



DISC BRAKE & TUNDRA TIRE ASSEMBLY MANUAL

**Phantom Aeronautics LLC
Erik Pederson, President
2010 Hov-Aire Dr
Three Rivers, MI 49093
PH: 616-610-6597
EMAIL: erik.pederson@att.net**

Version 9.29.2024

DISC BRAKE KIT A

Complete Nylon-Fiberglass Wheel Kit

DESCRIPTION	QTY
12.5" NYLON-FIBERGLASS WHEEL (TIRES, TUBES AND RIMS)	2
CALIPER & ROTOR SET	2
C17B - INSIDE BRAKE GUSSET PLATE	2
C17LDB - LEFT DISC BRAKE GUSSET PLATE	1
C17RDB - RIGHT DISC BRAKE GUSSET PLATE	1
C06DB-LG LARGE AXLE SPACER 1" OD NECKED DOWN TO 5/8"	2
C06DB-SM SMALL AXLE SPACER	2
AN8-60A 1/2" AXLE	2
AN3-17A GUSSET PLATE BOLTS	8
W3 WASHER	8
N3 NUT	8
W8 WASHER	8
N8 NUT	2
BRAKE HANDLE, STICK AND CABLES	1
CALIPER ADAPTER	2

DISC BRAKE KIT B

Complete Aluminum Wheel Kit

DESCRIPTION	QTY
6" AZUSA RIM	2
6" AZUSA TUBE	2
6" AZUSA TIRE	2
CALIPER & ROTOR SET	2
C17B - INSIDE BRAKE GUSSET PLATE	2
C17LDB - LEFT DISC BRAKE GUSSET PLATE	1
C17RDB - RIGHT DISC BRAKE GUSSET PLATE	1
C06B - AXLE SPACER	2
AN10-70A - AXLE	2
DISC BRAKE HUB	2
RUBBER WASHERS	6
AN5-26A - RIM BOLT	6
N5 NUT	6
W5 WASHER	12
AN3-17A GUSSET PLATE BOLT	8
W3 WASHER	8
N3 NUT	8
W10 WASHER	10
N10 NUT	2
BRAKE HANDLE, STICK AND CABLES	1
CALIPER ADAPTER	2

DISC BRAKE KIT C

Aluminum Wheel Upgrade Kit (for aircraft with existing band brakes)

DESCRIPTION	QTY
CALIPER & ROTOR SET	2
C17B - INSIDE BRAKE GUSSET PLATE	2
C17LDB - LEFT DISC BRAKE GUSSET PLATE	1
C17RDB - RIGHT DISC BRAKE GUSSET PLATE	1
C06B	2
DISC BRAKE HUB	2
RUBBER WASHERS	6
AN5-26A	6
N5 NUT	6
W5 WASHER	12
AN3-17A	8
W3	8
N3	8
W10	10
CALIPER ADAPTER	2

Introduction

This manual describes the steps necessary to install the disc brake system on your aircraft. In this manual when left side and right side of the aircraft are viewed as if you were sitting in the cockpit looking forward.

Installation

STEP 1 – Remove existing brake system and install new gusset plates C17B, C17LDB and C17RDB as shown in Figures 1, 2 & 3. These plates should be bolted using (4) AN3-17A, (4) W3 and (4) N3. The brake calipers are identical and therefore must be positioned differently on each side of the gear thus 2 different outside plates are required. The caliper will be in the rear on the right side and the caliper will be in the front on the left side.

