AIRCRAFT WHEEL & BRAKE DIVISION
PARKER HANNIFIN CORPORATION
AVON, OHIO

PARTS LIST

199-95 CONVERSION KIT

De Havilland DHC-2
BEAVER MODELS MKI, II & III

| PART NUMBER | DRAWING REVISION | DESCRIPTION | QUANTITY |
|---|---|---|---|
| 30-99 | Rev. F dated 08-29-1990 | Brake Assembly | 2 |
| 40-134 | Rev. H dated 10-04-2006 | Wheel Assembly | 2 |
| 103-21300 | ---------- | Bolt (AN5-7A) | 24 |
| 095-10500 | ---------- | Washer (AN960-516) | 48 |
| 094-10400 | ---------- | Nut (MS21044-N5) | 24 |
| 104-03100 | ---------- | Inlet Fitting (Parker P/N 4C50X-S) | 2 |

Publication Package (P/N PP199-09500)

| | | |
|---|---|---|
| IM199-95 | Rev. B dated 08-29-1990 | Installation Manual |
| 50-128 | Rev. B dated 08-29-1990 | Installation Drawing |
| SA1402GL | ------- | Supplemental Type Certificate |
| | | Warranty Registration Card |

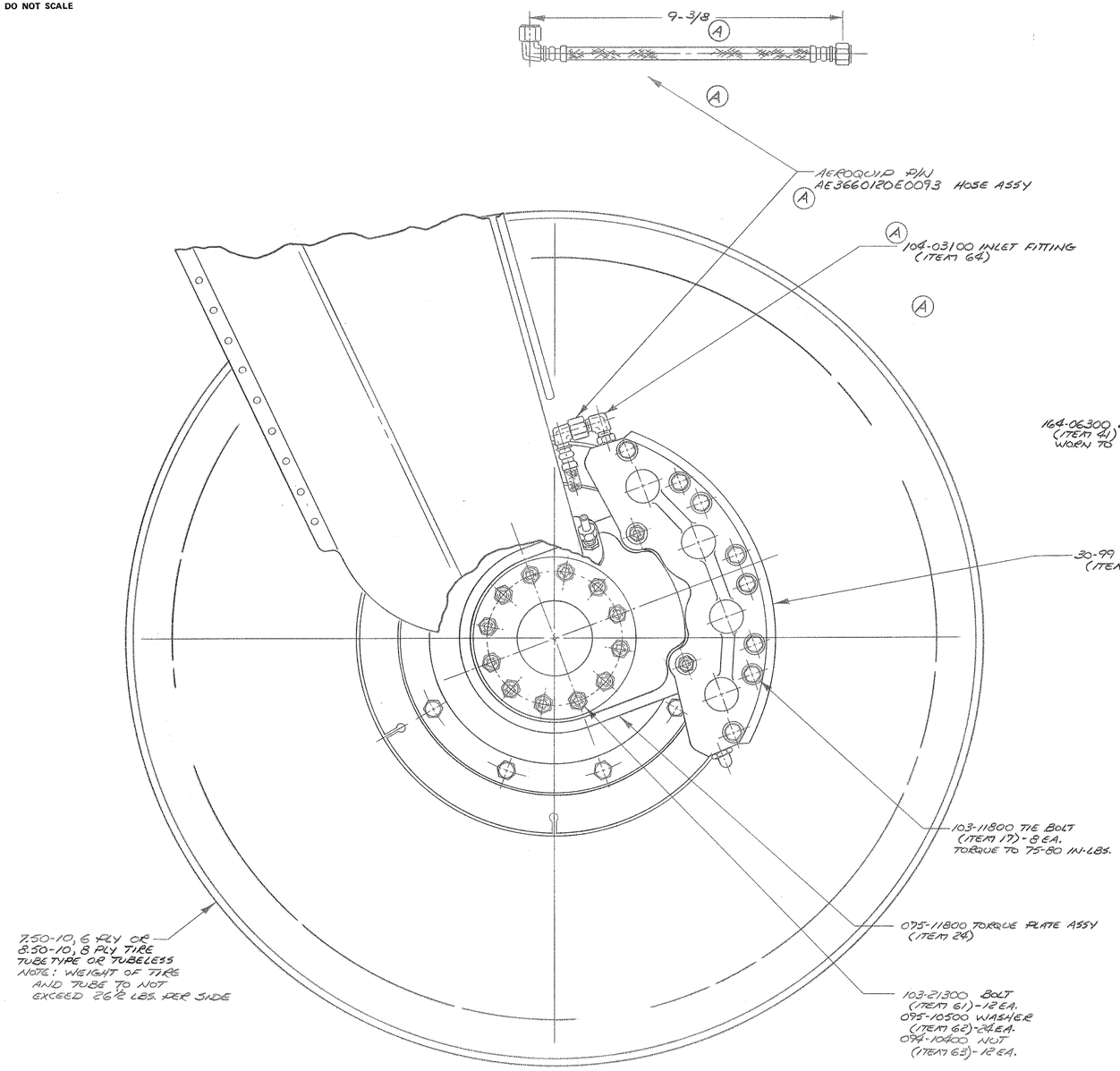
**NOTES:**

1. This kit will convert one aircraft to Cleveland Wheels and Brakes.
2. For use with MIL-H-5606 (Red Fluid).

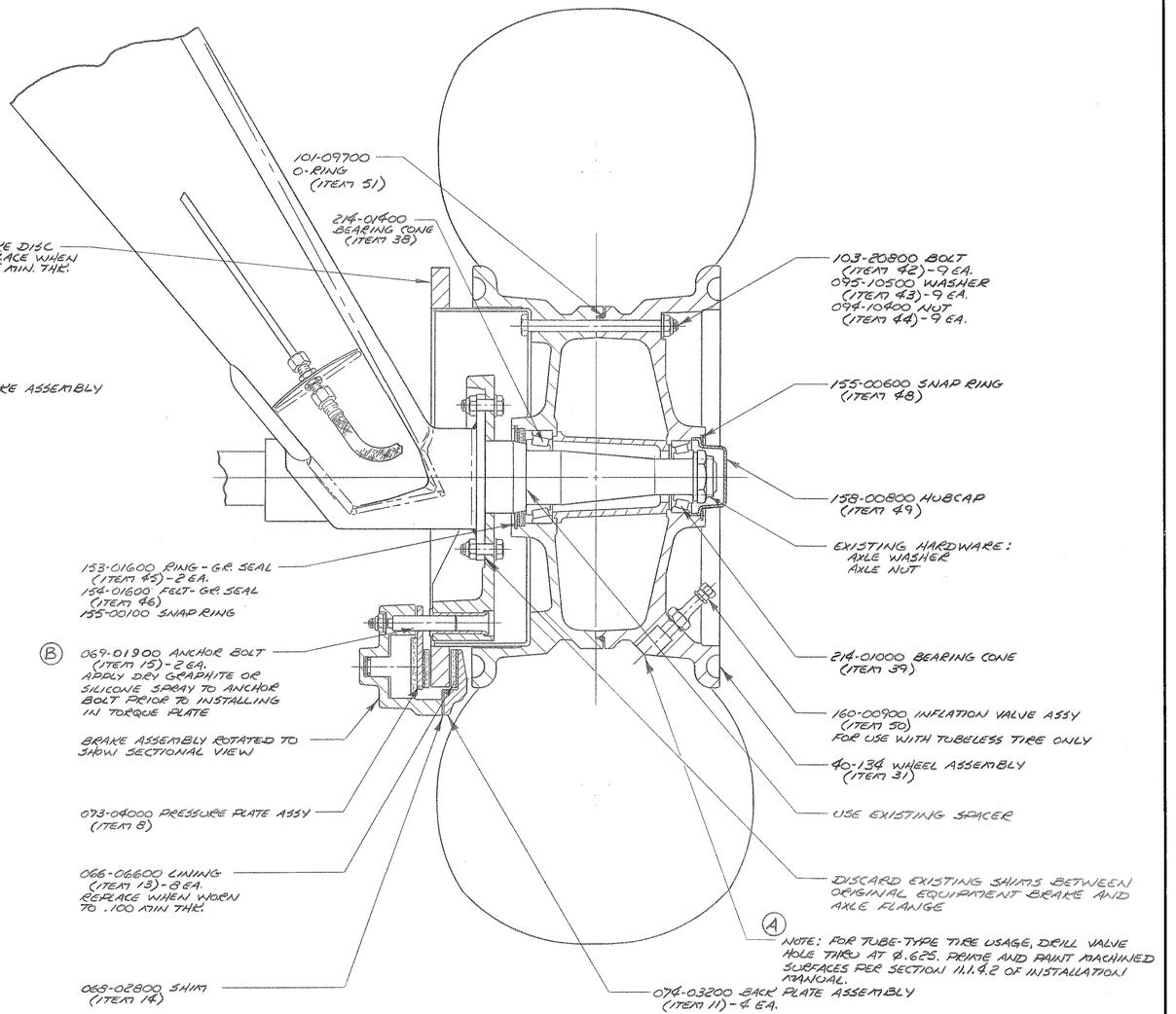
199-95
REV. NC 02-24-1989 (294-99)
REV. A 08-23-1989 (297-68)
REV. B 08-29-1990 (301-29)
REV. C 01-04-2007 (0373-13)

