator driver is connected to a pushrod and bell crank system that can be controlled via the control stick from the cockpit.




**Figure 55-1: Horizontal stabilizer (tailplane)**

The horizontal stabilizer is secured to the fin by a single bolt.

Pitot-static and total energy air data is measured by removable probes with receptacles fitted to the ends of the tailplane. Refer to AMM Chapter 34-10-00 NAVIGATION AND PITOT-STATIC SYSTEMS for details on the pitot-static system.



**Figure 55-2: Tailplane pneumatic line layout**

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## 55-10-00 HORIZONTAL STABILIZER: MAINTENANCE PRACTICES

### General

This section contains procedures for rigging and de-rigging the tailplane and the removal and fit of the elevators.

### Rigging / de-rigging the horizontal stabilizer

#### De-rigging the horizontal stabilizer

1. Unscrew the front attachment bolt using the hex socket key tip of the JS rigging tool.
2. Slide the tailplane forward. Take care to move the tailplane forward evenly to avoid damaging the elevators or the elevator auto-coupler.
3. Screw the front attachment bolt back into the fin (not applicable if a captive bolt is fitted).

#### Rigging the horizontal stabilizer

1. Clean the horizontal stabilizer pins and bushes.
2. Clean and lubricate the pitot-static auto-connectors. Ensure the O-rings are serviceable. Clean the landings on the fin and on the horizontal stabilizer.


**NOTE:** Apply a light coat of marine grease on the captive bolt. Take care to keep grease away from all skin surfaces.

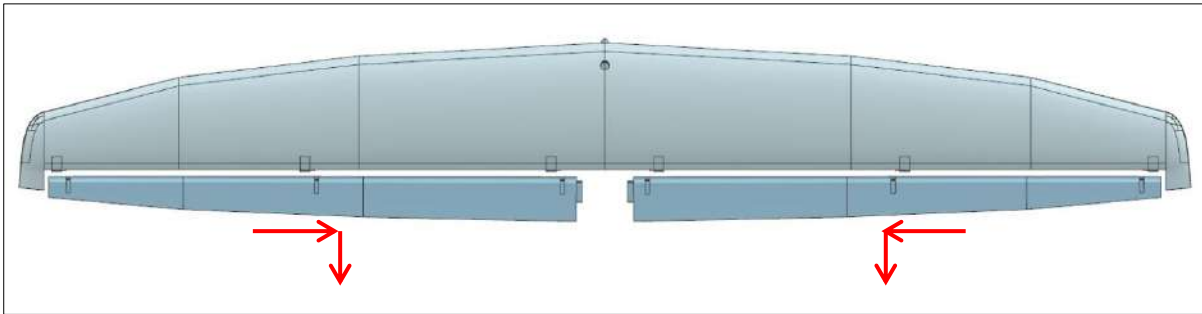
3. Slide the horizontal stabilizer onto the fin. Take care that the elevators are sliding into the elevator auto-coupler.
4. Ensure the Mylar edge on the horizontal stabilizer does not snag on the fin.
5. Screw the horizontal stabilizer main bolt into position, using the hex socket key tip of the rigging tool.

**CAUTION:** Take care not to over-tighten the horizontal stabilizer front attachment bolt. (Hand-tight only, max. 1 Nm torque)

### Elevator removal

1. De-rig the horizontal stabiliser according to AMM Chapter 55-10-00 HORIZONTAL STABILIZER "Rigging / de-rigging the horizontal stabilizer".
2. Remove the Mylar and Teflon tape from the top and bottom.
3. Slide the elevators inward to disengage from the hinges.

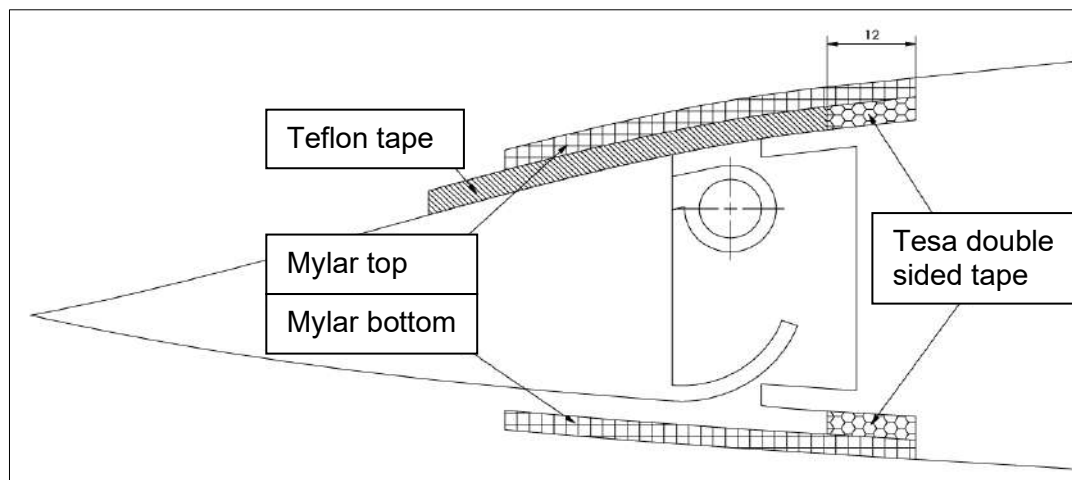
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**Figure 55-3: Elevator removal**


## Elevator installation

1. Clean the hinge pins with lint free cloth.
2. Lubricate the pins with silicone-free grease.
3. Align and connect the hinge pins with the elevators, then slide outwards until the elevators are fully engaged. Ensure that the elevators are not installed upside down.
4. Once installed, check the movement of the elevators. Full movement should be according to Table 27-3 and the motion should be smooth and without interference.
5. Apply double-sided adhesive tape on the top Mylar recess (Figure 55-4).



**Figure 55-4: Mylar, double-sided tape and Teflon tape on tail plane**

6. Deflect the elevators fully downward, and then apply Teflon tape along the edge of the double-sided tape (Figure 55-4).
7. Apply baby powder on the opposite side of the hinge gap to prevent the Teflon tape from adhering to itself.
8. Use air to remove excess baby powder in the hinge gap.
9. Apply Mylar to the top skin of the tail plane (Figure 55-4).
10. Apply double-sided tape and Mylar to the bottom skin (Figure 55-4).
11. Check the movement of the elevators again as per step 4. Ensure that the Mylar cannot catch on the elevator edge when fully deflected.

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## Mylar seals

It is mandatory to seal all control surface hinge gaps with Mylar strips. Without all the Mylar strips in position, the flutter speed and handling of the aircraft might be affected.

Table 55-1 specifies the Mylar required on the horizontal stabilizer.

**Table 55-1: Mylar thickness on the tailplane**

Position	Double sided type	Teflon	Mylar
Elevator bottom	Tesa 12 mm	None	22 mm x 0.19, Chamfered
Elevator top	Tesa 12 mm	25.4 mm	30 mm x 0.19, Chamfered

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## 55-40-00 RUDDER

### General

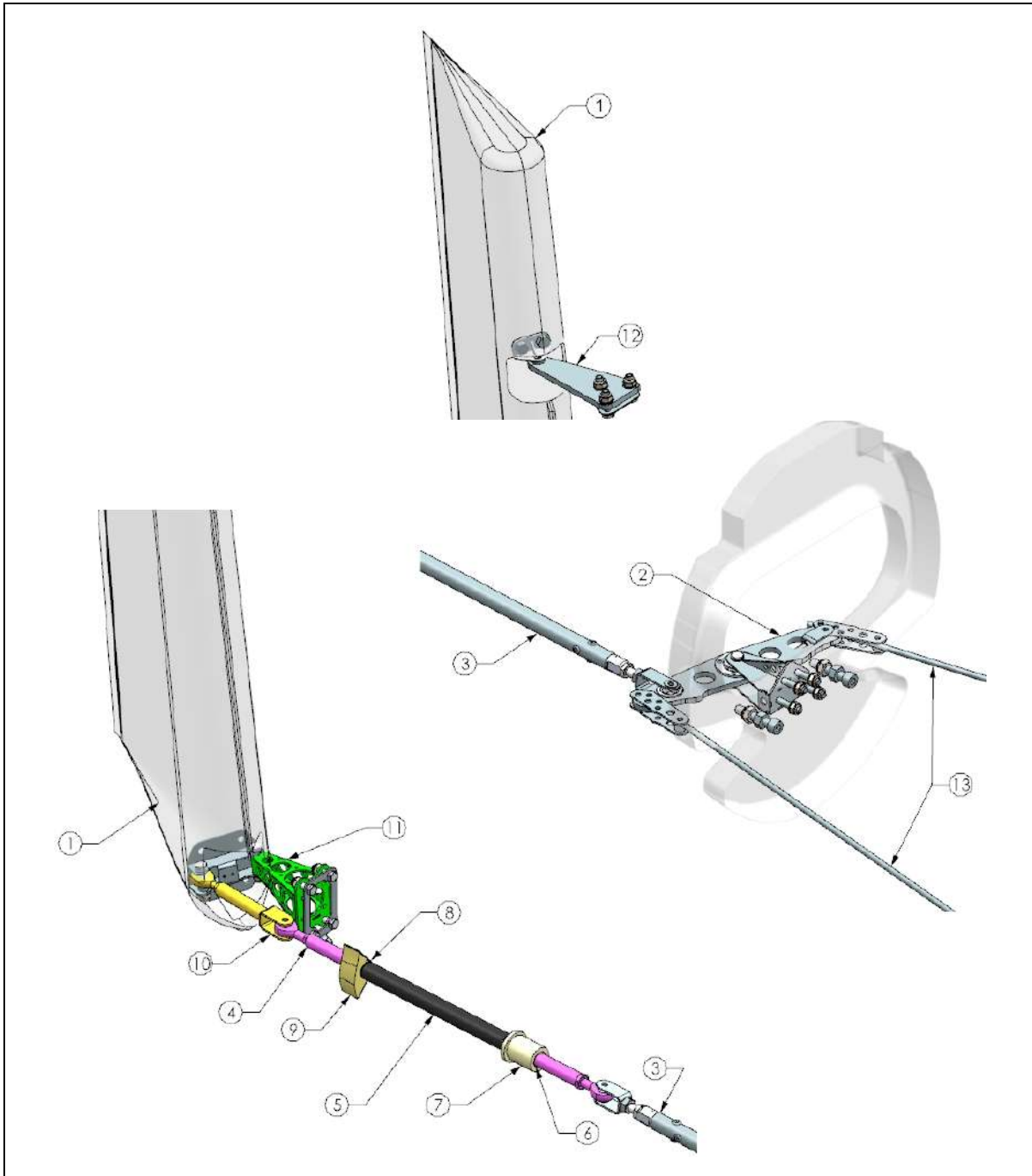
This section describes the vertical stabilizer (rudder).