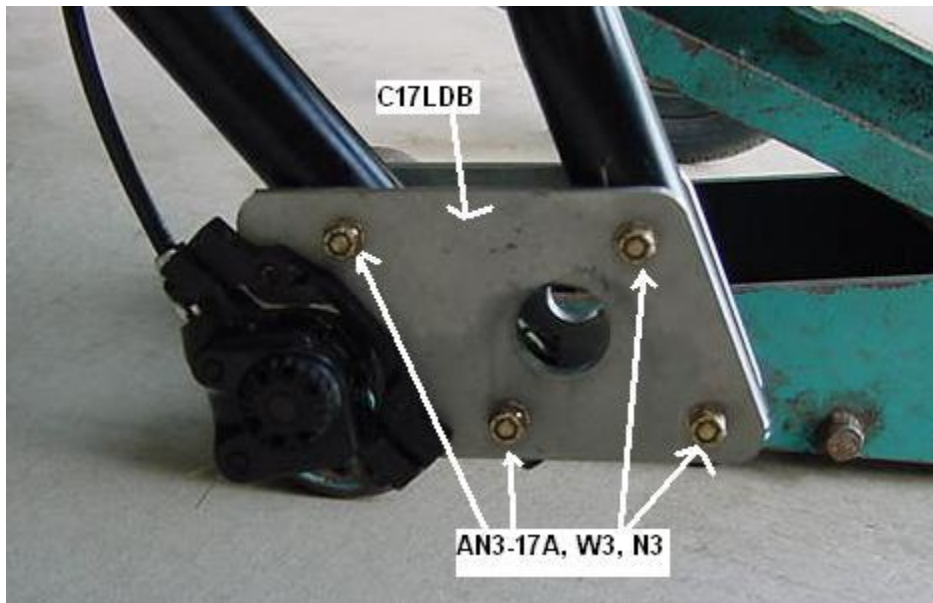


Figure 1 – C17LDB, Left Gusset Plate

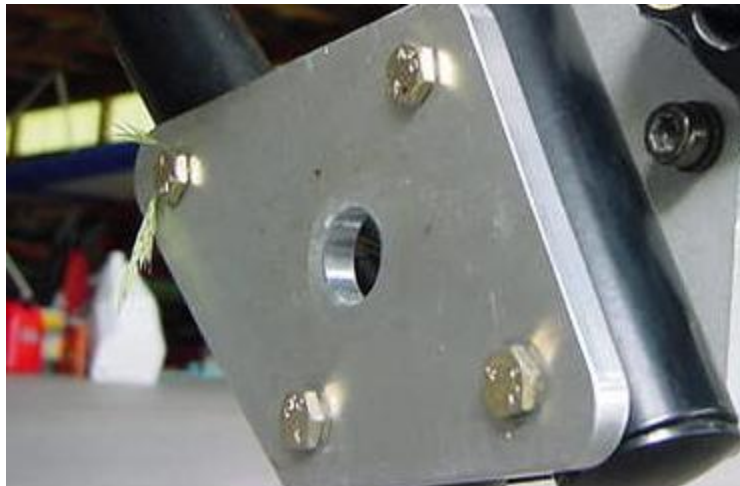


Figure 2 – C17B, Inside Gusset Plate (Same for both sides)

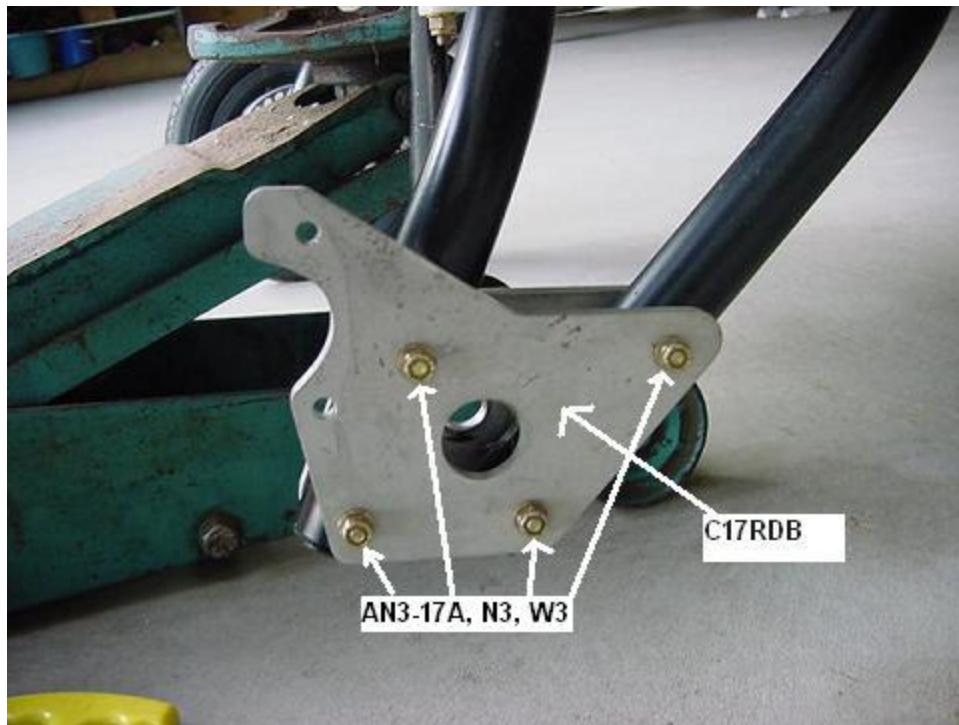


Figure 3 – C17RDB, Right Gusset Plate

STEP 2 – Attach Caliper Adapter to Brake Caliper as shown in Figure 4 & 5. The caliper has long slots into which the bolts for the caliper adapter go through. The Caliper Adapter should be bolted on to the caliper through these slots such that the adapter is as far away from the brake pads as possible.



Figure 4 – Caliper Adapter



Figure 5 – Brake Caliper

STEP 3 – Attach Control Stick and Brake Handle to the aircraft. If you purchased a disc brake upgrade kit you will be using your existing brake handle and cable setup. See Figure 6 & 7.



