


				Statut (à compléter, terminé, approuvé)	Signature du responsable conception
Référence équipement: STC-012					
Révisions	Date	Subject	Revised pages		
0	26.01.2015	Initial edition			
1	14.09.2015	Update			
2	14.09.2015	Change of master cylinder hydraulic fitting			
3	18.01.2017	Wheel RF-018(A) replaces wheel RF-005(B)	all	Terminé	

“The Airworthiness Limitation Information (ALI) as defined in paragraph 3 are EASA approved under approval number: 10052286”

Variations must also be approved.

The Airworthiness Limitations section is FAA approved and specifies maintenance required under Secs. 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

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1 GENERAL

This manual gives the installation and overhaul procedures of BERINGER wheels and brake system STC on the Extra 300 Aircraft.

Refer to the component list for parts and assemblies impacted by STC.

NOTE: These products have been fully tested and certified on the aircraft.

CAUTION: Substitution of parts by other than originally certified parts may cause failure of brake system. BERINGER quality process assures that replacement parts are produced and controlled with the same quality level as originally certified.

BERINGER brake system functioning is similar to original brake system.

CAUTION: Standard MIL-H-5606 Brake fluid is replaced by fire resistant fluid: MIL-PRF-87257, make sure that only this brake fluid is used.

Mass and balance influence:

The STC reduces the mass of the wheel-brake system by around 3kg.

The balance of the aircraft should be done after the installation of this STC and prior to the first flight.

1.1 Component list

The affected assemblies are listed next:

Part number *	Description
RF-018	Main wheel assembly
EA-002.2N	Brake caliper assembly
MP-003.4N	Master cylinder assembly

* Please refer to the part list NP-STC-012 for complete and updated component list impacted by this STC.

1.2 Specifications for quick reference

Tires:

Tires	Size	Type	Inflation pressure
Main	5.00-5	Tubeless	Not changed – refer to aircraft maintenance

5.00-5 Main wheel assembly RF-018(-):

Wheel screw:

Torque	10 N.m	87 in-lb
Threadlocker	medium strength (Loctite 243 recommended)	

Clip screw

Torque	1.5 N.m	13 in-lb
Threadlocker	high strength (Loctite 271 recommended)	

Clip – disc maximum play	0.4mm	0.016 in
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Disc safety wire	1.01mm (0.040") stainless steel grade 302	
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Brake caliper assembly EA-002.2N(-):

Assembly screw:

Torque	25 N.m	220 in-lb
Threadlocker	medium strength (Loctite 243 recommended)	
Hydraulic fluid	MIL-PRF-87257	

Lubrication *

Piston	Thick silicone grease (-50°C to 200°C) compliant with FDA CFR art. 178.3570 (liquid grease in spray is not allowed)	
Piston seal	Thick silicone grease (-50°C to 200°C) compliant with FDA CFR art. 178.3570 (liquid grease in spray is not allowed)	


* Lubricate cylinder, seal groove, piston seal, and piston with a coat of silicone grease at each time of assembly.

Brake Disc DSC-008.2(-):

Max. coning	0.3mm	0.012 in
Max. groove or bump	0.2mm	0.008 in
DSC-008 Minimum thickness	3.8mm	0.150 in
DSC-008.2 Minimum thickness	6.6mm	0.260 in

Brake Pad PQT-009(-):

Minimum thickness of friction material	1.0mm	0.040 in
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1.3 Cleaning

The aluminium parts are protected from corrosion with an anodizing coating. This thin coating does not protect against basic agent with pH > 9.

CAUTION: Cleaning the wheel and brake parts with basic agent may remove totally the anodizing coating

Acid agent may also remove the anodizing.

For cleaning the wheel and brake parts we recommend using only water and soap or dry clothes.

1.4 Conditioning procedure

When new brake pads have been installed, it is important to condition them properly to obtain the service life designed into them. Rated brake torque value is reached only after a full conditioning of brake pads and disc.

CAUTION: Brake torque value can be only 50% of rated brake torque before the conditioning. It means that even with full brake effort aircraft will not stop as usual. Pilot must take into consideration this parameter to avoid loose of aircraft control during the conditioning procedure.

CONDITIONING PROCEDURE:

1. Taxi aircraft for 500m (1500 feet) with light brake effort.
2. Perform two (2) consecutive stops from 30 – 35 knots down to 5 knots. Apply light brake effort during these two stops; do not try to apply full brake effort.
3. Allow the brakes to cool for 10 to 15 minutes.
4. Perform two (2) consecutive stops from 30 – 35 knots down to 5 knots. Apply light brake effort during these two stops; do not try to apply full brake effort.
5. Apply brakes and check for restraint at high static throttle. If brakes hold, conditioning is complete.
6. If brakes cannot hold aircraft during static run-up, allow the brakes to cool completely and repeat steps 1 through 5.

This conditioning procedure will wear off high spots and prepare pads and disc friction surfaces. A visual inspection of disc will indicate the pads condition: a smooth surface with light and regular grooves indicates that pads and disc are properly conditioned.

NOTE: A rough surface of disc with deep grooves and isolated bumps indicates that an excessive brake effort has been applied during conditioning. In this case, bumps must be sanded and conditioning procedure repeated.

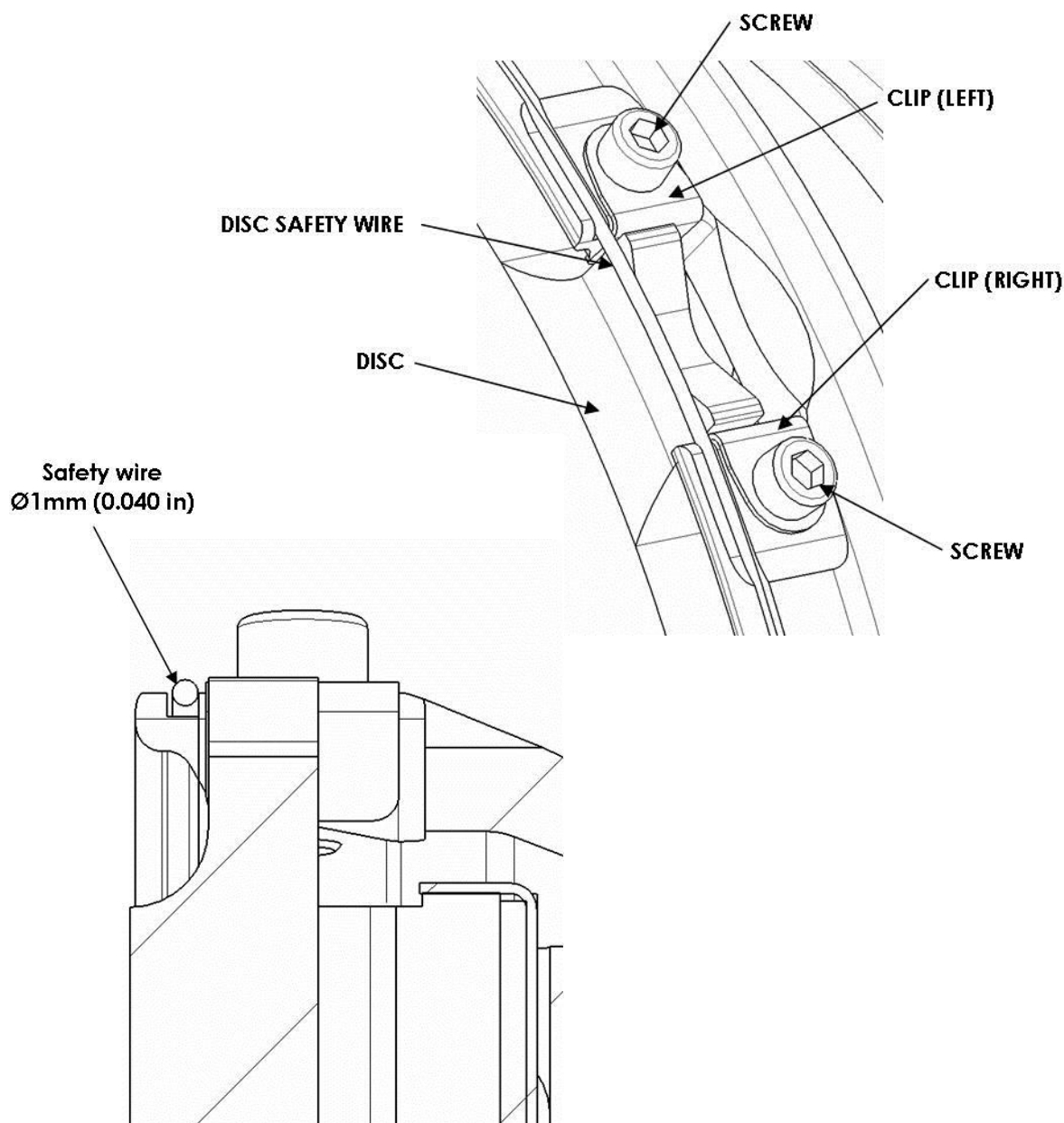
CAUTION: A wrong conditioning may affect brake performances and increase wear of pads and disc.

