# Instructions for Continued Airworthiness and Installation Instructions

for BERINGER wheels and brakes on
Pilatus PC-6 aircraft

Document Reference (*)
**ICA-STC-002**

Project Reference
**STC-002**

| PREPARED(**) | CHECKED(**) | APPROVED(**) |
|---|---|---|
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| 01 Dec 2022 | 01 Dec 2022 | 13 Dec 2022 |

(*) I.a.w. the numbering system defined in the APDOA manual.
(**) Authorised signatories shall be as defined in the APDOA manual.

TABLE DES MATIERES

# 1 LOG OF REVISIONS

| Rev. No | Rev. date | Description |
|---|---|---|
| **00** | 2010.05.18 | Initial edition |
| **01** | 2012.02.23 | Minor changes to this manual |
| **02** | 2012.04.05 | Update |
| **03** | 2014.08.08 | Update with optional small wheel |
| **04** | 2015.01.21 | Update with axle for ski, page 25 and 26 |
| **05** | 2015.08.05 | Update with new disc DSC-011.2(A) |
| **06** | 2017.02.20 | Update with new Brake pad PQT-016(A) |
| **07** | 2018.04.04 | Update of the wear limit of DSC-011.2 |
| **08** | 19 Oct 2021 | Administrative change: MM-STC-002 becomes ICA-STC-002. New maintenance document structure. |
| **09** | 07 Sep 2022 | MP-001N and RE-001N added<br>Tail wheel removal / installation / tire change updated |

# 2 INTRODUCTION

## 2.1 Purpose of the document

This manual gives removal and installation instructions of BERINGER wheels and brake system STC on the Pilatus Porter PC-6 and the Fairchild PC-6 Turbo Porter Aircraft and guides you to the BERINGER maintenance system for all continued airworthiness instructions.

**NOTE:** These BERINGER 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 except when dual (pilot + copilot brakes) are installed.
On original system only one of the two pilots can have the brake action due to shuttle valves. With BERINGER there is no shuttle valve and both pilots can brake simultaneously.
The brake pressure at the wheel is then the highest reached by pilot or co-pilot

**CAUTION:** Both pilot and co-pilot can brake simultaneously

When using skis, an optional small main wheel size 24x7.7 must be installed in place of the 11.00-12 standard main wheels.

**NOTE:** Optional brake pad PQT-016 combined with optional DSC-011.2 are only for use in specific conditions: high Temperature and intensive use. For a standard use prefer continue using the PQT-008 brake pad.

## 2.2 Applicable Certification Requirements

- CS-23
- FAR part 23

## 2.3 Effectivity

Type: PILATUS
Models: Pilatus Porter PC-6 and Fairchild PC-6 Turbo Porter Aircrafts

# 3 GENERAL

## 3.1 Components list

This STC scope includes Main and Tail wheels and brakes (master cylinder, caliper, lines…), as replacement parts to original equipment. All the assemblies are listed in NP-STC-002, at the last revision.

For the assembly detailed composition, refer to the BERINGER Illustrated Part Catalogues (IPC) that are available in the maintenance documents sorted per product family MM-0x-001, see §6.

## 3.2 Weight and Balance

| BERINGER Assembly Name | Weight (Kg) | Weight (Lbs) |
|---|---|---|
| Main wheels and brake (11.00x12”) | 14,2 | 31,3 |
| Main wheels and brake (24x7.7) | 11,5 | 25,3 |
| Tail wheel | 1,6 | 3,5 |

*(Weights are given without tires)*

Refer to local regulation requirements to determine if mass and balance must be updated.

## 3.3 Tires

| Wheel | Size | Type | Inflation pressure |
|---|---|---|---|
| Main | 11.00-12 | Tubeless | 20 PSI |
| Main | 24x7.7 or 8.50-10 | Tubeless | 49 PSI |
| Tail | 5.00-4 | Tube Type | 47 PSI |

## 3.4 Torque

All torques for BERINGER product assembly are specified in the installation instructions in this document or in the maintenance working cards.
For interface parts with aircraft, unless otherwise specified by BERINGER, all fasteners should be torqued as per Aircraft Manual.

## 3.5 Standard product and tools

- Tire lubricant: Tire lubricant or liquid soap
- Hydraulic fluid: Mineral
- Tire mounting tool: Refer to MM-02-002.
- Bearing grease
- Torque wrench
- Paint marker

# 4 REMOVAL - INSTALLATION

## 4.1 Brake calipers

REMOVAL:

a) Remove original Brake assembly from the gear leg

b) Remove hydraulic fittings

c) Remove flexible hose

INSTALLATION:

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

a) Put the brake assembly in position on the axle flange, bleeding screw down.

b) Install 6 bolts, 12 washers and the 6 self-locking nut

**NOTE:** Replace bolts, washers and nuts at each removal of brake assembly

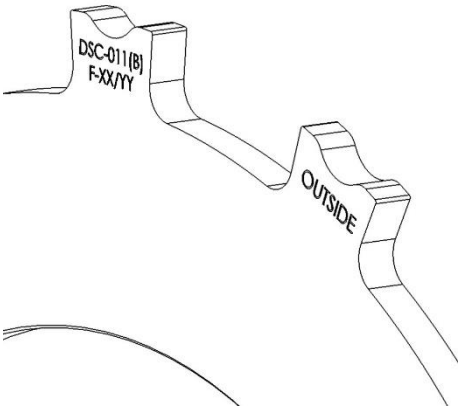
c) Torque the nuts to 7.5 to 8.5 N.m (65 to 75 in.lb).

d) Put the disc between brake pads on its correct side

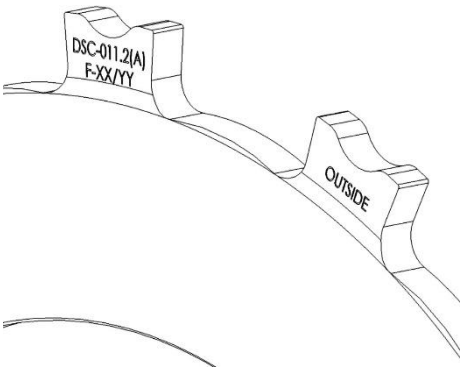
On one side of the disc there are markings: the P/N and batch number and the text "OUTSIDE".
"OUTSIDE" means on the visible side of the wheel which is also the fuselage side

**NOTE:** The disc DSC-011(B) is symmetrical so there is no absolute requirement of having the marking on the fuselage side.

**CAUTION:** DSC-011.2 is not symmetrical. On one side the disc is thickened and the other side is flat. The disc must be placed with the thickened side on the fuselage as per the schema next:

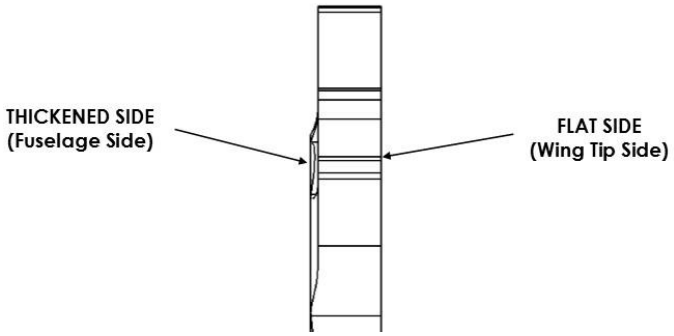



***DSC-011(B) – Standard Disc***

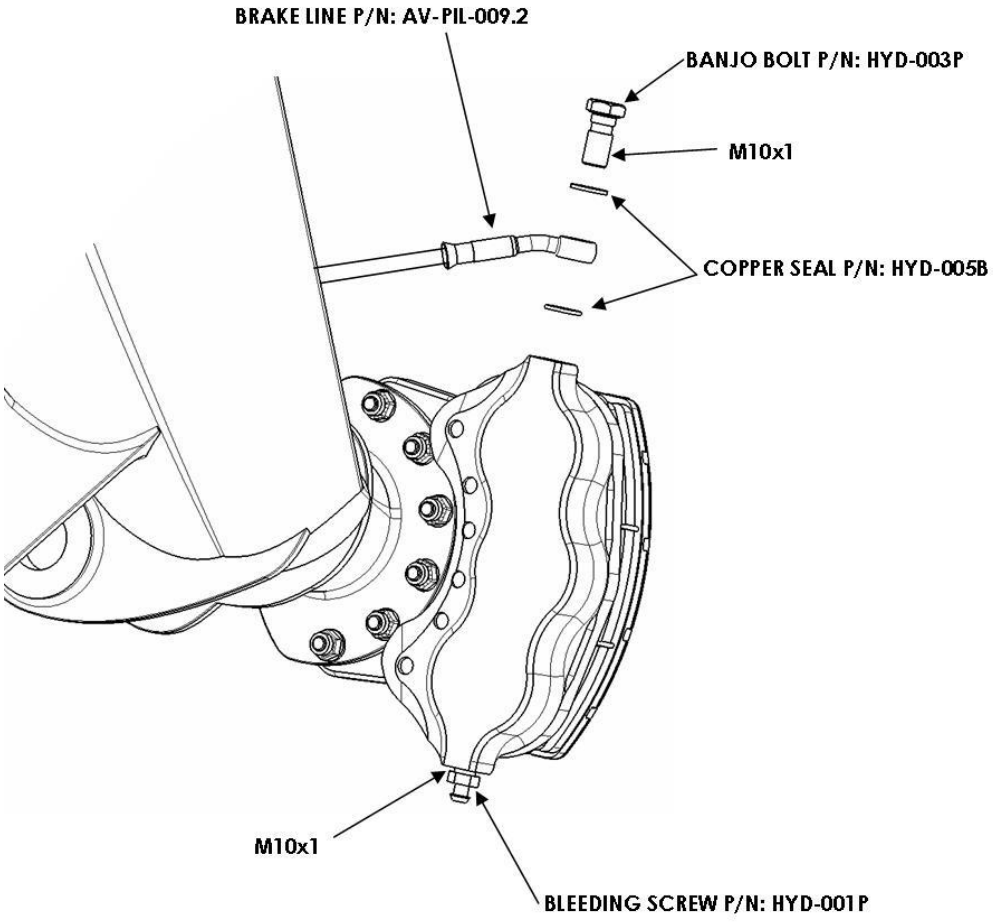



***DSC-011.2(A) – thickened disc***

Only for : DSC-011.2(A)
CAUTION: This disc is not symmetrical




e) Connect brake line to upper port using banjo screw and 2 copper seals.

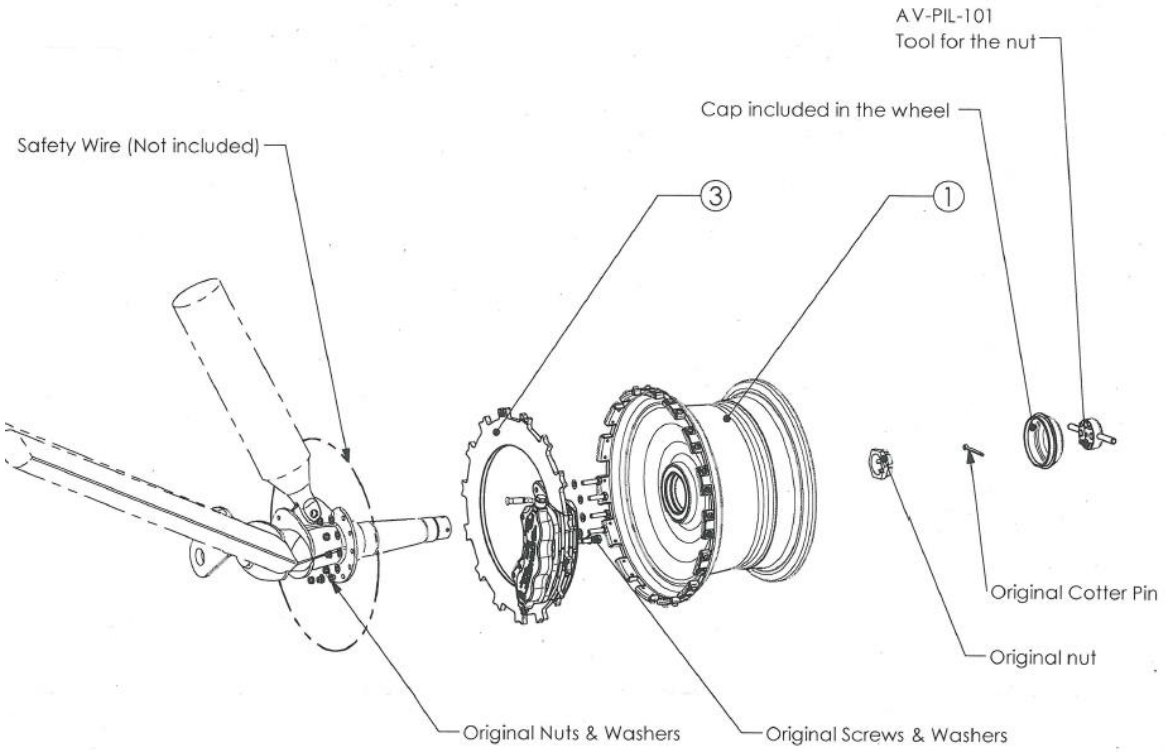


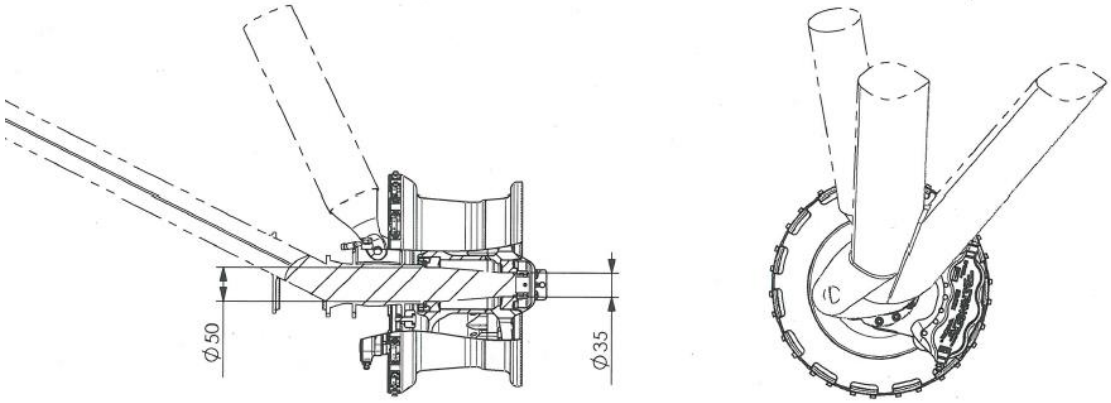

**Brake Caliper – Hydraulic fittings**

f) After hose and banjo are positioned properly, torque banjo screw to 15 to 17N.m (130 to 150 in.lb)

g) Check that flexible hose is not bent

## 4.2 Main Wheels

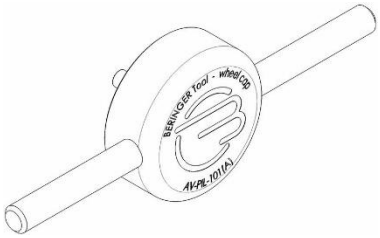



Weight / Masse: 11505g

| REP | PART NUMBER | DESCRIPTION | QTY. |
|---|---|---|---|
| 3 | DSC-011 | 10'' & 12'' HE_Disk / Disque | 1 |
| 2 | EA-001 | 3P38 (Mineral)_Brake Caliper / Etrier de frein | 1 |
| 1 | RF-011<br>Or RF-003 | 24x7.7_Main Wheel Assy / Roue Freinée<br>Or 11.00-12_Wheel Assy/Roue freinée | 1 |

**Hub Cap Pin Wrench AV-PIL-101 :**



REMOVAL:

d) Remove disc safety wire

e) Remove hub cap using pin wrench

f) Remove the cotter pin and nut

**CAUTION:** Make sure that bearing cones does not fall out when wheel is removed

g) Remove wheel from axle

INSTALLATION:

**CAUTION:** Make sure that axle is completely clean before packing with new grease

a) Lubricate wheel axle and axle thread with grease MIL-G-81322

**CAUTION:** Make sure that lipseal is good condition.
Do not reuse a lipseal that has been removed from wheel

b) Lubricate lipseal with a thin coat of grease MIL-G-81322

c) Install the wheel onto the wheel axle

**CAUTION:** Make sure that lipseal and bearing spacer are in place

d) Engage the disc into wheel slots

e) Install the wheel nut

f) Turn the nut and tighten the nut until wheel has no play

g) Loosen the wheel nut 1/6 of a turn so that cotter pin hole is accessible for cotter pin installation

h) Safety the wheel nut with a new cotter pin

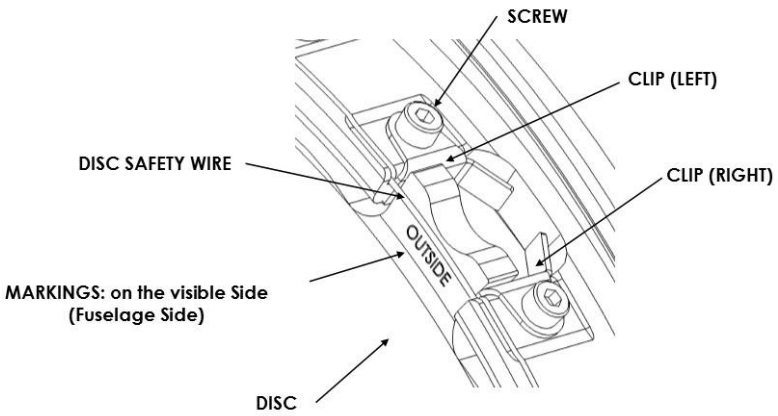
i) Install a new O-Ring on hub cap grease hub cap thread with MIL-G-81322

j) Torque the cap to contact with hand force using the pin wrench AV-PIL-101

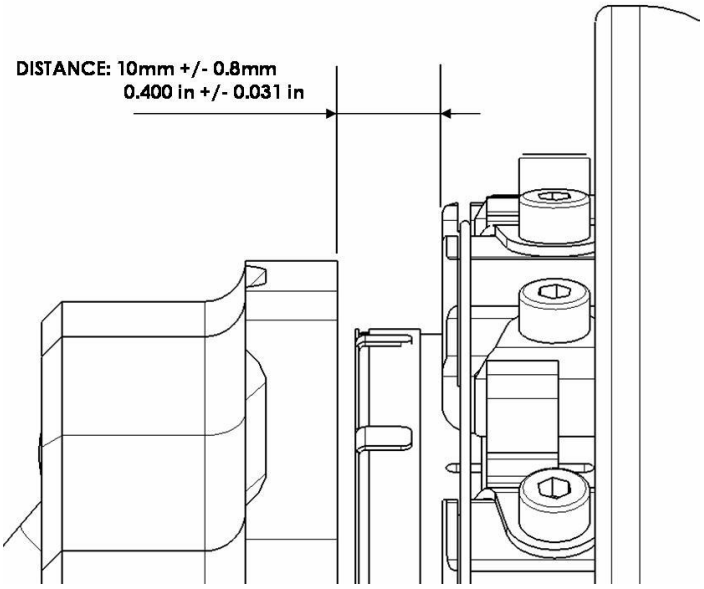
**CAUTION:** excessive torque on the cap may cause problem to unscrew.
Do not use power wrench

k) Install disc safety wire diameter 1.01mm (0.040”) from stainless steel grade 302 in wheel ring groove.

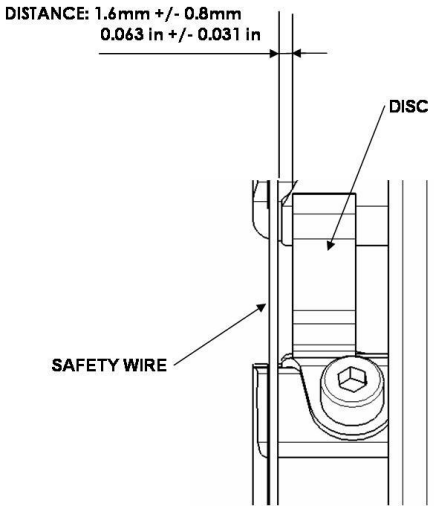
**CAUTION:** Disc safety wire must be in place, it prevents disc from sliding out the slots.



l) Check that disc in place at the right position in wheels slots.




**Main Wheel – Positioning control**




**Brake Disc – Positioning control**

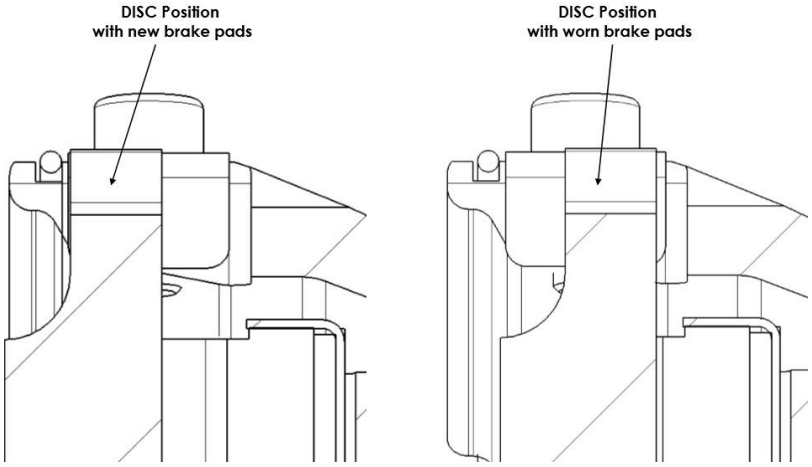
**CAUTION:** Above distances between caliper housing and inner wheel half or between disc and safety wire must be in the tolerances.

If not in the tolerances this may be due to:

- Missing of inner bearing spacer
- Wheel not in place
- Axle flange welded in incorrect position

Contact BERINGER to find the appropriate solution.

**NOTE:** The installation procedure is exactly the same for the optional small wheel 24x7.7




On one side of the disc there are markings: the P/N and batch number and the text "OUTSIDE". "OUTSIDE" means on the visible side of the wheel which is also the fuselage side

## 4.3 SensAIR installation

SensAIR system is an optional device located inside the tire, around the rim.
Refer to SM-08 document to get installation procedure, available on BERINGER Website.

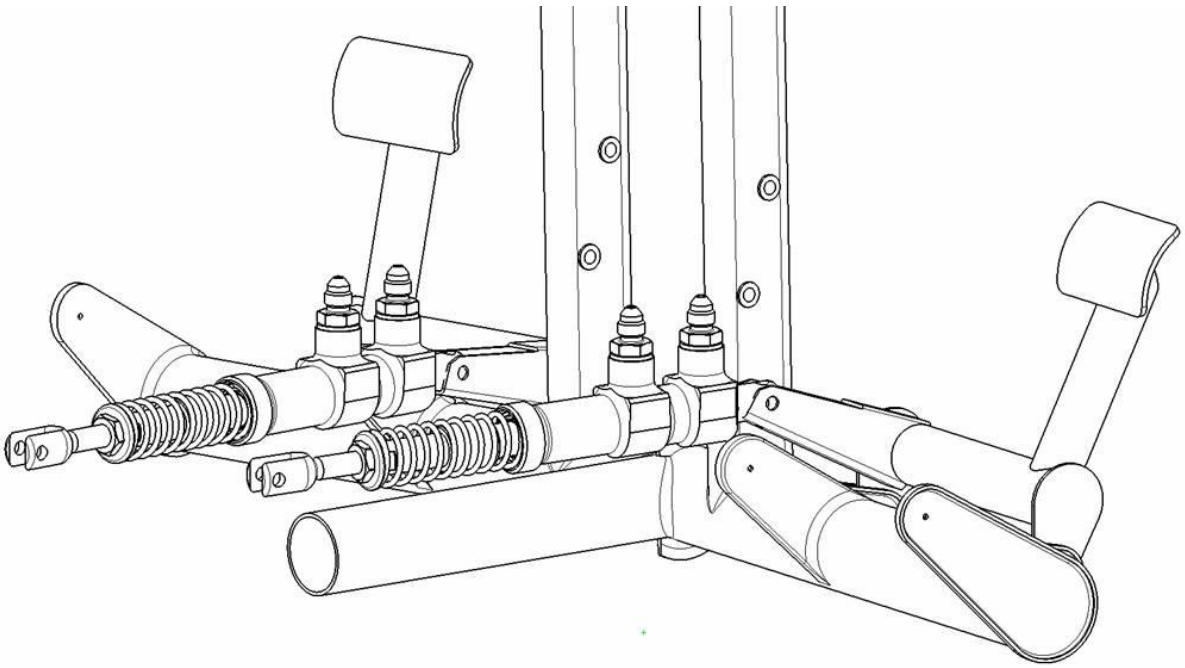

## 4.4 Master Cylinders

Same master cylinders are used on pilot side and co-pilot side. Only fittings are different.

