AIRCRAFT WHEEL & BRAKE DIVISION
PARKER HANNIFIN CORPORATION
AVON, OHIO

PARTS LIST
199-90 CONVERSION KIT
BEECH KING AIR AIRCRAFT
MODEL SERIES 65-A90, B90, C90, C90A, C90GT, C90GTi, E90, H90, 65-A90-1, AND 65-A90-4

PART NUMBER	DRAWING REVISION	DESCRIPTION	QUANTITY
30-144	Rev. M dated 05-07-2010	Brake Assembly	2
40-170A	Rev. D dated 01-29-2014	Wheel Assembly	2
094-10400	----------	Nut (MS21044-N5)	24
095-02900	Rev. A dated 03-30-1998	Washer (Wheel Bearing Retaining)	2
095-10500	----------	Washer (AN960-516)	48
103-22100	----------	Bolt (AN5-10A)	24
105-00800	----------	Rivet (CherryMax P/N CR3243-4-2)	32
110-05400	Rev. F dated 11-19-2002	Bracket (Right Side)	1
110-05500	Rev. F dated 11-19-2002	Bracket (Left Side)	1
110-05600	Rev. C dated 04-22-2002	End Tab	4
110-05700	Rev. A dated 11-09-1982	Filler	2
158-01400	Rev. C dated 09-13-1994	Hubcap (To be used on early model 90's with extended axle)	2

Publication Package (P/N PP199-09000)

IM199-90	Rev. K dated 04-01-2016	Installation Manual
50-80	Rev. H dated 01-07-2009	Installation Drawing (sheets 1 & 2)
CM30-144	Rev. A dated 10-15-2011	Component Maintenance Manual for 30-144
CM40-170A	Rev. A dated 04-01-2016	Component Maintenance Manual for 40-170A
SA619GL	----------	Supplemental Type Certificate
ANAC#9210-04	----------	ANAC (Brazil) Supplemental Type Certificate
EASA#10039114	----------	EASA Supplemental Type Certificate
PRM14A	----------	Conditioning Procedure For Metallic Brake Lining
-------		Pilot Operating Manual Inserts
-------		Product Registration Card
Template A	----------	Full-size Template for Wheel Well Modification

NOTES:

1. This kit will convert one aircraft to Cleveland equipment.
2. For use with MIL-H-5606 brake fluid
3. Models (S/N):
   - 65-A90 (LJ-114 thru LJ-317)
   - B90 (LJ-318 thru LJ-501)
   - C90 (LJ-502 thru LJ-1062)
   - C90A (LJ-1063 and up)
   - C90GT (all)
   - C90GTi (LJ1847, LJ1853 and up)
   - E90 (LW-1 and up)
   - H90 (all)
   - 65-A90-1 (all)
   - 65-A90-4 (all)

199-90
Rev V 07-06-2012 (ECO-0011541)
Rev W 02-12-2014 (ECO-0031955)
Rev Y 04-01-2016 (ECO-0066231)

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AIRCRAFT WHEEL AND BRAKE DIVISION
CONTRACTOR ADDRESS 1160 AVON CENTER ROAD
AVON, OHIO 44011
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APPLICABILITY OF AIRCRAFT INSTALLATION FOR CLEVELAND KIT 199-90

BEECH MODEL	TIRE SIZE	PLY	TYPE	PRESSURE
65-A90, B90, C90, C90GT, C90GTi	8.50-10 TYPE III	8 PLY	TUBELESS OR TUBE TYPE	52-58 PSI
E90, C90A, H90, 65-A90-1, 65-A90-4	8.50-10 TYPE III	10 PLY	TUBELESS OR TUBE TYPE	54-60 PSI
C90GT, C90GTi	8.50-10 TYPE III	10 PLY (OPTION)	TUBELESS OR TUBE TYPE	67-73 PSI

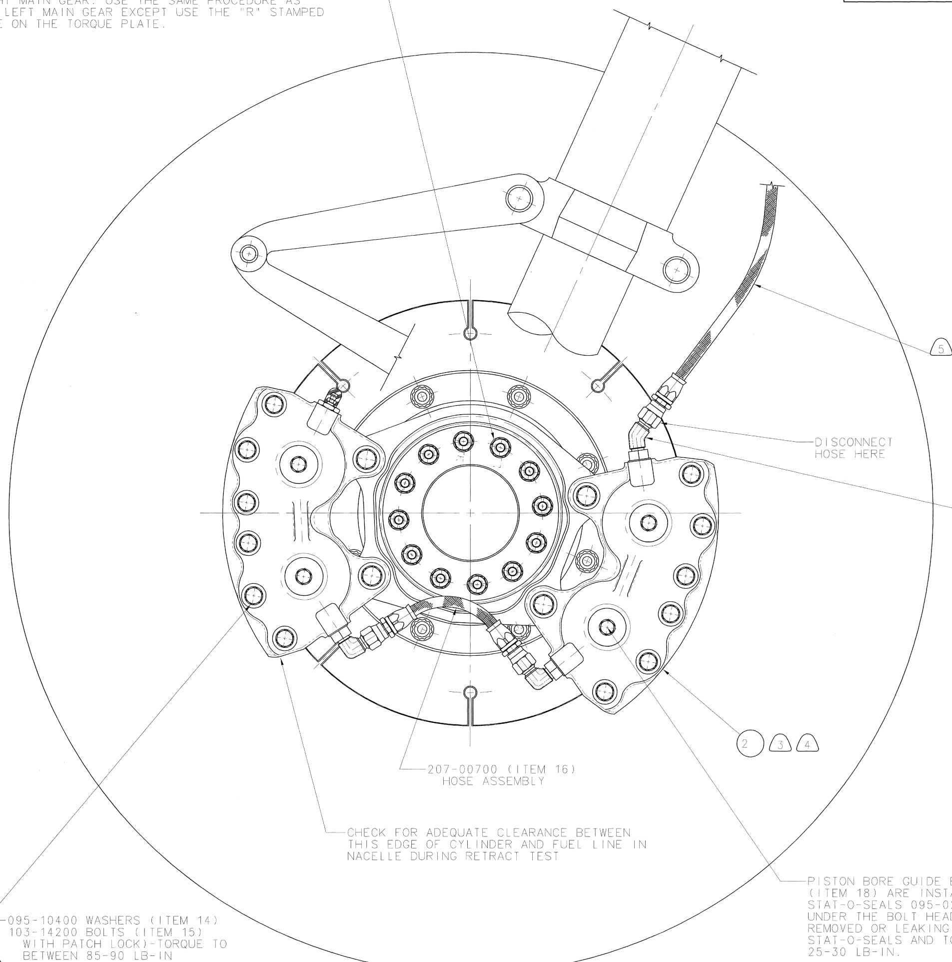
REVISIONS						
CHANGE NOTICE	REV	DESCRIPTION OF CHANGE	CHG BY	CHK BY	DATE	APPROVED
0364-50	G	PRODUCTION CHANGE. SEE C/N	PH	BB	07-01-2005	B. BARKER
0383-06	H	PRODUCTION CHANGE. SEE C/N	PH	PK	01-07-2009	P. KRONZ

TORQUE PLATE ASSEMBLY (ITEM 13) MOUNTING INSTRUCTION:

A. LEFT MAIN GEAR: ALIGN THE TORQUE PLATE BOLT HOLE (IMPRESSION STAMPED WITH AN "L" ON INBOARD SIDE OF TORQUE PLATE) TO UPPERMOST BOLT HOLE ON FLANGE/STRUT CENTERLINE.

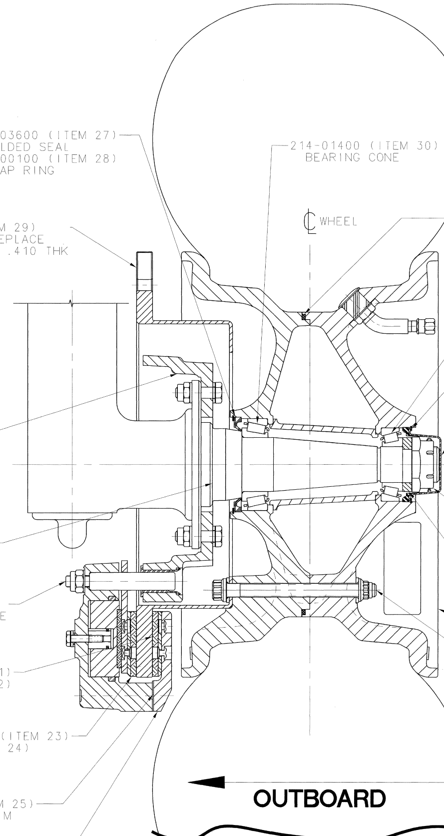
B. RIGHT MAIN GEAR: USE THE SAME PROCEDURE AS THE LEFT MAIN GEAR EXCEPT USE THE "R" STAMPED HOLE ON THE TORQUE PLATE.

TORQUE PLATE MOUNTING HARDWARE:
(4) 103-22100 BOLT (ITEM 6)
INSTALL WITH THE BOLT HEAD TOWARDS THE WHEEL
(4) 095-10500 WASHER (ITEM 5)
(4) 094-10400 NUT (ITEM 4)
TORQUE THE NUT TO BETWEEN 130 TO 150 LB-IN.



LEFT HAND GEAR

FORWARD



OUTBOARD

(8) (9)

QTY	ITEM NO.	CAGE CODE	PART NO.	DESCRIPTION	MATERIAL/SPECIFICATION	WGT.(LB)
2	12B	33269	158-01400	HUBCAP	.	.
2	11	33269	110-05700	FILLER	.	.
4	10	33269	110-05600	END TAB	.	.
1	9	33269	110-05500	BRACKET (RIGHT SIDE)	.	.
1	8	33269	110-05400	BRACKET (LEFT SIDE)	.	.
32	7	33269	105-00800	RIVET	.	.
24	6	33269	103-22100	BOLT	.	.
48	5	33269	095-10500	WASHER	.	.
24	4	33269	094-10400	NUT	.	.
1	3	33269	095-02900	WASHER	.	.
1	2	33269	30-144	BRAKE ASSEMBLY	.	.
1	1	33269	40-170A	WHEEL ASSEMBLY 24 X 7.7 TYPE III	.	.

PARTS LIST

NOTES:

1. REFER TO IM199-90 INSTALLATION MANUAL FOR DETAILED INSTALLATION INSTRUCTIONS.
2. SEE CM40-170A MAINTENANCE MANUAL FOR WHEEL ASSEMBLY MAINTENANCE AND PARTS BREAKDOWN.
3. SEE CM30-144 MAINTENANCE MANUAL FOR BRAKE ASSEMBLY MAINTENANCE AND PARTS BREAKDOWN.
4. THIS COMPONENT IS SUPPLIED IN THE 199-90 KIT.
5. THIS COMPONENT IS NOT SUPPLIED IN THE 199-90 KIT.
6. A MODIFICATION TO THE AIRFRAME (WHEEL WELL) IS REQUIRED PRIOR TO INSTALLATION OF THE 199-90 KIT. REFER TO SHEET 2 OF THIS INSTALLATION DRAWING AND TO IM199-90 INSTALLATION MANUAL.
7. THIS KIT IS TO BE USED WITH MIL-H-5606 HYDRAULIC FLUID.
8. QUANTITIES ARE PER KIT.
9. ITEM NUMBERS USED ON THIS INSTALLATION DRAWING ARE USED WITH REFERENCE TO THIS DRAWING AND TO IM199-90 INSTALLATION MANUAL.

A CONTRACT ALTERED ITEM EXISTS FOR THIS PART NUMBER

QTY	FINAL ASSY	QTY	NEXT ASSY
APPLICATION (NOT MAINTAINED)			

DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER HEAT TREATING, PLATING, AND BEFORE PAINTING.

DO NOT SCALE DRAWING

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GENERAL NOTES: UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
THIRD ANGLE PROJECTION
TOLERANCES
2 PLACE (.XX): ±.03
3 PLACE (.XXX): ±.010
ANGULAR DIMS. ±0.5°
REMOVE ALL BURRS
BREAK CORNERS .010 MAX.
INTERNAL RADII .005-.010
GENERAL MACHINED SURFACES 125 √ PER ANSI B46.1
RAW MATERIAL:

MISMATCH — DRAFT ANGLE — DIMENSIONS GIVEN TO SHARP PROJECTED CORNERS

STRESS | DATE
MFG ENGRG
QUAL ASSUR

PROGRAM/CONTRACT NO.
DRAWN P. HUNYAD — DATE 10-13-81
CHECKED
ENGINEER
DESIGN APPROVAL
PROJ APPROVAL
RELEASE DATE 12-17-82 (271/35)

CLEVELAND WHEELS & BRAKES
Aircraft Wheel And Brake Division
Parker Hannifin Corporation
Avon, Ohio 44011
Parker Aerospace

DWG. TITLE
INSTALLATION WHEEL & BRAKE

SIZE E | CAGE CODE 33269 | DWG. NO. 50-80 | REV. H
SCALE: .75:1 | UNIT WGT.: . | SHEET: 1 OF 2

(050-08000)

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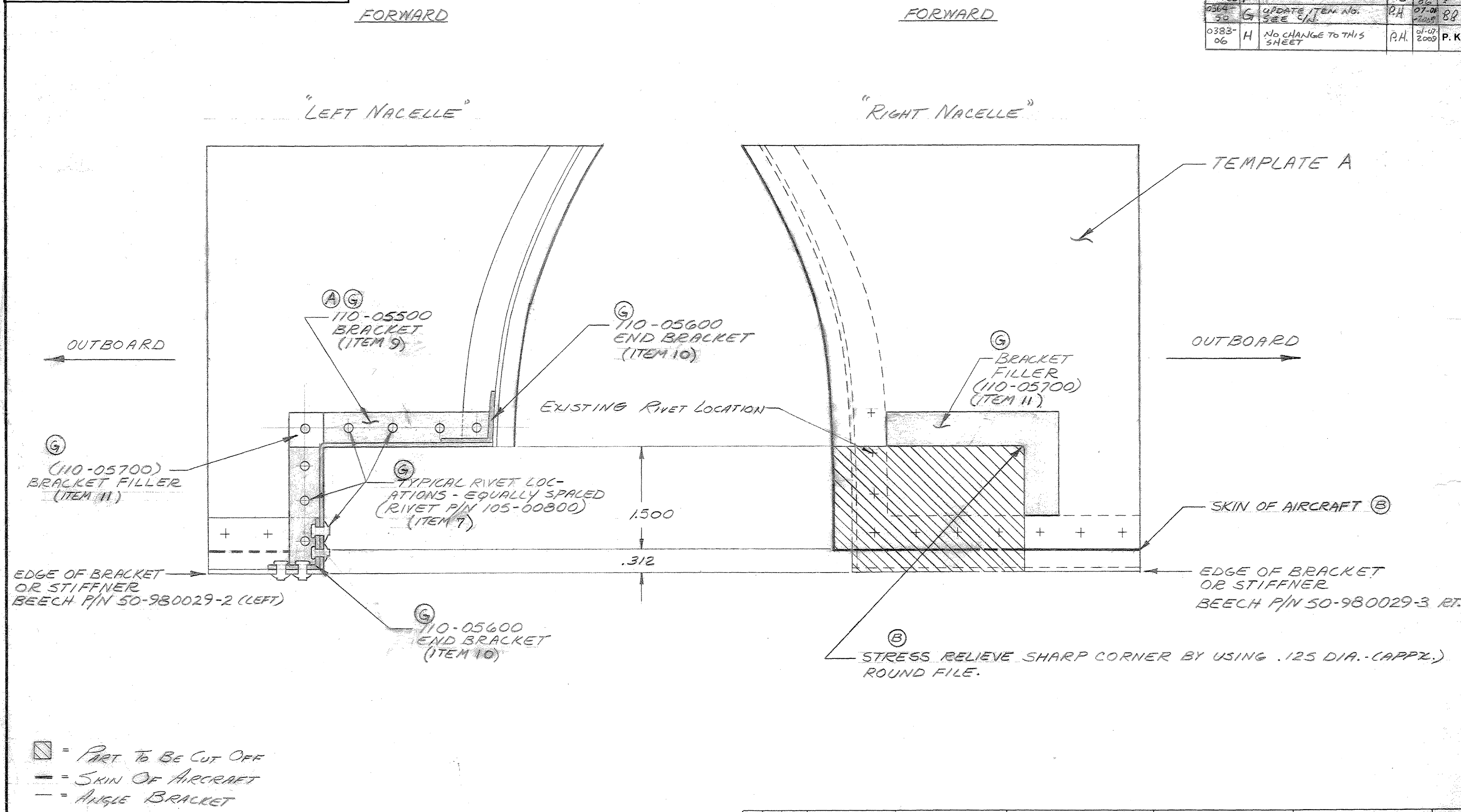
CHANGE NOTICE	LETTER	DESCRIPTION OF CHANGE	CHG. BY	DATE	CHK'D. BY
270/18	A	110-05500 WAS 110-05400	OM	6-29 82	
270/66	B	SEE C/N	RCG	9-13 82	
271/23	C	ADDED "ITEM" NUMBERS	[illegible]	11-16 82	
272/[illegible]	D	ADDED [illegible] TO SHEET 1	[illegible]	[illegible]	
284/34	E	SEE C/N	BB	1-8-87	BB
299/63	F	NO CHANGE TO THIS SHEET	[illegible]	90-03-06	[illegible]
0364-50	G	UPDATE ITEM NO. SEE C/N	P.H	07-0[illegible]-2008	BB
0383-06	H	NO CHANGE TO THIS SHEET	P.H.	01-07-2009	P. K.



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.	DRAWN BY OM 3-15-82

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ZYGLO PER MIL-I-6866 STAMP P ON PART
MAGNAFLUX PER MIL-I-6868 STAMP M ON PART
√ GENERAL MACHINED SURFACES TO BE 125 FINISH UNLESS 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.

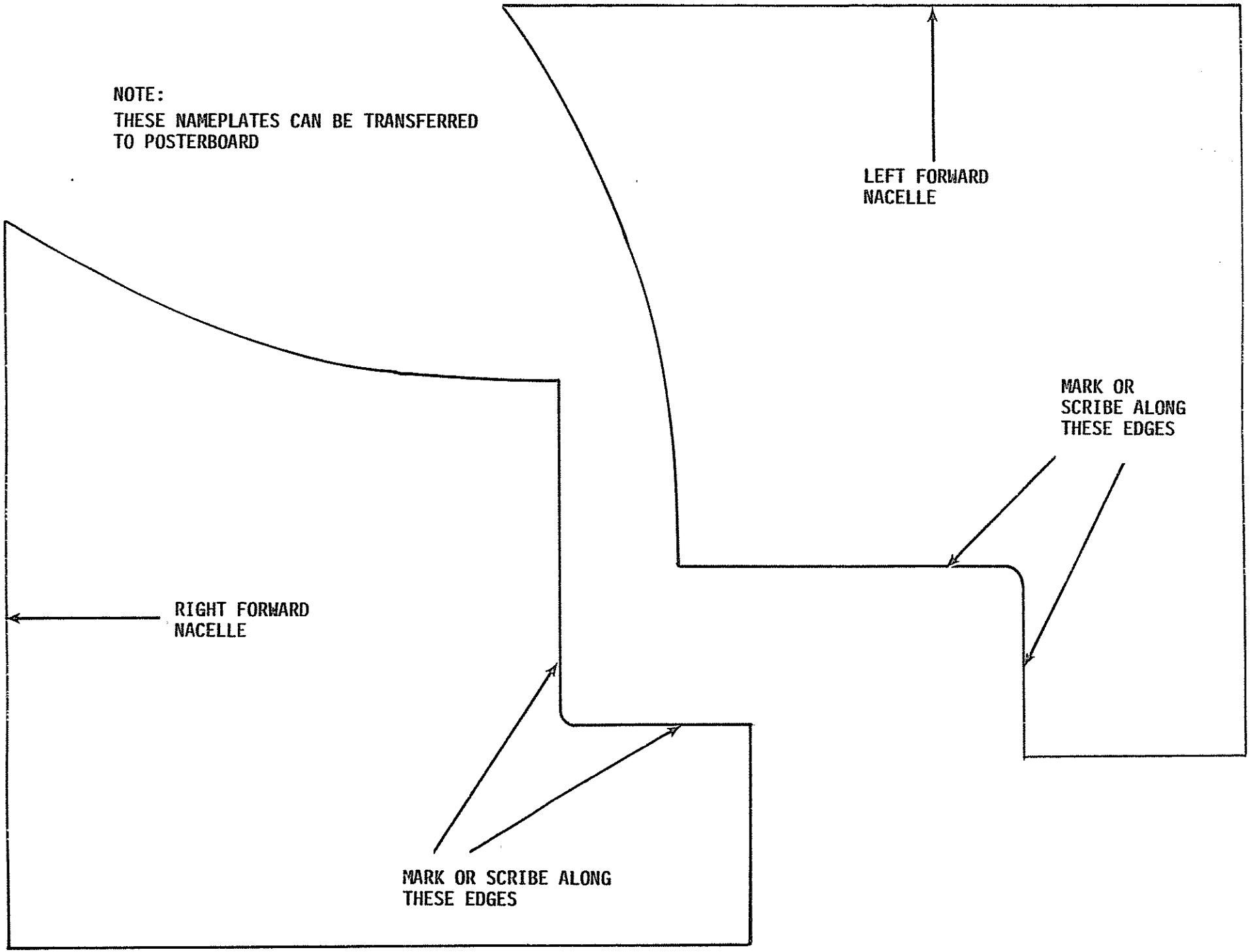
CHECKED BY
SCALE FULL

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

NAME CUTOUT & BRACKET LOCATION DRAWING
50-80 PG. 2 OF 2

050-08000

K&E CLEVELAND No. 10-9155


NOTE:
THESE NAMEPLATES CAN BE TRANSFERRED TO POSTERBOARD
LEFT FORWARD NACELLE
MARK OR SCRIBE ALONG THESE EDGES
RIGHT FORWARD NACELLE
MARK OR SCRIBE ALONG THESE EDGES
TEMPLATE A

Technical Publication

Conversion Kit Installation Manual With Illustrated Parts List

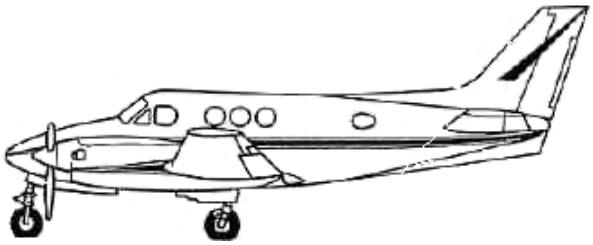
IM199-90

Wheel & Brake Assembly

Main Wheel Assembly
Part No. 40-170A
Main Brake Assembly
Part No. 30-144

Used On Beech Models:
65-A90, B90, C90, C90A, C90GT, C90GTi, E90, H90, 65-A90-1, 65-A90-4

Initial Issue June 30, 1982



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Cleveland Wheels & Brakes

Parker Hannifin Corporation
Aircraft Wheel & Brake Division
Avon, Ohio 44011 USA Cage Code 33269

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- IMPORTANT -

MODEL YEAR AND SERIAL NUMBER EFFECTIVITY OF AN AIRCRAFT CAN AFFECT CONVERSION KIT INSTALLATION. AIRFRAME MANUFACTURER UPGRADES, SERVICE BULLETINS AND SIMILAR DOCUMENTATION CAN ALSO AFFECT HOW A KIT IS EQUIPPED.

BECAUSE OF THE MANY POSSIBLE AIRCRAFT CONFIGURATIONS, SOME KITS WILL NOT INCLUDE THE HARDWARE NEEDED TO COMPLETE THE KIT INSTALLATION. THESE ITEMS MUST BE OBTAINED SEPARATELY. MODIFICATIONS TO THE AIRFRAME CAN ALSO BE REQUIRED.

SEE SECTION 4.1 FOR ADDITIONAL INFORMATION SPECIFIC TO CONVERSION KIT NO. 199-90.

For technical assistance, contact the

TECHNICAL SERVICES HOTLINE:

techhelp@parker.com

Fax: 440-937-5409

1-800-BRAKING (272-5464) Tel.: 440-937-1315

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LIST OF REVISIONS

Revision/Date	Section/Page No.	Description Of Change	Apvd
H 07-01-2005 (DCN 0364-50)	Maintenance, Overhaul, Parts List All sections/All pages	Removed pages. Information is found in maintenance manuals Revised to latest standard format	
J 01-07-2009 (DCN 0383-06)	Title Page, Pg T-1, Table 1 Kit Applicability, Pg 1 Section 6, Pg. 2 Section 9.2.3, Pg. 7	65-A90 was A90, Add models C90GT, C90GTi 65-A90 was A90 Add models C90GT, C90GTi Update contact information (NOW) MIL-T-5544 (WAS) MIL-T-55544	
K 04-01-2016 (ECO-0066231)	Title page Pg I 9.2.2.1/pg 5, step a. 13.0/pg 16	Data rights statement updated from pg I. (ADD) export statement (RE-LOCATE) data rights statement to title page. (NOW) 60 to 80 in-lb (6,8 to 9,0 N-m) (WAS) 75 to 100 in-lb (8,4 to 11,3 N-m) (DELETE) PRM78 from Kit Parts List	

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TABLE OF CONTENTS

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1.0 INTRODUCTION

The information herein addresses the installation of a Cleveland Conversion Kit. It is published for the guidance of qualified maintenance personnel responsible for the installation of a Cleveland Conversion Kit, manufactured by Parker Hannifin Corporation, Aircraft Wheel and Brake Division.

1.1 PURPOSE

This manual provides the necessary procedures to accomplish the installation of an STC'd Cleveland Conversion Kit. For information regarding service limits, maintenance and component overhaul, a copy of the Cleveland Wheels and Brakes Component Maintenance Manuals, CM30-144 and CM40-170A are included in this kit. The manuals should be passed on to the owner or retained by the maintenance facility for future reference.

2.0 TSO NOTICE

The wheels and brakes used in this STC'd 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.

Modifications or use of unapproved parts will void the TSO qualification and warranty for the wheel and brake assemblies.

3.0 PRODUCT REGISTRATION

The product registration card is located at the front of this manual. The card is our way of tracking the conversion kits and your guarantee of receiving any future airworthiness information applicable to Conversion Kit No. 199-90. Please fill out the registration card completely and return promptly. Postage is prepaid.

4.0 KIT APPLICABILITY

NOTE: Service bulletins, service letters and similar documentation issued by the airframe manufacturer or other STC installations can affect the installation of Conversion Kit No. 199-90. Contact the airframe manufacturer for documentation applicable to your model aircraft and review the maintenance log for any other STC's installed for compatibility before installing Conversion Kit No. 199-90.

Table 1 Kit Applicability

MAKE	STC	MODELS (SERIAL NUMBERS)
Beech Aircraft	SA619GL	65-A90 (LJ-114 through LJ-317) B90 (LJ-318 through LJ-501) C90 (LJ-502 through LJ-1062) C90A (LJ-1063 and up) C90GT (All) C90GTi (LJ1847, LJ1853 and up) E90 (LW-1 and up) H90 (All) 65-A90-1 and 65-A90-4 (All)

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4.1 KIT EQUIPMENT

Refer to paragraph 13.0 for the kit parts list.

NOTE: Review this installation manual and the installation drawing, number 50-80, completely before removal of existing original equipment and installation of 199-90 kit equipment.

a. The wheel well skin requires modification. Refer to section 10.0.

b. The following hardware is not included in the 199-90 Conversion Kit:
   - Hydraulic system connection hose.
   - Axle nut and cotter pin.
   - Fuel line repositioning hardware.

5.0 SAFETY

Follow proper safety precautions when servicing aircraft braking systems.

- A **"SAFETY WARNING"** flagged by this symbol  , calls attention to possible serious or life threatening situations if procedures are not followed.
- A **"WARNING"** calls attention to use of materials, processes, methods, procedures, or limits which must be followed precisely to avoid injury to persons.
- A **"CAUTION"** calls attention to methods and procedures that must be followed to avoid damage to equipment.
- A **"NOTE"** calls attention to an essential operating or maintenance procedure, condition, or statement, which must be highlighted.

6.0 ORDER INFORMATION

To order spare parts, contact the nearest Parker Hannifin, Aircraft Wheel and Brake distributor in your area, or contact Aircraft Wheel and Brake Division at the following address or numbers:

Parker Hannifin Corporation
Aircraft Wheel & Brake Division
1160 Center Road
Avon, Ohio 44011 U.S.A.
Attn: Technical Services/Hotline

Websites: www.parker.com
E-mail: clevelandwbhelp@parker.com
Fax: (440) 937-5409
Tel: 1-800-BRAKING (1-800-272-5464)
(440) 937-1315

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7.0 EQUIPMENT DESCRIPTION

7.1 BRAKE ASSEMBLY

For a complete parts breakdown and fastener torque values of the brake assembly, refer to CM30-144 Component Maintenance Manual.

The brake is a cast aluminum dual caliper, four piston external disc design, with sintered metallic lining. It is suitable for use with brake fluid conforming to MIL-H-5606.

7.2 WHEEL ASSEMBLY

For a complete parts breakdown and fastener torque values of the wheel assembly, refer to CM40-170A Component Maintenance Manual.

The wheel is cast aluminum 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, 8 or 10 ply tubeless or tube type tires. The wheel assembly is configured with an air valve assembly for use with a tubeless tire.

NOTE: Refer to the installation drawing, 50-80, for aircraft model and tire ply rating applicability.

8.0 GENERAL INFORMATION

8.1 BRAKE ASSEMBLY

The brakes are shipped from the factory as a complete assembly. Relocate the bleeder components and the inlet fitting to the necessary ports for left hand or right hand installation. The brakes are equipped with 7/16-20 UNF–3B ports.

8.2 WHEEL ASSEMBLY

The wheels are shipped from the factory as a complete assembly. The bearing cones are packed with grease and installed in the wheel halves.

9.0 KIT INSTALLATION

Review this installation manual, IM199-90 and the installation drawing, 50-80, completely before removal of existing equipment and installation of 199-90 kit equipment.

SAFETY WARNING: INSURE AIRCRAFT IS SECURE AND STABLE BEFORE BEGINNING ANY WORK. WORKING UNDER AN IMPROPERLY STABILIZED AIRCRAFT CAN CAUSE INJURY OR DEATH.