2 SCHEDULED MAINTENANCE CHECKS

2.1 Safety maintenance checks

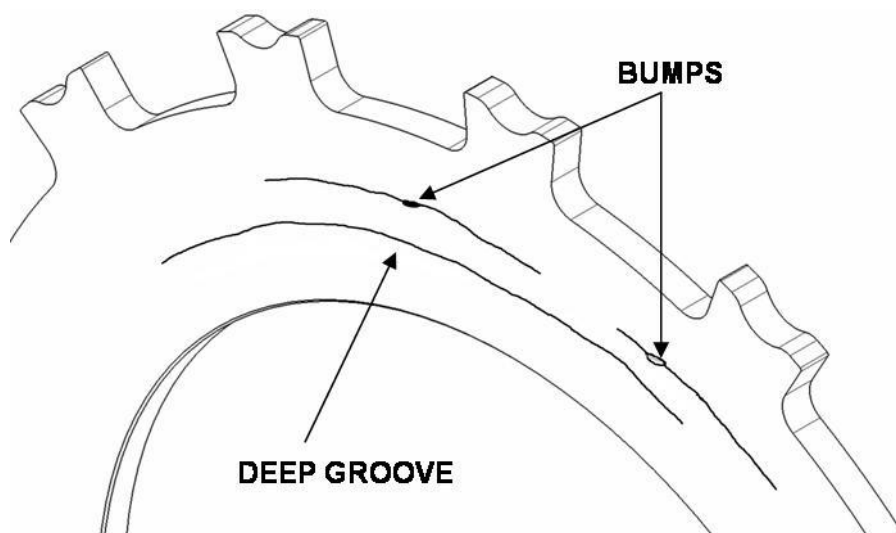
Wheel axle and his securing device must be in place.

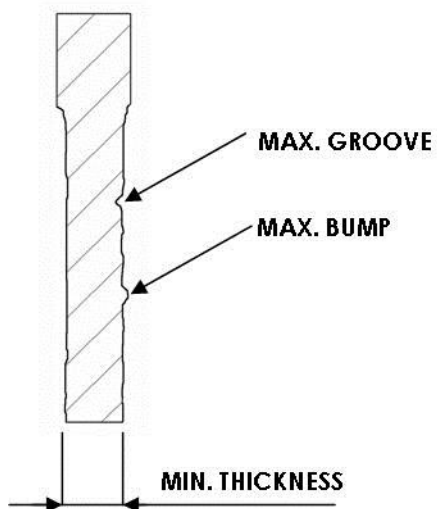
In case of a main wheel with brake, the safety wire must be in place to prevent the disc from going out the slots.



2.2 100h / Annual inspection

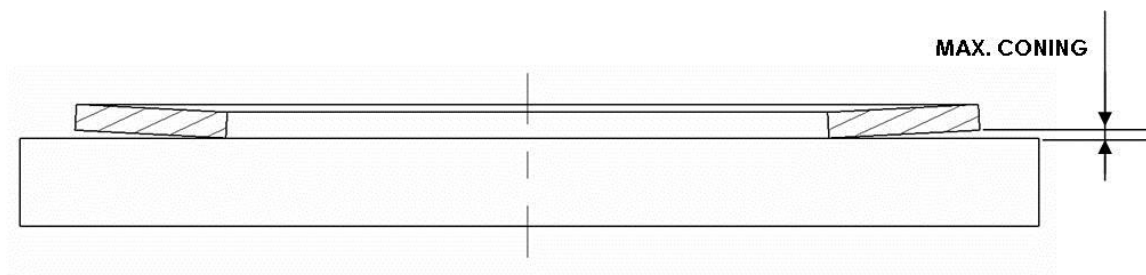
Inspection		Operation	
Component	Wear limit	100h	Annual inspection
Brake assembly	-	Apply brakes, examine system for leaks	
Brake assembly	-	Visual inspection	Check pistons retraction, check bolt torque
Brake Pads	1mm 0.040 in	Check brake pad wear	
Brake Disc DSC-008.2	6.6 mm 0.260 in	Check disc wear	Examine for cracks or corrosion Check disc wear
Wheel - Brake Disc	0.4 mm 0.016 in	Visual inspection	Check play between disc and wheel Clips
Main wheels	-	Visual inspection	Examine bearings, valve, axles and wheel flanges
Main wheel tires	-	Visual inspection Check inflation pressure and wear	
Hydraulic Hoses and fittings	-	Examine for damage, leak and corrosion	





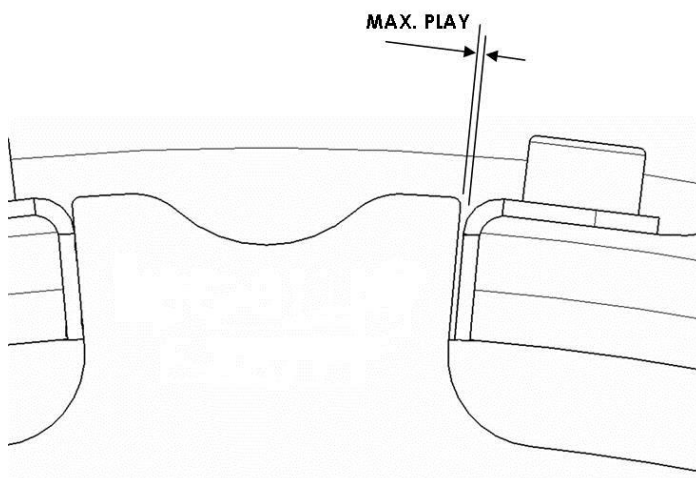
DISC WEAR LIMITS:

DSC-008.2 Min. Thickness	6.6mm	0.260 in
Max. Coning	0.3mm	0.012 in
Max. Groove	0.2mm	0.008 in
Max. Bump	0.2mm	0.008 in



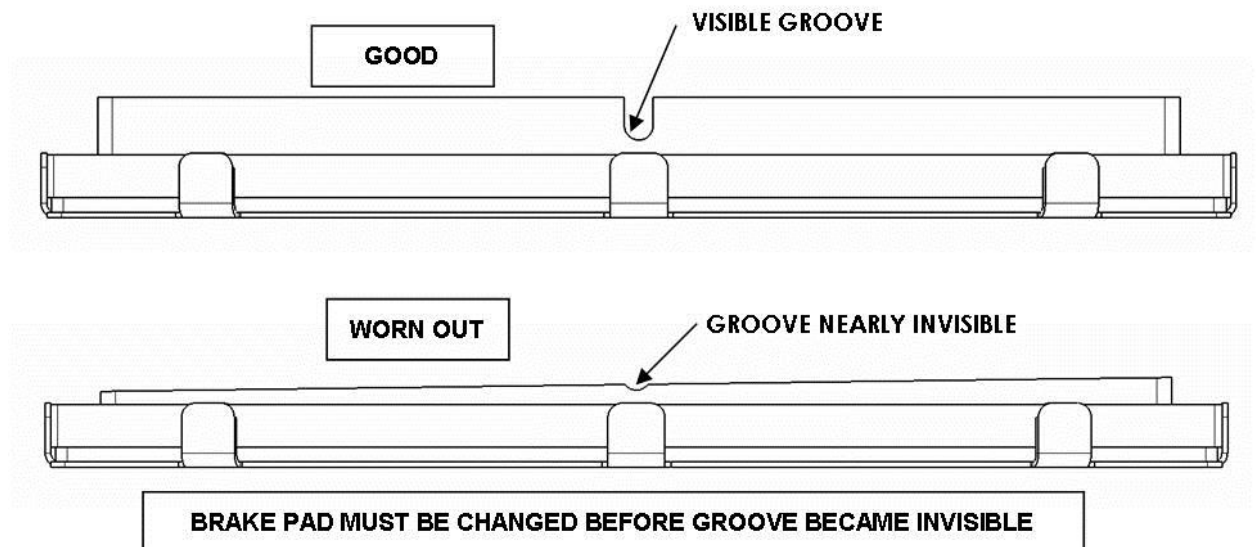
CLIP WEAR LIMITS:


Max. Play	0.4mm	0.016 in
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PAD WEAR LIMITS:

Min. Thickness groove nearly invisible
 Friction material min. thickness 1.0mm (0.040 in)




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		<i>Référence document :</i> MM-STC-012

2.3 Replacement schedule of wear parts

Replacement schedule of wear parts		
Component - item	Note	Replacement schedule
Wheel assembly bolts	a	On condition Immediate replacement if corroded
Wheel bearings	b	On condition Immediate replacement if corroded or damaged
Bearing retaining ring	-	On condition 10 years
Wheel O-ring seals	-	At each tire change 5 years
Main wheel disc clips	a	On condition If found worn, all key disc must be replaced
Brake caliper seals and pistons	b	10 years
Brake assembly screws	b	On condition 10 years
Brake pads	c	On condition After each brake disc change 5 years
Brake discs	b	On condition 10 years

NOTE:

- a All screws of the assembly must be changed at the same time. It is not allowed to change only few of them.
- b Parts must be changed by pair on both left and right sides at the same time. When new brake discs are installed all brake pads must be changed to new ones even if not worn out.
- c Brake pads must be changed all 4 at the same time even if not worn out (the 2 on left side and the 2 on right side).