DO NOT SCALE

| 50-128 | | | | | B |
|---|---|---|---|---|---|
| CHANGE NOTICE | LET-TER | DESCRIPTION OF CHANGE | CHG. BY | DATE | CHK'D. BY |
| 299/99 | NC | INITIAL RELEASE TO PRODUCTION | [illegible] H. | [illegible] 89 | BB |
| 297/68 | A | CHANGE HOSE ASSY P/N, CHANGE FITTING P/N & ADD VALVE NOTE. SEE EN | RJ H. | 8-23-89 | BB |
| 301/29 | B | "069-01300" WAS "069-00400" | BB | 8-29-90 | BB |




LEFT HAND GEAR
FORWARD




OUTBOARD

APPLICABILITY OF AIRCRAFT INSTALLATION — KIT P/N 199-95

| MODEL | TIRE SIZE | PLY | TYPE | PRESSURE |
|---|---|---|---|---|
| DE HAVILLAND BEAVER MODELS: DHC-2 MK I, II & III | 7.50-10 TYPE III OR IF APPLICABLE: 8.50-10 TYPE III | 6 PLY<br>8 PLY | TUBE TYPE OR TUBELESS | PER MANUAL |

| QTY | QTY | ITEM | PART NO. | DESCRIPTION | MATERIAL & SPEC. | HEAT TREAT & SPEC. | FINISH & SPEC. | WGT. |
|---|---|---|---|---|---|---|---|---|

NEXT ASSEMBLY | QTY | FINAL ASSEMBLY | QTY | PATTERN, CASTING OR BLANK NO.



ZYGLO PER MIL-I-6866 STAMP F ON PART

MAGNAFLUX PER MIL-I-6868 STAMP M ON PART

√ MACHINED SURFACES PER MIL STD 10 UNLESS OTHERWISE NOTED

UNLESS NOTED ALL THREADS PER MIL-S-7742

WORK TO DIMENSIONS — DO NOT SCALE
TOLERANCE FOR XXX ± .010
TOLERANCE FOR XX ± .030
TOLERANCE FOR ANGULAR DIMS. ± 1/2°
TOLERANCE FOR FRACTIONAL DIMS. ± .030

BREAK SHARP EDGES .010 UNLESS NOTED. REMOVE ALL BURRS BEFORE PLATING. DRILL PER INSP. PROCEDURE NO. 114.

DRAWN BY: [illegible] 3-6-89
CHECKED BY: BB
SCALE: 1/2 : 1

Cleveland Wheels & Brakes
Aircraft Wheel and Brake Division
Parker Hannifin Corporation
1160 Center Road
Avon, Ohio 44011

Parker

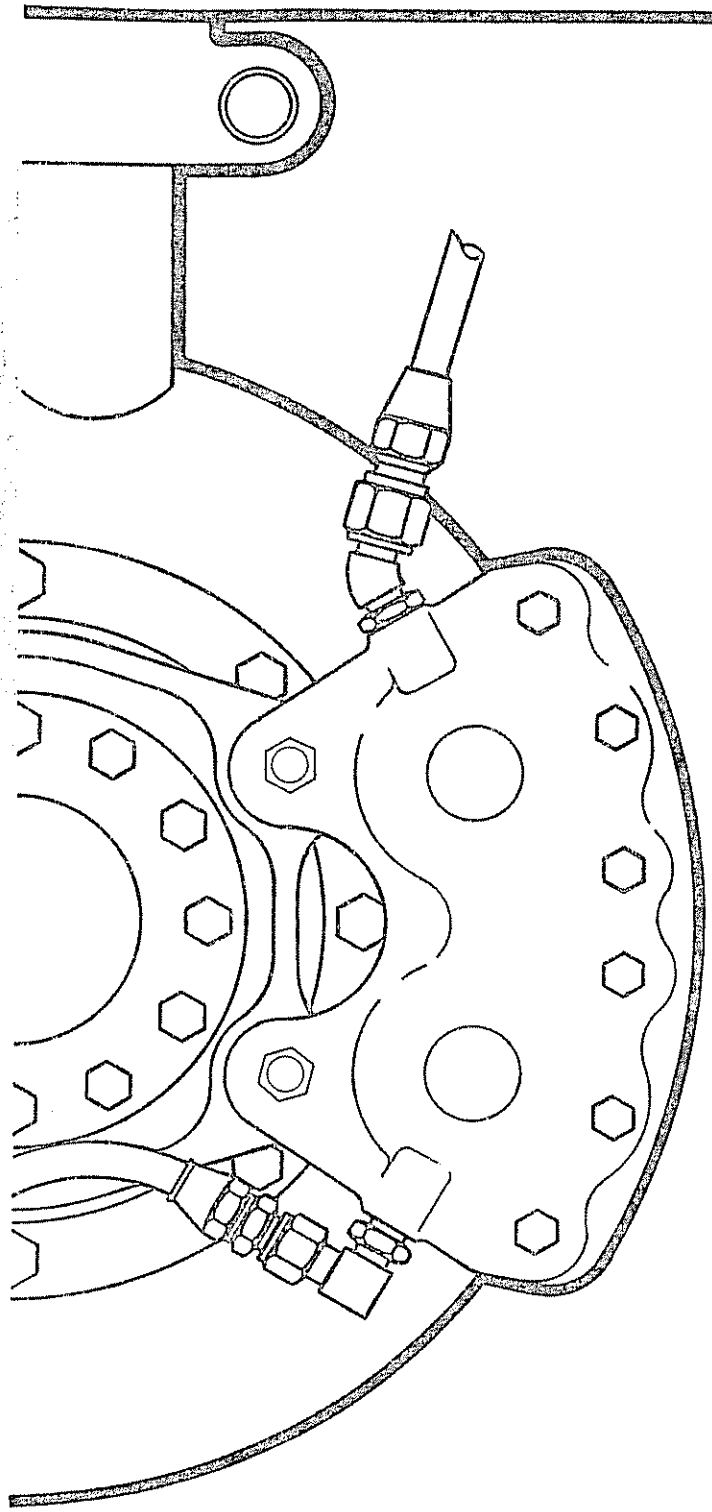
NAME: INSTALLATION — 50-128



K&E CLEVELAND No. 10-9185

050-12800

**Cleveland**
Wheels & Brakes



# Conversion Kit
# Installation Manual

Kit Number 199-95

For

de Havilland DHC-2

Beaver Models MKI, II & III

Parker General Aviation

Parker Hannifin Corporation
Aircraft Wheel & Brake Division
1160 Center Road
Avon, Ohio 44011 USA
(216) 934-5221 871-6424

