Technical Note TN.JS-017 v3.0

05 May 2014

TITLE

Check correct operation of 21m tips water system.

APPLICABILITY

Applicable if required by SB.JS-015.

REASON

The correct setup and operation of the water system for the 21m tips must be checked before the 21m tips can be commissioned.

SECTION 1: Identify water system junction bush

DESCRIPTION – Identify water system junction rib bush

This section is to identify the water system junction rib bush installed in the glider.

Figure 1 indicated the position where the junction bush is installed. Figure 2 – Figure 4 indicated the three possible junction bush design variations.

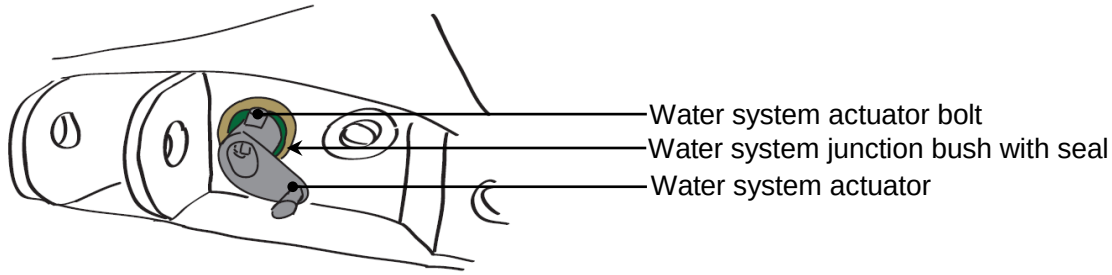


Figure 1: Junction bush position

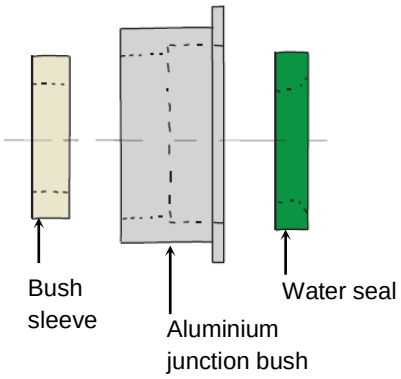


Figure 2: Type 1

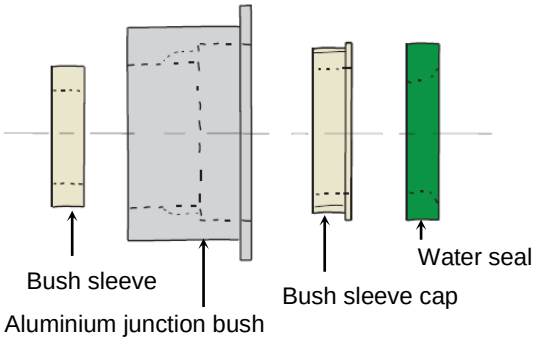


Figure 3: Type 2

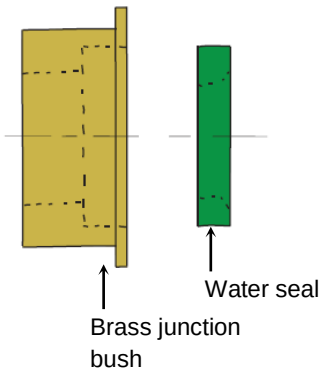


Figure 4: Type 3

INSTRUCTIONS – Identify water system junction bush

1. Identify the junction bush type installed. It might be difficult to differentiate between type 1 and 2. If so remove the water seal. (Take care not to damage the seal or the bush when removing the seal) If the bush sleeve cap is present the junction bush is then identified as type 2. If not then it is identified as type 1.
2. If type 1 is installed, contact the manufacturer for further technical support.

SECTION 2: Valve seal functionality

DESCRIPTION – Valve seal functionality

Check water system to ensure that the tip valve seal functions as required.

INSTRUCTIONS – Valve seal functionality

3. Position the 21m upside down on a suitable cushioned trestle.
4. Check that the 21m tip dump valves close fully.
5. Apply a load (approximately 1 daN) on the WS TIP LIFT PLATE 21m. Check that the bottom of the TIP VALVE BODY 21M protrudes pass the TIP VALVE SEAT 21m by approximately 0.5mm when the load is applied. (Refer to Figure 5)

3.0

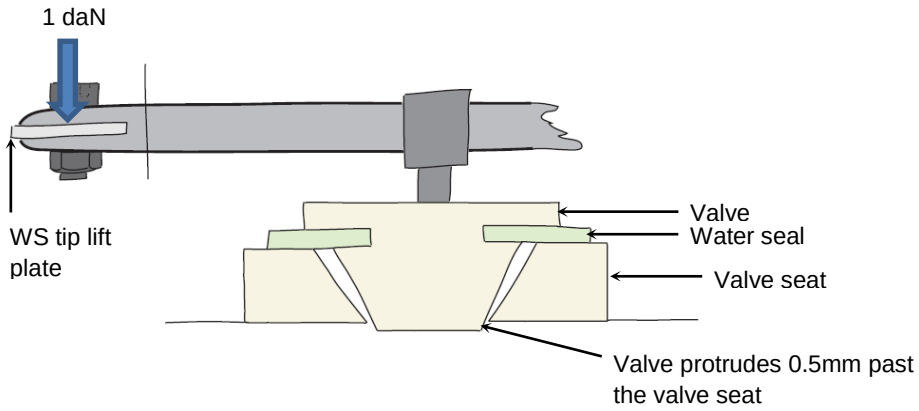


Figure 5: Protruding of valve body.

6. **If it does not protrude sufficiently**:
   a. Remove the TIP VALVE RUBBER SEAL and clean it from any debris or dirt.
   b. Clean inner contact area of TIP VALVE SEAT 21m with your finger, as illustrated in Figure 6. Any built-up of dirt on the valve seat may prevent the valve from closing fully. A cloth can be used if more severe abrasion than rubbing is required.

