

Project Reference **STC-004**

ICA-STC-004

REV. 06

Instructions for Continued Airworthiness and Installation Instructions

for BERINGER wheels and brakes on CIRRUS SR20/22 aircrafts (dual brake)

Document Reference^(*)
ICA-STC-004

Project Reference **STC-004**

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1 LOG OF REVISIONS

Rev. No	Rev. date	Description	
00	2012.12.18	Initial edition	
01	2013.07.16	Update with new brake EA-003.4N(B)	
02	2014.01.20	Update	
03	2015.10.20	Update of the name of the document and changes in §3 and §4	
04	2017.06.05	Update with new wheel	
05	19 Oct. 2021	Administrative change: MM-STC-004 becomes ICA-STC-004. New maintenance document structure and addition of SensAIR system as an option.	
06	12 Nov 2024	Addition of dedicated paragraph (§4.2) for STC-004.1 installation to improve ICA understanding	

2 INTRODUCTION

2.1 Purpose of the document

This manual gives removal and installation instructions of BERINGER wheels and brake system STC on the CIRRUS SR20 & SR22 aircrafts and guide you toward BERINGER maintenance system for continued airworthiness instructions.

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

NOTE: Wheels and brake assemblies are TSO C26d/ETSO C26c approved, for detailed maintenance and

overhaul procedures, please refer to the Servicing Manuals of BERINGER, in §6.

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.

2.2 Applicable Certification Requirements

• CS-23

FAR part 23

2.3 Effectivity

Type: CIRRUS

Models: SR20, SR22, SR22T



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3 GENERAL

3.1 Component list

This STC scope includes Main and Nose wheels, brakes (master cylinder, caliper, lines...) and axles as replacement parts to original equipment. All the assemblies are listed in BOM-STC-004, at the latest revision.

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

In option, BERINGER pressure measurement device is available for this STC:

Assembly / Product Name	BERINGER Reference number	
6" wheel SensAIR (option)	TP-006	
5" wheel SensAIR (option)	TP-005	

3.2 Weight and Balance

BERINGER Assembly Name	Weight (Kg)	Weight (Lbs)
Main wheel and brake	5,4	11,9
Nose wheel	1,7	3,7

(Weights are given without tires, per wheel)

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

3.3 Tires

Tires	Size	Туре	Ply	Inflation pressure
Main	15x6.00-6	Tubeless	PLY rating as per latest revision of aircraft manual	Refer to latest revision of aircraft manual
Nose	5.00-5"	Tubeless	PLY rating as per latest revision of aircraft manual	Refer to latest revision of aircraft manual

3.4 Torque

All torques for BERINGER product assembly are specified in the installation instructions in this document or in the maintenance working card MM-00-005.

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: To refer to MM-02-002.

Corrosion inhibitive sealant type CA1000 from PRC De Soto (or equivalent)

Torque wrench

Paint marker



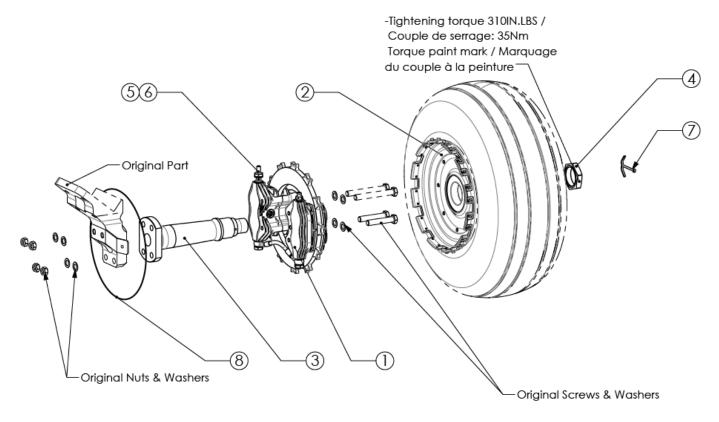
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4 REMOVAL AND INSTALLATION

4.1 STC-004 Installation

4.1.1 Main wheel and Brakes (STC-004)



Weight (Without tire)/Masse: 5409g

REP	PART NUMBER	DESCRIPTION	QTY.
1	EA-003.4N	4P32-6-9_Dual Brake Caliper / Etrier De Frein Double	1
2	RF-006	6.00x6" HE_Wheel Assy./Roue freinée	1
3	AV-CIRR-002	Cirrus SR22 6.00x6HE_Axle/ Fusée	1
4	ECR-001	M35x1.5_Axle nut /Ecrou	1
5	HYD-005B	Copper Seal/ Joint cuivre	2
6	HYD-026C	Vis Banjo	1
7	L-V-003	Cotter Pin 3.2x50/Goupille fendue 3.2x50	1
8	ZPA02	Safety Wire/Fil à freiner	1

