

# INSTALLATION INSTRUCTIONS

## for BF Goodrich/Hayes Disc Brake Conversion

- Check packaging to ensure that you have all these required items.

2 - P/N 018-013 Brake Discs	4 – 105X4 Tube Nut
2 - P/N 020-042A Torque Plates	2 – 302x4 Union
2 – Caliper Assemblies P/N 30-5(A), 30-6A or 30-7A	2 – 352X4 45° Elbow
8 – AN4-6A Bolts	2 – 402X4 90° Elbow
8 – AN960-416 Washer	2 – 502X4 90° Elbow
8 – AN960-416L Washer	1 – Drawing Number 76000 (Sheets 1-5)
8 – AN365-428A Nuts	1 – Drawing Number 76400
12 – AN441-6-6P Rivets	1 – Drawing Number 76401
2 – 1/4" O.D. x 12" Copper Tube	1 – Inspection & Repair Manual
	1 – 3/16 by 12" long Drill Bit

- Remove existing wheels and brakes from the aircraft.
  1. Support aircraft and remove wheels from the axles by removing cotter pins, nuts and washers.
  2. Disconnect brake line from existing expander tube. Note: have a suitable container available to collect the brake fluid as it drains from the line.
  3. Remove the existing brake frame from the aircraft.
  4. Inspect gear leg and axle for damage, corrosion, etc. and repair as required.
  5. Install new torque plate using the supplied AN4-6A bolts aft of the gear strut IAW sheet 4 of the installation drawings, or forward of the gear strut IAW sheet 5. Torque bolts to 70-80 in-lb.
- Remove tire and existing brake drum from wheel.
  1. Deflate tire by removing valve stem core.
  2. Remove wheel outer flange and remove tire and tube from wheel.
  3. Remove existing brake drum. This is done by removing the six rivets that attach the drum to the wheel. One method is to drill out the rivets. However, since the rivets are steel, and the wheel aluminum, there is a good chance that this will result in enlarged holes in the wheel. A better method is to grind off the bucked side of the rivet (brake drum side) and then punch out the rivet using a 3/16" punch.
  4. Clean and inspect the wheel for damage and corrosion and treat or repair as necessary. Particular attention should be paid to the surface where the brake disc attaches to the wheel. Any corrosion should be removed and the surface primed with zinc chromate or equivalent.

- Install the new brake disc.
  1. Press-fit the disc into the wheel, using an arbor press or gently tap it into place with a block of wood or equivalent.
  2. Place the wheel, disc side down, on the bench. Using the rivet holes in the wheel base as a guide, match drill the six rivet holes through the brake disc using the supplied 3/16" drill bit.
  3. Without removing the disc, de-bur the exposed side of the drilled holes.
  4. Rivet the disc to the wheel using the supplied AN 441-6-6P rivets per AC 43-13-1B.
  5. Re-install the tire on the wheel and inflate to proper pressure.
  
- Install wheel on the aircraft.
  1. Install wheel on axle.
  2. Tighten axle nut until wheel will not turn, loosen just enough so that the wheel turns freely, then safety the nut being careful that the cotter pin does not interfere with the valve stem.
  
- Install brake caliper.
  1. Lightly lubricate torque pins with Lubriplate, LPS #3, or equivalent.
  2. Remove the 2 AN4H-15A tie bolts to separate the brake caliper.
  3. Install the caliper on the wheel as shown in the installation drawings.
  4. Note: The brake line fitting and bleeder valve may be interchanged for best fit.
  5. Re-install the 2 AN4H-15A tie bolts.

- Attach existing brake line to brake caliper.

Because each aircraft differs in this area, the installing mechanic will have to determine the best method. Refer to drawing 76400/76401 for the fabrication and installation of the brake line extension. Some installations may require the use of a straight union (P/N 302x4) rather than the elbow union (P/N 502x4) as shown. An alternate method may be to connect the existing brake line to the caliper using a flexible hose and appropriate fittings.

If the brake line in the gear leg is exposed (uncovered), you may install a new one-piece line from the caliper to the top of the gear leg.

Regardless of the method used, it is important to allow enough freedom in the brake line for the caliper to float, and that the installation is done in accordance with accepted aircraft standards.

- Bleed the brakes.

Use the Proper Brake Fluid — Improper brake fluid will ruin the seals in the brake system. Use only standard aircraft Mil-H-5606 red hydraulic fluid. Never use automotive brake fluid!

The best method to fill and bleed aircraft brakes is from the bottom up. Connect a 1/8" ID clear hose to the brake caliper bleeder screw from your brake fluid source. An oil can used exclusively for this purpose works well. Pump the oil can until the hose is full of fluid, with no air bubbles. Tightly secure the hose to the bleeder valve, while opening it a quarter turn. Pump fluid into the system until it fills the brake cylinder reservoir. (The master cylinder reservoir filler cap must be open during

this process). Tighten the bleeder valve screw, remove the hose, and reseal the master cylinder reservoir, insuring that the reservoir is full.