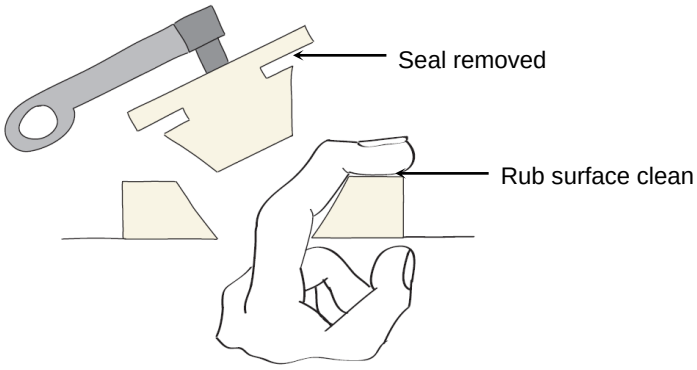


Figure 6: Cleaning of TIP VALVE SEAT 21m

c. Position the TIP VALVE RUBBER SEAL into its original position.

d. Check if the valve protrudes through the surface as specified. If required remove the TIP VALVE RUBBER SEAL again to prevent the seal from damage in the next step.

e. Close the TIP VALVE BODY 21M slowly and mark places on the seat where the TIP VALVE BODY 21M touches the TIP VALVE SEAT 21m during closing. These indicates positions pushes the TIP VALVE BODY 21M in a different direction and prevents the valve from sealing.

f. Using a small needle-file or small chisel, remove material from the chamfered sides of the TIP VALVE SEAT 21m, which interferes with the closing of the TIP VALVE BODY 21M, as illustrated in Figure 3.

g. Repeat step **e** & **f** until the valve body closes smoothly.

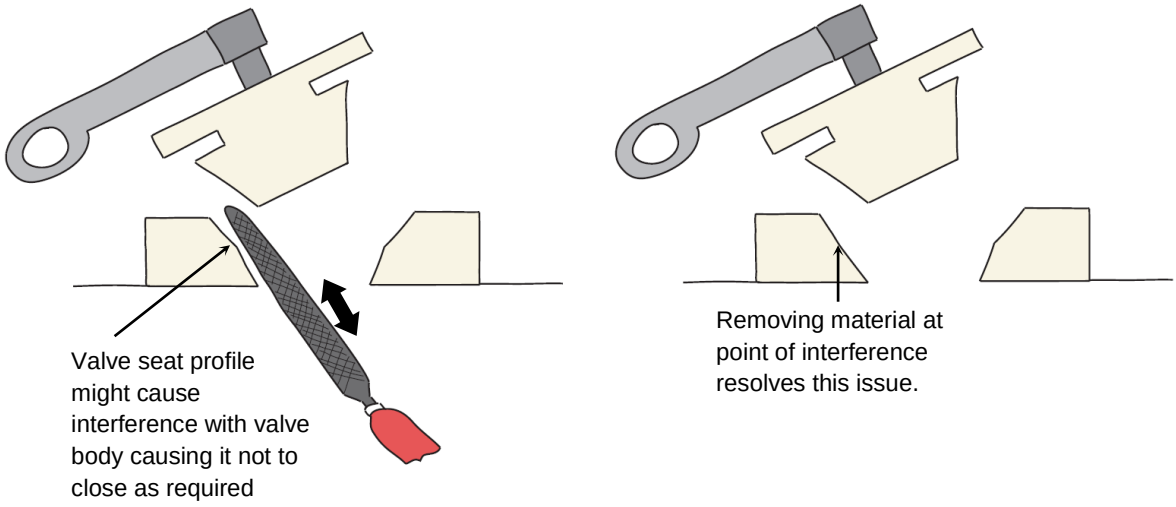


Figure 7: Removal of material from TIP VALVE SEAT 21m

h. Replace the TIP VALVE RUBBER SEAL. Ensure the TIP VALVE RUBBER SEAL bottoms completely in the slot made in the valve body. A poor seal fit will prevent the 21m valve from closing fully.

7. Check that the 21m water valve seals tightly in the close position without the application of any force on the TIP LIFT PLATE 21m. (If the valve does not seal contact the manufacturer for further technical support.)

SECTION 3: 21m wing tip water system synchronization adjustment

DESCRIPTION – 21m wing tip water system synchronization adjustment

Water system synchronization adjustment is required to ensure that the 21m tip water system valve opens and closes correctly in response to the cockpit control adjustment.

INSTRUCTIONS – 21m wing tip water system synchronization adjustment

1. Rig the inner wings of the sailplane in accordance with instructions given the JS1 Flight Manual Issue 3 or later issue.
2. Position the cockpit dump valve lever in the backward position (All valves closed).
3. Insert the 21m tip wings partially.
4. Position the cockpit dump valve lever in the middle position. (Only inboard wing valves open.)
5. Observe the vertical clearance between the ACTUATOR and the TIP LIFT PLATE 21M. The clearance must be 0.1 mm to 1.0 mm, as illustrated in Figure 8. (The clearance can be measured by applying clay on the TIP LIFT PLATE 21M. The height of the clay can then be measured with a Vernier, as illustrated in Figure 9).
6. **If the clearance is out of limits:**
    a. Remove the TIP LIFT PLATE 21M.
    b. Change the bend angle on the TIP LIFT PLATE 21M to adjust the clearance. (Figure 8)
    c. Re-install the TIP LIFT PLATE 21M and measure the clearance. Re-adjust if required.

