Revision	Description	Date
IR	-	10-Oct-2017
A	Updated 2.2 (b)	05-Jan-2018
B	Update of the document	23-Mar-2018
C	Update of the document	26-Apr-2018
D	Removed inspection tables in section 4. Determined with ACO that they did not add any value.	2-May-2018
E	Added inspection tables in section 4 per ACO request with additional detail	3-May-2018

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1 GENERAL

This manual defines the installation and maintenance procedures for the BERINGER brake master cylinder on the PA-18 type Aircraft.

Updates of this manual are available on the BERINGER AERO website or on demand.

1.1. Approved Model List

Aircraft eligible for this installation are as listed on the AML associated with the STC.

1.2. Weight and Balance

Unaffected

1.3. Brake Fluid

Use only MIL-H-5606 brake fluid or the equivalent military grade(MIL-PRF-87257).

Caution: *Using a brake fluid other than what is listed above can cause damage to the internal seals, resulting in leaks or ineffective braking.*

1.4. Tools

No special tools are needed to fit and remove the BERINGER AERO pedal and master cylinders assembly.

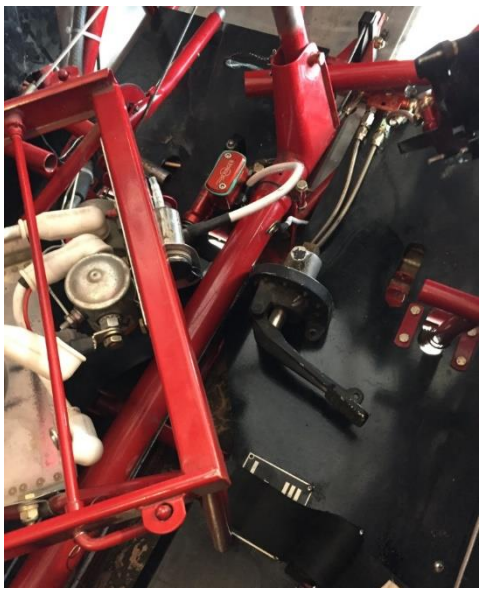
1.5. Basic control and operation

The BERINGER AERO pedal and master cylinder assembly is operating as per the original equipment.

2. REMOVAL and INSTALLATION

2.1. Removal

a) Remove seat, battery, and flap handle as necessary to allow access to the rear brake controls.



b) Remove the connecting rod between the rear brake pedal and the front brake pedal.

c) Drain the fluid from the brake system, and disconnect brake lines and fittings from the existing master cylinder.

d) Remove the AN bolts attaching the master cylinder to the floor. Remove the existing master cylinder assembly.

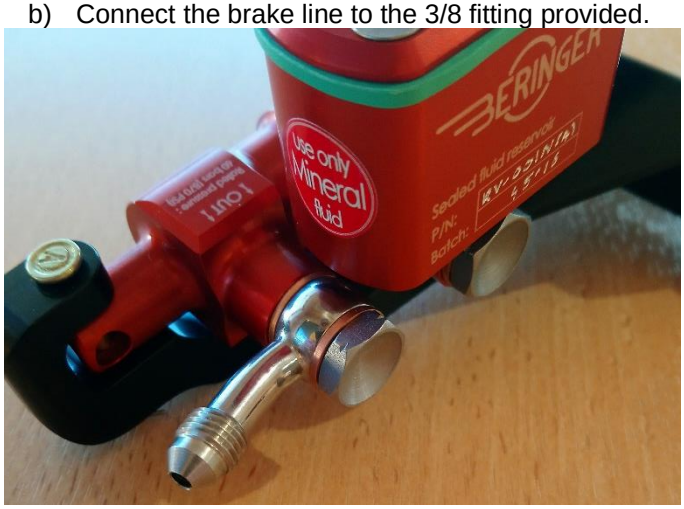
2.2. Installation

a) Install the banjo fitting to the master cylinder. Ensure the fitting is connected to the port labeled 'out' and the reservoir is connected to the port labeled 'in'. Two copper crush washers are required for each port as shown in the image below. Tighten the bolts to 148 in-lbs.