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3 AIRWORTHINESS LIMITATIONS

GENERAL:

This airworthiness limitations Section is FAA approved and specifies maintenance required under § 43.16 and 91.403 of the FAR unless an alternate program has been FAA approved.

LIFE LIMITED PARTS:

The replacement time of life limited components listed next must be accomplished not later than the specified period of operation for that component.

Component	Time limit	Maintenance interval **	Complete overhaul interval **
Brake assembly	-	2500 flying hours or 5 years*	10,000 flying hours or 20 years*
Wheel assembly	-	5000 flying hours or 10 years*	10,000 flying hours or 20 years*

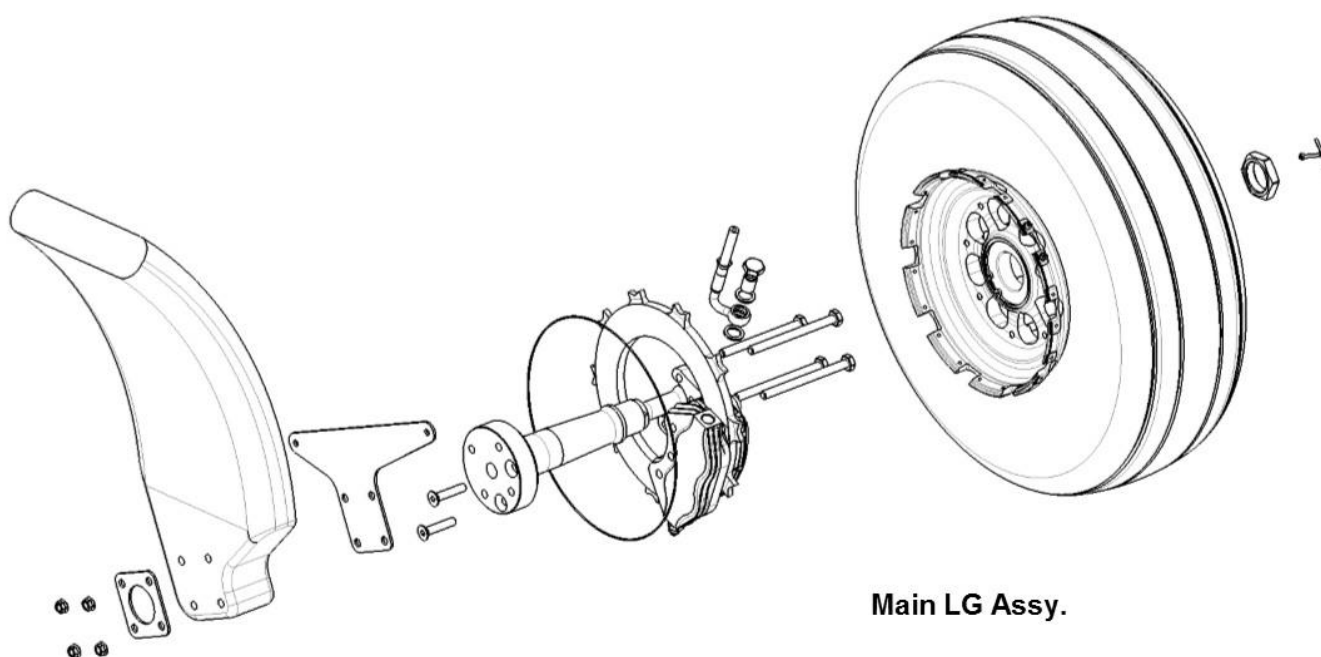
*Whichever limit occurs first

**Wheels and brake assemblies are TSO C26d/ETSO C26c approved, for detailed maintenance and overhaul procedures, please refer to next manual:

- MM-ETSO-007 Section 5 Rev.0 or later approved revision for wheel RF-018(-)

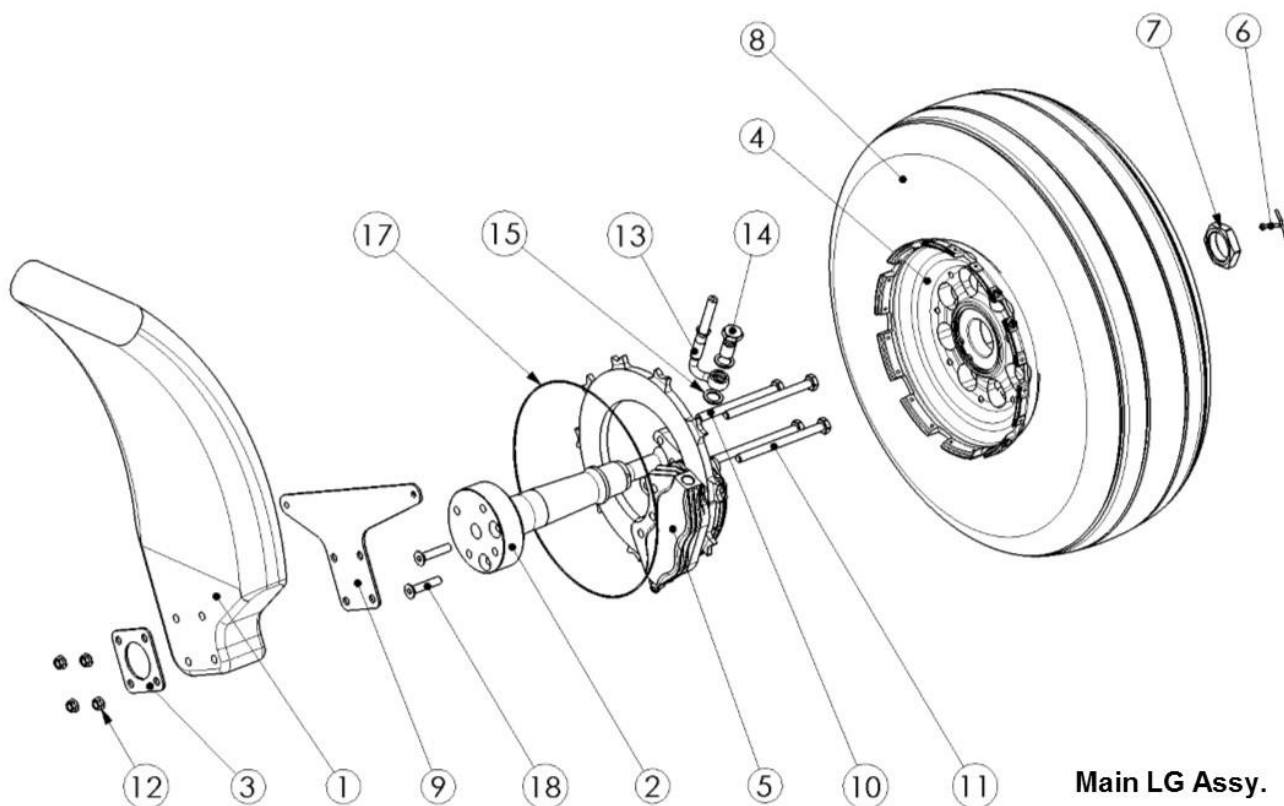
4 REMOVAL – INSTALLATION

4.1 Main Wheels and Brakes



REMOVAL:

- Remove wheel fairings
- Remove original wheel, axle and brake assy. from the gear leg
- Remove flexible hoses



18	V-FHC-003	Screw	2
17	-	Safety Wire	1
15	HYD-005B	Copper Seal	2
14	HYD-003P	Banjo Bolt	1
13	HYD-013SC	Brake line	1
12	MS21042-4	Self locking Nut	4
11	AN4-32A	Axle bolt	3
10	AN4-30A	Axle bolt	1
9	Original Part - Not included in the STC	Fairing plate	1
8	-	Tire 5.00-5 TUBELESS	1
7	ECR-002(B)	Axle nut	1
6	Original Part - Not included in the STC	Cotter Pin	1
5	EA-002.2N(A)	Brake Assy.	1
4	RF-018(A)	Main Wheel Assy.	1
3	Original Part - Not included in the STC	Axle Washer	1
2	FUS-009.3(B)	Axle	1
1	Original Part - Not included in the STC	RH Landin gear	1
REP	PART NUMBER	DESCRIPTION	QTY.