Figure 6 – Assemble Control Stick with Brake Lever

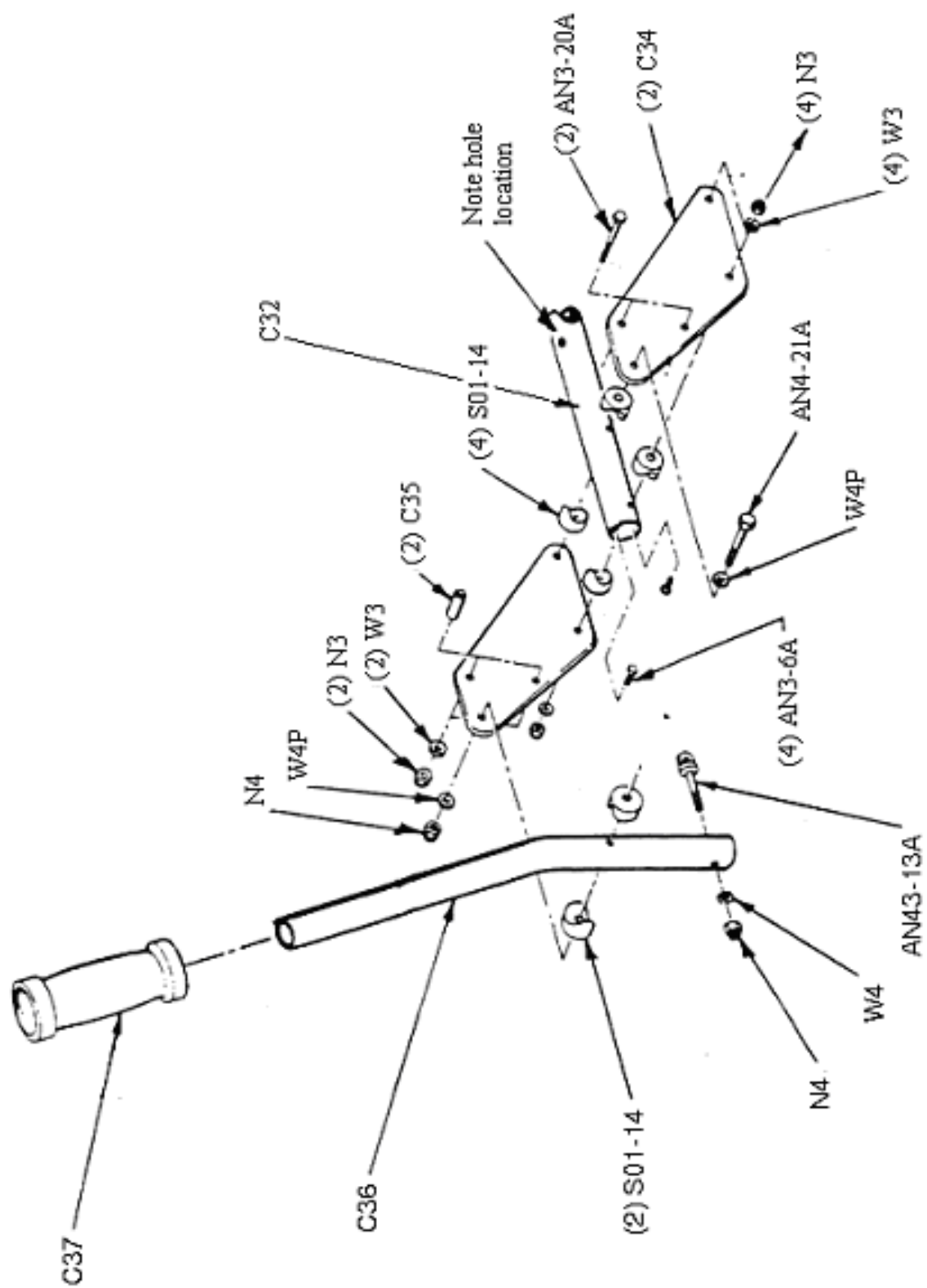


Figure 7 – Control Stick Assembly

STEP 4 – Bolt the Caliper to the Gusset Plates as shown in Figure 8 & 9 using (2) Allen bolts and washers per caliper. Brake pads should be positioned on the outside of the plates. If you are installing disc brakes with the Tundra Tire option then the caliper will need to be mounted after the wheel and disc brake hub assembly is already installed on the aircraft.

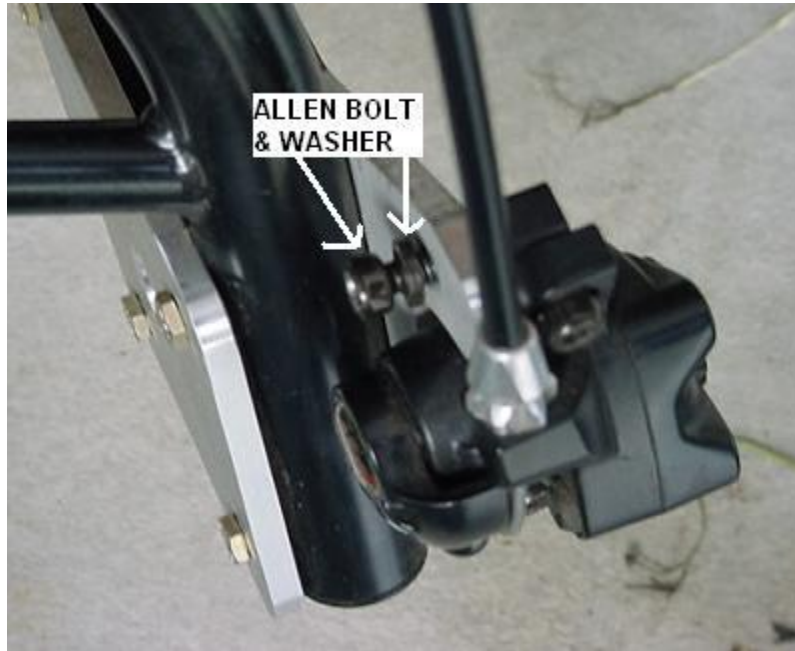


Figure 8 – Right Caliper Mount



Figure 9 – Left Caliper Mount

STEP 5 - Attach brake cable to the caliper. The cable runs through the cable adjuster on the caliper and is clamped in place using an Allen bolt and bracket as shown in Figure 10. Note the positioning of the black cable sheathing in the cable adjuster. The sheathing should be inserted until it is resting on the inside of the cable adjuster. The sheathing should also be inserted into the cable adjusters on the brake handle until they are resting on the inside of the handle cable adjuster as shown in Figure 6. These must be adjusted properly or the brakes will not work. The adjustment is usually made by pulling the bare brake cable through the Allen bolt and clamp until there is no slack left. The Allen bolt and clamp will allow adjustment of the brake sensitivity after the brake system is completely installed.



Figure 10 – Caliper and Cable Mounting

STEP 6 (nylon-composite wheels) – Bolt the rotor to the wheel using the six Torx head bolts and Torx wrench included in the kit. The rotor should be bolted such that the arrow on the rotor is facing the direction of forward rotation. The rotor will fail if this is not facing correctly. The tightening pattern should be a star pattern similar to what you would use when attaching lug nuts to your car. See Figure 11.