INSTALLATION INSTRUCTIONS
Cleveland Wheels & Brakes Conversion Kit 199-95

LIST OF REVISIONS

| REVISION | DATE | PAGE | DESCRIPTION | APVD |
|---|---|---|---|---|
| Initial Release | 02/24/89 | ---- | Installation Instructions Cleveland Wheels & Brakes Conversion Kit 199-95 | (294-99) BB |
| A | 08-23-89 | 16 | Item 41: 164-63F 164-06306" was 164-63 164-06300" | BB (297-68) |
| | | 20 | Item 64: "4C50X-S 104-03100" was "AN833-4D 104-02300" Delete Item 65: "AN924-4D 094-90500 Fitting Nut" Qty. 2 Delete Item 66: "AN6227-7 101-00700 O-Ring" Qty. 2 | |
| B | 08-29-90 | 18 | Item 15: "69-19 069-01900" was "69-4 069-00400" | BB (301-29) |

INSTALLATION INSTRUCTIONS
Cleveland Wheels & Brakes Conversion Kit 199-95

TABLE OF CONTENTS


| SECTION | ABSTRACT | PAGE |
|---|---|---|
| 1. | Introduction | 1 |
| 2. | TSO Notice | 1 |
| 3. | Applicability | 1 |
| 4. | Order Information | 1 |
| 5. | Description | 2 |
| 6. | Installation | 3 |
| 7. | Weight and Balance | 5 |
| 8. | Metallic Brake Lining Procedure | 5 |
| 9. | Warranty Registration | 5 |
| 10. | Maintenance | 6 |
| 10.1 | Wheel Maintenance | 6 |
| 10.2 | Brake Maintenance | 6 |
| 11. | Overhaul | 6 |
| 11.1 | Wheel Overhaul | 6 |
| 11.1.1 | Dismounting | 7 |
| 11.1.2 | Cleaning | 8 |
| 11.1.3 | Inspection | 8 |
| 11.1.4 | Repair and Replacement | 9 |
| 11.1.5 | Lubrication | 10 |
| 11.1.6 | Reassembly | 10 |
| 11.2 | Brake Overhaul | 10 |
| 11.2.1 | Dismounting | 10 |
| 11.2.2 | Cleaning | 12 |
| 11.2.3 | Inspection | 12 |
| 11.2.4 | Reassembly | 14 |
| 11.2.5 | Wear Limits | 15 |
| 12. | Parts List | 16 |
| 12.1 | Wheel Parts List | 16 |
| 12.2 | Brake Parts List | 18 |
| 12.3 | Kit Parts List | 20 |

INSTALLATION INSTRUCTIONS
Cleveland Wheels & Brakes Conversion Kit 199-95

Notes

INSTALLATION INSTRUCTIONS
Cleveland Wheels & Brakes Conversion Kit 199-95

## 1. INTRODUCTION.

**1.1** This manual is published for the guidance of personnel responsible for the installation of Cleveland Conversion Kit 199-95.

**1.2** Each kit contains all materials and instructions needed to replace existing equipment with Cleveland wheels and brakes. Kit 199-95 will completely retrofit the aircraft to Cleveland wheels and brakes.

## 2. TSO NOTICE.

**2.1** The wheels and brakes used in this conversion kit carry a "TSO" marking which identifies them as having been fully laboratory tested and qualified to meet the applicable Federal Aviation Agency (FAA) specifications and requirements.

**2.2** After final certification, substitution of critical parts or changes of processes or materials are not permitted without requalification of the assemblies and resubmittal of the test data to the FAA for approval.

**2.3** FAA regulations subject both Parker Hannifin, Aircraft Wheel and Brake Division and the user to constant surveillance to assure that uncompromising Quality Assurance materials and processing controls are maintained in order to provide replacement parts that are the same as the parts originally certified in the assembly.

## 3. APPLICABILITY.

**3.1** "KIT 199-95":

| MAKE | MODELS |
|---|---|
| de Havilland | Beaver Models DHC-2 MKI, II and III |

**3.2** On models with 1/4 inch brake mounting bolts, it will be necessary to drill out the Landing Gear flange holes for 5/16 bolt usage. Since the flange is made of hardened steel, it is advisable to use a long shanked drill bit for this operation.

## 4. ORDER INFORMATION

**4.1** To order spare parts, contact the nearest Parker Hannifin Aircraft Wheel & Brake distributor in your area, or call Parker Hannifin, Aircraft Wheel & Brake Division, Customer Service at 1-800-BRAKING for assistance.

February, 1989

## 5 DESCRIPTION.

**5.1** The brake is a single caliper, 4 piston external disc design, with sintered metallic lining. It is suitable for use with MIL-H-5606 brake fluid, and is composed of the following parts listed on page 18.

**5.2** The wheel is cast magnesium and conforms to all Tire and Rim Association standards for a 24 x 7.7 divided type wheel, suitable for use with all 8.50-10 tires. The wheel is a tubeless/tube-type only. It is composed of the following parts listed on page 16.

## 6. INSTALLATION.

**6.1** Jack aircraft in accordance with de Havilland Service Manual, deflate main wheels completely, and remove and retain axle nut and inboard and outboard spacers. Remove existing main gear wheels.

**6.2** Disconnect and remove lower hydraulic line at bulkhead fitting and cap. Next, disconnect existing brake assemblies from axle and remove. NOTE:....Remove and discard any shims between brake and axle flange.

**6.3** The brakes are shipped from the factory as a complete assembly.

**6.4** The wheel assemblies are shipped from the factory as a complete assembly. The bearings are packed with grease and installed in the wheel halves.

**-NOTE-**

Extended storage of lubricated bearings
may require relubrication.

**6.5** Remove snap ring Item #48, hub cap Item #49, and bearing cone Item #39 from the outboard side of wheel assembly Item #31 and place on a clean surface to avoid contamination.

**6.6** Remove all nine (9) nuts Item #44, nine (9) washers Item #43 and nine (9) tie bolts Item #42 to separate wheel halves.

**6.7** Position disc Item #41 and inner wheel half Item #32 on a flat surface with the register side up.

**6.8** Place serviceable tire & tube (if used) over inner wheel half Item #32 and then place outer wheel half Item #35 in tire making sure to properly align inner and outer registers.

**6.9** Slide tie bolts Item #42 through wheel assembly. Install washers Item #43 and nuts Item #44 on to tie bolts and torque to 150 in-lbs.

**6.10** Inflate tire to proper pressure in safety cage.

**6.11** Inspect bearing cone Item #39 for contamination and/or solidification at every periodic inspection. Repack wheel bearings with Mobilgrease 77, Mobilux EP2 or equivalent if required.

**6.12** Check for burrs or rough threads on axle and axle nut.

**6.13** Assure that flange mounting holes have been drilled per Section 3.2, then mount torque plate Item #24, to axle flange using new bolts Item #61, nuts Item #63 and washers Item #62. Torque at 150 in-lbs.

**-NOTE-**

Bolt head to be towards the wheel, with one (1) washer under bolt head and one (1) washer under nut. Orientation as shown on View A of Installation Drawing 50-128

**6.14** Mount wheel and tire assembly on axle using existing inboard spacers as shown in Installation Drawing 50-128, View B.

**6.15** Apply a thin coat of bearing grease on axle nut and threads. Install bearing cone Item #39, in wheel. Install existing outboard spacer and axle nut on axle. Tighten axle nut to 150 to 200 in-lbs of torque while rotating the wheel to insure proper seating of the bearings. Back off the axle nut to zero torque, then retorque the nut to 40 in-lbs while rotating the wheel. If the holes do not align, tighten the nut to the next available key position. Install a cotter pin. Install hubcap Item #49 and snap ring Item #48.

**-NOTE-**

Axle nut torque to be 40 in-lbs minimum of torque

**6.16** Loosen eight (8) tie bolts, Item #17 on 30-99 brake assembly, and remove all four (4) back plates Item #11 and insulator shim Item #14.

**6.17** Slide new brake cylinder, Item #2 into torque plate Item #24.

**6.18** Install insulator shim, Item #14 over tie bolts.

**6.19** Install back plates, Item #11 between brake disc and inner wheel flange. Align back plate with bolts, and torque at 75-80 in-lbs.

**6.20** Install inlet fitting, nut and O-ring in cylinder. Connect inlet hose (Not supplied in this Kit) between bulkhead fitting and brake inlet fitting. Check reservoir fluid level and bleed system.