### Description

The rudder is constructed from two sandwich structure composite skins joined together during production.


A pushrod (or driver) is connected to the right side of the rudder bottom hinge, while the rudder is hinging round the left side of the rudder bottom hinge.

The composite skins consist of aramid fibre and glass fibre, to allow the VHF antenna to be installed in the rudder.



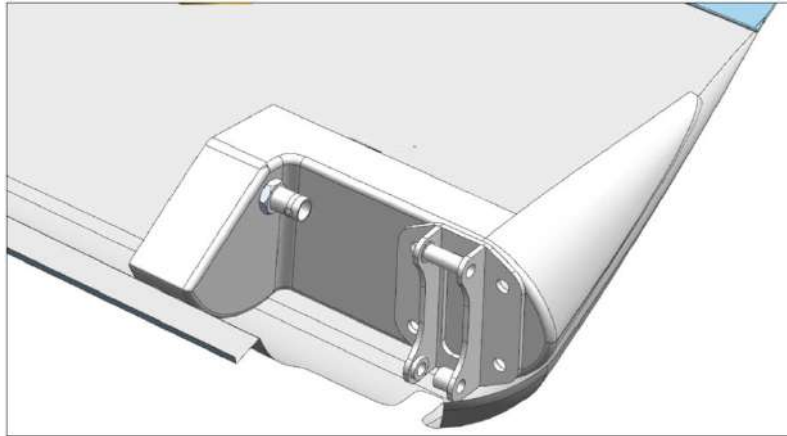
NO	DESCRIPTION	NO	DESCRIPTION
1	Rudder	8	DR2R rear bearing
2	BC1R	9	DR2R rear layup
3	DR1R	10	DR3R
4	DR2R	11	Fin bottom hinge
5	DR2R cover tube	12	Fin top hinge
6	DR2R front bearing	13	Rudder cables
7	DR2R front bearing holder		

**Figure 55-5: Rudder system breakdown**

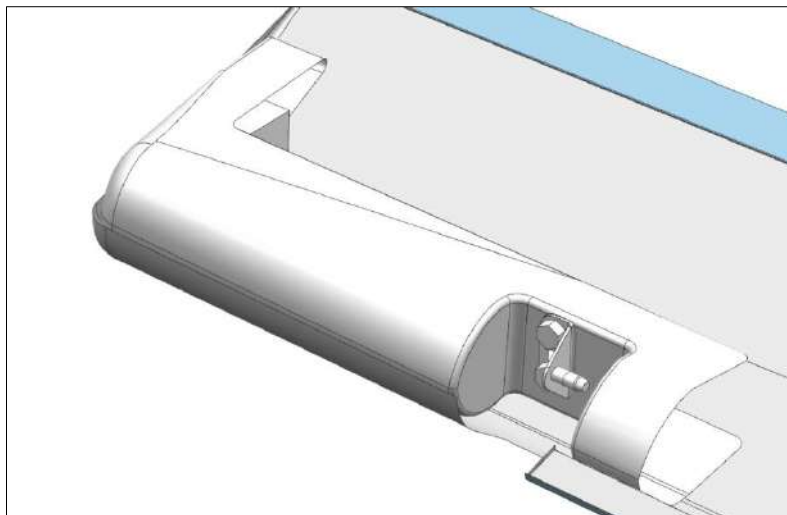
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## Rudder hinges


Attachment to the fin is performed by means of top and bottom hinges pivoting around an asymmetrical hinge line.



**Figure 55-6: Rudder bottom hinge**



**Figure 55-7: Rudder top hinge**

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## VHF antenna

The VHF antenna is installed in the rudder:

- Configuration type: DB15 butterfly type

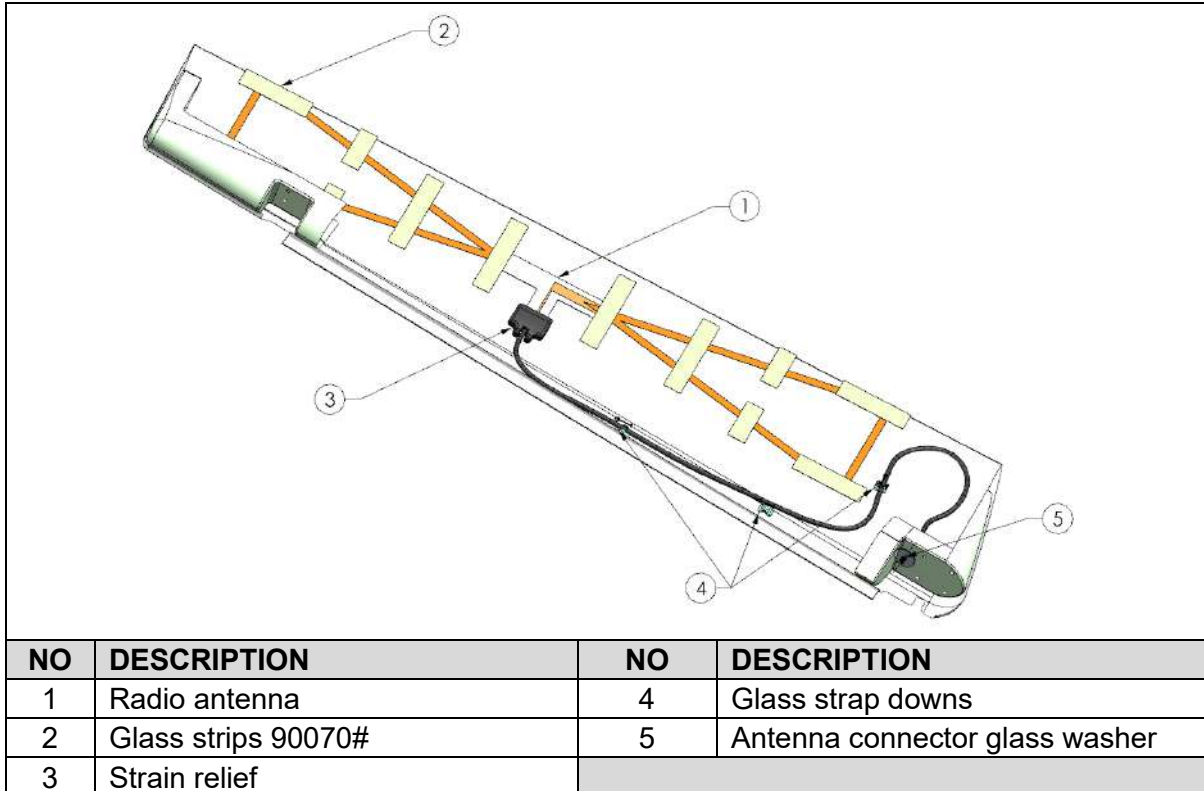



Figure 55-8: Radio antenna configuration in rudder

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## Antenna connectors

There are two sets of antenna connectors that can be used to connect the coax cable from the rudder to the fuselage:

1. BNC Bulkhead connector (Female) (Figure 55-9, Part Number 107 04 170 00) with a BNC Cable mount connector (Male) (Figure 55-10, Part Number 107 04 169 00).



**Figure 55-9: BNC Bulkhead connector (Female)**



**Figure 55-10: BNC Cable mount connector (Male)**

2. SMA Bulkhead connector (Female) (Figure 55-11, Part number 107 04 197 00) with a SMA Cable mount connector (Male) (Figure 55-12, 107 04 118 00).




**Figure 55-11: SMA Bulkhead connector (Female)**



**Figure 55-12: SMA Cable mount connector (Male)**

**NOTE:** It is allowed to change between the two types of connectors.

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## 55-40-00 RUDDER: MAINTENANCE PRACTICES

### General

The installation and removal procedure of the rudder is described in this section as well as the replacement procedure of the removable antenna.

### Remove / install the rudder

#### Tools required

- M10 spanner x 2
- Ratchet driver with M10 socket

#### Removal procedure


1. Remove the tail wheel according to AMM Chapter 32-11-00 RETRACTABLE TAIL WHEEL AND DOORS "Removal and installation of tail wheel" or AMM Chapter 32-11-02 FIXED TAIL WHEEL 200x50 "Removal and installation of 200x50 tail wheel".

**NOTE:** It is only necessary to remove the wheel, not the entire tail wheel assembly.

2. Remove the bolt M6H18/28 to disconnect DR3R (Figure 55-5, Item 10) from DR2R (Figure 55-5, Item 4).
3. Deflect the rudder full left.
4. Remove the bolt M6H24/34 to disconnect the rudder (Figure 55-5, Item 1) from the fin bottom hinge (Figure 55-5, Item 11).

**NOTE:** Use a small socket to loosen nut on hinge, while holding bolt with a spanner. When holding the bolt, be careful not to damage the Mylar on the right side of the rudder.

5. Pull rudder carefully backwards and lift the rudder upwards to disconnect from the rudder top hinge.
6. Disconnect the antenna plug from the rudder.
7. Installation is the reverse of removal.

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## Inspection of rudder moving parts

While the rudder is removed:

1. Inspect brass bush (rudder bottom hinge).
2. Inspect Vesconite bush (rudder top hinge).
3. Inspect rudder hinge bolt.
4. Inspect push-rod bolts.
5. Inspect rod-ends for rust or possible wear.
6. Inspect antenna cable and connectors for any signs of damage.

## Mylar seals and Turbulator tape

It is mandatory to seal all control surface hinge gaps with Mylar strips. Without all the Mylar strips in position, the flutter speed and handling of the aircraft might be affected.

Table 55-2 specifies the Mylar required on the rudder.


**Table 55-2: Mylar thickness on the rudder**

Position	Double sided type	Teflon	Mylar
Rudder left	Tesa 12 mm	None	30 mm x 0.24, Chamfered
Rudder right	Tesa 12 mm	None	38 mm x 0.24, Chamfered

Turbulator tape (zig-zag shape) of 0.8 mm is applied on the leading-edge side of the Mylar type for the length of the Mylar.


## Remove / install the radio antenna

Antenna is not removable.