AV-CIRR-020



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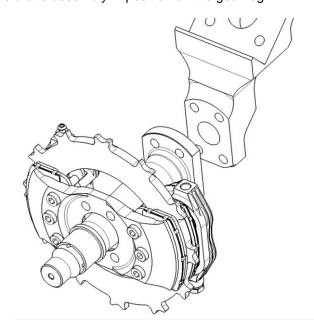
REMOVAL:

- a) Remove wheel fairings
- b) Remove original wheel, axle and brake assy. from the gear leg
- c) Remove flexible hose

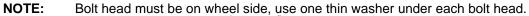
INSTALLATION:

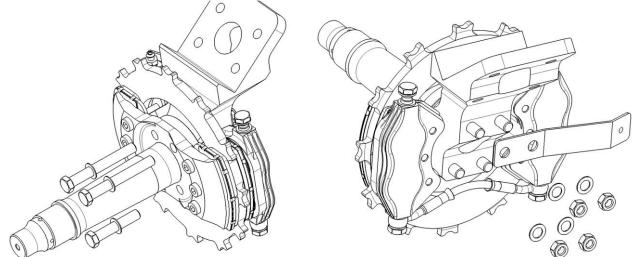
Brake calipers are fixed at the same place with same bolts as original brake unit.

- a) Apply a thin coat of corrosion inhibitive sealant type CA1000 from PRC De Soto (or equivalent) on next contact surfaces:
 - between axle and caliper
 - between axle and LG
 - on axle bolts and washers
- b) Place the axle and the brake assembly in position on the gear leg.



c) Install the 4 bolts, 8 washers and the 4 self-locking nuts. Place the fairing attachment plate.





d) Torque the nuts to appropriate torque - refer to the aircraft maintenance manuals for axle bolt torque value



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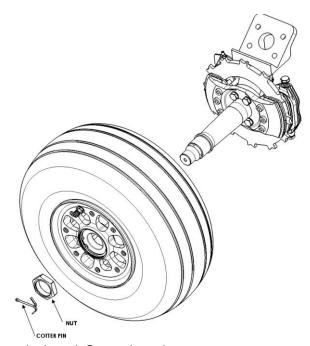
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- e) Apply a thin coat of grease on wheel bearings
- f) Insert the wheel through the axle while placing the disc in wheel slots.

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 35 N.m (310 in-lb)
- i) Insert a new cotter pin to secure the axle nut

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

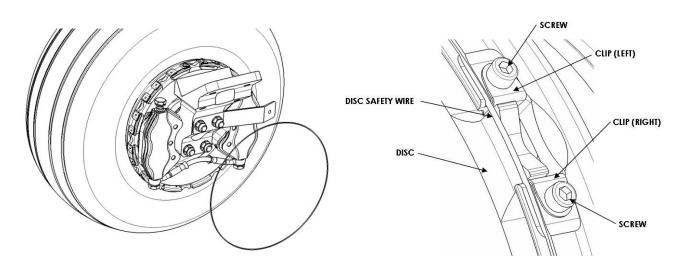
j) Place a new safety wire (stainless steel 1mm – 0.040") in the ring groove all around the wheel.

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



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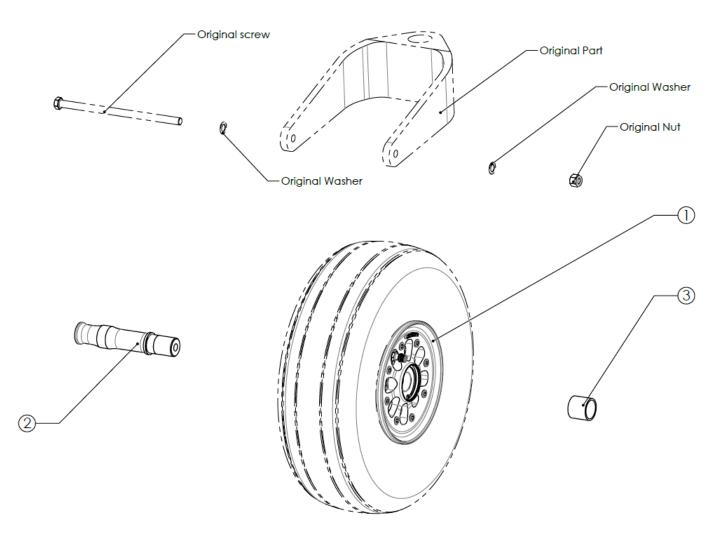
k) After the bleeding of the brake system, install wheel fairings as specified in the aircraft maintenance manuals.