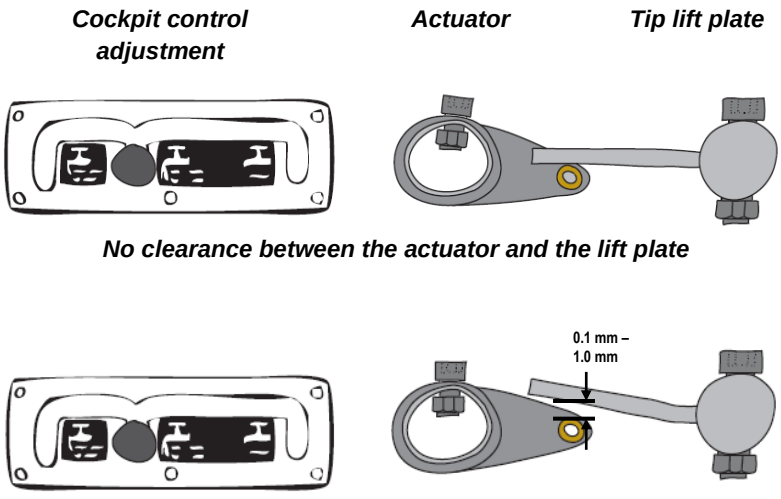


Figure 8: Clearance of Actuator

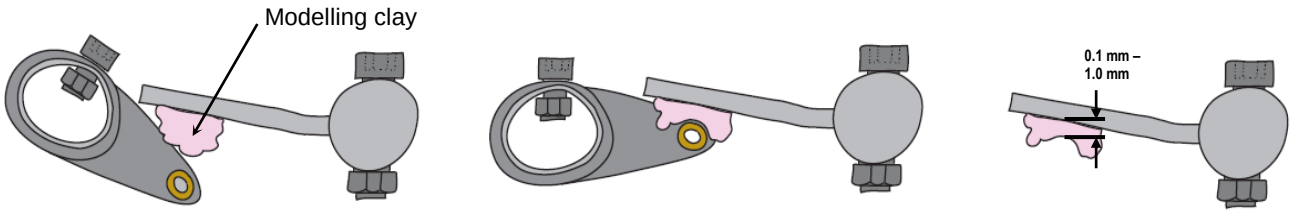


Figure 9: Clay imprint measuring method

7. Rig the 21m wing tips.
8. Fill all water tanks in accordance with the JS1 Flight Manual Issue 3.
9. Perform the following checks:
    a. All water valves seal correctly when closed – maximum allowable leak rate: 3ml/minute per valve. (If any of the valves does not seal contact the manufacturer for further technical support.)
    b. Position the cockpit dump valve lever in the middle position (Only inboard wing valves open) – check that only the main valves and tail valve dump.
    c. Position the cockpit dump valve lever in the forward position (All valves open) – check that all valves dump. Check that the dump rates of corresponding valves are equal. A 10% difference in dump rate is acceptable. (If the difference in dump rate is higher than 10%, contact the manufacturer for further technical support.)
    d. Position the cockpit dump valve lever in the middle position (Only inboard wing valves open) – check that the 21m tip main valves close fully.
    e. Whichever side is not functioning as it is required make the corresponding bend adjustment to the TIP LIFT PLATE as corrective action.
    f. Repeat the above mentioned functionality check procedure until the tip valves function as required.
    g. If adjusting of the TIP LIFT PLATE bend angle does not resolve the valve functionality issue, contact the manufacturer for further technical support.

SECTION 4: Check the longitudinal play in the torque tube

DESCRIPTION – Check the longitudinal play in the torque tube

The longitudinal play in the carbon water system torsion tube may lead to malfunctioning of the 21m wing tip dump valve if not set-up correctly.

The maximum allowable longitudinal play for the torsion tube is 4mm. If the play exceeds this value it may cause the water system to mal-function in one of the following ways:

- The torsion tube to disengage at the inner wing root torsion tube driver, causing the tip water system to mal-function. (Refer to Figure 10 and Figure 11.)
- Insufficient contact length between the actuator cam and the tip driver lever at the wing-tip junction, causing the tip water system to mal-function. (Refer to Figure 10 and Figure 11.)
- Interference between the ACTUATOR and the TIP LIFT PLATE when the ACTUATOR is in its maximum longitudinal position. (Refer to Figure 10 and Figure 11.)