Check to see that you have a "hard pedal." If you have a "soft-pedal," pump the brakes several times. Many times that will fix the problem. If the problem persists, drain the fluid and repeat the above process.

**NOTE:** It is possible that you may have excessive pedal travel. This is caused by the "free-play" between the brake pad and the brake disc. The pedal will travel (moving hydraulic fluid) until the brake pad contacts the brake disc, at which time you should have a "hard pedal". In order to have a "hard pedal" at the top of the pedal travel, accomplish the following:

1. Jack the aircraft so that the wheel(s) are off the ground and able to rotate freely. You may do this one wheel at a time.
2. Loosen and back-off the 2 AN4H-15A back plate tie bolts 1/16" - 1/8".
3. Attach your brake fluid filler source (pump) to the bleeder valve.
4. Open the bleeder valve and pump fluid into the system until the puck extends and the brake pad comes into contact with the brake disc.
5. Close the bleeder valve and disconnect the fluid pump.
6. Tighten both back plate tie bolts evenly until seated. You should not be able to rotate the wheel at this point.
7. Crack the bleeder valve and let just enough fluid escape to allow the wheel to rotate freely, with the brake pad still in loose contact with the brake disc, then tighten the bleeder valve.

- **Final Assembly and Inspection.**

1. Verify that the axle nut is tight and that the cotter pin does not interfere with the tube valve stem.
2. Torque the back plate tie bolts 70 to 80 in-lbs and safety wire.

- **Complete the Paperwork.**

1. Complete and process FAA form 337 for returning the aircraft to service.
2. Make an entry in the aircraft records (logbook) as to the work done. Because the FAA considers the weight change to be negligible, no revised weight and balance calculations are required.

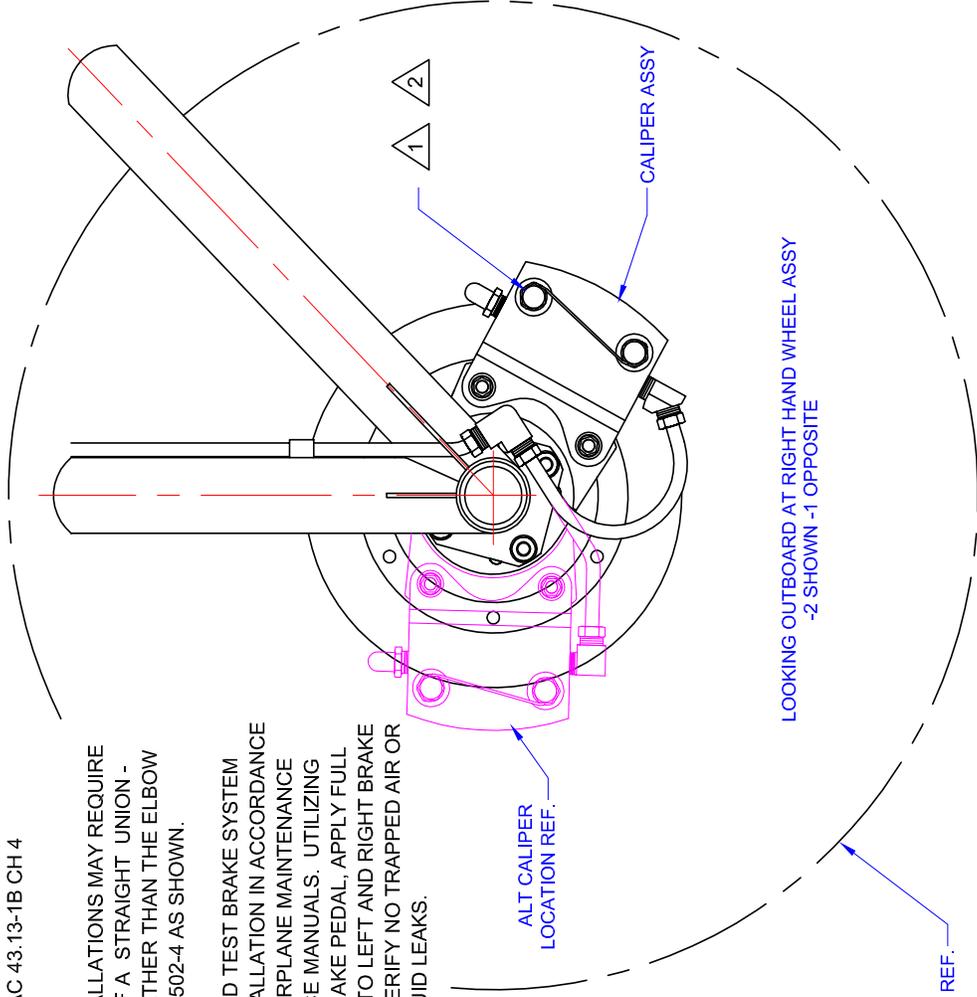
- **Seat the Brake Pads.**

These non-asbestos organic composition brake pads require a thin layer of glazed material at the lining friction surface in order to provide maximum braking performance. This glazed layer is produced by the heat generated during normal braking operations, and is maintained during the life of the lining. Since new brake pads do not have this layer, it must be created by the following process:

1. Heat the pads by performing a full stop from 30 - 40 mph.
2. Allow the brakes to cool for 5 - 10 minutes
3. Test the results at full static run-up. If the brakes hold, break-in is complete. If they fail to hold, repeat steps 1 and 2 until they do.