SAFETY WARNING: COMPLETELY DEFLATE THE TIRE BEFORE REMOVING THE VALVE CORE. VALVE CORES UNDER PRESSURE CAN BE EJECTED LIKE A BULLET AND CAUSE INJURY OR DEATH.

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9.1 REMOVE ORIGINAL EQUIPMENT

CAUTION: ALWAYS CHECK THE CONDITION OF ORIGINAL EQUIPMENT HARDWARE THAT WILL BE RETAINED SUCH AS FITTINGS, HOSES, AXLE NUTS, ETC. REPLACE THESE ITEMS AS NEEDED.

a. Properly raise and support the aircraft by following the airframe manufacturer's instructions.

b. Remove the cap from the tire inflation valve and slowly deflate the tire.

c. Confirm that the tire is completely deflated.

d. When all the tire pressure has been released, remove the valve core from the inside of the valve stem.

NOTE: The cotter pin is not supplied as part of the 199-90 kit and must be obtained separately. Refer to the airframe parts catalog for the part number and the quantity.

e. Remove and retain the axle nut. Discard the cotter pin.

f. Remove the original equipment main landing gear wheels from the axle.

g. Disconnect the lower hydraulic line from the existing brake housing fitting and cap tightly.

h. Remove the original equipment brake assemblies from the axle.

i. Discard all the original brake assembly mounting hardware

NOTE: New mounting hardware is including in the 199-90 kit.

9.2 INSTALL CLEVELAND EQUIPMENT

Refer to installation drawing, 50-80 and Section 13.0 Kit Parts List, for item number identification. Item numbers are in parenthesis.

9.2.1 Install the Torque Plate Assembly

The axle flange attachment hardware is included in the 199-90 Conversion Kit. Refer to the installation drawing, number 50-80 for details on axle attachment hardware.

a. Refer to the 50-80 installation drawing for torque plate mounting orientation and alignment.

NOTE: Install the bolt with the bolt head on the inboard side of the torque plate assembly.

(1) The torque plate assembly (13) attaches to the axle flange using the mounting hardware: bolts (6), washers (5) and nuts (4). Torque the nuts in a criss-cross pattern to the value specified on the 50-80 installation drawing. After all the nuts have been torqued, check the torque a second time to ensure that the proper torque value is obtained.

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9.2.2 Mount the Tire

a. To facilitate the installation of the wheel assembly onto the axle later, remove the snap ring (33), hubcap (12A), and bearing cone (32) from the outboard wheel half. Place the removed items on a clean surface to avoid contamination.

NOTE: You do not need to remove the inner wheel half snap ring (28) and grease seal (27).

b. Remove all eight nuts (36), sixteen washers (35), and eight bolts, (36), then separate the wheel halves.

c. Examine the bead seat area of the wheel halves. If necessary, remove all lubricant, grease or foreign material with a mild soap and water solution or with denatured alcohol.

d. The mating surfaces of the wheel halves should not have nicks, burrs, small dents, or other damage. Damaged mating surfaces can prevent the wheel halves from mating or sealing.

e. The preformed packing (31) groove in each wheel half should be examined for damage or other debris that would prevent the packing from properly seating. Remove any lubricant, grease or foreign material with a clean cloth moistened with a mild soap and water solution or with denatured alcohol.

9.2.2.1 Tubeless Tire

a. Examine the air valve grommet for damage such as cuts, tears, cracking. Replace if necessary. Install the grommet dry. Re-install the air valve assembly in the outboard wheel half and dry torque the valve nut to 60 to 80 in-lb (6,8 to 9,0 N-m).

b. Place the brake disc into position in the inner wheel half. Then while holding the brake disc and inner wheel half together, place the components on a clean work surface with the register side of the inner wheel half facing up.

NOTE: The register is the area where the wheel halves contact each other.

c. Remove and examine the preformed packing (31) for damage. Replace if necessary.

(1) Apply a light coat of Dow Corning 55 O-ring lube or a lube per MIL-G-4343 or an equivalent to the preformed packing before installation.

NOTE: A light coat of the wheel bearing grease can be used as an alternate.

CAUTION: THE PREFORMED PACKING (31) MUST BE INSTALLED UNIFORMLY. IT SHOULD BE FREE OF KINKS AND TWISTS.

(2) Re-install the preformed packing in the wheel register groove of the inboard wheel half.

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CAUTION: COMPOUNDS SUCH AS TALC INCREASE TIRE SLIPPAGE. REMOVING TALC WILL MINIMIZE TIRE SLIPPAGE ON THE WHEEL.

d. Make sure that the tire is clean inside. If it is not clean then wipe the bead seat base with a mild soap and water solution or with a suitable rubber cleaner.

CAUTION: WHEN YOU INSTALL A TIRE, DO NOT APPLY A LUBRICANT TO THE TIRE OR THE WHEEL BEAD SEAT. A LUBRICANT CAN CAUSE THE TIRE TO SLIP IN SERVICE AND DAMAGE THE WHEEL BEAD SURFACE.

e. Position the tire on the inner wheel / disc being careful not to disturb the preformed packing (31).

f. Place the outer wheel half inside the tire and align the bolt holes of both wheel halves.

g. Align the red balance dot on the tire with the air valve assembly.

(1) If there is no balance dot on the tire.

(a) Align the tire serial number with the air valve assembly.

9.2.2.2 Tube Type Tire

NOTE: The preformed packing (31) does not need to be installed when using a tube type tire.

CAUTION: COMPOUNDS SUCH AS TALC INCREASE TIRE SLIPPAGE. REMOVING TALC FROM THE TIRE BEADS WILL MINIMIZE TIRE SLIPPAGE ON THE WHEEL.

a. Make sure that the tire is clean inside. If it is not clean then wipe the bead seat base with a mild soap and water solution or with a suitable rubber cleaner.

CAUTION: WHEN YOU INSTALL A TIRE, DO NOT APPLY A LUBRICANT TO THE TIRE OR THE WHEEL BEAD SEAT. A LUBRICANT CAN CAUSE THE TIRE TO SLIP IN SERVICE AND DAMAGE THE WHEEL BEAD SURFACE.

CAUTION: APPLY TIRE TALC TO THE TIRE TUBE ONLY. TIRE TALC ON THE TIRE BEADS CAN CAUSE THE TIRE TO SLIP IN SERVICE AND DAMAGE THE WHEEL BEAD SURFACE OR TUBE VALVE STEM.

b. Lubricate or dust the tire tube lightly with tire talc. This will prevent the tube from sticking to the inside of the tire or to the tire beads. It also helps the tube assume its normal shape inside the tire during inflation and lessens the chances of wrinkling or thinning from irregular stretching.

c. Inflate the tube with dry nitrogen to slightly round, and insert the tube in the tire.

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NOTE: The tube heavy spot is indicated by a painted yellow stripe about ½ inch wide by 2 inches long.

d. Align the stripe on the tube with the tire red balance dot.

(1) If the tube has no balance mark.

(a) Align the tube valve with the tire red balance dot.

e. Position the tire and tube on the outboard wheel half inserting the valve stem through the valve hole in the wheel half tube well.

f. Place the inboard wheel half/disc inside the tire and tube, so that the bolt holes in both wheel halves and brake disc are aligned.

9.2.3 Attach the Wheel Half Sub-Assemblies

CAUTION: THE COUNTERSUNK SIDE OF THE WASHER (35) IS TO BE INSTALLED TOWARD THE BOLT HEAD OR NUT (AS APPLICABLE).

NOTE: The nuts (36) are to be located on the outboard wheel half side of the wheel assembly opposite the brake disc.

a. Prior to installed the fasteners, ensure that all bearing surfaces of the bolts (34), washers (35) and nuts (36) as well as the threads are coated with a uniform amount of SAE AMS2518 (MIL-T-5544) anti-seize compound.

b. Install a minimum of three washers and bolts, (35 and 34) in the inboard wheel half equally spaced, then:

(1) Compress the wheel halves and install a washer (35) onto the threaded end of each bolt.

(2) Then, install a nut (34) and tighten the nuts by hand.

c. Install the remaining bolts, washers, and nuts the same way.

CAUTION: DO NOT USE IMPACT OR POWER WRENCHES TO TORQUE THE WHEEL NUTS AND BOLTS. THE USE OF IMPACT OR POWER WRENCHES CAN CAUSE OVER TIGHTENING.

NOTE: The fasteners must be tightened by applying the torque to the nut while holding the bolt head.

c. Use the following steps and torque all of the nuts (36).

(1) Step one: (1/3 final torque): Lubtork to 100 in-lb (11,3 N-m) in a criss-cross pattern.

(2) Step two: (2/3 final torque): Lubtork to 200 in-lb (22,6 N-m) in a criss-cross pattern.

(3) Step three: (Final torque): Lubtork to 300 in-lb (33,9 N-m) in a criss-cross pattern.

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9.2.4 Inflate the Tire

SAFETY WARNING: ALWAYS PLACE THE TIRE IN AN INFLATION CAGE BEFORE INFLATING. INFLATING THE TIRE CAN BE VERY DANGEROUS. THE TIRE CAN EXPLODE. FAILURE TO USE AN INFLATION CAGE CAN CAUSE SERIOUS INJURY OR DEATH. SERVICE THE TIRE WITH INFLATION EQUIPMENT DESIGNED FOR THIS OPERATION.

DO NOT INFLATE THE TIRE TO THE OPERATING PRESSURE UNTIL THE WHEEL/TIRE ASSEMBLY HAS BEEN MOUNTED ON THE AIRCRAFT.

a. Inflate the tire just enough to seat the beads on the wheel. Then reduce the tire pressure to the tire manufacturer's recommended storage pressure and remove the wheel/tire assembly from the inflation cage.

9.2.5 Install the Wheel/Tire Assembly On the Aircraft

a. Examine the axle and nut for burrs or rough threads. The axle nut should rotate freely on the axle and not exhibit any drag or resistance. Apply a thin coat of the wheel bearing grease to the axle threads and all of the bearing surfaces of the washer (3) and axle nut.

NOTE: Use the same grease that was used to pack the bearing cones.

b. Mount the wheel/tire assembly on the axle.

c. Install the outboard bearing cone (32) that was removed earlier (reference 9.2.2).

d. Install the washer (3) that is included in the 199-90 kit and then install the existing axle nut.

9.2.6 Tighten the Axle Nut

a. Tighten the axle nut to 300 in-lb (33,9 N-m) while rotating the wheel to make certain that the bearing cones are seated. Then back the torque off to zero (0 in-lb).

CAUTION: DO NOT EXCEED 120 IN-LB (13,5 N-M) ON FINAL TORQUE WHEN ADVANCING THE AXLE NUT TO ALIGN THE COTTER PIN HOLE ON THE AXLE WITH ONE OF THE AXLE NUT SLOTS.

b. While rotating the wheel, re-torque the axle nut to 60 to 120 in-lb (6,8 to 11,3 N-m) at the alignment position of the cotter pin hole on the axle and the axle nut castellation. If one of the slots in the axle nut do not line up with the cotter pin hole in the axle, continue to tighten the axle nut until the first available alignment is reached, but do not advance the axle nut using torque in excess of 120 in-lb (13,5 N-m).

c. Install the cotter pin.

d. Install the hubcap (12A) and secure with the snap ring (33).

NOTE: Aircraft equipped with the extended axles are to use the hubcap (12B) that is included in the 199-90 kit.

e. Service the tires to inflation pressure as specified on drawing no. 50-80.

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9.2.7 Install the Brake Assembly On the Aircraft

a. Remove the twelve brake tie bolts (15) and washers (14), and both insulator shims (25) from the brake assembly (2). Then remove all four of the back plate assemblies (26).

NOTE: Leave the pressure plate assemblies (23) on the anchor bolts (20).

b. Apply a dry graphite or silicone lubricant to the anchor bolts (20).

c. Slide the brake assembly onto the torque plate assembly (13) that was installed earlier (reference 9.2.1).

d. Re-install the twelve brake tie bolts (15 or 15A) and washers (14) into the two brake cylinders.

NOTE: The supplied bolts (15) have a patch lock added (nylon material embedded in the threaded end) which serves as a self-locking element.

NOTE: The optional field alternate bolts (15A) have drilled heads for safety wire retention.

e. Re-install the two insulator shims (25) on the tie bolts.

f. Position and align the back plate assemblies (26) between the brake disc (29) and the inboard wheel flange. Next, thread the brake tie bolts (15 or 15A) into the back plate assemblies. Torque to between 85 to 90 in-lb (9,6 to 10,2 N-m).

NOTE: The optional field alternate bolts (15A) will require safety wire. Safety wire the bolts per NASM33540 after pressure testing the brake assembly. See step 9.2.8 f.

9.2.8 Connect the Brake Assembly

CAUTION: DO NOT EXCEED 1,35 N-M (12 IN-LB) WHEN TIGHTENING THE BLEEDER SCREW. TORQUE IN EXCESS OF 1,35 N-M (12 IN-LB) WILL DAMAGE THE BLEEDER SEAT

a. Re-connect the existing lower hydraulic line to the brake inlet fitting (item 17).

NOTE: Pressure bleeding from the brake to the reservoir is recommended for best results. Repeat if necessary to ensure that any entrapped air is removed from the system.

b. Check the brake reservoir for adequate fluid level and bleed the brake system.

(1) No fluid flow from the bleeder screw is cause for examination. Refer to CM30-144 Component Maintenance Manual for troubleshooting.

c. Tighten the bleeder screw snug to prevent leakage.

d. Apply 600 psi to the brake and check for leakage.

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e. Depress and release the toe pedal several times.

(1) Check for brake drag by rotating the wheel by hand. Check for excessive play. A slight amount of drag is acceptable; however, a tightly bound wheel should be investigated and corrected before releasing the aircraft to service.

NOTE: An improperly seated lining or air in the hydraulic system can cause excessive drag.

f. Safety wire the optional field alternate bolts (15A) in accordance with NASM33540.

9.3 BRAKE LINING CONDITIONING

It is important to condition new linings properly to obtain the service life designed into them. Condition the linings per the attached product reference memo PRM14A.

10.0 MODIFICATIONS

10.1. Wheel Well Modification

NOTE: Modification Template 'A' is included in the 199-90 kit.

Due to the location of the leading brake cylinder, the forward outboard lower wheel well skin will need to be trimmed to provide the proper clearance for the brake cylinder during wheel retraction into the wheel well. The modification to the lower skin is outlined as follows for both the left and the right wheel wells.

a. Use Template 'A' to locate and mark the skin as shown on the installation drawing 50-80, sheet 2. Also refer to Figure 1.

b. Cut and remove the brackets, Beech Part No. 50-980029-2 left, 50-980029-3 right section and lower skin. See Figure 2 for Beech bracket identification.

c. Remove all sharp edges and burrs.

d. Place the brackets (8 - left side) and (9 - right side) along the cutout.

e. Locate by drilling from the top down.

f. Place the filler (11) along the cutout area and drill to match the location of the brackets (8 and 9).

g. Fasten the brackets (8 and 9) and the filler (item 11) into place with Cleco or an equivalent fastener system.

h. Secure the brackets (items 8 and 9) and the filler (item 11) with sixteen rivets (item 7) as shown in the installation drawing 50-80.

i. Secure the following with rivets (7). See Figure 2 and installation drawing 50-80:

- Two end tabs (10) to the left side brackets (8) and Beech P/N 50-980029-2
- Two end tabs (10) to the right side brackets (9) and Beech P/N 50-980029-3

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CAUTION: MAINTAIN ADEQUATE CLEARANCE BETWEEN THE LEADING BRAKE CALIPER (LOWER EDGE) AND THE FUEL LINE IN THE NACELLE DURING THE RETRACTION TEST. SEE SECTION 10.2.

NOTE: If the aircraft is equipped with a mechanical retraction system, the circuit breaker for gear retraction can be tripped then slowly jogged to slowly raise gear and inspect for clearance. Re-set the breaker after completing the retraction test.

NOTE: If the aircraft is equipped with a hydraulic gear retraction system, the dragline can be disconnected and the gear can be manually raised to check for clearance. Re-connect the dragline after completing the retraction test.

j. After the skin has been cut out and the support brackets (8 and 9) have been installed, perform a gear retraction test prior to releasing the aircraft back into service.

k. Remove the aircraft from the jacks.

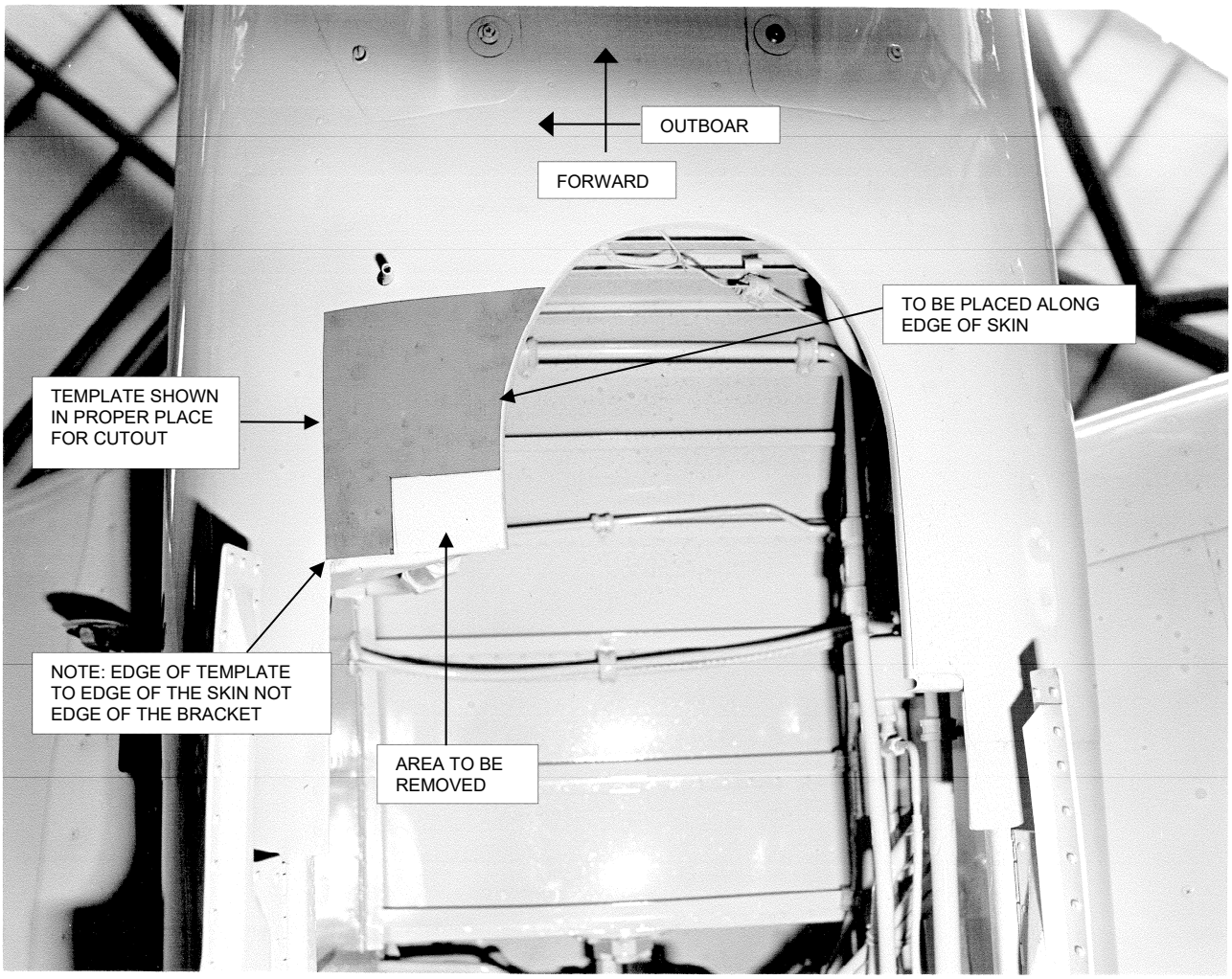

Figure 1 Mark the Skin

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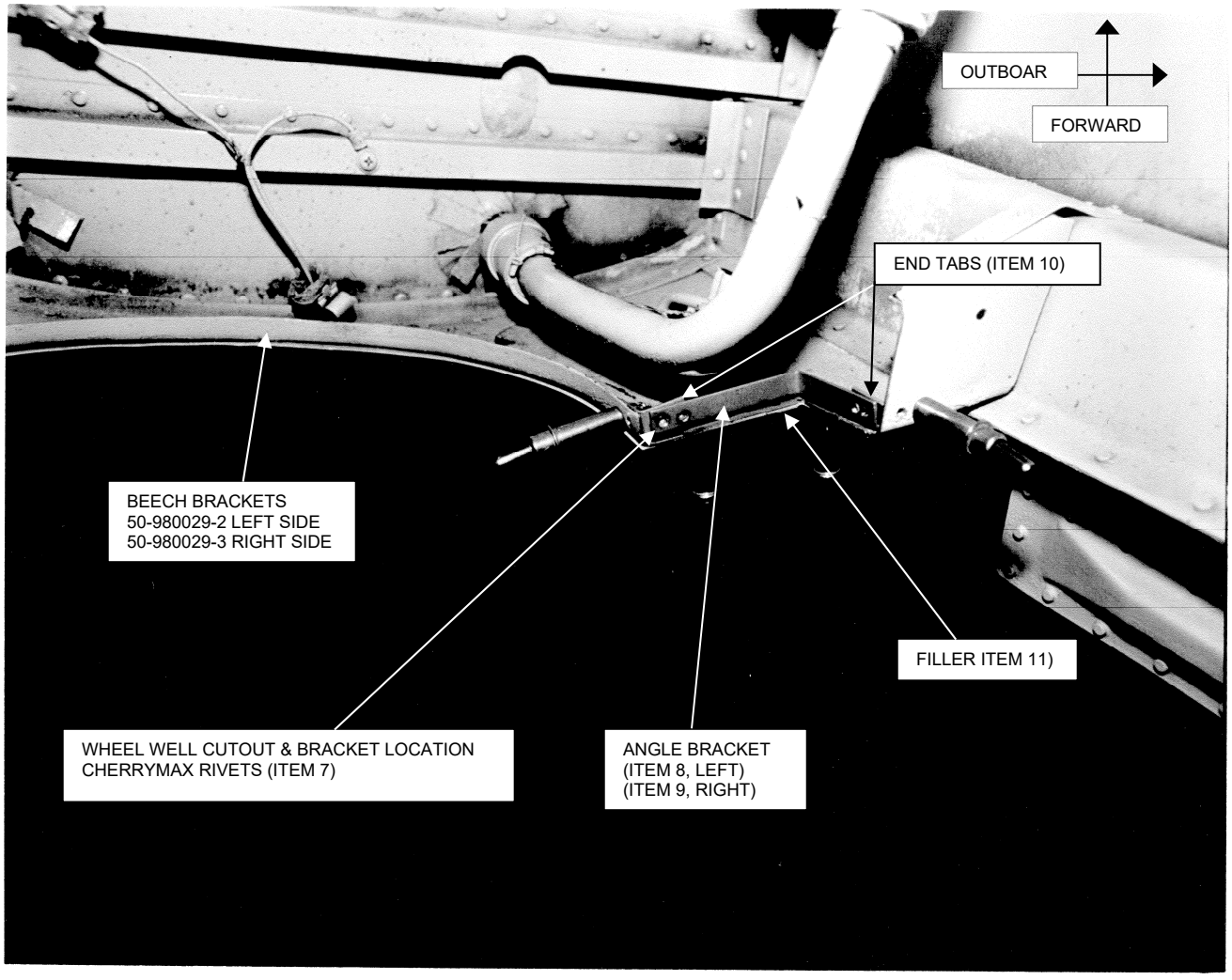

Figure 2 Beech Brackets

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10.2. Repositioning the Fuel Line (Refer to Figure 3)

After completing the gear retraction test to check for adequate clearance between the brake cylinder and the fuel line, it may be necessary to reposition the fuel line and restrain it to ensure positive clearance at all times. Complete the following procedure if needed:

CAUTION: LOOSENING OF THE B-NUTS WILL CAUSE FUEL SEEPAGE TO OCCUR. AT THE DISCRETION OF THE INSTALLER, WORK QUICKLY TO MINIMIZE FUEL SEEPAGE OR DEFUEL THE AIRCRAFT IN ACCORDANCE WITH THE AIRCRAFT SERVICE MANUAL.

a. Loosen the B-Nuts on the T-Fitting then move the fuel line toward Bracket “B” (away from the skin cutout) to the desired clearance.

b. Tighten the B-Nuts in accordance with the aircraft service manual requirements.

c. Secure the fuel line to Bracket “A” using the following components not supplied in this kit:

- Clamp, P/N MS21919WDG13, quantity: one
- Bushing, Beech P/N 50-810145-3 or equivalent, quantity: as required
- Bolt, P/N AN3- (length as required), quantity: one
- Washer, P/N AN960-10, quantity: as required
- Nut, Beech P/N 130909N29 or equivalent, quantity: one

d. Repeat the procedure for the fuel line in the opposite nacelle.

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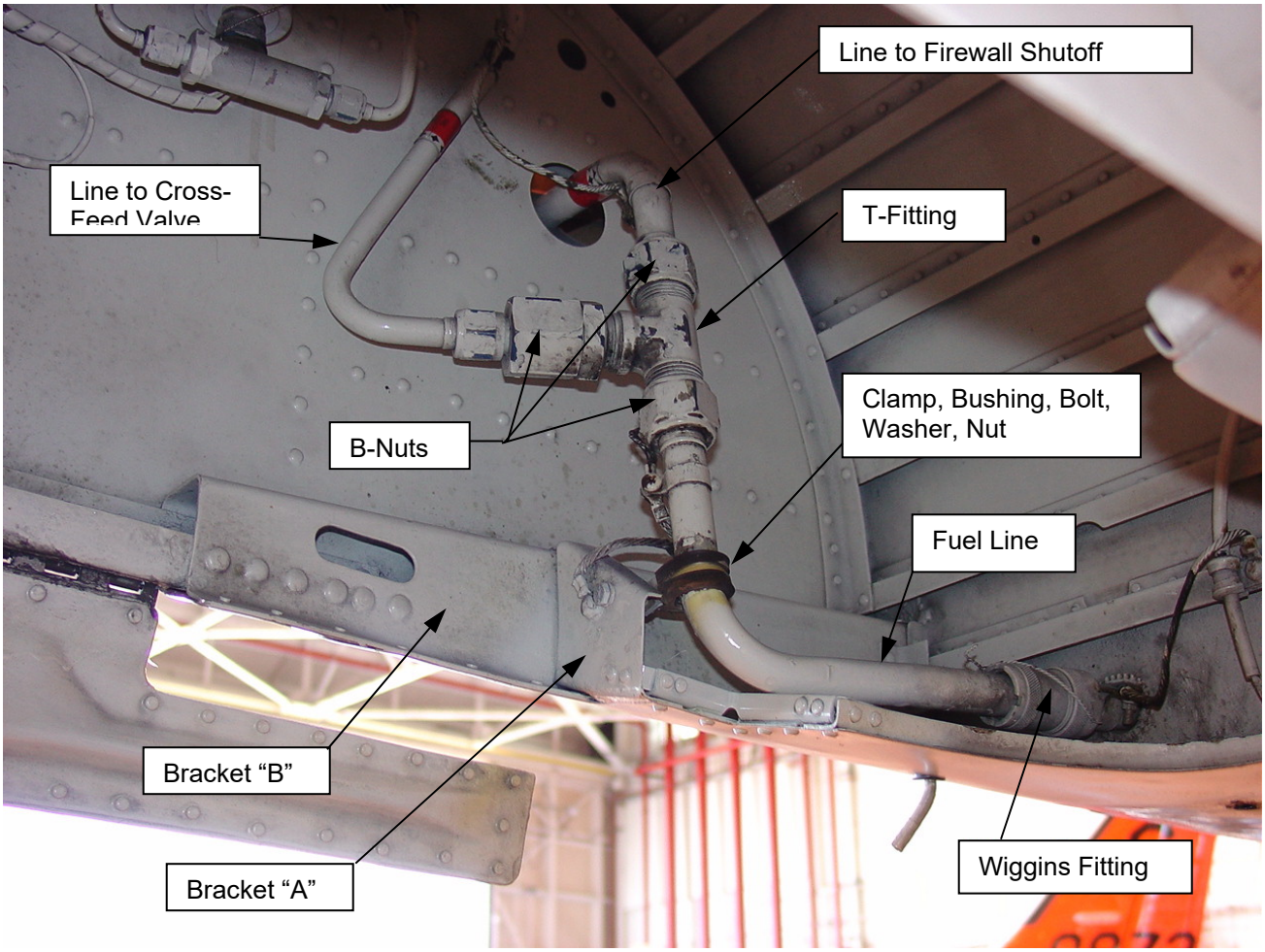

Figure 3 Securing the Fuel Line

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11.0 WEIGHT AND BALANCE COMPUTATIONS

Weigh the original equipment wheels and brakes. Subtract from the new weights to derive weight increase created by the kit installation. Multiply the weight increase by the applicable aircraft moment and revise the weight and balance information in the log book.

11.1 WEIGHT AND BALANCE DATA

Weights do not include the tire or tube.

New installed (per gear leg)

Brake assembly .....…14.30 lbs.
Wheel assembly .....…29.00 lbs.
Total .....……....43.30 lbs.

Complete form 337 and make appropriate log book entries.

12.0 FLIGHT MANUAL INSERTS

Inserts are located in front with conversion kit documentation.

Attach the “Item Installed Labels” (referenced below) into (or copy into) the flight manual as close as possible to the original section titled Main Wheel and Brake Assembly. Enter the correct arm and moment in the blocks provided. Zero the items out for the original main wheel and brake assemblies that have been removed.

X	Two dual piston, single disc Brake Assemblies, Cleveland P/N 30-144	14.30 ea.
X	Two 24 x 7.7 Type VII Wheel Assemblies, Cleveland P/N 40-170A	29.00 ea.

Attach the “Description Label” (referenced below) into (or copy into) the Pilots Operating Manual as close as possible to the section titled Brake System.

Cleveland Brake Assembly P/N 30-144 is a dual caliper, single fixed disc design, using two pistons per caliper (total of four pistons per brake) which respond to fluid pressure from the master cylinders for brake application.