**6.21** Depress and release toe pedals several times. Rotate wheels by hand to check for excessive drag. A slight amount of drag is acceptable, however a severely bound-up system should be investigated and corrected. Drag could be caused by cocked lining, or air in hydraulic system.

**6.22** Remove aircraft from jacks and condition linings per Section 9.

February, 1989

## 7. WEIGHT AND BALANCE COMPUTATIONS

Weight: 25.96 lbs. per wheel and brake assembly.

Complete Form 337 and make appropriate log book entries.

## 8. METALLIC BRAKE LINING CONDITIONING PROCEDURE

**8.1** The brake lining material used in this brake assembly is an iron based metallic composition. This material must be properly conditioned (glazed) in order to provide optimum service life.

**8.2** Dynamometer tests have shown that at low braking energies, unglazed linings experience greater wear and the brake discs become severely scored.

**8.3** Conditioning may be accomplished as follows:

**8.3.1** Perform two (2) full stop braking applications from 30 to 35 knots, allowing the brake discs to cool between each stop.

**8.3.2** This conditioning procedure will wear off high spots and generate sufficient heat to glaze the lining. Once the lining is glazed, the braking system will provide many hours of maintenance free service.

**8.3.3** Avoid light use, such as taxiing, which will cause the glaze to be worn rapidly.

## 9. WARRANTY REGISTRATION

**9.1** Completely fill out enclosed warranty card and return promptly. Postage is prepaid.

## 10. MAINTENANCE

### 10.1 Wheel Maintenance

**10.1.1** Inspect wheel half flanges for cracks and corrosion.

**10.1.2** Inspect brake disc assembly for cracks, excessive wear or scoring, rust and corrosion. Disc should be replaced when worn to a thickness of .465 in. See Figure 4.

**10.1.3** Check for loose bolts and nuts and retighten or replace if necessary.

**-NOTE-**

No repair or replacement is recommended while equipment is on aircraft.

### 10.2 Brake Maintenance

**10.2.1** Visually check the brake for hydraulic leakage.

**10.2.2** If brake pedal is not firm, bleed brakes again.

**10.2.3** Check for loose bolts and nuts and retighten or replace as necessary.

**10.2.4** Visually check lining for excessive wear or edge chipping. Linings should be replaced when worn to a thickness of .100 in. See Figure 4.

**10.2.5** Recommended wear limits for discs and linings - See Section 11.2.5.

## 11. OVERHAUL

### 11.1 Wheel Overhaul

**-NOTE-**

Should be accomplished only while wheel is removed from aircraft.

**11.1.1 Dismounting**

**11.1.1.1** Jack aircraft and deflate tire. Back plates must be removed from brake before wheel removal. Remove snap ring Item #48, hubcap Item #49, axle nut, outboard spacer and outer bearing Item #39, from outer wheel half. Remove wheel and tire assembly from axle as a unit. Remove snap ring Item #47, felt Item #46, O-rings Item #45 and inner bearing cone Item #38, from inner wheel half.

**11.1.1.2** Break tire beads away from wheel flange with a bead breaker or pneumatic tire dismounter.

**-CAUTION-**

DO NOT USE TIRE IRONS.
THEY MAY DAMAGE THE WHEEL FLANGES OR TIRE BEADS.

**11.1.1.3** Remove nine (9) nuts Item #44, nine (9) washers Item #43, and nine (9) bolts Item #42, from the wheel assembly and remove brake disc.

**11.1.1.4** Separate the wheel halves and remove the tire and tube.

**-NOTE-**

Bearing cups Items #34 and #37, are shrunk fit into the wheel half and should not be removed unless replacement is necessary. If a bearing cup is to be replaced, heat the wheel half to 149 degrees C (300 degrees F) maximum for 20 minutes before trying to remove the cup. Support the wheel hub while removing the bearing cup as shown in the following Figure 1.

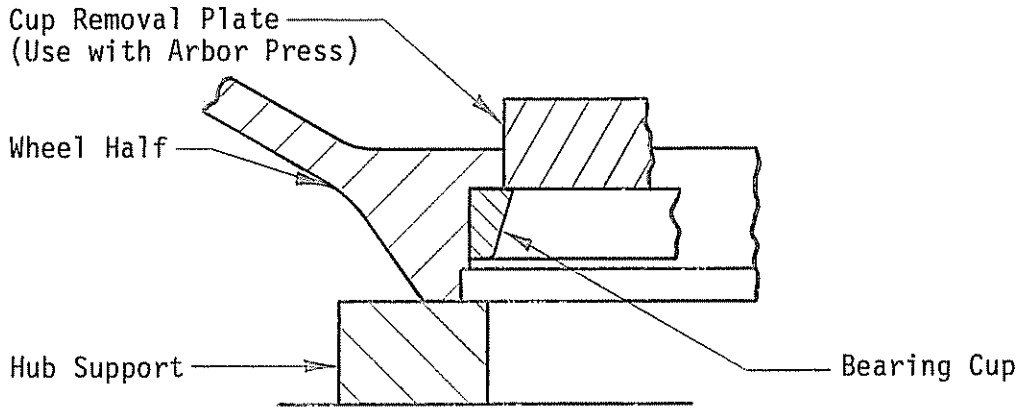



Figure 1 - Supporting Wheel Hub

**11.1.2 Cleaning**

**11.1.2.1** Clean all metal parts in a suitable solvent and dry with a lint free cloth.

**11.1.2.2** Wipe bearing grease seals clean with dry cloth. Do not use cleaning solvents on rubber components used in this wheel assembly.

**11.1.2.3** Wash bearing cones in uncontaminated cleaning solution, rotate the bearing cones by hand while submerged in the solution. Repack bearings with grease immediately after inspection to prevent corrosion and place in a clean, closed container.

**-CAUTION-**

DO NOT SPIN DRY BEARINGS OR HANDLE BEARINGS WITH BARE HANDS.

**11.1.2.4** Parts requiring fluorescent inspection are to be completely stripped using acetone or equivalent. Air dry parts after stripping is completed.

**11.1.3 Inspection**

**-NOTE-**

Inspect bolts Item #42 and wheel halves Item #33 & Item #36 after the fifth tire change, and then after the third subsequent tire change, for a total of twenty tire changes, and then at each and every tire change thereafter.

**11.1.3.1** Magnaflux bolts Item #42, for cracks and breaks.

**11.1.3.2** With dye penetrant, inspect wheel halves Item #33 and Item #36, for cracks and breaks. Note in particular the bead seat, tube well, and web junction areas.

**11.1.3.3** Visually inspect all metal parts for pitting, corrosion, cracks, breaks, uneven wear, and other surface defects.

**11.1.3.4** Inspect grease felts Item #46, for pits, cuts, and other defects. Replace as necessary.

**11.1.3.5** Remove and replace O-ring Item #51.

**11.1.4 Repair and Replacement**

**11.1.4.1** Repair scratches, nicks, corrosion, and other surface blemishes on wheel halves Item #33 and Item #36, by sanding with emery cloth, removing as little material as possible. Polish repaired surfaces with 400 grit emery cloth.

**11.1.4.2** Paint repaired areas with one coat of zinc chromate primer, and one coat of aluminum (color) polyurethane.

**-CAUTION-**

NEVER PAINT WORKING SURFACES OF BEARING CUPS.

**11.1.4.3** Replace all parts worn or damaged beyond limits of repair.

**11.1.4.4** To replace bearing cups, proceed as follows:

**11.1.4.4.1** Heat wheel halves to 149 degrees C (300 degrees F) maximum and cool cups to -18 degrees C (0 degrees F).

**11.1.4.4.2** Support wheel hub and paint the ID of the hub with zinc chromate primer. Then press cup into wheel half as shown in Figure 2.