**NOTES**

- 1 TORQUE TO 70-80 INCH-POUNDS.
- 2 SAFETY WIRE PER AC 43.13-1B CH 7 SECT 7
- 3 RIVET PER AC 43.13-1B CH 4 SECT 4
- 4 SOME INSTALLATIONS MAY REQUIRE THE USE OF A STRAIGHT UNION - P/N 302-4 RATHER THAN THE ELBOW UNION - P/N 502-4 AS SHOWN.
- 5. SERVICE AND TEST BRAKE SYSTEM AFTER INSTALLATION IN ACCORDANCE WITH THE AIRPLANE MAINTENANCE AND SERVICE MANUALS. UTILIZING COCKPIT BRAKE PEDAL. APPLY FULL PRESSURE TO LEFT AND RIGHT BRAKE PEDAL TO VERIFY NO TRAPPED AIR OR SYSTEM FLUID LEAKS.



**REVISIONS**

ECO NO.	CHG	LTR	CHANGES	BY	DATE
-	A		ADDED NOTE A TO SHTS 1&4	RPG	11/23/04
1	B		ADDED 76001 & 76002 ASSYS	RPG	8/12/06
61	C		ADDED ALT CALIPER LOCATION	RPG	8/15/17

76000 ASSY = A  
 76001 ASSY = B  
 76002 ASSY = C

\*Purchase from Weatherhead, Gainesboro, TN

Part Number	Name / Description	Qty	Alt	Alt	Alt
502X4	Union Elbow - Weatherhead* or Equiv.	1	1	1	1
302X4	Straight Union - Weatherhead* or Equiv.	1	Alt	Alt	Alt
352X4	45° Elbow - Weatherhead* or Equiv.	1	1	1	1
402X4	90° Elbow - Weatherhead* or Equiv.	1	Alt	Alt	Alt
AN441-6-6P	Rivet (Steel)	6	6	6	6
AN365-428A	Nut (Alt MS21044N4)	4	4	4	4
AN960-416L	Washer	4	4	4	4
AN960-416	Washer	4	4	4	4
AN4-6A	Bolt	4	4	4	4
007-001	Brake Line	1	1	1	1
007-006	Brake Line	1	Alt	Alt	Alt
018-013	Disc	1	1	1	1
D3-13A1	Wheel Assy	1	1	1	1
30-5(A)	Caliper Assy	1			
30-6A	Caliper Assy	1			
30-7A	Caliper Assy	1			
020-042(A)	Torque Plate Assy	1	1	1	1
Part Number	Name / Description	Qty	Qty	Qty	Qty

**Grove**

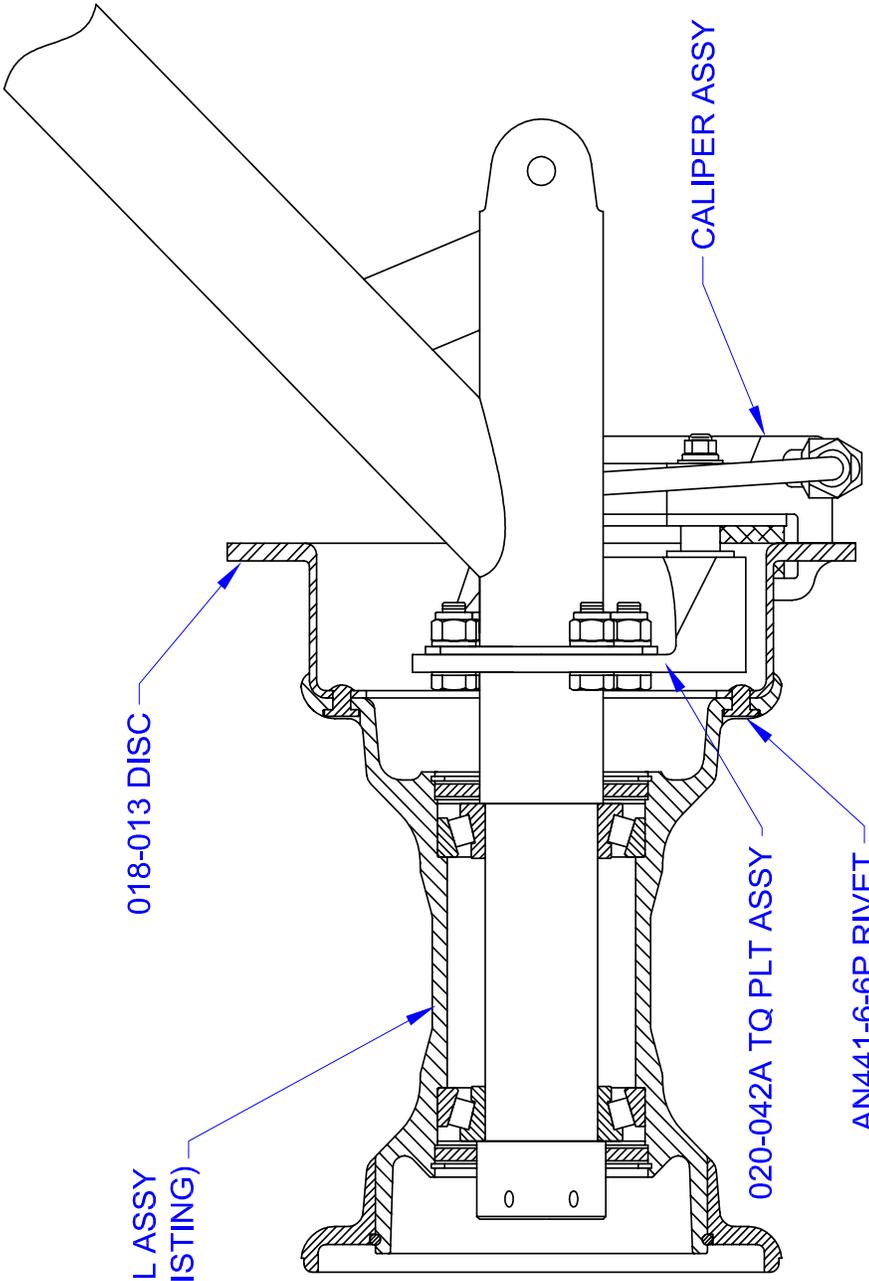
Aircraft Landing Gear Systems inc.  
 1800 JOE CROSSON DRIVE, ELCAJON, CA 92020