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13.0 KIT PARTS LIST

199-90 KIT

(1) ITEM NUMBER	PART NUMBER	DESCRIPTION	QUANTITY
(2) 1	40-170A	Wheel Assembly	2
(3) 2	30-144	Brake Assembly	2
3	095-02900	Washer (Wheel Bearing Retaining)	2
4	094-10400	Nut (MS21044-N5)	24
5	095-10500	Washer (AN960-516)	48
6	103-22100	Bolt (AN5-10A)	24
7	105-00800	Rivet (CherryMax P/N CR3243-4-2)	32
8	110-05400	Bracket (Left Side)	1
9	110-05500	Bracket (Right Side)	1
10	110-05600	End Tab	4
11	110-05700	Filler	2
12B	158-01400	Hubcap (To be used on early model 90's with extended axle)	2
	IM199-90	Installation Manual for Conversion Kit 199-90	1
	50-80	Installation Drawing (sheets 1 & 2)	1
	CM40-170A	Component Maintenance Manual for 40-170A Wheel Assembly	1
	CM30-144	Component Maintenance Manual for 30-144 Brake Assembly	1
	SA619GL	Supplemental Type Certificate	1
	PRM14A	Conditioning Procedure for Metallic Brake Lining	1
	PRM78	(Deleted)	
	Template A	Wheel Well Modification Template	1
	-------	Pilot Operating Manual Inserts	1
	-------	Product Registration Card	1

(1) Refer to 50-80 Installation Drawing.
(2) For a complete parts breakdown, refer to Maintenance Manual CM40-170A.
(3) For a complete parts breakdown, refer to Maintenance Manual CM30-144.

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Technical Publication

Component Maintenance Manual With Illustrated Parts List

CM30-144
Main Brake Assembly

Parker Hannifin
Part No. 30-144

Initial Issue
July 01, 2005

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Cleveland Wheels & Brakes

Parker Hannifin Corporation
Aircraft Wheel & Brake Division
Avon, Ohio 44011 Cage Code 33269

TO: HOLDERS OF CM30-144 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-144.

Attached to this transmittal letter is Revision NC of CM30-144 (dated July 01, 2005)

Revision NC, Dated July 01, 2005

REVISION NC CONTAINS ALL PAGES OF THE MANUAL. Pages that have been added or revised are outlined below together with the highlights of the revision.

Please retain all **REVISION HIGHLIGHTS** pages, inserting them into the manual for future reference.

REVISION HIGHLIGHTS

Section/Page No.	Description Of Change
All Sections/All Pages	Initial Release (DCN 0364-50)

TO: HOLDERS OF CM30-144 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-144.

Attached to this transmittal letter is Revision A of CM30-144 (dated October 15, 2011)

Revision A, Dated October 15, 2011

REVISION A CONTAINS ALL PAGES OF THE MANUAL. Pages that have been added or revised are outlined below together with the highlights of the revision.

Please retain all **REVISION HIGHLIGHTS** pages, inserting them into the manual for future reference.

REVISION HIGHLIGHTS

Section/Page No.	Description Of Change
As follows	DCN 0394-55
Title Page/T-1	(ADD) proprietary and export statements
Record of Revisions/ RR-1	(UPDATE) to reflect latest revision
List of Effective Pages/ LEP-1	(UPDATE) applicable pages to reflect latest revision
Introduction/Intro-1	(UPDATE) proprietary statement (ADD) export statement
Illustrated Parts List/ 10006	(ADD) 101-39800 (M83461/2-904) P/N for items 165 and 175

RECORD OF REVISIONS

Retain this record in front of manual. On receipt of revision, insert revised pages in the manual, and enter revision letter, date inserted and initial.

REV.	DATE ISSUED	DATE INSERTED	BY	REV.	DATE ISSUED	DATE INSERTED	BY
NC	07-01-2005	07-01-2005	PHC				
A	10-15-2011	10-15-2011	PH				

SERVICE BULLETIN LIST

Parker Hannifin Service Bulletins are issued in order to provide general information on product line concerns. The bulletin listings contained herein identify subject matter directly related to the support and function of the assembly and components.

SERVICE BULLETIN NUMBER	SUBJECT	REV.	DATE INCORPORATED

LIST OF EFFECTIVE PAGES

SUBJECT	PAGE	DATE
Title Page	T-1	Oct 15, 2011
Record of Revisions	RR-1	Oct 15, 2011
Service Bulletin List	SB-1	July 01, 2005
List of Effective Pages	LEP-1	Oct 15, 2011
Table of Contents	T/C-1	July 01, 2005
Introduction	INTRO-1	Oct 15, 2011
	2	July 01, 2005
Description and Operation	1	July 01, 2005
	2	July 01, 2005
Testing	1001	July 01, 2005
	1002	July 01, 2005
	1003	July 01, 2005
	1004	July 01, 2005
Disassembly	3001	July 01, 2005
	3002	July 01, 2005
	3003	July 01, 2005
	3004	Blank
Cleaning	4001	July 01, 2005
	4002	July 01, 2005
	4003	July 01, 2005
	4004	Blank
Checks	5001	July 01, 2005
	5002	July 01, 2005
	5003	July 01, 2005
	5004	July 01, 2005
	5005	July 01, 2005
	5006	July 01, 2005
	5007	July 01, 2005
	5008	Blank
Repair	6001	July 01, 2005
	6002	July 01, 2005
	6003	July 01, 2005
	6004	July 01, 2005
	6005	July 01, 2005
	6006	July 01, 2005
	6007	July 01, 2005
	6008	Blank
Assembly	7001	July 01, 2005
	7002	July 01, 2005
	7003	July 01, 2005
	7004	Blank
Fits And Clearances	8001	July 01, 2005
	8002	Blank
Special Equipment And Consumables	9001	July 01, 2005
	9002	Blank
Illustrated Parts List	10001	July 01, 2005
	10002	July 01, 2005
	10003	July 01, 2005
	10004	July 01, 2005
	10005	July 01, 2005
	10006	Oct 15, 2011
Storage	15001	July 01, 2005
	15002	Blank

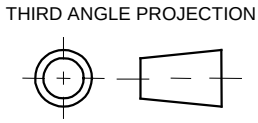
TABLE OF CONTENTS

INTRODUCTION

1. General

SAFETY WARNING: ALL TORQUE AND SPECIFIC LIMITS OR VALUES CONTAINED HEREIN MUST BE STRICTLY OBSERVED. IGNORING OF TORQUE LIMITS AND OTHER SPECIFIC VALUES GIVEN BY THIS MANUAL, CAN CAUSE PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH.

This manual is published for the guidance of personnel responsible for the overhaul and/or maintenance of the Parker Hannifin Assembly covered in this publication.



Third angle projection is used in this manual. All weights and measurements are in U.S. English units with metric units in parentheses. English units are shown with a period for the decimal point. Millimeters are shown with a comma for the decimal point. Numbers that contain five or more digits to the left of the decimal point have a space between the “thousands” and “hundreds” digits to prevent confusion with the metric decimal point.

The manual for the aircraft shall take precedence for the component’s interface connections with the functional features as used in the aircraft. This manual may also describe functional features that may or may not be used when installed as a component of a system in the aircraft.

The manufacturer recommends that you ask for the latest revision of the manual before continuing with overhaul or maintenance operations. Ask the Technical Services Department of the Aircraft Wheel & Brake Division for the latest revision.

Parker Hannifin Corporation
Aircraft Wheel & Brake Division
1160 Center Road
Avon, Ohio 44011 U.S.A.
Attn: Technical Services/Hotline

Websites: www.parker.com/ag/wbd
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E-mail: techhelp@parker.com
Fax: (440) 937-5409
Tel: 1-800-BRAKING (1-800-272-5464)
(440) 937-1315

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INTRODUCTION

3. TSO Notice

This assembly is certified for FAR Part 23 usage. It is identified with a "TSO-C26c" marking. This assembly has been tested and qualified to FAA (Federal Aviation Administration) requirements and specifications.

4. Manual Use

This manual is divided into various section blocks such as Testing and Fault Isolation, Disassembly, Inspection / Check, Repair, etc. Each section has its own range of page numbers. Refer to the Table of Contents for the location of the applicable section.

A. Warnings and Cautions and Notes

These adjuncts to the text shall be used to highlight or emphasize important points when necessary. Refer to the descriptions of these statements that follow:

- A **"SAFETY WARNING"** flagged by this symbol  , calls attention to possible serious or life threatening situations if procedures are not followed.
- A **"WARNING"** calls attention to use of materials, processes, methods, procedures, or limits which must be followed precisely to avoid injury to persons.
- A **"CAUTION"** calls attention to methods and procedures, which must be followed to avoid damage to equipment.
- A **"NOTE"** calls attention to an essential operating or maintenance procedure, condition, or statement, which must be highlighted.

5. Replacement Parts

SAFETY WARNING:  PARKER HANNIFIN WHEEL & BRAKE DOES NOT WARRANT OR ASSUME THE RISK OF THE USE OF REPLACEMENT PARTS NOT AUTHORIZED FOR USE BY PARKER HANNIFIN WHEEL & BRAKE. OPERATORS WHO USE REPLACEMENT PARTS NOT AUTHORIZED BY PARKER HANNIFIN WHEEL & BRAKE DO SO AT THEIR OWN RISK AND TAKE FULL RESPONSIBILITY FOR ALL PROPERTY DAMAGE, PERSONAL INJURY OR DEATH CAUSED BY SUCH REPLACEMENTS.

Use only the approved parts that are listed in the illustrated parts list of this manual.

DESCRIPTION AND OPERATION

1. Description

Refer to IPL Figure 1 to identify the brake assembly components.

The brake assembly is a piston actuated, dual cylinder, external disc design. It uses metallic linings. The brake is compatible with MIL-H-5606 and MIL-PRF-5606 hydraulic fluid.

The cylinder is an aluminum alloy casting which is anodized and painted for corrosion protection.

The brake assembly has two pressure plate assemblies (70), four piston assemblies (30), four back plate assemblies (95), a torque plate assembly (180), a hose assembly (195) and hardware and fittings.

Each piston assembly uses a friction ring (40) to maintain ideal piston positioning that limits piston travel for fluid displacement concerns.

The cylinder housing piston bores contain a preformed packing (25) to prevent leakage of hydraulic fluid. A piston insulator (50) in each piston (45) works to minimize heat transfer to the brake fluid generated during braking.

2. Operation

Braking action occurs when hydraulic pressure is applied to the brake via the pilot's or co-pilot's master cylinders. As hydraulic pressure reaches the cylinders, the pistons move outward forcing the pressure plate assembly against the surface of the brake disc. This causes the cylinder to align itself so that the pressure plate linings and back plate linings provide uniform contact against both rubbed surfaces of the brake disc. Kinetic energy is transformed into thermal energy as braking action takes place.

3. Handling Procedures

Handle and maintain the brake components properly to protect the paint and surface finishes.

4. Specifications

Brake Cylinder Material		Aluminum Alloy Casting
Brake Tie Bolt Torque		85 to 90 in-lb (9,6 to 10,2 N-m)
Hydraulic Fluid		MIL-H-5606 or MIL-PRF-5606
Seals		Compatible with MIL-H-5606 and MIL-PRF-5606 Hydraulic Fluid
Brake Cylinder Coatings	Surface Pretreatment:	MIL-A-8625, Type II, Class 1
	Primer Coating:	Refer to the Repair Section
	Finish Coating:	Refer to the Repair Section

DESCRIPTION AND OPERATION

5. Brake Lining Wear Check

Maximum wear limits for the brake linings are shown below.

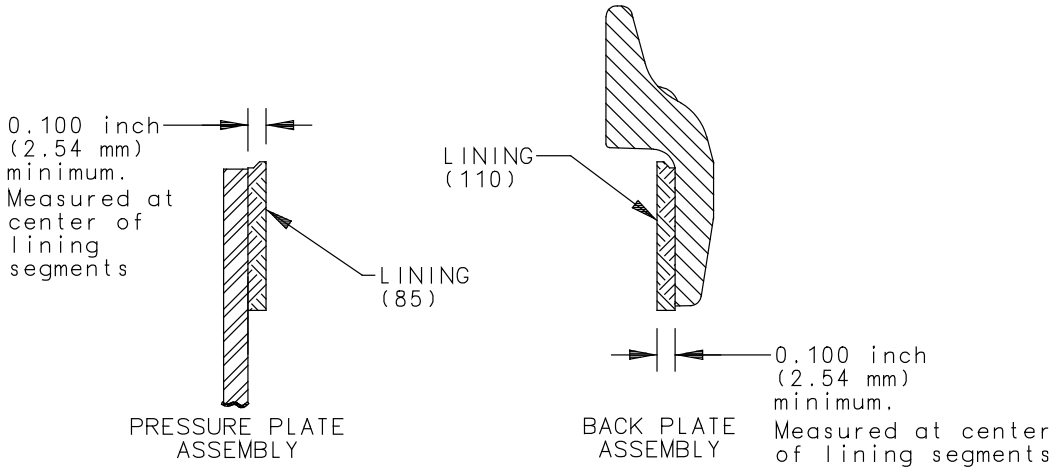


Figure 1 Minimum Lining Thickness

6. Maintenance Schedule

The maintenance schedule is intended to be a guideline based on laboratory testing environments that simulate normal braking conditions. Field operating requirements can vary from aircraft to aircraft. These variations will directly affect the wear rate of the brake assembly components. You must evaluate your own operating conditions to determine a suitable schedule to support and maintain the equipment.

NOTE: All task procedures in Table 1 refer to paragraphs in the CHECKS section.

Table 1 Maintenance Schedule

INTERVAL	ITEM	TASK
Every time the linings (85, 110) have reached the in-service wear limits as specified in Figure 1 and Table 8001 of the FITS AND CLEARANCES section 1.	All parts	a. Paragraph 1.B., visual examination. and b. Paragraph 2., detailed examination as necessary.
	Bolts (5) or (5A)	Paragraph 2. A. detailed examination including magnetic particle inspection.
	Preformed Packings (25, 55, 140, 165, 175)	Replace
At the 3rd (third) set of lining replacement and every other set of lining replacement thereafter.	Brake Cylinder (20)	Paragraph 2.B. detail examination including liquid penetrant inspection.
	Torque Plate (185)	Paragraph 2.H. detail inspection including liquid penetrant inspection.

TESTING AND FAULT ISOLATION

1. General

Refer to IPL Figure 1 to identify the brake assembly components.

This section contains test procedures that can be used both as troubleshooting measures and means to test overhauled brake assemblies. A test data sheet is included at the end of this section for reference.

SAFETY WARNING: FULLY ASSEMBLE BRAKE BEFORE TESTING. SERIOUS INJURY OR DEATH CAN OCCUR FROM TESTING A BRAKE THAT IS NOT FULLY ASSEMBLED.

WARNING: PUT ON PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Equipment and Consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 1001 Equipment and Consumables

NOMENCLATURE/ PART NO.	SPECIFICATION / SOURCE OF SUPPLY
Fluid, Hydraulic	MIL-H-5606 or MIL-PRF-5606, Commercial Source
Powered Hydraulic Test Stand	0 to 68,9 bar capacity, ± 1,38 bar gauge increment, (0 to 1000 psig, ± 20 psig gauge increment), Commercial Source
Hydraulic Pump	0 to 68,9 bar capacity (0 to 1000 psig) Commercial Source
Hydraulic Hose	68,9 bar minimum, (1000 psig), Commercial Source
Pressure Regulator	0 to 68,9 bar (0 to 1000 psig), Commercial Source
Pressure Gauge	0 to 68,9 bar (0 to 1000 psig), Commercial Source
Automatic Cycler	Commercial Source
Hydraulic Filter	10 micron, Commercial Source
Socket Set/ Wrench Set	Standard Hex Head (inch units), Commercial Source
Torque Gage	Commercial Source

TESTING AND FAULT ISOLATION

2. Test the Brake Assembly

Examine all brake assemblies that do not meet the test standards of this section. Disassembly will be necessary for further inspection of individual components to find the reason for failure. Replacement or repair of components may be necessary.

A. Pretest Check

Do these inspections and check procedures to approve the brake assembly for testing. Do not do a test on a brake assembly that shows signs of damage.

(1) Examine the cylinder (20) surfaces for dents, cracks, or other visible damage.

(2) Examine all fasteners and threaded components for loose fit. If a loose fastener is found, tighten it. Refer to Table 8002, Torque Values.

B. Bleed and Pressure Test the Brake Assembly

CAUTION: DO NOT EXCEED 1,35 N-M (12 IN-LB) WHEN TIGHTENING THE BLEEDER SCREW (150). TORQUE IN EXCESS OF 1,35 N-M (12 IN-LB) WILL DAMAGE THE BLEEDER SEAT (145).

(1) Connect the hydraulic supply line to the brake inlet fitting assembly (170).

NOTE: Pressure bleeding is recommended for best results.

(2) Check the brake system reservoir for adequate fluid level and bleed the brake system

(a) No fluid flow from the bleeder screw is cause for examination. Refer to Table 1002, Troubleshooting.

(3) Tighten the bleeder screw (150) snug to prevent leakage.

(4) Apply 600 psi to the brake and check for leakage.

(5) Depress and release the toe pedal several times.

(a) Check for brake drag by rotating the wheel by hand. Check for excessive play. A slight amount of drag is acceptable; however, a tightly bound wheel should be investigated and corrected before releasing the aircraft to service.

NOTE: An improperly seated lining or air in the hydraulic system can cause excessive drag.

TESTING AND FAULT ISOLATION

3. Troubleshooting

Refer to IPL Figure 1 for identification of brake assembly components.

Table 1002 Troubleshooting is a list of the possible problems you can find while operating the brake assembly. The table cannot list all possible problems and is intended to assist with troubleshooting the brake assembly.

Table 1002 Troubleshooting

PROBLEM	COMMON CAUSE	CORRECTION
Hydraulic fluid leaking from brake assembly piston bore areas	Worn or damaged preformed packing (25)	Replace preformed packing
	Pistons (45) worn or damaged	Examine per CHECKS section and replace if necessary
	Piston bores of cylinder (20) worn or damaged	Examine per CHECKS section and replace if necessary
Hydraulic fluid leaking from inlet fitting (170), bleeder components (145, 150), hose (195) or fitting assembly (160)	Loose hydraulic connection; worn or damaged preformed packing (140, 165 or 175) or damaged fitting (160, 170) or bleeder components (145, 150)	Tighten hydraulic connection; replace packing; or replace fitting or bleeder components
No fluid flow from fittings	Obstruction in hydraulic line, fitting or brake port	Clear obstruction – flush system if necessary
Brake not engaging or releasing correctly.	Air in the brake system	Bleed the brake
	Obstruction in hydraulic line or fluid passage	Remove obstruction – flush system if necessary
	Pistons (45) sticking or binding	Replace preformed packing (25) or Examine parts per CHECKS section
	Pistons (45) damaged	Replace pistons
	Brake cylinder (20) damaged	Replace cylinder
	Anchor bolts (125) not sliding freely in torque plate bushings (190)	Apply a lubricant such as dry graphite or silicone spray to the anchor bolts.
	Anchor bolts (125) bent or damaged.	Replace anchor bolts.
	Torque plate assembly (180) damaged or bushings (190) worn	Examine per CHECKS section and replace if necessary
	Pressure plate assembly (70) not sliding freely on anchor bolts (125)	Examine per CHECKS section and replace if necessary
	Brake cylinder (20) damaged.	Examine per CHECKS section and replace if necessary
Maximum pedal effort does not decelerate aircraft properly or does not actuate brake.	Linings (85, 110) and/or brake disc on wheel worn beyond limits	Replace linings and/or disc
	Air in the brake system	Bleed the brake
	Brakes have overheated	Allow the brakes to cool and inspect

TEST DATA SHEET

Date _____**Brake Serial No.** _____

Pretest Check and Bleed Brake **refer to paragraphs 2.A and 2.B.**

(1)	Brake cylinder condition	**Accept** _____	**Reject** _____
(2)	Brake assembly hardware condition	**Accept** _____	**Reject** _____
(3)	Brake bleed	**Pass** _____	**Fail** _____

Comments: _____

_____

_____

Pressure Test **refer to paragraph 2.D.**

Pressure Applied _____ bar/psig Required: 600 psig ± 20 psig (41,4 bar ± 1,4 bar)

Leakage: **Yes** _____ **No** _____

Comments: _____

_____

_____

Tester: _____ **Date:** _____

DISASSEMBLY

1. General

Refer to IPL Figure 1 to identify the brake assembly components.

WARNING: PUT ON PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

NOTE: The brake assembly should only be disassembled as far as necessary to repair or replace defective parts.

A. Equipment and Consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 3001 Equipment and Consumables

NOMENCLATURE/ PART NO.	SPECIFICATION / SOURCE OF SUPPLY
Preformed Packing Extraction Tool Set P/N 199-18	Parker Hannifin Corp., Aircraft Wheel & Brake Division or Parker Hannifin distributor
Socket Set/ Wrench Set	Standard Hex Head (inch units), Commercial Source

2. Remove the Brake Assembly

NOTE: Wheel removal is not necessary unless removal of the torque plate assembly (180) is required. Follow instructions in the wheel maintenance manual for wheel removal.

Do not remove the torque plate assembly (180) from the axle strut flange unless:

– The maintenance schedule requires removal.

– The torque plate needs repair or it needs to be replaced.

SAFETY WARNING: MAKE SURE THE AIRCRAFT IS SECURE AND STABLE BEFORE BEGINNING ANY WORK. WORKING AROUND AN AIRCRAFT THAT IS NOT SECURE AND STABLE CAN CAUSE INJURY OR DEATH.

CAUTION: MAKE SURE PARKING BRAKE IS IN THE OFF POSITION AND THE WHEELS ARE BLOCKED.

A. Remove and cap the hydraulic inlet line that is attached to the brake inlet fitting assembly (170). Cap the brake inlet fitting (170).

DISASSEMBLY

B. To keep the back plate assembly (95) from falling, hold each back plate assembly (95) while loosening the bolts (5 or 5A) and washers (10) that secure the back plate assemblies to the brake cylinder (20).

C. With the back plate assemblies (95) removed, carefully slide the brake cylinder from the torque plate assembly (180).

D. If the torque plate assembly (180) is being removed, remove it now by removing the axle flange mounting hardware that attaches the torque plate assembly to the axle strut flange.

3. Disassemble the Brake Assembly

SAFETY WARNING: FOLLOW ALL SAFETY PRECAUTIONS AND WEAR PROTECTIVE CLOTHING AND SAFETY GLASSES WHEN WORKING WITH THE BRAKE ASSEMBLY AND HYDRAULIC FLUIDS. FAILURE TO COMPLY CAN RESULT IN PERSONAL INJURY.

CAUTION: BE CAREFUL TO KEEP BRAKE FLUID FROM SPLASHING ONTO THE BRAKE LININGS (85, 110). BRAKE FLUID THAT HAS SOAKED INTO THE FRICTION MATERIAL CAN AFFECT THE BRAKING PROCESS.

NOTE: The anchor bolts (125) are pressed into the brake cylinder (20) and secured with a washer (130) and nut (135). Do not remove the anchor bolts unless replacement is necessary. Replacement will be necessary if the anchor bolts are damaged or if a more thorough inspection of the brake cylinder is to be made.

NOTE: Drain the hydraulic fluid into an approved container.

A. Remove the bolts (5 or 5A) and washers (10) from the assembled brake cylinder. This will also free the insulator shim (120).

B. Slide the pressure plate assembly (70) off of the anchor bolts (125).

C. Remove the hose assembly (195) that connects the two assembled brake cylinders together.

DISASSEMBLY

SAFETY WARNING: USE CAUTION IN BLOWING THE PISTONS OUT OF THE CYLINDER WITH COMPRESSED AIR. THE PISTONS CAN FLY OUT AT HIGH VELOCITY. TURN THE CYLINDER OVER SO THAT THE PISTONS ARE FACING THE WORK TABLE SURFACE. USE A RAG TO CUSHION THE PISTON AND TO PREVENT DAMAGE TO THE PISTON AND WORK TABLE SURFACE.

SAFETY WARNING: DEATH OR SERIOUS INJURY CAN OCCUR IF COMPRESSED AIR IS DIRECTED AGAINST THE SKIN. DO NOT EXCEED 20 PSI (2,1 BAR). USE CHIP GUARDS, EYE PROTECTION, AND OTHER PERSONAL PROTECTIVE EQUIPMENT.

D. Remove the pistons (45) by injecting air into the ports.

E. The piston insulator (50) is press fit into the piston (45). Do not remove the insulator unless it needs to be replaced. Refer to the CHECKS section for replacement criteria.

NOTE: A new stat-o-seal (55) must be used whenever the bolt (65) is removed for any reason because the original one will not seal properly if reinstalled.

F. This brake design has an internal piston guide (35) attached to the cylinder by a bolt (65), washer (60) and stat-o-seal (55). It is recommended that this unit not be removed unless it is necessary due to:

- Damage or corrosion to the piston guide (35) or the attaching hardware.

  NOTE: Do not remove the friction ring (40) from the piston guide (35) unless it needs to be replaced because of damage or corrosion.

- Damaged or worn stat-o-seal (55).
- Stripping and repainting of the cylinder (20).
- Detailed inspection of the cylinder including liquid penetrant inspection.

G. Remove the preformed packings (25) from the seal cavity of the cylinder piston bores.

H. Remove the two hose fittings (160) from the brake cylinders.

I. Remove the bleeder seat (145) and inlet fitting (170).

CLEANING

1. General

Refer to IPL Figure 1 to identify the brake assembly components.

WARNING: PUT ON PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Equipment and Consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 4001 Equipment and Consumables

NOMENCLATURE/ PART NO.	SPECIFICATION / SOURCE OF SUPPLY
Plastic Media Stripping Equipment	Commercial Source
Plastic Media	MIL-P-85891, Type II or V, Grade 20/30, 3.5 MOH max U.S. Technology Corp.
Air Supply	2,1 bar maximum (30 psig), Commercial Source
Clean Cloths	Lint Free, Commercial Source
Brushes	Non-Metallic Soft and Stiff Bristle, Commercial Source
Solvent, Stoddard, Type 1	MIL-PRF-680, Commercial Source
Cleaner/Degreaser	AMS1526, Commercial Source
Soap Solution	Mild Dishwashing Liquid, Commercial Source

2. Cleaning Procedures

SAFETY WARNING: MAKE SURE THAT THE AREA WHERE YOU WILL USE THE CLEANING SOLVENTS HAS GOOD AIRFLOW. DO NOT TOUCH OR GET FLUID ON YOUR BODY AND DO NOT BREATH VAPORS. KEEP CONTAINERS COVERED WHEN NOT IN USE.

WARNING: USE NO MORE THAN 2,1 BAR (30 PSIG) AIR PRESSURE. EYE PROTECTION IS NECESSARY. EYE INJURY FROM DIRT PARTICLES OR SOLVENT SPRAY IS POSSIBLE WHEN COMPRESSED AIR IS USED.

A. Clean the Metal Components

(1) Clean the metal parts that follow in Stoddard Solvent (MIL-PRF-680). Use a non-metal soft bristle brush to remove the heavy dirt deposits: (5, 10, 60, 75, 100, 125, 130, 135, 145, 150, 160, 170).

(2) Dry the parts using compressed air and lint-free cloths.

CLEANING

B. Clean the Non-Metal Components

(1) The preformed packings (25, 140, 165, 175), and bleeder cap (155) can be cleaned with a cloth dampened with hydraulic fluid. This will loosen the dirt.

(2) The insulator shim (120) can be wiped clean with a cloth dampened with a mild soap and water solution. Wipe dry with a clean cloth.

C. Clean the Aluminum Components and Magnesium Components

NOTE: The piston insulator (50) is press fit into the piston (45). It is a fiber-based material and will not be harmed if the piston is cleaned with the Stoddard Solvent.

NOTE: Do not remove the friction ring (40) from the piston guide (35) unless it needs to be replaced because of damage or corrosion. The stainless steel friction ring will not be harmed if the piston guide is cleaned with the Stoddard Solvent.

(1) Clean the parts that follow in Stoddard Solvent (MIL-PRF-680): (20, 35, 45, 180). Use a non-metal soft bristle brush to remove the heavy dirt deposits.

(a) Use a soft wire brush to remove any corrosion on the cylinder port threads.

(2) To remove chemical residue, clean parts in a water based cleaner/degreaser (per AMS1526).

(3) Rinse the parts with a mild soap and water solution.

(4) Rinse the parts in clean water.

(5) Dry the parts using compressed air and lint free cloths.

F. Protective Coating Removal for the Brake Cylinder (20) and Torque Plate Assembly (180)

SAFETY WARNING: DUE TO THE TOXICITY AND VOLATILITY OF CHEMICAL STRIPPING SOLVENTS, THEY ARE A HEALTH CONCERN AND NOT A RECOMMENDED SOURCE OF PROTECTIVE COATING REMOVAL.

NOTES: Removal of the protective coating (primer and topcoat) is necessary when doing the liquid penetrant inspection of the brake cylinder.

To achieve best results, always refer to the manufacturer's instructions for use and disposal of blast media.

NOTES: Stainless steel bushings (190) are press fit into the cast magnesium torque plate. The use of plastic media to remove the paint coating of the torque plate will not damage the bushings.

(1) Clean the parts in accordance with paragraph 2.

(2) Blast the parts per MIL-STD-1504 with plastic media per MIL-P-85891, Type II or V, Grade 20/30, maximum media hardness of 3.5 MOH.

CHECKS

1. General

Refer to IPL Figure 1 to identify the brake assembly components.

After a check is performed on a component, refer to the REPAIR section for applicable repairs.

Refer to Table 1 Maintenance Schedule for a timetable of scheduled maintenance tasks for the brake assembly components. All parts must be cleaned before examination. Refer to the CLEANING section.

WARNING: PUT ON PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Equipment and Consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 5001 Equipment and Consumables

NOMENCLATURE/ PART NO.	SPECIFICATION / SOURCE OF SUPPLY
Inspection Surface Plate	Commercial Source
Magnifier	X10 Magnification, Commercial Source
Micrometers	Commercial Source
Vernier Dial Calipers	Commercial Source
Magnetic Particle Inspection Kit	ASTM E1444, Commercial Source
Liquid Penetrant Inspection Kit	MIL-STD-6866 or ASTM E1417, Type 1, Method A, Sensitivity Level 2, Commercial Source

B. Visual Examination

Examine all of the parts for cuts, tears, cracks, breaks, nicks, scratches, gouges, corrosion, wear, distortion, scoring, stripped or crossed threads and other damage. Replace a part that is cracked, worn beyond limits or has exceeded allowable repair or is not a repairable or reworkable part.