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# CHAPTER 57 - 00 - 00

## WINGS

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## 57-00-00 WINGS

### General

The wings are manufactured from a GFRP/CFRP hard foam sandwich structure. The main spar is an I-section with flanges of carbon rovings built into the upper and lower wing skins. The wings are attached to the fuselage by means of two steel lifting pins per wing. The outer 1.5 m of the 15 m wingspan, and 3 m of the 18 m wingspan, of each wing is removable with the winglets fixed on the outer panel.

The wings are attached to each other with a tong and fork arrangement, secured with one main pin. The airbrakes are a triple blade design on the upper surface of the wing.


The main water ballast system consists of integral main tanks in the wing, each holding approximately 66 litres (or 78 litres optional) of water. The 18 m tip tanks each hold approximately 17 litres of water and 4.5 kg of lead. From serial number SN174 and onwards the 4.5 kg lead has been removed due to strengthening of the wing spars.

Average weight of 18m tip:

SN097 – SN173: 16.5 kg  
SN174 onwards: 12 kg

**WARNING:** 18m wingtips manufactured from SN174 and onwards should only be used with wings manufactured from SN174 and onwards. Using 18m wingtips without lead together with wings manufactured before serial number SN174 will lead to overstressing of the wings in certain flight conditions.

This chapter will describe internal structure as well as the procedures of rigging and de-rigging the wings and wing tips.

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## 57-10-00 WING STRUCTURE

### General

The wings are made out of two halves that are joined together during production. Structural load bearing parts consist of the top and bottom spar caps made from unidirectional carbon rovings joint with a glass shear web I-beam.

Flaperon controls and water tank controls are installed before the wings are bonded shut.

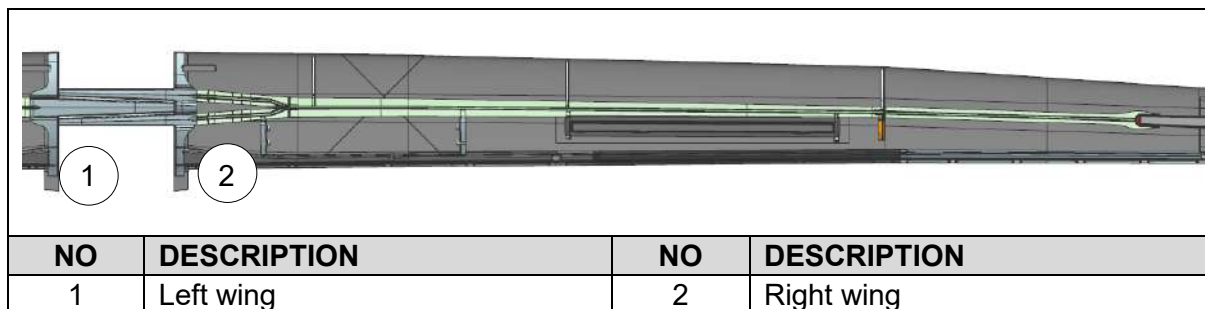


Figure 57-1: Left- and right-wing assembly

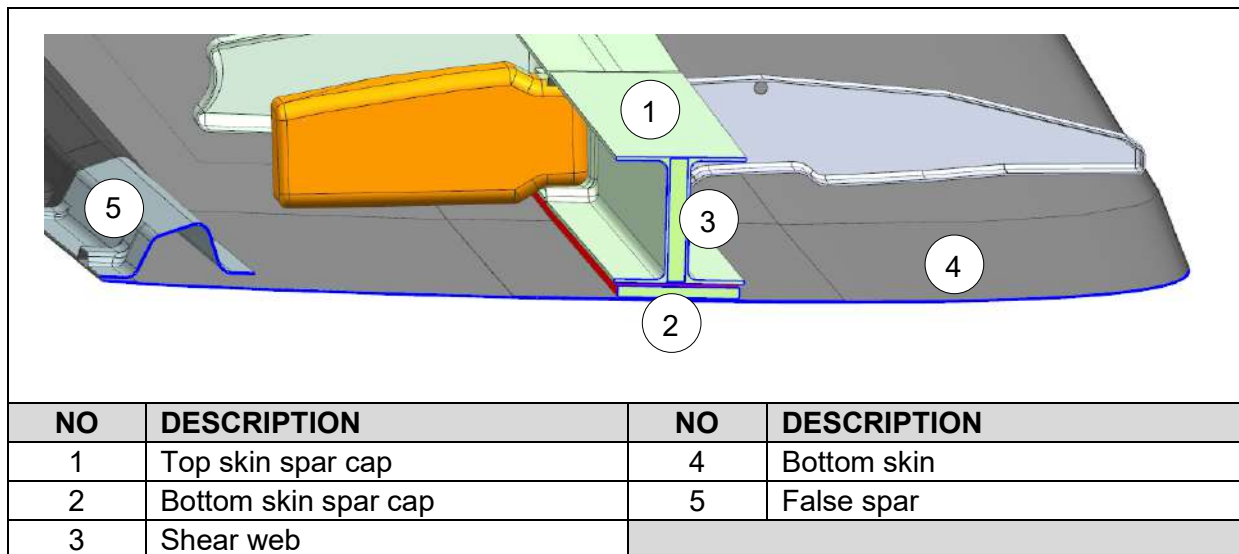



Figure 57-2: Wing cross-section view

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## 57-10-00 WING STRUCTURE: MAINTENANCE PRACTICES

### General

The rigging and de-rigging procedures for the wings are discussed in this section.

### Rigging / de-rigging the wing

#### De-rigging the wings


1. Unlock the airbrakes from the cockpit.
2. Set the flap handle in position 2 or position 3 and move the control stick to the centre position.
3. Pull wingtip locking lever fully back and slide wing-wingtips out of the inboard section. Secure the wingtips in the trailer.
4. Insert the tip rigging handle in the tip spar box.
5. Lift the wings at the tips until the main pin can rotate. Rotate the wing pin out of the locked position while pulling the lock pin backwards.
6. Remove the main pin.

**CAUTION:** Maintain the dihedral angle while removing the wings. The fuselage shell may be damaged if the correct angle is not maintained.

7. Pull the left wing out of the fuselage spar box. Secure the wing in the trailer.
8. Pull the right wing out of the fuselage spar area. Secure the wing in the trailer.
9. Lock both airbrakes, using the airbrake lock tool.
10. Push the fuselage into the trailer.

**NOTE:** To avoid loading the airbrake caps, do not leave the airbrakes locked for long periods (either rigged or de-rigged). The airbrake locking tool can be used for temporarily locking the airbrakes for maintenance or transportation, and the airbrakes should be unlocked when maintenance or transportation is complete.

**CAUTION:** Take care not to damage the unlocked airbrakes when using a trailer with a hinged top (e.g. Cobra, SWAN, Comet etc.). It is likely that damage will occur if the airbrakes are partially or fully open when lifting the trailer top.

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## Rigging the wings


1. Check that there is adequate ground clearance to extend the landing gear. When rigged, the assembled aircraft might be too heavy to lift to extend the landing gear.
2. Ensure the rubber water drain plugs are inserted in the wing roots in front of the forward lift pin.
3. Clean and grease all pins and matching bushes including main pins.
4. Unlock both airbrakes using the airbrake locking wrench.
5. Set the flap handle in flap position 2 or position 3 and the control stick to the centre position.
6. Close the water valve in the cockpit.
7. Ensure the self-aligning bushes in the main ribs of both wings are aligned correctly.
8. Insert the right spar end into the fuselage with the flaperon in the neutral position and the dihedral angle approximately correct.
9. Insert the left spar end into the fuselage, also with the flaperon in the neutral position and the dihedral angle such to slide into the self-aligning bush of the other wing.
10. Insert the main pin when the wings are fully inserted.

**CAUTION:** Ensure the main pin is inserted the right way up. It may have difficulties in removing the pin if inserted the wrong way.

11. Secure the main pin by rotating the pin into the spring- loaded locks pins.
12. Ensure the tail is lifted off the ground with sufficient clearance for the tail wheel to extend. Extend and lock the landing gear and lower aircraft onto the wheel.
13. Ensure the 18 m tip rubber water drain plugs are inserted (18 m wing tips roots).
14. Pull wingtip locking lever fully back and slide wingtip beam into main wing. Push the wingtip locking lever forward and ensure it locks positively by pushing the lever over-centre.

**CAUTION:** The flaperon sandwich can be damaged if excessive force is used and should be handled with care.

**WARNING:** Never grease the water drain valve, the rubber-based seal may be damaged and become detached from the valve-body.


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## **57-40-00 LEADING EDGE CLEANING DEVICES (BUG WIPERS)**

### **General**

The bug wipers can be optionally fitted to enable wing leading edge cleaning during flight. If bug wipers are not fitted, the wiper cavity in the fuselage can be closed with a blank wiper and secured with vinyl sticker available from the manufacturer.

An annual inspection according to AMM Chapter 05-20-00                      SCHEDULED  
 MAINTENANCE CHECKS is required.

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## 57-40-00 BUG WIPERS: MAINTENANCE PRACTICES

### Restranging the Bug Wiper blades

The bug wipers' nylon strings must be replaced if broken or showing sign of wear.

#### Tools required

- Bug wiper angle tool
- Utility knife

#### Procedure

1. Extend the bug wiper enough for the bug wipers to be fully opened, approximately 1 m.
2. Cut off the nylon string crossing on the leading edge of the wing.

**NOTE:** Do not cut the string connecting the bug wiper to the motor.

3. Open the bug wiper and insert the bug wiper angle tool between the blade and the leg at the bottom hinge (Figure 57-3). The angle tool is set for an angle of 70°.