**INSTALLATION BRAKE ASSY**

TOLERANCE  
 DECIMAL 0.XX= +/-0.030  
 DECIMAL 0.XXX= +/-0.010  
 DECIMAL 0.XXXX= +/-0.005  
 ANGLE = 0.25 DEGREES

FINAL ASSY

SCALE: NONE	DWG NO. 76000	REV C	SHT 1 OF 5
DRW: RG 8/14/17	CHK: PN 8/14/17	APV: RG 8/15/17	



018-013 DISC

D3-13A1 WHEEL ASSY  
(EXISTING)

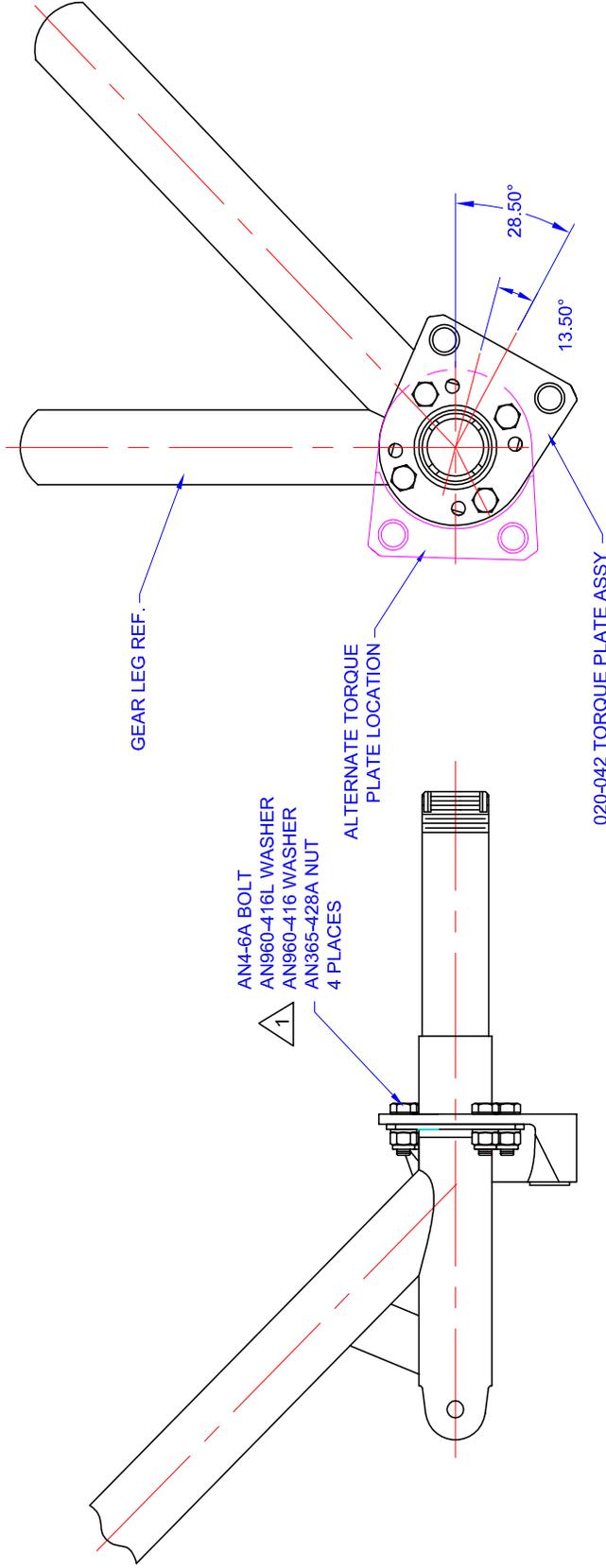
CALIPER ASSY

020-042A TQ PLT ASSY

AN441-6-6P RIVET