CHECKS

SAFETY WARNING: THIS ASSEMBLY CONTAINS PARTS THAT HAVE A CADMIUM PLATING FINISH (5, 10, 60, 65, 75, 100, 130, 135, 145). REMOVING THE CADMIUM PLATING CAN CREATE EXPOSURE TO CADMIUM DUST AND CADMIUM COMPOUNDS. THIS CAN BE A POTENTIAL HEALTH HAZARD. USE APPROPRIATE SAFETY PRECAUTIONS.

2. Detailed Brake Examination

A. Examine the hardware that is listed below.

CAUTION: REWORK OF BOLTS IS NOT ALLOWED.

(1) Examine the bolts (5 or 5A) for distortion, cracks, corrosion, or thread damage. Closely examine for cracks in the radius under the bolt head and in the threaded area next to the bolt shank. Use magnetic particle inspection (ASTM E1444).

(a) The supplied bolts (5) have a patch lock added (nylon material embedded in the threaded end) which serves as a self-locking element. These bolts will require replacement after 6 to 8 installations or whenever the bolts can be run in past the locking feature by the use of your fingers only.

(b) The optional field alternate bolts (5A) do not have a patch lock. They have drilled heads for safety wire retention.

NOTE: If one or more of the bolts are damaged, then replace all of the bolts.

(2) Examine the anchor bolts (125) for distortion, cracks, corrosion, or thread damage.

NOTE: The anchor bolts are press fit into the brake cylinder (20). Refer to the REPAIR section for anchor bolt replacement.

(3) Examine the washers (10, 130) for corrosion, distortion or damage. Replace a part that is distorted or damaged.

(4) Examine the nuts (135) for damage to the self-locking feature. The self-locking feature can be a deformation of the nut (elliptical), segmented beam lock, or a non-metallic insert that provides the self-locking effect. The self-locking feature is defective if:

- The self-locking feature does not tighten when you turn the nut onto the mating thread of the anchor bolt (125).
- The nut is loose and you cannot tighten the nut to the necessary torque value.

(5) Examine the hose assembly (195). Replace if the wire braiding is damaged, if the threads are damaged or any other indication of damage that would cause the hose to fail or leak.

(6) Examine the fittings (160 and 170) for damage to the threads and sealing surfaces. Replace a part that is corroded or damaged.

CHECKS

(7) Examine the bleeder seat (145) and bleeder screw (150) for damage to the threads and sealing surfaces. Replace a part that is corroded or damaged.

B. Examine the Brake Cylinder (20)

SAFETY WARNING: MAKE SURE THAT THE AREA WHERE YOU WILL USE THE LIQUID PENETRANT FLUID HAS GOOD AIRFLOW. DO NOT TOUCH OR GET FLUID ON YOUR BODY AND DO NOT BREATH VAPORS. KEEP CONTAINERS COVERED WHEN NOT IN USE. LIQUID PENETRANT FLUID CAN BE TOXIC AND EXPLOSIVE.

NOTE: A new stat-o-seal (55) must be used whenever the bolt (65) is removed for any reason because the original one will not seal properly if reinstalled.

(1) This brake design has an internal piston guide (35) attached to the cylinder by a bolt (65), washer (60) and stat-o-seal (55). It is recommended that this unit not be removed unless it is necessary due to:

- Damage or corrosion to the piston guide (35) or the attaching hardware.

  NOTE: Do not remove the friction ring (40) from the piston guide (35) unless it needs to be replaced because of damage or corrosion.

- Damaged or worn stat-o-seal (55).
- Stripping and repainting of the cylinder (20).
- Detailed inspection of the cylinder including liquid penetrant inspection.

  If the piston guide is removed for any reason, then examine the following:

  - Piston guide (35) for heavy scratches, nicks and burrs which can prevent the pistons from properly retracting, resulting in brake drag.
  - Friction ring (40) for burrs or distortion which can prevent the pistons from properly retracting, resulting in brake drag.
  - Bolts (65) and washers (60) for distortion, corrosion, or thread damage. A new stat-o-seal (55) must be used because the original one will not seal properly.

(2) Examine the exterior surface for missing paint caused by erosion, wear, inspection methods or surface repair.

(3) Visually examine the cylinder for surface cracks, nicks, corrosion, or other damage.

(4) Visually examine the cylinder for cracks to the areas around the anchor bolt holes, the piston bores and the ports.

CHECKS

(5) Examine for dimpled areas around the back plate to cylinder bolt holes. Refer to Figure 5001. Maximum allowable depression is 0.005 inch (0,127 mm).

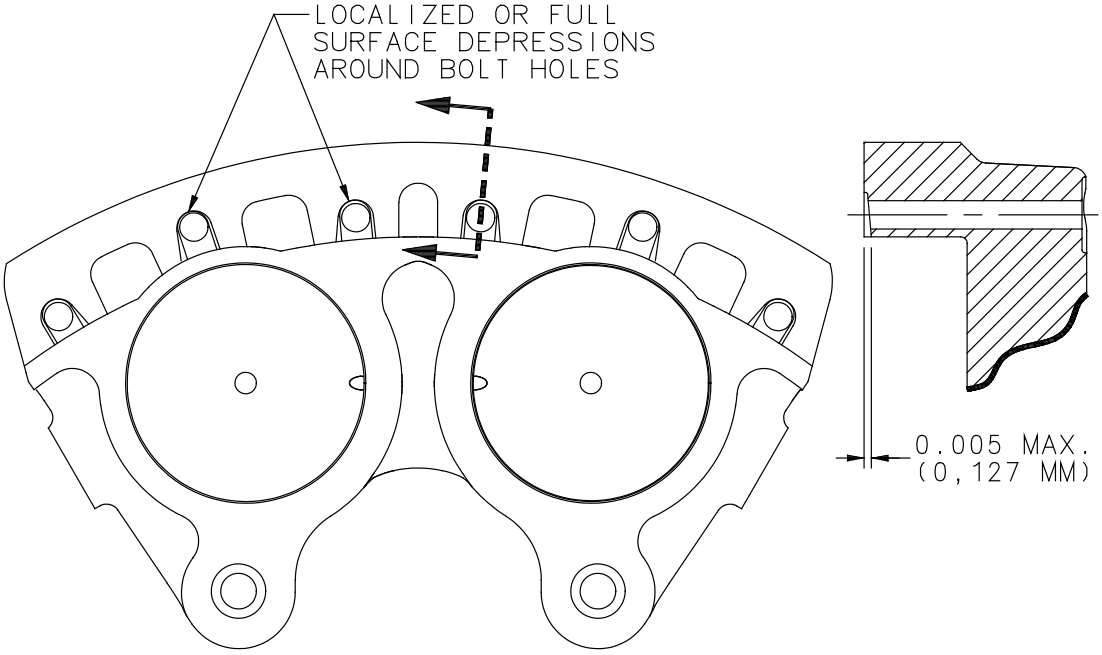


Figure 5001 Cylinder to Back Plate Surface Inspection

(6) Examine the port threads for corrosion or damage to the sealing surfaces or threads.

(7) Use a 10 power magnifier and examine the cylinder piston bores. Examine for scratches, nicks and burrs which can prevent the pistons from properly retracting, resulting in brake drag. Also examine the piston bores for wear and corrosion. Replace the cylinder if the bore diameter measures more than ∅ 2.150 inch maximum (54,61 mm).

(8) When it is required to perform liquid penetrant inspection, use ASTM E1417 or MIL-STD-6866, Type 1, Method A, Sensitivity Level 2.

NOTE: The protective coating (topcoat and primer) must be removed from the part and the part must be clean before doing a liquid penetrant inspection procedure. Refer to the CLEANING section for removal of the coating and cleaning instructions.

(a) Examine for cracks paying particular attention to the areas around the anchor bolt holes, the piston bores and the ports.

CHECKS

C. Examine the Pistons (45) and Insulators (50)
The insulator is not repairable.

(1) Examine the piston guide bore area for scratches, nicks and burrs which can prevent the pistons from properly retracting, resulting in brake drag.

(2) Examine the external surfaces for wear, minor scratches, nicks, burrs, and other signs of damage that can lead to fluid leakage past the preformed packing (25).

(3) Replace the pistons if the outside diameter measures less than ∅ 2.123 inch minimum (53,92 mm).

(4) Constant heat and pressure will compress the insulators over time. Replace the insulator when it is flush with the head of the piston. Refer to the REPAIR section for removal instructions.

D. Examine the Insulator Shims (120)
The insulator shim is not repairable.

(1) Replace insulators that are delaminating, cracked, or that show evidence of severe heat damage (e.g. charred).

E. Examine the Pressure Plate Assembly (70)

(1) Visually examine the pressure plate for cracks, nicks, corrosion, or other damage.

(2) Examine the linings (85) for looseness. Refer to para. 2.G. for detailed examination of the linings.

(a) If any rivets (90) are loose, damaged, or are missing, then replace per the REPAIR section.

(b) It is not necessary to remove the pins (80) on the pressure plate (75) unless the outside diameter of the pin is worn and does not allow for secure engagement of the pins into the counterbore areas of the steel backed lining segments.

(3) Examine the two anchor bolt holes for elongation or cracks. Badly elongated holes will prevent the pressure plate from moving or sliding freely on the anchor bolts and requires the replacement of the pressure plate.

(4) When it is required to replace the pressure plate assembly linings (85), check the pressure plate (75) for the following.

(a) Examine for distortion. Replace any pressure plate that is dished or out-of-flatness more than 0.020 inch (0,508 mm).

(b) Visually examine for cracks at the rivet holes and surrounding areas. Replace if cracked.

CHECKS

(c) Visually examine the pins (80) for looseness, mushroomed heads or other visible damage. Refer to the REPAIR section to replace loose or damaged pins.

(d) If the pins (80) are removed, then check the pin holes for elongation. Replace the pressure plate if the pin holes are elongated.

F. Examine the Back Plate Assembly (95)

(1) Visually examine the back plate for cracks, nicks, corrosion, or other damage.

(2) Examine the linings (110) for looseness. Refer to para. 2.G. for detailed examination of the linings.

(a) If any rivets (115) are loose, damaged, or are missing, then replace per the REPAIR section.

(b) It is not necessary to remove the pins (105) on the back plate (100) unless the outside diameter of the pin is worn and does not allow for secure engagement of the pins into the counterbore areas of the steel backed lining segments.

(3) Examine the three threaded holes for thread damage.

(4) When it is required to replace the back plate assembly linings (110), check the back plate (100) for the following.

(a) Visually examine for cracks at the rivet holes and surrounding areas. Replace if cracked.

(b) Visually examine the pins (105) for looseness or damage. Refer to the REPAIR section to replace loose or damaged pins.

(c) If the pins (105) are removed, then check the pin holes for elongation. Replace the back plate if the pin holes are elongated.

G. Examine the Linings (85, 110)
The linings are not repairable.

(1) Examine the linings for looseness. Examine for edge chipping and surface deterioration. Replace damaged or worn pads per the REPAIR section.

NOTE: The wear limits for the linings on the pressure plate and back plate assemblies are the same. See paragraph 5. Brake Lining Wear Check in the DESCRIPTION AND OPERATION section

CHECKS

H. Examine the Torque Plate Assembly (180)

NOTES: Stainless steel bushings (190) are press fit into the cast aluminum torque plate and swaged on the backside for retention. The bushings are not replaceable. A bushing that is not repairable will require the replacement of the torque plate assembly. Individual components are not available.

(1) Examine the exterior surface for missing paint caused by erosion, wear, or inspection techniques.

(2) Visually examine the torque plate for surface cracks, nicks, corrosion, or other damage.

(3) Visually examine the torque plate for cracks to the areas around the anchor bolt holes and the mounting bolt holes.

(4) Examine the mounting bolt holes areas for elongation. Badly elongated holes requires the replacement of the torque plate assembly.

(5) Examine the bushings for internal corrosion or contamination. Also examine for elongation of the inside diameter which can prevent the brake from sliding freely resulting in excessive brake drag.

(6) Examine the bushings for internal stepping which could indicate severe cocking of the cylinder anchor bolts in the torque plate.

(7) When it is required to perform liquid penetrant inspection, use ASTM E1417 or MIL-STD-6866, Type 1, Method A, Sensitivity Level 2.

NOTE: The protective coatings (topcoat and primer) must be removed from the part and the part must be clean before doing a liquid penetrant inspection procedure. Refer to the CLEANING section for removal of the coatings and cleaning instructions.

(a) Examine for cracks paying close attention to the areas around the anchor bolt bushings and the mounting bolt holes.

REPAIR

1. General

Refer to IPL Figure 1 to identify the brake assembly components.

WARNING: PUT ON PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

NOTE: Repairs are limited to the replacement of parts and to the repairs specified in this section.

A. Equipment and Consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 6001 Equipment and Consumables

NOMENCLATURE/ PART NO.	SPECIFICATION / SOURCE OF SUPPLY
Brake Lining Rivet Tool Kit P/N 199-579	Parker Hannifin Corp., Aircraft Wheel & Brake Division or Parker Hannifin distributor
Drill Bit	∅ 3.17 mm (0.125 inch), Commercial Source
Hand Files	Assorted, Commercial Source
Bench Vise	Commercial Source
Aluminum Oxide Cloth	600 Grade or Finer, Wet or Dry, Commercial Source
Alodine 1200 or Equiv.	MIL-C-5541, Class 1A, Commercial Source
Iridite 15 or Equiv.	MIL-M-3171, Type VIII, Commercial Source
Pin Punch Set	Inch or Metric, Commercial Source
Paint Application Equipment	Commercial Source
Primer and Topcoat	Refer to Table 6002
Screw Driver	Standard-Flat Head, Commercial Source

CAUTION: DO NOT USE ABRASIVES CONTAINING IRON OR COPPER (STEEL WOOL, IRON OXIDE, BRASS OR STEEL WIRE). IRON OR COPPER PARTICLES WILL BECOME EMBEDDED IN THE ALUMINUM COMPONENTS AND WILL INCREASE THE AMOUNT OFCORROSION.

REPAIR

2. Detailed Repairs

A. Repair the Brake Cylinder (20)
The cylinder is made from a cast aluminum alloy.

(1) Surface damage repair

(a) Blend out small nicks, burrs, scratches and light corrosion.

(2) Piston bore repair

(a) Light scratches and nicks can be polished out. Repair of piston bore cavity must not exceed ∅ 2.150 inch maximum (54,61 mm). If blend or polishing repair exceeds limits and prohibits the brake cylinder from retaining pressure during testing, then the cylinder must be replaced.

(3) Clean and surface treat the repaired areas

(a) Clean the cylinder. Refer to paragraph 2.D., CLEANING section.

(b) Prepare the repaired areas with corrosion preventative (Alodine 1200 or equivalent). Refer to MIL-C-5541, Class 1A.

B. Repair the Torque Plate Assembly (180)
The torque plate is made from a cast magnesium alloy.

(1) Light scratches nicks and corrosion in the bushing (190) inside diameter can be polished out.

(2) Torque plate surface damage repair

(a) Blend out small nicks, scratches and light corrosion.

(3) Clean and surface treat the repaired areas

(a) Clean the torque plate. Refer to paragraph 2.D., CLEANING section.

(b) Prepare the repaired areas with corrosion preventative (Iridite 15 or equivalent). Refer to MIL-M-3171, Type VIII.

C. Painting the Brake Cylinder (20) and Torque Plate Assembly (180)

SAFETY WARNING: PAINT MATERIALS CAN BE TOXIC AND VOLATILE. USE ONLY IN WELL VENTILATED AREAS. AVOID PHYSICAL CONTACT WITH PAINTS AND DO NOT INHALE VAPORS. KEEP PAINT CONTAINERS COVERED WHEN NOT IN USE. OBSERVE FIRE PRECAUTIONS.

REPAIR

NOTE: Because of local EPA low VOC requirements, Aircraft Wheel & Brake uses Columbia or Sherwin Williams primers and topcoats in the production of the brake assembly. Alternative products can be used by the repair facility but should be aircraft quality finishes.

(1) For small areas requiring a paint touchup.

(a) Prepare the area by sanding lightly with 600 grade or finer, wet or dry aluminum oxide cloth and feather out all edges of the adjacent area.

(2) Clean the surfaces to be painted.

(a) Plug the cylinder piston bores and cylinder ports to prevent paint material overspray.

(b) Mask the torque plate bushings (190) to prevent paint material overspray on internal surfaces of the bushings.

(3) Apply the primer and topcoat per Table 6002.

NOTE: To achieve best results, always refer to the manufacturer's instructions for mixing, application and use; for forced dry (oven heating) schedule and also for disposal of primer and topcoat media.

Table 6002 Primer and Topcoat Product Characteristics

MANUFACTURER	PRIMER	TOPCOAT	DRY FILM THICKNESS AND AIR DRY TIMES
Columbia Paint Corp. Huntington, WV	P/N 18-017A (water reducible) No mixing required.	P/N 17-250A (524 Aluminum) (water reducible) No mixing required. It is desirable to apply topcoat without thinning, however, topcoat material may be thinned up to 10% by volume with either water (use distilled) or a mixture of 4 parts water to 1 part butyl cellosolve..	Primer: 0.0002-0.0005 in. 15 minutes min. (to touch or topcoat) 60 minutes (to handle) 4-24 hours (dry hard) Topcoat (includes primer): 0.0008-0.0014 in. 15 minutes (to touch) 30 minutes (to handle) 48 hours (dry hard)
Alternate: Sherwin Williams Co. Cleveland, OH	2 parts washcoat (P/N P60G2) 3 parts catalyst reducer (P/N R7K44)	P/N F63BXS58-4337 6 parts base 1 part catalyst (P/N V66V27) Thin using up to 20% polane reducer (P/N R7K84).	Primer: 0.0002-0.0004 in. 3-10 minutes (to touch) 10-60 minutes (to topcoat) Topcoat (includes primer): 0.0008-0.0014 in. 20 minutes (to touch) 60 minutes (to handle) 24 hours (dry hard)

REPAIR

D. Repair the Piston Guide (35)
The piston guide is made from an aluminum alloy.

(1) If the piston guide required removal, then repair is limited to polishing out small nicks, scratches and light corrosion. Replace the piston guides if the outside diameter measures less than ∅ 0.558 inch minimum (14,17 mm). Damage to the threads requires replacement of the guide.

E. Repair the Pistons (45)
The piston is made from an aluminum alloy and hard anodized.

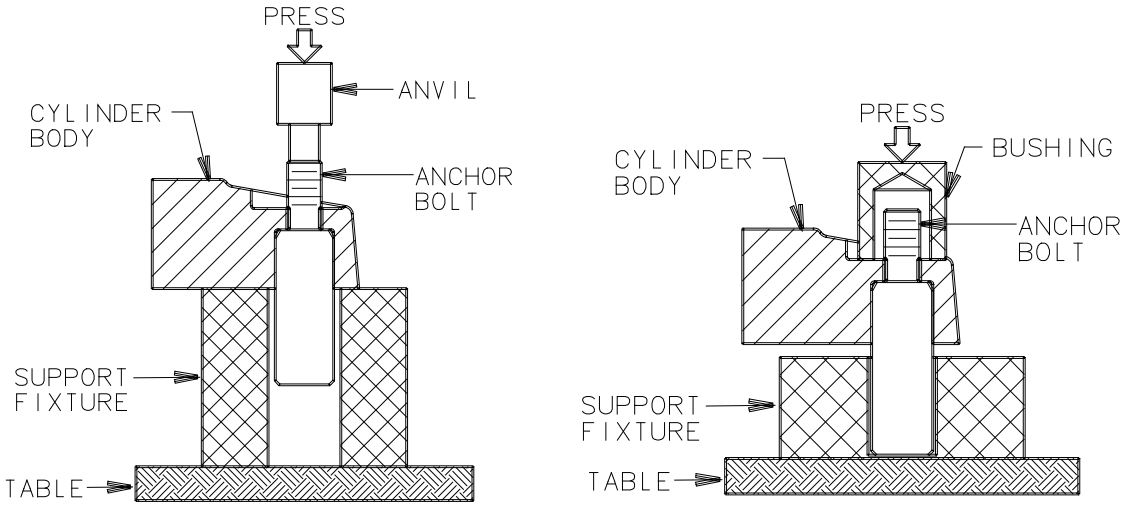
NOTE: The piston insulator (50) is press fitted into the piston (45).

(1) Piston repair is limited to polishing out small nicks, scratches and light corrosion. Replace the pistons if the outside diameter measures less than ∅ 2.123 minimum (53,92 mm).

(2) Worn insulators (50) can be replaced by drilling a ∅ 0.125 (1/8) (3,17 mm) hole directly into the insulator approximately 0.100 (2,54 mm) deep, slightly off center, but not close to outside of piston. Use a small screwdriver to work through the ∅ 1/8 diameter hole and lift to pry off insulator. Then, press in a new insulator.

F. Replace the Anchor Bolt (125)
The anchor bolt is made from stainless steel.
Refer to Figure 6001 and use an arbor press to remove and install the anchor bolts.

(1) Polish out small nicks, burrs, and scratches.



Removal Installation

Figure 6001 Replace Anchor Bolt

REPAIR

G. Remove the Linings (85, 110)
The metallic lining used on the brake assembly is a hard composition and is attached by pins which press fit into the back surface (steel carrier plate) of the lining. A center rivet completes the attachment. The holes for the pins are not visible on the lining surface unless the lining is worn beyond its wear limit.

WARNING: USE PROTECTIVE GOGGLES OR GLASSES WHEN REMOVING RIVETS TO AVOID INJURY TO EYES. AVOID GRABBING SHARP EDGES OF RIVETS WITH HANDS.

CAUTION: DO NOT ENLARGE THE RIVET HOLES IN THE PRESSURE PLATE, OR BACK PLATE. IF THE RIVET HOLE EXCEEDS ∅ 5,1 MM (0.201 INCH) THE PRESSURE PLATE OR BACK PLATE MUST BE REPLACED.

(1) Use a ∅ 0.125 inch (3,17 mm) drill bit, to drill out the rivets (90, 115). Discard the rivets.

(2) Pry the lining off of the pressure plate (75) and the back plate (100) with a thin screwdriver.

(3) Damaged attachment pins (80, 105) can be removed by carefully drilling out the pin with a ∅ 0.187 inch drill.

(4) The pressure plate (75) should now be examined for continued service per the CHECKS section.

(a) After the pressure plate is judged serviceable, refer to paragraph 2.H. and install the linings (85).

(5) The back plate (100) should now be examined for continued service per the CHECKS section.

(a) After the back plate is judged serviceable, refer to paragraph 2.H. and install the linings (110).

H. Install the Linings (85, 110)
Refer to Figure 6003 for pin / rivet installation acceptance criteria.

(1) Install a pin in the holes of the pressure plate (75) or back plate (100). Align each pin (85) or (105) with the tail of the pin toward the counterbored side of the part. Refer to Figure 6002.

(2) If new pins are required, then place the pins and the pressure plate or back plate on a flat metal surface.

(3) Use the Cleveland Brake Lining Rivet Tool Kit P/N 199-579 (or equivalent) and install the pins on the pressure plate or back plate.

(4) Check to be sure the pins are tight and movement free with no distortion of parts.

REPAIR

(5) Install the lining segment onto the pins. Check to make sure the metal backing is tight against the pressure plate or back plate surface. A fibre mallet may be used to tap the lining onto the pins lightly to seat it.

(6) Next, install the center retention rivet (90) or (115) using the Cleveland Brake Lining Rivet Tool Kit P/N 199-579 (or equivalent). Refer to Figure 6002.

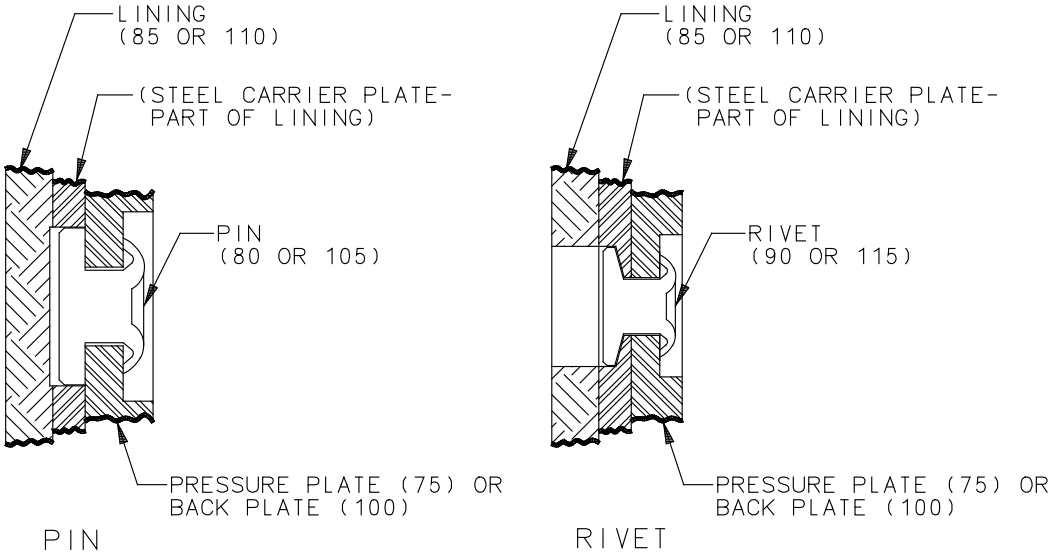


Figure 6002 Pin / Rivet Installation

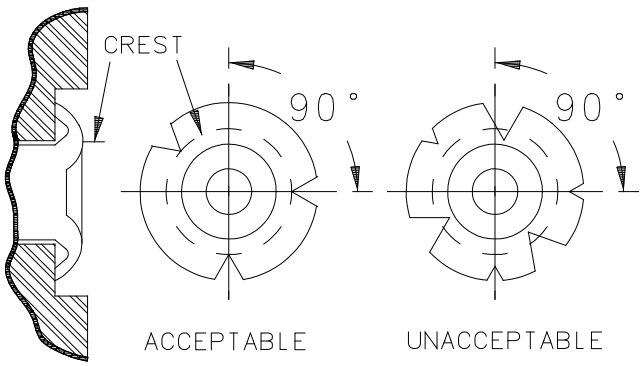


Figure 6003 Pin / Rivet Installation Acceptance Criteria

REPAIR

SAFETY WARNING: REMOVING THE CADMIUM PLATING CAN CREATE EXPOSURE TO CADMIUM DUST AND CADMIUM COMPOUNDS. THIS CAN BE A POTENTIAL HEALTH HAZARD. USE APPROPRIATE SAFETY PRECAUTIONS.

I. Repair the Pressure Plate (75) and Back Plate (100)
The pressure plate and back plate are made of steel and are cadmium plated.

NOTE: Stripping and re-cadmium plating steel parts is generally cost prohibitive in small lot sizes. Therefore, the pressure plate and back plate can be protected with an application of a zinc rich cold galvanizing compound.

(1) Blend out small nicks, burrs, scratches and light corrosion.

ASSEMBLY

1. General

Refer to IPL Figure 1 to identify the brake assembly components.

A. Equipment and Consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 7001 Equipment and Consumables

NOMENCLATURE/ PART NO.	SPECIFICATION/SOURCE OF SUPPLY
Fluid, Hydraulic	MIL-H-5606 or MIL-PRF-5606, Commercial Source
Socket Set/ Wrench Set	Standard Hex Head (inch units), Commercial Source
Preformed Packing Extraction Tool Set 199-18	Parker Hannifin Corp., Aircraft Wheel & Brake Division or Parker Hannifin distributor
Torque Gage	Commercial Source

2. Assembly Procedures

A. Assemble the Main Brake Assembly

(1) If the anchor bolts were removed, then install them now (refer to REPAIR section). After the anchor bolts have been installed, then install a washer (130) onto the threaded end of the anchor bolt. Install a nut (135) and tighten to 85 to 95 in-lb (9,6 to 10,7 N-m).

(2) Lubricate the preformed packing (140) with MIL-H-5606 or MIL-PRF-5606 hydraulic fluid and install the packing on the bleeder seat (145). Install the bleeder seat into the cylinder. Tighten to between 65 to 70 in-lb (7,3 to 7,9 N-m).

CAUTION: DO NOT TORQUE BLEEDER SCREW (150) TO A VALUE GREATER THAN 12 IN-LB (1,35 N-M). TORQUE GREATER THAN 12 IN-LB (1,35 N-M) WILL DAMAGE THE BLEEDER SEAT.

(3) Install the bleeder screw (150) into the bleeder seat (145). Tighten the bleeder screw snug to prevent leakage.

(4) Install the fittings (160, 170) into the cylinder. Tighten to 50 to 70 in-lb (5,6 7,9 N-m).

(5) Lubricate the preformed packings (25) with MIL-H-5606 or MIL-PRF-5606 hydraulic fluid and install in the cylinder (20) piston bore groove.

ASSEMBLY

(6) If the piston guide unit (35) was removed, install it now as follows:

NOTE: A new stat-o-seal must be used because the original one will not seal properly.

(a) Lubricate a new stat-o-seal (55) with MIL-H-5606 or MIL-PRF-5606 hydraulic fluid. Install the Washer (60), then the new lubricated stat-o-seal (55) on the bolt (65).

(b) Position the piston guide (35) in the cylinder piston bore and from the opposite side (exterior of cylinder bore) insert the bolt through the hole and thread the bolt into the guide (35). Ensure that the friction ring (40) is installed on the piston guide (35).

(c) Tighten the bolt (65) to 25 to 30 in-lb (2,8 to 3,4 N-m).

(7) Install the piston (45) as follows:

(a) Lubricate the piston, preformed packing (25), piston guide (35) and cylinder piston bore with a small amount of MIL-H-5606 or MIL-PRF-5606 hydraulic fluid.

(b) Place the piston in the bore and rotate while pressing down to seat the friction ring and insure that the piston and the preformed packing (25) are in the proper alignment.

(c) Tap the piston with a wooden or plastic mallet while alternately rotating the piston.

NOTE: If considerable effort is required, then remove the piston and inspect the pilot bore area for damage. If the bore is damaged, check the corresponding area of the piston guide for damage. Repair or replace if necessary and repeat the procedure.

(8) Install the pressure plate assembly (70) by aligning the anchor bolt holes with the anchor bolts and slide onto the cylinder.

NOTE: The pressure plate must float freely on the anchor bolts.

(9) Install the hose assembly (195) between the two cylinders. Tighten the hose ends to between 100 to 110 in-lb (11,3 to 12,4 N-m).

