AIRCRAFT WHEEL & BRAKE DIVISION
PARKER HANNIFIN CORPORATION
AVON, OHIO

FAA-PMA

PARTS LIST

199-110 CONVERSION KIT

* Beech Aircraft – Models As Noted
Those equipped with standard gear,
18 X 5.5 Main Wheels & Brakes

PART NO.	CODE NO.	DRAWING REVISION	DESCRIPTION	QUANTITY
30-146	030-14600	Rev. N dated 01-14-2013	Brake Assembly	4
40-289	040-28900	Rev. G dated 07-31-2012	Wheel Assembly	4
111-05800	111-05800	Rev. B dated 11-23-2009	Hydraulic Line Assembly	2
207-01901	207-01901	Rev. D dated 07-08-2013	Hose Assembly	2

Publication Package (P/N PP199-11000)

IM199-110	Rev. H, dated 06-18-2010	Installation Manual
50-79	Rev. P, dated 01-19-2011	Installation Drawing
CM30-146	Rev. D, dated 01-19-2011	Component Maintenance Manual for 30-146
CM40-289	Rev. B, dated 08-10-2004	Component Maintenance Manual for 40-289
SA646GL		Supplemental Type Certificate
SA650GL		Supplemental Type Certificate
SA890GL		Supplemental Type Certificate
EASA #10043296		EASA STC for Beech 200 Series (SA890GL)
ANAC #2013S08-15		ANAC STC for Beech 200 Series (SA890GL)
PRM14A		Conditioning Procedure for Metallic Brake Lining
PRM51		Alternate Cylinder Connecting Line Installation For Brake Model 30-146
PRM78		Wheel Assemblies Alternate Bearing Grease
-------		Pilot Operating Manual Inserts
-------		Product Registration Card

NOTES:
1. This kit will convert one aircraft to Cleveland Wheels and Brakes.
2. The 30-146 brake assembly is designed for use with MIL-H-5606 hydraulic fluid.

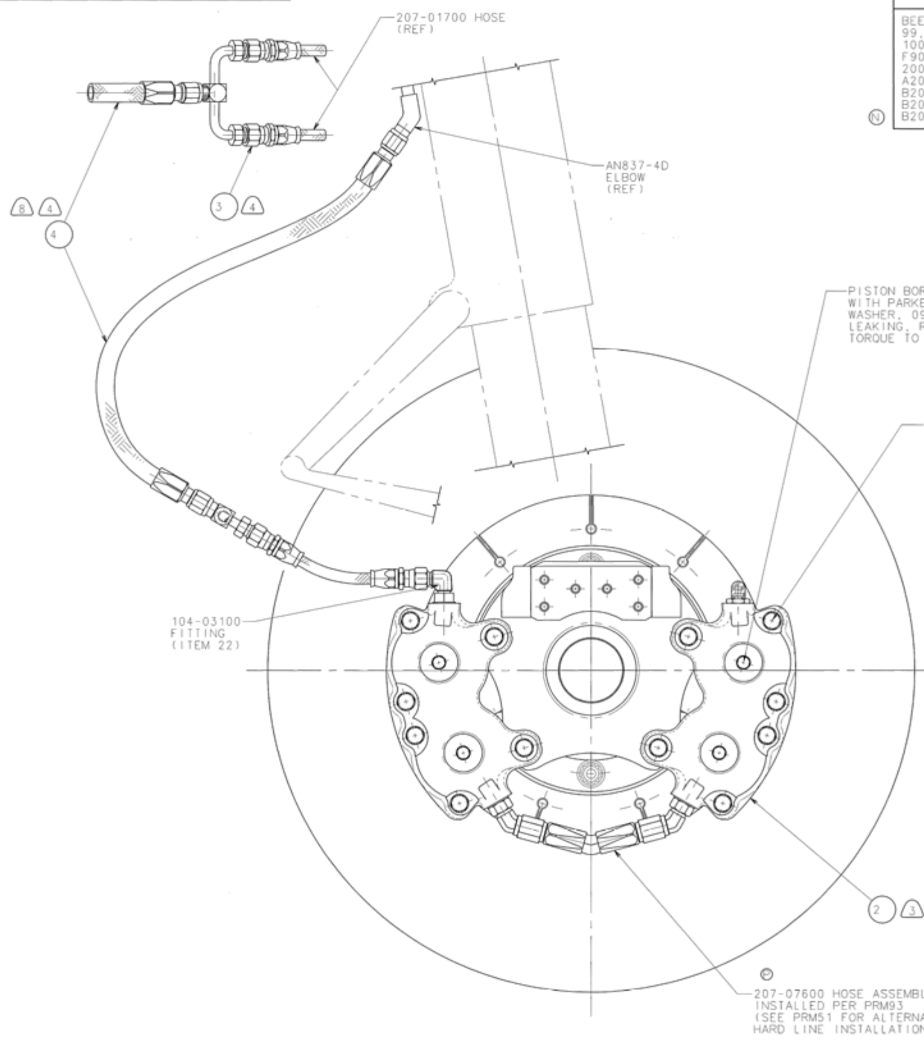
* Applicability as follows:
- STCSA646GL…… Beech Models 99, 99A, A99A, B99, C99, 100, A100, B100
- STCSA650GL…… Beech Model F90
- STCSA890GL…… Beech Models 200, 200C, 200CT, 200T, A200, A200C, A200CT, B200, B200C, B200CT, B200T, B200GT, B200CGT

199-110 Rev. NC 12-13-1982 (C/N 271-23)
Rev. AA 11-24-2009 (DCN 0387-17)
Rev. AB 06-18-2010 (DCN 0389-80)
Rev. AC 01-19-2011 (DCN 0390-56)
Rev. AD 11-11-2011 (DCN 0394-70)
Rev. AE 09-07-2012 (ECO-0014664)
Rev. AF 01-16-2013 (ECO-0019353)
Rev. AG 09-04-2013 (ECO-0026329)

REVISIONS						
CHANGE NOTICE	REV	DESCRIPTION OF CHANGE	CHG BY	CHK BY	DATE	APPROVED
0362-52	M	PRODUCTION CHANGE. SEE C/N	PH	BB	08-10-2004	REH
0385-80	N	PRODUCTION CHANGE. SEE C/N	PH	BB	06-18-2010	PK
0390-56	P	SEE C/N	GL	BB	01-19-2011	BG