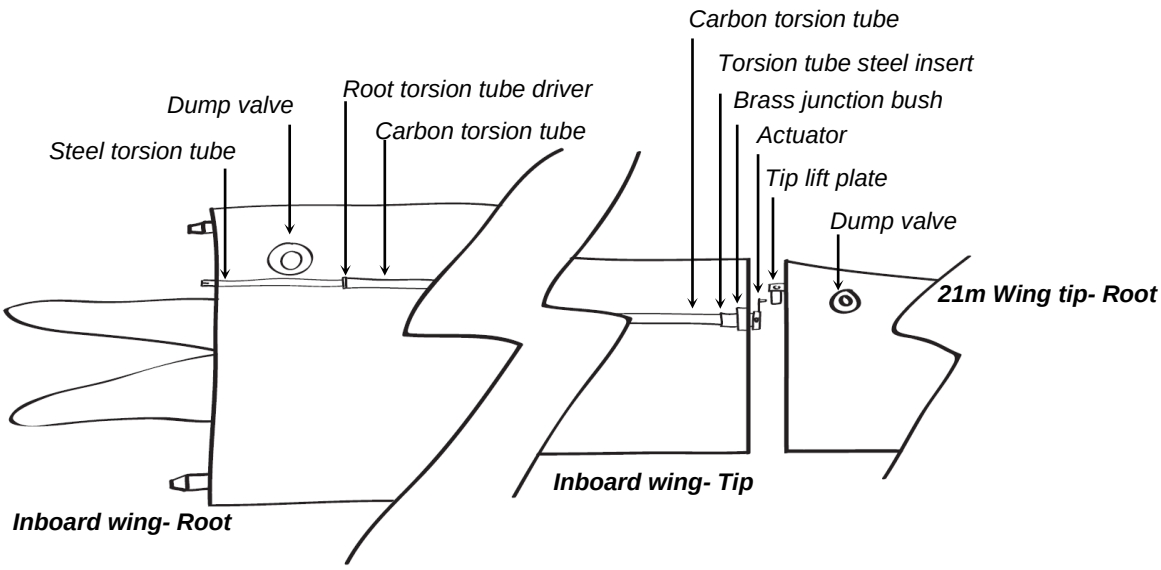


Figure 10: Descriptions of Wing & 21m tip water system

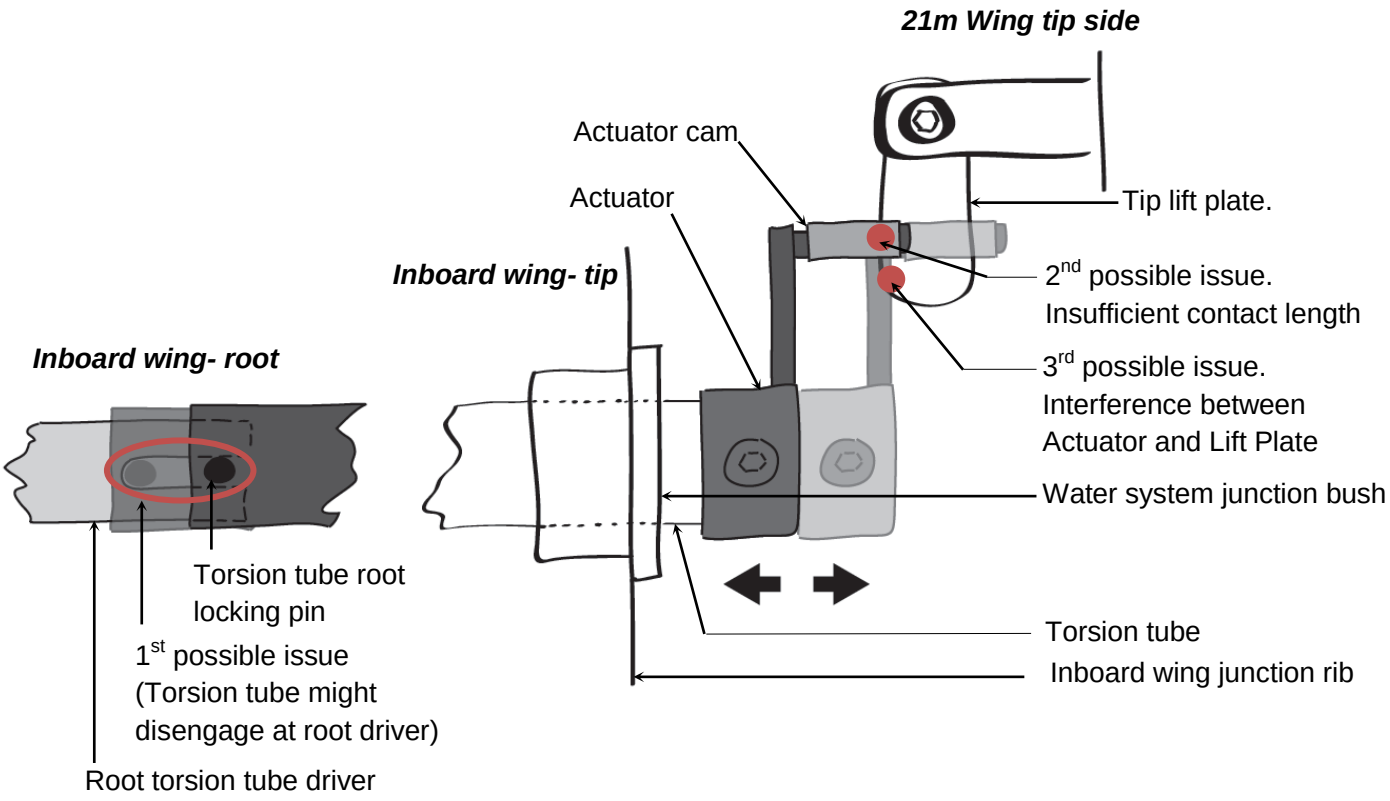


Figure 11: Possible issues with the Tip actuator and lift plate

INSTRUCTIONS – CHECK LONGITUDINAL PLAY IN TORQUE TUBE

1. Measure the longitudinal play on the water system as follow:
    a. Push the ACTUATOR on the tip side of the inner wing all the way inward. (Towards the fuselage)
    b. Mark the position on the rod.
    c. Pull the ACTUATOR on the tip side of the inner wing all the way outward. (Towards the wing tip)
    d. Measure the play.
    e. If the amount of longitudinal play of the TORSION TUBE is more than 4mm, contact the manufacturer for further technical support.

2. Measure the contact length between the ACTUATOR CAM and the TIP LIFT PLATE as follow: (Refer to Figure 13 & Figure 14 for an example)
    a. Push the ACTUATOR on the tip side of the inner wing all the way inward. (Towards the fuselage)
    b. Place modelling clay at the bottom of the TIP LIFT PLATE.
    c. Position the cockpit dump valve lever in the backward position. (All valves closed)
    d. Rig the 21m wing tip.
    e. Position the cockpit dump valve lever in the forward position. (All valves open)
    f. Ensure that the tip valve is opening.

Note: If the tip valve does not open it might be either one of the following:

- *The tip is not appropriately rigged or*
- *the actuator does not come into contact with the driver lever.(If this is the case the manufacturer should be contacted for further technical support.)*

    a. Position the cockpit dump valve lever in the backward position. (All valves closed)
    b. De-rig the 21m wing tip.
    c. The ACTUATOR CAM should have made an imprint on the modelling clay indicating the contact length.
    d. Contact length must be at least 4mm. If the contact length is less than 4mm, contact the manufacturer for further technical support.
    e. Repeat the above mentioned procedure, but with the actuator pulled outward as far as possible.
    f. A minimum clearance of 1.5mm is allowable between the ACTUATOR and the TIP LIFT PLATE. (Refer to Figure 12). If the clearance between the two mechanisms is smaller than 1.5mm, contact the manufacturer for further technical support.

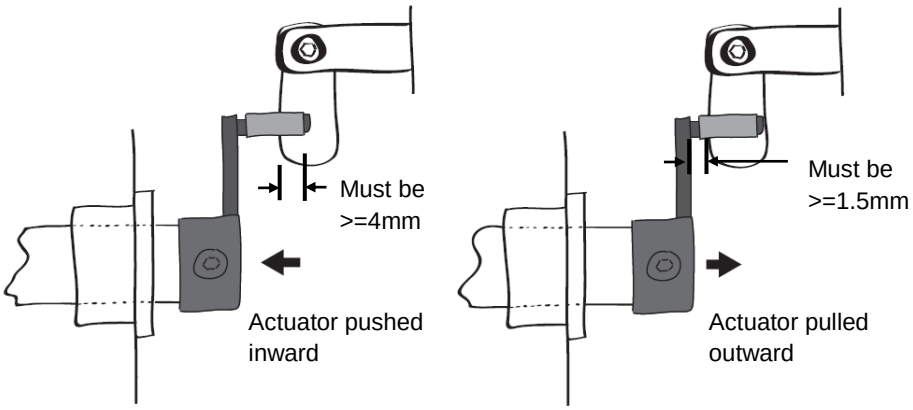


Figure 12: Maximum and minimum clearance of the Actuator

Wing-tip-side-water-system-driver-lever with modelling clay. Insufficient contact length (<4mm)

Figure 13

Wing tip side water system driver lever with modelling clay. Sufficient contact length (>4mm)

Figure 14

MATERIAL & TOOLS REQUIRED

SECTION	MATERIAL REQUIRED	TOOLS REQUIRED
SECTION 2: Valve seal functionality	N/A	- Small round tip needle-file - Small Chisel
SECTION 3: 21m wing tip water system calibration.	N/A	- Clay - Vernier - 4 Water buckets - Water filling system - Vice grip - Bench vice grip - 3mm Allen-key - Size 7 wrench
SECTION 4: Check the longitudinal play in the torque tube	N/A	- Clay - Vernier

MASS AND BALANCE

This service has no effect on the mass and balance of the aircraft, as it restores conformance to the original design.

MANUALS

This service has no effect on the Flight Manual and Maintenance Manual.

NOTES

N/A

Technical Note TN.JS-017 Addendum A **05 August 2013**

TITLE

Water system torsion tube longitudinal play repair procedure.

DESCRIPTION

This addendum to Technical Note TN.JS-017 supplies two possible repair procedures as solution to the problem of excessive longitudinal play on the water system torsion tube.

> *Note: Please refer to TN.JS-017 before starting any of the two corrective actions listed in this procedure. TN.JS-017 supplies instructions on how to check whether the two issues truly are a risk and thus this repair procedure need only be done if required by TN.JS-017.*

INSTRUCTIONS

Solution 1 (Add a spacer bush)

The carbon torsion tube in the inboard wing might disengage at the root torsion tube driver if the longitudinal play on the water system is more than 4mm (Play must be between 2 and 4mm).

Inserting spacer bushes between the junction bush and the torsion tube steel insert shoulder the amount of longitudinal play will be reduced and the whole system will move closer to root- Ensuring the carbon torsion tube cannot disengage at the root torsion tube driver.