NOTE: Hold the fittings (160, 170) stationary while tightening the hose ends.

B. Mount the Main Brake Assembly onto the Aircraft
Refer to Parker drawing no. 50-80, sheet 1

NOTE: The torque plate mounting bolts, washers and nuts are included in the 199-90 kit.

(1) If removed, re-install the torque plate assembly (180) now. Attach the torque plate assembly to the axle strut-mounting flange with the 12 bolts, 24 washers (one under each bolt head and nut), and 12 nuts. Tighten the nuts to 130 to 150 in-lb (14,7 to 17,0 N-m).

ASSEMBLY

(2) Slide the brake assembly onto the torque plate assembly (180) while aligning the anchor bolts (125) to the torque plate holes.

NOTE: The cylinder anchor bolts must slide freely in the torque plate bushings (190).

(3) Install the washers (10) and bolts (5 or 5A) and insulator shim (120).

(4) Install the back plate assemblies (95) between the brake disc and the wheel flange, and align with the bolts (5 or 5A). Tighten the bolts to 85 to 90 in-lb (9,6 to 10,2 N-m).

NOTE: The optional field alternate bolts (5A) will require safety wire. Safety wire the bolts after pressure testing the brake assembly. See step 2.B. (7).

(5) Re-connect the aircraft system hydraulic supply line to the fitting (170).

(6) Refer to the TESTING AND FAULT ISOLATION section to bleed and pressure test the brake assembly.

(7) If using the optional field alternate bolts (5A), safety in accordance with NASM33540.

C. Brake Lining Conditioning Procedure

NOTE: PRM14A is included in the 199-90 kit.

It is important to condition new linings properly to obtain the service life designed into them. Condition the linings by following the instructions in product reference memo PRM14A.

FITS AND CLEARANCES

1. General

Refer to IPL Figure 1 to identify the brake assembly components.

A. Assembly Wear Limits

Table 8001 In-Service Wear Limits

PART NAME (IPL ITEM NUMBER)	FIGURE	WORN AREA DESCRIPTION	WORN DIMENSION
Pressure Plate Assembly (70): Lining (85)	1	Thickness	0.100 inch (2,540 mm) minimum
Back Plate Assembly (95): Lining (110)	1	Thickness	0.100 inch (2,540 mm) minimum
Cylinder Piston Bores	N/A	Diameter	∅ 2.150 inch (54,61 mm) maximum
Piston (45)	N/A	Outside Diameter	2.123 inch (53,9 mm) minimum
Pressure Plate Assembly (70): 2 Anchor Bolt Holes	N/A	Diameter	∅ 0.505 inch (12,827 mm) maximum

B. Assembly Torque Values

Table 8002 Assembly Torque Values

PART NAME	TORQUE LIMITS
Bolt (5)	85 to 90 in-lb (9,6 to 10,2 N-m)
Bolt (65)	25 to 30 in-lb (2,8 to 3,4 N-m)
Nut (135)	85 to 95 in-lb (9,6 to 10,7 N-m)
Bleeder Seat (145)	65 to 70 in-lb (7,3 to 7,9 N-m)
Bleeder Screw (150)	Close the screw, then tighten snug to prevent leakage. Do not tighten to a value greater than 12 in-lb. (1,35 N-m). Torque greater than a value of 12 in-lb (1,35 N-m) will damage the bleeder seat (145)
Fitting Assembly (170)	50 to 70 in-lb (5,6 to 7,9 N-m)
Fitting Assembly (160)	50 to 70 in-lb (5,6 to 7,9 N-m)
Hose Assembly (195)	100 to 110 in-lb (11,3 to 12,4 N-m)

SPECIAL EQUIPMENT AND CONSUMABLES

1. General

This section contains source of supply information for all applicable sections of this manual.

A. Source of Supply

NOTE: Unless specified differently, you can use equivalent alternatives for items listed.

Table 9001 List of Manufacturers

PRODUCT NOMENCLATURE	SPECIFICATION OR REQUIREMENT	SOURCE OF SUPPLY	DISASSEMBLY	CLEANING	REPAIR	ASSEMBLY
Preformed Packing Extraction Tool Set P/N 199-18	N/A	Parker Hannifin Corp. Aircraft Wheel & Brake Div. Avon, OH 44011 U.S.A.	X			X
		or Parker Hannifin distributor				
Plastic Media for stripping paint	MIL-P-85891, Type II or V, Grade 20/30, 3.5 MOH max	U.S. Technology Corporation Canton, OH 44702 U.S.A.		X		
Lining Rivet Tool Kit P/N 199-579	N/A	Parker Hannifin Corp. Aircraft Wheel & Brake Div. Avon, OH 44011 U.S.A.			X	
		or Parker Hannifin distributor				
Primer and Topcoat	Refer to the REPAIR section	Refer to the REPAIR section			X	

ILLUSTRATED PARTS LIST

1. General

The illustrated parts list describes and illustrates the detail parts of the brake assembly.

All parts are listed, except parts, which lose their identities by being permanently fastened to other parts of assemblies and cannot be disassembled.

A. Explanation of Columns

(1) Figure/Item column: The figure and item numbers refer to the applicable Illustrated Parts List (IPL) Figure. The first number shows the figure number of the illustration.

(2) Part Number column: This column shows the Parker Hannifin Aircraft Wheel and Brake part number for the individual item.

(3) Airline Stock Number column: This column gives the Airline Stock Number when applicable.

(4) Nomenclature column: This column identifies the parts being listed by noun name followed by modifiers when applicable. The indenting system used in the parts list shows the relationship of the parts to their subassemblies and to the assembly:

1 2 3 4
Assembly
Attaching Parts for Assembly
Detailed Parts for Assembly
Subassembly
Attaching Parts for Subassembly
Detailed Parts for Subassembly

(5) Effectivity column: An effectivity code shows the difference in parts within different configurations. The effectivity code is used for more than one configuration of the basic part number. Effectivity codes only apply to the figure in which they are used.

(6) Units Per Assembly column: This column shows the total number required for each assembly or for each subassembly as applicable. These abbreviations may appear in the Units Per Assembly column:

AR..... As Required (for bulk items)
NP..... Item is Nonprocurable (listed for reference only)
RF .....Reference (item listed for reference only)

ILLUSTRATED PARTS LIST

B. Part Numbering System

Parker Hannifin Aircraft Wheel & Brake has given a part number to all the purchased and government standard off-the-shelf parts. They are defined and used as follows:

When a purchased part is listed, the Parker Hannifin AWB part number will be used in the part number column. If required by contract or if the original manufacturer of a purchased part has FAA manufacturing approval then; the original manufacturer's part number along with the manufacturer's federal supply code will be shown in parentheses following the part nomenclature. The letter "V" will precede the federal supply code.

Unless specified differently by contract, the assigned Parker Hannifin AWB part number will be used in the part number column to identify government standard off-the-shelf parts (such as MS, AN, NAS, etc.).

C. Parts Replacement Data

The interchangeability relationship between parts is identified in the Nomenclature column of the parts list. A list of the terms used to show interchangeability and their definition is as follows:

Term	Abbreviation	Definition
Optional	OPT	This part is optional to and interchangeable with other parts in the same item number variant group or other item number if designated.
Superseded by	SUPSD BY	The part in the part number column is replaced by and is not interchangeable with the item number shown in the notation.
Supersedes	SUPSDS	The part in the part number column replaces and is not interchangeable with the item number shown in the notation.
Replaced by	REPLD BY	The part in the part number column is replaced by and interchangeable with the item number shown in the notation.
Replaces	REPLS	The part in the part number column replaces and is interchangeable with the item number shown in the notation.
Vendor	V	Federal Supply Code for vendors.

ILLUSTRATED PARTS LIST

D. Items Not Illustrated

Items not illustrated are shown by a dash (-) in front of the item number in the Figure/Item number column.

E. Alpha Variant Item Numbers

Alpha variants A through Z (except I and O) are assigned to existing numbers when necessary to show:

(1) Added items
(2) Modification or configuration differences
(3) Optional parts

Alpha variant item numbers are not shown on the exploded view when the appearance and location of the alpha variant item is the same as the basic item.

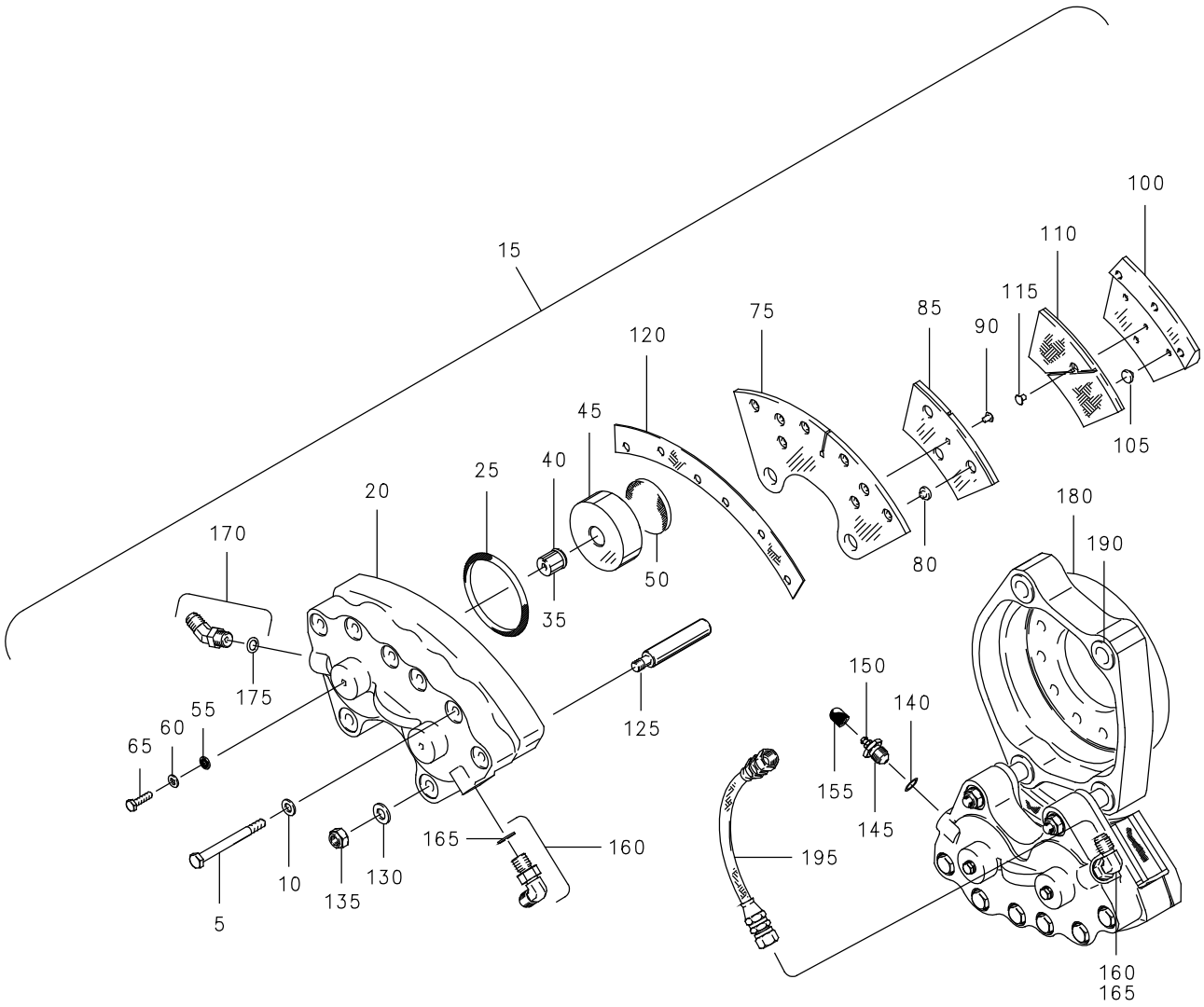
2. Optional Vendor Index

Not applicable.

3. Federal Supply Code for Manufacturers

Not applicable.

ILLUSTRATED PARTS LIST



IPL Figure 1 Main Brake Assembly Exploded View

ILLUSTRATED PARTS LIST

4. Detailed Parts List – Main Brake Assembly (Sheet 1 of 2)

FIG. ITEM	PART NUMBER	AIRLINE STOCK NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	EFF CODE	UNITS PER ASSY.
1 - 1	30-144		BRAKE ASSEMBLY, MAIN		RF
			ATTACHING PARTS		
5	103-14200		BOLT (with patch lock)		12
5A	103-14400		BOLT (AN4H-23A) (OPT – Field alternate for Item 5)		RF
10	095-10400		WASHER, (AN960-416)		12
			* * *		
15	091-13900		. CYLINDER ASSEMBLY		2
20	061-10600		. . CYLINDER		1
25	101-24200		. . PREFORMED PACKING		2
– 30	092-07300		. . PISTON ASSEMBLY		2
35	139-08100		. . . PISTON GUIDE		1
40	082-02000		. . . FRICTION RING		1
45	062-04100		. . . PISTON		1
50	088-00100		. . . INSULATOR		1
55	095-02600		. . . STAT-O-SEAL		1
60	095-10300		. . . WASHER (AN960-10)		1
65	103-00200		. . . BOLT (AN3-7A)		1
– 70	073-06200		. . PRESSURE PLATE ASSEMBLY		2
75	063-03500		. . . PRESSURE PLATE		1
80	177-01600		. . . PIN		6
85	066-09000		. . . LINING		2
90	105-00200		. . . RIVET		2
– 95	074-04800		. . BACK PLATE ASSEMBLY		4
100	064-03200		. . . BACK PLATE		1
105	177-01600		. . . PIN		3
110	066-09000		. . . LINING		1
115	105-00200		. . . RIVET		1

ILLUSTRATED PARTS LIST

4. Detailed Parts List – Main Brake Assembly (Sheet 2 of 2)

FIG. ITEM	PART NUMBER	AIRLINE STOCK NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	EFF CODE	UNITS PER ASSY.
120	068-03300		. . INSULATOR SHIM		2
125	069-02400		. . ANCHOR BOLT		4
130	095-10500		. . WASHER (AN960-516)		4
135	094-10400		. . NUT (MS21044-N5)		4
140	101-24600		. . PACKING, PREFORMED		1
145	081-00200		. . BLEEDER SEAT		1
150	079-00300		. . BLEEDER SCREW		1
155	183-00100		. . BLEEDER CAP		1
160	104-03100		. . FITTING ASSEMBLY		2
165	101-39800		. . . PACKING, PREFORMED (M83461/2-904)		1
170	104-04700		. . FITTING ASSEMBLY		1
175	101-39800		. . . PACKING, PREFORMED (M83461/2-904)		1
180	075-15500		. TORQUE PLATE ASSEMBLY		1
185	065-13800		. . TORQUE PLATE		NP
190	145-08300		. . BUSHING		NP
195	207-00700		. HOSE ASSEMBLY		1
– 200	166-08600		. NAMEPLATE		1

STORAGE

CAUTION: BRAKES STORED IN CARDBOARD BOXES, WHICH HAVE BECOME WET OR HAVE BEEN EXPOSED TO HIGH HUMIDITY, CAN BECOME CORRODED.

1. Procedures

A. Brake Assembly Storage

Brake assemblies which are not to be immediately installed on the aircraft must be properly stored. Acceptable storage conditions are listed below.

(1) Rubber Based Components

The shelf life of components that are made of or contain a rubber based material is listed below. The serviceable life can be decreased by exposure to sunlight, very high or low temperatures, low humidity, ozone, contamination of fluids or lubricants, severe operating conditions, etc.

(a) The preformed packings (25, 55, 140, 165, 175) have a shelf life of 15 years from the date of manufacture (also known as the cure date).

(2) Seal all fittings with covers to prevent contaminants from entering the brake.

(3) Wipe all excess oil and foreign material from exposed surfaces of the brake assembly with a clean shop towel.

(4) The brake assembly should be stored in a clean, dry environment. The desirable temperature range is from 10° to 25°C (50° to 77°F). Exposure to extreme temperatures can affect service life.

Technical Publication

Component Maintenance Manual With Illustrated Parts List

CM40-170A
Main Wheel Assembly

Parker Hannifin
Part No. 40-170A

Initial Issue
July 01, 2005

Cleveland
Wheels & Brakes

Parker Hannifin Corporation
Aircraft Wheel & Brake Division
Avon, Ohio 44011 Cage Code 33269

TO: HOLDERS OF CM40-170A COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-170A.

Attached to this transmittal letter is Revision NC of CM40-170A (dated July 01, 2005).

Revision NC, Dated July 01, 2005

REVISION NC CONTAINS ALL PAGES OF THE MANUAL. Pages that have been added or revised are outlined below together with the highlights of the revision.

Please retain all **REVISION HIGHLIGHTS** pages, inserting them into the manual for future reference.

REVISION HIGHLIGHTS

Section/Page No.	Description Of Change
All Sections/All Pages	Initial Release (DCN 0364-50)

RECORD OF REVISIONS

Retain this record in front of manual. On receipt of revision, insert revised pages in the manual, and enter revision letter, date inserted and initial.

REV.	DATE ISSUED	DATE INSERTED	BY	REV.	DATE ISSUED	DATE INSERTED	BY
NC	07-01-2005	07-01-2005	PHC				

SERVICE BULLETIN LIST

Parker Hannifin Service Bulletins are issued in order to provide general information on product line concerns. The bulletin listings contained herein identify subject matter directly related to the support and function of the assembly and components.

SERVICE BULLETIN NUMBER	SUBJECT	REV.	DATE INCORPORATED

LIST OF EFFECTIVE PAGES

SUBJECT	PAGE	DATE
Title Page	T-1	July 01, 2005
Record of Revisions	RR-1	July 01, 2005
Service Bulletin List	SB-1	July 01, 2005
List of Effective Pages	LEP-1	July 01, 2005
Table of Contents	T/C-1	July 01, 2005
Introduction	INTRO-1	July 01, 2005
	2	July 01, 2005
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	2	July 01, 2005
Testing	1001	July 01, 2005
	1002	July 01, 2005
	1003	July 01, 2005
	1004	July 01, 2005
	1005	July 01, 2005
	1006	July 01, 2005
	1007	July 01, 2005
	1008	Blank
Disassembly	3001	July 01, 2005
	3002	July 01, 2005
	3003	July 01, 2005
	3004	July 01, 2005
Cleaning	4001	July 01, 2005
	4002	July 01, 2005
	4003	July 01, 2005
	4004	Blank
Checks	5001	July 01, 2005
	5002	July 01, 2005
	5003	July 01, 2005
	5004	July 01, 2005
Repair	6001	July 01, 2005
	6002	July 01, 2005
	6003	July 01, 2005
	6004	July 01, 2005
	6005	July 01, 2005
	6006	July 01, 2005
Assembly	7001	July 01, 2005
	7002	July 01, 2005
	7003	July 01, 2005
	7004	July 01, 2005
	7005	July 01, 2005
	7006	July 01, 2005
Fits and Clearances	8001	July 01, 2005
	8002	Blank
Special Equipment and Consumables	9001	July 01, 2005
	9002	July 01, 2005
	9003	July 01, 2005
	9004	Blank
Illustrated Parts List	10001	July 01, 2005
	10002	July 01, 2005
	10003	July 01, 2005
	10004	July 01, 2005
	10005	July 01, 2005
	10006	Blank
Storage	15001	July 01, 2005
	15002	July 01, 2005

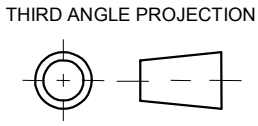
TABLE OF CONTENTS

INTRODUCTION

1. General

SAFETY WARNING: ALL TORQUE AND SPECIFIC LIMITS OR VALUES CONTAINED HEREIN MUST BE STRICTLY OBSERVED. IGNORING OF TORQUE LIMITS AND OTHER SPECIFIC VALUES GIVEN BY THIS MANUAL CAN CAUSE PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH.

This manual is published for the guidance of personnel responsible for the overhaul and/or maintenance of the Parker Hannifin Assembly covered in this publication.



Third angle projection is used in this manual. All weights and measurements are in U.S. English units with metric units in parentheses. English units are shown with a period for the decimal point. Millimeters are shown with a comma for the decimal point. Numbers that contain five or more digits to the left of the decimal point have a space between the “thousands” and “hundreds” digits to prevent confusion with the metric decimal point.

The manual for the aircraft shall take precedence for the component’s interface connections with the functional features as used in the aircraft. This manual may also describe functional features that may or may not be used when installed as a component of a system in the aircraft.

The manufacturer recommends that you ask for the latest revision of the manual before continuing with overhaul or maintenance operations. Ask the Technical Services Department of the Aircraft Wheel & Brake Division for the latest revision.

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INTRODUCTION

3. TSO Notice

This assembly is certified for FAR Part 23 usage. It is identified with a "TSO-C26c" marking. This assembly has been tested and qualified to FAA (Federal Aviation Administration) requirements and specifications.

4. Manual Use

This manual is divided into various section blocks such as Testing and Fault Isolation, Disassembly, Inspection / Check, Repair, etc. Each section has its own range of page numbers. Refer to the Table of Contents for the location of the applicable section.

A. Warnings and Cautions and Notes

These adjuncts to the text shall be used to highlight or emphasize important points when necessary. Refer to the descriptions of these statements that follow:

- A **"SAFETY WARNING"** flagged by this symbol , calls attention to possible serious or life threatening situations if procedures are not followed.
- A **"WARNING"** calls attention to use of materials, processes, methods, procedures, or limits which must be followed precisely to avoid injury to persons.
- A **"CAUTION"** calls attention to methods and procedures, which must be followed to avoid damage to equipment.
- A **"NOTE"** calls attention to an essential operating or maintenance procedure, condition, or statement, which must be highlighted.

5. Replacement Parts

SAFETY WARNING: PARKER HANNIFIN WHEEL & BRAKE DOES NOT WARRANT OR ASSUME THE RISK OF THE USE OF REPLACEMENT PARTS NOT AUTHORIZED FOR USE BY PARKER HANNIFIN WHEEL & BRAKE. OPERATORS WHO USE REPLACEMENT PARTS NOT AUTHORIZED BY PARKER HANNIFIN WHEEL & BRAKE DO SO AT THEIR OWN RISK AND TAKE FULL RESPONSIBILITY FOR ALL PROPERTY DAMAGE, PERSONAL INJURY OR DEATH CAUSED BY SUCH REPLACEMENTS.

Use only the approved parts that are listed in the illustrated parts list of this manual.

DESCRIPTION AND OPERATION

1. Description

Refer to IPL Figure 1 to identify the wheel assembly components.

CAUTION: DO NOT MIX BEARING GREASES GREASE INCOMPATIBILITY CAN RESULT IN CONTAMINATION AND LOSS OF GREASE PERFORMANCE.

The wheel assembly is a 24 x 7.7 Type III rim size split wheel design utilizing an 8:50-10, Type III tire.

The two wheel halves are attached together with eight external wrenching bolts (5), sixteen washers (10) and eight self-locking nuts (15).

The wheel halves are made from a cast aluminum alloy which are anodized and painted for corrosion protection.

A preformed packing (20) is installed on the inboard wheel half (40). The preformed packing makes an air-tight seal between the wheel halves. An air valve assembly (65) is installed in the outboard wheel half (55). The air valve assembly is used with a tubeless tire to inflate and deflate the tire.

The wheel assembly rotates on two tapered roller bearings. The tapered roller bearings include inboard and outboard bearing cups (45, 60) and inboard and outboard bearing cones (100, 105). The bearing cups are pressed into the hubs of the wheel halves. A grease seal with bonded rubber (110) and a hubcap assembly with bonded rubber (115) protect the inside of the wheel hubs from contamination.

2. Operation

The main wheel assembly is the primary interface between the main landing-gear strut and the tire during landing and taxi. The main wheels transfer stopping forces from the brake to the ground.

3. Handling Procedures

Handle the wheel bearing cones with extreme care. Many bearing failures can be traced to dropping or mishandling the bearings during maintenance. Handle and maintain the wheel components properly to protect the paint and surface finishes.

4. Specifications

Wheel Material / Size		Aluminum Alloy Casting / 24 X 7.7 Type III
Wheel Nut Torque		300 in-lb (33,9 N-m) with SAE AMS2518 or MIL-T-5544 anti-seize
Bearing Lubricant		MIL-PRF-81322 Grade 2 or DOD-G-24508A
or alternate approved bearing lubricant		Mobil Aviation Grease SHC 100
Wheel Half Coatings	Surface Pretreatment	MIL-A-8625, Type II, Class 1
	Primer: Coating:	Refer to the Repair Section
	Finish Coating::	Refer to the Repair Section

DESCRIPTION AND OPERATION

5. Brake Disc Wear and Warpage Limits

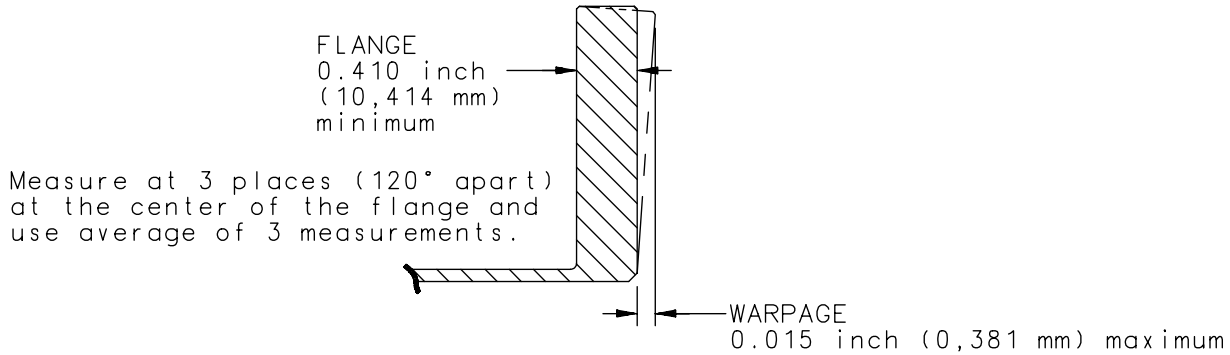


Figure 1 Disc Limits

6. Maintenance Schedule

The maintenance schedule is intended to be a guideline based on laboratory testing environments that simulate normal braking conditions. Field operating requirements can vary from aircraft to aircraft. These variations will directly affect the wear rate of the wheel assembly components. You must evaluate your own operating conditions to determine a suitable schedule to support and maintain the equipment.

NOTE: All task procedures in Table 1 refer to paragraphs in the CHECKS section.

Table 1 Maintenance Schedule

INTERVAL	ITEM	TASK
At every tire change	All parts	a. Paragraph 1.B., visual examination. and b. Paragraph 2., detailed examination as necessary.
	Bolts (5)	Paragraph 2. A., detailed examination including magnetic particle inspection.
	Preformed Packing (20)	Replace
At the 5th, 8th, 10th, 12th 14th, and 16th tire changes	Wheel Halves (40) and (55)	Paragraph 2. H., detailed examination including liquid penetrant inspection.
	Grommet (70)	Replace (more often at discretion of end user)
At the 17th tire change and every tire change after	Wheel Halves (40) and (55)	Paragraph 2. H., detailed examination including Liquid Penetrant Inspection.
	Grommet (70)	Replace
	Bolts (5)	Paragraph 2. A., detailed examination including magnetic particle inspection.
Every tire change – or – every 12 months (which ever occurs first)	Bearing Cones (100, 105)	Clean and repack then grease. Refer to paragraph 1.B, in the ASSEMBLY section.

TESTING AND FAULT ISOLATION

1. General

Refer to IPL Figure 1 to identify the wheel assembly components.

This section contains test procedures that can be used both as troubleshooting measures and means to test overhauled wheel assemblies. A test data sheet is included at the end of this section for reference.

SAFETY WARNING: FULLY ASSEMBLE THE WHEEL BEFORE TESTING. SERIOUS INJURY OR DEATH CAN OCCUR FROM TESTING A WHEEL THAT IS NOT FULLY ASSEMBLED.

WARNING: PUT ON PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Equipment and Consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 1001 Equipment and Consumables

NOMENCLATURE/ PART NO.	SPECIFICATION / SOURCE OF SUPPLY
Inflation Cage	Commercial Source
Dry nitrogen	Commercial Source
Tire Pressure Gage	Commercial Source
Torque Gage	Commercial Source
Socket Set/ Wrench Set	Standard 12 Pt. (Dbl. Hex) and Std. Hex Head (inch units), Commercial Source
Soap Solution	Mild Dishwashing Liquid, Commercial Source
Brushes	Non-Metallic Soft Bristle, Commercial Source

2. Test the Wheel Assembly

SAFETY WARNING: ALWAYS PLACE THE TIRE IN AN INFLATION CAGE BEFORE YOU INFLATE THE TIRE. INFLATING THE TIRE CAN BE VERY DANGEROUS. THE TIRE CAN EXPLODE. FAILURE TO USE AN INFLATION CAGE CAN CAUSE SERIOUS INJURY OR DEATH.

TESTING AND FAULT ISOLATION

A. Pretest Check

Do these examinations and check procedures to approve the wheel assembly for testing.

(1) Do a visual check of the wheel for corrosion, cracks, loose bearing cups, or other visible damage.

(2) Examine all threaded components to make sure they have not become loose or have lost their self-locking feature. These include the bolts (5), nuts (15), and the nut on the air valve assembly (65). If a loose component is found, tighten it. Refer to Table 8002, Torque Values.

(a) If you cannot tighten a component, then examine for damage to the threads of the component. Also examine the self-locking feature of the nuts (15). Refer to the CHECKS section.

(3) Examine the tires for cuts, flat spots, or damage to the tread or sidewall.

NOTE: Refer to the tire manufacturer's service and maintenance manuals for tire service procedures.

B. 24 Hour Pressure Test

CAUTION: COVER THE HUB OPENINGS OF THE WHEEL HALVES TO PREVENT CONTAMINATION OF THE BEARINGS.

(1) Put the wheel and tire assembly in an inflation cage.

(2) Inflate the tire to the service inflation pressure with dry nitrogen.

(a) Allow 12 hours minimum for a new tire to stretch.

(b) Measure the tire pressure. If necessary, re-inflate to the service inflation pressure again.

(3) The wheel and tire assembly must hold the service inflation pressure for 24 hours. A maximum five percent pressure drop is allowed.

(4) If the pressure drop is less than five percent:

(a) The test is completed. Remove the wheel and tire assembly from the inflation cage.