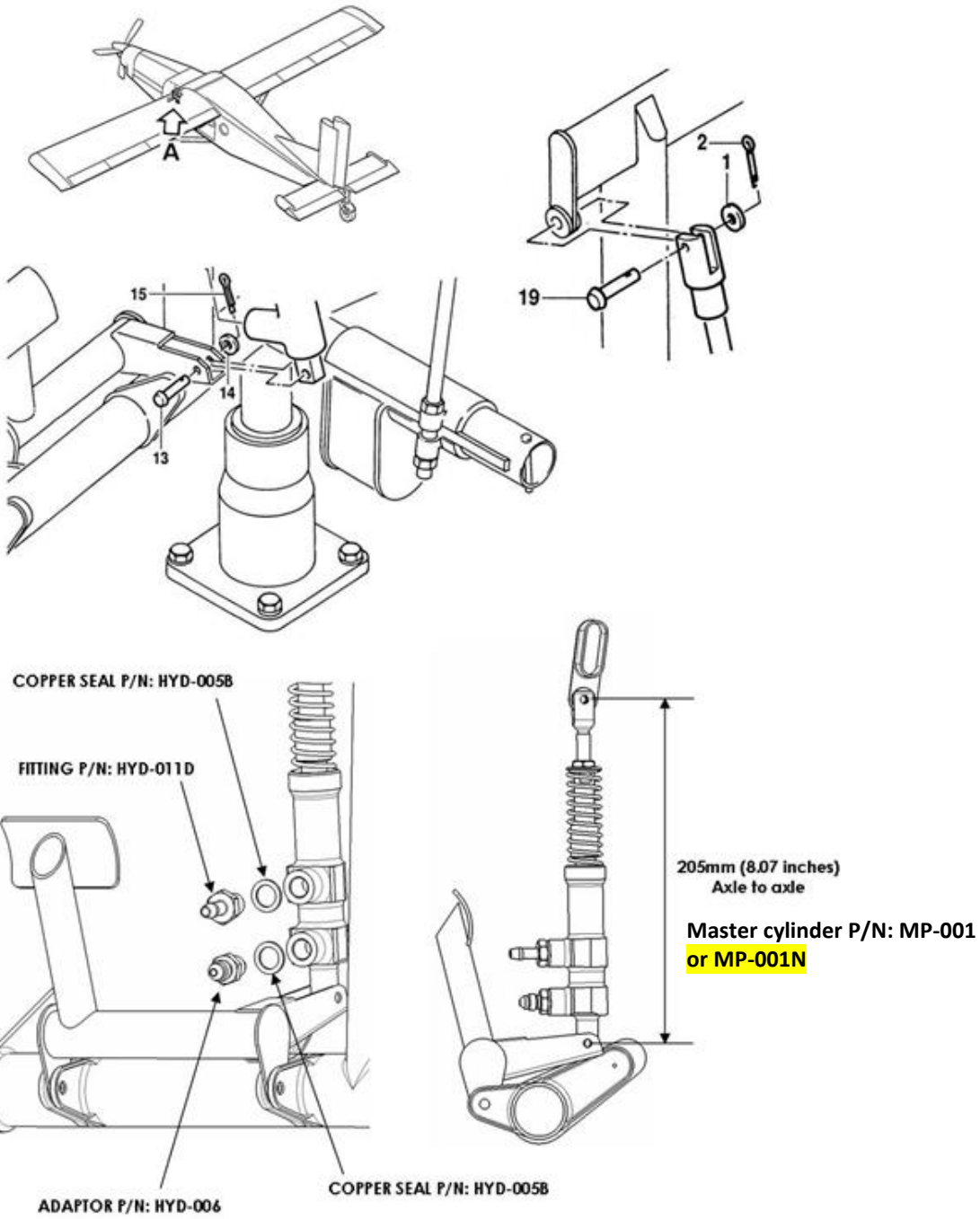
Fluid reservoir is separated and not changed from original

Position of pedals remains the same as original equipment

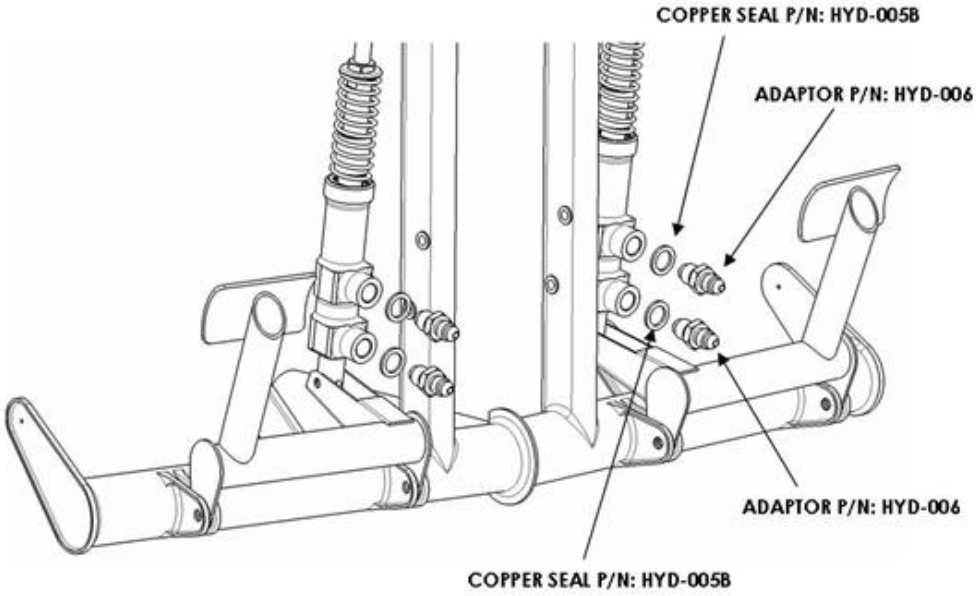
**NOTE:** To achieve a complete bleeding, master cylinder should be positioned horizontally with fittings up during bleeding procedure.

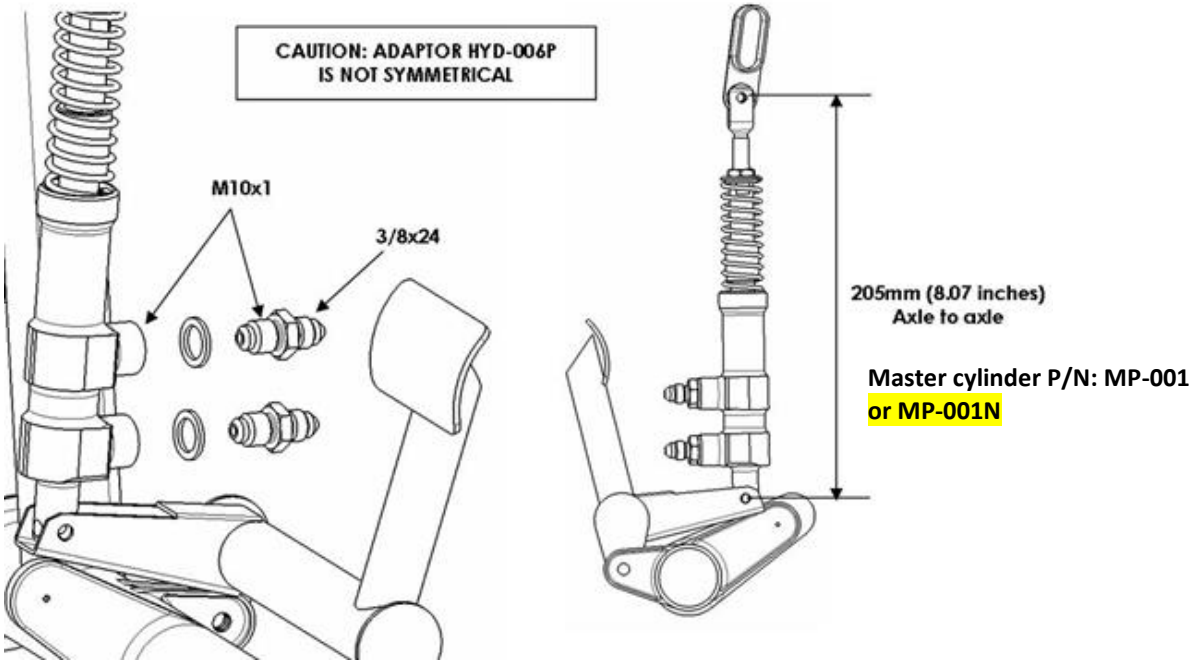


**Master cylinders – Bleeding position**




**Master Cylinders – Removal / Installation**
**Pilot side**




**Master cylinder P/N: MP-001 or MP-001N**

**Master Cylinders – Removal / Installation**
**Co-Pilot side**

REMOVAL:

a) Disconnect inlet and outlet hose

b) Remove and discard the cotter pins

c) Remove clevis pins and washers

d) Remove fittings and copper washer

e) Install blanking cap on all open connections

INSTALLATION:

a) Do a check of brake pedal to make sure it moves easily and free of parasite friction

b) Lubricate the new or polished clevis pins with grease MIL-G-81322

**NOTE:** Clevis pins must be polished and free of scratches

c) Lubricate inner bore of master cylinder body and clevis with grease MIL-G-81322

d) Insert master cylinder body in brake pedal, insert clevis pin

**NOTE:** a small play should be observed between master cylinder body and brake pedal. If not slightly deform the brake pedal.