CAUTION: Copper seals cannot be re-used after being torqued. They must be changed each time the fitting is removed.

NOTE: If under torque is applied a leak may occur, if over torque is applied the banjo bolt may break or damage the internal threads.

b) Connect the brake line to the 3/8 fitting provided.



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

NOTE: A small amount of play should be observed between master cylinder body and the bracket.

c) Once all the brake system is installed and connected, re-service the brake system with new brake fluid. Use only MIL-H-5606 brake fluid or the equivalent military grade(MIL-PRF-87257) as stated in chapter 1.3.

d) Bleed the brake system. Use the included Beringer bleeding reservoir cap pictured below.
This allows bleeding to be done with the master cylinder oriented with the bolts facing up. Connect a tube to the bleeding cap to collect the excess fluid. Connect another tube to the bleed fitting on the caliper. Crack the bleed fitting open and pump brake fluid up through the caliper. Periodically cycle the brake pedal until air bubbles are no longer seen in the tube coming from the reservoir. Verify that the brake pedal is firm. Close the bleed fitting on the caliper. Return the master cylinder to the normal orientation and replace the bleeding cap with the normal reservoir cap.

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

f) Install the mounting bracket to the floorboards using the AN3 bolts. Torque to the original specifications.

g) Reconnect the connecting rod from the pilot brake pedal to the rear brake pedal. Verify that when the pilot brake pedal is released, the master cylinder is fully extended. Adjust the length of the connecting rod for the correct amount of travel in the pedal to obtain the full extension of the master cylinder.

3. Airworthiness Limitations

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 alternate program has been approved by the FAA.

No additional airworthiness limitations have been imposed by this modification.

This modification does not affect the airworthiness section of the FAA Approved Maintenance manual.

4. Maintenance Instructions

4.1. Safety Maintenance Checks

Inspection		Operation	
Component	**Wear Limit**	**Each Scheduled Maintenance**	
Entire Assembly	Visibile cracks or leaks	General visual inspection	Check for cracks or leaks
If cracks are observed, replace the entire component. If leaks are observed at a hydraulic fitting, check the torque on the fitting. If the leak persists, replace the copper crush washers and retorque the fitting. If the leak persists, replace the entire component. If leaks are observed originating other than at a hydraulic fitting, replace the entire component.			

4.2. 100h/Annual Inspection

Inspection		Operation	
Component	**Wear Limit**	**100h**	**Annual Inspection**
Brake Pedal	Visible cracks	General visual inspection for damage	Check for cracks or leaks
Hydraulic Hoses and Fittings	Visible leaks	General visual inspection for damage, leaks and corrosion	
Master Cylinder	Visibile cracks or leaks	General visual inspection for damage, leaks and corrosion	
If cracks are observed, replace the entire component. If leaks are observed at a hydraulic fitting, check the torque on the fitting. If the leak persists, replace the copper crush washers and retorque the fitting. If the leak persists, replace the entire component. If leaks are observed originating other than at a hydraulic fitting, replace the entire component.			