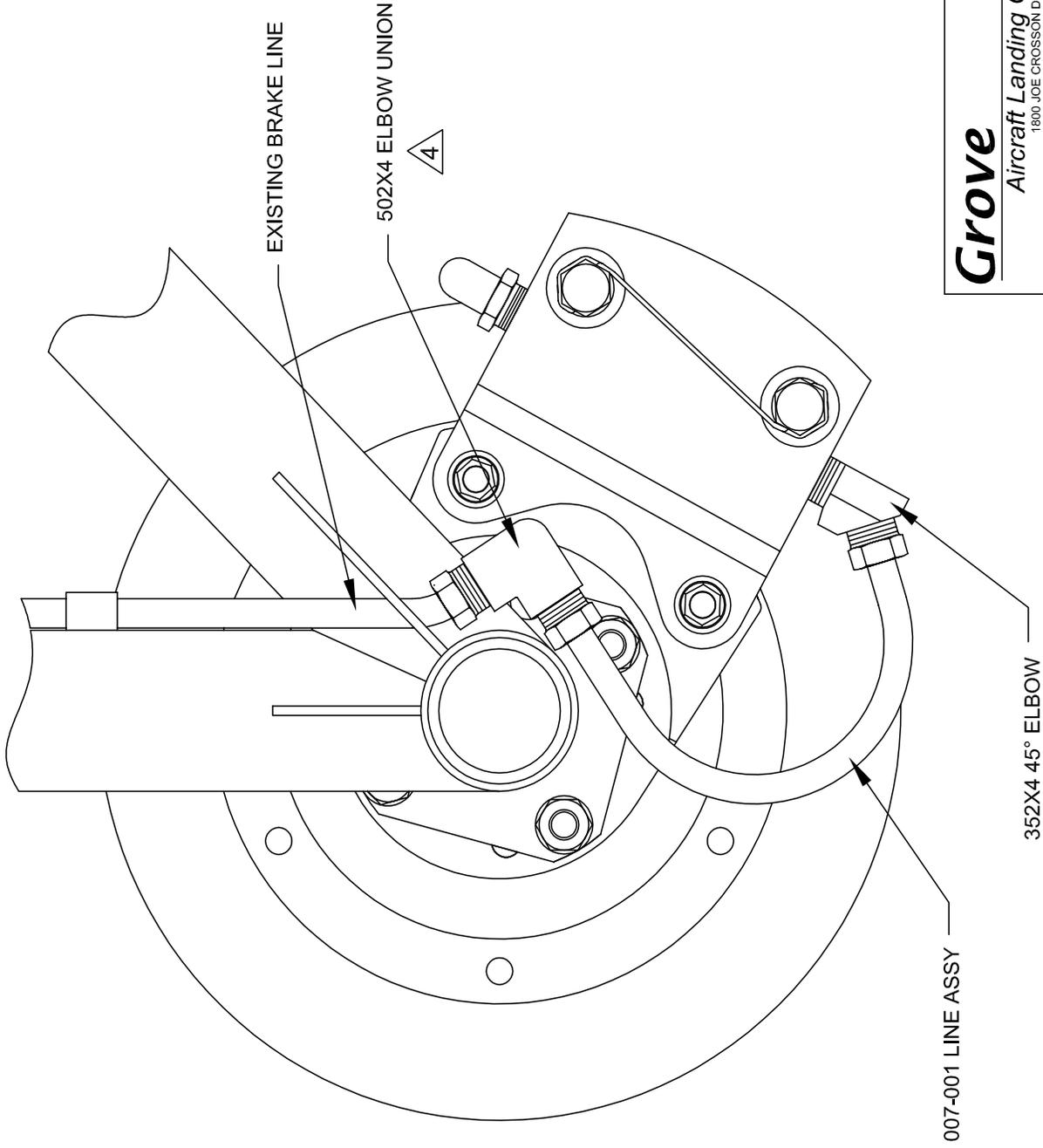
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<b>Grove</b> Aircraft Landing Gear Systems inc. 1800 JOE CROSSON DRIVE, ELCAJON, CA 92020		<b>INSTALLATION BRAKE ASSY</b>		
		SCALE: NONE	DWG NO. 76000	REV C
TOLERANCE DECIMAL 0.XX= +/-0.030 DECIMAL 0.XXXX= +/-0.010 DECIMAL 0.XXXXX= +/-0.005 ANGLE = 0.25 DEGREES		FINAL ASSY		
DRW: RG 8/14/17	CHK: PN 8/14/17	APV: RG 8/15/17		