(5) If the pressure drop is more than five percent:

(a) Put the wheel and tire assembly in an inflation cage. Inflate the tire to the service inflation pressure with dry nitrogen.

(b) For a tube type tire, apply a soap and water solution to:

– the tire tube valve stem area.

Examine for air leaks.

(c) For a tubeless tire, apply a soap and water solution to:

– the air valve assembly (65)

TESTING AND FAULT ISOLATION

– the tire bead area

– the area where the wheel halves contact each other (known as the wheel register area)

Examine for air leaks.

(6) For a tube type tire, air leaks can occur at or around the tube valve stem area.

(a) Check the valve core for leakage and replace if necessary.

(b) Repeat the pressure test.

1 If the leakage continues, Refer to the DISASSEMBLY section and remove the tire from the wheel assembly.

2 Check the tube for leaks and replace the tube if necessary.

3 Repeat the pressure test.

(7) For a tubeless tire, air leaks can occur around or through the air valve assembly (65).

(a) The inflation valve assembly nut can be loose. Refer to Table 8002, Torque Values and tighten it.

(b) Repeat the pressure test.

1 If the part continues to leak, remove the part and examine the mating surfaces on the outboard wheel half (45). Examine the grommet and replace if necessary.

2 Examine the air valve components (75, 80, 85, 90) and if damaged, replace the air valve assembly (65).

3 Repeat the pressure test.

(8) For a tubeless tire, air leaks occur around the tire bead

(a) Deflate the tire and remove the wheel and tire assembly from the inflation cage.

(b) Refer to the DISASSEMBLY section and remove the tire from the wheel assembly.

(c) Examine the tire bead and wheel bead seat for damage. Use the instructions that follow.

1 Examine the tire bead. If the tire is cut or damaged, install a new tire. Refer to the ASSEMBLY section.

2 Disassemble the wheel. Refer to the DISASSEMBLY section.

3 Examine the wheel bead seat. Refer to the CHECKS section.

4 If the wheel bead seat is damaged, repair the wheel. Refer to the REPAIR section.

TESTING AND FAULT ISOLATION

5 Assemble the wheel. Refer to the ASSEMBLY section.

6 Install the tire. Refer to the ASSEMBLY section.

7 Repeat the 24 hour pressure test.

(9) For a tubeless tire, air leaks occur through the wheel

(a) Deflate the tire and remove the wheel and tire assembly from the inflation cage.

(b) Refer to the DISASSEMBLY section and remove the tire from the wheel assembly.

(c) Examine the wheel. Use the instructions that follow.

1 Disassemble the wheel. Refer to the DISASSEMBLY section.

2 Liquid penetrant inspect the wheel halves (40 and 55) for cracks. Refer to the CHECKS section. If cracks are found, replace the wheel half.

3 Assemble the wheel. Refer to the ASSEMBLY section.

4 Install the tire. Refer to the ASSEMBLY section.

5 Repeat the 24 hour pressure test.

(10) For a tubeless tire, air leaks occur where the wheel halves contact each other (known as the wheel register area)

(a) Deflate the tire and remove the wheel and tire assembly from the inflation cage.

(b) Refer to the DISASSEMBLY section and remove the tire from the wheel assembly.

(c) Examine the register area of each wheel half for damage. Examine the seal groove area of each wheel half for damage. Examine the preformed packing (20) for damage. Use the instructions that follow.

1 Examine the preformed packing. If the preformed packing is cut, torn, deformed or has other damage, install a new preformed packing. Refer to the ASSEMBLY section.

2 Disassemble the wheel. Refer to the DISASSEMBLY section.

3 Examine the wheel halves. Refer to the CHECKS section.

4 If the wheel register is damaged, repair the wheel. Refer to the REPAIR section.

5 If the sealing groove area is damaged, replace the wheel half.

6 Assembly the wheel. Refer to the ASSEMBLY section.

7 Repeat the 24 hour pressure test.

TESTING AND FAULT ISOLATION

3. Troubleshooting

Refer to IPL Figure 1 for identification of brake assembly components.

Table 1002 Troubleshooting is a list of the possible problems you can find while operating the wheel assembly. The table cannot list all possible problems and is intended to assist with troubleshooting the wheel assembly.

Table 1002 Troubleshooting

PROBLEM	POSSIBLE CAUSE	CORRECTION
Loss of tire pressure.	The packing (20) on the wheel register is worn, damaged or twisted on the mating groove.	Replace the packing and align on mating groove taking care not to twist packing.
	The rubber grommet (70) on the air valve assembly is damaged.	Replace the grommet.
	An air valve component (75, 80, 85, 90) is damaged.	Replace the air valve assembly (65).
	Damage to the sealing surface on the outer wheel half where the inflation valve rubber grommet seals.	Replace the outboard wheel half subassembly (50).
	Loss of the preload on wheel bolts (5).	Examine and replace the self-locking nuts (15) if the locking feature is defective.
	The wheel half (40 or 55) is cracked. **NOTE:** Use Liquid Penetrant Inspection to examine the wheel half for cracks at or near the surface. Refer to paragraphs 2.D. (4) in the CHECKS section. Liquid Penetrant Inspection will not detect cracks below the wheel surface. This method only scans the near surface.	Examine the wheel half for cracks. Refer to the CHECKS section. **NOTE:** A cracked wheel half cannot be repaired.
Excessive drag on the wheel when rotating.	Incorrect preload or torque on the axle nut.	Loosen and re-tighten the axle nut . Refer to the ASSEMBLY section.

TESTING AND FAULT ISOLATION

Table 1002 Troubleshooting (continued)

PROBLEM	POSSIBLE CAUSE	CORRECTION
Excessive drag on the wheel when rotating.	Damage to the bearing cones (100, 105) or bearing cups (45, 60).	Examine the bearing cones and cups. Replace any parts that are damaged or corroded. Pack the new cones with bearing grease. Refer to the ASSEMBLY section.
Cracked or damaged wheel half (40 or 55). **NOTE:** Use Liquid Penetrant Inspection to examine the wheel half for cracks at or near the surface. Refer to paragraphs 2.D. (4) in the CHECKS section. Liquid Penetrant Inspection will not detect cracks below the wheel surface. This method only scans the near surface.	Foreign object damage during landing or takeoff.	Visually examine the wheel half for cracks and other damage. Refer to the CHECKS section. Find out if the part can be repaired. Refer to the REPAIR section. **NOTE:** A cracked wheel half cannot be repaired.
	Use of sharp objects to break the tire bead.	
	Hard landing or landing with a flat tire.	
	Wheel fatigue.	Replace the wheel or wheel half.
Damaged bearing cones (100, 105) or bearing cups (45, 60).	Bearings are not in alignment.	Replace the damaged part.
	Incorrect axle nut torque.	Replace the damaged part. Tighten the axle nut in accordance with the axle nut torque procedure in the ASSEMBLY section.
	Contaminated bearing grease.	Replace the damaged part. Examine the bearing grease seal (110) for damage. Replace damaged seal. Be sure the bearing grease is clean.
	Low or no bearing grease in the bearings.	Replace the damaged part.

TEST DATA SHEET

Date _____Wheel Serial No. _____

Pretest Check refer to paragraph 2.A.

(1)	Wheel condition	**Accept _____**	**Reject _____**
(2)	Wheel assembly hardware condition	**Accept _____**	**Reject _____**
(3)	Tire condition	**Accept _____**	**Reject _____**

Comments: _____

_____

_____

_____

24 hour Pressure Test refer to paragraph 2.B. **Accept _____** **Reject _____**

Tire inflation pressure:_____ psig Required: Service inflation pressure

Pressure after 24 hrs.:_____ psig Pressure Drop: five percent maximum

Pass ____ less than five percent pressure loss

Fail ____ more than five percent pressure loss

Leakage from tire tube valve stem or from tire tube:	Yes ____ No ____
Leakage around inflation air valve (65): (if so equipped)	Yes ____ No ____
Leakage around bead seat:	Yes ____ No ____
Leakage through wheel:	Yes ____ No ____
Leakage around wheel register:	Yes ____ No ____

Comments: _____

_____

_____

_____

Tester: _____ Date: _____

DISASSEMBLY

1. General

Refer to IPL Figure 1 to identify the wheel assembly components.

WARNING: PUT ON PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

NOTE: The wheel assembly should only be disassembled as far as necessary to repair or replace defective parts.

A. Equipment and Consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 3001 Equipment and Consumables

NOMENCLATURE/ PART NO.	SPECIFICATION / SOURCE OF SUPPLY
Preformed Packing Extraction Tool Set 199-18	Parker Hannifin Corp., Aircraft Wheel & Brake Division or Parker Hannifin distributor
Tire Bead Breaker	Commercial Source
Socket Set / Wrench Set	Standard 12 Pt. (Dbl. Hex) and Std. Hex Head (inch units), Commercial Source
Screw Driver	Standard-Flat Head, Commercial Source
Soap Solution	Mild Dishwashing Liquid, Commercial Source
Valve Core Tool	Commercial Source

DISASSEMBLY

2. Remove the Wheel Assembly

SAFETY WARNING: MAKE SURE THE AIRCRAFT IS SECURE AND STABLE BEFORE BEGINNING ANY WORK. WORKING AROUND AN AIRCRAFT THAT IS NOT SECURE AND STABLE CAN CAUSE INJURY OR DEATH.

SAFETY WARNING: FULLY DEFLATE THE TIRE BEFORE REMOVING THE VALVE CORE. THE AIR IN A TIRE PUTS PRESSURE ON THE VALVE CORE. THE VALVE CORE CAN EJECT WITH GREAT FORCE AND CAN CAUSE INJURY OR DEATH.

A. Refer to the airframe manufacturer's instructions to lift and support the aircraft.

B. Deflate the tire:

- If equipped with a tube type tire, remove the cap from the tube valve stem deflate the tire by pushing the valve stem plunger until air can no longer be heard escaping from the tube.
- If equipped with a tubeless tire, remove the cap from the air valve assembly (65) and deflate the tire by pushing the valve stem plunger until air can no longer be heard escaping from the tire.

C. When all the tire pressure is released, then:

- If equipped with a tube type tire, remove the valve stem from the tube valve.
- If equipped with a tubeless tire, remove the valve stem from the air valve assembly (65).

D. Remove the remainder of the air valve assembly (65) from the outboard wheel half (55).

E. Support the wheel and tire assembly and remove the axle mounting hardware.

F. Move the wheel and tire assembly back and forth to unseat the outboard bearing.

G. Remove the wheel and tire assembly from the axle and put on a clean flat surface.

DISASSEMBLY

3. Disassemble the Wheel Assembly

SAFETY WARNING: DO NOT DISASSEMBLE THE WHEEL UNTIL THE TIRE IS COMPLETELY DEFLATED. SERIOUS INJURY TO PERSONS, OR DAMAGE TO EQUIPMENT CAN RESULT.

NOTE: The bearing cups (45, 60) are pressed into the hub of the wheel halves (40, 55). Do not remove them unless replacement is necessary. Replacement will be necessary if the bearing cups are damaged or if a more thorough inspection of the wheel is to be made.

A. Make sure the tire is completely deflated.

B. Refer to Figure 3001. Use a flathead screwdriver to remove the snap ring (120) from the inboard wheel half. Then remove the grease seal (110) and inboard bearing cone (100).

C. Then use the flathead screwdriver to also remove the snap ring (125) from the outboard wheel half. Then remove the hubcap assembly (115) and outboard bearing cone (105).

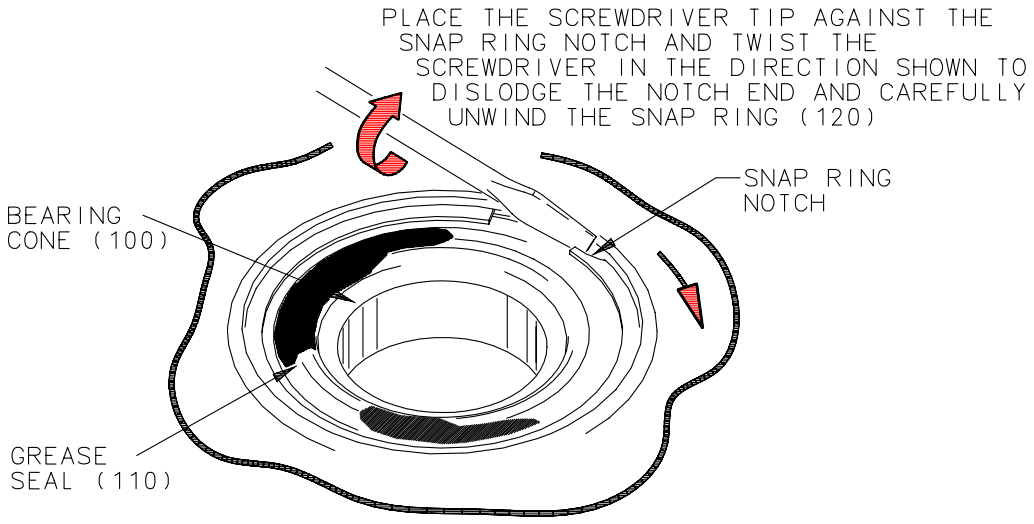


Figure 3001 Snap Ring Removal – Inboard Wheel Half Shown

D. Apply a mild dish soap and water solution around the tire bead and wheel flange to help loosen the tire from the bead seat.

CAUTION: DO NOT USE TIRE IRONS OR SCREWDRIVERS TO PULL THE TIRE AWAY FROM THE WHEEL. SHARP METAL TOOLS CAN DAMAGE THE SEALING SURFACE OF THE WHEEL.

E. Use a tire bead breaker and separate the tire beads from both wheel flanges. Apply the same pressure around the entire sidewall as close to tire beads as possible.

DISASSEMBLY

CAUTION: DO NOT USE AN IMPACT WRENCH OR A POWER WRENCH TO REMOVE THE WHEEL NUTS AND BOLTS. THESE TOOLS CAN DAMAGE THE BOLTS AND NUTS.

F. Remove the nuts (15), bolts (5) and washers (10).

G. Separate the wheel halves. Then, remove the tire.

H. Remove the preformed packing (20) from the wheel register groove of the inboard wheel half (40).

CLEANING

1. General

Refer to IPL Figure 1 to identify the wheel assembly components.

WARNING: PUT ON PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Equipment and Consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 4001 Equipment and Consumables

NOMENCLATURE/ PART NO.	SPECIFICATION / SOURCE OF SUPPLY
Plastic Media Stripping Equipment	Commercial Source
Plastic Media	MIL-P-85891, Type II or V, Grade 20/30, 3.5 MOH max U.S. Technology Corp.
Air Supply	30 psig maximum (2,1 bar), Commercial Source
Clean Cloths	Lint Free, Commercial Source
Brushes	Non-Metallic Soft and Stiff Bristle, Commercial Source
Solvent, Stoddard, Type 1	MIL-PRF-680, Commercial Source
Cleaner/Degreaser	AMS1526, Commercial Source
Mineral Spirits	Commercial Source
Soap Solution	Mild Dishwashing Liquid, Commercial Source

CLEANING

2. Cleaning Procedures

SAFETY WARNING: MAKE SURE THAT THE AREA WHERE YOU WILL USE THE CLEANING SOLVENTS HAS GOOD AIRFLOW. DO NOT TOUCH OR GET FLUID ON YOUR BODY AND DO NOT BREATH VAPORS. KEEP CONTAINERS COVERED WHEN NOT IN USE.

WARNING: MAKE SURE THAT THE COMPRESSED AIR PRESSURE IS NO MORE THAN 30 PSIG (2,1 BAR). EYE PROTECTION IS NECESSARY. EYE INJURY FROM DIRT PARTICLES OR SOLVENT SPRAY IS POSSIBLE WHEN COMPRESSED AIR IS USED.

WARNING: NEVER SPIN A BEARING WITH COMPRESSED AIR. THE COMPRESSED AIR FORCE CAN EJECT THE ROLLERS WITH GREAT FORCE AND CAUSE A SERIOUS INJURY.

A. Clean the Metal Components

NOTE: The rubber grommet (70) on the air valve stem (75) will not be harmed if the air valve assembly (65) is cleaned with the Stoddard Solvent.

(1) Clean metal parts that follow with Stoddard Solvent (MIL-PRF-680): (5, 10, 15, 30, 65, 120, 125). Use a non-metal soft bristled brush to help remove the heavy dirt deposits:

CAUTION: CAREFULLY CLEAN BEARING CONES (100, 105) IN A SEPARATE CONTAINER OF CLEAN SOLVENT TO PREVENT CONTAMINATION.

(2) Clean the bearing cones in mineral spirits. Use a non-metallic soft bristled brush to help remove all deposits. Remove the solvent chemical residue in a water based cleaner/degreaser per AMS 1526.

NOTE: Bearing cones can be packed with grease just before installation. Refer to the ASSEMBLY section. If bearing cones are packed after cleaning and drying, then place them in a clean, closed container to prevent contamination.

(3) Dry the parts using compressed air and lint-free cloths.

B. Clean the Non-Metallic Components

(1) Wipe the following rubber-based components with a clean soft cloth dampened in a mild soap and water solution or with the wheel bearing grease and a clean cloth. This will loosen the dirt:

- The nitrile preformed packing (20)
- The nitrile seal material of the grease seals (110)
- The nitrile seal material of the hubcap assembly (115)
- The rubber-based grommet (70) of the air valve assembly (65)

CLEANING

C. Clean the Aluminum Components

(1) Clean the parts that follow with Stoddard Solvent (MIL-PRF-680): (25, 40, 55). Use a non-metal soft bristle brush to remove the heavy dirt deposits.

(a) Use a soft wire brush to remove any corrosion on the air valve and fuse plug port threads.

(2) To remove the solvent chemical residue, clean parts in a water based cleaner / degreaser (per AMS 1526).

(3) Rinse the parts with a mild soap and water solution.

(4) Rinse the parts in clean water.

(5) Dry the parts using compressed air and lint free cloths.

D. Protective Coating Removal for the Aluminum Wheel Halves (40, 55) and Spacer (25)

SAFETY WARNING: DUE TO THE TOXICITY AND VOLATILITY OF CHEMICAL STRIPPING SOLVENTS, THEY ARE A HEALTH CONCERN AND NOT A RECOMMENDED SOURCE OF PROTECTIVE COATING REMOVAL.

NOTES: Removal of the protective coating (primer and topcoat) is necessary prior to conducting the liquid penetrant inspection of the wheel halves.

To achieve best results, always refer to the manufacturer's instructions for use and disposal of blast media.

(1) Clean the parts in accordance with paragraph 2.C.

(2) Blast the parts per MIL-STD-1504 with plastic media per MIL-P-85891, Type II or V, Grade 20/30, maximum media hardness of 3.5 MOH.

E. Protective Coating and Corrosion Removal for the Steel Brake Disc (30)

SAFETY WARNING: DUE TO THE TOXICITY AND VOLATILITY OF CHEMICAL STRIPPING SOLVENTS, THEY ARE A HEALTH CONCERN AND NOT A RECOMMENDED SOURCE OF PROTECTIVE COATING REMOVAL.

NOTE: To achieve best results, always refer to the manufacturer's instructions for use and also for disposal of abrasive blast media.

(1) Clean the parts in accordance with paragraph 2.A.

(2) Abrasive blast the parts per MIL-STD-1504 with 80 grit aluminum oxide media.

CHECKS

1. General

Refer to IPL Figure 1 to identify the wheel assembly components.

After a check is performed on a component, refer to the REPAIR section for applicable repairs.

Refer to Table 1 Maintenance Schedule for a timetable of scheduled maintenance tasks for the wheel assembly components. All parts must be cleaned before examination. Refer to the CLEANING section.

WARNING: PUT ON PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Equipment and Consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 5001 Equipment and Consumables

NOMENCLATURE/ PART NO.	SPECIFICATION / SOURCE OF SUPPLY
Magnetic Particle Inspection Equipment	ASTM E1444, Commercial Source
Liquid Penetrant Inspection Equipment	ASTM E1417 or MIL-STD-6866, Type 1, Method A, Sensitivity Level 2, Commercial Source
Magnifier	X10 Magnification, Commercial Source
Vernier Dial Calipers	Commercial Source

B. Visual Examination

Examine all of the parts for cuts, tears, cracks, breaks, nicks, scratches, gouges, corrosion, wear, distortion, scoring, stripped or crossed threads and other damage. Replace a part that is cracked, has thread damage, is worn beyond limits, has exceeded allowable repair or is not a repairable part.

SAFETY WARNING: THIS ASSEMBLY CONTAINS PARTS THAT HAVE A CADMIUM PLATING FINISH (5, 10, 15, 115). REMOVING THE CADMIUM PLATING CAN CREATE EXPOSURE TO CADMIUM DUST AND CADMIUM COMPOUNDS. THIS CAN BE A HEALTH HAZARD.

2. Detailed Wheel Examination

A. Examine the Hardware: Bolts (5), Washers (10), Nuts (15) and Snap Rings (120, 125).

CHECKS

CAUTION: REWORK OF BOLTS IS NOT ALLOWED.

(1) Examine the bolts (5) for distortion, cracks, corrosion, or thread damage. Closely examine for cracks in the radius under the bolt head and in the threaded area next to the bolt shank. Use magnetic particle inspection (ASTM E1444).

NOTE: If one or more of the bolts are damaged, replace all of the bolts.

(2) Examine the washers (10) for corrosion, distortion or damage. Replace a part that is distorted or damaged.

(3) Examine the nuts (15) for damage to the self-locking feature. The self-locking feature can be a deformation of the nut (elliptical), segmented beam lock, or a non-metallic insert that provides the self-locking effect. The self-locking feature is defective if:

– The self-locking feature does not tighten when you turn the nut onto the mating thread of the bolt (5).

– The nut is loose and you cannot tighten the nut to the necessary torque value.

NOTE: If one or more of the nuts are damaged, then replace all of the nuts.

(4) Examine the snap rings (120, 125) for distortion, cracks, nicks, burrs, pitting, corrosion, or other signs of damage. Replace a part that is damaged.

B. Examine the Bearing Cups (45, 60) and Cones (100, 105)

NOTE: The bearing cups (45, 60) are pressed into the hub of the wheel halves (40, 55). They should not be removed unless replacement is necessary because of damage or loose fit or for a more thorough inspection of the wheel. Refer to the REPAIR section for cup removal.

(1) Examine the bearing cups in the wheel half for loose fit, wear, corrosion, spalling, brinelling, nicks, scratches, water staining, pitting, and heat discoloration.

(2) Examine the roller surfaces of the bearing cones for wear, corrosion, spalling, pitting and heat discoloration.

(3) Examine the bearing cone cage for dents or distortion, and for wear of the roller pocket sides, corners and ends.

NOTE: [1] Refer to the bearing manufacturer's manual for more instruction.

[1] How to Recognize and Prevent Tapered Roller Bearing Damage
available from Timken Company, Canton, Ohio 44706 U.S.A.

CHECKS

C. Examine the Brake Disc (30)

Refer to Figure 1, DESCRIPTION AND OPERATION section and examine for mininum flange thickness and warpage. Replace disc when flange is worn to 0.410 inch (10,41 mm). Replace if warpage exceeds 0.015 inch (0,381 mm).

D. Examine the Grease Seal (110)

Examine for cuts, nicks, distortion, and other damage. Examine the rubber to metal bond. Replace a seal that has a tear in the rubber to metal bond. If the rubber is cracked replace the seal.

E. Examine the Hubcap Assembly (115)

Examine for cuts, nicks, distortion, and other damage. Examine the rubber to metal bond. Replace a seal that has a tear in the rubber to metal bond. If the rubber is cracked replace the hubcap assembly.

F. Examine the Air Valve Assembly (65)

(1) Examine the threads and replace if there is thread damage.

(2) Examine and replace the rubber grommet if it has cuts, tears, cracking, and other damage.

G. Examine the Spacer (25)

(1) Examine the spacer for surface cracks, nicks, corrosion, or other damage.

H. Examine the Wheel Halves (40 and 55)

SAFETY WARNING: MAKE SURE THAT THE AREA WHERE YOU WILL USE THE LIQUID PENETRANT FLUID HAS GOOD AIRFLOW. DO NOT TOUCH OR GET FLUID ON YOUR BODY AND DO NOT BREATH VAPORS. KEEP CONTAINERS COVERED WHEN NOT IN USE. LIQUID PENETRANT FLUID CAN BE TOXIC AND EXPLOSIVE.

(1) Examine the exterior surface for missing paint caused by erosion, wear, or inspection techniques.

(2) Examine the wheel halves for surface cracks, nicks, corrosion, or other damage.

NOTE: Look closely at the bead seat area for corrosion.

(3) Examine the inboard and outboard wheel half register grooves. Examine for burrs, corrosion, or other raised edges. Replace the wheel half if damage to the register areas can cause damage to the packing or prevent a good seal of the packing.

(4) Examine the sealing surface of the inflation valve where the rubber grommet seats and provides the sealing. Examine for corrosion, burrs, or other raised edges that could damage the grommet during installation or operation and cause leakage.

CHECKS

(5) When it is necessary to examine the wheel half for cracks at or near the surface use Liquid Penetrant Inspection (ASTM E1417 or MIL-STD-6866, Type 1, Method A, Sensitivity Level 2).

NOTE: The paint (topcoat and primer) must be removed from the part. The part must be clean before doing a liquid penetrant inspection procedure. Refer to the CLEANING section for paint removal and cleaning instructions.

(6) Refer to Figure 5001. Examine the wheel half for cracks and structural damage. Examine these areas carefully to find out if the wheel is serviceable:

– tire bead seat area on the inboard and outboard wheel halves

NOTE: The tire bead seat area can be damaged by tools that are used to remove the tires.

– the bolt bosses on the inboard and outboard wheel halves

– the air valve area on the outboard wheel half

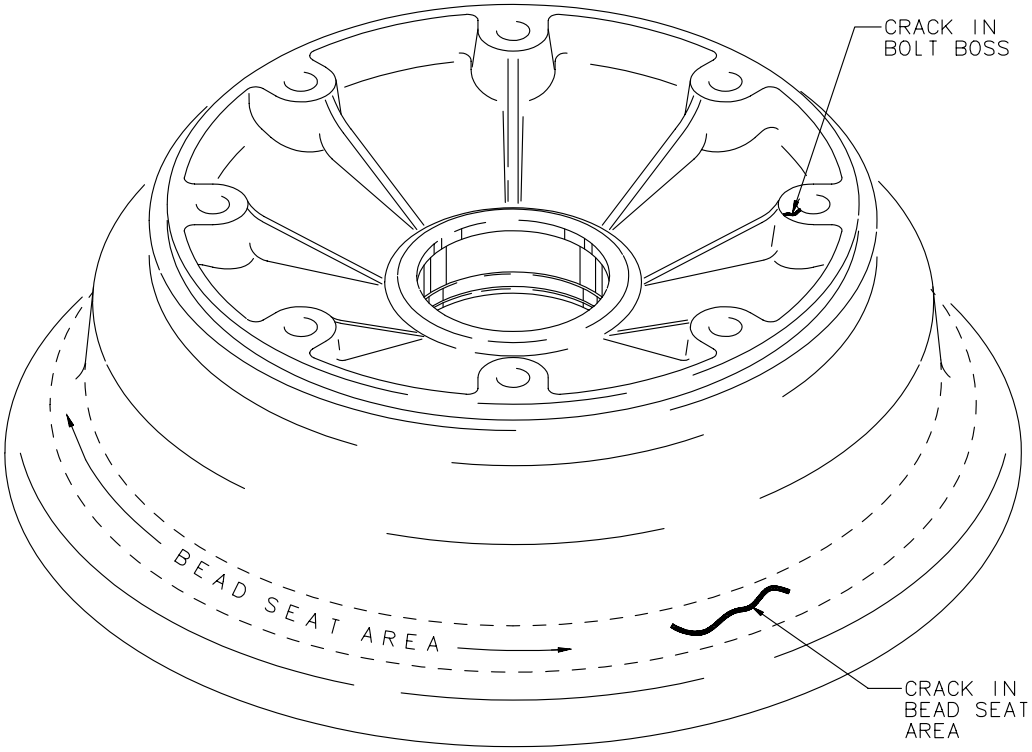


Figure 5001 Wheel Half Examination – Inboard Wheel Half Shown

REPAIR

1. General

Refer to IPL Figure 1 to identify the wheel assembly components.

WARNING: PUT ON PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

NOTE: Repairs are limited to the replacement of parts and to the repairs specified in this section.

A. Equipment and Consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 6001 Equipment and Materials

NOMENCLATURE/ PART NO.	SPECIFICATION / SOURCE OF SUPPLY
Aluminum Oxide Cloth	400 to 600 Grade or Finer, Wet or Dry, Commercial Source
Alodine 1200 or Equiv.	MIL-C-5541, Class 1A, Commercial Source
Sub-Zero Freezer or Dry Ice	-34.4°C to -51.1°C (-30°F to -60°F), Commercial Source
Oven	121°C (250°F) capacity, Commercial Source
Bearing Cup Tools	SPECIAL EQUIPMENT AND TOOLS section
Hand Files	Assorted, Commercial Source
Arbor Press	Commercial Source
Paint Application Equipment	Commercial Source
Primer and Topcoat	Refer to Table 6002
Bearing Grease: Aeroshell Grease 22	MIL-PRF-81322 Grade 2 or DOD-G-24508A Shell Oil Company, Lubricant Division
Alternate Bearing Grease: Mobil Aviation Grease SHC 100	Exxon-Mobil Oil Company, Aviation Lubricants

B. General Repairs

CAUTION: DO NOT TRY TO REPAIR A SEALING SURFACE FOR A PREFORMED PACKING.

1 Replace all parts that have cracks or distortions. Replace all parts with damage that you cannot repair. Replace all parts that are damaged or worn more than the specified limits.

2 Use 400 to 600 grade or finer, wet or dry aluminum oxide cloth to remove small burrs, nicks, and scratches.

REPAIR

CAUTION: DO NOT USE ABRASIVES CONTAINING IRON OR COPPER (STEEL WOOL, IRON OXIDE, BRASS OR STEEL WIRE). IRON OR COPPER PARTICLES WILL BECOME EMBEDDED IN THE ALUMINUM AND MAGNESIUM COMPONENTS AND WILL INCREASE THE AMOUNT OF CORROSION.

