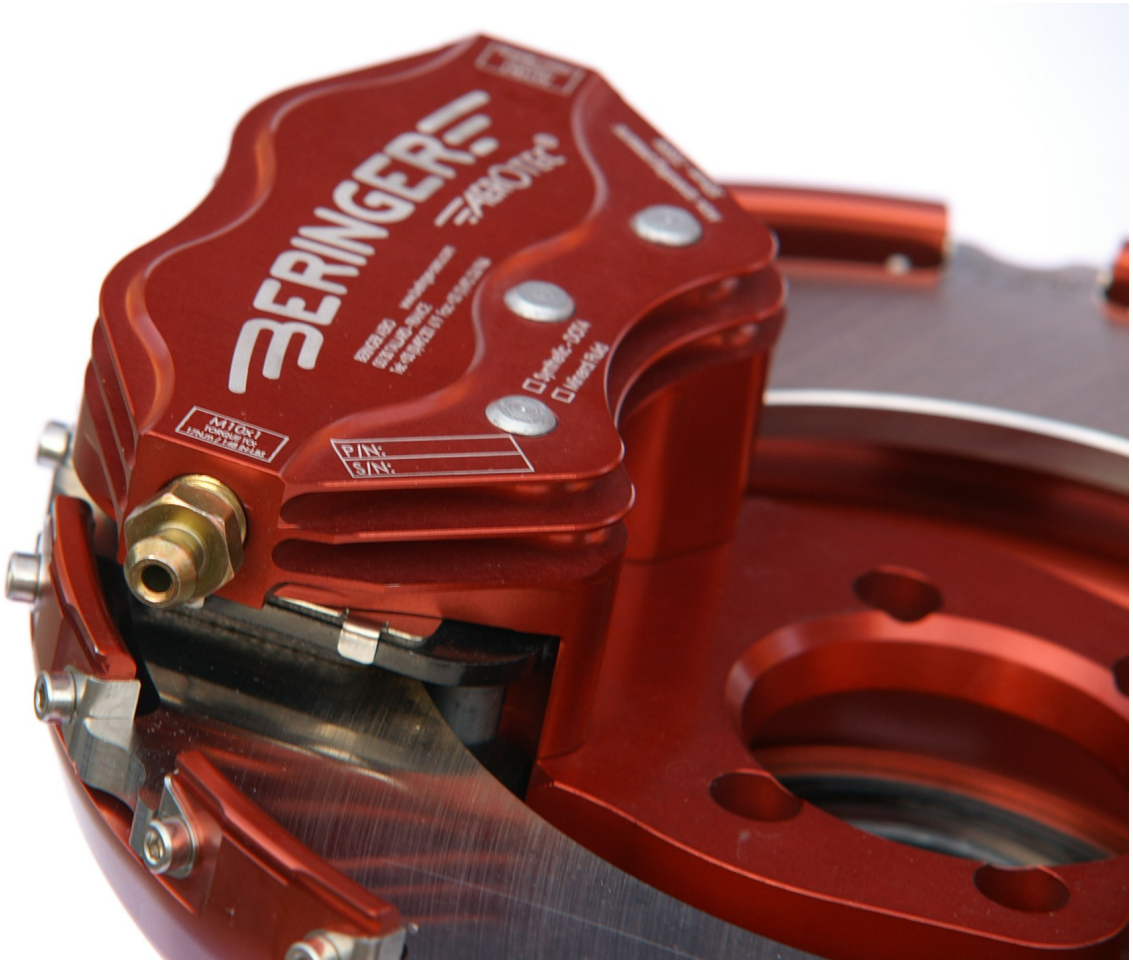
Indice B du 16-10-2013

WHEELS & BRAKES

high performance for Aircraft

Maintenance Manual



made in respect

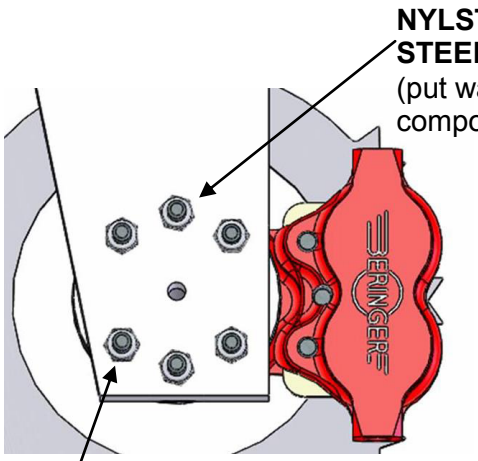
Agreements:
APDOA
POA (PART21G)

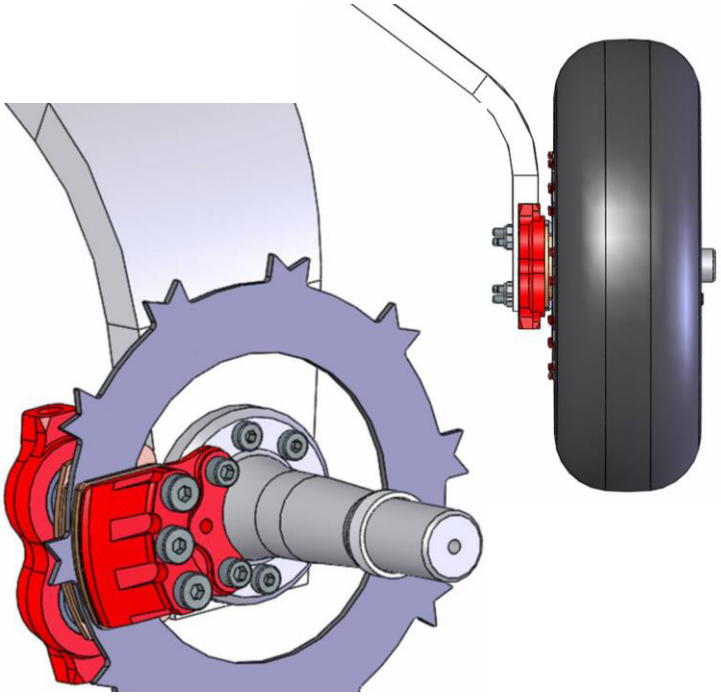
conform TRA2007 (tire and rim association)

MOUNTING & MAINTENANCE MANUAL
5" and 6" light WHEELS and BRAKES

Installation of the main wheels with brake discs and calipers on the gear leg:

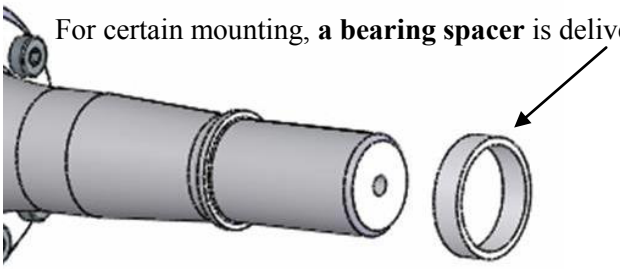
- Install the caliper mounted on the main wheel axle on the gear leg and put in the 6 screws **(screw head must be on wheel side)**
- The locking nuts must be on the gear leg side
- Put in the brake disc between the two brake pads : **YOU MUST NOT DISASSEMBLE THE CALIPER TO DO THIS OPERATION**



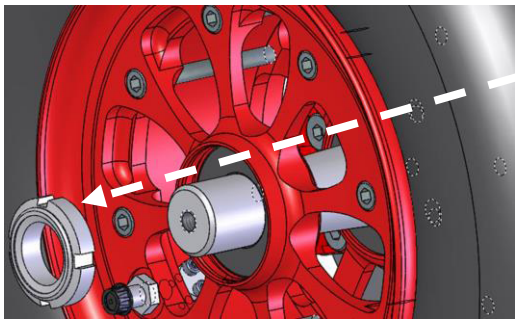


Tightening torque for the axle/gear leg linkage:
Screw 6mm = 10N.m (88 in.lb)
- screw ¼ pouce = 9N.m (80 in.lb)
- screw 8mm = 20N.m (177 in.lb)

Report to the instruction of the plane specific manual.



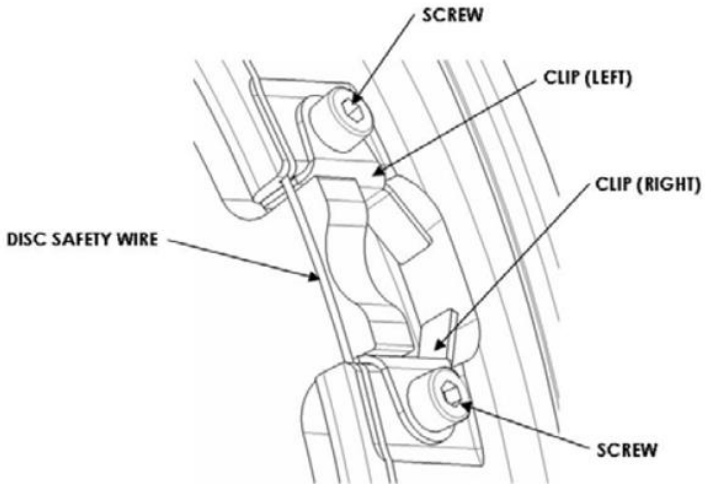
For certain mounting, **a bearing spacer** is delivered (to fit between the axle and the wheel)
- if one spacer is delivered, fit it on the axle
- put **with the hand** the wheel with the tire on the wheel. Help the disc to fit inside the slots. **Do not force**
- grease copiously the axle thread and screw the axle nut. Use the appropriate tightening tool
- tighten the screw until you feel the contact with the bearing (tightening torque for information : 25N.m)
- you must **ABSOLUTELY install the pin**



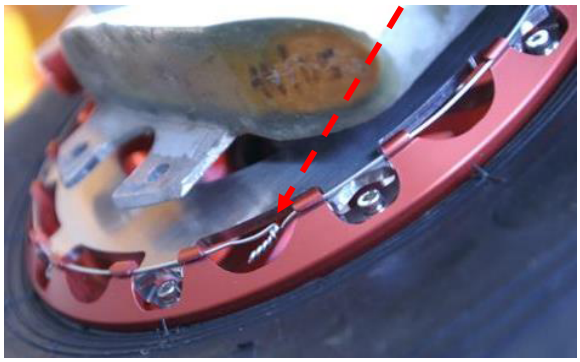
Nylstop slotted nut
ou slotted nut + pin

nut + pin





The LOCKING WIRE MUST ABSOLUTELY and PROPERLY BE INSTALLED BEFORE THE FLIGHT



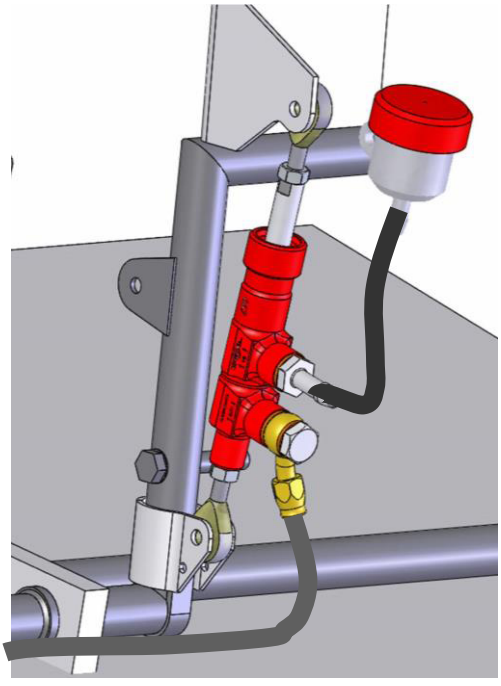
During the installation, you must check the following points:

- there is not play between the wheel and its axle
- the stainless steel locking wire limiting the disc is in place (wire diameter 1mm). **You must check at each plane check before the flight that this locking wire is in proper place otherwise the disc could go out of its slots in the wheel.**
- The wheels can freely rotate : airplane on blocks, wheel in the air, you must be able to rotate the wheel easily with the hand without special effort or hard spot.
- brakes locked, airplane on the ground , you must not be able to move the airplane.