INSTALLATION:

Brake calipers are fixed at the same place as the original brake unit.

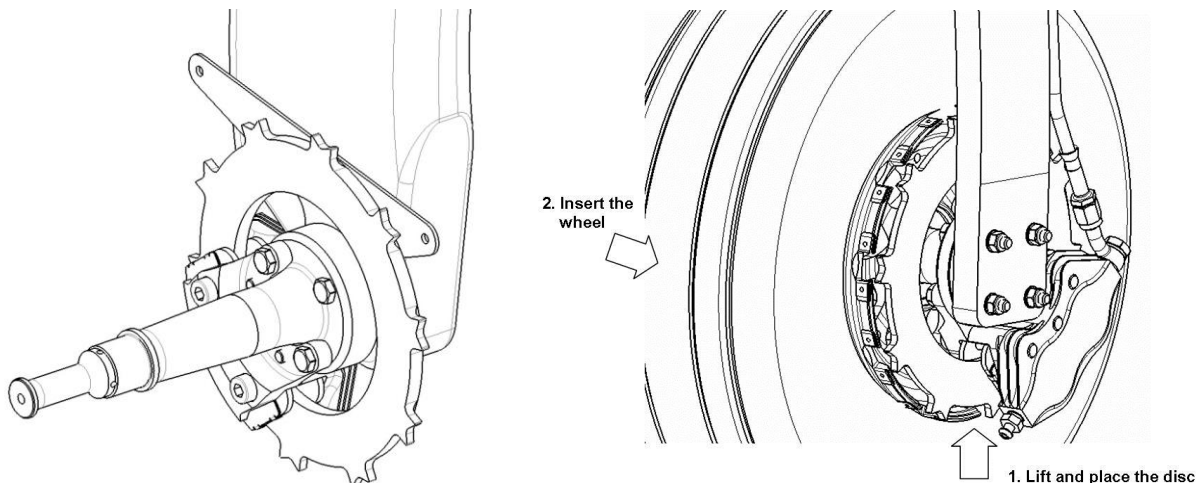
- a) Place the axle and the brake assembly in position on the gear leg; do not forget the fairing plate.
- b) Apply a thin coat of corrosion inhibitive sealant type CA1000 from PRC De Soto (or equivalent) on next contact surfaces:
 - between axle fairing plate
 - on axle bolts
- c) Install the 4 bolts, the Axle washer and the 4 self locking nuts.

NOTE: Bolt head must be on wheel side.

NOTE: There are 3 bolts size AN4-32A and 1 shorter bolt size AN4-30A

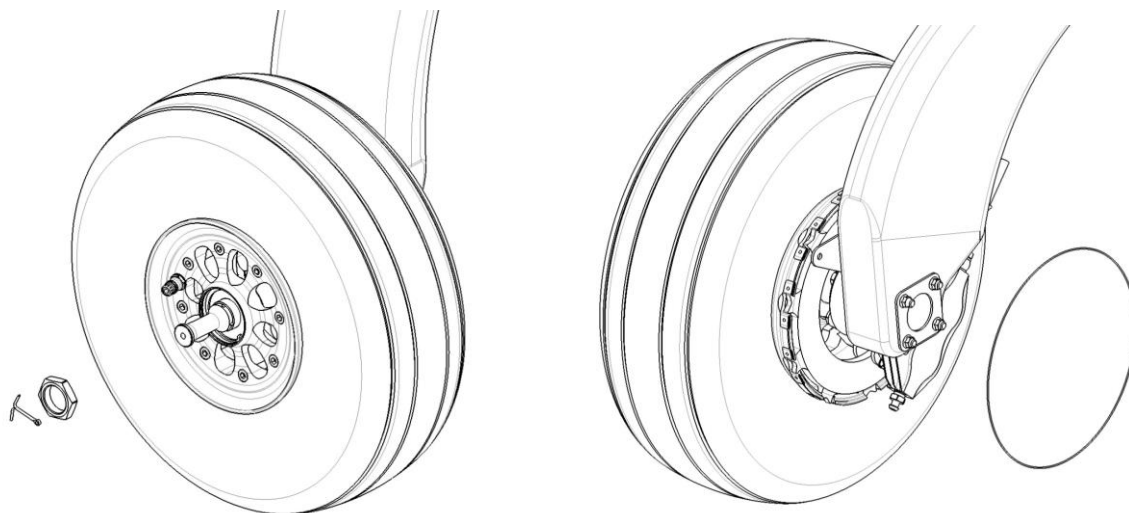
- d) Torque the nuts to appropriate torque – refer to the aircraft maintenance manuals for axle bolt torque value
- e) Apply a thin coat of grease on wheel bearings.
- f) Insert the wheel through the axle while placing the disc in wheel slots.

NOTE: Do not force, the disc has to be properly positioned to fit inside wheel slots



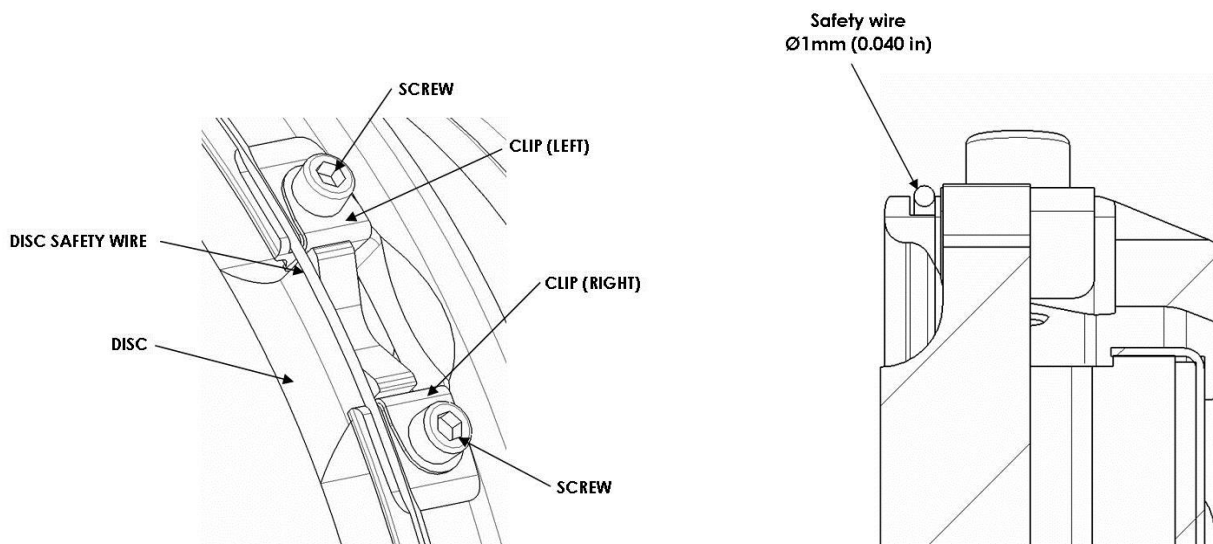
- g) Apply a thin coat of grease on axle thread. Screw the axle nut to contact
- h) Torque axle nut to 40 N.m (350 in-lb)
- i) Insert a new cotter pin to secure the axle nut

CAUTION: Cotter pin must be in place to prevent the loose of axle nut.



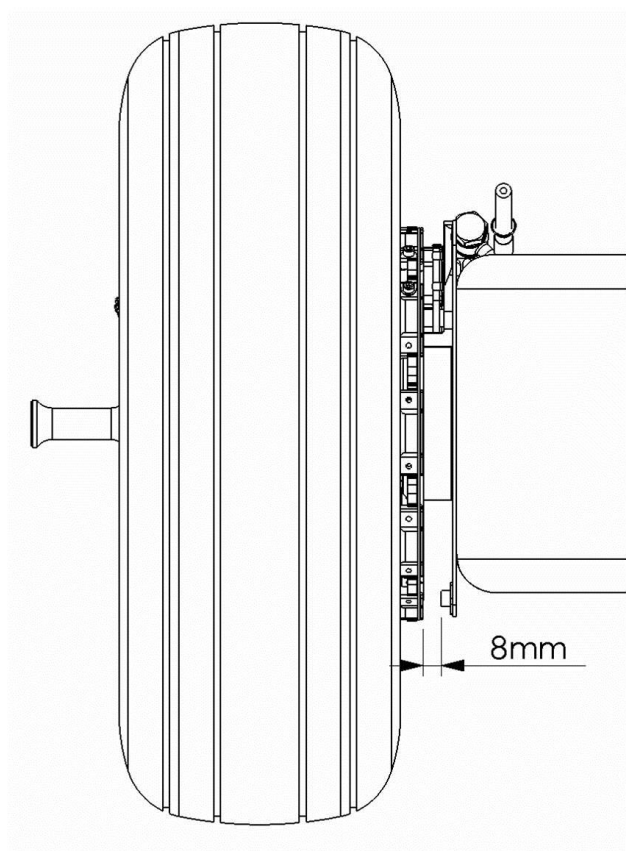
- j) Place a new safety wire (stainless steel 1mm – 0.040”) in the ring groove all around the wheel. This safety wire must be in place to secure the disc.