2. Detailed Repairs

A. Repair the Wheel Halves (40 and 55)
The wheel halves are made from an aluminum alloy casting.

(1) Surface damage repair

(a) Blend out small nicks, gouges, scratches and light corrosion.

(2) Clean and surface treat the repaired areas

(a) Clean the wheel halves. Refer to paragraph 2.C., CLEANING section.

(b) Apply a corrosion preventative (Alodine 1200 or equivalent) to the repaired areas. Refer to MIL-C-5541, Class 1A.

B. Repair the Spacer (25)
The spacer is made from an aluminum alloy casting.

(1) Surface damage repair

(a) Blend out small nicks, gouges, scratches and light corrosion.

(2) Clean and surface treat the repaired areas

(a) Clean the spacer. Refer to paragraph 2.C., CLEANING section.

(b) Apply a corrosion preventative (Alodine 1200 or equivalent) to the repaired areas. Refer to MIL-C-5541, Class 1A.

C. Painting the Wheel Halves (40, 55) and Spacer (25)

SAFETY WARNING: PAINT MATERIALS CAN BE TOXIC AND VOLATILE. USE ONLY IN WELL VENTILATED AREAS. AVOID PHYSICAL CONTACT WITH PAINTS AND DO NOT INHALE VAPORS. KEEP PAINT CONTAINERS COVERED WHEN NOT IN USE. OBSERVE FIRE PRECAUTIONS.

NOTE: Because of local EPA low VOC requirements, Aircraft Wheel & Brake uses Columbia or Sherwin Williams primers and topcoats in the production of the wheel assembly. Alternative products can be used by the repair facility.

REPAIR

(1) For small areas requiring a paint touchup.

(a) Prepare the area by sanding lightly with 600 grade or finer, wet or dry aluminum oxide cloth and feather out all edges of the adjacent area.

(2) Clean the surfaces to be painted.

CAUTION: DO NOT GET PAINT ON THE BEARING CUPS. PAINT ON THE BEARING CUPS CAN CAUSE BEARING FAILURE.

(3) Mask the parts from the primer and topcoat as follows:

(a) For the wheel halves, mask the bearing bores, inflation valve ports and the inflation valve cross drilled holes.

(b) The spacer does not require masking.

(4) Apply the primer and topcoat per Table 6002.

NOTE: To achieve best results, always refer to the manufacturer's instructions for mixing, pot life, application and use and also for disposal of primer and topcoat media.

Table 6002 Primer and Topcoat Product Characteristics

MANUFACTURER	PRIMER	TOPCOAT	DRY FILM THICKNESS AND AIR DRY TIMES [1]
Columbia Paint Corp. Huntington, WV	P/N 18-017A (water reducible) No mixing required.	P/N 17-250A (524 Aluminum) (water reducible) No mixing required. It is desirable to apply topcoat without thinning, however, topcoat material may be thinned up to 10% by volume with either water (use distilled) or a mixture of 4 parts water to 1 part butyl cellosolve.	Primer: 0.0002-0.0005 in. 15 minutes min. (to touch or topcoat) 60 minutes (to handle) 4-24 hours (dry hard) Topcoat (includes primer): 0.0008-0.0014 in. 15 minutes (to touch) 30 minutes (to handle) 48 hours (dry hard)
Alternate: Sherwin Williams Co. Cleveland, OH	2 parts washcoat (P/N P60G2) 3 parts catalyst reducer (P/N R7K44)	P/N F63BXS58-4337 6 parts base 1 part catalyst (P/N V66V27) Thin using up to 20% polane reducer (P/N R7K84).	Primer: 0.0002-0.0004 in. 3-10 minutes (to touch) 10-60 minutes (to topcoat) Topcoat (includes primer): 0.0008-0.0014 in. 20 minutes (to touch) 60 minutes (to handle) 24 hours (dry hard)

[1] Refer to the manufacturer's data sheet for forced dry (oven heating) schedule.

REPAIR

D. Replacement of the Bearing Cups (45, 60)

The bearing cups are pressed into the hub of the wheel halves (40, 55). Do not remove them unless replacement is necessary. Replacement will be necessary if the bearing cups are damaged or if a more thorough inspection of the wheel is to be made.

WARNING: PUT ON PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK. DRY ICE AND HOT PARTS CAN BE THE CAUSE OF INJURY.

CAUTION: BEARING CUPS AND CONES MUST BE REPLACED AS A SET.

REMOVE THE AIR VALVE ASSEMBLY (65) BEFORE HEATING THE WHEEL HALVES.

WORK SWIFTLY. THERMAL EXPANSION AND CONTRACTION OF PARTS WILL AFFECT THE INSTALLATION PROCESS.

DO NOT HEAT WHEEL HALF ABOVE 93.3° C (200° F).

DURING BEARING CUP REMOVAL AND INSTALLATION, SUPPORT THE WHEEL HALF ON THE HUB, NOT ON THE FLANGE. SUPPORTING THE WHEEL HALF ON THE FLANGE CAN DAMAGE THE FLANGE.

NOTE: [2] Refer to the bearing manufacturer's manual for damage allowances.

(1) Removal
Refer to Figure 6001 and remove the bearing cups using the following procedure.

NOTE: Oven heating is the preferred method for heating the wheel half. If oven heating is not possible, use a container of clean, boiling water.

(a) Heat one of the wheel halves (40 or 55) to 79 to 93.3° C (175 to 200° F). Do not heat the wheel half for more than 30 minutes.

(b) Remove the wheel half from the heat source and place it on the support base (Figure 9001B or 9002B).

(c) Place the one of the bearing cup presses (Figure 9001A or 9002A) over the support base guide pin and rest it on the back face of the bearing cup (45 or 60).

(d) Use an arbor press to apply even pressure to the cup press. The bearing cup will then drop out.

(e) Repeat steps (a) thru (d) for the remaining wheel half.

[2] How to Recognize and Prevent Tapered Roller Bearing Damage
available from Timken Company, Canton, Ohio 44706 U.S.A.

REPAIR

(2) Installation
Refer to Figure 6002 and install the bearing cups using the following procedure.

NOTE: The installation of the bearing cup is made easier when the bearing cup is frozen.

(a) Make sure that the bearing bores and the bearing cups are clean and free of burrs.

(b) Before installing, use a sub zero freezer or dry ice and freeze the bearing cups to between -34° to -51°C (-30° to -60°F).

(c) Remove the bearing cup from the freezer or the dry ice.

(d) Dry the bearing cups to remove the condensation.

NOTE: Do not let the primer coating dry before installing the bearing cup.

(e) Apply a coat of primer to the bearing bore surface where the bearing cup will be installed. This will help prevent corrosion.

(f) Place one of the wheel halves on the support base (Figure 9001D or 9002D). Align the mating bearing cup over the bore. Place one of the cup pushers (Figure 9001C or 9002C) on the front face of the cup.

(g) Press the bearing cup into the bearing bore by applying even pressure to the cup installation tool. Make sure that the back face of the bearing cup is flush against the surface (shoulder) of the bearing bore. See Figure 6002.

(h) See Figure 6002. Check for proper seating of the cup against the housing shoulder. Try to insert a 0.002 inch feeler gauge between the back surface of the bearing cup and the bearing bore shoulder.

(1) The feeler gauge must not be able to be inserted at any location between the back surface of the cup and the bearing bore shoulder.

(i) Wipe off excess primer and let the wheel half cool to room temperature.

(j) Apply a light coat of bearing grease to the bearing cup I.D. to prevent corrosion.

(k) Repeat steps (a) thru (j) for the remaining wheel half.

REPAIR

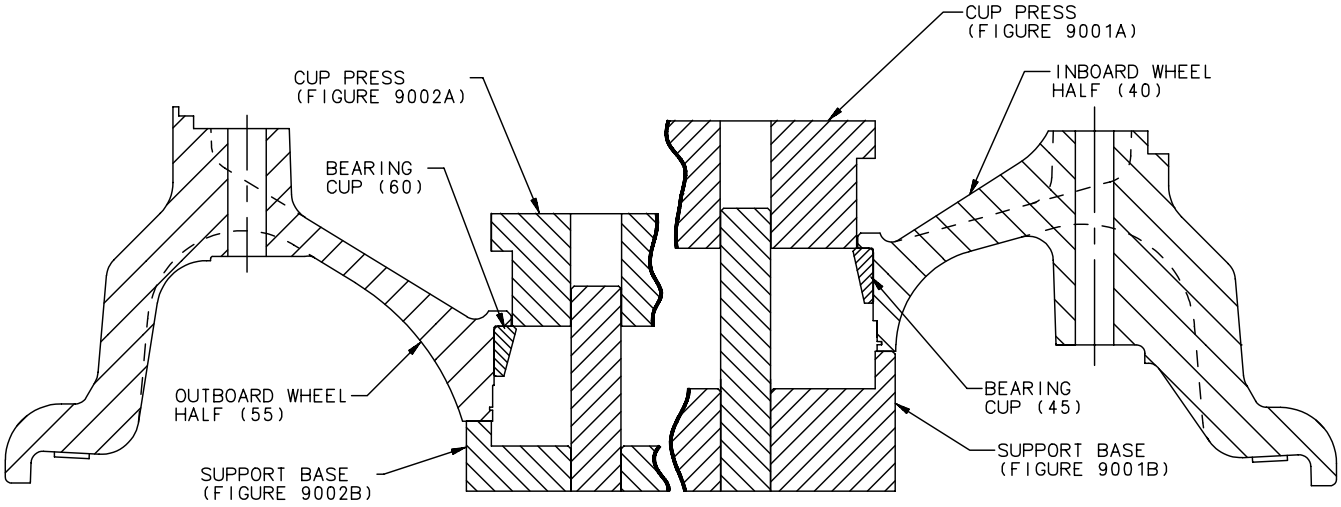


Figure 6001 Bearing Cup Removal

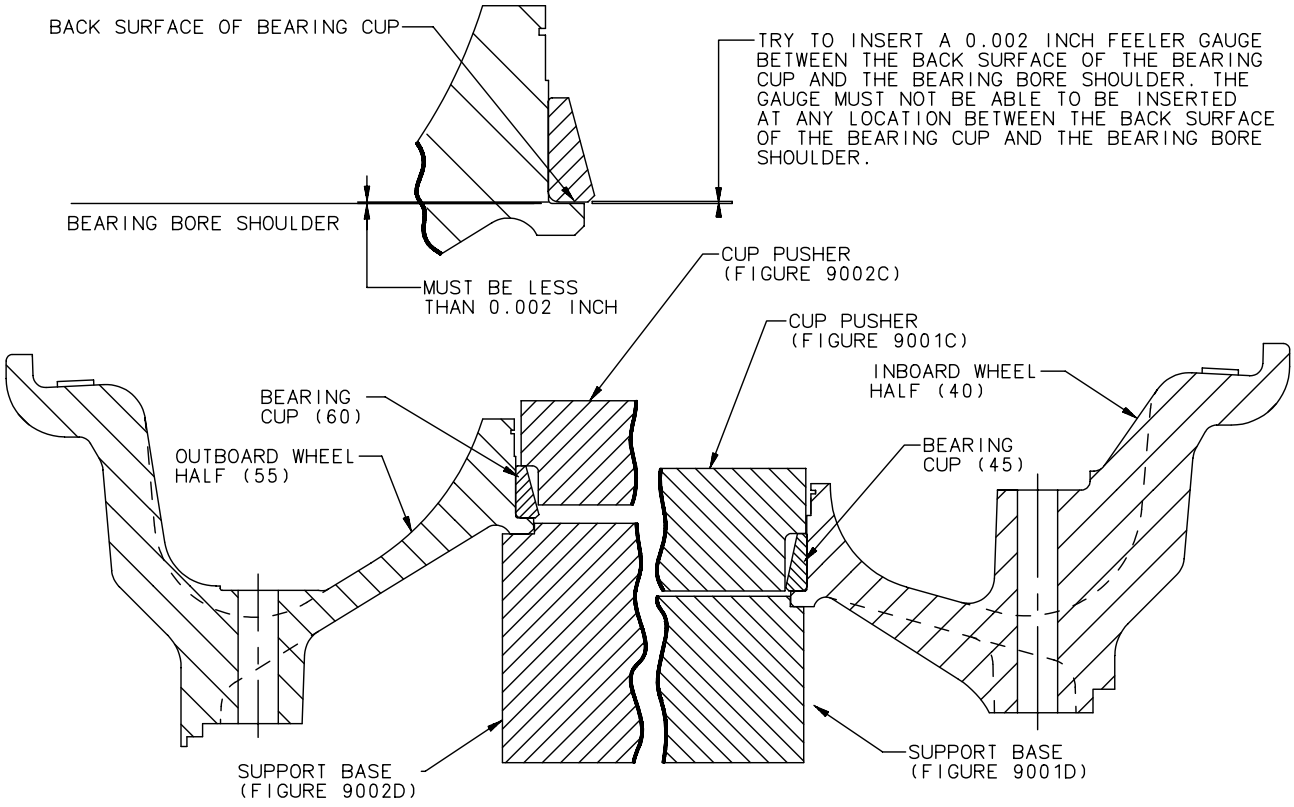


Figure 6002 Bearing Cup Installation

ASSEMBLY

1. General

Refer to IPL Figure 1 to identify the wheel assembly components.

A. Support Equipment, Consumables, and Materials

Supplier information can be found in the SPECIAL EQUIPMENT AND TOOLS section. The term “Commercial Source” lets the repair facility get the product from a supplier of choice.

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 7001 Support Equipment, Consumables, and Materials

NOMENCLATURE/ PART NO.	SPECIFICATION / SOURCE OF SUPPLY
Bearing Grease: Aeroshell Grease 22	MIL-PRF-81322 Grade 2 or DOD-G-24508A Shell Oil Company, Lubricant Division
Alternate Bearing Grease: Mobil Aviation Grease SHC 100	Exxon-Mobil Oil Company, Aviation Lubricants
Dow Corning 55 Lube or a lube per MIL-G-4343	Dow Corning Corporation or Commercial Source
Clean Cloths	Lint Free, Commercial Source
Soap Solution	Mild Dishwashing Liquid, Commercial Source
Preformed Packing Extraction Tool Set, 199-18	Parker Hannifin Corp., Aircraft Wheel & Brake Division or Parker Hannifin distributor
Socket Set/ Wrench Set	Standard 12 Pt. (Dbl. Hex) and Std. Hex Head (inch units), Commercial Source
Inflation Cage	Commercial Source
Torque Gage	Commercial Source
Tire Pressure Gage	Commercial Source

ASSEMBLY

B. Bearing Cone Grease Packing Procedure

The correct application of grease to the tapered roller bearing will reduce friction, dissipate heat and maintain a rust and corrosion proof coating on the operating surfaces of the roller bearings.

CAUTION: IF USING AN ALTERNATE OR EQUIVALENT SUBSTITUTE FOR THE GREASE SPECIFIED IN TABLE 7001, DO NOT MIX BEARING GREASES. GREASE INCOMPATIBILITY CAN RESULT IN CONTAMINATION AND LOSS OF GREASE PERFORMANCE.

NOTE: Pack the bearing cones just before installation to prevent contamination or pack the bearing cones immediately after cleaning and drying and then place them in a clean, closed container.

NOTE: Packing the bearings with grease is best performed with the use of a mechanical lubricating fixture such as a bearing greaser.

(1) If necessary, clean the bearing cones. Refer to the CLEANING section.

(2) Push the grease up between the rollers, cone and cage. Make sure that all empty spaces inside the cone are filled (see Figure 7001). Make sure that a thick coat of grease is applied to the roller surfaces on the outside of the cone.

NOTE: Shaded area shows the recommended quantity of grease.

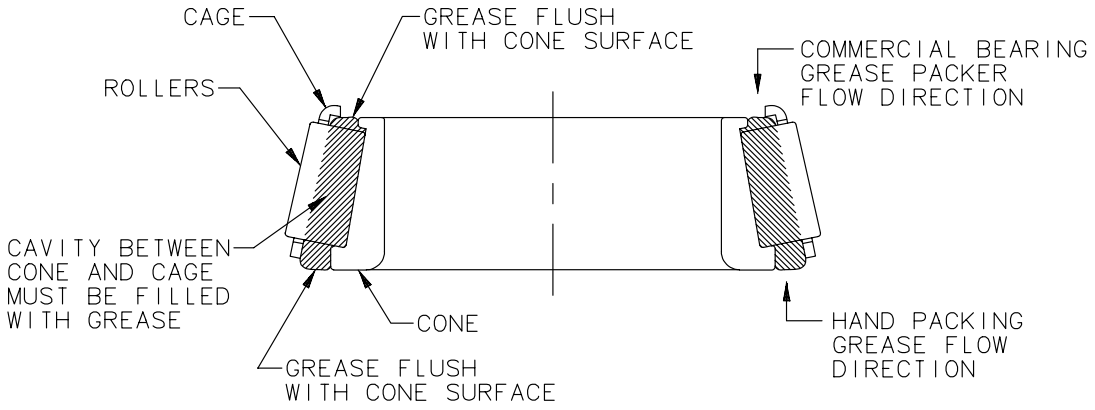


Figure 7001 Packing Bearing Cones

ASSEMBLY

2. Assembly Procedures

A. Install the Bearing Cups (45, 60)

If new bearing cups are necessary, install them now. Refer to the REPAIR section. If it is not necessary to replace them, continue to step 2.B.

B. Wheel and Tire Pre-Assembly Preparation

(1) Examine the bead seat area of the wheel halves. If necessary, remove all lubricant, grease or foreign material with a clean cloth moistened with a mild soap and water solution or with denatured alcohol.

(2) The mating surfaces of the wheel halves should not have nicks, burrs, small dents, or other damage. Damaged mating surfaces can prevent the wheel halves from mating or sealing.

(3) The preformed packing (20) groove in each wheel half should be examined for damage or other debris that would prevent the packing from properly seating. Remove any lubricant, grease or foreign material with a clean cloth moistened with a mild soap and water solution or with denatured alcohol.

(4) Examine the air valve grommet (70) for damage such as cuts, tears, cracking. Replace if necessary.

(a) Install the air valve assembly (65) in the outboard wheel half (55). Torque the air valve nut (85) to the values shown in Table 8002.

C. Tire Mounting

(1) Place the inboard wheel half subassembly (35) on a clean work surface with the register side facing up.

(2) Examine the wheel register preformed packing (20) for damage. Replace if necessary.

(a) Apply a light coat of Dow Corning 55 O-ring lube or a lube per MIL-G-4343 or an equivalent to the preformed packing before installation.

NOTE: A light coat of the wheel bearing grease can be used as an alternate.

CAUTION: THE PREFORMED PACKING (20) MUST BE INSTALLED UNIFORMLY. IT SHOULD BE FREE OF KINKS AND TWISTS.

(b) Install the preformed packing in the wheel register groove of the inboard wheel half (40).

ASSEMBLY

CAUTION: COMPOUNDS SUCH AS TALC INCREASE TIRE SLIPPAGE. REMOVING TALC WILL MINIMIZE TIRE SLIPPAGE ON THE WHEEL.

(3) Make sure that the tire is clean inside. If it is not cean or is coated with a talc compound, then wipe the bead base with a clean cloth moistened with a mild dishwashing soap and water solution or a suitable rubber cleaner.

CAUTION: WHEN YOU INSTALL A TIRE, DO NOT APPLY A LUBRICANT TO THE TIRE OR THE WHEEL BEAD SEAT. A LUBRICANT CAN CAUSE THE TIRE TO SLIP IN SERVICE AND DAMAGE THE WHEEL BEAD SURFACE.

(4) Place a serviceable tire (see airframe manufacturer's manual) over the inboard wheel half (40) being careful not to move the preformed packing (20).

(5) Position the spacer (25) on the hub section of the inboard wheel half (40) then position the outboard wheel half (55) inside the tire and align the bolt holes of both wheel halves.

(6) Align the red balance dot on the tire with the air valve hole.

(a) If there is no balance dot on the tire.

1 Align the tire serial number with the air valve hole.

D. Attach the Wheel Half Subassemblies (35) and (50)

(1) Install a washer (10) onto each bolt (5).

NOTE: The nuts (15) must be located on the outboard wheel half side.

(2) Install the following equally spaced: a minimum of three bolts (5) [with installed washers (10)] through the holes in the brake disc (30) and align the brake disc on the bosses of the inboard wheel half (35), then:

(a) Compress the wheel halves and install a washer (10) and nut (15) on each bolt. Tighten the nuts by hand.

(3) Repeat steps (1) and (2) for the remaining bolts, washers and nuts.

CAUTION: DO NOT USE IMPACT OR POWER WRENCHES TO TORQUE THE WHEEL NUTS AND BOLTS. THE USE OF IMPACT OR POWER WRENCHES CAN CAUSE OVER TIGHTENING.

NOTE: The fasteners must be tightened by applying the torque to the nut while holding the bolt head.

NOTE: While tightening the fasteners, ensure that both ends of the spacer (25) are properly aligned and engaged on each wheel hub.

ASSEMBLY

(5) Use the following steps and torque all of the nuts (15).

(a) Step one: (1/3 final torque): Torque to 100 in-lb (11,3 N-m) in a criss-cross pattern.

(b) Step two: (2/3 final torque): Torque to 200 in-lb (22,6 N-m) in a criss-cross pattern.

(c) Step three: (final torque): Torque to 300 in-lb (33,9 N-m) in a criss-cross pattern.

NOTE: The application of "torque stripe" can be applied at the junction of the nut and the bolts. This will provide a monitor for torque retention. This can be done at the discretion of the maintenance facility

E. Tire Inflation

SAFETY WARNING: ALWAYS PLACE THE TIRE IN AN INFLATION CAGE BEFORE INFLATING. INFLATING THE TIRE CAN BE VERY DANGEROUS. THE TIRE CAN EXPLODE. FAILURE TO USE AN INFLATION CAGE CAN CAUSE SERIOUS INJURY OR DEATH. SERVICE THE TIRE WITH INFLATION EQUIPMENT DESIGNED FOR THIS OPERATION.

DO NOT INFLATE THE TIRE TO THE OPERATING PRESSURE UNTIL THE WHEEL/TIRE ASSEMBLY HAS BEEN MOUNTED ON THE AIRCRAFT.

(1) Inflate the tire to the service inflation pressure to seat the tire beads on the wheel. Then reduce the tire pressure to the recommended storage pressure and remove the wheel/tire assembly from the inflation cage.

F. Final Assemble the Wheel

(1) Place the wheel/tire on a clean surface.

(2) If not already done, pack the bearing cones (100, 105) with wheel bearing grease and put aside. Refer to paragraph 1.B. for the grease packing procedure.

(3) Before installing the bearing cone, apply a light coat of wheel bearing grease to the following:

- Exposed surfaces of the bearing cups (45, 60).
- The outside profile of the grease seal (110).
- The molded rubber of the hubcap assembly (115).

ASSEMBLY

(4) Install a bearing cone (100) in the inboard wheel half subassembly (35) and then install the following in the hub of the inboard wheel half:

- The grease seal (110).
- The snap ring (120). Install the end of the snap ring into the groove in the hub of the inboard wheel half and wind or spiral the ring into the groove.

(5) Install a bearing cone (105) in the outboard wheel half subassembly (50) and then install the following in the hub of the outboard wheel half:

- The hubcap assembly (115).
- The snap ring (125). Install the end of the snap ring into the groove in the hub of the outboard wheel half and wind or spiral the ring into the groove.

(6) Put a cover on the inboard hub opening of the wheel to prevent the bearing from being contaminated with dirt and moisture. Keep the cover on until the wheel assembly is installed on the aircraft.

(7) Test the wheel assembly. Refer to the TESTING AND FAULT ISOLATION section.

G. Install the Wheel and Tire Assembly On the Aircraft

(1) Remove the hubcap assembly (115) and snap ring (125) from the outboard wheel haf subassembly (50), then install the wheel and tire assembly on the axle.

(2) Use the following steps to install the axle attaching hardware and tighten the axle nut.

(a) install the wheel bearing retaining washer and then the axle nut on the axle.

1 Tighten the axle nut.

a. Tighten the axle nut to 300 in-lb (33,9 N-m) while rotating the wheel to make certain that the bearing cones are seated. Then back the torque off to 0 in-lb or a snug condition.

CAUTION: DO NOT EXCEED 120 IN-LB (13,5 N-M) ON FINAL TORQUE WHEN ADVANCING THE AXLE NUT TO ALIGN THE COTTER PIN HOLE OF THE AXLE AND ONE OF THE AXLE NUT SLOTS.

b. While rotating the wheel, re-torque the axle nut to 80 to 100 in-lb (9,0 to 11,3 N-m). If one of the slots in the axle nut do not line up with the cotter pin hole in the axle, continue to tighten the axle nut until the first available alignment is reached, but do not advance the axle nut using torque in excess of 120 in-lb (13,5 N-m).

c. Install the hubcap assembly (115) in the hub of the outboard wheel half subassembly (50) and secure with the snap ring (125).

FITS AND CLEARANCES

1. General

Refer to IPL Figure 1 to identify the wheel assembly components.

A. Assembly Wear Limits

Table 8001 In-Service Wear Limits

PART NAME (IPL ITEM NUMBER)	FIGURE	WORN AREA DESCRIPTION	WORN DIMENSION
Brake Disc	1	Flange Thickness Warping	0.410 inch (10,414 mm) minimum 0.015 inch (0,381 mm) maximum

B. Assembly Torque Values

Table 8002 Assembly Torque Values

PART NAME	TORQUE LIMITS
Nut (15)	300 in-lb (33,9 N-m) final torque apply anti-seize compound [1]
Nut (85) of the Air Valve Assembly (if so equipped)	75 to 100 in-lb (8,4 to 11,3 N-m)

[1] **NOTE:** Refer to ASSEMBLY section for applying anti-seize compound.

SPECIAL EQUIPMENT AND TOOLS

1. General

This section contains source of supply information for all applicable sections of this manual.

A. Source of Supply

NOTE: Unless specified differently, you can use equivalent alternatives for the items listed.

Table 9001 List of Manufacturers

PRODUCT NOMENCLATURE	SPECIFICATION OR REQUIREMENT	SOURCE OF SUPPLY	DISASSEMBLY	CLEANING	CHECKS	REPAIR	ASSEMBLY
Preformed Packing Extraction Tool Set 199-18	N/A	Parker Hannifin Corp. Aircraft Wheel & Brake Div. Avon, OH 44011 U.S.A. or Parker Hannifin distributor	X				X
Plastic Media for stripping paint	MIL-P-85891, Type II or V, Grade 20/30, 3.5 MOH max	U.S. Technology Corp. Canton, OH 44702 U.S.A.		X			
Dow Corning 55 Lube	N/A	Dow Corning Corporation Midland, MI U.S.A.					X
Bearing Grease: Aeroshell Grease 22	MIL-PRF-81322 Grade 2 or DOD-G-24508A	Shell Oil Company Lubricant Division Metairie, LA U.S.A					X
Alternate Bearing Grease: Mobil Aviation Grease SHC 100	N/A	Exxon-Mobil Oil Company Aviation Lubricants Fairfax, VA U.S.A					X
Bearing Cup Tools	Figure 9001 and 9002	N/A				X	

SPECIAL EQUIPMENT AND TOOLS

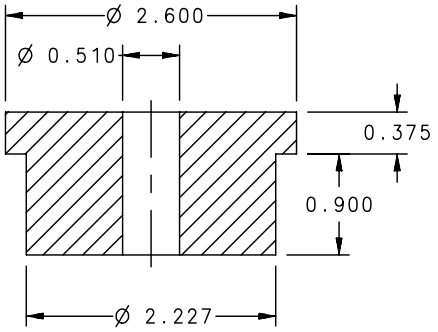


FIGURE 9001A
REMOVAL CUP PRESS
(INBOARD WHEEL HALF)

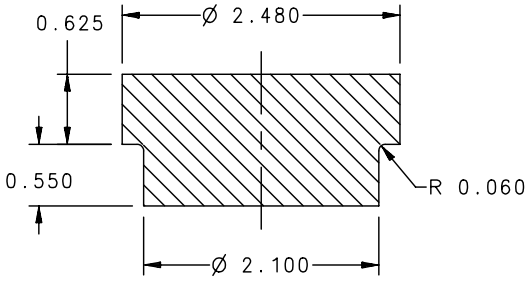


FIGURE 9001C
INSTALLATION CUP PUSHER
(INBOARD WHEEL HALF)

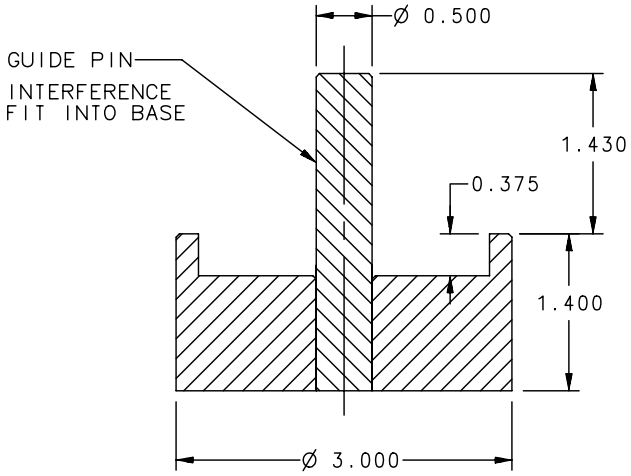


FIGURE 9001B
REMOVAL SUPPORT BASE
(INBOARD WHEEL HALF)

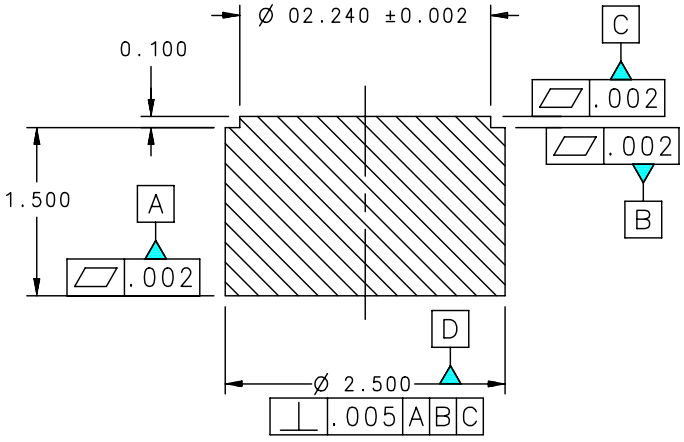


FIGURE 9001D
INSTALLATION SUPPORT BASE
(INBOARD WHEEL HALF)

Figure 9001 Inboard Wheel Half Bearing Cup Tools

Notes for Figure 9001:

1. Material: 4130 steel or equivalent
   Heat treat to 40-45 Rc
2. Tolerances unless otherwise specified:
   .XXX ± 0.010 inch
3. Break unspecified sharp edges
   0.005-0.015 inch

SPECIAL EQUIPMENT AND TOOLS

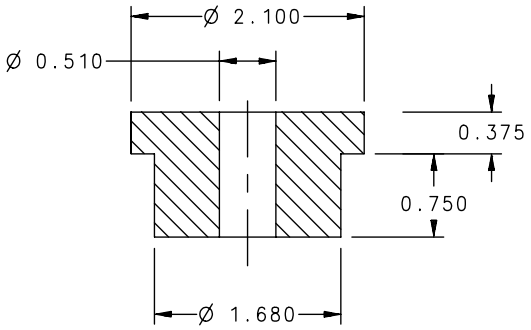


FIGURE 9002A
REMOVAL CUP PRESS
(OUTBOARD WHEEL HALF)

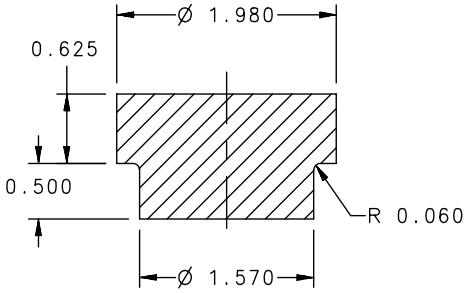


FIGURE 9002C
INSTALLATION CUP PUSHER
(OUTBOARD WHEEL HALF)

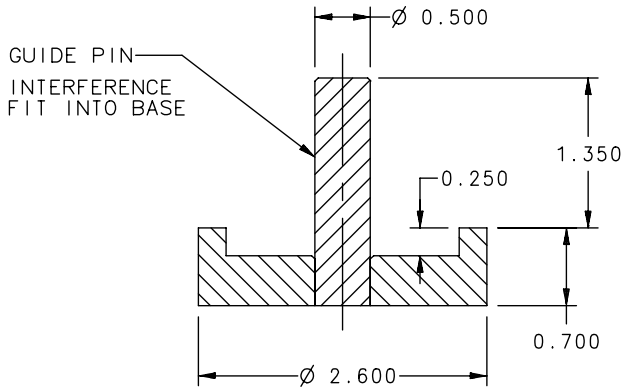


FIGURE 9002B
REMOVAL SUPPORT BASE
(OUTBOARD WHEEL HALF)

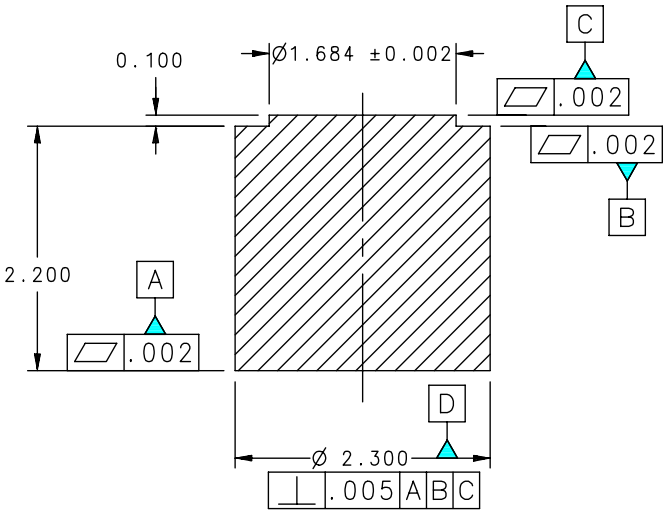


FIGURE 9002D
INSTALLATION SUPPORT BASE
(OUTBOARD WHEEL HALF)

Figure 9002 Outboard Wheel Half Bearing Cup Tools

Notes for Figure 9002:

1. Material: 4130 steel or equivalent
   Heat treat to 40-45 Rc
2. Tolerances unless otherwise specified:
   .XXX ± 0.010 inch
3. Break unspecified sharp edges
   0.005-0.015 inch

ILLUSTRATED PARTS LIST

1. General

The illustrated parts list describes and illustrates the detail parts of the wheel assembly.