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4.1.2 Nose Wheel



Weight (Without tire)/Masse: 1702g

REP	PART NUMBER	DESCRIPTION	QTY.
1	RA-014	Nose wheel	1
2	AV-CIRR-003	Nose wheel axle	1
3	AV-CIRR-004	Bearing spacer	1

AV-CIRR-030



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REMOVAL:

- a) Remove wheel fairings
- b) Remove original axle and wheel from the fork

INSTALLATION:

- a) Apply a light coat of grease in wheel bearings
- b) Insert the axle in the wheel and then the bearing spacer on the other side.
- c) Place the assembly inside the fork
- d) Insert the original axle bolt with washers, screw the nut to contact and tighten to the appropriate torque
- e) Insert cotter pin to secure the nut

CAUTION: Make sure that the wheel is turning freely but without lateral play.

- f) Check tire inflation pressure
- g) Install the fairing as specified in the aircraft maintenance manuals.



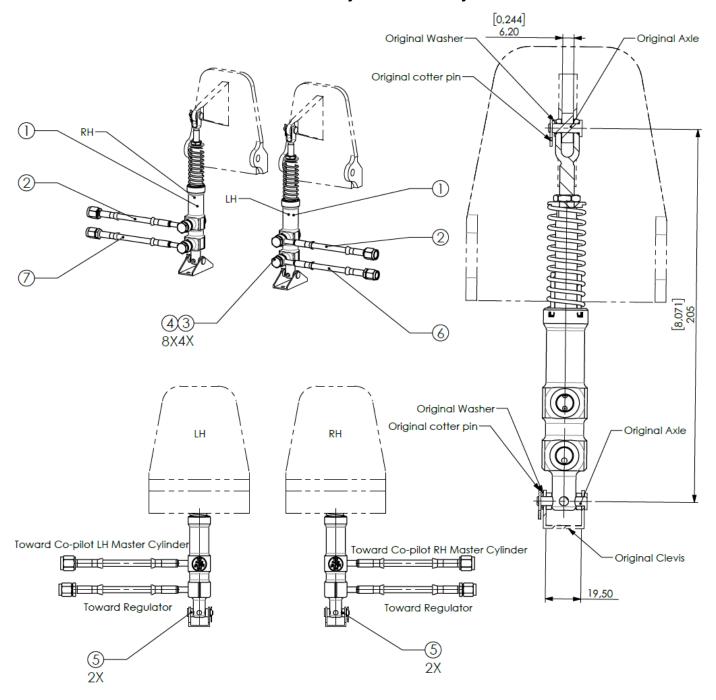


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4.1.2.1 Master Cylinders (STC-004)

Pilot Master Cylinder Assembly



REP	PART NUMBER	DESCRIPTION	QTY.
1	MP-001.2N	MC14.5 NBR_Master cylinder/ Maitre Cylindre	2
2	AV-CIRR-001.6	Cirrus_Brake Line 6	2
3	HYD-003P	M10x1_Banjo Bolt/ Vis Banjo	4
4	HYD-005B	Copper Seal/ Joint cuivre	8
5	RDL-010	9-5.1-3_Spacer / Entretoise	4
6	AV-CIRR-001.5	Cirrus_Brake Line 5	1
7	AV-CIRR-001.4	Cirrus_Brake Line 4	1

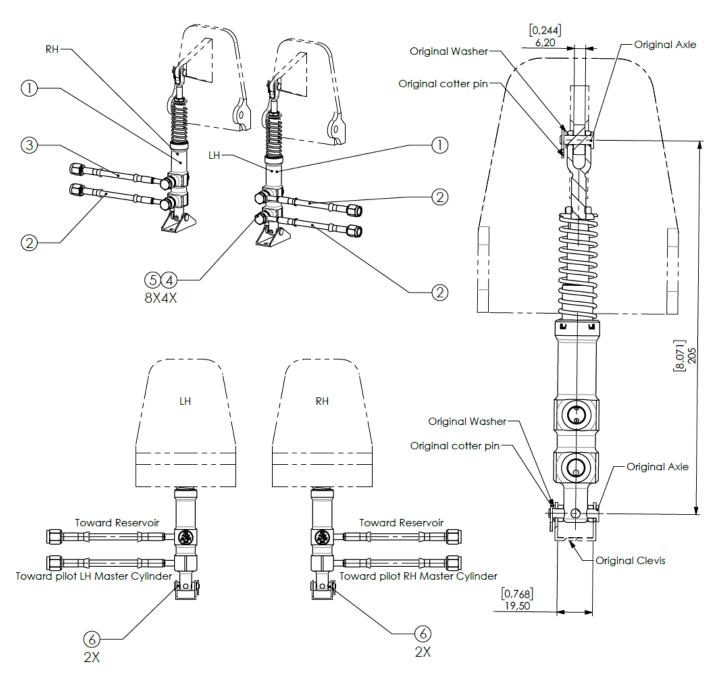
AV-CIRR-042



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Co-Pilot Master Cylinder Assembly



REP	PART NUMBER	DESCRIPTION	QTY.
1	MP-001.2N	MC14.5 NBR_Master cylinder/ Maitre Cylindre	2
2	AV-CIRR-001.6	Cirrus_Brake Line 6	3
3	AV-CIRR-001.7	Cirrus_Brake Line 7	1
4	HYD-003P	M10x1_Banjo Bolt/ Vis Banjo	4
5	HYD-005B	Copper Seal/ Joint cuivre	8
6	RDL-010	9-5.1-3_Spacer / Entretoise	4

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REMOVAL:

- a) Disconnect inlet and outlet hose
- b) Remove and discard the cotter pins
- c) Remove clevis pins and washers
- d) Remove flexible lines with fittings
- e) Install blanking cap on all open connections

NOTES: Same master cylinders are used on pilot side and co-pilot side.