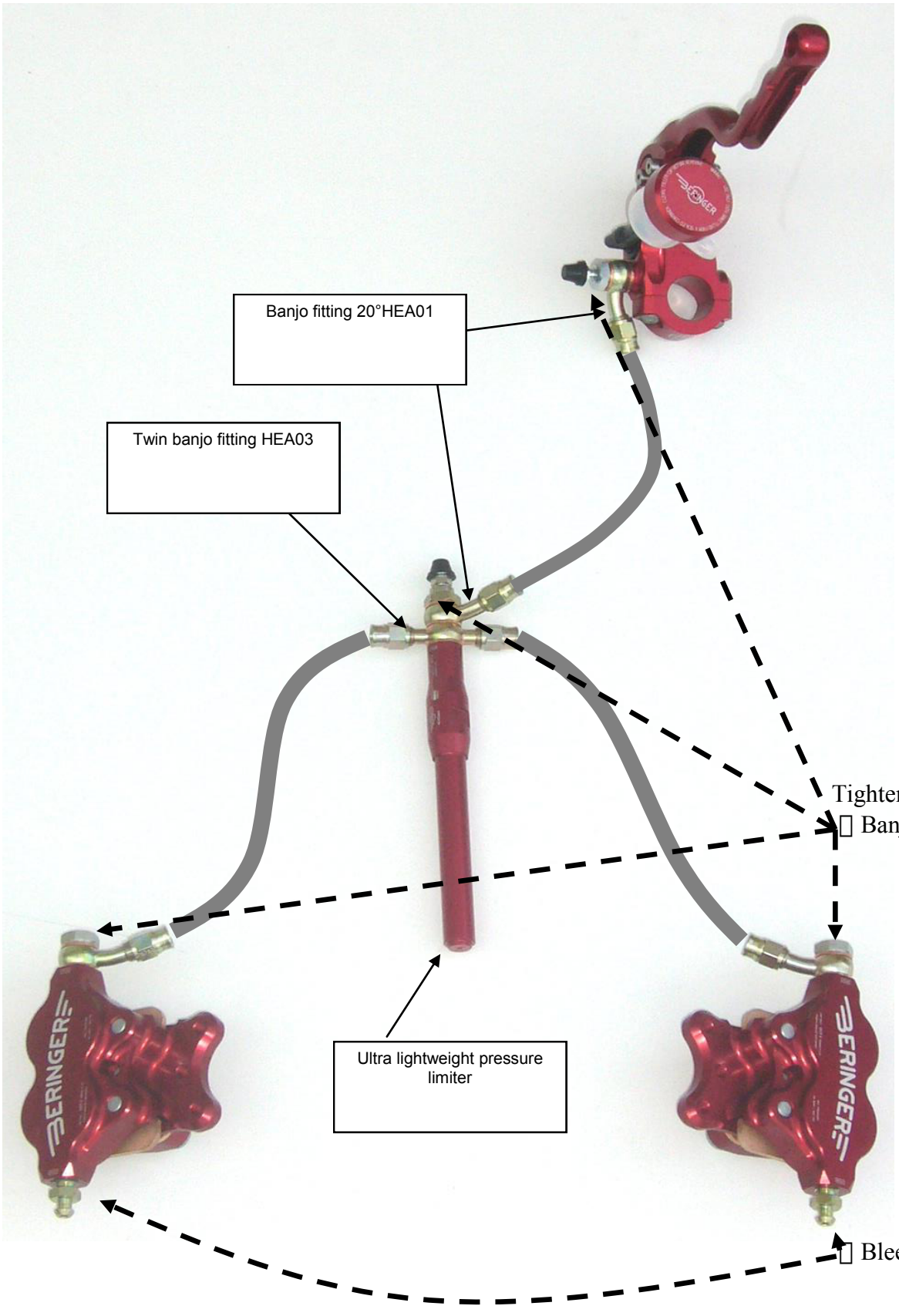
INSTALLATION of the BRAKES :

MASTER BRAKE CYLINDERS : depending on the aircraft, the master brake cylinder(s) are located on the control stick, on the pedals or between the seats and must be installed according to the state of art.

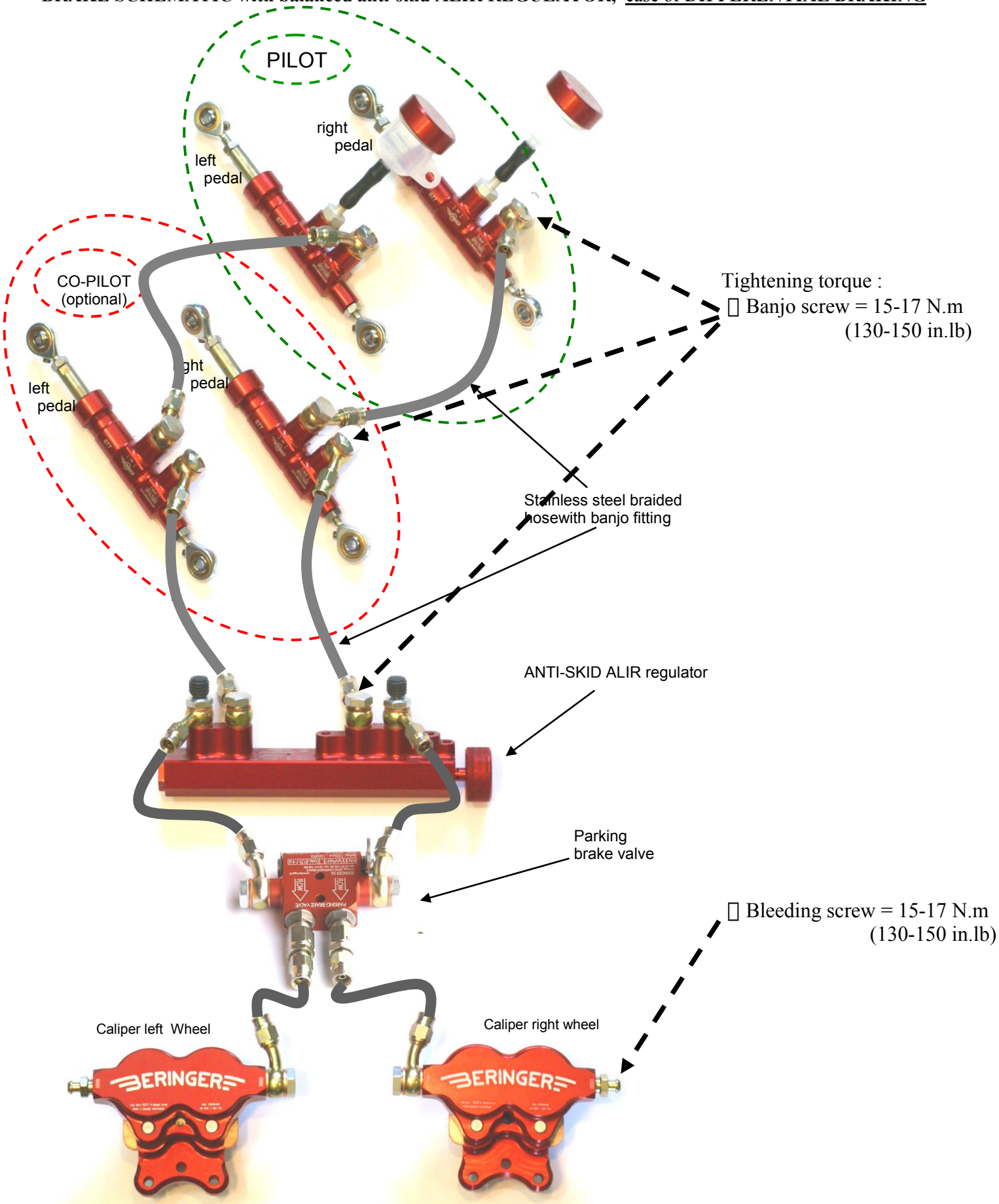




BRAKE SCHEMATIC with LIMITER, case of a **SYMMETRICAL BRAKING** (if not, report to the schematic of a differential braking system next page)