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

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

f) Insert upper clevis pin

g) Move brake pedal and check for any parasite friction.

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

**CAUTION:** Master cylinder length axle to axle is 205mm (8.07 in) this dimension is adjusted at factory and should not be changed.

i) Safety the pins with new cotter pins

j) Remove blanking caps

k) Install copper washer and fittings

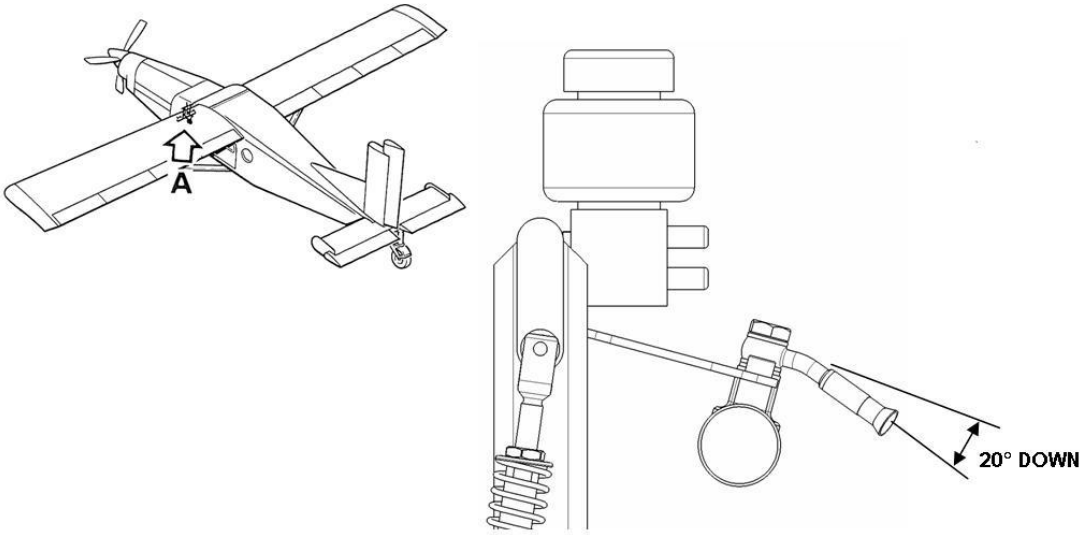
l) Connect brake lines

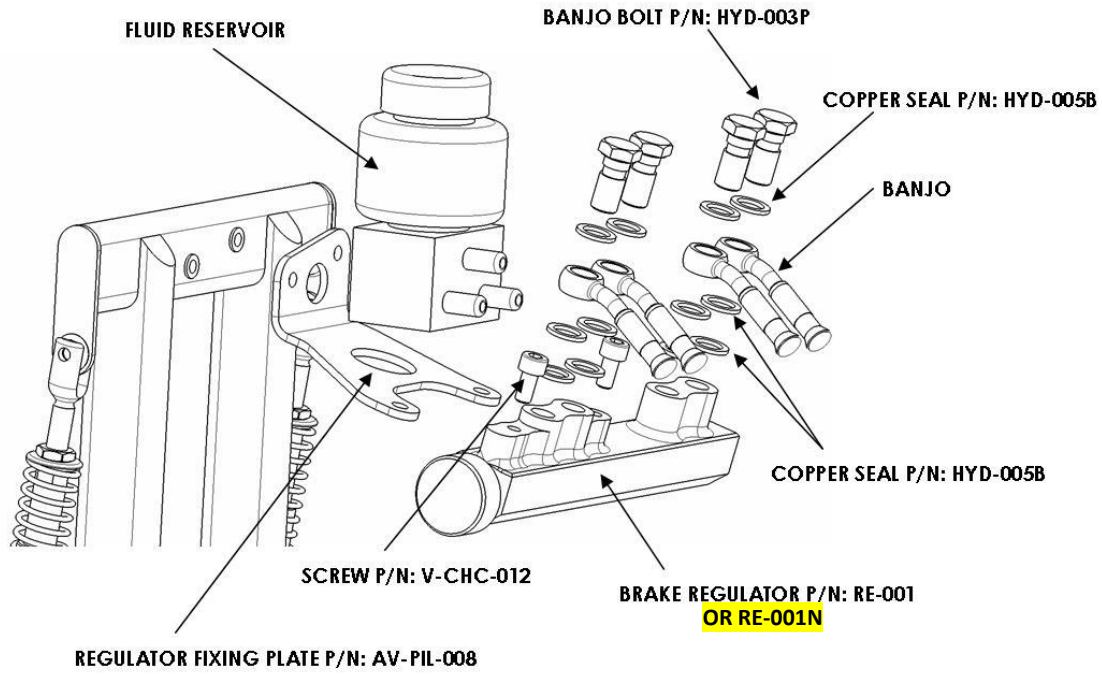
m) Torque the hydraulic fittings to 15 N.m (130 in.lb)

## 4.5 Brake Regulator

Regulator is a 2 ways system hydraulically separated (1 and 2). Each way is equipped with metric internal thread inlet and outlet port identified by “IN” and “OUT”.

**CAUTION:** Do not mix “IN.1” and “OUT.2” or “IN.2” and “OUT.1” brake system will not work.




**Brake Regulator – Removal / Installation**

REMOVAL:

a) Remove the fluid reservoir and his support from the pedal assembly

INSTALLATION:

**NOTE: Install on the Pilot side only**

a) Install regulator RE-001 or RE-001N on his fixing plate

b) Put a drop of threadlocker medium-strength (Loctite 243 Recommended) on the 2 screws V-CHC-012.

c) Torque to 10 N.m (83 in.lb)

d) Place fixing plate with regulator in between rudder pedal and fluid reservoir

**NOTE:** Regulator thumbwheel should be positioned on the right side when sitting in the cockpit

e) Use longer screws of 3mm (0.12 in)

f) Install brake lines with fittings

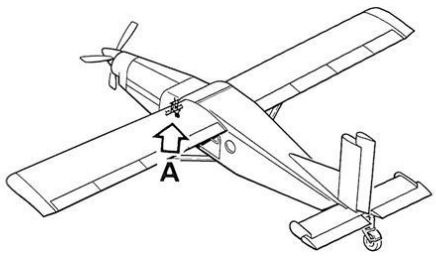
**CAUTION:** Use 3 copper washer (2 + 1) at each fitting

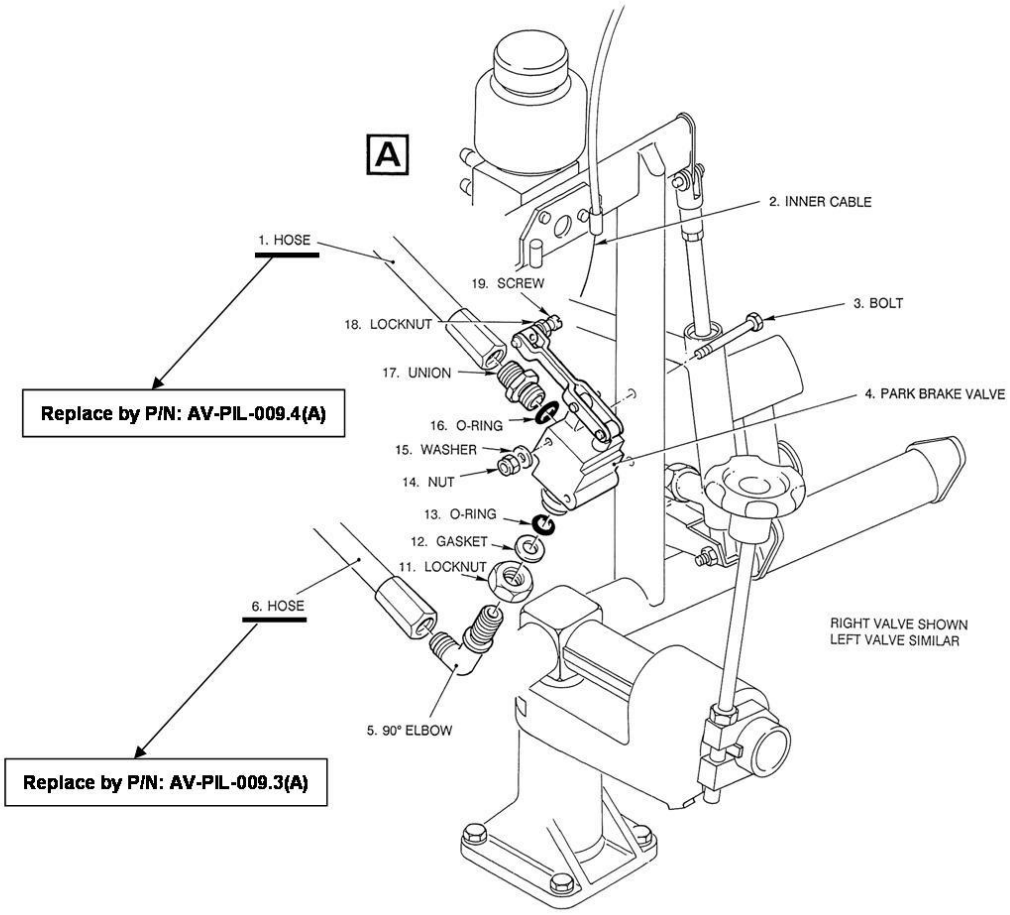
g) Torque banjo screws to 15 – 17 N.m (130 to 150 in.lb)

**CAUTION:** Do not grease banjo screw, copper washer or hydraulic fitting

h) The flexible hose between fluid reservoir and master cylinders can be replaced by Clear PVC hose, Pilatus P/N: 9179638110.