Fluid reservoir is not changed by this STC

Position of pedals remains the same as original equipment

INSTALLATION:

a) Pre-assemble the master cylinder with the two brake lines, banjo bolts and copper seals

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

b) Torque tighten the banjo bolt to 5 Nm + 90° (45 in-lbs +90°)

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) Do a check of brake pedal to make sure it moves easily and free of parasite friction
- d) Lubricate the new or polished clevis pins with grease MIL-G-81322

NOTE: Clevis pins must be like new and free of scratches

- e) Lubricate inner bore of master cylinder body and clevis with grease MIL-G-81322
- f) Insert master cylinder body in the fixing on floor, place the two spacers and insert the axle. Place the washer and cotter pin.

NOTE: a small play should be observed between master cylinder body and his 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 possible failure of master cylinder

- h) Insert clevis pin with washer and cotter pin
- i) Move brake pedal and check for any parasite friction.
- j) Check that when brake pedal is released the master cylinder is fully extended



CAUTION:

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should not be changed.

- k) Make sure that the pins are secured with cotter pins
- I) Do the same operation for each master cylinder
- m) Then connect brake lines to original fittings

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

4.1.3 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.

Master cylinder length axle to axle is 207mm (8.15 in) this dimension is adjusted at factory and

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.

4.1.4 Parking brake Valve

Parking brake valve is not changed and remains the same.

CAUTION: For parking brake valves, refer to manufacturer for maintenance procedures and service life.

4.1.5 Brake Regulator (STC-004)

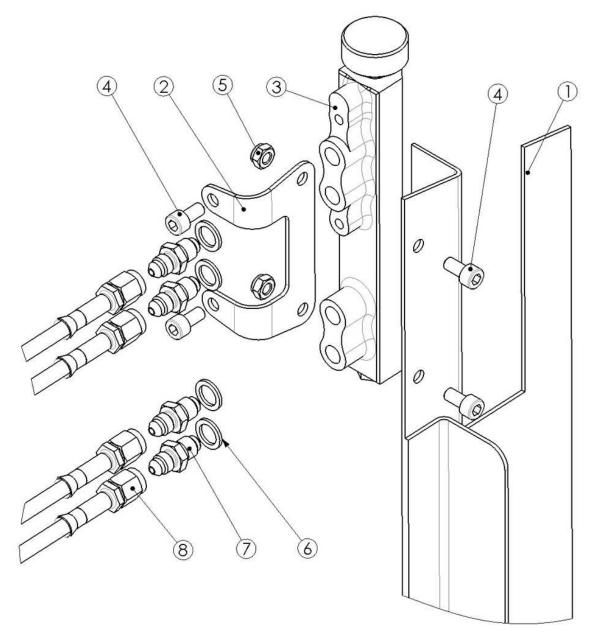
Regulator is a 2 ways system hydraulically separated (1 and 2). Each way is equipped with metric internal thread inlet and outlet port identified by "IN" and "OUT".

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



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REP	PART NUMBER	DESCRIPTION	QTY.
1	Original Part - not included in the STC	Lateral Control panel - Pilot side	1
2	PTF-004	Regulator fixing plate	1
3	RE-001	Regulator	1
4	V-CHC-012	Screw	4
5	E-HN-003	Nut	2
6	HYD-005B	Copper seal	4
7	HYD-006P	Adaptor	4
8	Refer to the hydraulic schema	Brake line	4

AV-CIRR-013



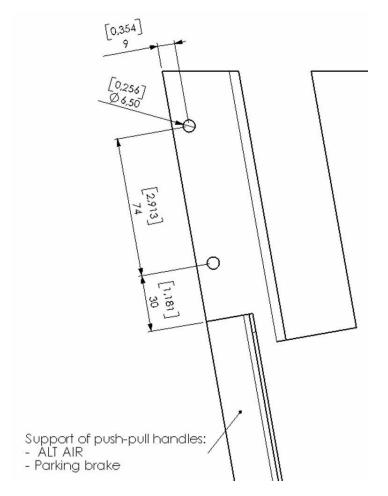
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INSTALLATION:

a) To fix the brake regulator, two holes must be drilled as per the drawing next:





- b) The fixing plate PTF-004 can be used to help drilling the two holes.
- c) Bolt on the plate PTF-004 with screws and nuts