BRAKE SCHEMATIC with balanced anti-skid ALIR REGULATOR, case of **DIFFERENTIAL BRAKING**



ASSEMBLING OF THE BRAKE HOSES and FITTINGS : report to the specific instruction

BLEEDING of the BRAKING SYSTEM : when the assembling of the braking line is completed, report to the bleeding instruction. You must **USE ONLY the braking fluid indicated** on the calipers, master cylinders, limiters, regulators and parking brake valves.

HOW TO SET the ALIR REGULATOR : the ALIR anti-skid regulator can prevent the wheel locking if it is properly set.



When you rotate the thumbwheel, you change the maximum pressure available in the wheel brakes.

You look at the thumbweel in front of you :
- if you rotate it clockwise : the braking power increases
- if you rotate it anti-clockwise : the braking power decreases

The coarse setting is indicated on the top of the regulator:
As example, on the picture, the lowest pressure indicated is 20 bars and the maximum pressure 50 bars.
1 click on the thumbwheel = 1 bar
1 revolution of the thumbwheel = 5 clicks = 5 bars



Setting : **First of all, you must have done approximately twenty landings to run in the brakes** (report to the following chapter: BRAKES RUNNING IN) with the regulator set at a 20 bars pressure approximately.

Then you will do braking tests with the aircraft **at low load** to evaluate what is happening:
- if the deceleration is not enough : increase the pressure of the regulator
- if the wheels are locking : decrease the pressure of the regulator until the wheel locking disappear
- in the case of a taildragger, if the tail lifts up : decrease the pressure of the regulator

BRAKES RUNNING IN : you **MUST RUN IN properly** the brake pads and the discs to ensure the best performance and the best life time to the brakes.
Running in instruction : during 20 to 30 landings :
- brakes must be operated smoothly
- without too strong effort on the brake controls (master brake cylinders)
- without heating the brakes

nota : **TAKE CARE** that braking efficiency is reduced by approximately 50% when the brakes are new. This warning is also available when you put new brake pads and discs.

Life time of wear parts :

Wear parts :	Limit wear allowed :
Brake pads (linings)	Min. thickness : 1mm (0.039 Inch)
Replacement of the discs	Min. thickness : 2.8mm (0.109 Inch)
Replacement of the wheel protection clips (internal rim)	Play between disc and rim >0.8mm (0.0315 Inch) measured with a gauge block
Replacement of the wheel o'rings : 5" wheel : Ø118 (2x) and Ø2.8 (1x) 6" wheel in 3 parts: Ø142 (2x) and Ø2.8 (1x) 6" wheel Classic : Ø130 (1x) and Ø142 (1x) 6" wheel SL in 2 parts : Ø142 (1x)	each time you disassemble the wheel
Brake fluid : depending on which type	

Maintenance cycle : life time of BERINGER products depends on the way you use them. In any case the following maintenance cycles are maximum limits. In case of intensive use, the wear of parts must be more often checked and replaced.

Check of the different parts of the equipment:	New material	Annual check	Replacement advice
Thickness of brake pad compound	3mm	x	
Thickness of the brake disc	3mm	x	
Radial play between disc and internal rim	0 to 0.4	x	
Brake fluid level	maxi	x	
Replacement of the brake disc	neuf		5 years
Replacement of caliper pistons and piston seals	neuf		10 years
Replacement of o'ring seals, bearings and screws of the wheels	neuf		10 years

- following products: wheel, caliper, master cylinder, anti-lock regulator are safety parts. They have been assembled with strict procedures and tested to ensure a total reliability.
- Disassembling without respecting the proper procedures will cancel the guaranty.
- Consult us before disassembling any product, we will send you the adapted procedures.

IMPORTANT NOTES :

- Use only **WATER** or SOAPED WATER to clean BERINGER products. Do not use any thinner or cleaning sprays, it will damage the seals. Do not use any grease or lubricants that are not prescribe by BERINGER, they may be not compatible with seals.
- In case of problem, contact us before doing anything on the products.
- Use only the type of brake fluid indicated on the parts from a sealed bottle in our brake parts.

Assembly instructions for hose and banjo fittings

Dossier ref: MONT_BJO
Equipment concern: Brake hose and Banjo fittings

Révision	Description	Date
3	Modification address	05/12/2012

1) Preliminary:

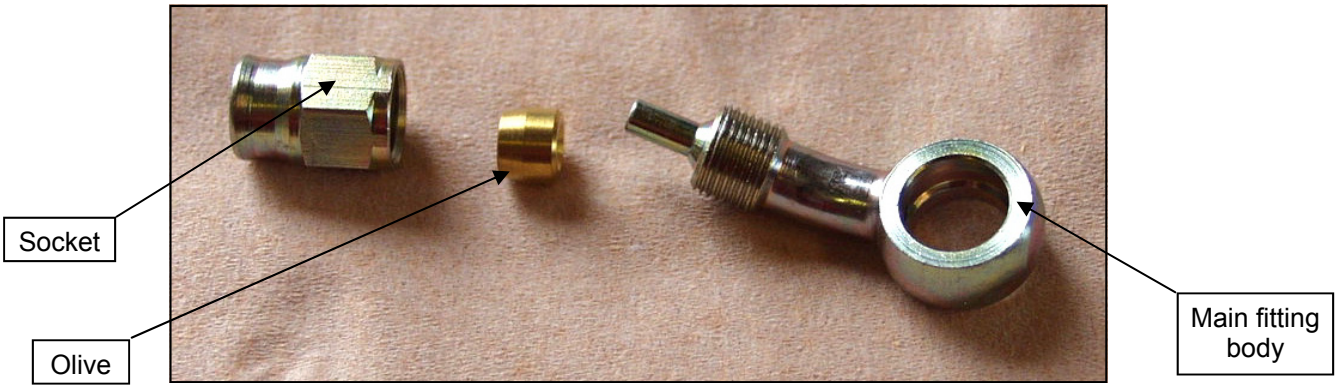
Tools needed to make a brake line:

- click-type torque wrench
- fine screwdriver
- Cutter plier

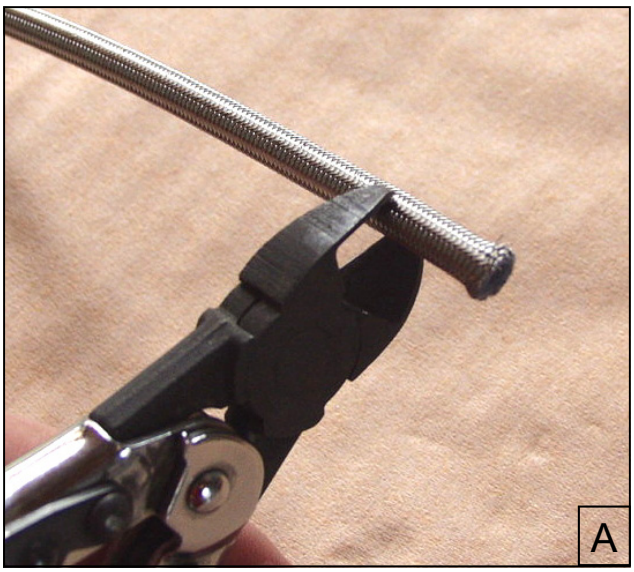
2) Safety instructions:

Brake lines must be made carefully. In the purpose to ensure an optimal safety of the brake system, the lines must be done as describe next.
In case of any question or problem, please contact BERINGER.

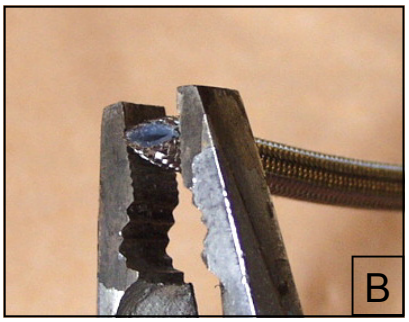
1 A banjo fitting is made of the 3 following parts :



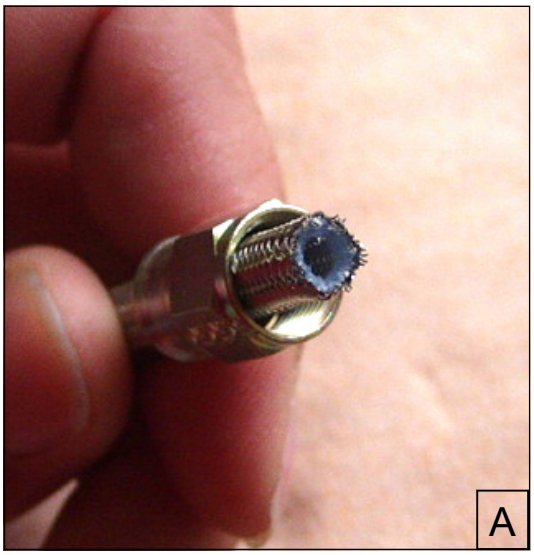
2 Cut the hose to the required length :

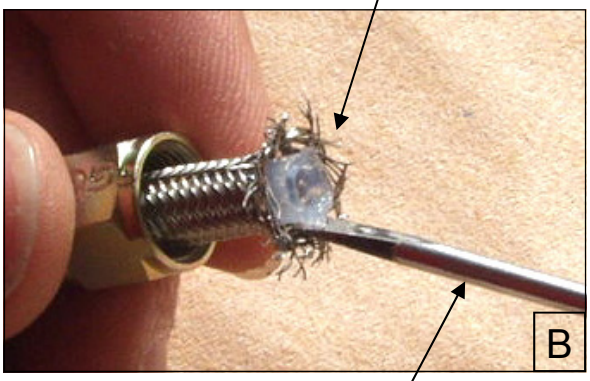


- Using a fine tooth saw blade or cutter plier, cut hose to the required length.
- Clean any loose debris from both the cut ends and inside the hose.
- Then use a flat pliers to make the hole circular, as shown on the picture below.