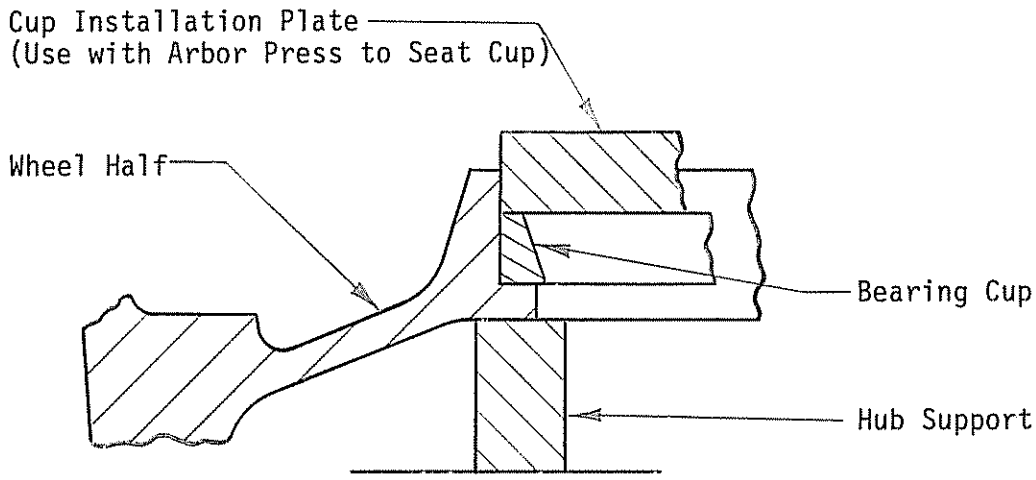



Figure 2 - Supporting Wheel Hub

**-NOTE-**

The wet zinc chromate primer lubricates the parts to be pressed together and acts as protection against galvanic corrosion between the parts.

February, 1989

### 11.1.5 Lubrication

**11.1.5.1** Pack Mobilux EP2 or equivalent into bearing cones and smear grease on ends of rollers. Do not over lubricate. Spread a thin coat of grease on the surface of the bearing cups.

**11.1.5.2** Lubricate threads of bolts and nuts and face of washers with thread compound.

### 11.1.6 Reassembly

**11.1.6.1** Position disc Item #41 and inner wheel half Item #32, on a flat surface with register side up. Coat O-ring Item #51, with Dow Corning Molycoat 55M and install on inner wheel half.

**-CAUTION-**

Seal should not be twisted, but fully aligned in groove.

**11.1.6.2** Place a serviceable tire & tube (if applicable) over inner wheel half Item #32, and then place outer wheel half Item #35, in the tire, making sure to properly align inner and outer wheel registers.

**11.1.6.3** Slide tie bolts Item #42, through wheel assembly. Install washers Item #43 and nuts Item #44, on bolts and torque to 150 in-lbs.

**11.1.6.4** Inflate tire to proper pressure in a safety cage.

**11.1.6.5** Install bearing cone Item #38, grease felt Item #46, grease rings Item #45, and snap ring Item #47, into inner wheel half. Install bearing cone Item #39, hubcap Item #49 and snap ring Item #48, into outer wheel half.

## 11.2 Brake Overhaul

### 11.2.1 Dismounting

**-NOTE-**

It is not necessary to remove the wheel from the aircraft to disassemble and service brake assembly

**11.2.1.1** Remove and cap hydraulic line.

**11.2.1.2** Remove the cylinder tie bolt Item #17 and remove back plates Item #11. Slide cylinder housing from torque plate. (the torque plate will remain mounted to the axle).

**11.2.1.3** Remove the pressure plate assembly, hydraulic fitting, and bleeder fitting.

**11.2.1.4** The pistons may be removed by applying a slight amount of air pressure to the inlet or outlet ports of the cylinder.

**11.2.1.5** Remove the O-rings Item #22, from cylinder.

**11.2.1.6** If necessary, the anchor bolts may be removed by using a holding fixture and arbor press. If possible, place the anchor bolts into the holding fixture so that the anchor bolt is piloted while being removed.

**-CAUTION-**

CYLINDER MUST BE SQUARE WITH ARBOR IN STEPS A AND B
SO THAT THE ANCHOR BOLTS DO NOT COCK.

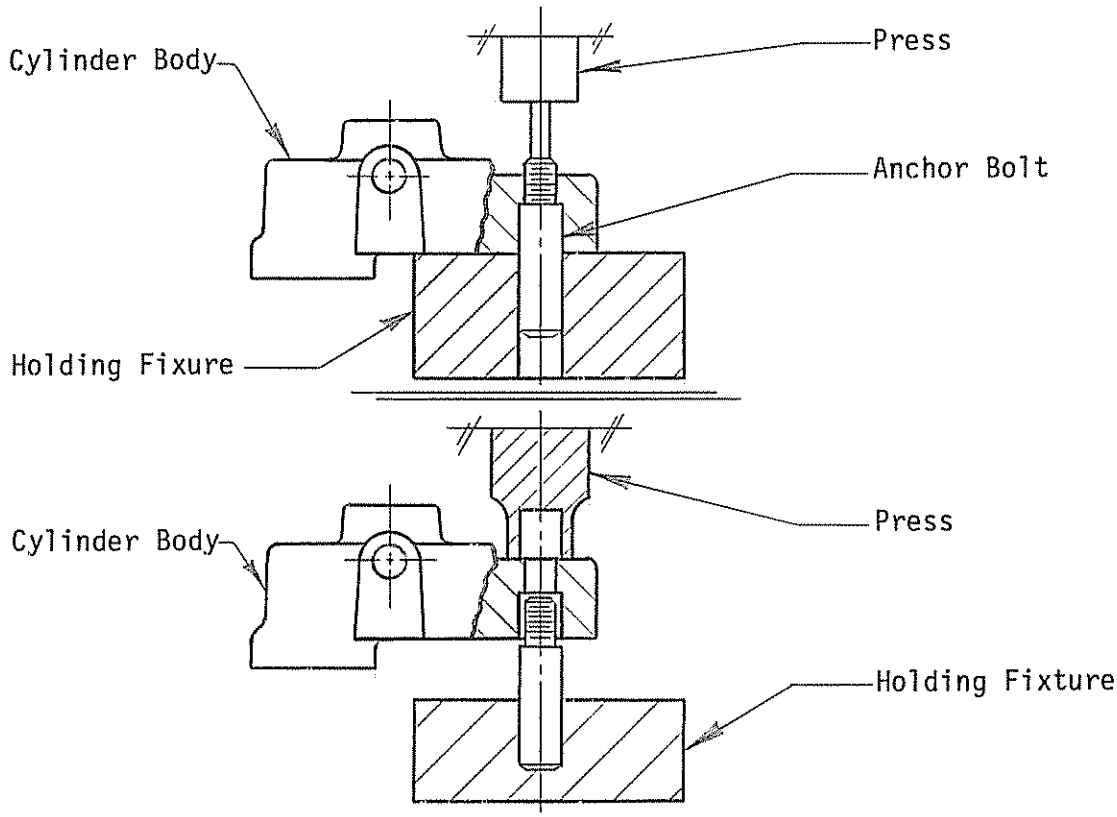



Figure 3 - Anchor Bolt Removal

**11.2.2 Cleaning**

**11.2.2.1** Clean all metal parts in a suitable solvent.

**11.2.2.2** Discard and replace all O-ring seals Item #22.

**11.2.3 Inspection**

**11.2.3.1** Inspect brake cylinder Item #3, for cracks, especially in the lug area around the anchor bolts. Cracks in this area necessitate cylinder replacement.

**11.2.3.2** Small nicks and light corrosion may be blended and removed with emery or sand paper. Any area from which the protective coating is removed should be thoroughly cleaned, and repainted with one coat of zinc chromate primer, and one coat of aluminum (color) polyurethane.

**11.2.3.3** Inspect the fitting ports and piston bores for contamination. Light scratches or nicks in the piston bores or on the chamfered surfaces within these bores may be polished out with #600 grit emery.

**11.2.3.4** Thoroughly clean out any residue upon completion of step 11.2.3.3. Any external surfaces around the piston bores from which the protective coating has been removed should be cleaned, and painted with one coat of zinc chromate primer and one coat of aluminum (color) polyurethane.

**-NOTE-**

Do not paint internal surfaces of piston bores.