CAUTION: This safety wire must be in place to secure the disc.

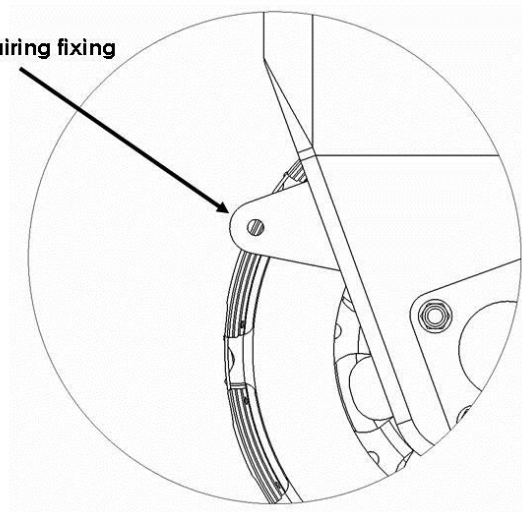


- k) After the bleeding of the brake system, install wheel fairings
- l) Install short bolts on the inner side of the fairing (fuselage side) because it may touch the wheel rim.

CAUTION: Use short bolts because it may touch the wheel rim, especially on the front screw.

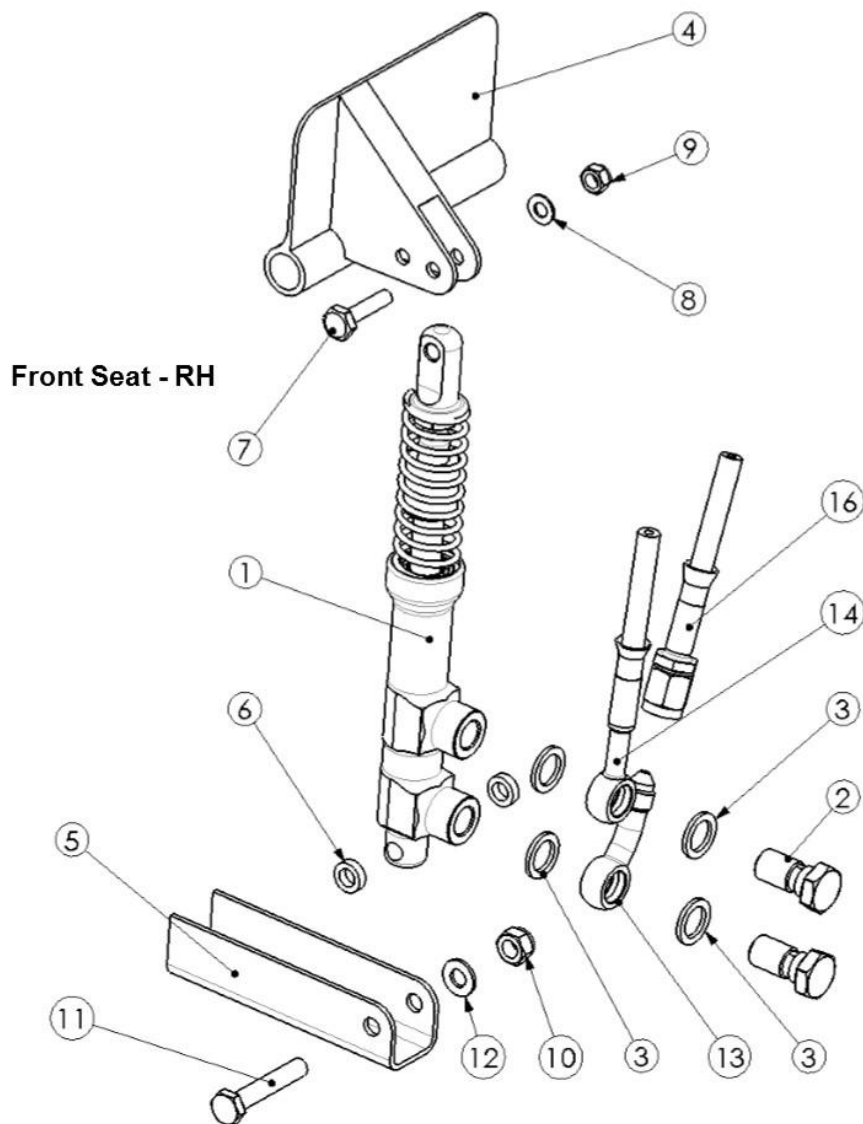


Front Fairing fixing

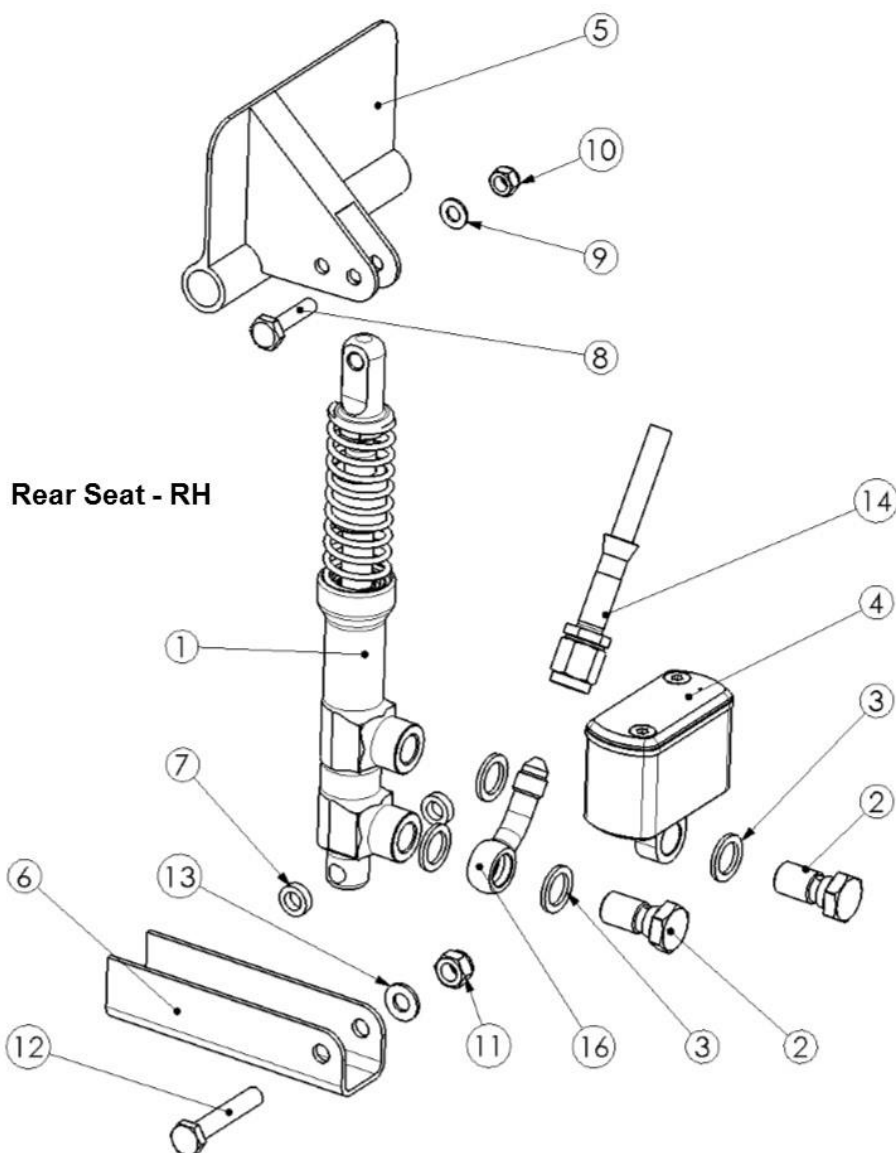


- m) Between the fairing fixing plate and the rim the standard distance is 8mm and the minimum required distance is 5mm to avoid any contact between the wheel rim and the fairing fixing screws.
- n) On the axle end (wing tip side) adjust the length with washers if required so that the fairing is in place