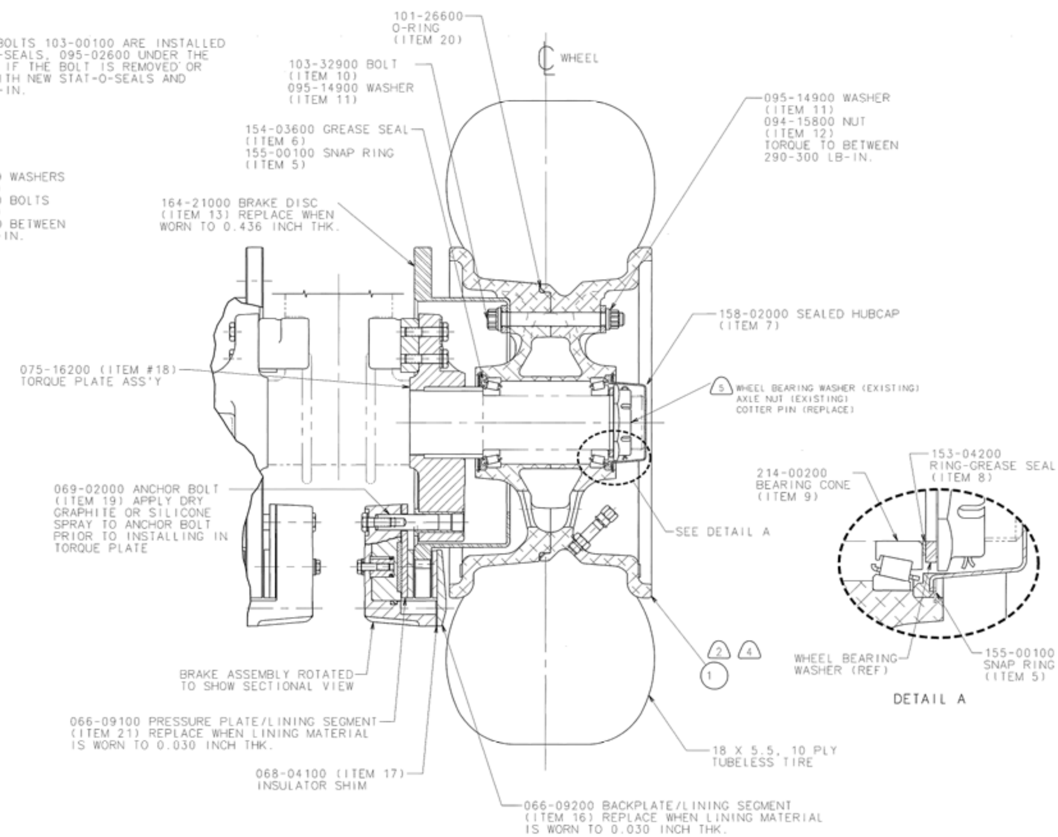
APPLICABILITY OF AIRCRAFT INSTALLATION FOR CLEVELAND KIT 199-110

MODEL	TIRE SIZE	PLY	TYPE	PRESSURE
BEECH MODELS: 99, 99A, A99A, B99, C99 100, A100, B100 F90 200, 200C, 200CT, 200T A200, A200C, A200CT B200, B200C, B200CT, B200T B200 HIGH DENSITY CONFIGURATION (N) B200GT, B200CGT	18 X 5.5 TYPE VII	10 PLY	TUBELESS	PER MANUAL



LEFT HAND GEAR

FORWARD



OUTBOARD

NOTES:

1. REFER TO IM199-110 INSTALLATION MANUAL FOR DETAILED INSTALLATION INSTRUCTIONS.
2. FOR WHEEL ASSEMBLY MAINTENANCE AND PARTS BREAKDOWN, SEE CM40-289 MAINTENANCE MANUAL.
3. FOR BRAKE ASSEMBLY MAINTENANCE AND PARTS BREAKDOWN, SEE CM30-146 MAINTENANCE MANUAL.
4. THIS COMPONENT IS SUPPLIED IN THE 199-110 KIT
5. THESE COMPONENTS ARE NOT SUPPLIED IN THE 199-110 KIT. CONSULT THE BEECH ILLUSTRATED PARTS CATALOG FOR COMPONENT PART NUMBER.
6. THIS KIT IS TO BE USED WITH AIRCRAFT EQUIPPED WITH STANDARD GEAR. FOR THOSE AIRCRAFT EQUIPPED WITH BEECH BRAKE DEICE SYSTEM; THE USE OF 199-168 HOT AIR MANIFOLD KIT IS REQUIRED.
7. THIS KIT IS TO BE USED WITH MIL-H-5606 HYDRAULIC FLUID.
8. SELECTED AIRCRAFT MODELS MAY REQUIRE THE USE OF RESTRAINT HARDWARE FOR THE HOSE ASSEMBLY: SUPPORT CLIP, SPRING, EYEBOLT. CONSULT THE BEECH ILLUSTRATED PARTS CATALOG FOR APPLICABILITY AND COMPONENT PART NUMBERS.
9. QUANTITIES ARE PER GEAR LEG.

(9)

QTY	ITEM NO.	CAGE CODE	PART NO.	DESCRIPTION	MATERIAL/SPECIFICATION	WGT. (LB)
1	4	33269	207-01901	HOSE ASSEMBLY		
1	3	33269	111-05800	HYDRAULIC LINE ASSEMBLY		
2	2	33269	30-146	BRAKE ASSEMBLY		
2	1	33269	40-289	WHEEL ASSEMBLY 18 X 5.5 TYPE III		

PARTS LIST

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
THIS PLOT IS COMPLETELY DEFINED BY THE COMPUTER DATASET, WHICH IS THE SOLE AUTHORITY FOR THE INFORMATION PROVIDED. DIMENSIONALLY STABLE COPIES MUST BE OBTAINED FROM THE DATASET. ALL REVISIONS TO THIS PLOT MUST BE BY DATASET REVISION ONLY - NO REVISIONS MAY BE MADE BY HAND.

A CONTRACT ALTERED ITEM EXISTS FOR THIS PART NUMBER

GENERAL NOTES: UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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:
THIRD ANGLE PROJECTION

PROGRAM/CONTRACT NO.
DRAWN P. HUNYAD DATE 10-13-81
CHECKED
ENGINEER
DESIGN APPROVAL
PROJ APPROVAL
STRESS DATE
MFG ENGRG
QUAL ASSUR
RELEASE DATE 2-17-82 (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. 50-79 | REV. P
SCALE: .75:1 | UNIT WGT.: | SHEET: 1 OF 1

(050-07900)

Technical Publication

Conversion Kit Installation Manual With Illustrated Parts List

IM199-110

Wheel & Brake Assembly

Main Wheel Assembly
Part No. 40-289
Main Brake Assembly
Part No. 30-146

Used On
Beech F90, 99, 100, 200
Initial Issue June 15, 1988

Cleveland
Wheels & Brakes

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

STOP!

PLEASE COMPLETE AND RETURN THE ATTACHED REGISTRATION CARD. IT IS IMPORTANT THAT ALL INFORMATION IS LEGIBLY PRINTED. THIS DATA WILL ASSIST PARKER HANNIFIN, AIRCRAFT WHEEL & BRAKE TO NOTIFY END USERS OF SPECIFIC AIRWORTHINESS DOCUMENTS IF NECESSARY.

- 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.

SEE PARAGRAPH 4.1 FOR ADDITIONAL INFORMATION SPECIFIC TO CONVERSION KIT NO. 199-110.

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
G (DCN 0362-52)	08-10-2004	Maintenance, Overhaul, Parts List All sections/All pages	Removed pages. Information is found in maintenance manuals Revised to latest standard format	
H (DCN 0389-80)	06-18-2010	Table 1 Kit Applicability	Add B200GT, B200CGT	

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.

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, CM30-146 and CM40-289 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. 199-110. 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. 199-110. Contact the airframe manufacturer for documentation applicable to your model aircraft and review the maintenance log for any other STC's installed for their compatibility before installing Conversion Kit No. 199-110.

The equipment supplied as Kit No. 199-110 is applicable to the following Beech model aircraft under the listed STC.

NOTE: For those aircraft equipped with Beech brake deice system; use of 199-168 Hot Air Manifold Kit is required.

Table 1 Kit Applicability

MAKE	STC	MODELS
Beech Aircraft with standard gear	SA646GL	99, 99A, A99A, B99, C99, 100, A100, B100
	SA650GL	F90
	SA890GL	200, 200C, 200CT, 200T, A200, A200C, A200CT, B200, B200C, B200CT, B200T, B200GT, B200CGT

4.1 KIT EQUIPMENT

Refer to paragraph 14.0 for the kit parts list.