LEFT HAND SHOWN RIGHT HAND OPPOSITE

<b>Grove</b> Aircraft Landing Gear Systems inc. <small>1800 JOE CROSSON DRIVE, EL CAJON, CA 92020</small>					
				<b>INSTALLATION BRAKE ASSY</b>	
TOLERANCE DECIMAL 0.XX= +/-0.030 DECIMAL 0.XXX= +/-0.010 DECIMAL 0.XXXX= +/-0.005 ANGLE = 0.25 DEGREES		SCALE: NONE	DWG NO. 76000	REV C	SHT 3 OF 5
<b>FINAL ASSY</b>		DRW: RG 8/14/17	CHK: PN 8/14/17	APV: RG 8/15/17	



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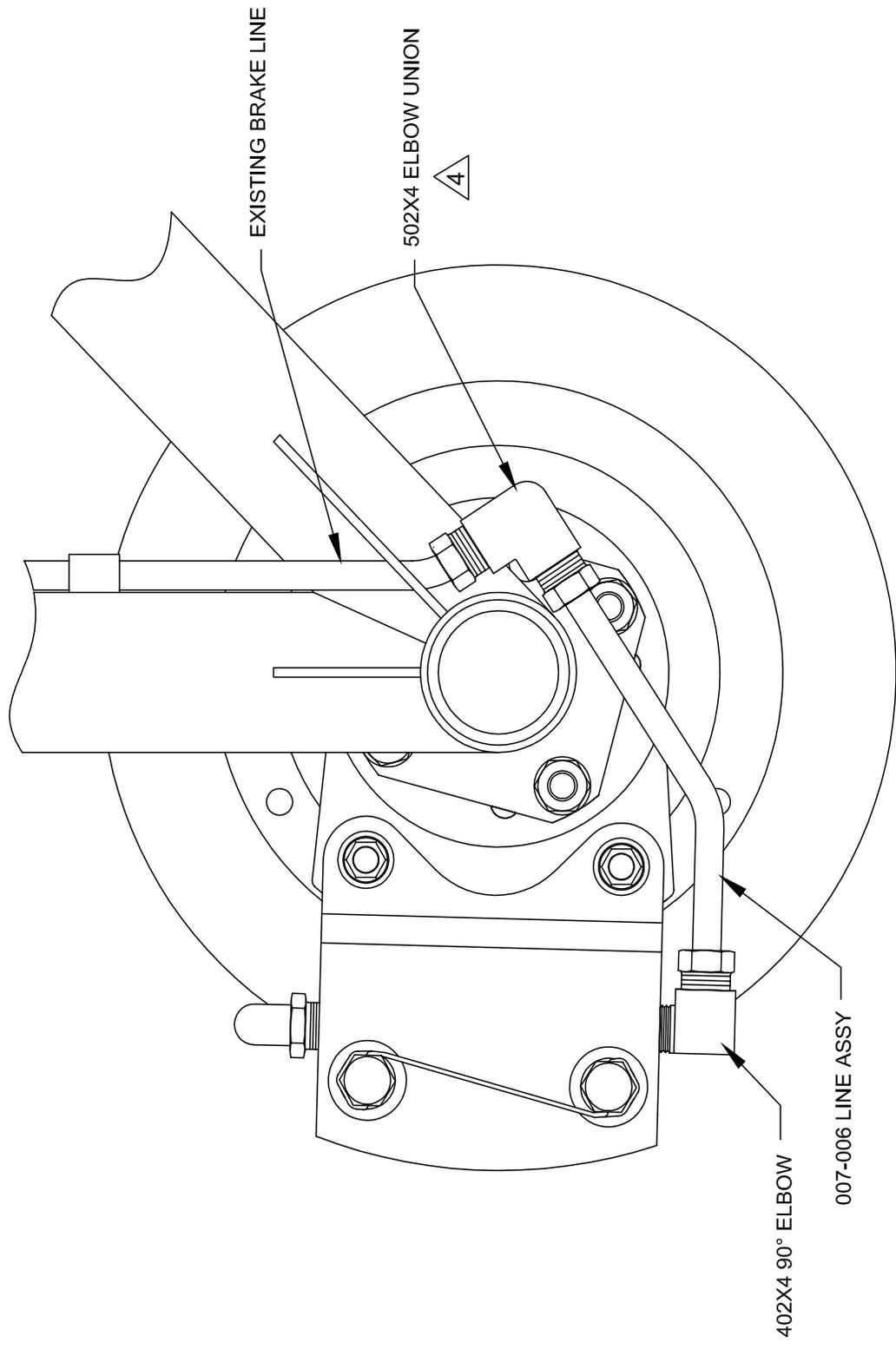
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1800 JOE CROSSON DRIVE, ELCAJON, CA 92020