4.3. Cleaning

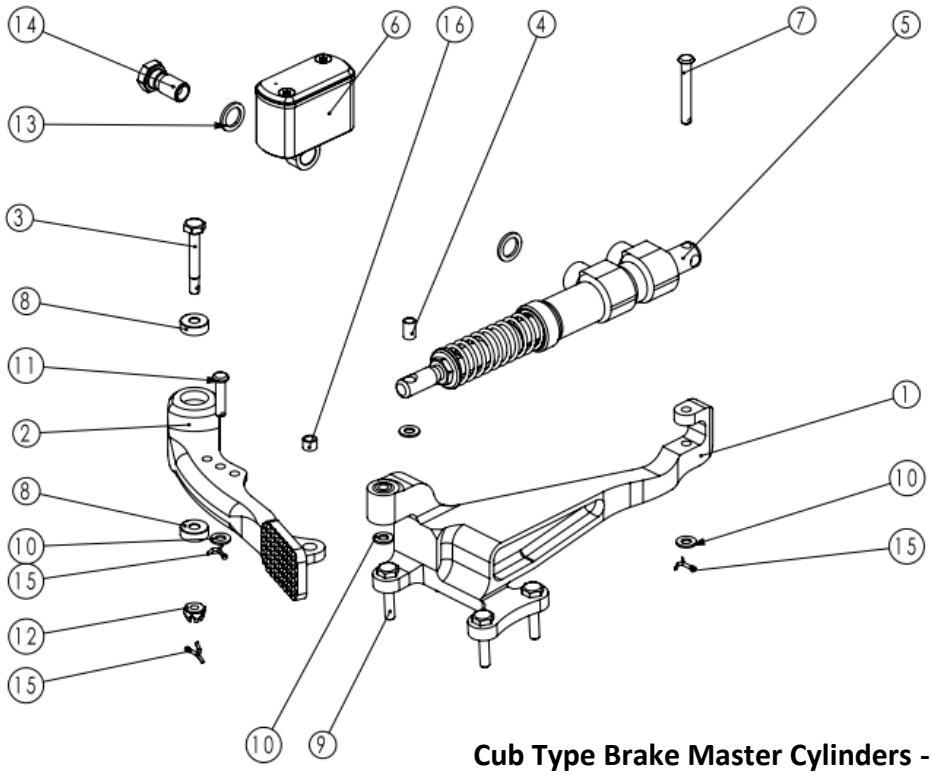
The aluminum parts are protected from corrosion with an anodizing coating. This thin coating does not protect against cleaning agents any acidity, or alkalinity greater than 9. These types of agents may damage or remove the protective anodizing. For cleaning the brake parts we recommend using only water and soap or dry clothes.

4.4. Master cylinders

The master cylinders are maintenance free. In case of damage, do not attempt disassembly or repair of the master cylinder. Repair or overhaul can only be performed by the manufacturer.

5. Drawings

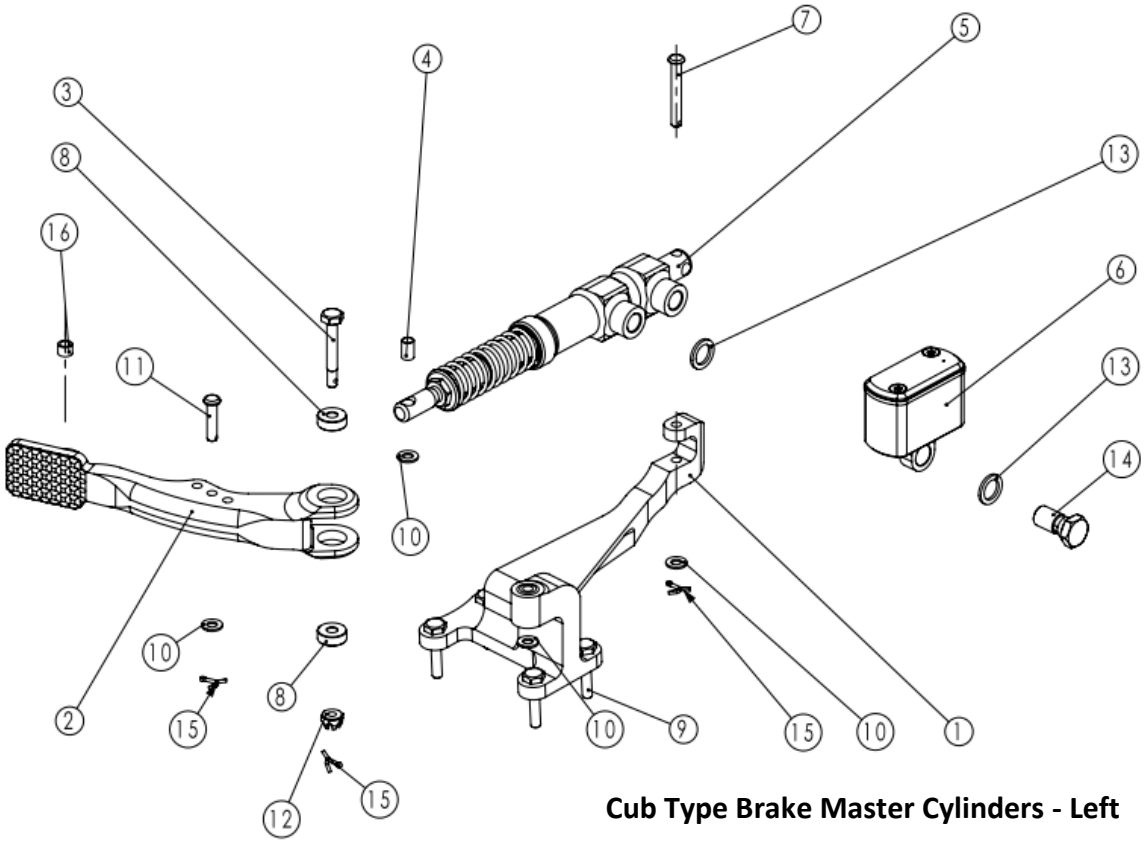
5.1. Right master cylinder and pedal assembly