NOTE: Review this installation manual and the installation drawing, number 50-79, completely before removal of existing original equipment and installation of 199-110 kit equipment.

The following hardware is not included in the 199-110 Conversion Kit:

- Axle nut, washer and cotter pin.

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 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

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

7.0 EQUIPMENT DESCRIPTION

7.1 BRAKE ASSEMBLY

For a complete parts breakdown of the brake assembly, refer to CM30-146 Maintenance Manual.

The brake is a 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 of the wheel assembly, refer to CM40-289, Maintenance Manual.

The wheel is cast aluminum and conforms to all tire and rim association standards for an 18 x 5.5 divided type wheel, suitable for use with all 18 x 5.5, 10 ply tubeless tires.

8.0 GENERAL INFORMATION

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

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

NOTE: Extended storage (longer than two years) of lubricated bearings will require re-lubrication. Refer to paragraph 8.1 for grease packing procedure.

8.1 BEARING CONE GREASE PACKING PROCEDURE

The proper 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: USE GREASE CONFORMING TO MIL-PRF-81322 GRADE 2 OR DOD-G-24508A; OR USE MOBILE AVIATION GREASE SHC 100. DO NOT MIX THE GREASES WITH EACH OTHER. MIXING THE GREASE CAN DECREASE GREASE PERFORMANCE AND CAUSE FAILURE OF THE BEARING.

NOTE: To prevent foreign matter contamination, clean and pack bearing cones just before installing or clean and pack bearing cones and store cones in a protective container until ready to install.

NOTE: Packing bearing cones with grease is best performed by mechanical means such as a bearing greaser.

a. If necessary, clean the bearing cones in mineral spirits. Make sure the bearing cones are completely dry before packing them with grease.

b. Refer to Figure 1 and pack the bearing cone with grease.

c. Force the grease up between rollers, cone and cage, making sure that all voids inside the cone are filled (see Figure 1). Also, make sure that a generous amount of grease is applied to the roller surfaces on the outside of the cone.

NOTE: Shaded area indicates the recommended amount of grease.

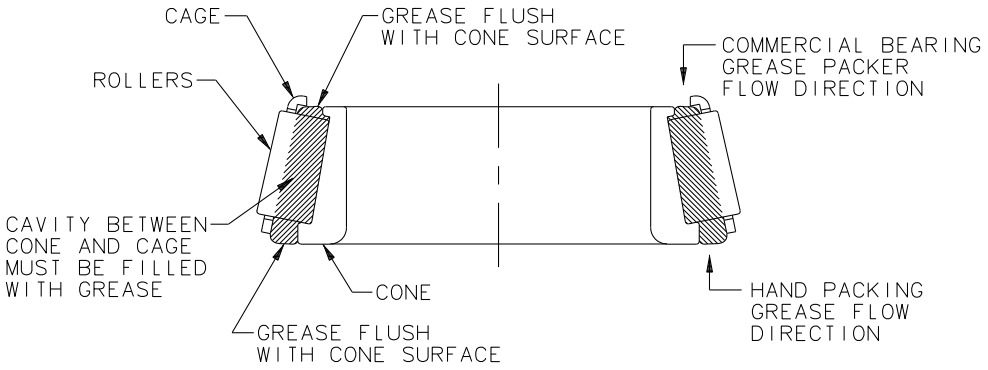

Figure 1, Packing Bearing Cones

9.0 KIT INSTALLATION

Read this installation manual and look at the installation drawing, 50-79, before removing and installing components.

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.

NOTE: If aircraft is equipped with brake de-ice, refer to 199-168 Hot Air Manifold Installation Kit for installation instructions.

9.1 REMOVE ORIGINAL EQUIPMENT

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

a. Properly raise and support the aircraft off the ground 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 199-110 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 and washer. Discard the cotter pin.

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

g. Disconnect, remove and cap the hydraulic lines from existing brakes. Next, remove the existing hose assembly and cap upper line at the AN837-4D elbow.

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

9.2 INSTALL CLEVELAND EQUIPMENT

Refer to installation drawing, 50-79, for item number identification.
There are two wheel assemblies and two brake assemblies per gear leg. The following instructions are per assembly.

9.2.1 Mount Tubeless Tire

a. Remove all six nuts, item 12, twelve washers, item 11, and six bolts, item 10, and separate the wheel halves.

b. Keep the brake disc with the inner wheel half.

c. Remove the snap ring, item 5, hubcap, item 7, grease seal ring, item 8, and bearing cone, item 9, from the outer wheel half. Place the removed items on a clean surface to avoid contamination.

NOTE: Do not remove the inner wheel half snap ring, item 5 and grease seal, item 6.

d. Make sure the inside of the tire is clean and dry. Inspect the bead seat area and wipe it clean with denatured alcohol, followed by soap and water, then dry thoroughly.

e. Position the inner wheel half with brake disc on a flat surface with the register side of the wheel half facing up.

CAUTION: THE O-RING (20) MUST BE INSTALLED UNIFORMLY. DO NOT STRETCH OR TWIST THE O-RING.

f. Coat O-ring, item 20 with Dow Corning Molycoat 55M or equivalent and install in the wheel register groove of the inner wheel half.

g. Place a serviceable tire over the inner wheel half and then place the outer wheel half in the tire, making sure to properly align the inner and outer wheel half registers.

CAUTION: FAILURE TO PROPERLY TORQUE THE WHEEL ASSEMBLY BOLTS MAY RESULT IN PREMATURE FAILURE OF THE MATING COMPONENTS OR HARDWARE.

NOTE: The nuts, item 12 should be located on the outer wheel half side of the wheel assembly opposite the brake disc, item 13.

h. Slide the washers and bolts, items 11 and 10 through the bolt holes in the brake disc and then through the bolt holes in the wheel halves. Install the remaining washers and nuts, items 11 and 12 onto the bolts and torque the nuts to between 290-300 lb-in.

SAFETY WARNING: INFLATION OF THE TIRE CAN BE DANGEROUS. INFLATE THE TIRE IN AN INFLATION CAGE TO PREVENT INJURY TO PERSONNEL FROM POSSIBLE EXPLOSION. TIRES AND WHEEL ASSEMBLIES MUST BE SERVICED WITH INFLATION EQUIPMENT THAT HAS BEEN SPECIFICALLY DESIGNED FOR THIS OPERATION.

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

i. Inflate the tire to the tire manufacturer's specifications to seat the beads on the wheel.

j. Place the wheel assembly and tire on a clean surface. Position the wheel assembly with the outer wheel half side of the wheel assembly (inflation valve side) face down.

9.2.2 Attach the Brake Assembly to the Wheel

NOTE: The bolts, item 14 and washers, item 15, can remain in the cylinder bolt holes.

a. Loosen the eight bolts, item 14, on the brake assembly and remove the two backplate/lining segments, item 16, and the two insulator shims, item 17. Leave the pressure plate/lining segment, item 21 on the anchor bolts, item 19.

b. Place the torque plate assembly, item 18 with attached brake assembly into the wheel assembly and tire unit (disc side up).

c. Position the two insulator shims, item 17, over the eight bolts, item 14. Next, slip the two backplate/lining segments, item 16, between the brake disc, item 13, and the inner wheel half flange. Position to align holes and tighten the bolts. Torque the bolts to between 85 to 90 lb-in.

d. For those aircraft equipped with brake de-ice; installation of 199-168 Hot Air Manifold kit is required at this point. Refer to the 199-168 Hot Air Manifold kit installation manual.