**11.2.3.5** Inspect pistons Item #5, for nicks or burrs. Remove nicks or burrs by polishing with #600 grit emery. Thoroughly clean before reinstallation.

**11.2.3.6** Inspect brake lining for edge chipping and surface deterioration. See section 12.2.5 for wear limits.

**11.2.3.7** Lining replacement can be accomplished by prying the old segments off of the carrier with a screwdriver. To install new pads, snap the new pad onto the carrier pins.

**-NOTE-**

If the linings are changed, but the pistons are not removed from the cylinder, clean the exposed surfaces of the pistons before displacing the pistons back into the cylinder.

**11.2.3.8** Inspect pressure plate Item #8 and back plates Item #11, for cracks or warpage. Replace if cracked or severely deformed. Inspect pins Item #10, for looseness. If loose, tighten with rivet set and anvil, part number 199-1A and 199-1B.

**-NOTE-**

Slightly warped pressure plates with relief slots can be fixtured in a vise and straightened when laid on a flat surface, flatness should be within .015 TIR. Warped pressure plates can cause brake drag.

**11.2.3.9** Inspect anchor bolt holes in torque plate for internal corrosion or contamination. If present, clean with emery and apply a light coat of dry lube.

**-NOTE-**

For best service life, the cylinders must slide freely in the torque plate.

Check the anchor bolt hole and mounting bolt hole areas for elongation or cracks. Badly elongated or cracked parts should be replaced with new parts of corresponding part number. Minor corrosion on the torque plates may be removed with #600 grit emery.

**-NOTE-**

Surfaces from which the protective coating is removed should be painted with one coat of zinc chromate primer, and one coat of aluminum (color) polyurethane.

**11.2.3.10** Inspect bolts Item #17 for cracks, thread damage, or corrosion and replace if necessary.

### 11.2.4 Reassembly

**11.2.4.1** If removed, press anchor bolts Item #15 (ref. Figure 3) into brake and install washers Item #18 and nuts Item #16. Torque bolts to 85-90 in-lbs.

**11.2.4.2** Install inlet and bleeder fitting.

**11.2.4.3** For piston installation, lubricate the piston, O-ring, and piston bore with a small amount of MIL-H-5606 hydraulic fluid. Insert O-rings into cylinder. Rotate to seat drag ring and insure that piston and seal are in proper alignment. Tap the piston with a wooden or plastic mallet while alternately rotating. If considerable effort is required, remove piston and inspect pilot bore area for damage. If the bore is damaged, check the corresponding area of the cylinder for damage. Repair, if necessary, and repeat the above procedure.

**11.2.4.4** Install pressure plate assembly by aligning anchor bolt holes with anchor bolts and slide onto cylinder. The pressure plate must float freely on the anchor bolts.

**11.2.4.5** Slide the brake assembly into the torque plate Item #24, aligning the anchor bolts to the torque plate holes (the cylinder must slide freely in torque plate).

**11.2.4.6** Install washers Item #18, tie bolts Item #17, and insulator shim Item #14. Install back plate assemblies Item #11, between brake disc and wheel flange, and align with tie bolts. Torque bolts to 75-80 in-lbs.

**11.2.4.7** Reconnect hydraulic lines and bleed system. Check pedal for proper feel and travel.

### 11.2.5 Wear Limits

**11.2.5.1** Maximum wear limits for brake linings and discs are shown in the following sketch. Disc warpage should not exceed .015 in.

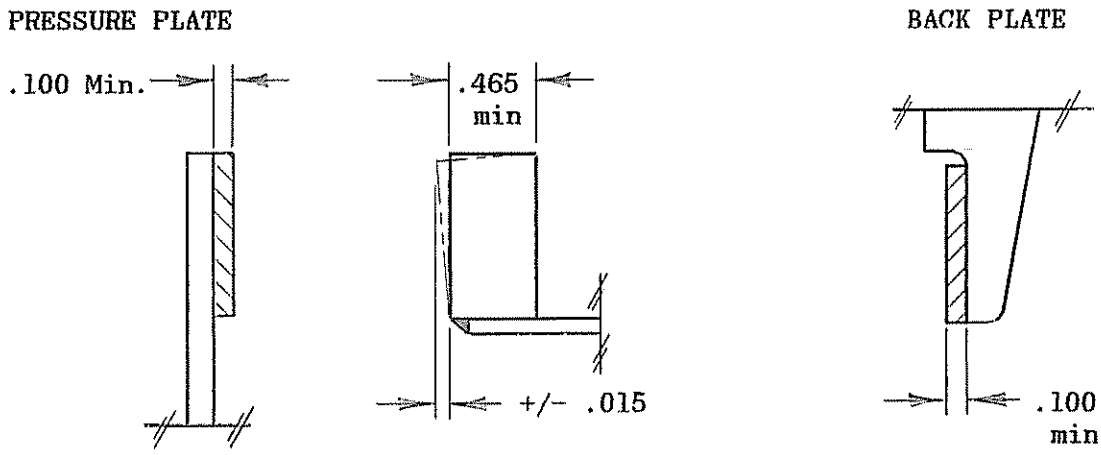



Figure 4
Lining and Disc Wear Limits

February, 1989

## 12. PARTS LIST

### 12.1 Wheel Parts List

AIRCRAFT WHEEL AND BRAKE DIVISION

PARKER HANNIFIN CORPORATION

AVON, OHIO

PARTS LIST

40-134 WHEEL ASSEMBLY 24.x 7.7 TYPE VII

| ITEM | OLD P/N | CODE NO. | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| 31 | 40-134 | 040-13400 | Wheel Assembly | 1 |
| 32 | 161-63 | 161-06300 | Inner Wheel Half Assembly | 1 |
| 33 | 151-61 | 151-06100 | Wheel Half - Inner | 1 |
| 34 | LM29710 | 214-01300 | Cup - Bearing | 1 |
| 35 | 162-59 | 162-05900 | Outer Wheel Half Assembly | 1 |
| 36 | 152-61 | 152-06100 | Wheel Half - Outer | 1 |
| 37 | 07196 | 214-00900 | Cup - Bearing | 1 |
| 38 | LM29749 | 214-01400 | Cone - Bearing | 1 |
| 39 | 07100 | 214-01000 | Cone - Bearing | 1 |
| 40 | 67-6 | 067-00600 | Spacer | 1 |
| 41 | 164-63F | 164-06306 | Brake Disc Assembly | 1 |
| 42 | AN5-41A | 103-20800 | Bolt | 9 |
| 43 | AN960-516 | 095-10500 | Washer | 9 |
| 44 | AN365-524 | 094-10400 | Nut | 9 |
| 45 | 153-16 | 153-01600 | Ring - Grease Seal | 2 |
| 46 | 154-16 | 154-01600 | Felt - Grease Seal | 1 |
| 47 | 155-1 | 155-00100 | Ring - Snap | 1 |
| 48 | 155-6 | 155-00600 | Ring - Snap | 1 |
| 49 | 158-8 | 158-00800 | Cap - Hub | 1 |
| 50 | TR756-03 | 160-00900 | Inflation Valve Assembly | 1 |
| 51 | AN6230-47 | 101-09700 | O-ring | 1 |
| 52 | 166-97 | 166-09700 | Nameplate | 1 |
| 53 | 166-14 | 166-01400 | Nameplate | 1 |