NOTE: 1/4" bolts can be used instead of metric bolts delivered in the kit

- d) Install the brake regulator on his fixing plate
- e) Put a drop of threadlocker medium-strength (Loctite 243 Recommended) on the 2 metric screws V-CHC-012.
- f) Torque to 10 N.m (87 in-lb)

NOTE: Regulator thumbwheel must be positioned on the upper side



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g) Install brake lines with adaptors and copper seals

CAUTION: The adaptors are not symmetric: Metric thread on one side and 3/8x24 thread on the other side

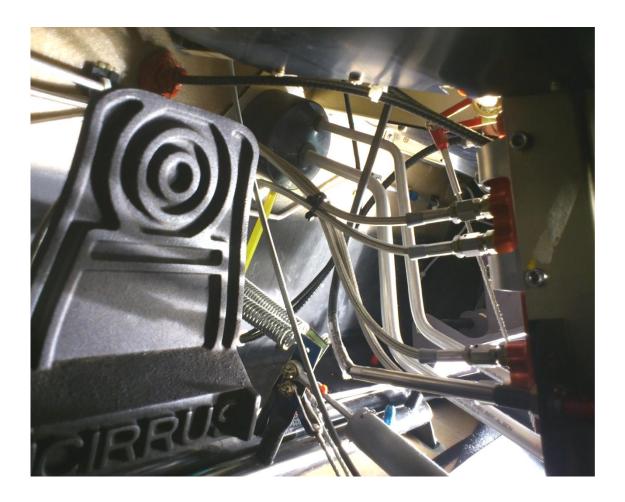
h) Torque the adaptors to 15 - 17 N.m (130 to 150 in-lb)

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

i) Connect the corresponding brake lines to "IN.1", "IN.2", "OUT.1" and "OUT.2"

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

- j) Use plastic straps to hold brake lines in place
- k) Make sure that the brake pedals can move in their full stroke without touching or pulling on the brake lines
- I) The setting of brake regulator has been adjusted at the factory and should not be changed



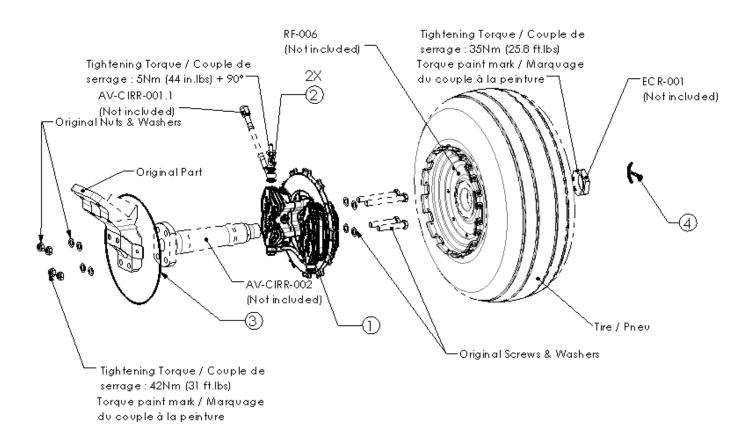


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4.2 STC-004.1 Installation

4.2.1 Main wheel and Brakes (STC-004.1)



REP	PART NUMBER	DESCRIPTION	QTY.
1	EA-003.4N	4P32-6-9_Dual Brake Caliper / Etrier De Frein Double	1
2	HYD-005B	Copper Seal/ Joint cuivre	2
3	ZPA02	Safety Wire/Fil à freiner	1
4	L-V-003	Cotter Pin 3.2x50 / Goupille fendue 3.2x50	1

AV-CIRR-020.1

REMOVAL:

- a) Remove wheel fairings
- b) Remove the wheel and the brake assy. from the axle
- c) Unplug flexible hose AV-CIRR-001.1



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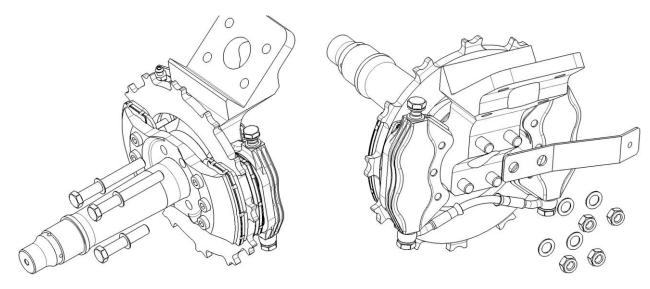
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INSTALLATION:

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

- a) Apply a thin coat of corrosion inhibitive sealant type CA1000 from PRC De Soto (or equivalent) on next contact surfaces:
 - between axle and caliper
 - on axle bolts and washers
- b) Install the 4 bolts, 8 washers and the 4 self-locking nuts. Place the fairing attachment plate.