9.2.3 Mount the Wheel and Brake onto the Axle

a. Pickup the whole assembly and slide it onto the axle, positioning the torque plate lugs over the torque pads on the gear leg.

b. Apply a thin coat of bearing grease to the axle, axle threads and axle nut.

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

c. Install the bearing cone, item 9, which was removed in section 9.2.1, onto the axle and in the outer wheel half.

d. Install the grease seal ring, item 8, wheel bearing washer and axle nut.

e. Apply an initial torque of 60 to 100 lb-in to seat the bearings then back the torque off to 0 lb-in or a snug condition.

f. While rotating the wheel, re-torque the axle nut to 30 lb-in. If 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 in excess of 30°.

g. Install the cotter pin.

h. Coat the rubber compound on the hubcap, item 7, with a light coat of silicone spray or bearing grease. Install the hubcap into the hub of the outer wheel half and secure the hubcap with the snap ring, item 5.

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

i. Carefully inflate the tire to the necessary operating pressure.

j. Connect the 111-05800 hydraulic line assembly, item 3, to each 104-03100 brake fitting assembly, item 22.

k. Connect the 207-01901 hose assembly, item 4, to the remaining end of the 111-05800 hydraulic line assembly, item 3.

l. Connect the remaining end of the 207-01901 hose assembly, item 4, into the AN837-4D elbow.

m. Check the reservoir fluid level and bleed the system. Check for system leakage.

9.3 SYSTEM CHECKS

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

b. Check for possible interference applicable to the individual aircraft. Investigate and correct or contact Technical Support. See beginning of this manual.

c. Properly remove the aircraft from the supports.

9.4 BRAKE LINING CONDITIONING

When new linings are installed, it is important to condition them properly to obtain the service life designed into them. Condition linings per attached product reference memo PRM14A.

10.0 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.

10.1 WEIGHT AND BALANCE DATA

New installed (per gear leg)

Wheel assy.....18.00 lbs. each x 2 = 36.00 lbs. per gear leg.
Brake assy ..... 10.69 lbs. each x 2 = 21.38 lbs. per gear leg.
Total .....…...28.69 lbs. each x 2 = 57.38 lbs. per gear leg.

Complete form 337 and make appropriate log book entries.

11.0 PILOT OPERATING MANUAL INSERTS

Inserts are located in front with conversion kit documentation.

Attach the label in the pilot operating manual as close as possible to the original section labeled Main Wheel 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.

Inserts are reprinted below for reference:

x	Two dual piston, single disc Brake Assemblies, Cleveland P/N 30-146	10.69 ea.
x	Two 18 x 5.5 Type III Wheel Assemblies, Cleveland P/N 40-289	18.00 ea.

Cleveland Brake Assembly P/N 30-146 is a dual caliper, single fixed disc design, using two pistons per caliper which respond to fluid pressure from the master cylinders for brake application.

12.0 KIT PARTS LIST

199-110 KIT

(1) ITEM NUMBER	PART NUMBER	DESCRIPTION	QUANTITY
(2) 1	40-289	Wheel Assembly	4
(3) 2	30-146	Brake Assembly	4
3	111-05800	Hydraulic Line Assembly	2
4	207-01901	Hose Assembly	2
	IM199-110	Installation Manual for Conversion Kit 199-110	1
	50-79	Installation Drawing	1
	CM40-289	Component Maintenance Manual for 40-289 Wheel Assembly	1
	CM30-146	Component Maintenance Manual for 30-146 Brake Assembly	1
	SA646GL	Supplemental Type Certificate	1
	SA650GL	Supplemental Type Certificate	1
	SA890GL	Supplemental Type Certificate	1
	PRM14A	Conditioning Procedure for Metallic Brake Lining	1
	PRM51	Alternate Cylinder Connecting Line Installation for Brake Model 30-146	1
	PRM78	Wheel Assemblies-Alternate Bearing Grease	1
	-------	Pilot Operating Manual Inserts	1
	-------	Product Registration Card	1

(1) Refer to 50-79 Installation Drawing.
(2) For a complete parts breakdown, refer to Maintenance Manual CM40-289.
(3) For a complete parts breakdown, refer to Maintenance Manual CM30-146.

CLEVELAND WHEELS & BRAKES
OVERHAUL MANUAL
WITH ILLUSTRATED PARTS LIST
FOR
BRAKE ASSEMBLY
PART NO. 30-146

Parker Aerospace

PARKER HANNIFIN CORPORATION
AIRCRAFT WHEEL & BRAKE
1160 Center Road - Avon, Ohio 44011

Parker Aerospace

CLEVELAND WHEELS & BRAKES

OVERHAUL MANUAL

WITH

ILLUSTRATED PARTS LIST

FOR

BRAKE ASSEMBLY

30-146

FOR

BEECH AIRCRAFT MODEL 200 KING AIR

AND

BEECH AIRCRAFT MODEL B200 SUPER KING AIR

BASIC ISSUE 24 NOVEMBER 1993

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

NOVEMBER 24, 1993

Parker Aerospace

OVERHAUL MANUAL WITH IPL
BRAKE ASSEMBLY 30-146

REVISION A DATED 15 JUNE 2004

Section/Page No.	Description of Change
Record of Revisions, pg 1	Update page to reflect Rev. A
Effective Pages, pg 1,2	Update applicable page dates to reflect Rev. A
Table of Contents, pg 2	(Remove) Distribution Network section
Introduction, pg 1	Update contact information
Description, pg 2	(Remove) "MIL-H-83282" callout
Cleaning, pg 201	(Remove) "Isopropyl Alcohol" from materials list (Remove) "Isopropyl Alcohol" reference from para. 2.A. (now) para. 3. "Clean the preformed packings and piston boots with clean hydraulic fluid and wipe them dry with a clean cloth. Clean the insulator shims by wiping them with a clean cloth." Note: It is recommended that all preformed packings piston boots, and insulator shims be replaced at each overhaul regardless of condition." (was) para. 3. "All O-rings, piston boots, and insulator shims should be replaced at each overhaul. If it is necessary to reuse these items, clean them with isopropyl alcohol and dry them with a clean cloth."
Repair, pg 401	(now) Columbia primer, paint and Sherwin Williams primer, paint information (was) "Epoxy-Polyamide Primer MIL-23377" and "Polyurethane Topcoat MIL-P-81773"
pg 402	(now) 3.A.4) "Apply the primer. Refer to Figure 401." (was) 3.A.4) "Apply a coat of Epoxy-Polyamide Primer conforming to MIL-P-23377 (one coat is roughly .001 inch thick)." (now) 3.A.5) "Apply the topcoat. Refer to Figure 401." (was) 3.A.5) "Apply a coat of white Polyurethane Topcoat conforming to MIL-P-81773."
pg 404	(now) 5.A.5) "Apply the primer. Refer to Figure 401." (was) 5.A.5) "Apply a coat of Epoxy-Polyamide Primer conforming to MIL-P-23377 (one coat is roughly .001 inch thick)." (now) 5.A.5) "Apply the topcoat. Refer to Figure 401." (was) 5.A.5) "Apply a coat of Polyurethane Topcoat conforming to MIL-P-81773 color white." (add) Primer and Topcoat Table, Figure 401