**INSTALLATION BRAKE ASSY**

TOLERANCE  
DECIMAL 0.XX= +/- .030  
DECIMAL 0.XXXX= +/- .010  
DECIMAL 0.XXXXX= +/- .005  
ANGLE = 0.25 DEGREES

SCALE: NONE	DWG NO. 76000	REV C	SHT 4 OF 5
DRW: RG 8/14/17	CHK: PN 8/14/17	APV: RG 8/15/17	

FINAL ASSY



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**INSTALLATION BRAKE ASSY**

SCALE: NONE    DWG NO. 76000    REV C    SHT 5 OF 5

DRW: RG 8/14/17    CHK: PN 8/14/17    APV: RG 8/15/17

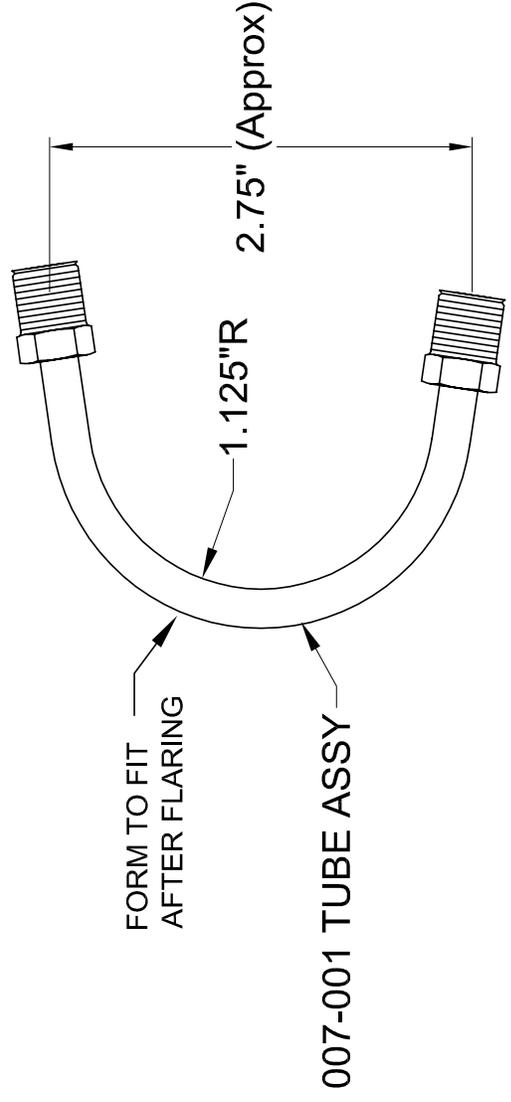
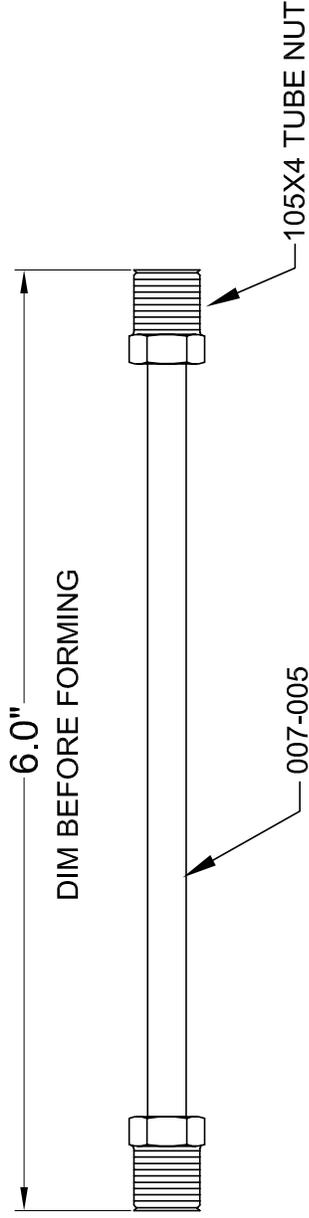
TOLERANCE	
DECIMAL 0.XX= +/-0.030	
DECIMAL 0.XXX= +/-0.010	
DECIMAL 0.XXXX= +/-0.005	
ANGLE = 0.25 DEGREES	
FINAL ASSY	

**ALTERNATE CALIPER LOCATION**

REVISIONS

CHG LTR	CHANGES	BY	DATE

NOTE: FLARE WITH  
45° FLARING TOOL IN  
ACCORDANCE WITH  
AC 43.13-1B CH 9 SECT 2.