Here follows the procedure for conducting the above mentioned operation:

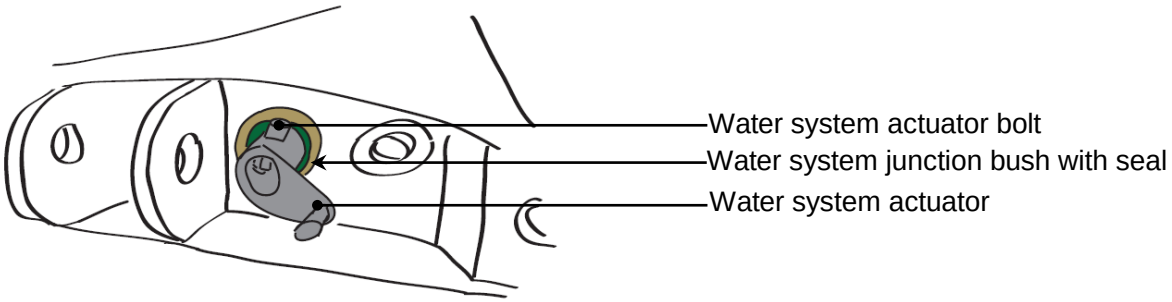


Figure 1: Inner wing tip side

1. Measure the amount of longitudinal play on the water system by pushing and pulling on the actuator and denote it as “X”.
2. Remove water system actuator by removing actuator bolt.
3. Remove water system junction seal. Take care not to damage the brass junction bush while removing the seal.

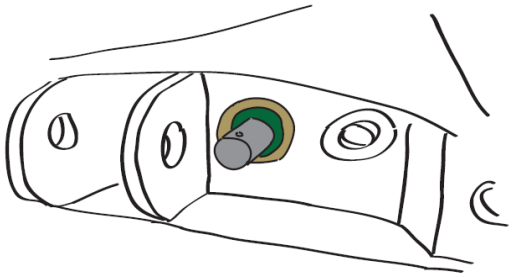


Figure 2: Actuator removed

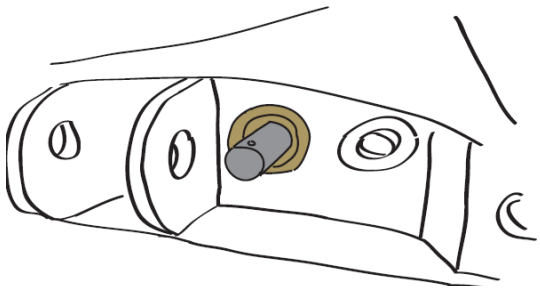


Figure 3: Water seal removed

4. Remove the junction bush. (Refer to Figure 4)

4.1. Insert the heat soaking tool into the junction bush seal recess.

Note: It is extremely important to use the heat soaking tool rather than heating the bush directly. None of the surrounding structure or parts either than the junction bush may increase in temperature, because the heat can cause permanent damage to the composite material- lowering its structural integrity.

4.2. Heat the tool (See Figure 4) using a heat gun.

4.3. Wait for the bond around the bush to soften. The bond should start to soften within 5 minutes.

4.4. Remove the junction bush by slightly wedging the heat soaking tool against the bush sides and pulling the tool outwards.

Notes: If the inside of the wing is moist the heat application might be ineffective due to moisture conducting the heat away from the bush. It is advised to elevate the tip side of the wing slightly, causing most water to run to the root. If heat soaking is still a problem the wing must be ventilated for the moisture to escape.

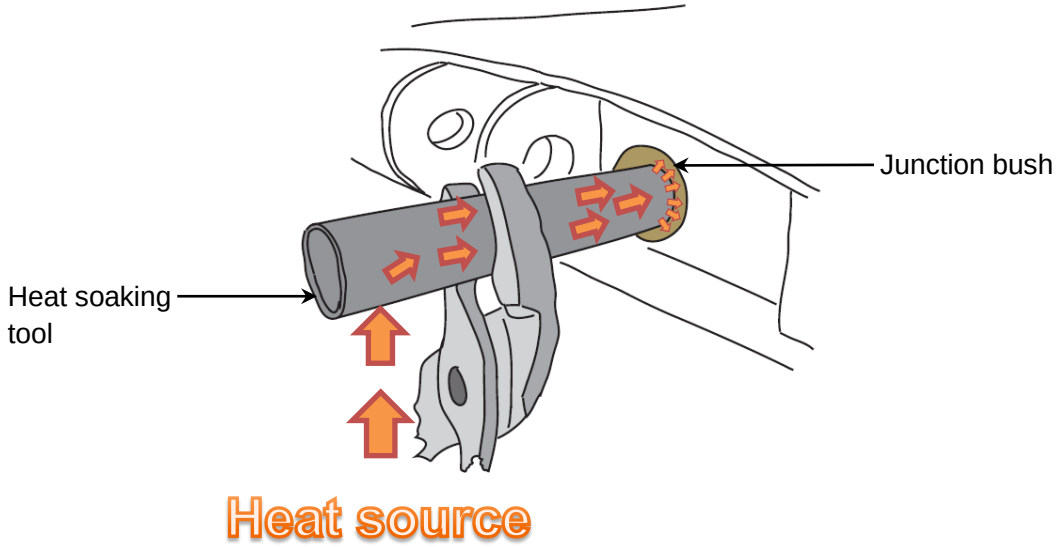


Figure 4: Heat soaking tool application

5. Insert one or a combination of the Vesconite bushes (total bush length = X - 2mm) over the torsion tube, between the junction bush and the torsion tube shoulder.