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Section/Page No.	Description of Change (continued)
Assembly, pg 501	(Remove) "Antiseize...MIL-T-5544" info from materials list (Remove) "MIL-G-4343" from Silicone Grease callout
Assembly, pg 502	(now) 2)A. "...Dry torque bolts to 60-90 in-lbs." (was) 2)A. "...Lubtork bolts to 85-90 in-lbs." (now) 2)B. "...Dry torque to 65-70 in-lbs." (2 places) (was) 2)B. "...torque to 140-180 in-lbs." (2 places) (now) 2)C. "...dry torque to 65-70 in-lbs." (was) 2)C. "...torque to 140-180 in-lbs." (now) 2)D. "...dry torque to 25-30 in-lbs." (was) 2)D. "...torque to 85-90 in-lbs."
pg 503	(now) 2)L. "...dry torque the brake tie bolts to 85-90 in-lbs." (was) 2)L. "...lubtork the brake tie bolts to 80-85 in-lbs."
Fits and Clearances pg 602	Torque Value Table, Figure 602: for adjuster bolt (10), (now) 25-30 in-lb (was) lubtork 35-50 in-lb for bolt (23), (now) 60-90 in-lb (was) lubtork 85-90 in-lb for bolt (14), (remove) "lubtork" reference for bleeder seat fitting (15,18,24), (now) 65-70 in-lb (was) 140-180 in-lb for hose assembly(25), (now) 100-110 in-lb (was) 35-50 in-lb for bolt (32), (now) 80-90 in-lb (was) 85-90 in-lb, apply loctite 680... (add) bleeder screw (16), torque snug to prevent leakage. Do not exceed 12 in-lb.
Testing, pg 701	(Remove) "MIL-H-83282" reference from CAUTION
Illustrated Parts List, pg 1003	item 23 bolt, (now) "AN4H5A" (was) "AN4-5A"
pg 1004	item 30 washer, (now) "AN960-416" (was) "AN960-10L"

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REVISION B DATED 10 AUGUST 2004

Section/Page No.	Description of Change
As Follows: Record of Revisions, pg 1	Rev. B (DCN 0362-52) Update page to reflect Rev. B
Effective Pages, pg 1,2	Update applicable page dates to reflect Rev. B
Disassembly, pg 101	para. 2.B. (add) "and insulator shims" para. 2.H. (add) "...by applying a slight amount of air pressure to the inlet or outlet ports of the cylinder." para. 2.I. (add) "...from the four Parker P/N 069-02000 anchor bolts." para. 2.J. (add) "Thread an AN4-15A (or equivalent) bolt into the anchor bolt. Press out the anchor bolt and unthread the AN4-15A bolt from the anchor bolt. See Figure 102."
pg 102	Figure 102: revised to show the AN4-15A bolt or equiv. being used.
pg 103	para. M.: (remove) "...and four 082-02000 drag rings." (add) "NOTE: DO NOT REMOVE THE DRAG RING P/N 082-02000 UNLESS IT IS DAMAGED OR CORRODED."
Repair, pg 401	Repair Materials table: (add) "Primer: MIL-P-23377 Topcoat: MIL-C-85285" (add) "NOTE: BECAUSE OF EPA LOW VOC REQUIREMENTS, AIRCRAFT WHEEL & BRAKE USES THE ALTERNATE PRIMERS AND TOPCOATS IN THE PRODUCTION OF THE BRAKE ASSEMBLY. THE USE OF MIL-P-23377 AND MIL-C-85285 IS PERMITTED AS AN ALTERNATE."
pg 404	Figure 401: (add) MIL-P-23377 primer and MIL-C-85285 topcoat.

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REVISION C DATED MAY 15, 2007

Section / Page No.	Description of Change
Revision C Highlights Page 1 of 1 Dated May 15, 2007	Ref: DCN 0374-88 Added new Revision Highlights Page for Rev. C
Record of Revisions Page 1	Added Revision C information
List of Effective Pages Page 1	Check Section: Deleted call-outs for Pages 306, 307, and 308, all Dated 11-24-93

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REVISION D DATED JANUARY 19, 2011

Section / Page No.	Description of Change
Revision D Highlights Page 1of 1 Dated January 19, 2011	Ref: DCN 0390-56 Added new Revision Highlights Page for Rev. D
Record of Revisions, Page 1	Added Revision D information
List of Effective Pages, Page 1	Updated to reflect changed pages & deleted Page 2
Dissasembly, Page 101	E. Remove the pressure plate assembly, inlet fitting, bleeder fitting, hose assembly (P/N 207-01600 or 207-07600) and fittings (P/N 104-04900 or 104-04700). (See Exploded View). was: E. Remove the pressure plate assembly, inlet fitting, bleeder fitting, hose assembly (P/N 207-01600) and fittings (P/N 104-04900). (See Exploded View).
Assembly, Page 502	B Lubricate …..on P/N 104-04900 (207-01600 Hose Assembly used) or 104-04700 (if 207-07600 Hose Assembly used) fittings and install fitting into brake housing. ….. was: B. Lubricate ….on P/N 104-04900 fittings and install fitting into brake housing. ….
Assembly, Page 503	H. Fasten the P/N 207-01600 hose assembly to the two P/N 104-04900 fitting assemblies. If 207-07600 hose assembly is used, fasten to the two P/N 104-04700 fitting assemblies. was: Fasten the P/N 207-01600 or 207-07600 hose assembly to the two 104-04700 fitting assemblies.
Parts List, Page 1003	Fitting Assembly, Item 18 P/N 104-07600, Qty 2 was: P/N 104-04900, Qty 1 Hose Assembly, Item 25 P/N 207-07600 was: P/N 207-01600

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REVISION E DATED JANUARY 29, 2016

Section / Page No.	Description of Change
Revision E Highlights	Ref: ECO-0063275
Record of Revisions, Page 1	Added Revision E information
List of Effective Pages, Page 1	Updated to reflect changed pages
Parts List, Page 1003	Fitting Assembly, Item 18 (NOW) P/N 104-04700 (WAS) P/N 104-07600

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REV NO.	ISSUE DATE	DATE INSERTED	BY	REV NO.	ISSUE DATE	DATE INSERTED	BY
NC	11-24-1993	11-24-1993	PH				
A	06-15-2004	06-15-2004	PH				
B	08-10-2004	08-10-2004	PH				
C	05-15-2007	05-15-2007	PH				
D	01-19-2011	01-19-2011	PH				
E	01-29-2016	01-29-2016	PH				

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RECORD OF TEMPORARY REVISIONS

TEMPORARY REVISION NO	PAGE NUMBER	ISSUE DATE	BY	DATE REMOVED	BY

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INTRODUCTION

This manual is published for the guidance of personnel responsible for the overhaul and/or maintenance of the Parker Hannifin 30-146 Brake Assembly covered in this publication. The procedures outlined in this manual may be altered if better and/or more economical methods can be employed by the individual facilities. However, alternative procedures must not reduce the efficiency of operation of the assembly.

NOTE: All torque values and specified limits or values set by Parker Hannifin Engineering and contained herein must be strictly observed and not deviated from.

While Parker Hannifin Corporation represents that the information contained in this manual was current at the time of publication, it is recommended that the user inquire as to the latest revision level in existence before proceeding with overhaul or maintenance operations. This can be accomplished by contacting the Product Support Department of the Aircraft Wheel & Brake Division at the following address or numbers:

Parker Hannifin Corporation
Aircraft Wheel & Brake Division
Attn: Technical Support
1160 Center Road
Avon, Ohio 44011

Phone: 440-937-1315
1-800-272-5464
Fax: 440-937-5409

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TSO NOTICE

This assembly carries a "TSO" marking for FAR Part 23 usage, which identifies it as having been fully tested in the laboratory and qualified to applicable FAA (Federal Aviation Administration) requirements and specifications. As a Part 23 category assembly, it is also tested and qualified to the requirements of Beech Aircraft. After final certification, substitution of critical parts or changes of processes or materials are not permitted without requalification of the assembly and resubmittal of the test data to the FAA for approval.