All parts are listed, except parts, which lose their identities by being permanently fastened to other parts of assemblies and cannot be disassembled.

A. Explanation of Columns

(1) Figure/Item column: The figure and item numbers refer to the applicable Illustrated Parts List (IPL) Figure. The first number shows the figure number of the illustration.

(2) Part Number column: This column shows the Parker Hannifin Aircraft Wheel and Brake part number for the individual item.

(3) Airline Stock Number column: This column gives the Airline Stock Number when applicable.

(4) Nomenclature column: This column identifies the parts being listed by noun name followed by modifiers when applicable. The indenting system used in the parts list shows the relationship of the parts to their subassemblies and to the assembly:

1 2 3 4
Assembly
Attaching Parts for Assembly
  Detailed Parts for Assembly
    Subassembly
    Attaching Parts for Subassembly
      Detailed Parts for Subassembly

(5) Effectivity column: An effectivity code shows the difference in parts within different configurations. The effectivity code is used for more than one configuration of the basic part number. Effectivity codes only apply to the figure in which they are used.

(6) Units Per Assembly column: This column shows the total number required for each assembly or for each subassembly as applicable. These abbreviations may appear in the Units Per Assembly column:

AR..... As Required (for bulk items)
NP..... Item is Nonprocurable (listed for reference only)
RF ..... Reference (item listed for reference only)

ILLUSTRATED PARTS LIST

B. Part Numbering System

Parker Hannifin Aircraft Wheel & Brake has given a part number to all the purchased and government standard off-the-shelf parts. They are defined and used as follows:

When a purchased part is listed, the Parker Hannifin AWB part number will be used in the part number column. If required by contract or if the original manufacturer of a purchased part has FAA manufacturing approval then; the original manufacturer's part number along with the manufacturer's federal supply code will be shown in parentheses following the part nomenclature. The letter "V" will precede the federal supply code.

Unless specified differently by contract, the assigned Parker Hannifin AWB part number will be used in the part number column to identify government standard off-the-shelf parts (such as MS, AN, NAS, etc.).

C. Parts Replacement Data

The interchangeability relationship between parts is identified in the Nomenclature column of the parts list. A list of the terms used to show interchangeability and their definition is as follows:

Term	Abbreviation	Definition
Optional	OPT	This part is optional to and interchangeable with other parts in the same item number variant group or other item number if designated.
Superseded by	SUPSD BY	The part in the part number column is replaced by and is not interchangeable with the item number shown in the notation.
Supersedes	SUPSDS	The part in the part number column replaces and is not interchangeable with the item number shown in the notation.
Replaced by	REPLD BY	The part in the part number column is replaced by and interchangeable with the item number shown in the notation.
Replaces	REPLS	The part in the part number column replaces and is interchangeable with the item number shown in the notation.
Vendor	V	Federal Supply Code for vendors.

ILLUSTRATED PARTS LIST

D. Items Not Illustrated

Items not illustrated are shown by a dash (-) in front of the item number in the Figure/Item number column.

E. Alpha Variant Item Numbers

Alpha variants A through Z (except I and O) are assigned to existing numbers when necessary to show:

(1) Added items
(2) Modification or configuration differences
(3) Optional parts

Alpha variant item numbers are not shown on the exploded view when the appearance and location of the alpha variant item is the same as the basic item.

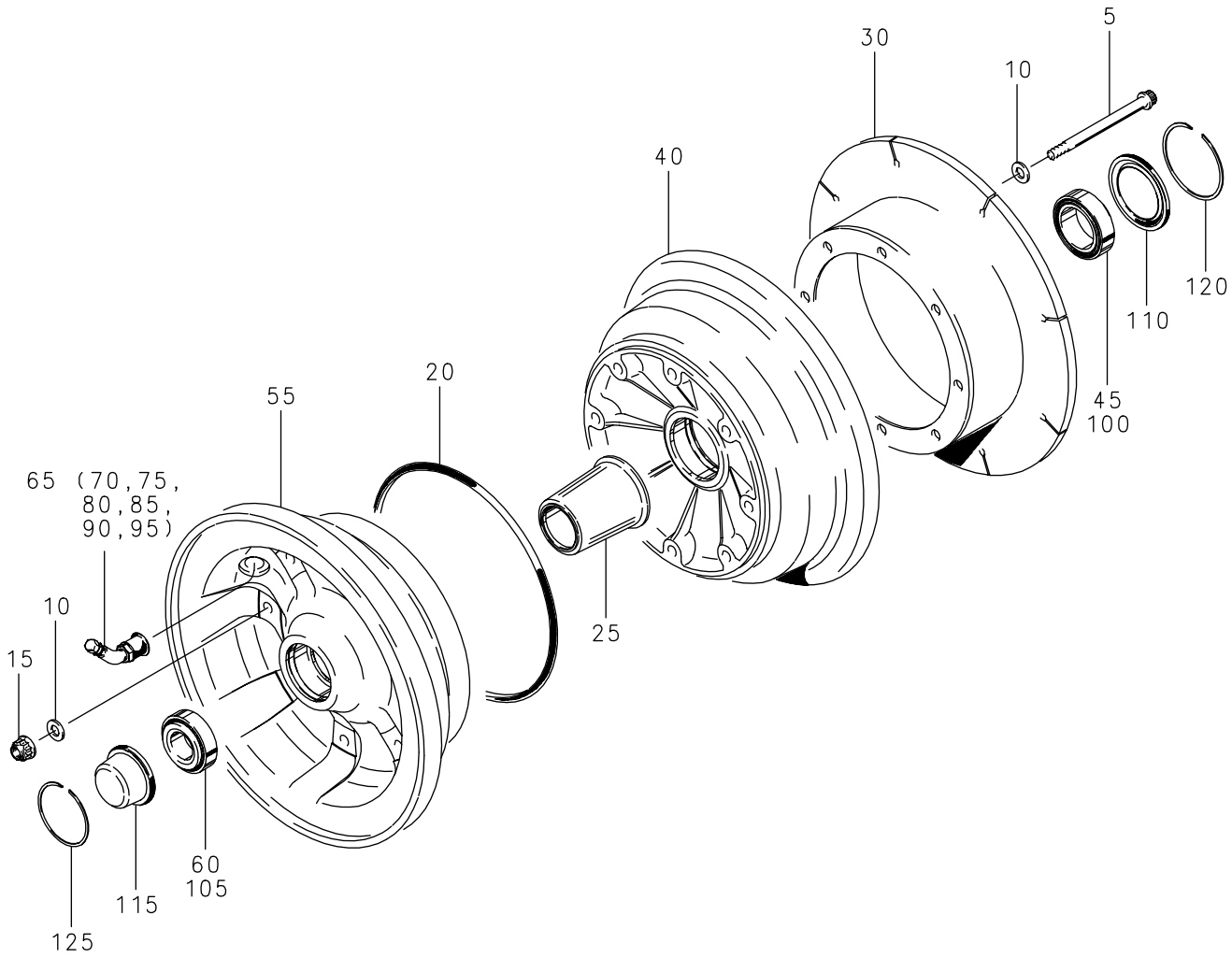
2. Optional Vendor Index

Not applicable.

3. Federal Supply Code for Manufacturers

Not applicable.

ILLUSTRATED PARTS LIST



IPL Figure 1 Main Wheel Assembly Exploded View

ILLUSTRATED PARTS LIST

4. Detailed Parts List – Main Wheel Assembly

FIG. ITEM	PART NUMBER	AIRLINE STOCK NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	EFF CODE	UNITS PER ASSY.
1 - 1	40-170A		MAIN WHEEL ASSEMBLY		RF
			ATTACHING PARTS		
5	103-32500		BOLT (MS21250-06056)		8
10	095-03100		WASHER (MS20002C6)		16
15	094-15800		NUT (NAS1804-6N)		8
			* * *		
20	101-24100		. PREFORMED PACKING (MS28775-266)		1
25	067-04100		. SPACER		1
30	164-20900		. BRAKE DISC		1
– 35	161-14900		. SUBASSEMBLY, WHEEL HALF, INBOARD		1
40	151-14200		. . WHEEL HALF, INBOARD		NP
45	214-01300		. . CUP, BEARING		1
– 50	162-13700		. SUBASSEMBLY, WHEEL HALF, OUTBOARD		1
55	152-14000		. . WHEEL HALF, OUTBOARD		NP
60	214-03400		. . CUP, BEARING		1
65	160-01100		. . AIR VALVE ASSEMBLY (Tire & Rim P/N 716-05)		1
70	- - - - - - - -		. . . GROMMET (Tire & Rim P/N RG-44)		RF
75	- - - - - - - -		. . . STEM, VALVE (Tire & Rim P/N 716-04)		RF
80	- - - - - - - -		. . . CORE, VALVE (Tire & Rim P/N C-4)		RF
85	- - - - - - - -		. . . NUT (Tire & Rim P/N HN-4)		RF
90	- - - - - - - -		. . . SPACER (Tire & Rim P/N S-10)		RF
95	- - - - - - - -		. . . CAP, VALVE (Tire & Rim P/N VC-5)		RF
100	214-01400		. CONE, BEARING, INBOARD		1
105	214-01000		. CONE, BEARING, OUTBOARD		1
110	154-03600		. GREASE SEAL		1
115	158-01900		. HUBCAP ASSEMBLY		1
120	155-00100		. SNAP RING, INBOARD		1
125	155-00600		. SNAP RING, OUTBOARD		1
– 130	166-15900		. NAMEPLATE		1

STORAGE

CAUTION: WHEELS STORED IN CARDBOARD BOXES, WHICH HAVE BECOME WET OR HAVE BEEN EXPOSED TO HIGH HUMIDITY, CAN BECOME CORRODED.

1. Procedures

The storage instructions are for wheels stored without the tires mounted.

A Rubber Based Components

The shelf life of components that are made of or contain a rubber based material is listed below. The serviceable life can be decreased by exposure to sunlight, very high or low temperatures, low humidity, ozone, contamination of fluids or lubricants, severe operating conditions, etc.

(1) The preformed packing (20) has a shelf life of 15 years from the date of manufacture (also known as the cure date).

(2) The following components that contain rubber based material have a shelf life of 15 years from the date of manufacture:

- The air valve assembly grommet (70).
- The grease seal (85) has bonded rubber.
- The hubcap assembly (90) has bonded rubber.

B. Storage Time

NOTE: Wheel assemblies stored without the rubber based components installed have an indefinite storage life.

(1) Use the instructions below to store a wheel assembly up to a maximum of 90 days.

(a) Plug or cover the wheel hub openings to help prevent dirt and moisture contamination.

STORAGE

(2) Use the instruction below to store a wheel assembly for longer than 90 days:

(a) Remove and store all components that are made of or contain a rubber based material in separate ultraviolet protective containers.

(b) Remove and store the bearing cones (75, 80) in a clean, dry container.

(c) Apply a coat of bearing grease to the exposed surfaces of the installed bearing cups (45, 60) to prevent corrosion and plug or cover the wheel hub openings.

(d) Install a minimum of three sets of bolts, washers, and nuts (5, 10, and 15) at equally spaced locations. Tighten the nuts enough to keep the wheel halves secure. Do not tighten to the assembly torque value until the equipment is ready to be installed on the aircraft. Keep the remaining bolts, washers, and nuts in a clean, dry container.

(3) Storage Conditions

The wheel assembly should be stored in a clean, dry environment. The desirable temperature range is from 10° to 25°C (50° to 77°F). Exposure to extreme temperatures can affect service life.

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

METALLIC BRAKE LINING CONDITIONING PROCEDURE

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.

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

Conditioning may be accomplished as follows:

1. Perform two (2) consecutive full stop braking applications from 30 to 35 kts. Do not allow the brake discs to cool substantially between stops.

2. On aircraft with tail wheels, exercise caution during stopping to prevent tail lifting. Due to the efficiency of these brakes, extremely hard braking could result in lifting the tail from the ground.

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

Visual inspection of the brake disc will indicate the lining condition. A smooth surface, without grooves, indicates the linings are properly glazed. If the disc is rough (grooved), the linings must be reglazed. The conditioning procedure should be performed whenever the rough disc condition is evident.

Light use, such as in taxiing, will cause the glaze to be worn rapidly.

Use caution in performing this procedure, as higher speeds with successive stops could cause the brakes to overheat resulting in warped discs and/or pressure plates.

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

Cleveland
Wheels & Brakes

Parker Hannifin Corporation
Aircraft Wheel & Brake
1160 Center Road
Avon, Ohio 44011 USA
1-800-BRAKING (272-5464)
440-937-1315 ● FAX 440-937-5409

PRODUCT REFERENCE MEMO

WHEEL ASSEMBLIES – PREFERRED BEARING GREASE (MOBIL AVIATION GREASE SHC 100)

EFFECTIVITY: All Parker Hannifin (Cleveland Wheels & Brakes) wheel assemblies.

APPLICABILITY: Any aircraft equipped with Parker Hannifin wheel assemblies.

REASON: ExxonMobil "Mobil Aviation Grease SHC 100" is the preferred bearing grease for use in all Parker Hannifin (Cleveland Wheels & Brakes) wheel assemblies.

DESCRIPTION: Mobil Aviation Grease SHC 100 is a high performance grease which combines a synthesized hydrocarbon base fluid with a lithium soap thickener. The thickener system provides a high dropping point, excellent resistance to water wash and a tenacious structural stability. The unique properties provide outstanding protection against wear, rust, corrosion and high temperature degradation. The grease is recommended for aviation applications which need a lubricant that can perform normal functions yet go far beyond in terms of high and low temperature and long-life performance. The grease has an operating temperature range of -65°F (-54°C) to + 350°F (+177°C). There is no Military specification for this product.

CAUTION: Aviation bearing greases should not be intermixed with each other. Precautions should be taken to ensure that this grease is not intermixed with other wheel bearing greases and is being used in accordance with the manufacturer's guidelines. For technical Data and MSDS sheets on Mobil Aviation Grease SHC 100, visit the manufactures Web Site at: www.mobil.com

COMPLIANCE: Recommended

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

WEIGHT & BALANCE: Not applicable

PUBLICATIONS: The information contained in this Product Reference Memo (PRM78) is to be incorporated into the Product Catalog and Maintenance Manual at the next revision of each.

INSTRUCTIONS: At next tire change or overhaul remove and discard the grease felts. Thoroughly clean wheel assembly and completely remove the contained grease from the bearings, bearing bore and hub per Component Maintenance Manual. Refer to AWBCMM0001, latest issue, for grease packing instructions. Pack bearings with Mobile SHC-100. Install new felt grease seals lubricated with Mobile SHC-100.

CIVIL AVIATION AUTHORITY

Central Office

G.P.O Box 367
Canberra
ACT 2601
Telephone: 062 684111
Telex: 62221
FAX: 485239

Our ref: F88/865

Aircraft Wheel and Brake Division
Parker Hannifin Corporation
1160 Center Road
Avon Ohio 44011
UNITED STATES OF AMERICA

PARKER HANNIFIN CORP.
SEP 29 1988
AW & B

Dear Sir/Madam

We are pleased to advise you that the following FAA STC has been accepted for Beech 90, A90, B90, C90 and E90 aircraft in Australia:

SA 619 GL - INSTALLATION OF CLEVELAND WHEELS AND BRAKES

The data package will be retained in our "commercial in confidence" storage for continuing airworthiness purposes. It will not be made available to anyone, other than an officer of the Authority with a need to know, without your written consent. This is a condition of STC acceptance and we trust this is satisfactory to you.

Thank you for your co-operation on this project.

Yours faithfully

(D J Bradford)
for Manager
Aircraft Certification

21 September 1988

cc Lloyd Aviation Jet Charter
Adelaide Airport
ADELAIDE SA 5000

Attn: Mr G Manning
Assistant Chief Inspector

General Manager SA/NT Region

Attn: Mr J Crocker
Adelaide Airport

REPÚBLICA FEDERATIVA DO BRASIL
Ministério da Aeronáutica
CENTRO TÉCNICO AEROESPACIAL

CERTIFICADO DE HOMOLOGAÇÃO SUPLEMENTAR DE TIPO

NÚMERO 9210-04

CATEGORIA NORMAL

Este documento, emitido com base na Portaria nº **453/GM5, de 02 de Agosto de 1991**, em nome de: **PARKER HANNIFIN CORPORATION**
1160 Center Road, P.O. Box 158
Avon, OHIO 44011
U.S.A.

atesta que a modificação ao projeto de tipo do produto citado abaixo, observadas as **limitações e condições** especificadas no **Adendo** a este Certificado, satisfaz os requisitos de aeronavegabilidade aplicáveis ao produto original.

PRODUTO ORIGINAL

Marcas de nacionalidade e de matrícula: **- X - X -**

Fabricante: **BEECH AIRCRAFT CORPORATION**

Modelo(s): **90, A90, B90, C90, C90A, E90, 65-A90-1 e 65-A90-4**

Nº de série: **- X - X -** Nº do Certificado de Tipo: **3A20 (FAA)**

DESCRIÇÃO DA MODIFICAÇÃO

Instalação do CLEVELAND WHEELS AND BRAKES - KIT 199-90/199-90A, Rev. K, de 30/07/90, de acordo com o PARKER HANNIFIN INSTALLATION INSTRUCTIONS, Rev. G, de 30/07/90, ou em revisões posteriores aprovadas pelo CTA.

DATAS

Do requerimento: **04 SET 92** Da emissão: **13 OUT 92** Da reemissão:

APROVAÇÃO

Chefe da Divisão de Homologação Aeronáutica
PAULO GASTÃO SILVA - Maj Eng

Diretor do CTA
Maj Brig do Ar - ADYR DA SILVA

FDH-200-04C

NOTAS

a) Este Certificado e os dados técnicos com base nos quais ele foi emitido são válidos até que sejam cancelados, suspensos, revogados ou um prazo limite seja estabelecido pelo **Centro Técnico Aeroespacial.**

b) O proprietário deste Certificado deve:
- mantê-lo integrado ao dossiê do respectivo processo de homologação;
- manter cópia do Certificado a bordo da aeronave junto dos documentos da mesma.

ENDOSSO DE TRANSFERÊNCIA* ***NÃO APLICÁVEL***

Transfiro a propriedade deste Certificado de Homologação Suplementar de Tipo para:

ADQUIRENTE	Nome:	
	Logradouro:	
	CEP: Cidade:	Estado:
TRANSFERENTE	Nome:	
	Logradouro:	
	CEP: Cidade:	Estado:

Data de Transferência:

Assinatura do Transferente:

* - No caso de transferência de propriedade deste Certificado, o transferente deve preencher o quadro **"Endosso de Transferência"**, e o adquirente deve enviar este Certificado à Divisão de Homologação Aeronáutica para que seja reemitido em nome do adquirente.

OBSERVAÇÕES

- ***KIT 199-90A aplicável somente as aeronaves BEECH 90 de N/S LJ-1 até LJ-113.***

European Aviation Safety Agency

SUPPLEMENTAL TYPE CERTIFICATE

10039114

This Supplemental Type Certificate is issued by EASA, acting in accordance with Regulation (EC) No. 216/2008 on behalf of the European Community, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation and in accordance with Commission Regulation (EC) No. 1702/2003 to

PARKER HANNIFIN CORPORATION
AIRCRAFT WHEEL & BRAKE DIVISION

1160 CENTER ROAD
AVON OH 44011
USA

and certifies that the change in the type design for the product listed below with the limitations and conditions specified meets the applicable Type Certification Basis and environmental protection requirements when operated within the conditions and limitations specified below:

Original Product TC Number : 1. EASA.IM.A.503
Original Product TC Number : 2. FAA 3A20
TC Holder : HAWKER BEECHCRAFT CORP
Model : 1. C90A, C90GT, C90GTI
Model : 2. 65-90, 65-A90
Model : 2. 65-A90-1 (JU-21A)
Model : 2. 65-A90-4 (RU-21E, RU-21H)
Model : 2. B90, C90, E90, H90 (T-44A)
Original STC Number : FAA STC SA619GL

Description of Design Change:
EASA Validation of FAA STC SA619GL
Installation of Parker Hannifin Main Wheel and Brake Conversion Kit Part Numbers 199-90 in accordance with Parker Hannifin Conversion Kit Installation Manual IM 199-90, Revision J, dated January 7, 2009, or later FAA approved revisions.

See Continuation Sheet(s)

For the European Aviation Safety Agency,

Date of issue: 10.04.2012

European Aviation Safety Agency
Paul HATTON
Project Certification Manager

Note:
The following numbers are listed on the certificate:
EASA current Project Number: 0010015859-001

EASA Certification Basis:
The Certification Basis for the original product remains applicable to this certificate/ approval.
The requirements for environmental protection and the associated certificated noise and/ or emissions levels of the original product are unchanged and remain applicable to this certificate/ approval.

Associated Technical Documentation:
Parker Hannifin Conversion Kit Installation Manual IM 199-90, Rev. J, dated January 7, 2009.
Instructions for Continued Airworthiness of the Main Wheel and Main Brake in accordance with the Parker Hannifin Conversion Kit 199-90.
or later revisions of the above listed documents approved by EASA in accordance with EASA ED Decision 2004/04/CF (or subsequent revisions of this decision)

Limitations:
None

Conditions:
Prior to installation of this modification it must be determined that the interrelationship between this modification and any other previously installed modification and/ or repair will introduce no adverse effect upon the airworthiness of the product.

- end -

Note:
The following numbers are listed on the certificate:
EASA current Project Number: 0010015859-001

Luftfahrt-Bundesamt
I312/14/95-2021

Braunschweig, 21.6.1995

Mitteilung über die Ergänzung der Musterzulassung Nr. 0617/2021

STC-Inhaber: Aircraft Wheel and Brake Division
Parker Hannifin Corporation

Änderung: Einrüstung Parker Hannifin Wheel and Brake Conversion Kit 199-90

Muster/Baureihe: Beech 65-90, 65-A90, B90, C90, C90A u. E90

Geräte-Kennblatt Nr.: 2021

Die Musterzulassung des/der o.a. Musters/Baureihe wird durch folgende Angaben ergänzt:

Die Verwendung des Parker Hannifin Wheel and Brake Conversion Kit 199-90 in Beech 65-90, 65-A90, B90, C90, C90A und E90 entsprechend dem FAA Supplemental Type Certificate **SA619GL** ist zugelassen.

So umgerüstete Flugzeuge sind zu betreiben nach dem Installation Manual

1) 199-90; FAA-anerkannt am 30.07.1990 und
2) 199-90A; FAA-anerkannt am 19.04.1989

oder jede spätere FAA-anerkannte Fassung.

Unterlagen sind zu beziehen bei:

1) **Atlas Air Service GmbH**
Postfach 15 64
27766 Ganderkesee

oder

2) **Parker Hannifin Corporation**
Aircraft Wheel & Brake
1160 Center Road
P.O. Box 158
Avon, Ohio 44011
USA

Diese Mitteilung gilt in Verbindung mit dem Flugzeug-Kennblatt Nr. 2021, der jeweils gültigen Ausgabe.

MINISTERE DE L'EQUIPEMENT, DU LOGEMENT,
DES TRANSPORTS ET DU TOURISME

DIRECTION GENERALE DE L'AVIATION CIVILE

SERVICE
DE LA FORMATION AERONAUTIQUE
ET DU CONTROLE TECHNIQUE

DIVISION AERONEFS

Issy-les-Moulineaux, le 24 décembre 1996

FEDERAL AVIATION ADMINISTRATION
2300 East Devon avenue Room 232
Des Plaines, IL 60018
U.S.A.

BUREAU NAVIGABILITE DES AERONEFS
D'AVIATION GENERALE

N/Ref : SFACT/N.AG

V/Ref : letter dated November 14, 1996 de Parker Hannifin Corp.

Affaire suivie par : Hugues LE CARDINAL
Tel : (33) (1) 41 09 44 85
Fax : (33) (1) 41 09 43 19

Objet : STC SA 619GL

Monsieur,

La société Parker Hannifin Corp. nous a transmis une demande d'approbation de STC par sa lettre du 14 novembre 1996.

Après étude, la DGAC a l'honneur d'approuver cette installation définie dans le STC 619GL daté du 23 juin 1982 sur les avions Beech 90, A90, B90, C90, C90A, E90, H90, 65-A90-1 et 65-A90-4. Je vous prie de transmettre cette approbation à la société Parker Hannifin Corp. avec nos compliments.

Je vous prie d'agréer, Monsieur, l'expression de mes salutations distinguées.

H. Le Cardinal

Copies : - Mr Barry W. BARKER, Parker Hannifin Corp.

P.J. : - 1 traduction de courtoisie

COURTESY TRANSLATION

Sir,

The Parker Hannifin Company has sent to us an application for a STC with its letter dated November 14, 1996.
After studies, DGAC approves the installation defined in the STC 619GL dated 6/23/1982 on the aircraft Beech 90, A90, B90, C90, C90A, E90, H90, 65-A90-1 et 65-A90-4.
Please provide this approbation to the Parker Hannifin Company with our congratulations.

Best Regards,

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 SA619GL

This certificate issued to Parker Hannifin Corporation
Aircraft Wheel & Brake Division
1160 Center Road
Avon, IH 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 3 of the Civil Air *Regulations.* See Type Certificate Data Sheet 3A20 for complete certification basis.

Original Product - Type Certificate Number: 3A20

Make: Hawker Beechcraft

Model: 65-90, 65-A90, 65-A90-1 (JU-21A), 65-A90-4 (RU-21E, RU-21H), B90, C90, C90A, C90GT, C90GTi, E90, H90 (T-44A)

Description of Type Design Change:
Installation of Parker Hannifin Main Wheel and Brake Kit Part Numbers 199-90 in accordance with Parker Hannifin Conversion Kit Installation Manual IM199-90, Revision J, dated January 7, 2009, or later FAA approved revisions.

Limitations and Conditions
1 Compatibility of this design change with previously approved modifications must be determined by the installer
2 A copy of this Certificate must be maintained as part of the permanent records for the modified aircraft
3 If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission

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 29, 1982

Date of issuance: June 23, 1982

Date reissued:

Date amended: August 24, 1982, August 22, 1983, October 11, 1988, November 22, 1991, January 5, 1995, June 4, 2009

By direction of the Administrator

(Signature)

for Roy E. Boffo, III
Acting Manager, Systems and Flight Test Branch
Chicago Aircraft Certification Office

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