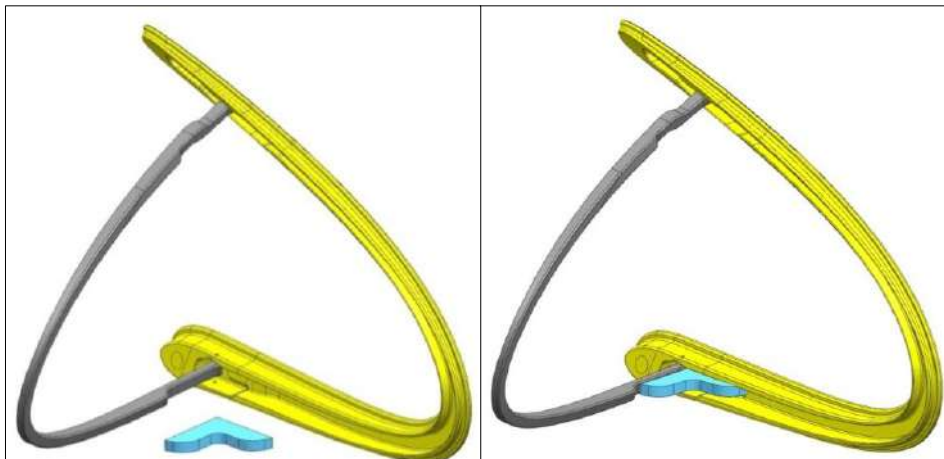

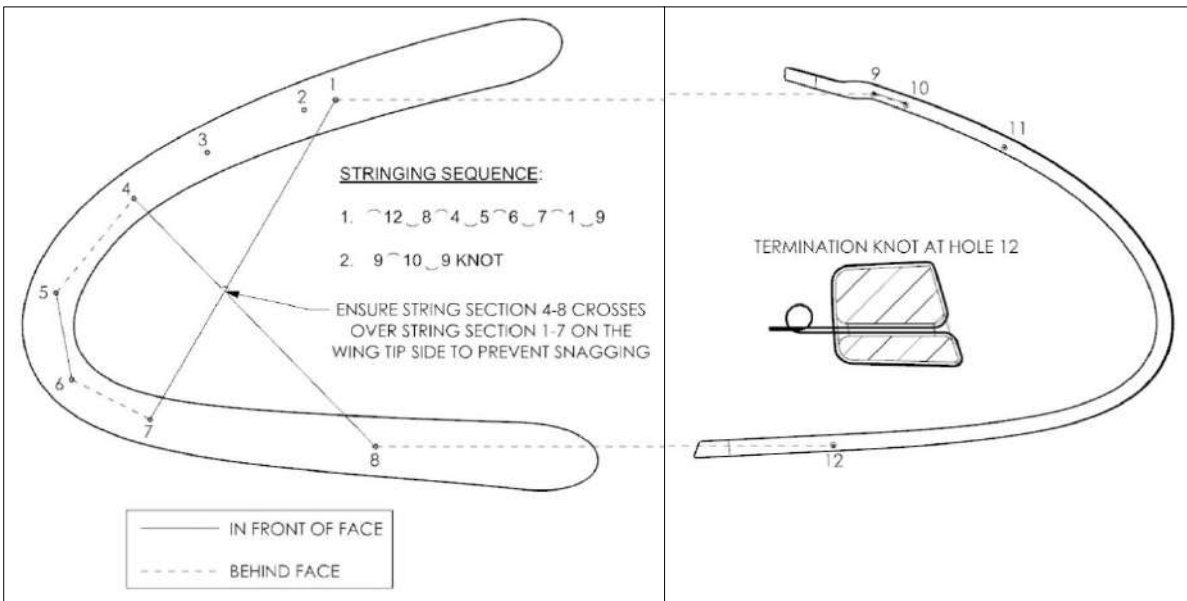


Figure 57-3: Bug wiper angle tool inserted

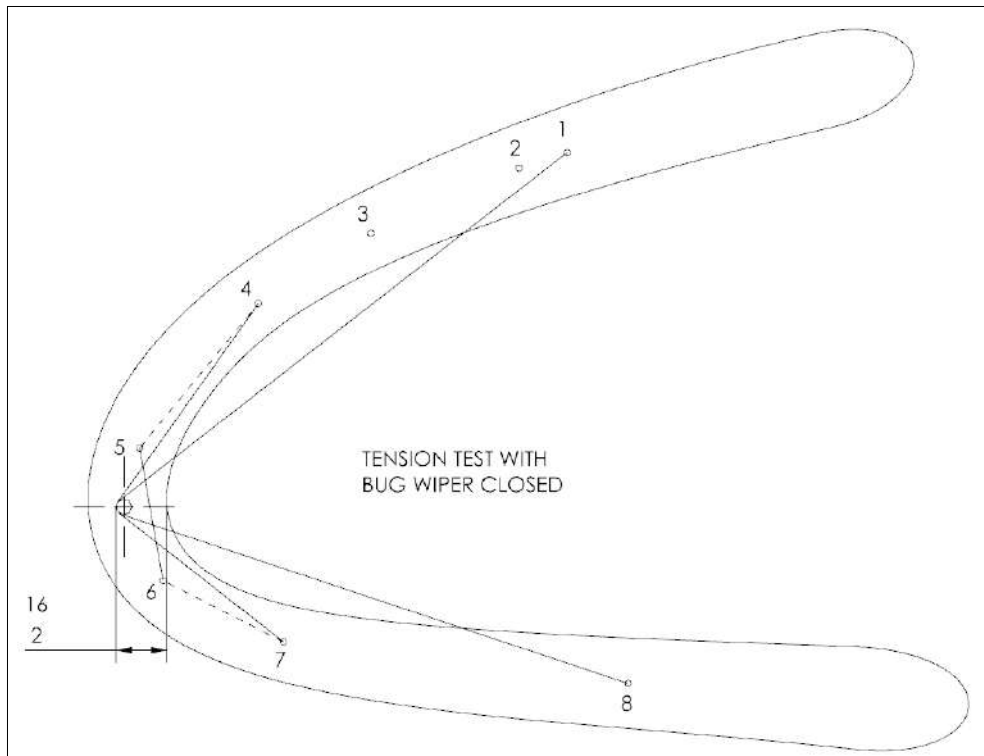
4. Install a new string (Figure 57-4).

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**Figure 57-4: Bug wiper stringing**

- Remove the bug wiper angle tool and tug at the string. Test the bug wiper string length. With the bug wiper closed, the strings should cross each other on the bug wiper blade surface (Figure 57-5).



**Figure 57-5: Bug wiper string check**

- Retract the bug wiper.
- Repeat for the bug wiper on the opposite side.

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## 57-50-00 FLAPERONS

### General

The JS-3 RES is equipped with full span flaperons. Each wing is fitted with four separate flaperons. Figure 57-6 indicates the position and names of the flaps.

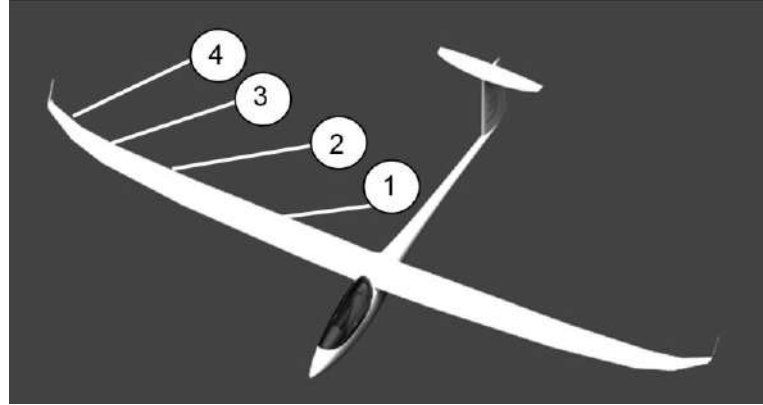

	#	Name	
	1	Flap 1R	
	2	Flap 2R	
	3	Flap 3R	
	4	Flap 4R	
	Not indicated		Flap 1L
			Flap 2L
			Flap 3L
		Flap 4L	

Figure 57-6: Flap identification

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## 57-50-00 FLAPERONS: MAINTENANCE PRACTICES

### Flaperon removal

1. De-rig the aircraft according to AMM Chapter 57-10-00 WING STRUCTURE "Rigging / de-rigging the wing".
2. Remove the Mylar and Teflon tape from the top and bottom.
3. Disconnect the final aileron driver from the Flap 2 and Flap 3.
4. Slide Flap 1 & 2 outwards to disengage from the hinges.
5. Slide Flap 3 & 4 inwards to disengage from the hinges.

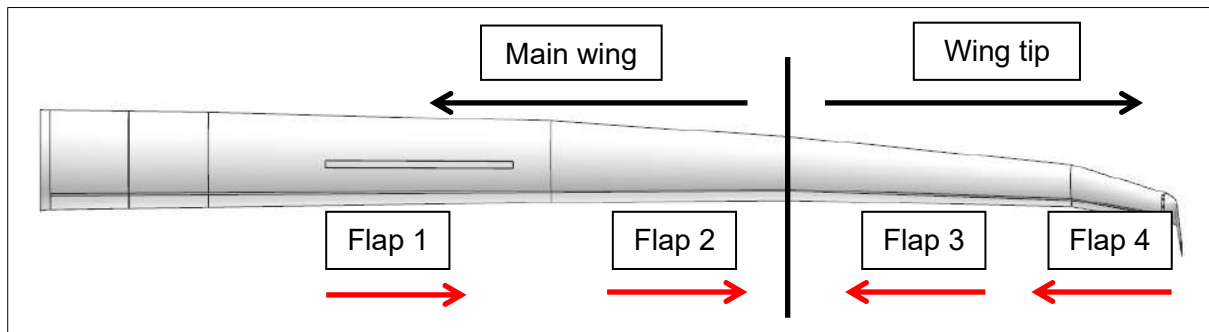



Figure 57-7: Flaperon removal

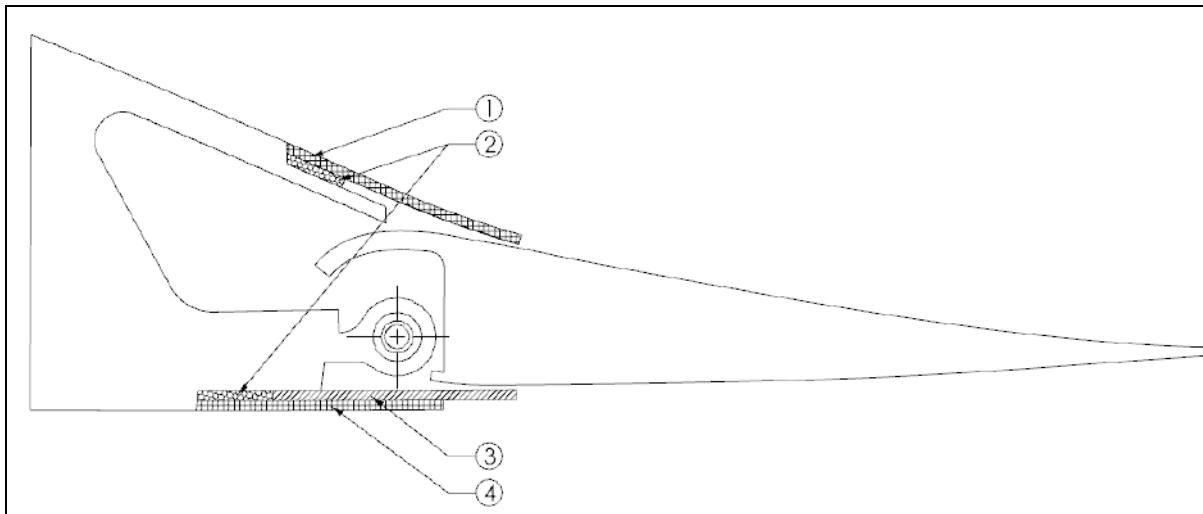
### Flaperon installation

1. Clean the Mylar bonding surfaces and remove glue residues.
2. Clean the hinge pins with lint free cloth.
3. Lubricate the pins with silicone-free grease.
4. Align and connect the hinge pins with the flaperon, then slide inwards until the hinge at the driver bottoms out.