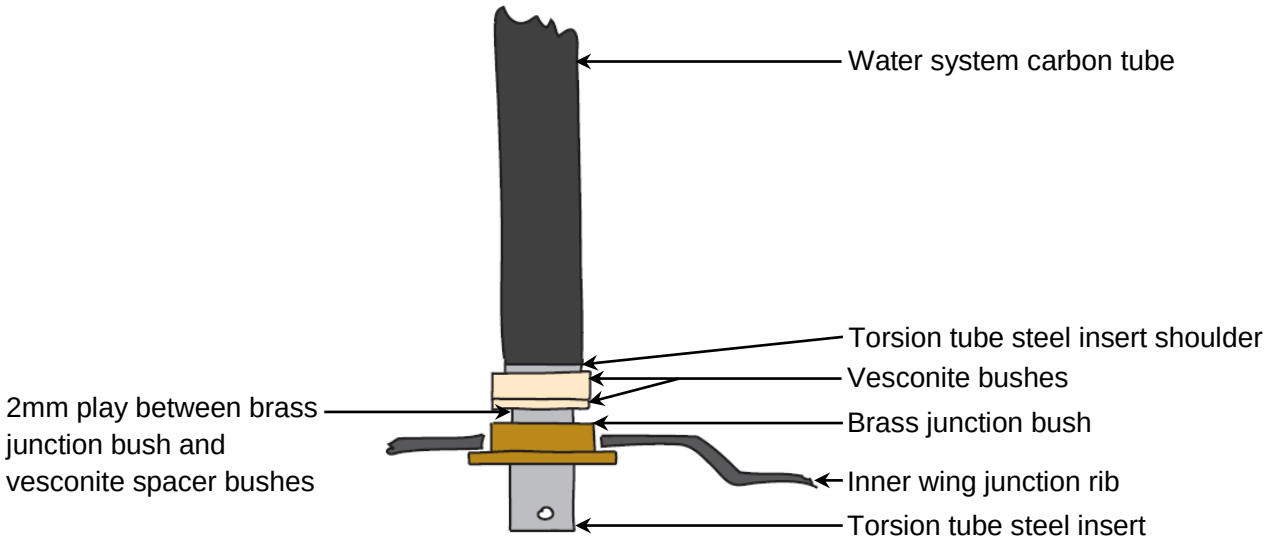


Figure 5

6. Push the brass junction bush back into position and check the total longitudinal play on the system. (It must be in the order of 2mm)
7. Repeat the two preceding steps until the correct amount of play is achieved.
8. Re-bond the junction bush into its position using Spabond.
9. Install a new water seal.
10. Fasten the actuator to the torsion tube.
11. Repeat the entire inspection as described in Technical Note 17. (TN.JS-017)

Solution 2 (Lengthen the torsion tube)

The carbon torsion tube in the inboard wing might disengage at the root torsion tube driver if the longitudinal play on the water system is more than 4mm (Play must be between 2 and 4mm).

When the carbon torsion tube inside the wing is lengthened via a repair the problem can be resolved.

Here follows the procedure for conducting the above mentioned operation:

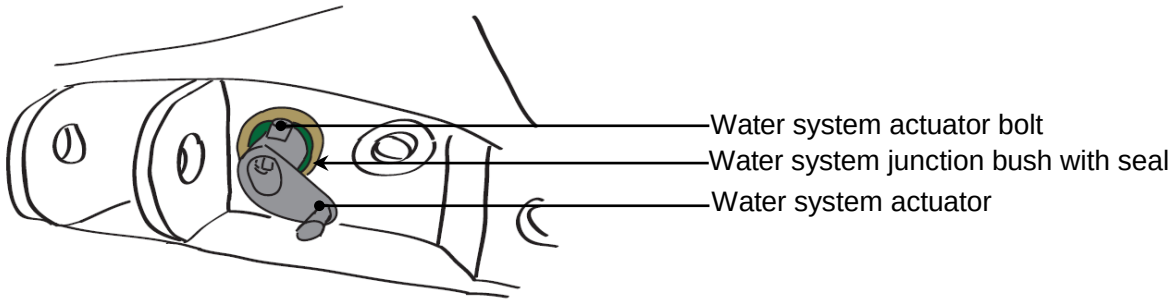


Figure 6: Inner wing tip side

1. Measure the amount of longitudinal play on the water system by pushing and pulling on the actuator and denote it as “X”.
2. Remove water system actuator by removing actuator bolt.
3. Remove water system junction seal. Take care not to damage the brass junction bush while removing the seal.

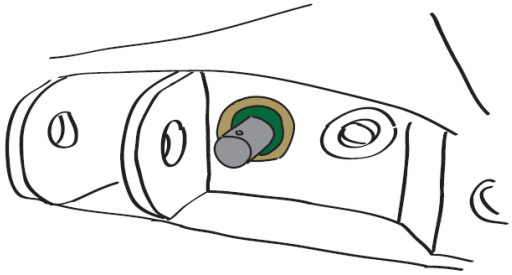


Figure 7: Actuator removed

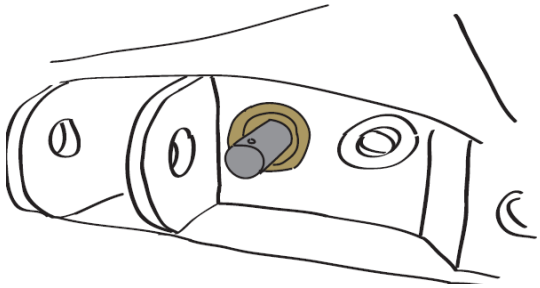


Figure 8: Water seal removed

4. Remove the junction bush. (Refer to Figure 4)

4.1. Insert the heat soaking tool into the junction bush seal recess.

Note: It is extremely important to use the heat soaking tool rather than heating the bush directly. None of the surrounding structure or parts either than the junction bush may increase in temperature, because the heat can cause permanent damage to the composite material- lowering its structural integrity.

4.2. Heat the tool (See Figure 4) using a heat gun.

4.3. Wait for the bond around the bush to soften. The bond should start to soften within 5 minutes.

4.4. Remove the junction bush by slightly wedging the heat soaking tool against the bush sides and pulling the tool outwards.

Notes: If the inside of the wing is moist the heat application might be ineffective due to moisture conducting the heat away from the bush. It is advised to elevate the tip side of the wing slightly, causing most water to run to the root. If heat soaking is still a problem the wing must be ventilated for the moisture to escape.