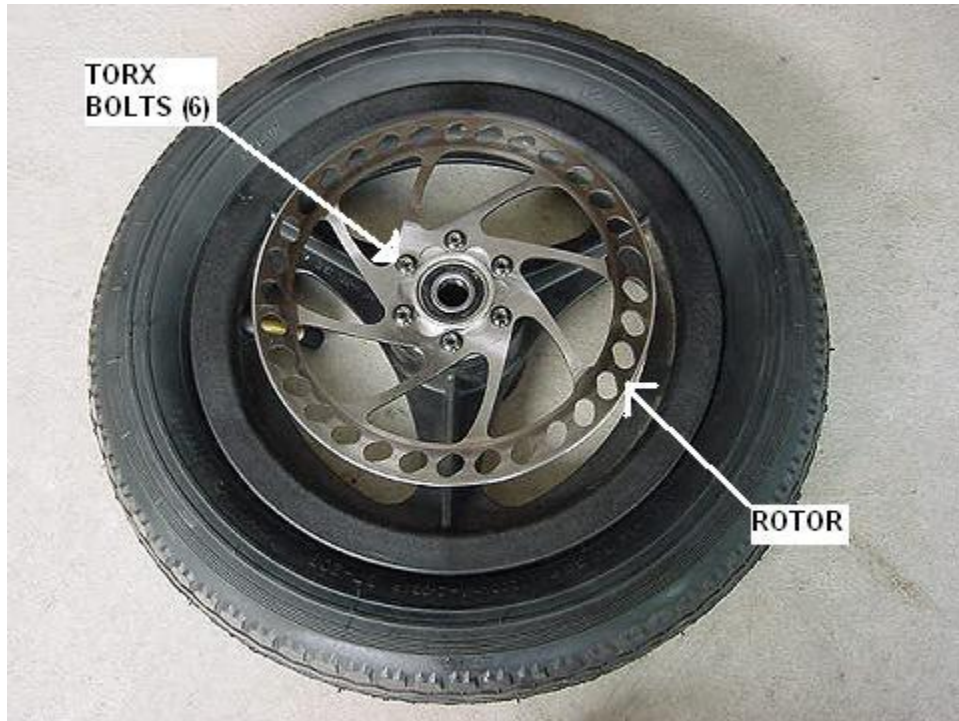


Figure 11 – Nylon – Composite Wheel

STEP 6A – (Aluminum Rims with 12” diameter standard tire and 18” tundra tire) - Bolt the rotor to the disc brake hub using the six Torx head bolts and Torx wrench included in the kit. The rotor should be bolted such that the arrow on the rotor is facing the direction of forward rotation. The rotor will fail if this is not facing correctly. The tightening pattern should be a star pattern similar to what you would use when attaching lug nuts to your car. See Figure 12. Skip ahead to STEP 6E if you have Tundra Tires.

STEP 6B – (Aluminum Rims with 12” diameter standard tire) – Assemble the aluminum tires, tubes and rims. The tube should be inserted inside the tire. Each halve of the rim should then be placed inside the tire paying careful attention to the location of the valve stem. The tube should then be slightly inflated to hold everything in place. Not much pressure is required initially. (3) AN5-25A bolts should then be used to bolt the

rim and hub together. PAY CLOSE ATTENTION TO THE LOCATION OF WASHERS IN THE FOLLOWING FIGURES. One set of W5 washers should be used on the outside of the rim as is shown in Figure 13.