**NOTE:** Flap 1 and 4 is installed before Flap 2 and 3 respectively

5. Test the movement of the flaperons. Full movement should be according to Table 27-1 and the motion should be smooth and without interference.
6. Apply 12 mm TESA double-sided adhesive tape on the bottom Mylar recess (Figure 57-8).
7. Deflect the ailerons fully upwards, and then apply Teflon tape along the edge of the double-sided tape (Figure 57-8).

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NO	DESCRIPTION	NO	DESCRIPTION
1	Top Mylar	3	Teflon tape
2	Tesa double sided tape	4	Bottom Mylar

**Figure 57-8: Mylar, double-sided tape and Teflon tape on wing**


8. Apply Talc powder on the opposite side of the hinge gap to prevent the Teflon tape from adhering to itself in the glue-exposed area.

**NOTE:** Talc is a clay mineral composed of hydrated magnesium silicate with the chemical formula  $Mg_3Si_4O_{10}(OH)_2$ . Cosmetic Talc, e.g. Johnson Baby Powder is acceptable for this application.

9. Use compressed air to remove excess baby powder in the hinge gap.
10. Apply Mylar to the bottom skin of the wing plane (Figure 57-8).
11. Apply TESA 12 mm double-sided tape and Mylar to the Top skin (Figure 57-8).
12. Check the movement of the flaperons. Ensure that the Mylar cannot catch on the flaperon edges when fully deflected.
13. Connect the driver pushrods to the flap's control horn and secure.
14. Fit control horn covers.

### **Mylar seals**


It is mandatory to seal all control surface hinge gaps with Mylar strips. Without all the Mylar strips in position, the flutter speed of the aircraft might be affected.

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The following table specifies the Mylar tape required on the wing.

**Table 57-1: Mylar dimensions on the wings**

<b>Flap</b>	<b>Double sided tape</b>	<b>Teflon</b>	<b>Mylar</b>
Flap 1 bottom Flap 2 bottom	Tesa 12 mm	25.4 mm	38 x 0.24 mm, Chamfered
Flap 3 bottom Flap 4 bottom	Tesa 12 mm	25.4 mm	30 x 0.24 mm, Chamfered
Flap 1 Top Flap 2 Top	Tesa 12 mm	None	22 x 0.19 mm, Chamfered
Flap 3 Top Flap 4 Top	Tesa 12 mm	None	22 x 0.19 mm, Chamfered


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# CHAPTER 92 - 00 - 00

## WIRING DIAGRAMS AND CHARTS

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## 92-00-00 WIRING DIAGRAMS AND CHARTS

### General

This section provides information wiring and signal information as well as loom routing to complement electrical information provided in AMM Chapter 24-00-00 ELECTRICAL POWER and Chapter 39-00-00 ELECTRICAL SYSTEMS.

The following information is provided in this section:


1. Generic wiring diagram overview
2. Wire harness schematic layout
3. Wire harness routing in fuselage
4. Connector pin layout

### Abbreviations - Electrical

Table 92-1 lists the abbreviations used in the electrical system for system, signals, wires or connectors.

**Table 92-1: Electrical system abbreviations**

<b>Abbreviation</b>	<b>Explanation</b>
AV-BSS	Avionics battery selection switch
BAT	Battery
BWC	Bug wiper controller
BWC-P	Bug wiper controller - Power connector
BWC-S	Bug wiper controller - Signal connector
ELEC-BSS	Electric battery selection switch
ELEC-MS	Electric master switch
GND-TB	Ground terminal block
ICC	Instrument console connectors
ICC-P	Instrument console connector - Power
ICC-S	Instrument console connector - Signal
RES-MS	RES master switch
L/S	Limit switch
NC	Not connected
RCIS	Rudder controller interface switches
RFU	Retraction and fuses unit
RES-DCU	RES display and control unit

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Abbreviation	Explanation
RPC	Rudder pedal controller
RPC-CS	Rudder pedal controller - Control switch
USB-EP	USB - External port

A detailed diagram of the JS-3 RES electrical system is shown in Figure 92-1.

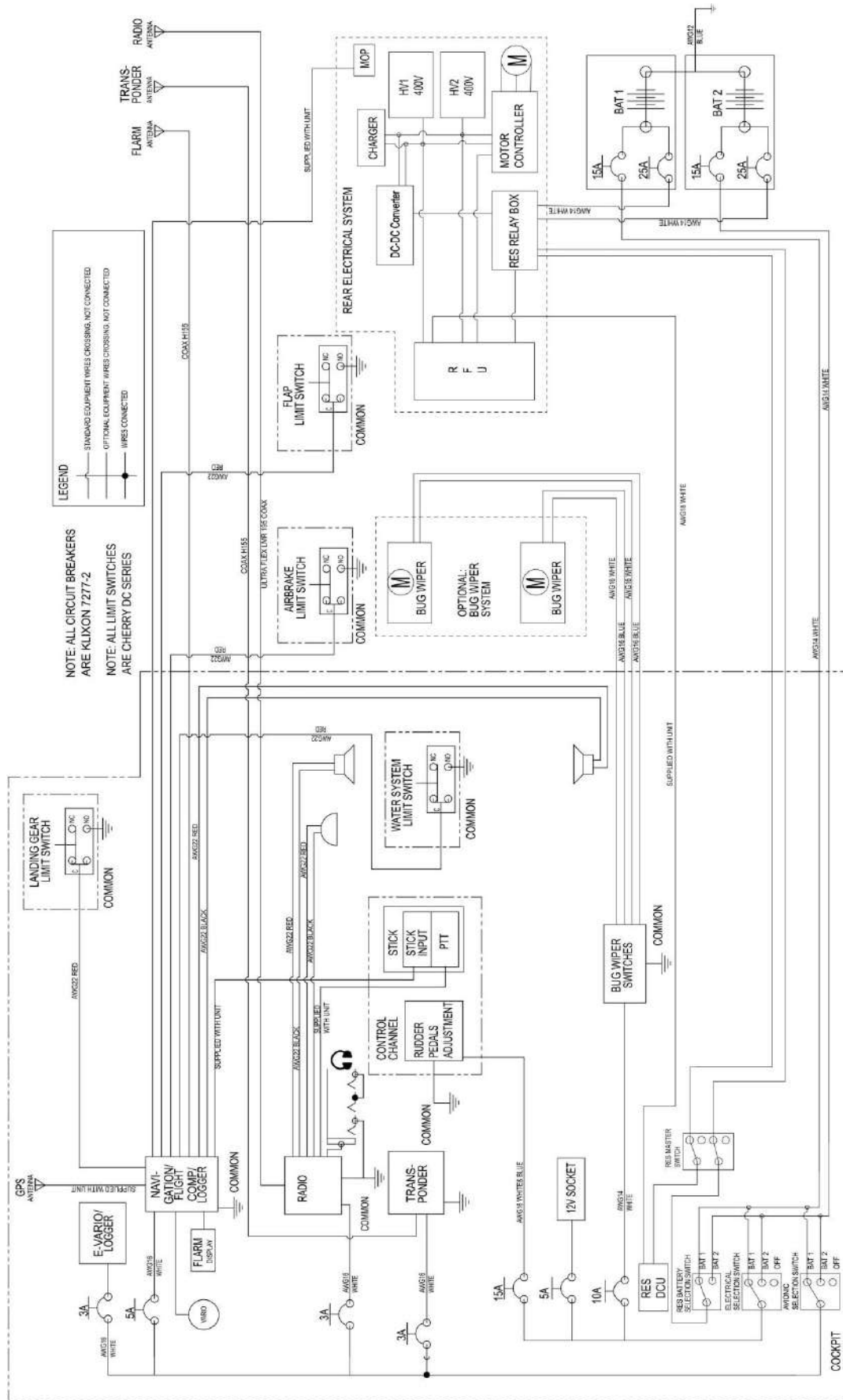



Figure 92-1: JS-3 RES Electrical diagram (if RES fitted)

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## 92-10-00 WIRE HARNESS

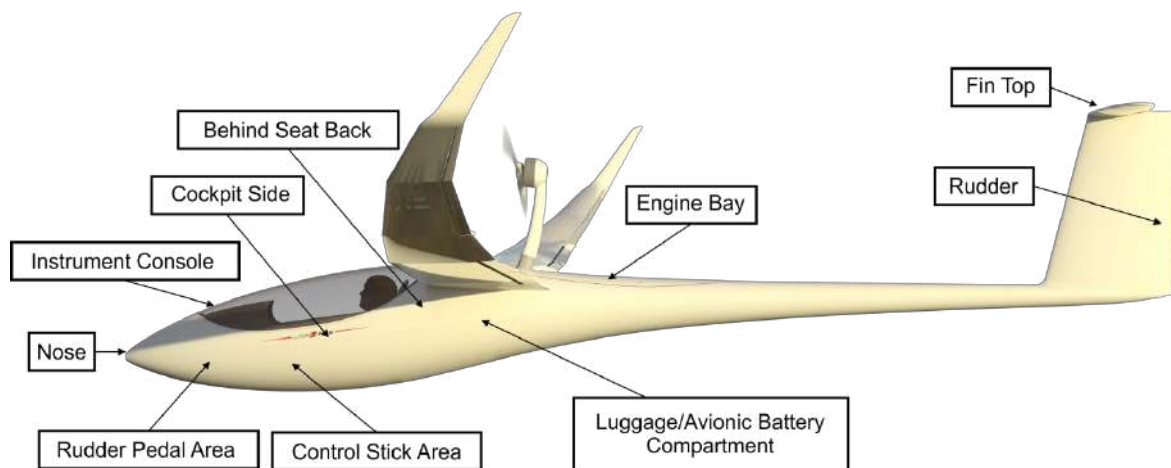
### General

The wire harness (also referred to as a cable harness, cable assembly, wiring assembly or wiring loom), is the assembly of electrical cables or wires which transmit signals and electrical power. The cables are bound together by straps and electrical tape and are contained in a weave of extruded string.