February, 1989
Rev. A, August 1989

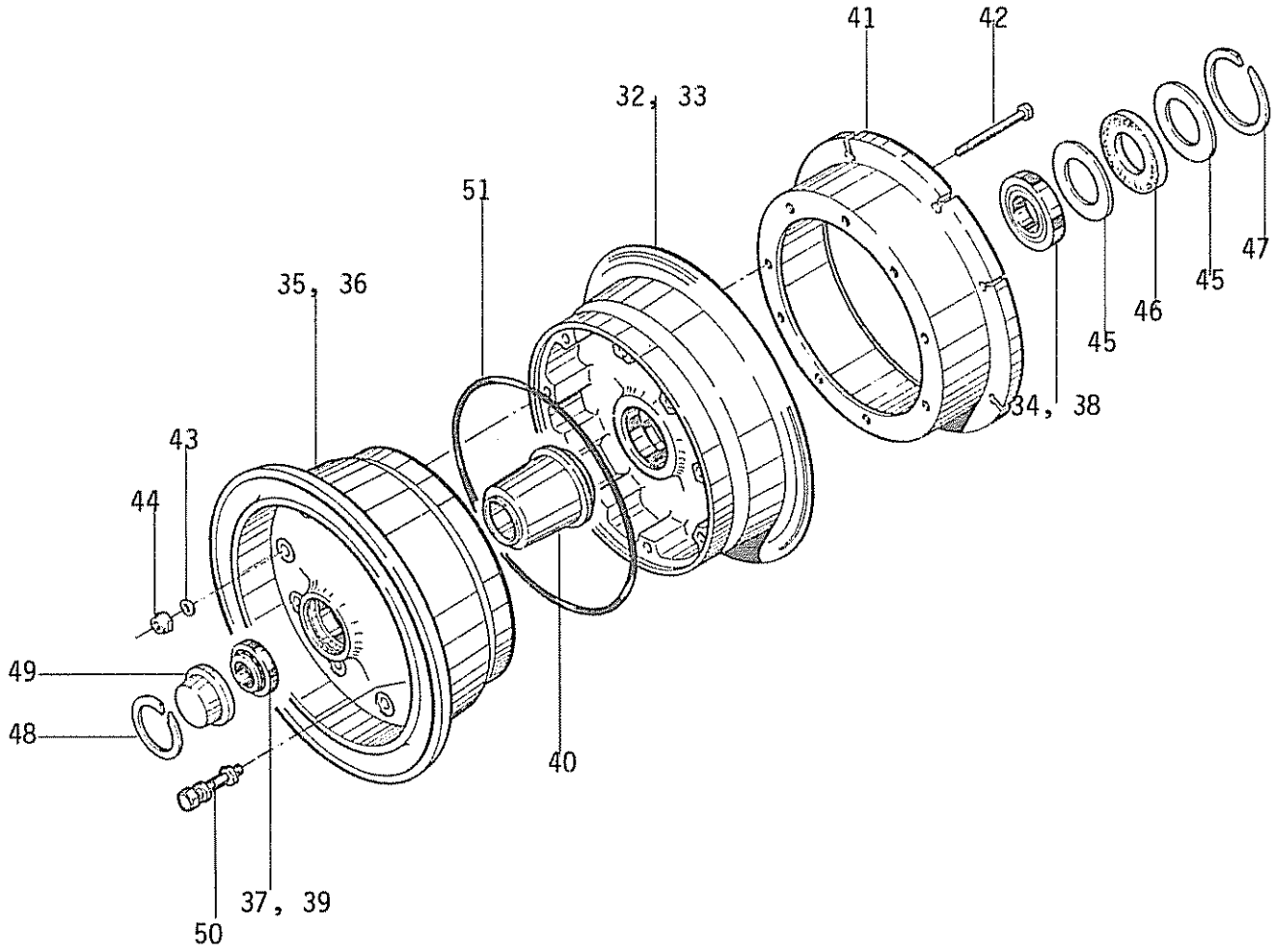



Figure 5
40-134 Wheel Assembly

February, 1989

## 12.2 Brake Parts List

PARTS LIST

30-99 BRAKE ASSEMBLY

| ITEM | OLD P/N | CODE NO. | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| 1 | 30-99 | 030-09900 | Brake Assembly | 1 |
| 2 | 91-91 | 091-09100 | Cylinder Assembly | 1 |
| 3 | 61-49 | 061-04900 | Cylinder | 1 |
| 4 | 92-37 | 092-03700 | Piston Assembly | 4 |
| 5 | 62-32 | 062-03200 | Piston | 4 |
| 6 | 82-20 | 082-02000 | Friction Spring | 4 |
| 7 | 88-1 | 088-00100 | Insulator | 4 |
| 8 | 73-40 | 073-04000 | Pressure Plate Assembly | 1 |
| 9 | 63-26 | 063-02600 | Plate - Pressure | 1 |
| 10 | 177-16 | 177-01600 | Pin | 8 |
| 11 | 74-32 | 074-03200 | Back Plate Assembly | 4 |
| 12 | 64-25 | 064-02500 | Plate - Back | 4 |
| 10 | 177-16 | 177-01600 | Pin | 8 |
| 13 | 66-66 | 066-06600 | Lining | 8 |
| 14 | 68-28 | 068-02800 | Shim - Back Plate | 1 |
| 15 | 69-19 | 069-01900 | Bolt - Anchor | 2 |
| 16 | AN365-428 | 094-10300 | Nut | 2 |
| 17 | ABP4-21A | 103-11800 | Bolt | 8 |
| 18 | AN960-416L | 095-10200 | Washer | 10 |
| 19 | 183-1 | 183-00100 | Cap - Bleeder | 1 |
| 20 | FC6446 | 079-00300 | Screw - Bleeder | 1 |
| 21 | 81-2 | 081-00200 | Seat - Bleeder | 1 |
| 22 | MS28775-132 | 101-23200 | "O" Ring | 4 |
| 23 | AN6227-7 | 101-00700 | "O" Ring | 1 |
| 24 | 75-118 | 075-11800 | Torque Plate Assembly | 1 |
| 25 | 166-65 | 166-06500 | Nameplate | 1 |