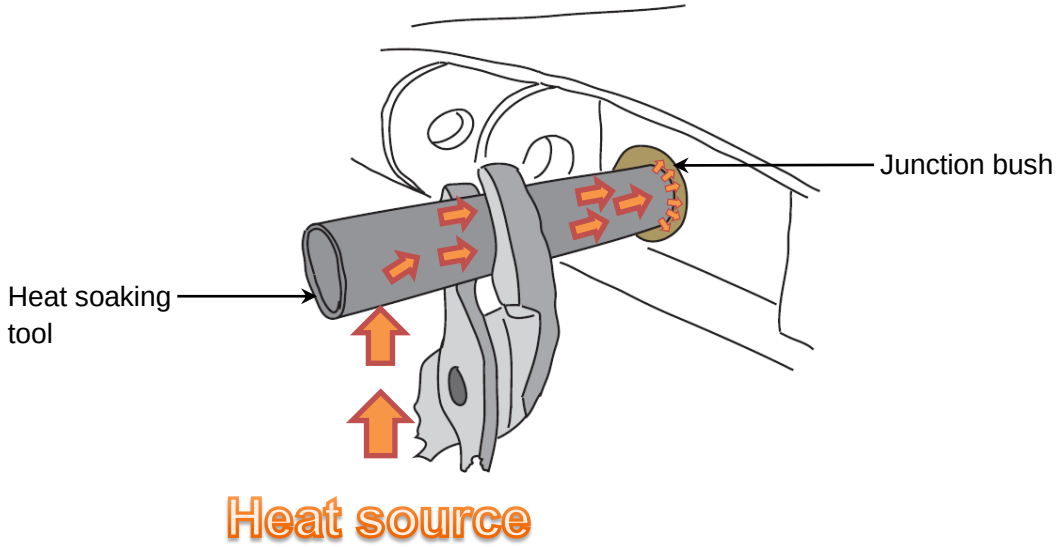


Figure 9: Heat soaking tool application

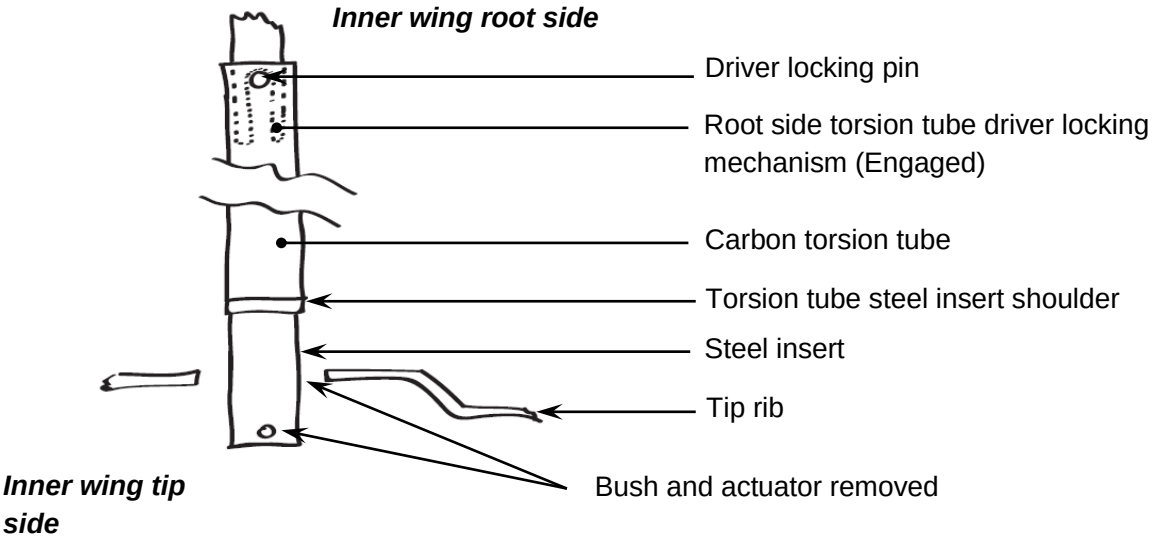


Figure 10

9. Pull the torque tube ±200mm out of the wing. If pulled to far it can be pulled past the first baffle rib at the wing root. This must be avoided.
10. Mark a torsional alignment line on the carbon tube using a scriber.

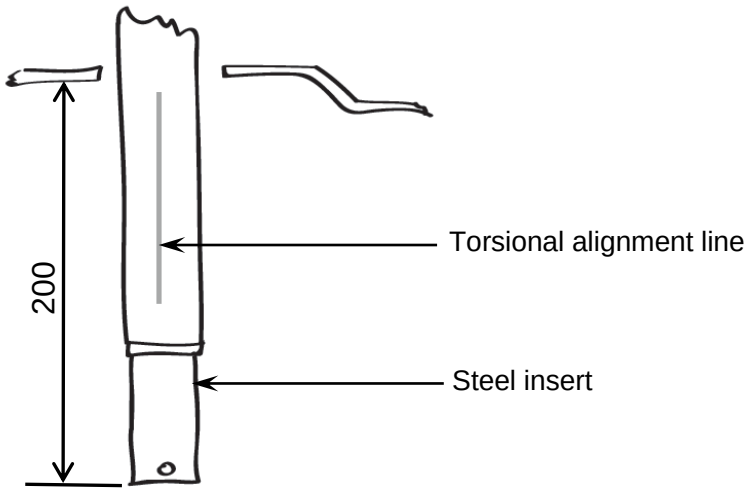


Figure 11

11. Cut the carbon tube, 100mm from the steel insert

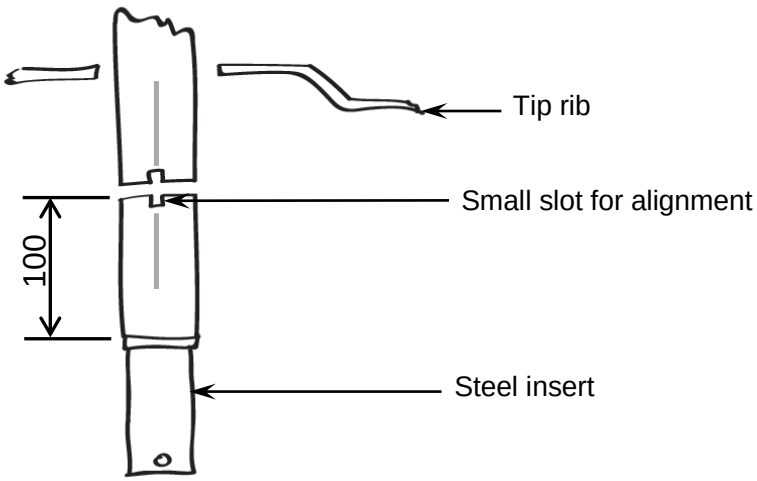


Figure 12

12. Prepare the 14x12 carbon joint.
    12.1. Cut the carbon joint to length. ±60mm
    12.2. Sand and clean the bonding surfaces. Entire outer surface of carbon joint
13. As illustrated in Figure 12 cut a small slot with a saw to indicate the alignment.
14. Sand the inside and outside surfaces of the cut off carbon torsion tube.
15. Insert the carbon joint with a carbon spacer. Carbon spacer must be [x-2mm] (Refer to Figure 13)