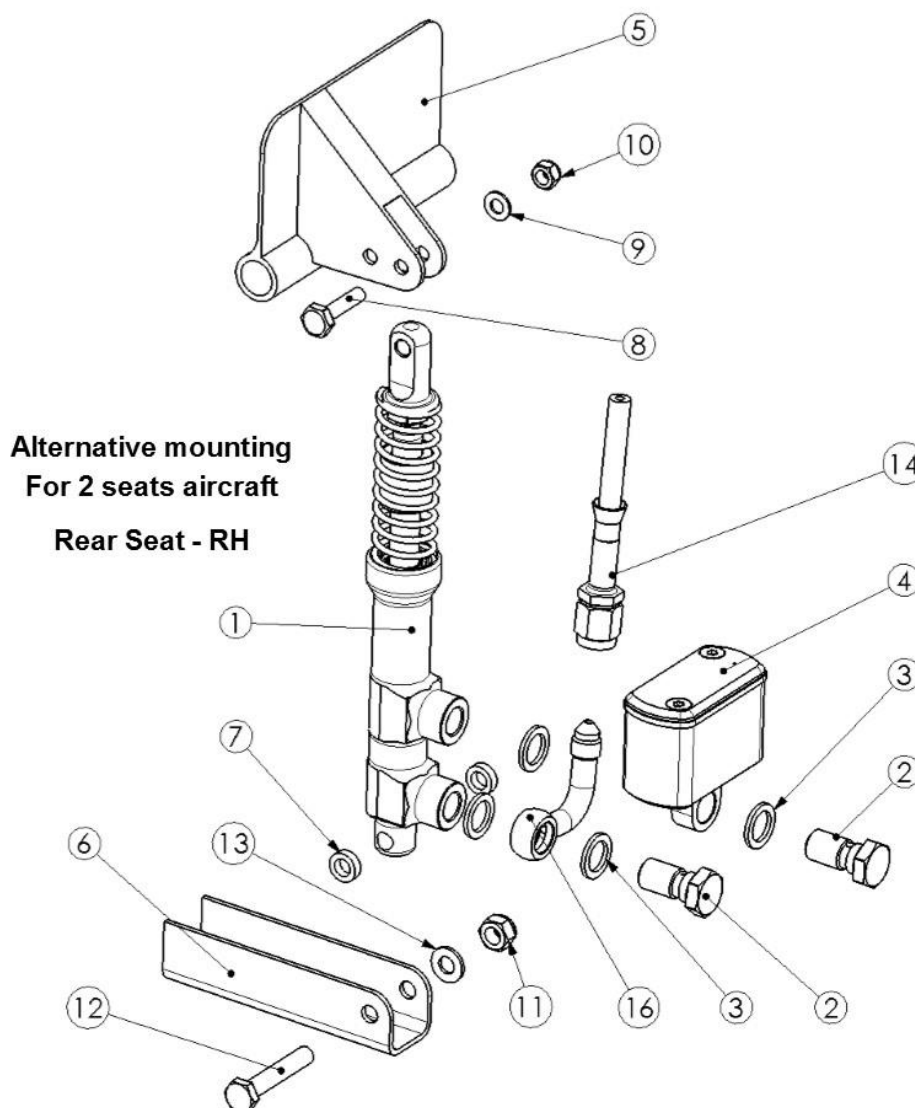
4.2 Master Cylinders



16	AV-EXT-001.1(A)	Brake line	1
14	AV-EXT-001.1(A)	Brake line	1
13	HYD-022VC	Banjo	1
12	Original part - Not included in the STC	Washer	1
11	Original part - Not included in the STC	Lower Bolt	1
10	Original part - Not included in the STC	Nut	1
9	Original part - Not included in the STC	Nut	1
8	Original part - Not included in the STC	Washer	1
7	Original part - Not included in the STC	Upper bolt	1
6	RDL-011(A)	Spacer	2
5	Original part - Not included in the STC	Lower MC attachment	1
4	Original part - Not included in the STC	Brake pedal	1
3	HYD-005B	Copper Seal	4
2	HYD-003P	Banjo bolt	2
1	MP-003.4N(A)	Master cylinder Assy.	1
REP	PART NUMBER	DESCRIPTION	QTY.




16	HYD-022VC	Banjo	1
14	AV-EXT-001.1(A)	Brake line	1
13	Original part - Not included in the STC	Washer	1
12	Original part - Not included in the STC	Lower Bolt	1
11	Original part - Not included in the STC	Nut	1
10	Original part - Not included in the STC	Nut	1
9	Original part - Not included in the STC	Washer	1
8	Original part - Not included in the STC	Upper bolt	1
7	RDL-011(A)	Spacer	2
6	Original part - Not included in the STC	Lower MC attachment	1
5	Original part - Not included in the STC	Brake pedal	1
4	RV-001N(A)	Reservoir	1
3	HYD-005B	Copper Seal	4
2	HYD-003P	Banjo bolt	2
1	MP-003.4N(A)	Master cylinder Assy.	1
REP	PART NUMBER	DESCRIPTION	QTY.



16	HYD-049VC	Banjo	1
14	AV-EXT-001.1 (A)	Brake line	1
13	Original part - Not included in the STC	Washer	1
12	Original part - Not included in the STC	Lower Bolt	1
11	Original part - Not included in the STC	Nut	1
10	Original part - Not included in the STC	Nut	1
9	Original part - Not included in the STC	Washer	1
8	Original part - Not included in the STC	Upper bolt	1
7	RDL-011 (A)	Spacer	2
6	Original part - Not included in the STC	Lower MC attachment	1
5	Original part - Not included in the STC	Brake pedal	1
4	RV-001N (A)	Reservoir	1
3	HYD-005B	Copper Seal	4
2	HYD-003P	Banjo bolt	2
1	MP-003.4N (A)	Master cylinder Assy.	1
REP	PART NUMBER	DESCRIPTION	QTY.

Alternative : HYD-049VC replaces HYD-022VC

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Same master cylinders are used on rear and front seat, LH and RH.

The original fluid reservoir is not used any more and should be definitively removed.
The new reservoirs are going to be installed directly on the rear master cylinders.

The Position of pedals remains the same as original equipment

REMOVAL:

- Disconnect inlet and outlet hose
- Remove original master cylinders from the pedal assembly
- Remove the fluid reservoir from the engine firewall
- Place the reservoir bolts with washers in their original thread and lock them
- Seal the open hole (where the hydraulic line was passing through) with high temperature silicone paste
- Remove all the brake lines with fittings they are not going to be used anymore

INSTALLATION:

- Pre-assemble master cylinders with the reservoir, banjo bolt and copper seals

NOTE: Refer to the hydraulic schema to choose the corresponding brake lines and fittings

- Torque tighten the banjo bolt to 17 N.m (148 in-lb)

CAUTION: Do not lubricate the hydraulic threads with any grease.


NOTE: If under torque is applied there may be a leakage, if over torque is applied the banjo bolt may broke or damage the internal thread

CAUTION: Copper seals cannot be re-used after being locked because they may leak. They must be changed each time the fitting is removed.

- Do checks of brake pedal to make sure it moves easily and is free of parasite friction, if necessary grease the brake pedal axle.
- Lubricate the new or polished bolts with grease MIL-G-81322

NOTE: Upper and lower bolts must be like new and free of scratches

- Lubricate inner bore of master cylinder ends with grease MIL-G-81322
- Insert master cylinder body in the pedal assembly, place the two spacers on the lower end and insert the lower bolt. Place the washer and nut. Then place and torque the upper bolt, washer and nut.

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NOTE: a small play should be observed between master cylinder body and its fixing.

- g) Present master cylinder clevis in front of pedal assembly. No lateral effort should be applied to position the master cylinder clevis at the right place

CAUTION: Wrong adjustment of master cylinder will cause premature wear, and a possible failure of master cylinder

- h) Move brake pedal and check for any parasite friction.

- i) Check that when brake pedal is released the master cylinder is fully extended

CAUTION: Master cylinder length axle to axle is 176mm (6.9 in) this dimension is adjusted at factory and should not be changed.

- j) Make sure that the bolts and nuts are properly torque and secured

- k) Do the same operation for each master cylinder

- l) Then connect brake lines to original fittings

CAUTION: Brake lines must not touch other parts or be twisted

CAUTION: Make sure that the brake lines and fittings do not touch other parts or controls in the full range of rudder pedal movement and for each of the rudder pedal position.

4.3 Brake Fluid

Brake fluid required by the new brakes is per MIL-PRF-87257. The sticker on the fluid reservoir must be replaced by the new one delivered in the kit.

CAUTION: Standard MIL-H-5606 Brake fluid is replaced by fire resistant fluid: MIL-PRF-87257, make sure that only this brake fluid is used.

4.4 Brake lines - Hydraulic Schema

Brake lines are made from Teflon and stainless steel hose braided.

CAUTION: Brake lines and hydraulic schema are different from original. Make sure that new brake lines are connected properly. The brake system will not work if brake lines are not connected properly.