February, 1989
Rev. B, August, 1990

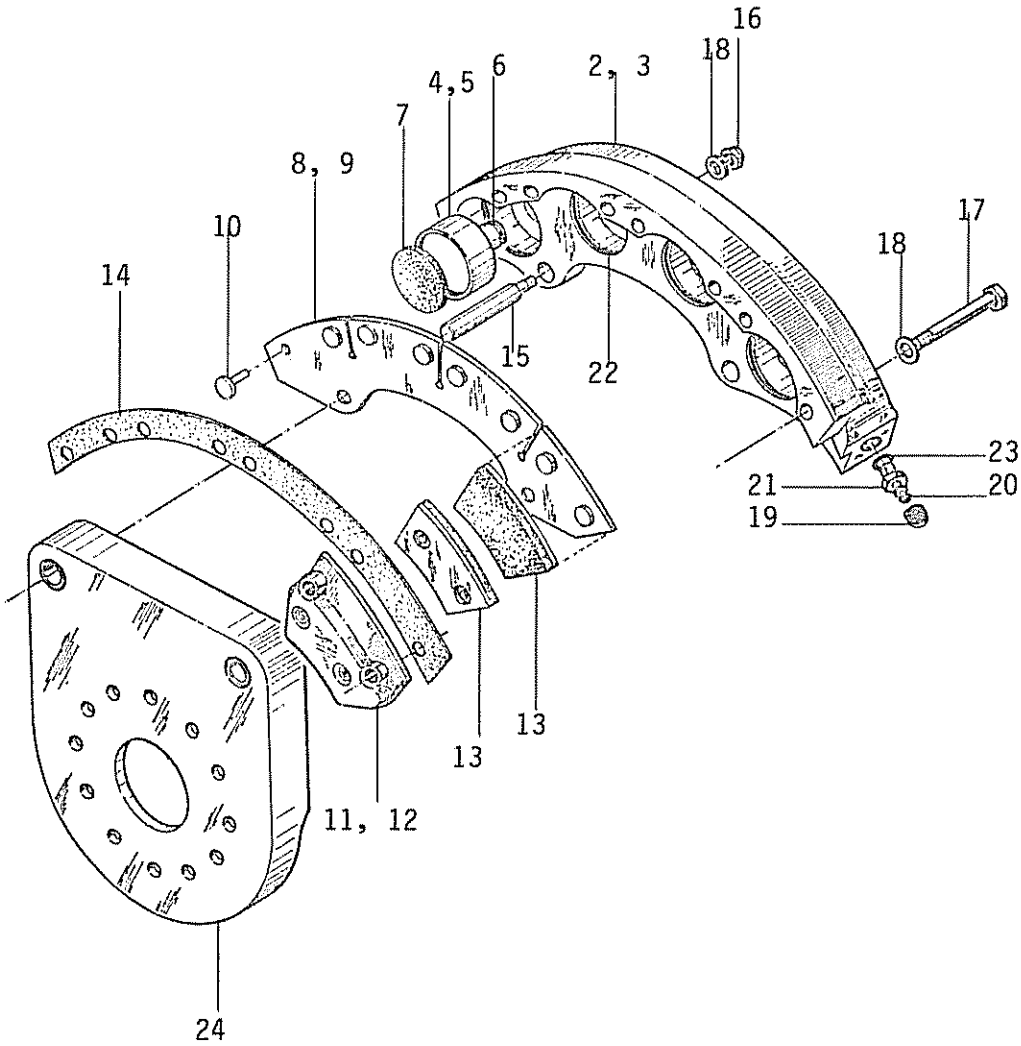



Figure 6
30-99 Brake Assembly

February, 1989

## 12.3 Kit Parts List

PARTS LIST

199-95 CONVERSION KIT

de Havilland DHC-2
BEAVER MODELS MKI, II & III

| ITEM | OLD P/N | CODE NO. | DESCRIPTION | QUANTITY |
|---|---|---|---|---|
| 1 | 30-99 | 030-09900 | Brake Assembly | 2 |
| 31 | 40-134 | 040-13400 | Wheel Assembly | 2 |
| 61 | AN5-7A | 103-21300 | Bolt | 24 |
| 62 | AN960-516 | 095-10500 | Washer | 48 |
| 63 | AN365-524 | 094-10400 | Nut | 24 |
| 64 | 4C50X-S | 104-03100 | Inlet Fitting | 2 |
| | 50-128 | | Installation Drawing | 1 |
| | 199-95 Manual | | Installation Manual | 1 |
| | SA1402GL | | STC | 1 |
| | | | Warranty Registration | 1 |

* For Subassembly and Parts Identification: See 30-99 Parts List

** For Subassembly and Parts Identification: See 40-134 Parts List

February, 1989
Rev. A, August, 1989

**Cleveland**
Wheels & Brakes

Parker Hannifin Corporation
**Aircraft Wheel & Brake**
1160 Center Road
Avon, Ohio 44011 USA
1-800-BRAKING (272-5464)
216-937-1272 ● FAX 216-937-5409

# PRODUCT REFERENCE MEMO

## AVAILABILITY OF GENERAL MAINTENANCE INFORMATION AND TORQUING PROCEDURES

EFFECTIVITY: All Parker Hannifin (Cleveland Wheels & Brakes) External Disc Design wheel & brake assemblies.

APPLICABILITY: Aircraft converted per STC approved kits to use Cleveland External Disc Design wheel & brake assemblies.

REASON: This PRM is issued to inform Wheel & Brake Conversion Kit users and installers that information regarding general maintenance and proper bolt / nut torquing procedures is available. This information is contained in the Cleveland Wheels & Brakes Component Maintenance Manual (CMM) and in the Cleveland Technicians Service Guide, PRM64. Most Cleveland Conversion Kits were designed prior to creation of the CMM. Parker Hannifin is in process of upgrading kit paperwork to include a requirement to use the CMM and PRM64 as wheel & brake service information. This PRM serves the same purpose for kits whose paperwork has not yet been upgraded.

DESCRIPTION: The Cleveland Wheels & Brakes Component Maintenance Manual and PRM64, Technician's Service Guide shall be used as service information when performing general maintenance on Cleveland External Disc Design wheels & brakes. Particular attention should be paid to instructions regarding wheel bolt torquing procedures.

**NOTE:** Refer to the CMM or PRM64 to determine the required torque procedure (Dry or Lubtork). While using the required torque procedure, observe the torque required to turn the nut (free running torque). This value must be added to the value stated on the casting or nameplate (or in the CMM or PRM64) to obtain a true torque value. Proper torque is imperative to prevent premature bolt or mating component failure.

COMPLIANCE: Highly Recommended.

APPROVAL: The engineering contents of this Product Reference Memo are FAA DER approved.

WEIGHT & BALANCE: Not applicable.

PUBLICATIONS: Cleveland Wheels & Brakes Component Maintenance Manual and PRM64 are available from:

Customer Support
Parker Hannifin Corporation
Aircraft Wheel & Brake
1160 Center Road
Avon, Ohio

Phone: 1-800- BRAKING (272-5464)
FAX: 216-937-5409

DEPARTMENT OF TRANSPORT

# Supplemental Type Approval

## Number: SA90-1

**This approval is issued to:**

Aircraft Wheel and Brake Division
Parker Hannifin Corporation
1160 Center Road
Avon, OHIO
U.S.A. 44011

**Issue No.:** 1

**Approval Date:** January 11, 1990

**Issue Date:** January 11, 1990

**Responsible Region:** Ontario

**Aircraft/Engine Type or Model:** De Havilland DHC-2 Mk. I, DHC-2 Mk. II, DHC-2 Mk. III

**Canadian Type Approval or Equivalent:** A-22

**Description of Type Design Change:**

Installation of Cleveland Wheels and Brakes in accordance with FAA Supplemental Type Certificate (STC) SA1402GL.

**Installation/Operating Data, Required Equipment and Limitations:**

This installation must be in accordance with Parker Hannifin Conversion Kit Parts List 199-95, Revision A, dated August 23, 1989, or later FAA Approved revision.

**Conditions:** This approval is only applicable to the type/model of aeronautical product specified therein Prior to incorporating this modification, it shall be established that the interrelationship between this change and any other modification(s) incorporated will not adversely affect the airworthiness of the modified product

H. Wojnicki
Regional Airworthiness Engineer
For Minister of Transport

Canada

26-0402

Parker Hannifin Corporation
Aerospace/Aircraft Wheel & Brake
1160 Center Road
Avon, OH 44011

Date: _ _/_ _/20_ _

Subject: Letter of Authorization for Installation of STC'd Conversion Kits

To whom it may concern:

Parker Hannifin Corporation, Aircraft Wheel & Brake Division, hereby states that the following item(s):

KIT NUMBER: 199-_____

FAA APPROVAL: 1) STC # _____

NO OTHER APPROVALS NECESSARY

AUTHORIZATION TO INSTALL: With the sale of this STC KIT, OWNER of the Supplemental Type Certificate agrees to permit the buyer or buyer's agent or agency to use the certificate to alter the product under the terms and conditions of this STC.

A/C MAKE: _____

A/C MODEL_____

TAIL # _____

Regards,

Technical Support Team
Technical Hotline (800) 272-5464
Clevelandwbhelp@parker.com
Web-site: www.clevelandwheelandbrake.com
Manufacturer of Cleveland Wheels & Brakes

United States of America

Department of Transportation — Federal Aviation Administration

# Supplemental Type Certificate

*Number* SA1402GL

*This certificate, issued to* Aircraft Wheel and Brake Division
Parker Hannifin Corporation
1160 Center Road
Avon, Ohio 44011

*certifies that the change in the type design for the following product with the limitations and conditions thereof as specified hereon meets the airworthiness requirements of Part* 10 *of the* Civil Air *Regulations:* See Aircraft Specification No. A-806 for complete certification basis.

*Original Product — Type Certificate Number* A-806
*Make* De Havilland
*Model* DHC-2 Mk.I, DHC-2 Mk.II, DHC-2 Mk.III

*Description of Type Design Change:*

Installation of Cleveland Main Wheels and Brakes in accordance with Parker Hannifin Conversion Kit Parts List 199-95, revision A, dated August 23, 1989, or other FAA Approved revision.

*Limitations and Conditions:*

This approval should not be extended to other aircraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the interrelationship between this change and any of those other previously approved modifications will introduce no adverse effect upon the airworthiness of that aircraft.

*This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.*

*Date of application* March 22, 1989
*Date of issuance* August 23, 1989

*Date reissued*
*Date amended*

*By direction of the Administrator*

for Donald P. Michal, Manager
Chicago Aircraft Certification Office
*(Signature)*
*(Title)*

*Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.*

*This certificate may be transferred in accordance with FAR 21.47.*

FAA Form 8110-2 (10-68)