Cub Type Brake Master Cylinders - Right

	REP	PART NUMBER	DESCRIPTION	QTY.
	16	BGE-029|A|	Spacer	1
	15	MS24665-132	Cotter Pin	3
	14	HYD-003P	Banjo Bolt	1
	13	HYD-005B	Copper Seal	2
	12	AN310-3	Nut	1
	11	MS20392-2C23	Clevis Pin	1
	10	R-AP-004	Washer	4
	9	AN3-10A	Axle bolt	4
	8	B-BE-006	BEARING	2
	7	MS20392-2C41	Clevis Pin	1
	6	RV-001N|A|	Reservoir	1
B	5	MP-001.4N|A|	Master cylinder	1
	4	BGE-027|A|	Spacer	1
	3	VIS-025|A|	Screw	1
C	2	AV-CUB-102|C|	Pedal	1
	1	AV-CUB-103|B|	Left Support	1

5.2. Left master cylinder and pedal assembly



Cub Type Brake Master Cylinders - Left

REP	PART NUMBER	DESCRIPTION	QTY.
16	BGE-029(A)	Spacer	1
15	MS24665-132	Cotter Pin	3
14	HYD-003P	Banjo Bolt	1
13	HYD-005B	Copper Seal	2
12	AN310-3	Nut	1
11	MS20392-2C23	Clevis Pin	1
10	R-AP-004	Washer	4
9	AN3-10A	Axle bolt	4
8	B-BE-006	BEARING	2
7	MS20392-2C41	Clevis Pin	1
6	RV-001N(A)	Reservoir	1
5	MP-001.4N(A)	Master cylinder	1
4	BGE-027(A)	Spacer	1
3	VIS-025(A)	Screw	1
C 2	AV-CUB-102(C)	Pedal	1
1	AV-CUB-101(B)	Left Support	1

6. 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. Excessive pedal travel or spongy pedal feel.	Air in hydraulic system	Bleed the hydraulic system
	Leak in the system	Locate leak and repair
	Wrong fluid used caused degradation of master cylinder seals	Return to manufacturer for replacement
2. Brake drag	Residual brake pressure due to improper adjustment of connecting rod. Some pedal force remains on master cylinder.	Adjust the length of the connecting rod between the pilot brake pedals and the rear brake pedals. Ensure master cylinder is completely released when pedal is released.
	Residual brake pressure due to excessive pressure in the reservoir	Open and close the reservoir to release the pressure
	Wrong fluid used caused degradation of master cylinder seals	Return to manufacturer for replacement