## 4.6 Parking brake Valve




**Parking brake Valve – Removal / Installation**

Parking brake valve removal / installation is the same as original.

Hoses are changed and fittings are the same for single operated brakes or dual (pilot + co-pilot) operated brakes.

**NOTE:** Inner cable must be greased properly

**CAUTION:** Parking brake valves are not made by BERINGER, refer to manufacturer for maintenance procedures and service life.

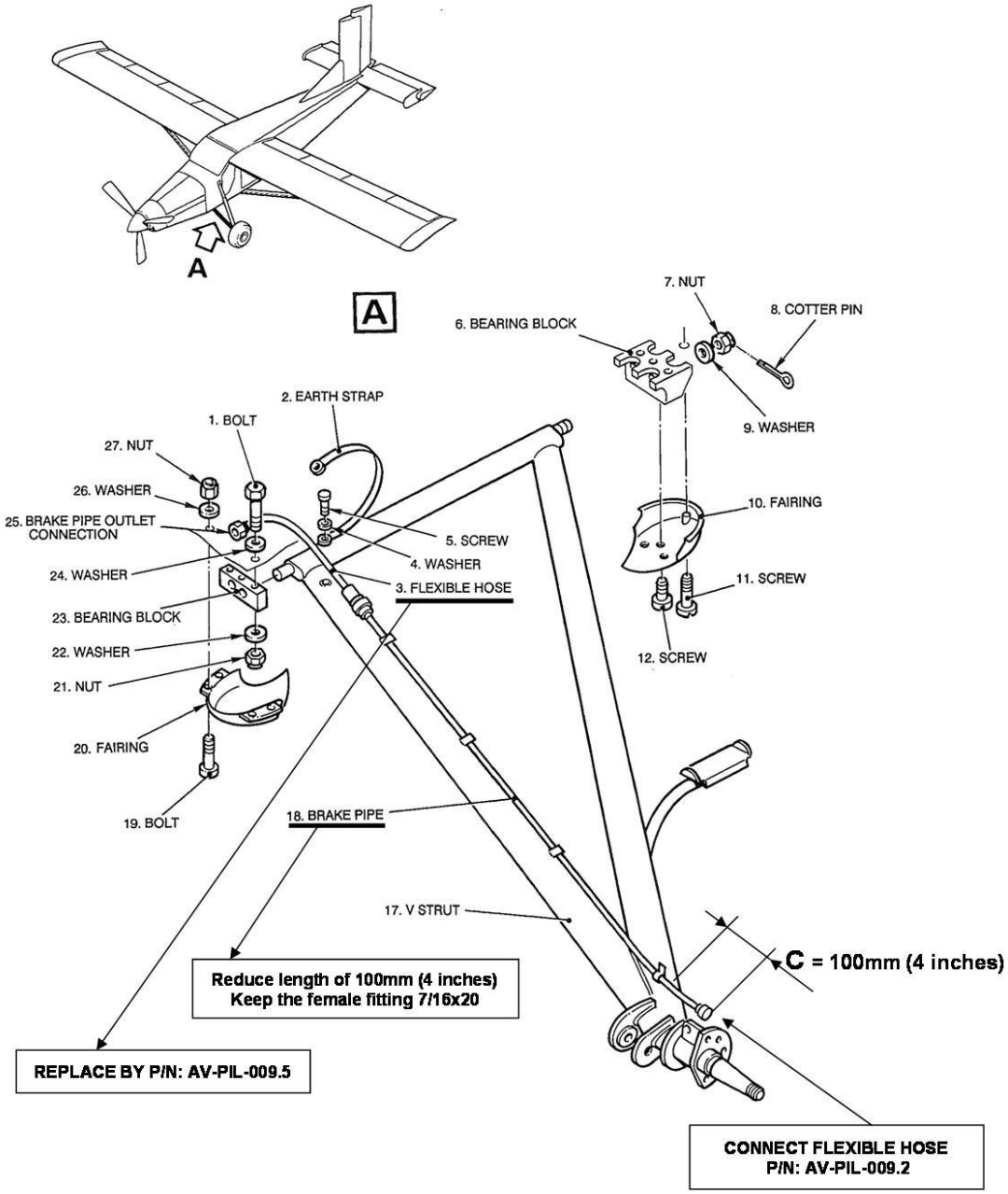
## 4.7 Brake lines - Hydraulic Scheme

Brake lines are made of stainless steel hose braided without life limit.

Flexible rubber brake hoses must be replaced by new ones.

**NOTE:** Shuttle valves are not required any more. Remove them from aircraft

**CAUTION:** Brake lines and hydraulic schema is 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.

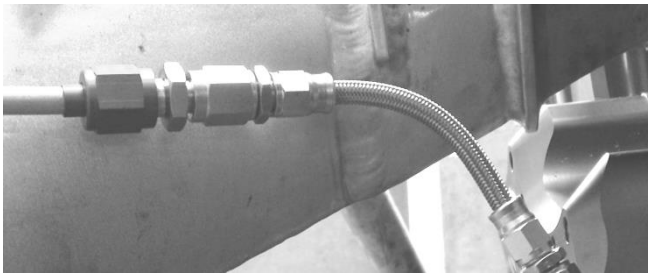



**Brake lines – Modifications**

INSTALLATION:

a) Starting from brake caliper, reduce length of existing rigid line of 100mm (4 in)

b) Install flexible brake line AV-PIL-009.2



c) Replace the flexible rubber hose at the top of V-Strut by AV-PIL-009.5

d) Install brakes lines on rudder assemblies

Hydraulic schema is different if using single operated brakes (pilot side only) or if using dual operated brakes (pilot and co-pilot).

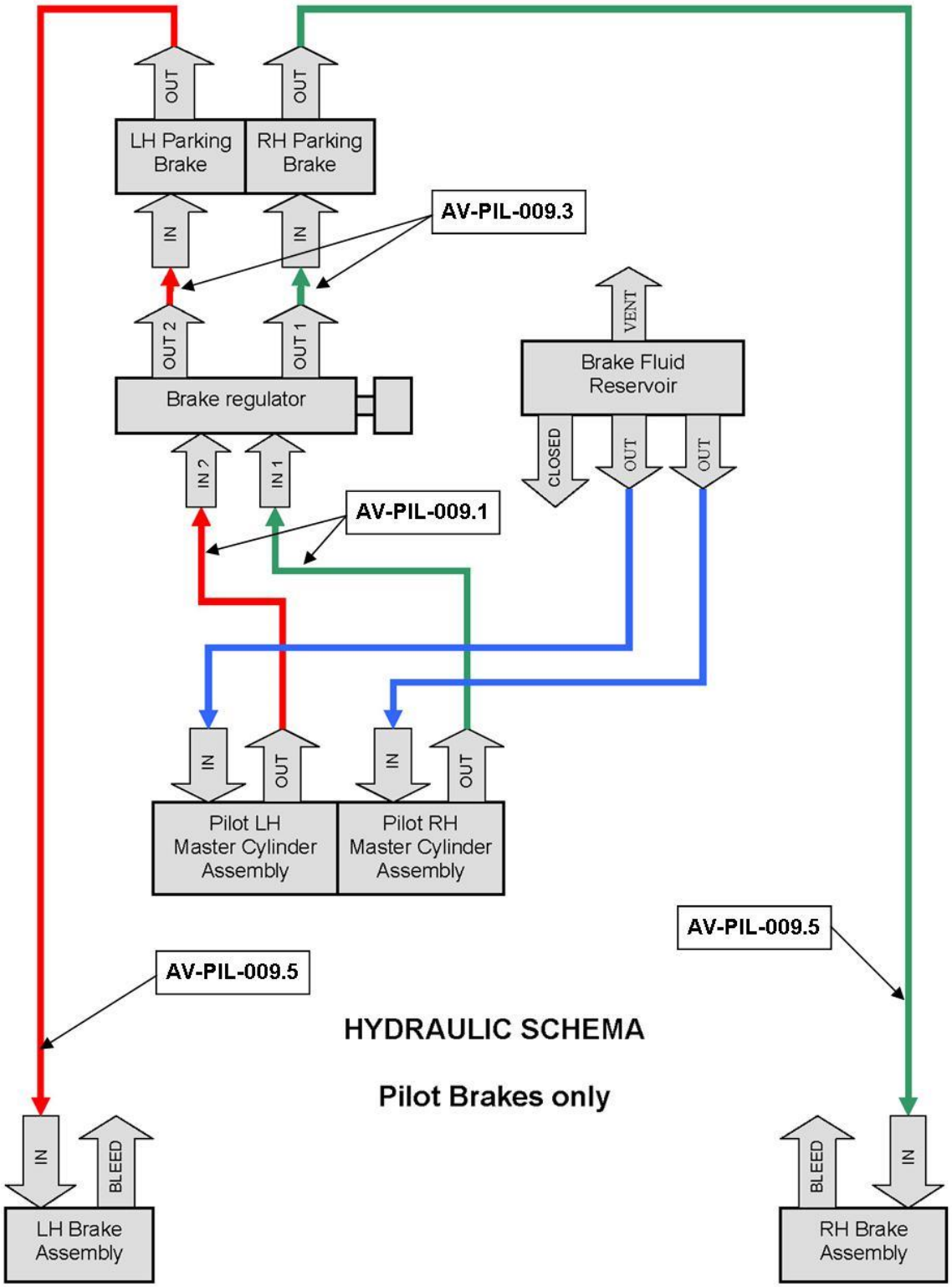
Depending on the brake configuration, refer to the appropriate brake schema to install brake lines.