NOTE: Bolt head must be on wheel side, use one thin washer under each bolt head.



c) Torque the nuts to appropriate torque - refer to the aircraft maintenance manuals for axle bolt torque value





- d) Apply a thin coat of grease on wheel bearings
- e) Insert the wheel through the axle while placing the disc in wheel slots.

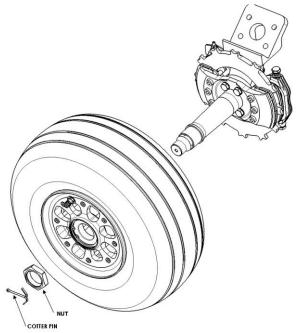
NOTE: Do not force, the disc has to be properly positioned to fit inside wheel slots



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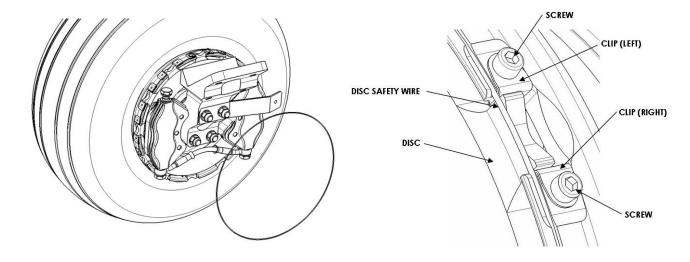


- f) Apply a thin coat of grease on axle thread. Screw the axle nut to contact
- g) Torque axle nut to 35 Nm (310 in.lbs)
- h) Insert new cotter pin to secure the axle nut L-V-003

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

i) Place a new safety wire (stainless steel 1mm – 0.040", reference ZPA02) in the ring groove all around the wheel.

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



j) After the bleeding of the brake system, install wheel fairings as specified in the aircraft maintenance manuals.

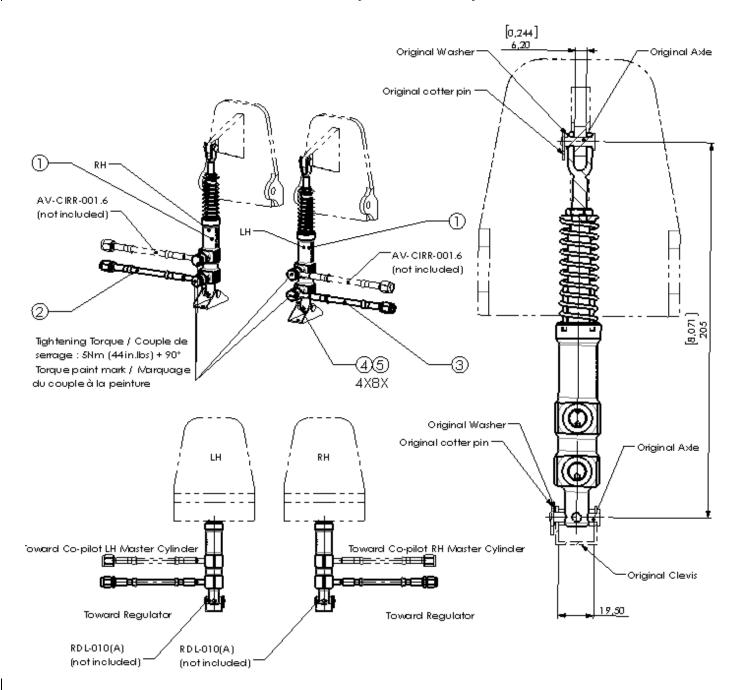


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4.2.1.1 Master Cylinders (STC-004.1)

Pilot Master Cylinder Assembly



5	HYD-005B	Copper Seal/ Joint cuivre	8
4	HYD-003P	M10x1_Banjo Bolt/ Vis Banjo	4
3	AV-CIRR-001.5	Cirrus_Brake Line 5	1
2	AV-CIRR-001.4	Cirrus_Brake Line 4	1
1	MP-001.2N	MC14.5 NBR (L=205)_Master cylinder/ Maitre-Cylindre	2
REP	PART NUMBER	DESCRIPTION	QTY.