This section describes the wire harness schematic layout and routing through the airframe.

### Description

The wire harness electrically connects different areas of the aircraft. Figure 92-2 defines the zones in the fuselage used in the description of the looms.



**Figure 92-2: JS-3 RES Reference locations**

A detailed block diagram of the JS-3 RES electrical system is shown in Figure 92-3.

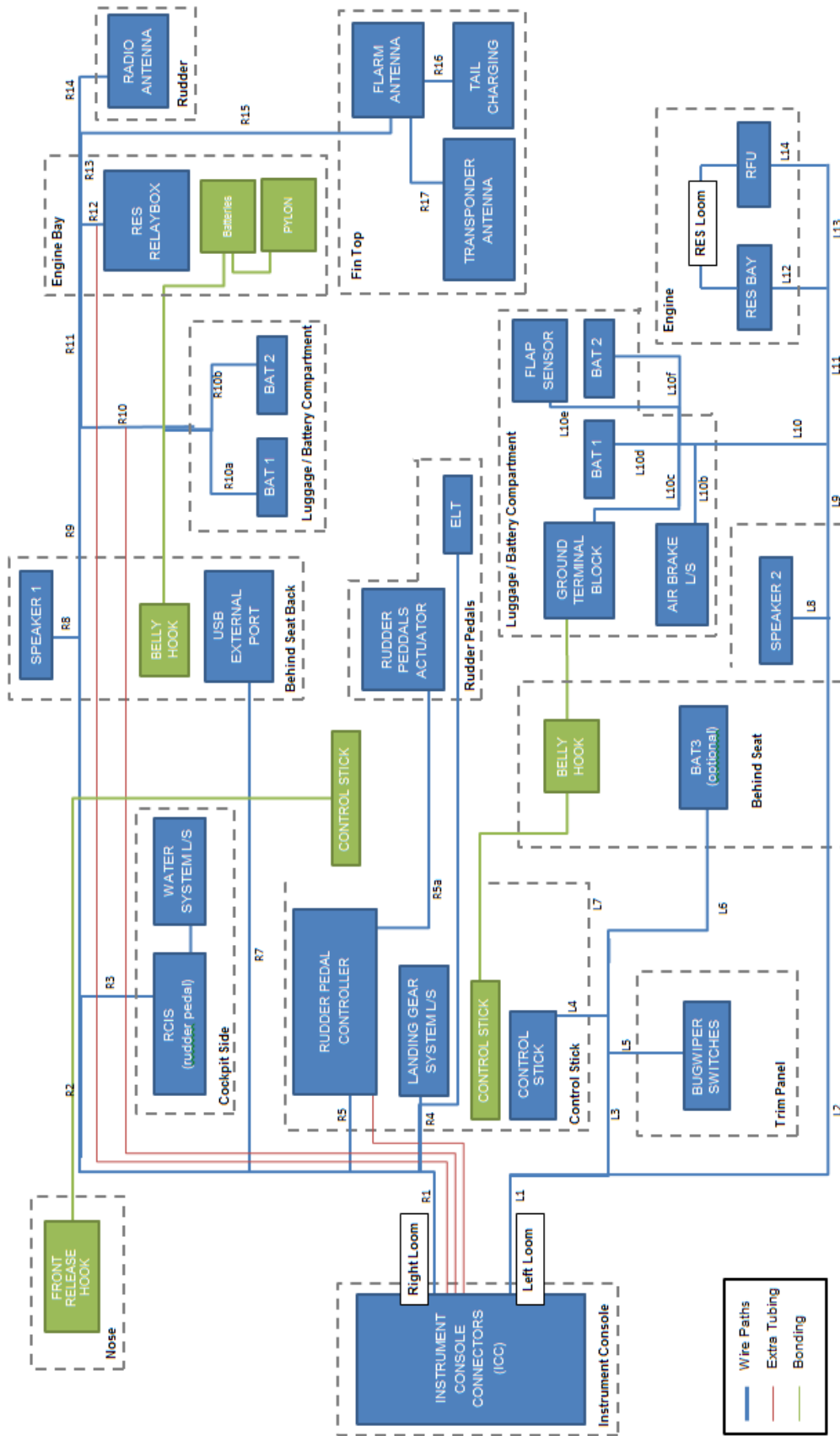

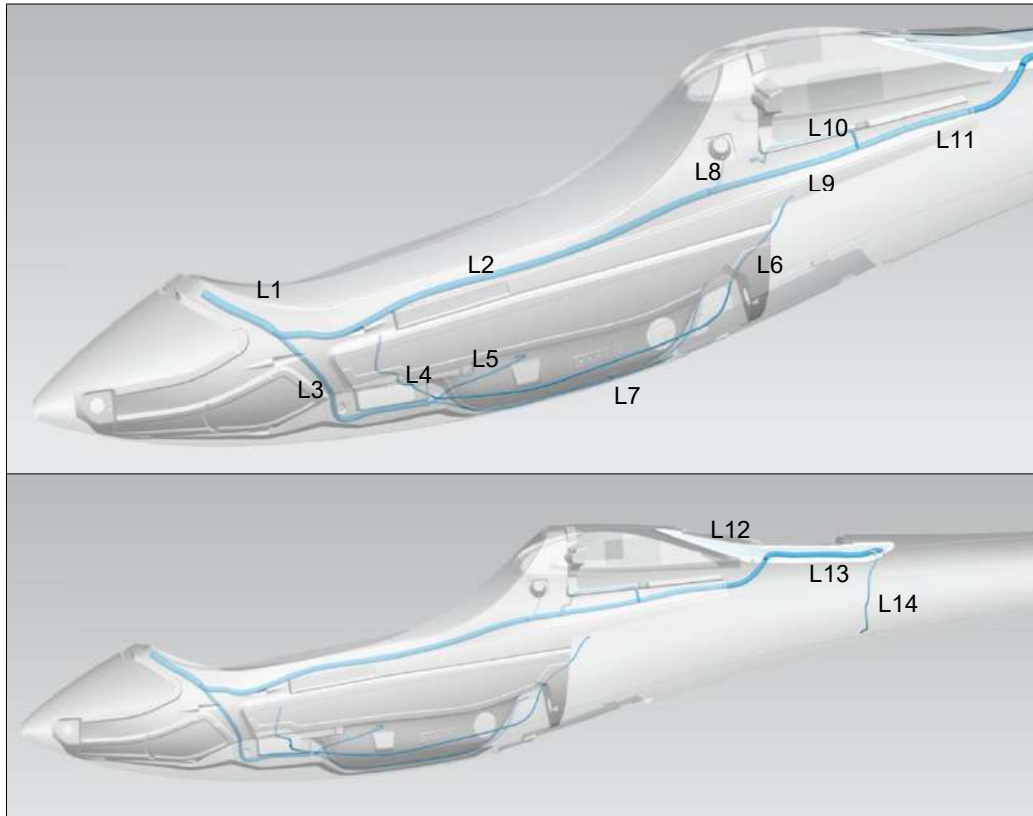


Figure 92-3: Electrical system wire harness layout (if RES fitted)

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## Wire harness routing

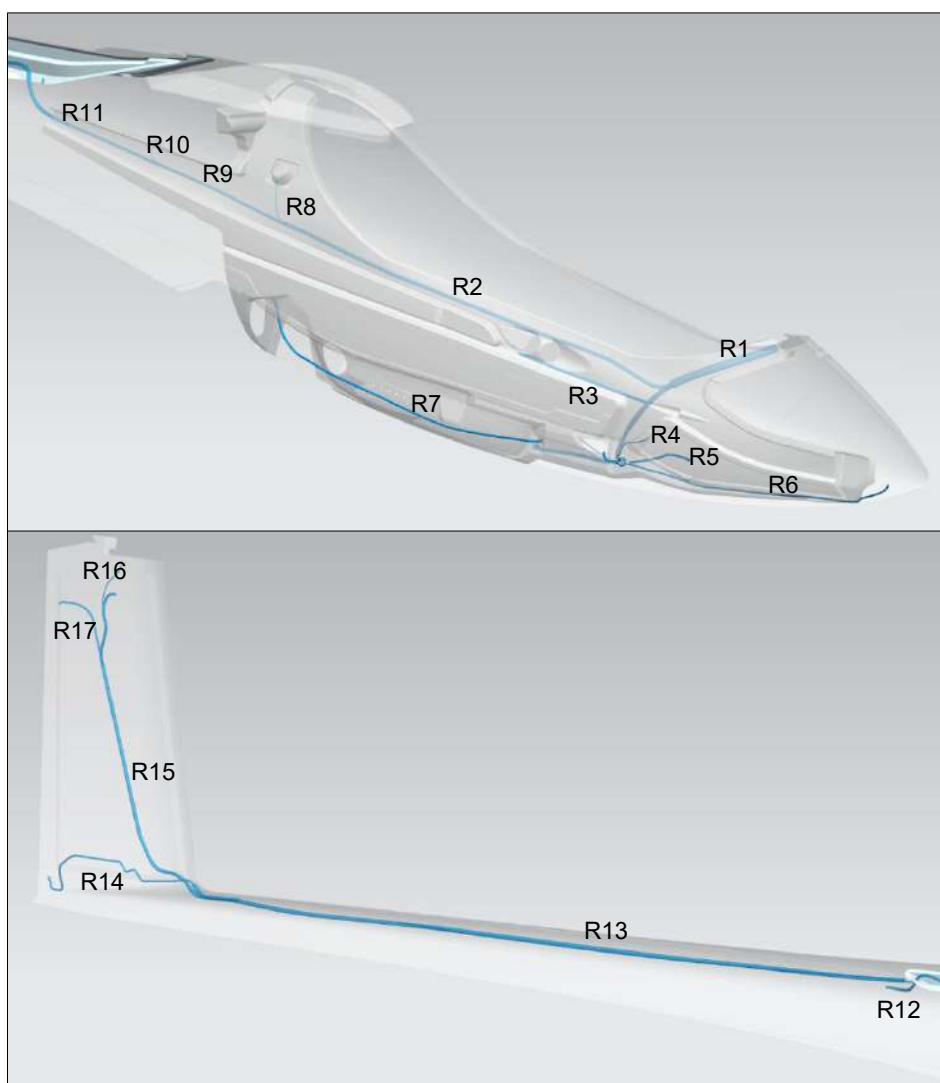
Figure 92-4 illustrates the wire harness schematic layout and routing through the left-hand side of the fuselage.