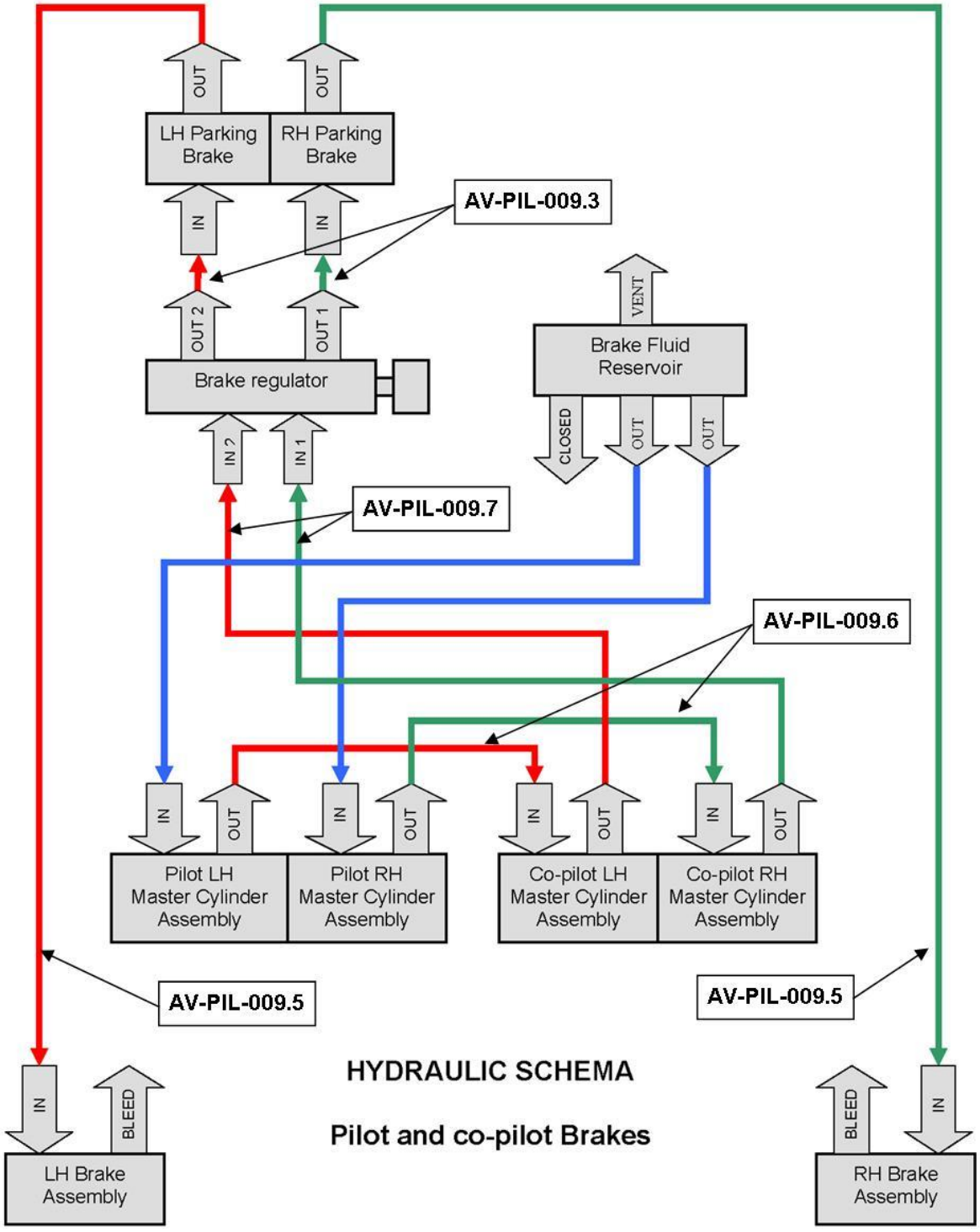
**NOTE:** Flexible brake lines can be bent easily. Make sure that minimum radius is more than 50mm (2 in)

**NOTE:** Flexible brake lines are very rigid in torsion. They must not be twisted while locking the fittings.

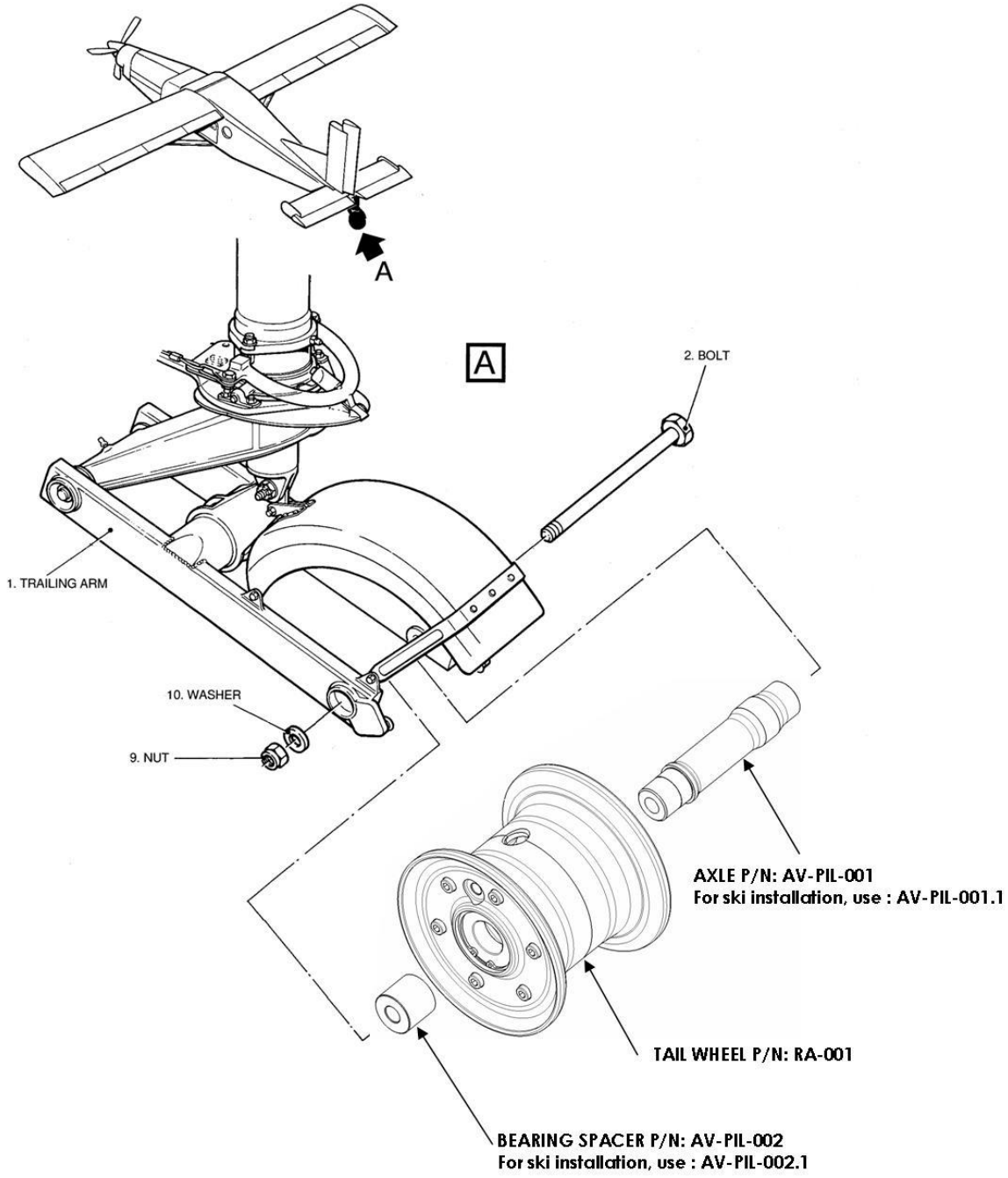
**CAUTION:** Make sure that flexible brake lines are not twisted or bent or in tension on the full rudder pedals and brake pedal movements.