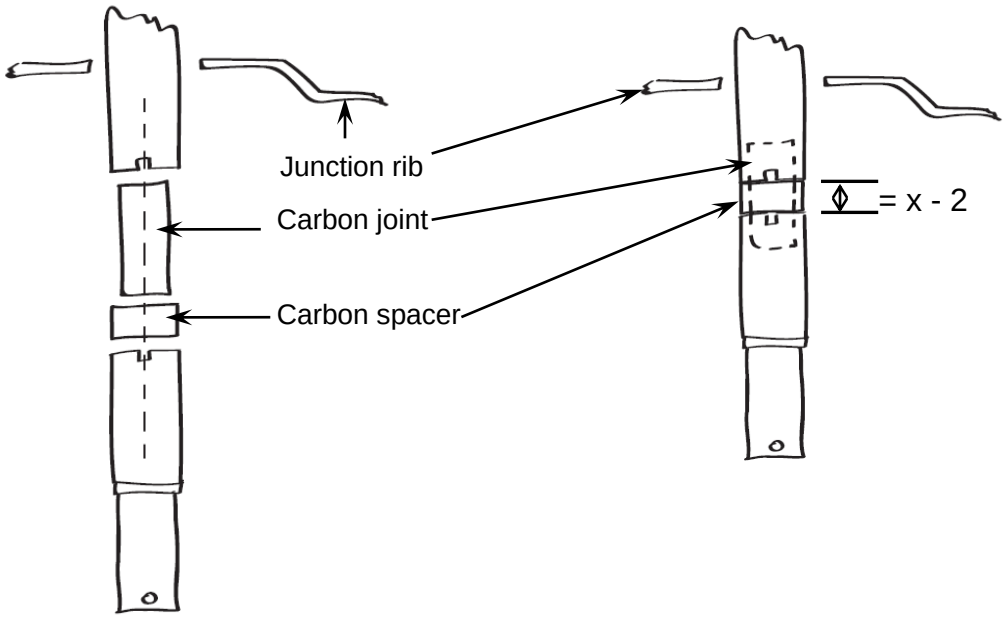


Figure 13

27. Do a dry assembly (Assemble without bonding as a check) with the junction bush as illustrated in Figure 14. Ensure root driver locking pin is engaged.

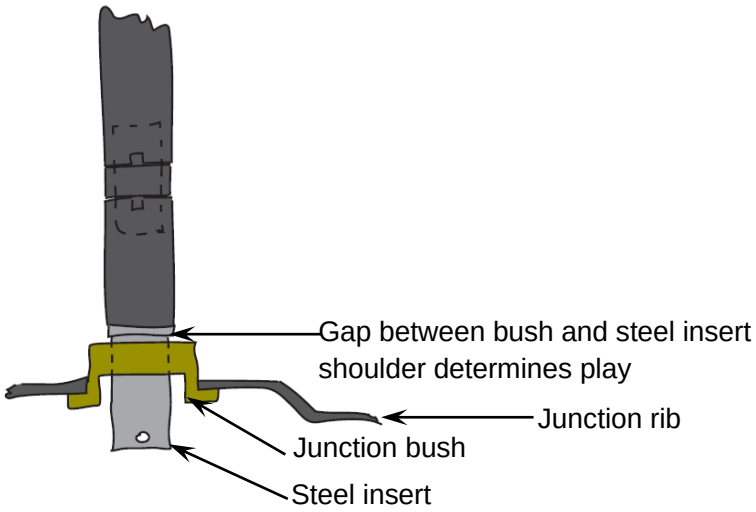


Figure 14

28. Longitudinal play on the water system torsion tube must be in the range of 1.5 - 2mm.
29. If play is insufficient repeat the above mentioned steps with a different spacer until the required play is achieved.
30. When the required play is achieved, remove the bush and bond the carbon joint to join the two halves of the cut off carbon tube using Spabond. Also bond the spacer.

Note: Ensure the alignment slot lines up when bonding!

31. Do a layup around the joint.
    31.1. One layer of Carbon 45° (50x50mm)
    31.2. One layer of Glass 45° (50x50mm)

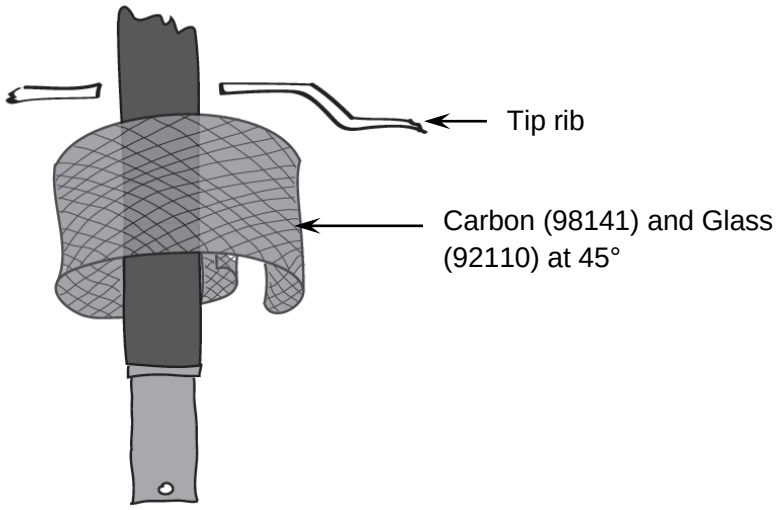


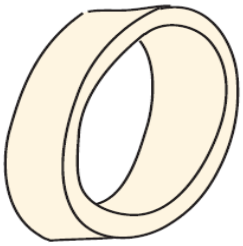
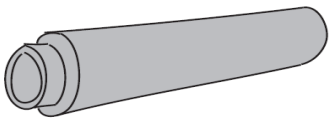
Figure 15

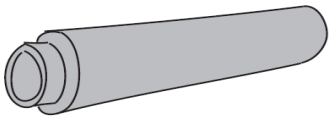
32. Install water system torsion tube back into position.
33. Ensure root driver is engaged.
    33.1. Push inner wing water system towards the root.
    33.2. Use the dump valve at the root as observing hole to ensure the torsion tube is engaged into the water-system-root-driver.
    33.3. Ensure driver bolt hole is at top when engaging.
34. Bond junction bush into the junction rib using Spabond.
35. Install new water seal.
36. Fasten actuator to torsion tube.

Notes: Ensure torsional alignment is still correct.

37. Wait 24 hours to cure.
38. Repeat the entire inspection as described in Technical Note 17. (TN.JS-017)

MATERIAL SUPPLIED

Description	JS reference number	Qty	Picture
Solution 1			
Vesconite spacer bush 1mm	1C-2.21.12.91	2	
Vesconite spacer bush 2mm	1C-2.21.12.92	2	
Vesconite spacer bush 3mm	1C-2.21.12.93	2	
Vesconite spacer bush 4mm	1C-2.21.12.94	2	
Heat soaking tool	T1C-2.21.12.6	1	
Solution 2			
12x14 Carbon joint	6.7.04	2	
Water seal	8.2.13	2	
Carbon spacer 3mm	6.7.03	2	
Carbon spacer 4mm	6.7.03	2	
Carbon spacer 5mm	6.7.03	2	
Carbon spacer 6mm	6.7.03	2	

Heat soaking tool	T1C-2.21.12.6	1	

MATERIAL REQUIRED

Epoxy, weaved carbon fibre(98141) and glass fibre(92110) mat