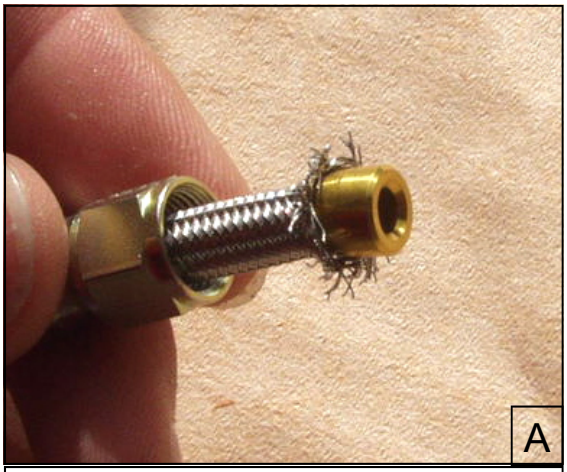


3 Push one socket over the overbraid working and flare out end of stainless steel from the PTFE inner tube.

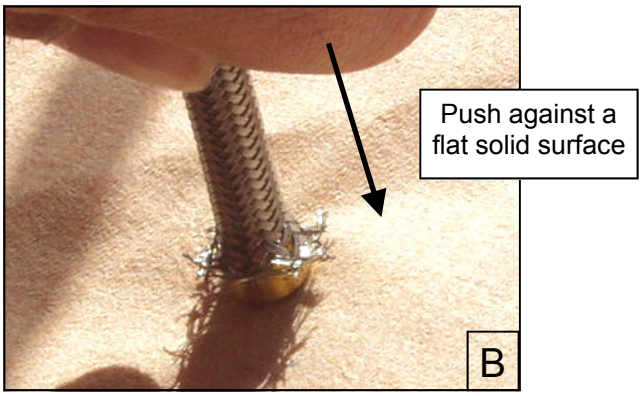


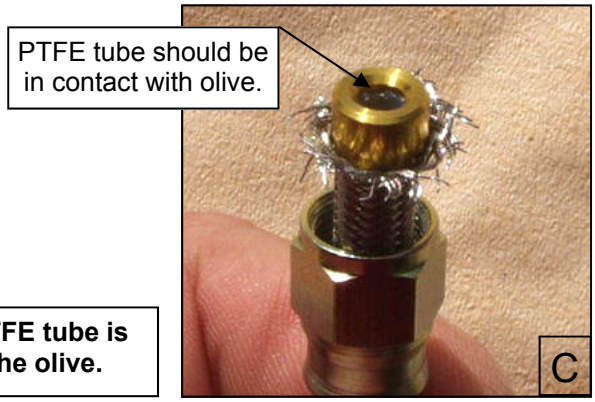


4 Insert olive



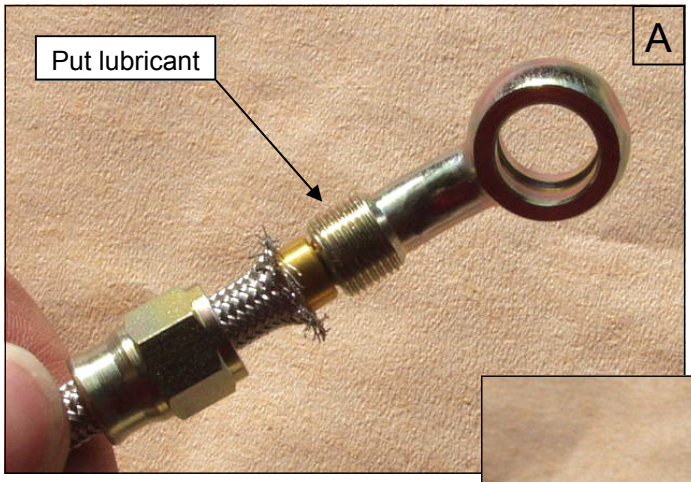
Push the olive onto the end of PTFE inner tube and under the stainless steel.
Make sure that all stainless steel filaments are outside the olive.





Make sure that PTFE tube is fully homed in the olive.

5 Insert main fitting body

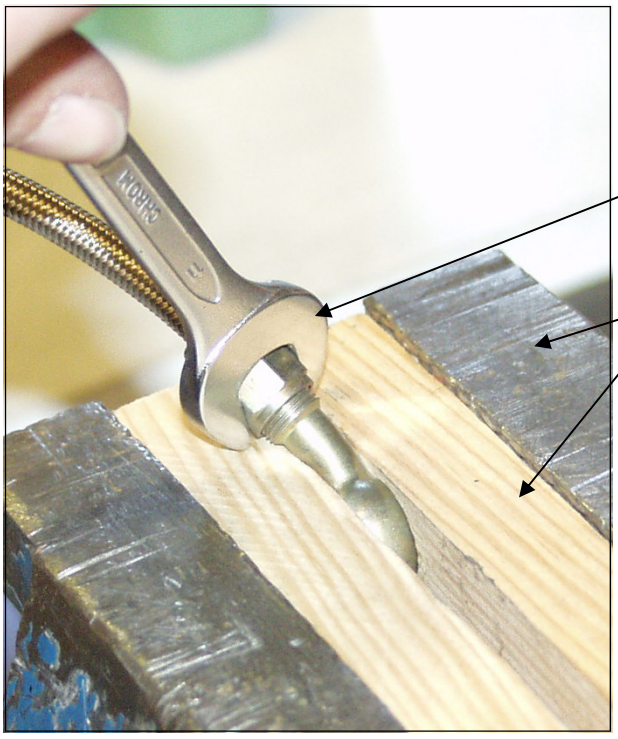


Push between hands the main fitting body and hose as shown on left picture.



Turn with hand the main fitting body to start thread the socket as shown on right picture.

6 Finish tightening the socket onto the fitting



Torque tightening the socket at 10N.m to 15N.m
(90 IN-LBS to 132 IN-LBS)

Vice with wood plates to preserve the main fitting body

BRAKE SYSTEM BLEEDING PROCEDURE

18-03-2013

A. Bleeding of the braking system

1 Tools

USE ONLY the brake fluid indicated on the parts

Tools:

- Pressure bleeder kit
- lots of rags

DURING THE BLEEDING PROCEDURE, Master cylinders and regulators MUST be positioned horizontally with the screws up.

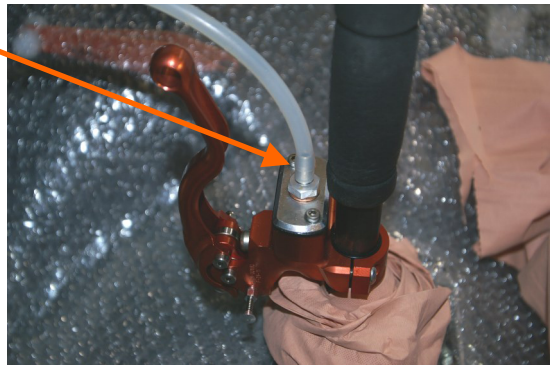
2 Method

To bleed the brake system consists in removing all air bubbles.
If bleeding is not done properly, bubbles can stay in the brake system. It will result in poor brake performances, or no brake torque at all.

Next are some recommendations:

- open the reservoir of the master cylinder : remove the reservoir cap and replace it with the proper cap delivered in the bleeding kit. Then connect the small bottle to the cap as shown on the photo.





- Open the bleeding screw of the caliper
- Connect the pressure tank to the bleeding screw of the caliper as shown on the photo and protect CAREFULLY the brake disc and the brake pads from the brake fluid.





- Fill in the pressure tank with brake fluid
- Pump the handle of the pressure tank to reach a 15psi pressure
- The fluid goes up fom the caliper to the rmaster cylinder reservoir

BRAKE SYSTEM BLEEDING PROCEDURE

18-03-2013

- When the reservoir is full, the extra fluid goes away to the small bleeding bottle through the transparent hose. You can see the air bubbles leaving the circuit through this hose.
- The bleeding operation is completed when no bubble can be seen any more in the hose

At this step, you should have some brake pressure when pulling master cylinder lever.
If you feel no effort at all on the master cylinder lever, that means too much air bubbles are still in the brake system. Repeat the operation taking care that you still have fluid in the tank under pressure.

- to help the bleeding process, release and pull lever 5 -6 times and check if lever is harder to pull (or push) than before.

When the bleeding is completed on the first wheel:
- Close the bleeder screw of the caliper
- Disconnect the hose of the caliper
- Repeat the same operation on the other wheel.