FAA regulations subject both Parker Hannifin, Aircraft Wheel & Brake Division and the user to constant surveillance to assure that uncompromising quality assurance material and processing controls are maintained in order to provide replacement parts that are the same as the parts originally certified in the assembly.

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BRAKE ASSEMBLY 30-146

DESCRIPTION AND OPERATION

1. Description

* Designed for use with 40-289 and 40-172 Wheel Assemblies.

A. The brake assembly is a piston actuated, hydraulically operated, external disc unit designed for use with a petroleum base hydraulic fluid.

WARNING: DO NOT USE PHOSPHATE ESTER (SKYDROL 500B, 500C, HYJET W OR HYJET III) HYDRAULIC FLUID IN THIS BRAKE. THIS WILL CAUSE O-RING FAILURE.

B. The right and left brake assemblies can be interchanged by switching the bleeder fitting with the inlet fitting.

C. Each brake assembly is composed of two pressure plate assemblies, four pistons, two back plate assemblies, a torque plate, two cast aluminum alloy cylinder housings, four piston insulators to minimize the conduction of heat into the hydraulic fluid, seven O-rings, four friction springs to maintain ideal piston positioning, four sets of anchor bolt hardware, a hydraulic fitting, one set of bleeder fitting hardware, eight high strength bolts, and eight washers to fasten the two back plate assemblies to the cylinder housing.

2. Operation

Braking action occurs when hydraulic pressure is applied to the brake via the pilot's or copilot's master cylinders. As hydraulic pressure reaches the caliper, the pistons move outward in the caliper forcing the pressure plate against the surface of the brake disc. This causes the caliper to align itself so that the pressure plate linings and backplate 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. Leading Particulars

Hydraulic fluid MIL-H-5606

Normal Operating Pressure ..... 255-355 psi.

Weight of Assembly ..... 10.7 Lbs.

Cylinder Housing Material ..... A356 Cast Aluminum

4. Brake Lining Wear Check

Maximum wear limits for the brake linings are shown in the following sketch.

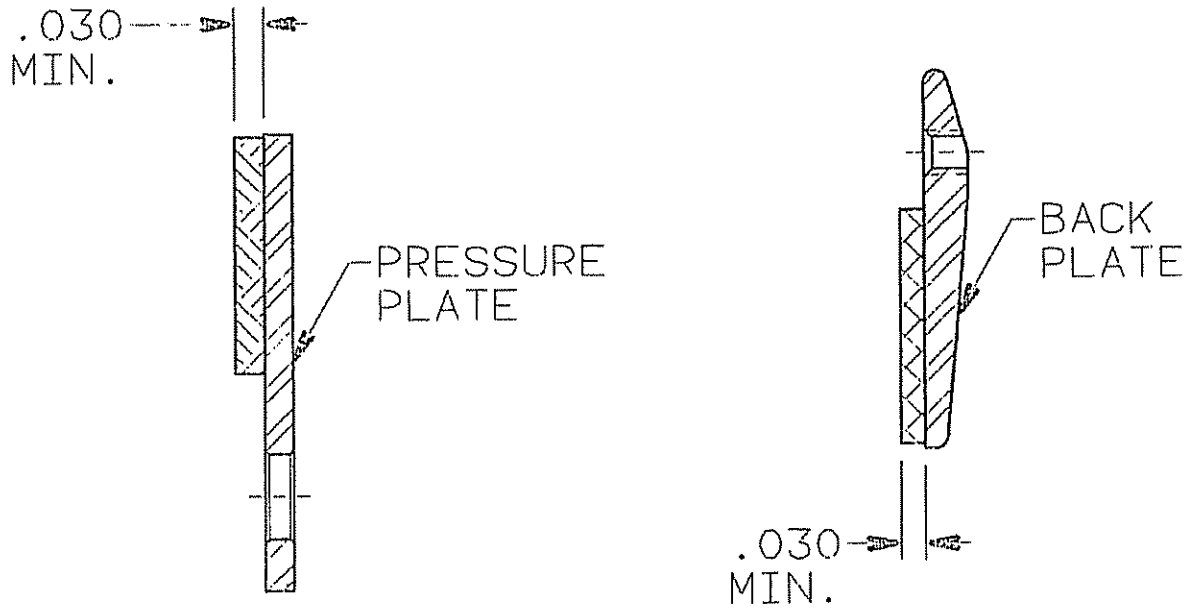

FIGURE 1
LINING WEAR LIMITS

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DISASSEMBLY

1. General

It is NOT necessary to remove the wheel from the aircraft to disassemble and service the brake cylinder assembly.

1. Disassembly Procedures

A. Remove and cap the hydraulic line.

B. Remove the eight cylinder tie bolts and eight washers, and two back plate assemblies and insulator shims (see Figure 101).

C. Slide the cylinder out of the torque plate. (The torque plate will remain mounted to the axle.)

D. Place the assembly on a clean flat surface.

E. Remove the pressure plate assembly, inlet fitting, bleeder fitting, hose assembly (P/N 207-01600 or 207-07600) and fittings (P/N 104-04900 or 104-04700). (See Exploded View).

F. Drain the hydraulic fluid from the cylinder housing.

G. If necessary, remove the piston insulators.

H. Remove the pistons by applying a slight amount of air pressure to the inlet or outlet ports of the cylinder.

I. Remove the O-Ring from each piston bore groove. Remove the four Parker P/N 103-10100 bolts and four Parker P/N 095-10200 washers from the four Parker P/N 069-02000 anchor bolts.

J. If necessary, the anchor bolts may be removed by using a holding fixture and arbor press. If possible, place the anchor bolts into the holding fixture so that the anchor bolt is piloted while being removed. (See Figure 102). Thread an AN4-15A (or equivalent) bolt into the anchor bolt. Press out the anchor bolt and unthread the AN4-15A bolt from the anchor bolt. See Figure 102.

NOTE: The cylinder must be square with the arbor press so that the anchor bolts do not cock.