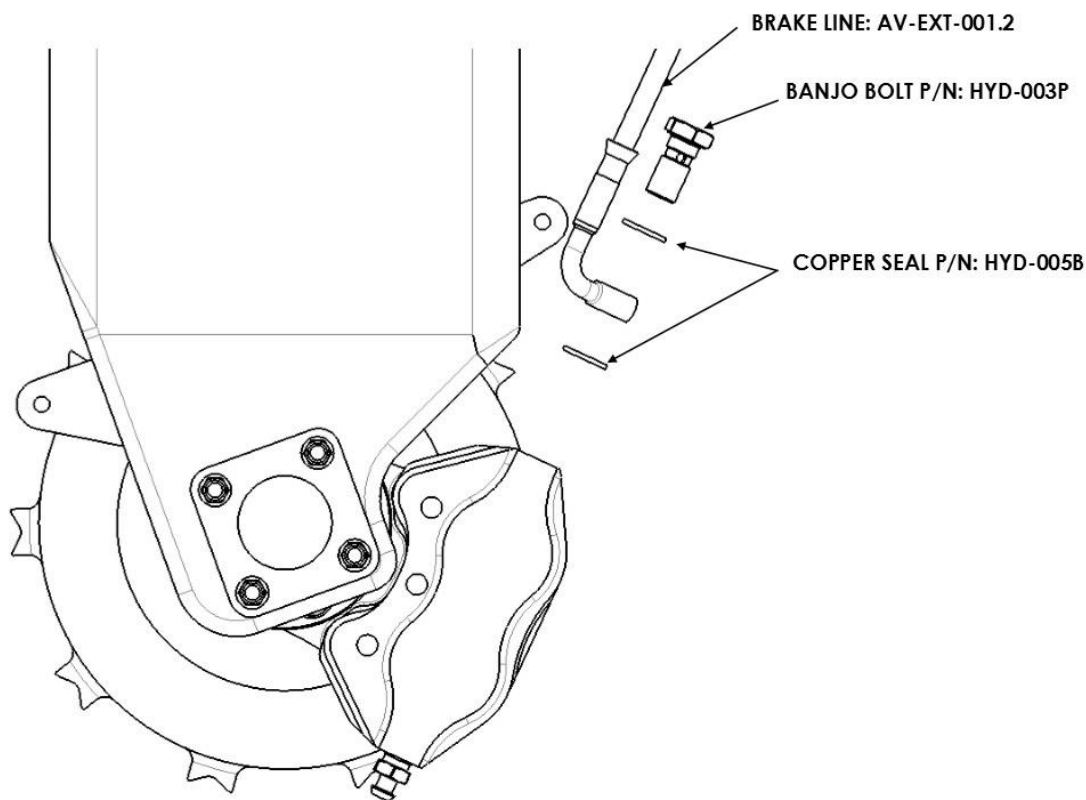
INSTALLATION:

- a) On the brake caliper : install flexible brake line AV-EXT-001.2
- b) Torque tighten the banjo bolt to 17 N.m (148 in-lb)

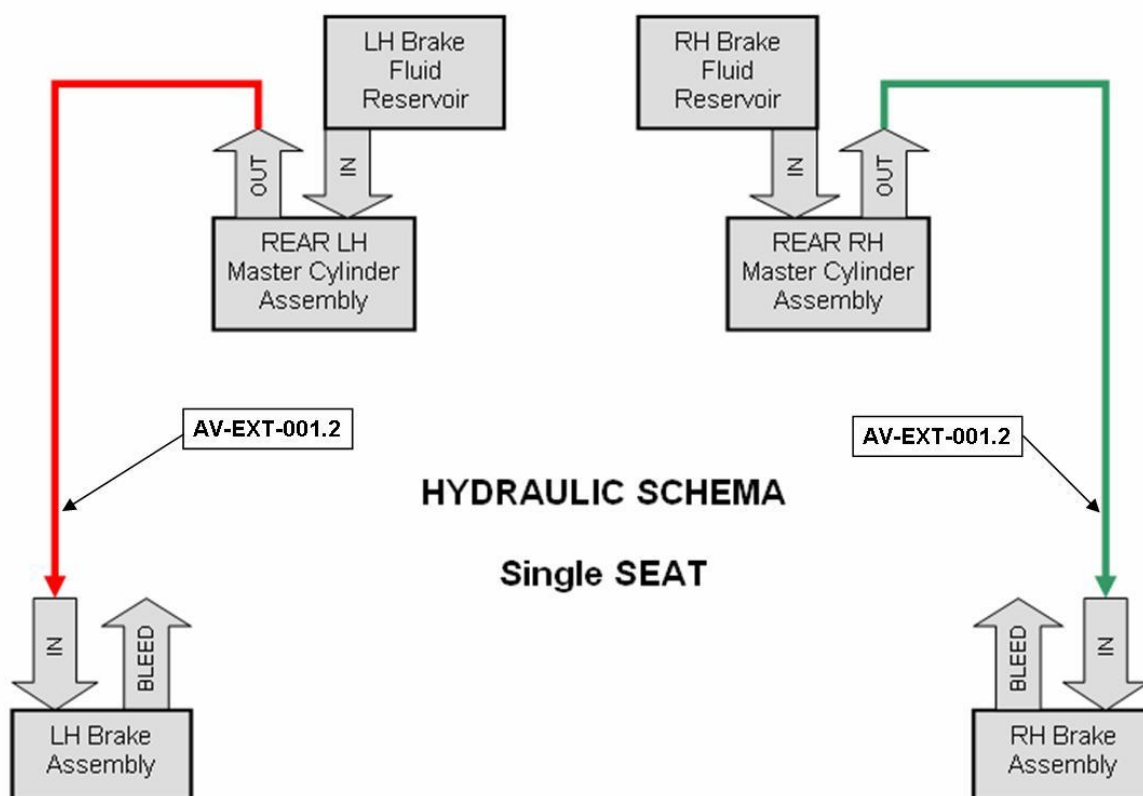
CAUTION: Do not lubricate the hydraulic threads with any grease.

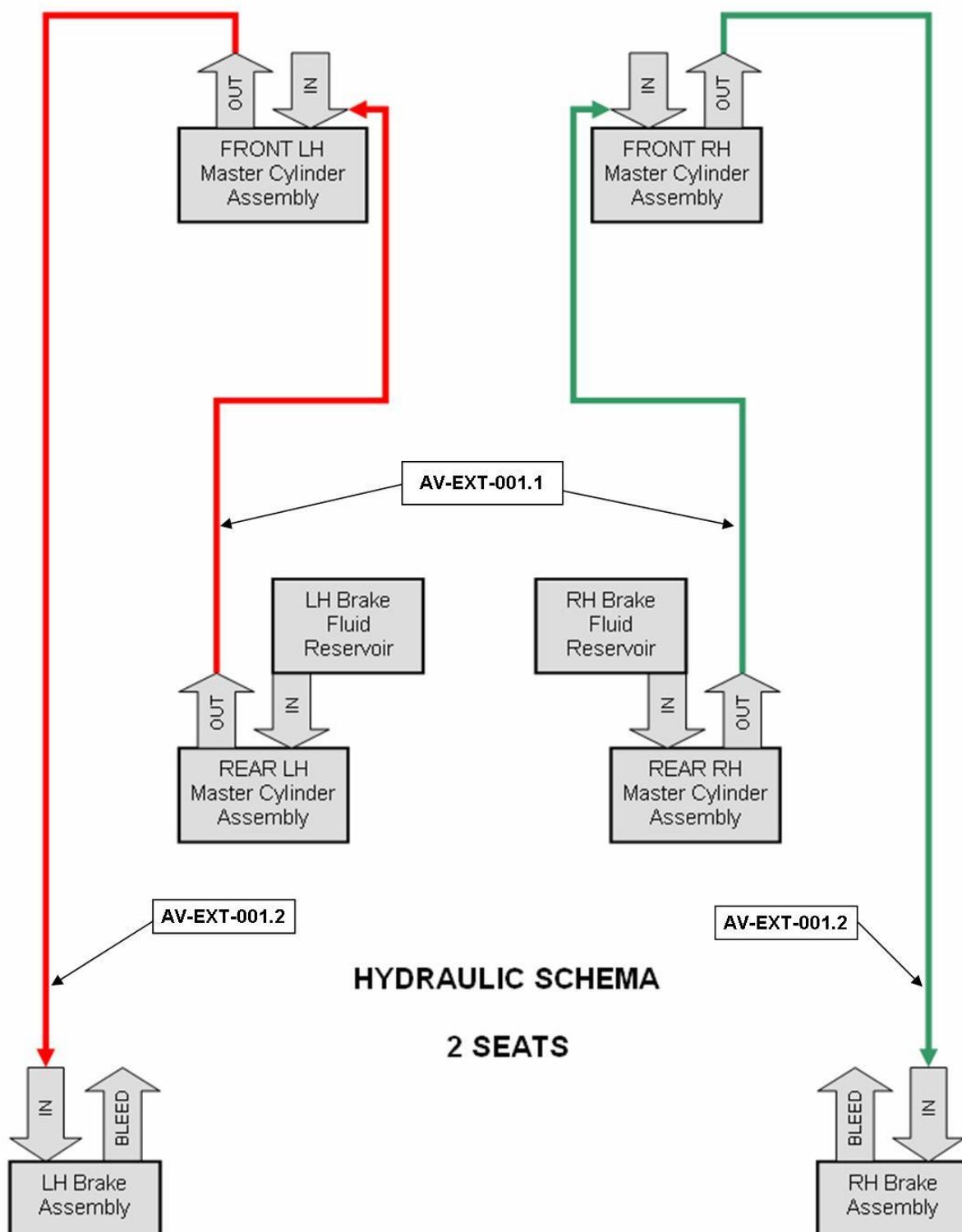
NOTE: If under torque is applied there may be a leakage, if over torque is applied the banjo bolt may broke or damage the internal thread

CAUTION: Copper seals cannot be re-used after being locked because they may leak. They must be changed each time the fitting is removed.