Figure 12 – Aluminum Rim Disc Brake Hub

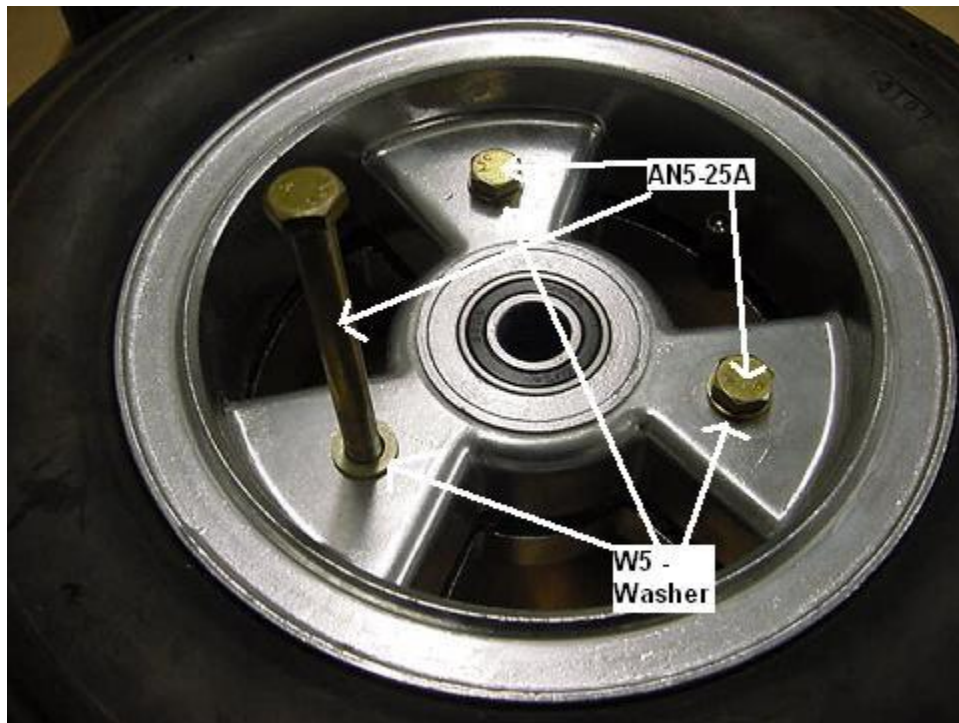


Figure 13 – Outside of Aluminum Rim

STEP 6C – (Aluminum Rim with 12” diameter standard tire) On the backside of the rim insert 1 rubber washer over each bolt as is shown in Figure 14. These washers are used for fine tuning of the rotor angle to the caliper. The aluminum rims are cast aluminum and therefore are not always square and dimensionally perfect. The rotor may initially have a wobble when the wheel is installed on the axle. The tightness of each rim bolt is set differently to adjust the angle of the rotor thereby reducing the wobble. The rubber washers allow for the adjustment of the rim bolt tightness.

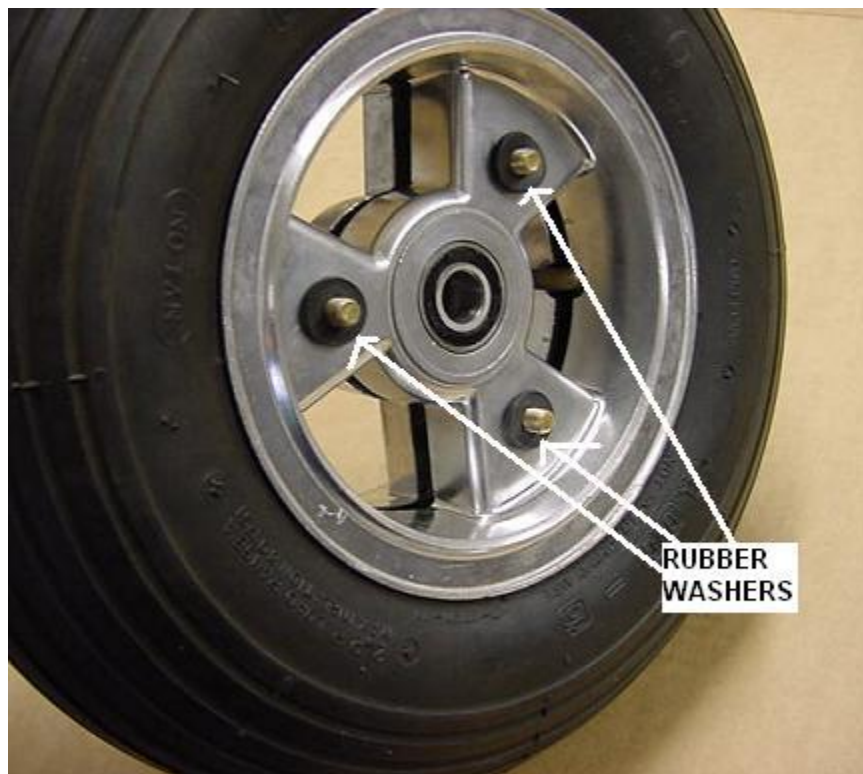


Figure 14 – Rubber Washers

STEP 6D – (Aluminum Rim with 12” diameter standard tire) Bolt the disc brake hub onto the aluminum rim using the washer and bolt pattern shown in Figure 15 and 16A. Tighten the locknuts until the rims just start to touch. Do not tighten them any further at this point. Inflate the tire to the recommended pressure of 25 – 30 psi. Tighten the locknuts again until the rims just start to touch and there is no gap between the rim halves.

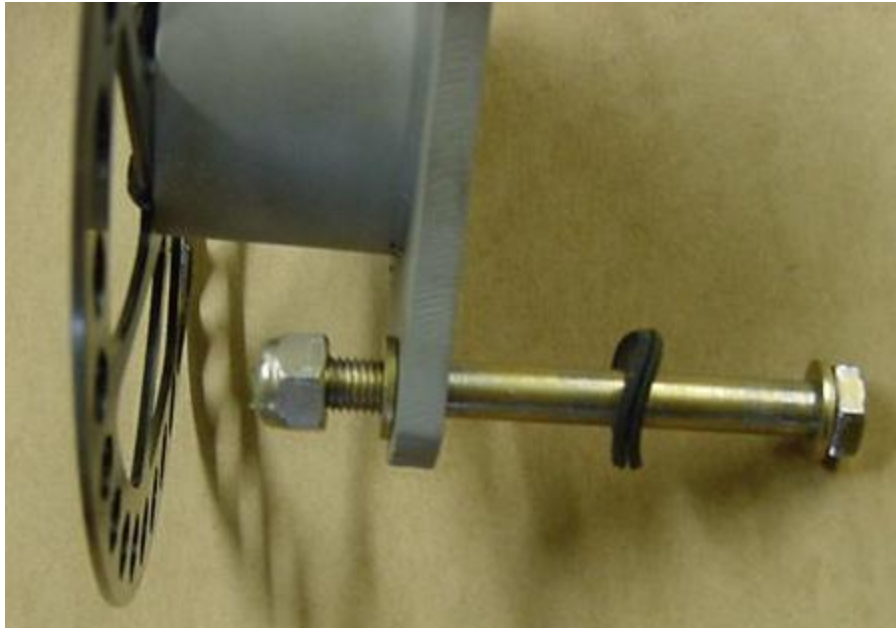


Figure 15 – Washer and Bolt Pattern



Figure 16A – Assembled Tire

STEP 6E – (Aluminum Rim with 18” tundra tires) Assemble the aluminum tires, tubes and rims. The tube should be inserted inside the tire. Each half of the rim should then be placed inside the tire paying careful attention to the location of the valve stem. The tube should then be slightly inflated to hold everything in place. Not much pressure is required initially. (3) AN5-42A bolts should then be used to bolt the rims, spacers and hub together. PAY CLOSE ATTENTION TO THE LOCATION OF WASHERS AND SPACERS IN THE FOLLOWING FIGURE 16B. THE RUBBER WASHERS CAN BE ON EITHER SIDE OF THE SPACER. THESE WASHERS ALLOW FOR TRUE UP OF THE ROTOR