**Hydraulic lines / AV-PIL-009.4**


OUT
OUT
LH Parking Brake
RH Parking Brake
IN
IN
AV-PIL-009.3
OUT 2
OUT 1
Brake regulator
VENT
Brake Fluid Reservoir
CLOSED
OUT
OUT
IN 2
IN 1
AV-PIL-009.1
IN
OUT
IN
OUT
Pilot LH Master Cylinder Assembly
Pilot RH Master Cylinder Assembly
AV-PIL-009.5
AV-PIL-009.5
HYDRAULIC SCHEMA
Pilot Brakes only
IN
BLEED
LH Brake Assembly
BLEED
IN
RH Brake Assembly


OUT
OUT
LH Parking Brake
RH Parking Brake
IN
IN
AV-PIL-009.3
OUT 2
OUT 1
VENT
Brake Fluid Reservoir
Brake regulator
CLOSED
OUT
OUT
IN 2
IN 1
AV-PIL-009.7
AV-PIL-009.6
IN
OUT
IN
OUT
IN
OUT
IN
OUT
Pilot LH Master Cylinder Assembly
Pilot RH Master Cylinder Assembly
Co-pilot LH Master Cylinder Assembly
Co-pilot RH Master Cylinder Assembly
AV-PIL-009.5
AV-PIL-009.5
HYDRAULIC SCHEMA
Pilot and co-pilot Brakes
IN
BLEED
BLEED
IN
LH Brake Assembly
RH Brake Assembly

## 4.8 Tail wheel



## Tail Wheel – Removal / Installation / Tire change

DISASSEMBLY:

**WARNING:** Do not attempt to disassemble wheel until tire has been completely deflated. Otherwise, serious injury to personnel or damage to equipment can result.

**WARNING:** Do not attempt to remove valve core until tire has been completely deflated. Valve core will be ejected at high velocities if unscrewed before air pressure has been released.

a) Remove valve cap and apply a tire deflator to release tire pressure completely

b) Remove wheel from aircraft

c) Break the beads away from the wheel flanges by applying pressure by hand or using a wood tool all around the entire sidewall as close to the tire bead as possible.

**CAUTION:** Do not pry between tire bead and wheel flange, this may destroy the structural and sealing properties of the wheel and tire.

d) Remove all screws holding wheel halves together.

**CAUTION:** Do not use impact or power wrenches

e) Separate wheel halves and remove the tire and tube

f) Carefully lay the wheel halves on a flat clean bench.

CLEANING:

a) Clean all metal parts using soaped water and wipe dry with a clean cloth. Rubber valve must not be cleaned with solvent.

**CAUTION:** Do not use basic or acid agent on wheel halves. Anodizing can be totally removed within few minutes in contact with basic agent. Make sure that cleaning soap is not basic.

**CAUTION:** Sealing of ball bearings must not be damaged or cleaned with solvent.

b) Clean wheel bead seat with dry-cleaning solvent and wipe dry with a clean cloth.

**CAUTION:** oily solvent must not be used on wheel bead seat because tire will not stick properly on the wheel.

**WARNING:** Dry-cleaning solvents are toxic and volatile. Use a well-ventilated room. Avoid contact with skin or clothing. Do not inhale the vapor.

c) Apply air pressure to dry internal thread

**CAUTION:** oily solvent or oily air pressure must not be used on internal thread because threadlocker will not properly lock the screws.

REASSEMBLY:

a) Check ball bearings and seals

b) Make sure that the inside of tire is clean and dry. Clean tire bead seat with a cloth impregnated with dry-cleaning solvent as to remove residual grease or wax

**CAUTION:** Oily solvent must not be used on tire bead seat because tire will not stick properly on the wheel.

c) Inflate inner tube just enough to round it out

d) Install inner tube in tire with the yellow stripe on the base of the inner tube adjacent to the red balance dot on the tire

e) Install the tire and inner tube on the outer wheel half and install the inner tube valve through the valve hole

f) Place the outer wheel half with tire and tube on inner wheel half align the bolt holes

g) Put a drop of threadlocker medium strength (Loctite 243 recommended) on each end of assembly screw

**CAUTION:** using a wrong threadlocker or not from recommended type may cause loose of screws or removal problem.

h) Install all screws to contact

**NOTE:** It is recommended that assembly screw be replaced at each tire change.

i) Torque all screws to 10 N.m (83 in.lb)

**CAUTION:** Do not use impact or power wrenches

j) Torque all screws a second time to 10 N.m (83 in.lb)

k) Inflate tire just enough to seat beads

**WARNING:** Place wheel in an inflation cage for initial inflation. Do not inflate tire to full operating pressure until wheel has been installed on aircraft. Tire and / or wheel failure may occur causing injury to personnel or damage to equipment if the tire is inflated from any high pressure source. Tire and wheel assemblies must be serviced with inflation equipment that has been specifically designed for this operation.

l) Completely deflate tire to allow the inner tube to equalize itself in the tire; then inflate to one half of the operating pressure.

m) Install wheel on aircraft

n) Inflate tires to operating pressure and install valve caps

o) Check inflation pressure after 24hours

**CAUTION:** after 24hours, inflation pressure should not be less than 90%. If so check for a leakage at valve or tube

# 5 INITIAL USE

BERINGER brakes need to be bled and conditioned prior to use.
For procedure instructions, refer to the following manuals available on BERINGER website:

- BRAKE BLEEDING procedure MM-00-003
- BRAKE CONDITIONING procedure MM-01-002

Completing the procedure conforms the brakes to the STC requirements. However, note that the brake performance will continue to improve during the first few hours of use.

# 6 INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

All instructions for continued airworthiness are provided through the Servicing Manuals (SM) and Maintenance Manual (MM) of BERINGER.

- The Servicing Manuals (SM) sums-up the parts replacement scheme, the maintenance intervals, troubleshooting and the Maintenance Working Cards to be used for each BERINGER assembly.
- The Maintenance Manual (MM) describes each maintenance step for all BERINGER products.

Refer to the maintenance guide **SM-00** for **general guidance**.

The SM breakdown structure is as follows:

| Servicing Manual Reference | Product Type | Product Reference |
|---|---|---|
| **SM-01** | Brake Assembly | EA-xxx |
| **SM-02** | Nose/Tail wheel | RA-xxx |
| **SM-02** | Main wheel | RF-xxx |
| **SM-03** | Control-stick Master-Cylinders | MM-xxx |
| **SM-03** | Longitudinal Master-Cylinders | MP-xxx |
| **SM-04** | Parking Brake | FP-xxx |
| **SM-05** | Brake Pressure regulator | RE-xxx |
| **SM-06** | Brake Pressure limiter | LM-xxx |
| **SM-07** | Shock Wheel | LL-xxx |
| **SM-08** | SensAIR device | TP-xxx |
| **SM-09** | Tyre 5x2.00-3.7 & 6x2.00-3.7 | PAR-xxx |
| **SM-10** | Carbon Fairing | CR-xxx |

**All documents are available on:**

BERINGER website: www.beringer-aero.com/Support
Go to Support section.

# 7 AIRWORTHINESS LIMITATIONS SECTION

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of Title 14 of the Code of Federal Regulations unless an alternative program has been FAA approved.

# 8 ASSOCIATED DOCUMENTS

| Document reference | Document title |
|---|---|
| NP-STC-002 | Part Nomenclature |
| MM-00-003 | BRAKE BLEEDING procedure |
| MM-01-002 | BRAKE CONDITIONING procedure |
| SM-00 | BERINGER PRODUCTS MAINTENANCE GUIDE |

*Refer to the latest revision.*