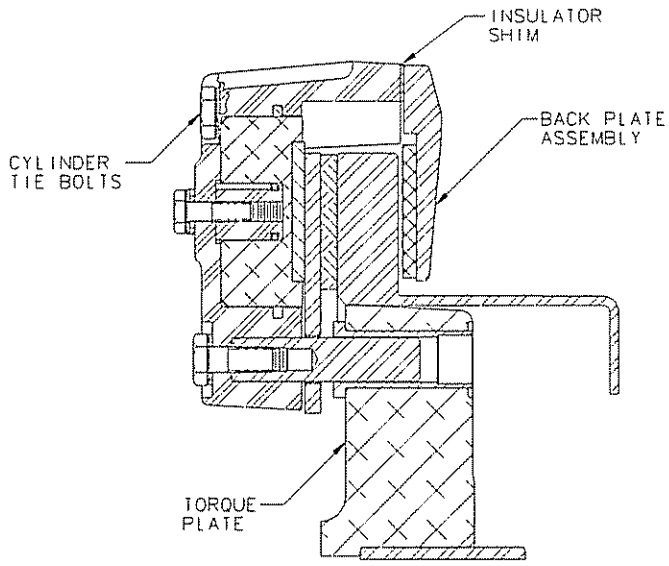


Figure 101
Cylinder Tie Bolt Removal

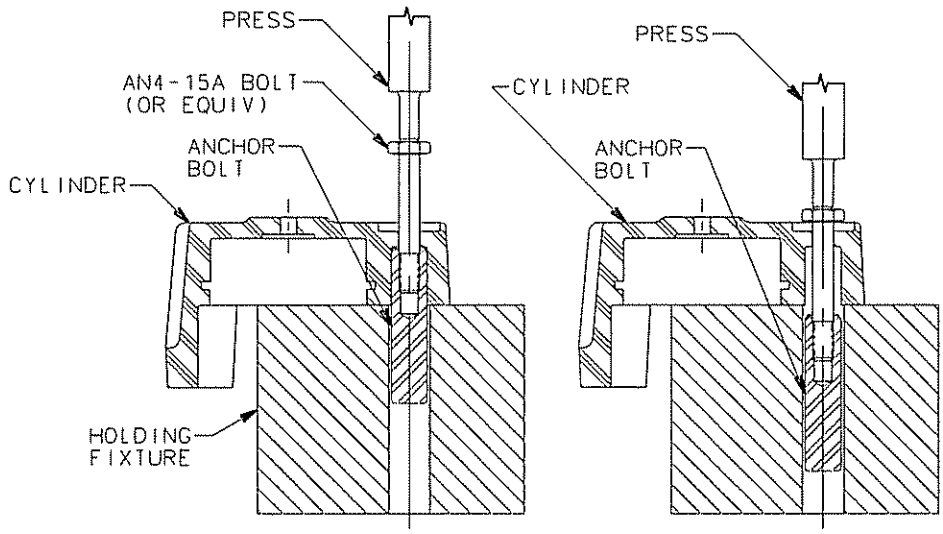


Figure 102
Anchor Bolt Removal

K. Remove the insulator shim from the cylinder.

L. Remove the bleeder seat O-ring.

M. Remove the four Parker P/N 103-00100 bolts, four Parker P/N 095-10800 washers, four P/N 095-02600 seals, four 139-09300 piston guides

NOTE: DO NOT REMOVE THE DRAG RING P/N 082-02000 UNLESS IT IS DAMAGED OR CORRODED.

CLEANING

1. Cleaning Materials

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR ITEMS LISTED BELOW.	
Dry Cleaning Solution Specification P-D-680 Stoddard Solvent	Commercially Available
Soft Bristle Brush	Commercially Available
Clean Wiping Cloth	Commercially Available

2. Cleaning Metallic Parts

A. Clean all the metal parts of the brake assembly in dry-cleaning solution, Specification P-D-680 (Stoddard Solvent) and dry with filtered compressed air. It may be necessary to scrub some of the parts with a soft bristle brush.

WARNING: THESE CLEANING SOLUTIONS SHOULD BE USED IN A WELL VENTILATED AREA. AVOID PROLONGED INHALATION OF THE FUMES.

3. Cleaning Nonmetallic Parts

Clean the preformed packings and piston boots with clean hydraulic fluid and wipe them dry with a clean cloth. Clean the insulator shims by wiping them with a clean cloth.

NOTE: IT IS RECOMMENDED THAT ALL PREFORMED PACKINGS, PISTON BOOTS, AND INSULATOR SHIMS BE REPLACED AT EACH OVERHAUL REGARDLESS OF CONDITION.

4. Paint Removal Procedures

A. Remove the paint from the cylinder housing using glass/plastic media blast or chemical paint removal solvents intended for polyurethane paint.

NOTE: DUE TO THE TOXICITY OF CHEMICAL PAINT REMOVAL SOLVENTS, IT IS HIGHLY RECOMMENDED THAT PAINT REMOVAL BY THIS METHOD BE ACCOMPLISHED BY A COMMERCIAL FACILITY WITH THE PROPER EQUIPMENT AND CHEMICAL DISPOSAL CAPABILITIES.

B. Completely disassemble the brake prior to paint removal.

NOTE: REFER TO THE SECTION TITLED "REPAIR" OF THIS OVERHAUL MANUAL FOR RETREATING AND REPAINTING INSTRUCTIONS.

CHECK

1. Check Materials

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR ITEMS LISTED BELOW:			
Type	Penetrant	Developer	Supplier
Fluorescent	Zyglo ZL-16	Zyglo ZP-13 (wet) optional	Magnaflux Corp. 7300 West Lawrence Ave Chicago, IL. 60656 (708) 867-8000
	Penetrex ZL-2A with emulsifier ZE-4	Penetrex ZP-4 (dry) or ZP-13 optional	
Red Dye	Spot Check	Spot Check	
	Dy-Chek	Dy-Chek	Turco Products Division of Purex Corp P.O. Box 6200 Carson, CA 90749
	Met-L-Chek	Met-L-Chek	Met-L-Chek Company 1639 Euclid Street Santa Monica, CA 90404 (310) 450-1111

2. General

A. Check all parts for cracks, wear, structural damage, corrosion, and damaged threads. Replace all parts that show evidence of cracks, excessive wear, structural damage, or thread damage. Repair minor scratches and corrosion. Check specific parts in accordance with the following instructions.

3. Detailed Check

A. Cylinder Subassembly

1) Check cylinder housing for cracks using a dye-penetrant method. Pay particular attention to the lug area around the anchor bolts. The cylinder housing must be replaced if any cracks are present.

NOTE: THE TOP COAT PAINT AND PRIMER SHOULD BE STRIPPED FROM THE CYLINDER HOUSING PRIOR TO DYE-PENETRANT INSPECTION (SEE PAINT REMOVAL PROCEDURES IN THE SECTION OF THIS OVERHAUL MANUAL TITLED "CLEANING"). FAILURE TO STRIP THE PAINT AND PRIMER COULD RESULT IN FALSE CRACK INDICATIONS.

2) Check the condition of the threads in the inlet and bleeder ports. Replace all cylinders that have damaged port threads.

3) Check the piston bore, the inlet port, and the bleeder port for contamination. Pay special attention to the O-ring groove in the piston bore.

4) Check the cylinder housing for nicks, scratches and corrosion. Blend all such damage in accordance with the section of this overhaul manual titled "Repair".

B. Pistons

1) Check pistons for burrs, scratches, and nicks. Replace any pistons that are damaged more than .003 in (.076 mm) deep on O-ring contacting surfaces. Pistons damaged less than .003 in. (.076 mm) deep on O-ring contacting surfaces should be treated as described in the section titled "Repair".

2) Check pistons for wear by measuring the O.D. of the pistons at three places around the circumference. Replace all pistons with an O.D. measuring less than 1.873 inches (44.35 mm) at any point.

C. Piston Insulators

1) Check all insulators for cracks.

2) Replace all cracked insulators.

D. Brake Lining

1) Inspect the brake lining for crumbling, pitting, and the wear limits shown in Figure 1.

2) Replace the brake lining if the lining surface is excessively deteriorated, or if the lining is worn below the wear limits shown in Figure 1.

E. Brake Tie Bolts

1) Visually inspect the brake tie bolts for thread damage and check for cracks at the intersection of the bolt head and the bolt shank.

2) Magnetic particle inspect the bolts to insure that there are no cracks.

3) Replace any bent, cracked, or thread damaged bolts.

F. Anchor Bolts

1) Visually inspect the anchor bolts to insure that they are neither bent or corroded.

2) Replace any bent or severely corroded anchor bolts.

3) Apply a light coat of dry lube to any anchor bolts that are being re-used.

G. Torque Plate

1) Inspect the anchor bolt holes in the torque plate for contamination, elongation, and corrosion.