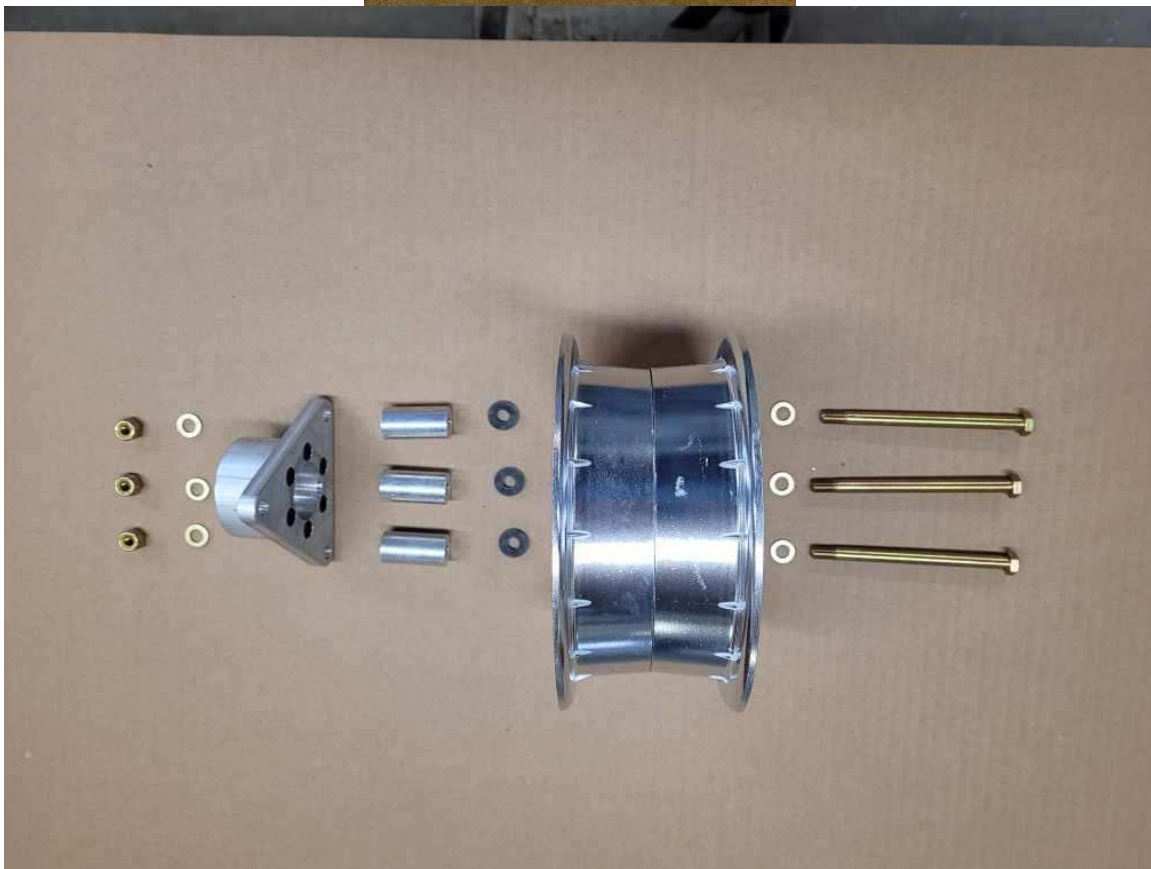


Figure 16B – Disc Brake Hub, washers and spacer installation for Tundra Tires

STEP 7 – (Nylon Composite Rims) – Insert the large 1” OD large axle spacer into the gusset plates as is shown in Figure 18. Insert the AN8-60A axle bolt, 1” OD small axle spacer and W8 washer into the gusset plates as is shown in Figure 17. Push the axle bolt through until it just starts to appear on the other end of the large axle space. Put a W8 washer over the end of this bolt as is shown in Figure 18. Slide the tire with rotor attached in between the disc brake pads while at the same time adjusting the location of the axle to allow the rotor to slide in at the correct angle. Keep pressure on the axle against the rotor to keep the washer from falling off the axle bolt. Once the tire is on far enough slide the axle through the tire. Bolt the axle in place using a W8 and N8. Tighten down until snug still allowing free rotation of the tire. Extra washers are included to change the spacing of the rotor and pads if required.