- c) Brake lines are going along the fuselage structure in the same location as the original brake lines
- d) Secure the brake lines with plastic straps





4.5 Bleeding procedure

Use only fire resistant fluid with the spec. MIL-PRF-87257.

NOTE: It is recommended using a Pressure bleeder pump.

- Remove the reservoir cap and fill down-up from the brake bleeder, push down and release the brake pedal 5 times while the fluid is flowing
- Let the fluid flowing for 30s and check that no bubbles appear in the reservoir.
- Close the brake bleeder and check for pedal feeling: strong pedal means the bleeding is complete. If the brake pedal is soft there is still air in the system: bleed again.

NOTE: If the FRONT pedals are strong but the REAR pedals are soft, it means there is still air in the front master cylinder. Then the front master cylinder should be actuated while bleeding.

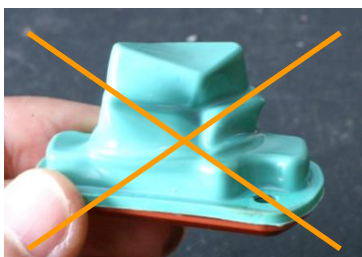
- When both FRONT AND REAR brake pedals are strong, close the bleeders and check for any leaks.

In order to provide optimum results and to avoid residual brake pressure the filling of the reservoir should be done as per the next procedure:

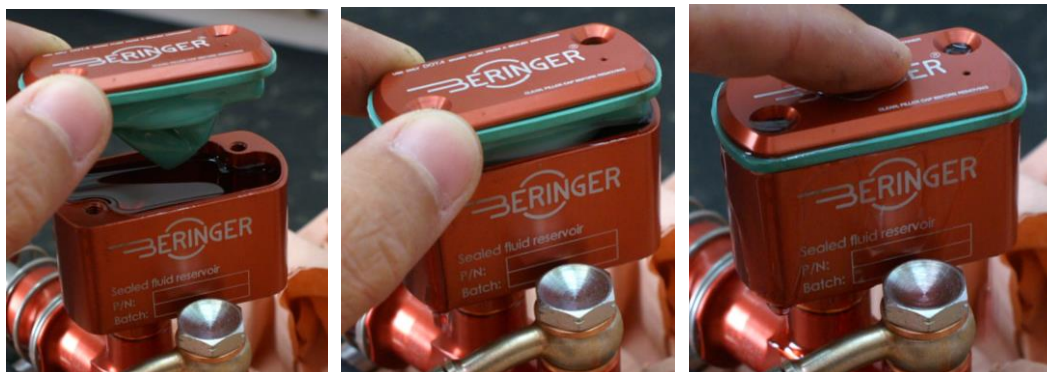
- Fill the reservoir to the top as per the next picture:



- Prepare the membrane as per the picture on the right:



- Place the reservoir cap as next pictures :




- h) Screw to contact and tighten, Clean with dry clothes



- i) Check for leaks

CAUTION: Do not use thinner to clean the parts, it may damage the seals. For cleaning the wheel and brake parts we recommend using only water and soap or dry clothes.

- j) Apply brake pressure, release and then check that there is no residual drag: the wheels should be turning freely.

 <p>Aeropole, 05130 TALLARD - FRANCE Tel: +33 (0)4 92 20 16 19 Fax: +33 (0)4 92 52 69 66 e-mail : contact@beringer-aero.com</p>	<p>MAINTENANCE AND OVERHAUL MANUAL INSTRUCTIONS FOR CONTINUED AIRWORTHINESS</p>	<p>Manuel référence : BRG-ALTP-02</p> <p>Référence document : MM-STC-012</p>
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5 MAINTENANCE AND OVERHAUL PROCEDURES

5.1 Main wheels and brakes

Main wheels are TSO C26d - ETSO C26c certified, please refer to the corresponding maintenance manual ref:

- MM-ETSO-007 section 5, Rev. 0 or later approved revision for wheel RF-018(-)

Illustrated part list and detailed procedures are described in the corresponding maintenance manual.

5.2 Master cylinders

There is no maintenance on master cylinders.

In case of damage they must be replaced by overhauled or by new ones.

Do not try to disassemble, maintenance on master cylinders can only be performed at the factory.

5.3 Axles

Main and nose wheel axles are made of aluminium with anodizing coating.

Anodizing is very thin and must not be sanded or painted.

Cause for replacement by new parts:

- signs of corrosion
- damaged bearing bore
- damaged thread
- heavy nicks or other damages

5.4 Brake lines

There is no maintenance on brake lines.

In case of damage they must be replaced by new ones.

6 SPECIAL TOOLS AND LUBRICANTS

6.1 Special tools

Plywood tool for tire change on 5" wheels P/N: OPA01

6.2 Lubricants

Tire lubricant :	lubricant for tire mounting, liquid in spray
Silicone grease for piston seals :	Use thick silicone grease compound (-50°C to +200°C) per MIL-S-8660 or SAE AS 8660 or compliant with FDA CFR art. 178.3570 (liquid grease in spray is not allowed).
Threadlocker :	Medium strength: Loctite 243 recommended High strength: Loctite 271 recommended
Corrosion inhibitive sealant :	CA1000 from PRC De Soto (or equivalent)

7 TROUBLESHOOTING

This paragraph provides information necessary to identify, diagnose and correct potential problems which may occur with the wheel or brake assemblies.

TROUBLE	PROBABLE CAUSE	CORRECTION
1. Brakes won't hold	Improper conditioning of brake pads and disc	See the conditioning procedure
	Brake fluid or grease on disc and pads	Clean the disc and change the pads
	Wrong brake fluid has caused blocking of pistons	Change all seals of the system, put the right fluid
	Pads worn below minimum wear limits	Change brake pads
	Insufficient hydraulic pressure Improper master cylinder bore	Check the master cylinder type and geometry

2. Excessive toe pedal travel, spongy pedal or lever	Air in hydraulic system	Bleed the hydraulic system
	Leak in the system	Locate leak and repair
	Improper brake lines, too expandable	Replace brake lines
	Caliper assembly bolts are not tighten	Torque bolts to proper value
	Improper adjustment of master cylinder: does not release completely	Modify the pedal geometry or length of master cylinder
	Defective seal in master cylinder	Replace
3. Brake drag	Residual brake pressure due to improper adjustment of master cylinder: does not release completely	Modify the pedal geometry or length of master cylinder
	Residual brake pressure due to excessive pressure in the reservoir	Open and close the reservoir to release the pressure
	Wrong brake fluid has caused blocking of pistons	Change all seals of the system, put the right fluid
	Improper brake assembly fixing	Inspect and repair
	Pistons do not retract	Inspect for damage, change seals and pistons
	Pads are blocked and do not release	Inspect and repair
4. Rapid disc and pads wear	Improper conditioning of pads and disc	See the conditioning procedure
	Frequent overheating of disc and pads, brake is not adapted to the use	Replace brake assembly by another model with increased energy capacity
	Excessive rusting, scoring or pitting of brake disc	Repair or replace the disc and pads
5. Cracked or distorted wheel flanges	Improper tire inflation pressure	Replace wheel flange, check tire inflation pressure
	Loads applied excess the wheel load ratings	Change wheel model for a stronger one
6. Rapid decrease of tire pressure (10 PSI per day)	Improper tire mounting, damaged seal	Disassemble and replace seals
	Leak at valve core	Replace valve core
7. Medium decrease of tire pressure (10 PSI per week)	Improper tire	Use only tubeless tires
	Scratches on sealing faces	Replace the part by a new one
	Defective valve core	Replace valve core
8. Slow decrease of tire pressure (10 PSI per month)	Standard decrease of pressure with some tubeless tires	Inflate tire to the appropriate pressure. Check inflation pressure every month.