2	105X4	Tube Nut - Purchase from Weatherhead, Gainesboro, TN
1	007-005	1/4" x .030" Type 122 Copper Tube Per ASTM B280
Assy	007-001	Brake Line Assy
Quantity	Part Number	Name / Description

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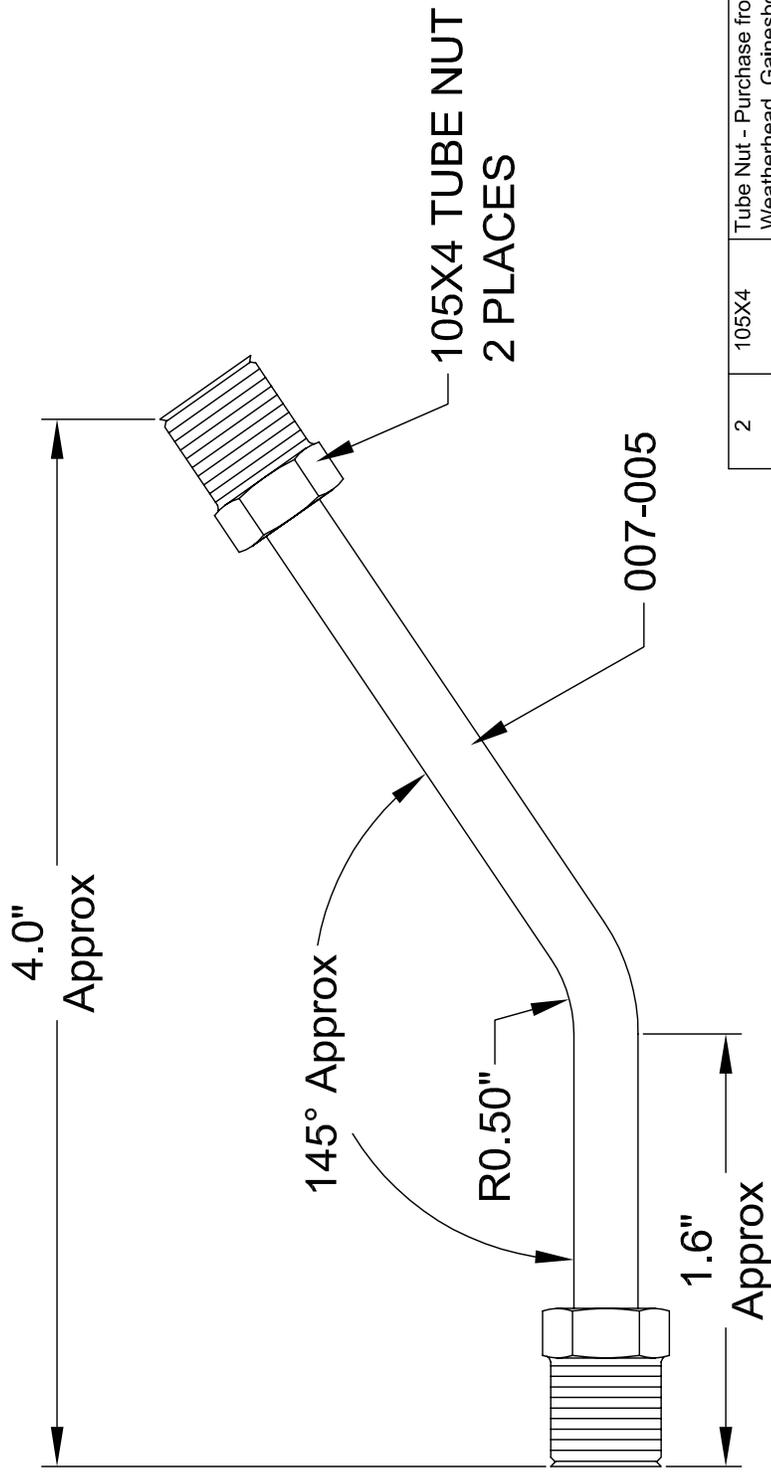
ASSY BRAKE LINE 007-001

TOLERANCE	DECIMAL 0.XX= +/-0.30
	DECIMAL 0.XXX= +/-0.10
	DECIMAL 0.XXXX= +/-0.05
	ANGLE = 0.25 DEGREES

SCALE: NONE	DWG NO. 76400	REV IR	SHT1 OF1
DRW: RG 10/09/02	CHK: PN 3/17/03	APV: RG 3/17/03	

Next Assy 76000

REVISIONS		
CHG LTR	CHANGES	BY DATE



105X4 TUBE NUT  
2 PLACES

007-005

2	105X4	Tube Nut - Purchase from Weatherhead, Gainesboro, TN
1	007-005	1/4" x .030" Type 122 Copper Tube Per ASTM B280
Assy	007-006	Brake Line Assy
Quantity	Part Number	Name / Description

**Grove**

Aircraft Landing Gear Systems inc.  
1800 JOE CROSSON DRIVE, ELCAJON, CA 92020

ASSY BRAKE LINE 007-006

SCALE: NONE	DWG NO. 76401	REV IR	SHT1 OF1
DRW: RG 8/14/17	CHK: PN 8/14/17	APV: RG 8/15/17	

TOLERANCE DECIMAL 0.XX= +/-0.030 DECIMAL 0.XXX= +/-0.010 DECIMAL 0.XXXX= +/-0.005 ANGLE = 0.25 DEGREES Next Assy 76000,76001,76002
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- NOTES:
1. TO BE USED WITH ALTERNATE CALIPER LOCATION.
  2. DETERMINE LENGHT DURING FABRICATION.
  3. BECAUSE THESE ARE LEGACY AUTOMOTIVE TYPE FITTINGS, FLARE WITH 45° FLARING TOOL.