**Figure 92-4: JS-3 RES left side wiring loom**

Figure 92-5 illustrates the wire harness schematic layout and routing through the right-hand side of the fuselage.

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**Figure 92-5: JS-3 RES Right side wiring loom**

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## 92-20-00 WIRE PIN LAYOUT

### General

This section provides the detail of the pin layout for the various connectors linking different components or systems.

### Description

Detail on the following connectors is provided:

1. Instrument console connector – Power (ICC-P)
2. Instrument console connector (signal) (ICC-S)
3. Rudder control interface switches (RCIS)
4. Rudder pedal controller (RPC) (if fitted)
  - PRC-S
  - PRC-P

### Instrument Console Connector (Power) (ICC-P)

The instrument console connector (power) is fitted in the instrument console.

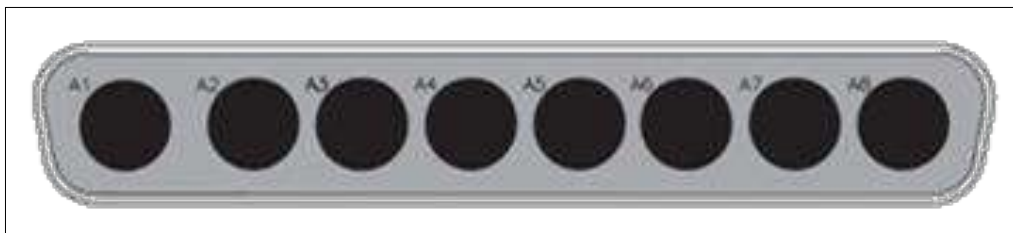



Figure 92-6: ICC-P Pin layout

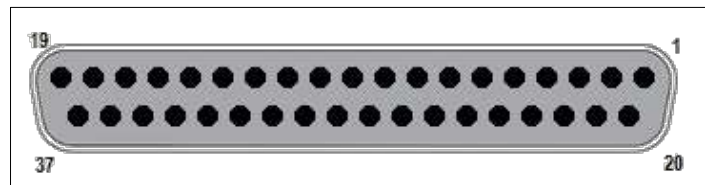
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**Table 92-2: ICC-P Pin layout**

From		Wire			To		
Plug / Comp.	Pin	Marking	Gauge	Loom path	System	Plug / Comp.	Pin
ICC-P	A1	Blue	8	L1, L2, L9, L10, L10c	GND-TB	GND-TB	Any
ICC-P	A2	White	12	R1, R2, R9, R10, R10a	Battery 1 (left)	BAT1	A2
ICC-P	A3	White	12	R1, R2, R9, R10, R10b	Battery 2 (right)	BAT2	A2
ICC-P	A4	White	12	L1, L3, L6	NC	BAT3	A2
ICC-P	A5	White	14	L1, L3, L5	BWC	BWC-P	2
ICC-P	A6	White	14	R1, R5	RPC	ERG-P	A5
ICC-P	A7	White		NC			
ICC-P	A8	Blue		NC			

### Instrument Console Connector (Signal) (ICC-S)


The instrument console connector (signal) is fitted in the instrument console.




**Figure 92-7: ICC-S Pin layout**

**Table 92-3: ICC-S Pin layout (Male)**

From		Wire			To		
Plug / Comp.	Pin	Marking	Gauge	Loom path	System	Plug / Comp.	Pin
ICC-S	1	Black	22	L1, L2, L8	Left speaker	Unit	-
ICC-S	2	Black	22	R1, R2, R8	Right speaker	Unit	-
ICC-S	3	Black	22	R1, R2, R3	GND - Water system	L/S	C
ICC-S		Black	22	L1, L2, L9, L10, L10e	GND - Flap system	L/S	C
ICC-S		Black	22	L1, L2, L9, L10, L10b	GND - Airbrake system	L/S	C
ICC-S		Black	22	R1, R4	GND - Landing gear	L/S	C
ICC-S	4	Red	22	R1, R4	Landing gear	L/S	C
ICC-S	5	Red	22	L1, L2, L9, L10, L10b	Airbrake system	L/S	C
ICC-S	6	Yellow	22	L1, L3, L4	LX Control stick	Unit	Green
ICC-S	7	Blue	22	L1, L3, L4	LX Control stick	Unit	Blue
ICC-S	8	Orange	22	L1, L3, L4	PTT	Unit	White
ICC-S	9	Green	22	L1, L3, L4	PTT	Unit	Shield
ICC-S	10	Green	22	L1, L2, L9, L10, L10e	LX Flap sensor	Unit	Green
ICC-S	11	Blue	22	L1, L2, L9, L10, L10e	Flap sensor	Unit	Brown

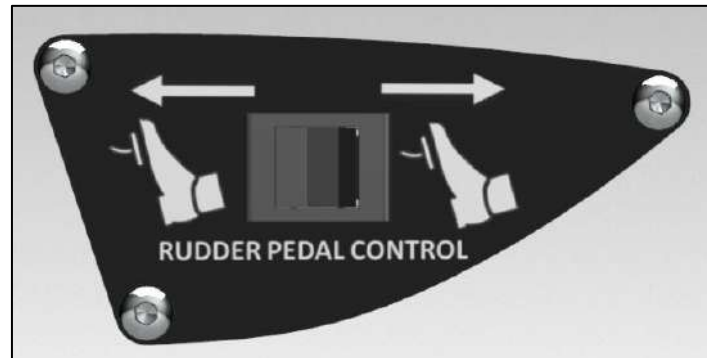
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From		Wire			To		
Plug / Comp.	Pin	Marking	Gauge	Loom path	System	Plug / Comp.	Pin
ICC-S	12	Green	22	L1, L2, L9, L10, L11, L13, L14	LX MOP	D-Sub 9	7
ICC-S	13	Blue	22	L1, L2, L9, L10, L11, L13, L14	LX MOP	D-Sub 9	4
ICC-S	14	White	22	R1, R2, R9, R11, R12	RES Relay Box	RRB	5
ICC-S	15	Yellow	22	R1, R2, R9, R11, R13	RES Relay Box	RRB	4
ICC-S	16	Shield	22	L1, L2, L9, L10, L11, L13, L14			
ICC-S	17	Green	22	L1, L2, L9, L10, L11, L13, L14	NC		
ICC-S	18	Yellow	22	L1, L2, L9, L10, L11, L13, L14	NC		
ICC-S	19	Orange	22	L1, L2, L9, L10, L11, L13, L14	NC		
ICC-S	20	Red	22	L1, L2, L8	Left speaker	Unit	-
ICC-S	21	Red	22	R1, R2, R8	Right speaker	Unit	-
ICC-S	22	Red	22	R1, R2, R3	Water system	L/S	C
ICC-S	23	Red	22	L1, L2, L9, L10, L10e	Flap system	L/S	C
ICC-S	24	Orange	22	L1, L3, L4	Control stick	Unit	Red
ICC-S	25	White	22	L1, L3, L4	Control stick	Unit	White
ICC-S	26	White	22	L1, L3, L4	ELT	Unit	K
ICC-S	27	Blue	22	L1, L3, L4	ELT	Unit	G
ICC-S	28	Orange	22	L1, L2, L9, L10, L10e	Flap Sensor	Unit	Yellow
ICC-S	29	White	22	L1, L2, L9, L10, L10e	Flap sensor	Unit	White
ICC-S	30	Orange	22	L1, L2, L9, L11, L13, L14	LX MOP	D-Sub 9	1
ICC-S	31	White	22	L1, L2, L9, L11, L13, L14	LX MOP	D-Sub 9	6
ICC-S	32	Shield	22	L1, L2, L9, L10, L11, L13, L14	LX MOP	Dsub-9	5,9
ICC-S	33	Blue	22	R1, R2, R9, R11, R12	RES Relay Box	RRB	3
ICC-S	34	Blue	16	R1, R7	USB -	Spade	-
ICC-S	35	White	16	R1, R7	USB +	Spade	+
ICC-S	36	Red	22	L1, L2, L9, L10, L11, L13, L14	NC		
ICC-S	37	White	22	L1, L2, L9, L10, L11, L13, L14	NC		

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## Rudder Pedal Control Interface Switches (RCIS)

The rudder control interface switch is fitted to the right-hand side of the cockpit.



**Figure 92-8: Rudder control interface switches layout**

Two different designs are used to adjust the rudder pedal position:

1. Rudder Pedal Controller (RPC)
2. Interface switch H-bridge

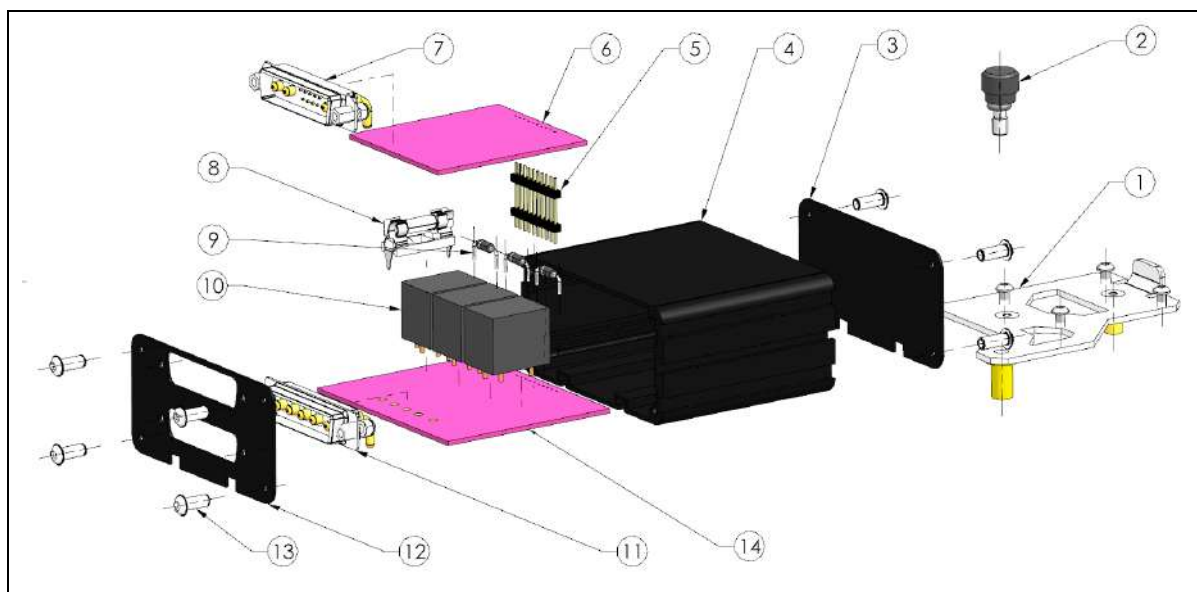
### Rudder Pedal Controller (RPC)

The RPC consist of an H-bridge switching using relays. The pin layout RCIS is set out in Table 92-4.