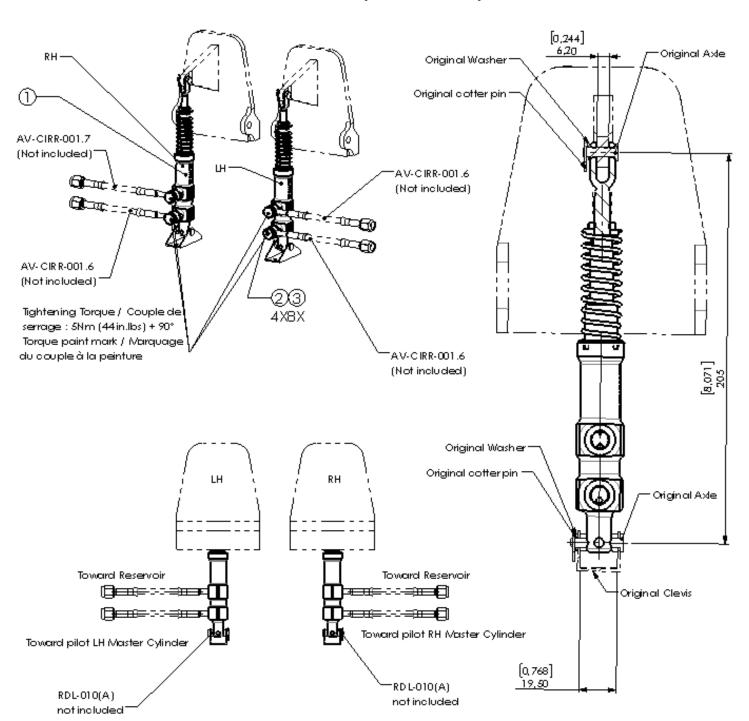
AV-CIRR-042.1



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Co-Pilot Master Cylinder Assembly



REP	PART NUMBER	DESCRIPTION	QTY.
1	MP-001.2N	MC14.5 NBR (L=205)_Master cylinder/ Maitre-Cylindre	2
2	HYD-003P	M10x1_Banjo Bolt/ Vis Banjo	4
3	HYD-005B	Copper Seal/ Joint cuivre	8

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REMOVAL:

- a) Disconnect inlet and outlet hose
- b) Remove the cotter pins and washers
- Remove flexible lines with fittings and master-cylinders MP-003N
- d) Install blanking cap on all open connections

NOTES: Same master cylinders are used on pilot side and co-pilot side.

Fluid reservoir is not changed by this STC

Position of pedals remains the same as original equipment

INSTALLATION:

a) Pre-assemble the master cylinder MP-001.2N with the two brake lines AV-CIRR-001.4 and AV-CIRR-001.5, banjo bolts and copper seals

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

b) Torque tighten the banjo bolts to 5 Nm + 90° (45 in.lbs +90°)

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

Copper seals cannot be re-used after being locked because they may leak. They must be changed CAUTION:

each time the fitting is removed.

- c) Do a check of brake pedal to make sure it moves easily and free of parasite friction
- d) Lubricate the new or polished clevis pins with grease MIL-G-81322

NOTE: Clevis pins must be like new and free of scratches

- e) Lubricate inner bore of master cylinder body and clevis with grease MIL-G-81322
- Insert master cylinder body in the fixing on floor, place the two spacers and insert the axle. Place the washer and cotter pin.

NOTE: A small play should be observed between master cylinder body and his 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 possible failure of master cylinder

- Insert clevis pin with washer and cotter pin
- Move brake pedal and check for any parasite friction.
- 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.



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k) Make sure that the pins are secured with cotter pins

- I) Do the same operation for each master cylinder
- m) Then connect brake lines to original fittings

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

4.2.2 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.

4.2.3 Parking brake Valve

Parking brake valve is not changed and remains the same.

CAUTION: For parking brake valves, refer to manufacturer for maintenance procedures and service life.

4.2.4 Brake Regulator (STC-004.1)

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".

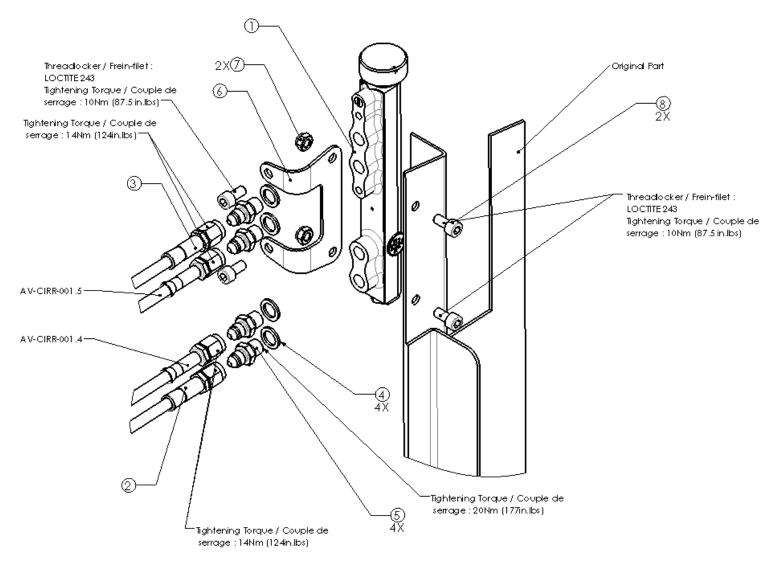
CAUTION: Do not mix "IN.1" and "OUT.2" or "IN.2" and "OUT.1" brake system will not work.