When the bleeding is completed on both wheels.
- Disconnect the hose of the bleeding bottle
- Remove carefully the bleeding cap of the reservoir
- Replace it with the normal reservoir cap

Air bubbles stay always at upper points

Check your brake lines

Bleeders should be at each upper point of brake system

Do not use thinner or equivalent, it will damage seals

Clean only with dry rags or with soaper water

B. Security check before flying

it is necessary to check next points before the first flight

- All bolts and nuts must be torqued to appropriate value and locked with wire.
- Distance between controls and new parts must be checked.
- Wheels must turn freely on the axle (2 revolutions min. when turning with hand).
- Safety wire around the disc must be in place.

- Level of brake fluid adjusted to maximum (indicated on reservoir).
- Clean brake fluid with dry rags.
- Place lever in parking position during 15min and check eventual leakage of fluid around parts and fittings. Torque again if necessary.
- Place lever in parking position and check that plane cannot be moved by 2 -3 persons.

On the ground:
- Check brake efficiency: performs 2 -3 stops at low speed on taxiway (do not perform more than 2 -3 consecutive brakings, system can overheat).
- place lever in parking position and apply engine power: the plane should not move at all, even at full power.
- After theese tests, check again that wheel are turning freely when brakes are released (2 revolution min. when turning by hand).

ATTENTION: Brake efficeincy can be surprising. Make sure than you can control the new brake system before flying.

For any question, please contact directly BERINGER AERO

Procedure to change tyre on the BERINGER wheel

5.00 -5 light , 4.00 -5 light , 4.00 -6 light,
6.00 -6 light, 4.00 -6 classic et 6.00 -6 classic

File ref: MONT_R5_2
Equipement concerned: roue 5.00 -5 4.00 -5 4.00 -6 6.00 -6

Revision	Description	Date
6	Mod. of address	04-12-2012
7	Graissage joints	12-06-2013

1) Preliminary

Tools needed to change the tyre:

- Click -type torque wrench
- Loctite 243 (blue)
- Thinner
- Tyre mounting lubricant "TYRE UP" or "MICHELIN BIB'UP" réf. ONA01
- Special tool: 5" wheel Tyre change tool réf. OPA01
  O-ring kit réf. KDF01
  6" wheel Tyre change réf. OPA02
  O-ring kit réf. KDF02

2) Remove tyre procedure

1 Deflate the tyre to zero pressure, unscrew the needle valve.

2 Separate the tyre from the 2 sides of the wheel, specified below:





- Press the tyre with a clamp until the separation with the wheel. .
  CAUTION : Do not pry on the side of the wheel.
- Turn 90° and press again.
- Continue turning 90° and pressing till the tyre is totally separated.
- Use tyre mounting lubricant to facilitate the separation of the tyre.



- Invert the wheel and do the same operation.
- Use tyre mounting lubricant to facilitate the separation of the tyre.

3 Check that the tyre is totally free from the wheel:
The tyre can rotate on the wheel by hand turning. It is recommended to spray a tyre mounting lubricant to make the separation easier.

4 Remove the M6 screws and lay them on the work -bench, as detailed on the photos.





5 Extract the side of the wheel which has the disc brackets, see photos below:



Revert the whole wheel with the tyre delicately.



Pull up delicately by hand the side of the wheel with disc brackets.

CAUTION : No extra force is needed if the tyre is correctly separated.

BE CAREFUL to the O -ring



6 Remove the tire from the 2 other parts of the wheel, as detailed below.



Spray tyre mounting lubricant between the tyre and the wheel.



BE CAREFUL this operation is delicate !

Pull up the tyre and push the wheel at the same time with the thumbs.

7 When the tyre is removed, clean all the parts. The wheel is ready for mounting a new tyre, as detailed after.

CAUTION :
Use brand new O -rings clean and lubricated with grease for bearings when you change the tyre.



3) New tyre mounting procedure

NOTE : - Mounting correctly a brand new tyre is not possible without the special tool: Ref. OPA01 (5" wheel) et Ref. OPA02 (6" wheel).
- A proper mounting could not be guarantied without using this special tool.

All the parts must be clean and dry



1

Special tool for tyre mounting



2

Remove the needle valve with the appropriate tool as detailed above.

BE CAREFUL : The steps 3,13 and 14 following, for the tyre mounting, are different depending on the Light and the Classic wheel.

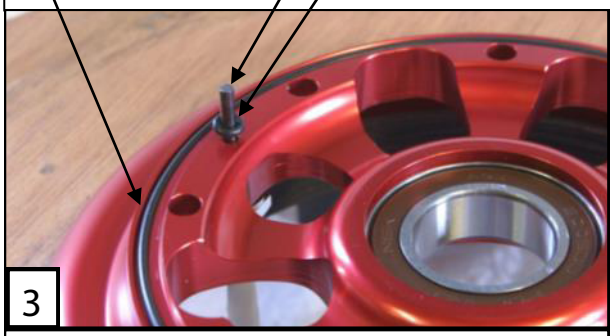
Wheel 5.00 -5 light , 4.00 -5 light , 4.00 -6 light and 6.00 -6 light



Large O -ring

Ø 3mm axle without sharp edges

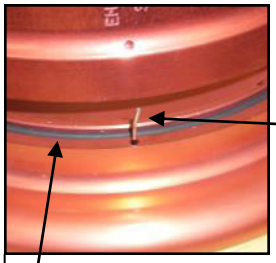
Small O -ring



3

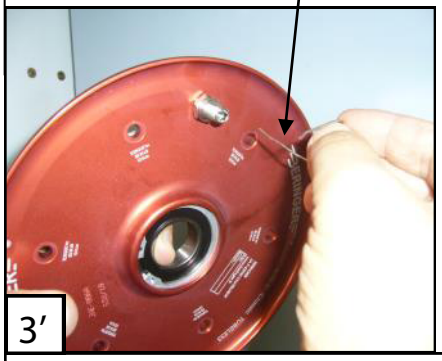
- ☐ Insert a Ø 3mm axle without sharp edges in the valve hole.
- ☐ Insert the small O -ring (clean and dry) on the Ø 3mm axle.
- ☐ Check that there is no dirt in the ring groove.
- ☐ Insert the large O -ring on the side of the wheel (clean and lubricated).

Wheel 4.00 -6 classic and 6.00 -6 Classic



Wire without sharp edges

Large O -ring



3'

- ☐ Insert a wire without sharp edges in the valve hole.
- ☐ Check that there is no dirt in the large O -ring groove.
- ☐ Insert the large O -ring on the side of the wheel (clean and lubricated).



4

Place the wheel spacer on the wheel flange and press by hand, as shown above. Check that the 2 parts are in contact.