Figure 17 – Inside Axle

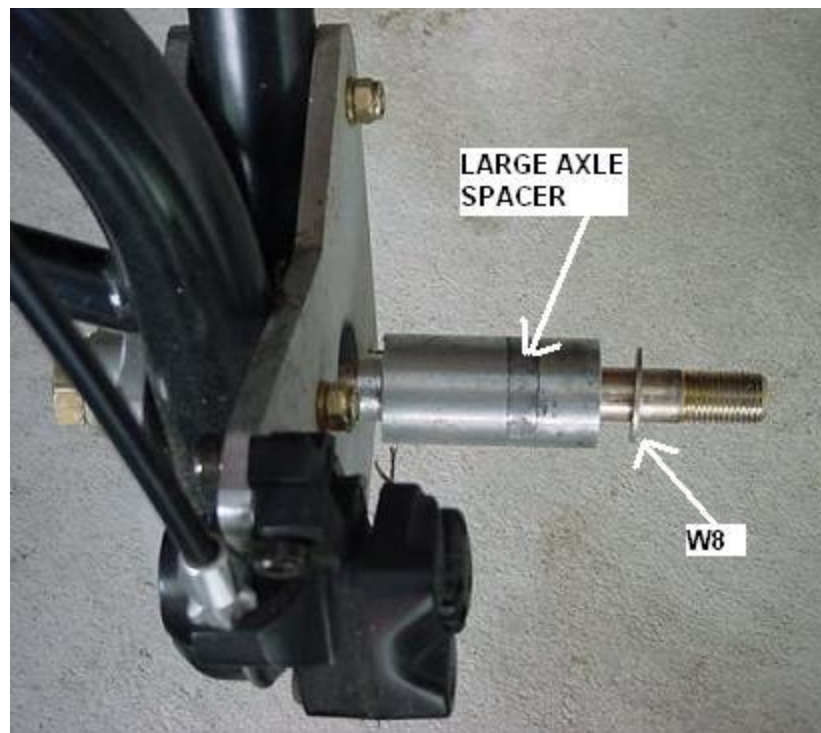


Figure 18 – Outside Axle



Figure 19 – Assembled Tire

STEP 7A - (Aluminum Rims with 12" diameter standard tire) Unbolt the caliper from the gusset plate. Install the axle spacer, W10 washers, N10 nut and tire as shown in Figures 20 & 21. You will need (3) W10 on the inside for spacing and (2) W10 on the outside by N10 for spacing. There should be no washer between C06B and the rim. Tighten the nut until the tire is snug, but still allowing free rotation. Slide the caliper over the rotor and reattach to the gusset plate.

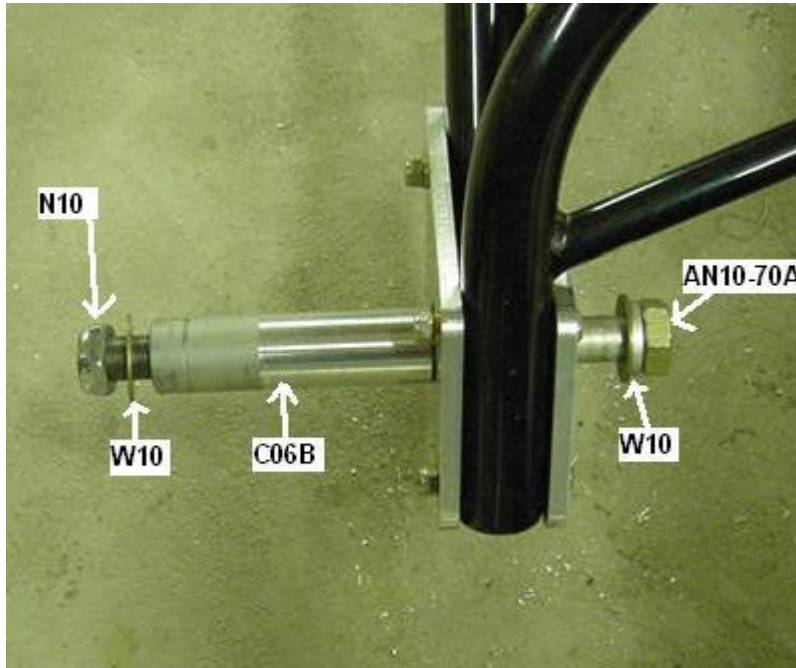


Figure 20 – Washer and Bolt Spacing for standard 12" diameter tire



Figure 21A – Assembled Aluminum Rim and Axle for standard 12" diameter tire

STEP 7B - (Aluminum Rims with 18" diameter tundra tire)