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8	V-CHC-012	M6x12(A2 or A4)_Screw/Vis	2
7	E-HN-003	M6_self-locking Nut/Ecrou NL	2
6	PTF-004	Régulator Fixing Plate / Patte Fixation Régulateur	1
5	HYD-006	M10x1-3/8x24_Adaptator / Adaptateur	4
4	HYD-005B	Copper Seal/ Joint cuivre	4
3	AV-CIRR-001.30	CIRRUS SR2X STC-004.1 (FP/Regulateur)_Brake Line / Durite	1
2	AV-CIRR-001.20	CIRRUS SR2X STC-004.1 (FP/Regulateur)_Brake Line / Durite	1
1	RE-001N	20-50 Bars Mineral_Regulator Assy/ Assemblage Regulateur	1
REP	PART NUMBER	DESCRIPTION	QTY.

AV-CIRR-013.1



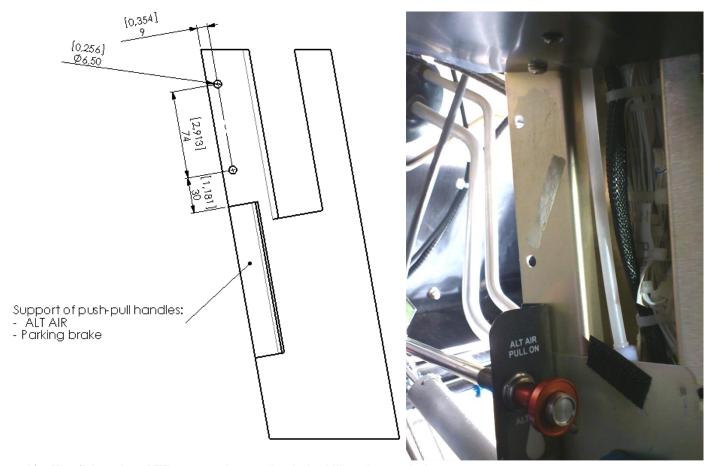
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INSTALLATION:

a) To fix the brake regulator, two holes must be drilled as per the drawing next :



- b) The fixing plate PTF-004 can be used to help drilling the two holes.
- c) Bolt on the plate PTF-004 with screws and nuts

NOTE: 1/4" bolts can be used instead of metric bolts delivered in the kit

- d) Install the brake regulator on his fixing plate
- e) Put a drop of threadlocker medium-strength (Loctite 243 Recommended) on the 2 metric screws V-CHC-012.
- f) Torque to 10 Nm (87.5 in.lbs)

NOTE: Regulator thumbwheel must be positioned on the upper side



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g) Install brake lines with adaptors and copper seals

CAUTION: The adaptors are not symmetric: Metric thread on one side and 3/8x24 thread on the other side

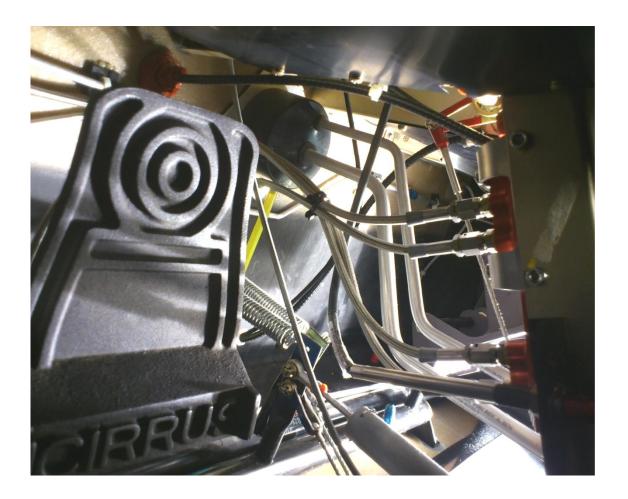
h) Torque the adaptors to 15 - 17 N.m (130 to 150 in.lb)

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

i) Connect the corresponding brake lines to "IN.1", "IN.2", "OUT.1" and "OUT.2"

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

- j) Use plastic straps to hold brake lines in place
- k) Make sure that the brake pedals can move in their full stroke without touching or pulling on the brake lines
- I) The setting of brake regulator has been adjusted at the factory and should not be changed





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AV-CIRR-001.1 HYDRAULIC SCHEMA AV-CIRR-001.5 AV-CIRR-001.4 AV-CIRR-001.6 Parking Brake Valve AV-CIRR-001.6 AV-CIRR-001.6 AV-CIRR-001.6 AV-CIRR-001.7 AV-CIRR-001.6 AV-CIRR-001.1



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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 all available on:



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



Project Reference **STC-004**

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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	
BOM-STC-004	Part Nomenclature	
MM-00-003	BRAKE BLEEDING procedure	
MM-01-002	BRAKE CONDITIONING procedure	
SM-00	BERINGER PRODUCTS MAINTENANCE GUIDE	
SM-02	Wheels Servicing Manual	

Refer to the latest revision.