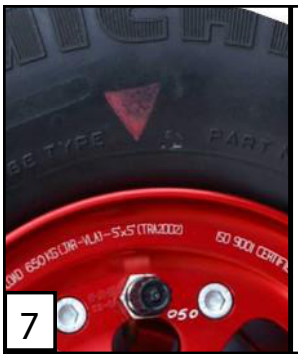
5

Clean all the parts.
COMMENT : You must use a brand new O -ring kit at each tyre changing.
Place the 2 wheel parts previously assembled (spacer and flange) on the special tool in the right orientation for the tyre mounting.



6

Clean the 2 tyre flanges with thinner to remove residual wax.



7

Spray tyre mounting lubricant on the tyre flanges.

BE CAREFUL: The tyre has a red triangle that must be in front of the valve.



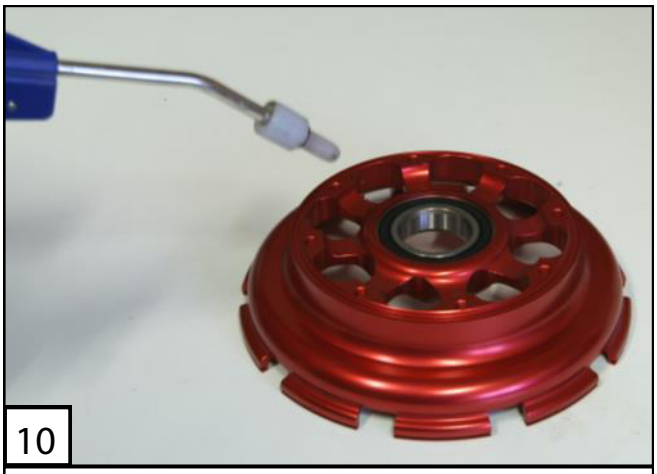
8

- Place the conical aluminium tool on the wheel spacer as shown above.
- Spray tire mounting lubricant on this tool then put the tyre on it.
- Press by hand to insert the tyre on the wheel.



9

- Place the second part of the special tool then insert the 3 bolts.
- Press the tyre with the tool till the tyre flange is totally under the level of the horizontal surface of the wheel.
- Clean the horizontal surface of the wheel.



10

Clean with pressurized air or dry cloth the other wheel flange. Check that there is no dirt in the ring groove.

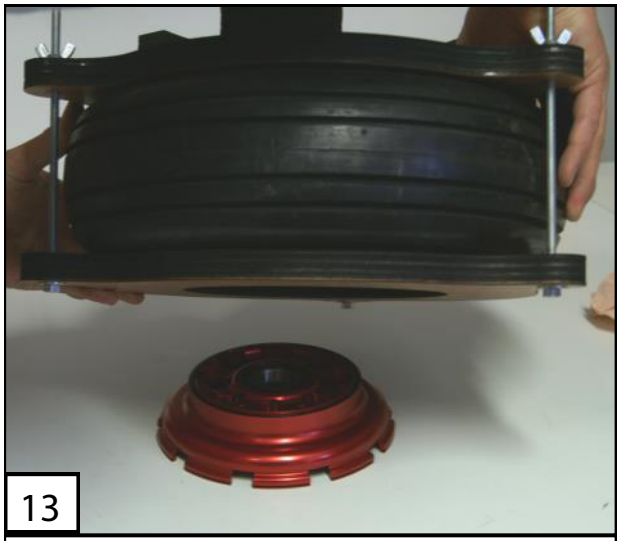
11 Insert the new O -ring in the ring groove.



12

Put Loctite 243 (blue) at the end of each screw.

Wheel 5.00 -5 light , 4.00 -5 light , 4.00 -6 light and 6.00 -6 light



13

Place the whole assembly on the wheel flange as shown above.

BE CAREFUL: The O -ring must stay in the ring groove during this operation.

Wheel 4.00 -6 classic and 6.00 -6 classic



13'

Place the 2 guide screws in 2 opposite holes on the wheel flange as illustrated above.



13"

Place the whole assembly on the wheel flange as shown above.

BE CAREFUL: The O -ring must stay in the ring groove during this operation.

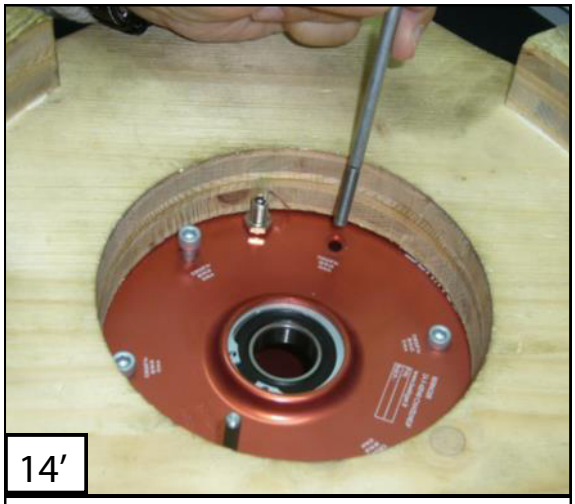
Wheel 5.00 -5 light , 4.00 -5 light , 4.00 -6 light and 6.00 -6 light



14

Insert all the screws that bolt the 2 wheel flanges.

Wheel 4.00 -6 classic and 6.00 -6 classic



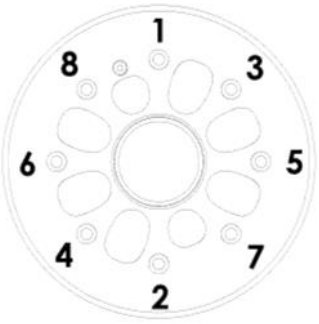
14'

Insert 4 screws before removing the 2 guide screws.
Then insert the screws remaining.

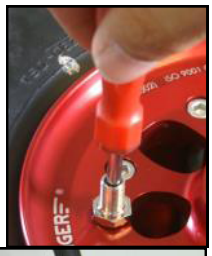


15

Tighten all the wheel screws to contact (2 to 4 Nm).



BE CAREFUL
Respect the order when you torque tighten the 8 x M6 screws.





16

Torque tighten to 10N.m (+ -1Nm) equivalent to 1m.kg (+ - 0.1m.kg)
Then torque tighten twice each screw to 10N.m .



17

- Screw the needle valve with the appropriate tool.
- Inflate the tyre to the appropriate air pressure.
- 24h later : check that the air leak is not more than 10%
- Inflate tyre to the appropriate air pressure and screw the valve cap.