**Table 92-4: Rudder control interface switches layout**

From		Wire			To		
Plug / Component	Pin	Marking	Gauge	Loom path	System	Plug / Component	Pin
ERG-S	6	Blue	22	R5, R2, R3	RCIS	RPC-CS	3, 6
ERG-S	7	White	22	R5, R2, R3	RCIS	RPC-CS	2
ERG-S	8	Orange	22	R5, R2, R3	RCIS	RPC-CS	5
ERG-S	9	Green	22	R5, R2, R3	RCIS	RPC-CS	1
ICC-P	A7	White	12	R1, R2, R3	RCIS	HTB-CS	1
ICC-P	A8	Blue	12	R1, R2, R4	RCIS	HTB-CS	2

## Rudder Pedal Controller (RPC)



NO	DESCRIPTION	NO	DESCRIPTION
1	ERG Mounting bracket	8	5A Fuse and holder
2	ERG Thumb bolt	9	Diode
3	ERG Rear cover	10	Relay
4	ERG Enclosure	11	5P Straight D-Sub connector
5	PCB Pins	12	ERG Front cover
6	PCB: Secondary RPC	13	M4 AB12
7	3P10S Straight D-Sub connector	14	PCB: Main RPC

Figure 92-9: Rudder pedal controller assembly

Two connectors are fitted to the RPC enclosure:

1. RPC-S: 3 power pins, 10 signal pins
2. RPC-P: 5 power pins

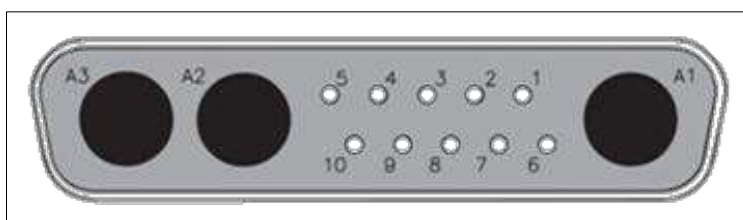


Figure 92-10: RPC-S

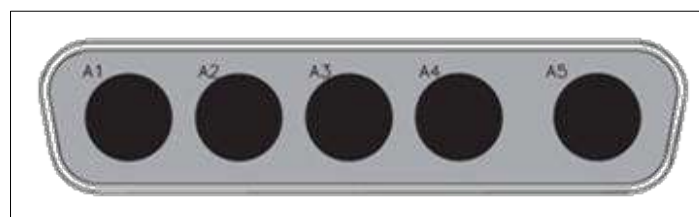



Figure 92-11: RPC-P

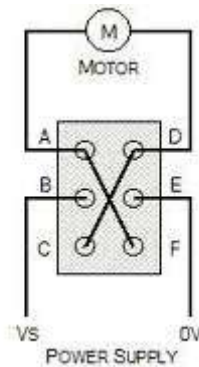
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**Table 92-5: Rudder pedal controller layout**

From		Wire			To		
Plug / Comp.	Pin	Marking	Gauge	Loom Path	System	Plug / Comp.	Pin
ERG-S	1-5	N/C					
ERG-S	6	Blue	22	R5, R2, R3	RCIS	RPC-CS	3, 6
ERG-S	7	White	22	R5, R2, R3	RCIS	RPC-CS	2
ERG-S	8	Orange	22	R5, R2, R3	RCIS	RPC-CS	5
ERG-S	9	Green	22	R5, R2, R3	RCIS	RPC-CS	1
ERG-S	10	N/C					
ERG-S	A1	White	14	R5, R1	Rudder pedal +	Unit	White
ERG-S	A2	White	14	R5, R1	CB	ICC-P	A6
ERG-S	A3	Blue	14	L1, L2, L9, L10, L10c	GND-TB	GND-TB	Any
ERG-P	A1	Blue	16	R5, R1	Rudder pedal -	Unit	Blue
ERG-P	A2-A5	N/C					


### Interface Switch H-bridge

This simplified design uses the interface switch in an H-bridge configuration to control the rudder pedal actuator instead of the PRC.




**Figure 92-12: IPIC H-bridge layout**

**NOTE:** An H-bridge is an electronic circuit that switches the polarity of a voltage applied to a load. These circuits are often used to allow DC motors to run forwards or backwards


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# **CHAPTER 99 - 00 - 00**

## **SPECIAL TOOLS**

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## 99-00-00 SPECIAL TOOLS

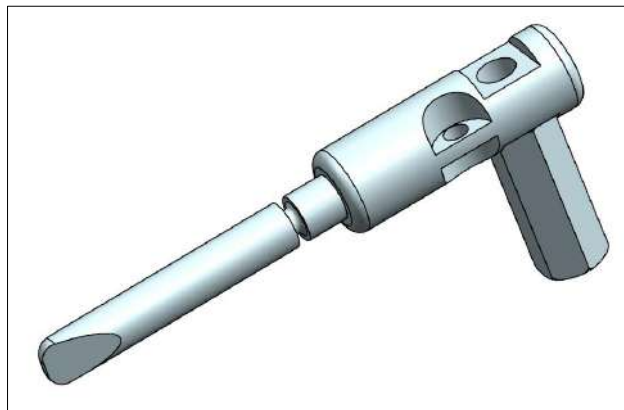
### General

Tools provided by JS-MD are listed in this chapter. These tools are specifically designed to perform a specific job, or to aid in a process that would otherwise be very difficult.

### Universal rigging tool

The JS Universal rigging tool (Figure 99-1, Part number 200 00 047 00) is used for:

1. Securing of the tailplane with the Allen key part.
2. Securing the wing tip (locking pin removing / install lock pin).
3. Opening / securing of the water tanks plugs.
4. Keeping the retractable tail wheel extended for ground handling.




**Figure 99-1: Universal rigging tool**

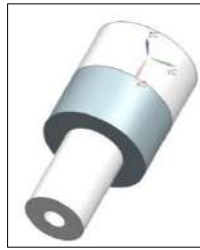
The universal tool in Figure 99-1 is required when the lock-spring was replaced by spring-loaded junction lock pin.

This tool is part of the sailplane equipment and is not a requirement for maintenance.

### Brake bleed bolt

The bleed bolt (Figure 99-2, Part number 211 18 051 00) is helpful to bleed the brake system. Refer to AMM Chapter 32-40-00 WHEELS AND BRAKES for details.

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**Figure 99-2: Brake bleed bolt**

This tool is not mandatory for maintenance.

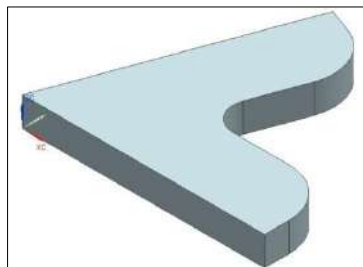
### **Water tank ventilator**

The water tank ventilator is used to vent the main water tanks when the aircraft is stored. Using the tank ventilator reduces the amount of moisture absorbed in the structure containing the water ballast.

This tool is not mandatory for maintenance.


### **Bug Wiper angle tool**

The bug wiper angle tool (Figure 99-3, Tool number TA1A-1.15) is used to keep the bug wiper arms open at the correct angle when stringing the bug wiper.



**Figure 99-3: Bug wiper angle tool**

This tool is not mandatory for maintenance.

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### Retractable tail wheel cable tension tool

The retractable tail wheel cable tension tool (Figure 99-4, Tool number T 233 12 056 00) is used to check the cable tension when setting up the tail wheel.

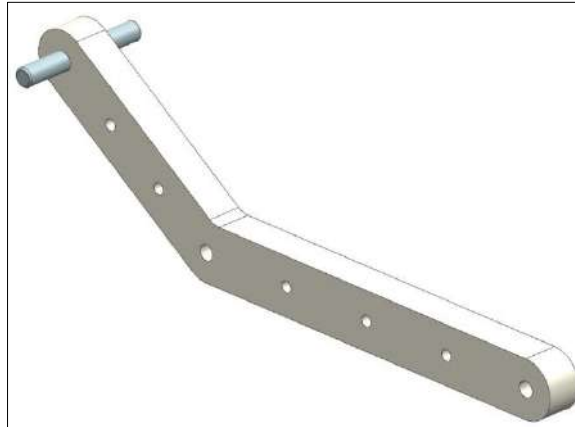


Figure 99-4: Retractable tail wheel cable tension tool

### Airbrake lock/unlock setup tool

The airbrake lock/unlock setup tool (Figure 99-5, Tool number TA 200 00 057 00) is used during the airbrake setup procedure.

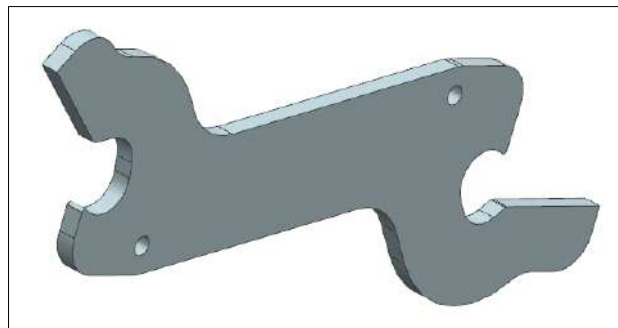



Figure 99-5: Airbrake lock/unlock setup tool

This tool is not mandatory for maintenance as forces at different arm positions can be calculated to determine equivalent moments.

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