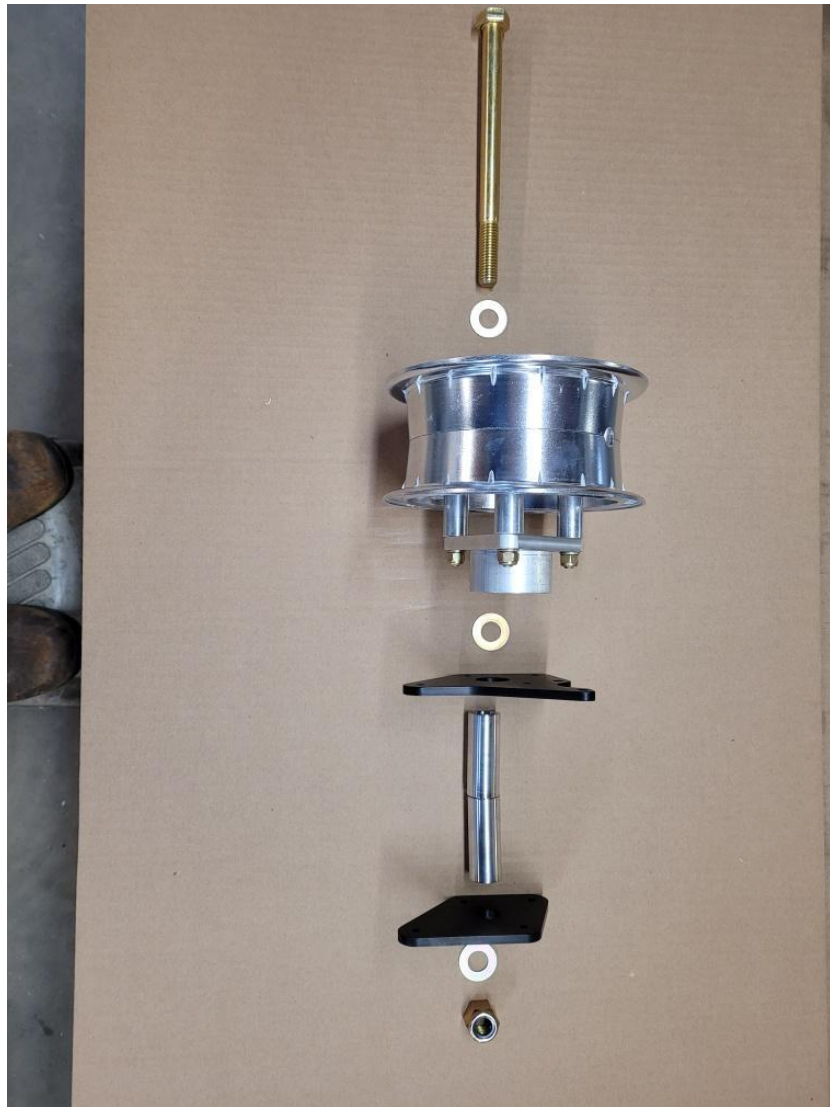


Figure 21B – Exploded View of Aluminum Rim, Brakes and Axle for standard 18" diameter Tundra tire



Figure 31C – Assembled Aluminum Rim, Brakes and Axle for standard 18” diameter Tundra tire

STEP 8 – Brake Adjustment – The brakes will require adjustment to achieve proper operation. Initially you may experience an all or nothing braking characteristic. This occurs because the pads do not touch the rotor until just before the end of the cam movement on the brake caliper. These brakes are strong enough to lock the tires up during landing if adjusted properly. Pad spacing can be adjusted in three ways.

- 1) **Large adjustment** – add or remove washers on the axle to change the spacing
- 2) **Mid Range Adjustment** – rotate the large adjustment knob on the outside of the caliper to adjust the spacing of the outside pad. Rotate clockwise to move the pad in and counterclockwise to move the pad out. Pad initially starts at the full out position. This may initially require a set of pliers to move. For the aluminum rims it may require removal of the rim to adjust the knob. See Figure 22.
- 3) **Fine Adjustment** - Adjust the starting location of the caliper cam using the Allen bolt and clamp to change location of the cam along the cable. Shortening the distance between the cable adjuster and the Allen head bolt will start the pads closer to the rotor. See Figure 23.
- 4) **Rotor Adjustment for Aluminum Rims** – The aluminum rims may not be in perfect alignment due to the manufacturing technique used. You may see a wobble in the rim and rotor when spinning. To remove the wobble rubber washers have been used between the rotor hub and the aluminum rim. To adjust the rotor tighten each hub bolt individually. Tightening of the hub bolt pulls the rotor in towards the rim. Thus when you are spinning the rotor observe which portion of the rotor appears to be the furthest away from the rim and tighten the bolt corresponding to that portion of the rotor. Continue to adjust until the rotor is parallel with the gusset plate.



Figure 22 – Adjustment Knob (may be different on some caliper models)

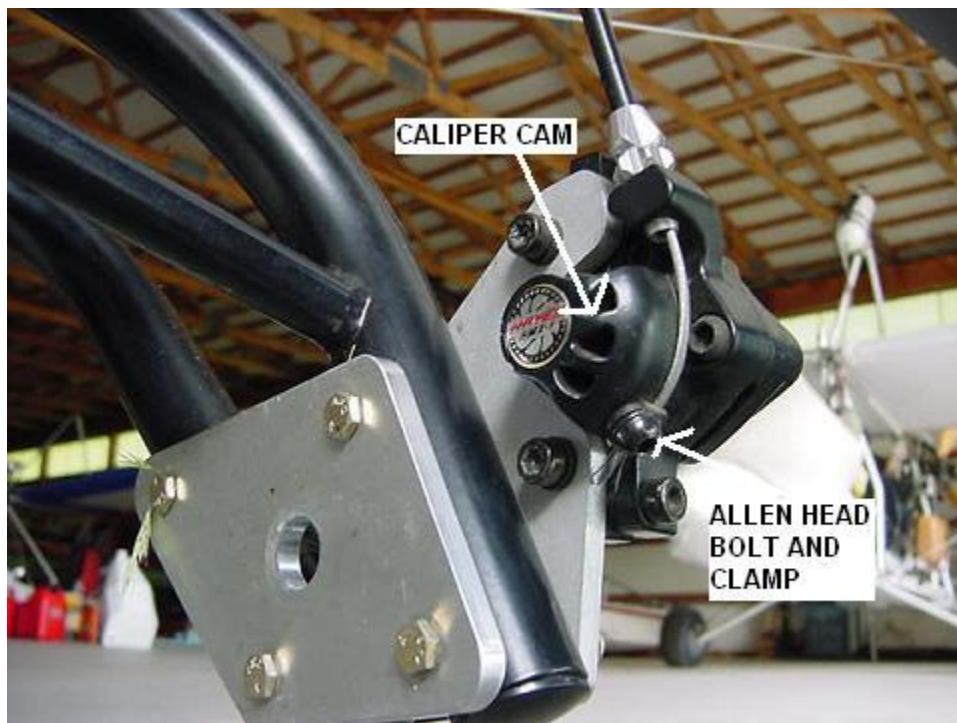


Figure 23 – Caliper Cam

REPLACEMENT PARTS ARE AVAILABLE FROM THE FACTORY