2) Visually inspect the area surrounding the mounting bolt holes and anchor bolt holes for cracks using dye penetrants (Spotcheck, a product of the Magnaflux Corporation, is recommended).

3) All torque plates that have elongated anchor or mounting bolt holes, that have any visible cracks, or that have severe corrosion must be replaced.

4) Minor corrosion on the torque plates may be removed with #600 emery cloth. Blend all such damage in accordance with the section of this overhaul manual titled "Repair".

H. Back Plates

1) Check the back plate lining for minimum thickness. See Figure 1.

2) Replace the back plate lining if it fails to meet the minimum thickness requirement.

NOTE: IF THE LININGS ARE REPLACED AND THE PISTONS ARE NOT REMOVED FROM THE CYLINDER, CLEAN THE EXPOSED SURFACES OF THE PISTON BEFORE PRESSING THE PISTONS BACK INTO THE CYLINDER. FAILURE TO DO SO COULD RESULT IN A DRAGGING BRAKE.

3) Inspect the brake tie bolt holes for thread damage.

4) Visually inspect the back plates for cracks using dye penetrants.

5) All back plates that have any thread damage, severe corrosion or cracks must be replaced.

I. Pressure Plate

1) Check the pressure plate lining for minimum thickness, per Figure 1.

2) Replace the pressure plate lining if it fails to meet the minimum thickness requirement.

NOTE: IF THE LININGS ARE REPLACED AND THE PISTONS ARE NOT REMOVED FROM THE CYLINDER, CLEAN THE EXPOSED SURFACES OF THE PISTON BEFORE PRESSING THE PISTONS BACK INTO THE CYLINDER. FAILURE TO DO SO COULD RESULT IN A DRAGGING BRAKE.

3) Check the pressure plate for warpage. Flatness should be within .015-.020 in. TIR (Total Indicator Reading).

4) Inspect the pressure plate for cracks using dye penetrants or magnetic particle inspection techniques.

5) Check to ensure that the pressure plate anchor bolt holes are not elongated, are not severely corroded, and do not contain any contaminants.

6) Any pressure plates that are warped, cracked, severely corroded, or elongated in the anchor bolt area must be replaced.

J. Fittings

1) Check the hydraulic fitting, the bleeder screw, and the bleeder seat for thread damage, battering, contamination, or corrosion.

2) Replace any fittings that have thread damage, that have been battered, or that have corroded.

3) Replace the bleeder O-ring at each lining replacement.

K. AN4H5A Bolts

1) Check the four AN4H5A bolts for thread damage.

2) Replace any bolts with thread damage.

REPAIR

1) Repair Materials

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR THE FOLLOWING ITEMS.

Equipment/Material	Description
Dry Cleaning Solvent Industrial Name "Stoddard Solvent" Federal Specification P-D-680 Type I	Petroleum Distillate Commercially Available
Aluminum Oxide Cloth (400 Grit Wet or Dry)	Commercially Available
Zinc Rich Cold Galvanizing Compound No. 740	Sprayon Products Inc. Industrial Supply Division Bedford Heights, OH 44146 (216) 292-7400
[1] Primer: MIL-P-23377 Topcoat: MIL-C-85285	Commercially Available
Primer: P/N 18-017A (Gray) Topcoat: P/N 11-358A (524 Gloss White) Primer: P/N P60G2 and R7K44 Topcoat: P/N F63W13 (White)	Columbia Paint Corp. 641 Jackson Ave. Huntington, WV 25728 Sherwin Williams Co. 101-T Prospect Ave. N.W. Cleveland, Oh 44115
Chemical Conversion Coating Specification MIL-C-5541 Class 1A	Industrial Name "Alodine" Amchem Products, Inc. Ambler, PA 19002

[1] NOTE: BECAUSE OF EPA LOW VOC REQUIREMENTS, AIRCRAFT WHEEL & BRAKE USES THE COLUMBIA OR SHERWIN WILLIAMS PRIMERS AND TOPCOATS IN THE PRODUCTION OF THE BRAKE ASSEMBLY. THE USE OF MIL-P-23377 AND MIL-C-85285 IS PERMITTED AS AN ALTERNATE.

2) General Repair Procedures

Repair of the brake is limited to the replacement of damaged parts and to the specific repairs listed in this section. (Ref. IPL Fig. 1)

3) Repair of Cylinder Housing

A. Except for the piston bore and inlet and bleeder ports, any burrs, nicks, scratches or corroded areas may be reworked per the following instructions:

1) Blend out burrs, nicks, scratches, and corrosion, all less than .030 inch. deep, with 400 grit aluminum oxide paper or Scotch Brite products.

NOTE: DO NOT USE ABRASIVES CONTAINING IRON SUCH AS STEEL WOOL, IRON OXIDE, OR STEEL WIRE; IRON PARTICLES WHICH BECOME EMBEDDED IN THE ALUMINUM HOUSING WILL ACCELERATE THE CORROSION RATE OF THE HOUSING.

2) Clean all repair areas such that a water break-free surface is obtained after rinsing.

3) Brush, spray, or immerse all repair areas with a chemical conversion coating conforming to MIL-C-5541 Class 1A (Industrial Name "Alodine").

4) Apply the Primer. Refer to figure 401.

5) Apply the Topcoat. Refer to figure 401.

NOTE: DO NOT ATTEMPT TO REMOVE ANY MATERIAL FROM THE PISTON BORES. A SURFACE FINISH OF $\sqrt{32}$ RMS MUST BE MAINTAINED FOR SEALING PURPOSES.

4) Repair of the Pistons

A. O-Ring contact services.

1) Polish all nicks or scratches of .003 inch depth or less with 600 grit aluminum oxide paper. Be careful not to remove more than .003 inch of material.

2) Clean all repair areas such that a water break-free surface is obtained after rinsing.

3) Brush, spray, or immerse all repair areas with a chemical conversion coating conforming to MIL-C-5541 Class 1A (Industrial Name "Alodine'). DO NOT prime or paint the piston!

NOTE: IF LEAKAGE OF FLUID IS STILL EVIDENT AFTER PISTON REWORK, PISTONS MUST THEN BE REPLACED.

5) Torque Plate

A. Any burrs, nicks, scratches, or corroded areas may be reworked per the following instructions:

1) Blend out burrs, nicks, scratches, and corroded areas less than .030 inch deep with 400 grit aluminum oxide paper or Scotch Brite products. Torque plates with burrs, nicks, scratches, and corroded areas in excess of .030 inch deep should be scrapped.

NOTE: DO NOT USE ABRASIVES CONTAINING IRON SUCH AS STEEL WOOL, IRON OXIDE, OR STEEL WIRE; IRON PARTICLES WHICH BECOME EMBEDDED IN THE ALUMINUM TORQUE PLATE WILL ACCELERATE THE CORROSION RATE OF THE TORQUE PLATE.

2) Clean all repair areas such that a water break-free surface is obtained after rinsing.

3) Brush, spray, or immerse all repair areas with a chemical conversion coating conforming to MIL-C-5541 Class 1A (Industrial Name "Alodine").

4) **Apply** the Primer. Refer to figure 401.

5) **Apply** the Topcoat. Refer to figure 401.

6) Other Components

It is not recommended that any attempt be made to repair any of the remaining components. Most of the steel components are cadmium plated and no attempt should be made to remove corrosion from these parts using abrasives since this action could cause cadmium oxide particles to become airborne; cadmium oxide can cause illness when inhaled. The function of the remaining components is of such a critical nature that no repair work should be attempted which would compromise safety.

MANUFACTURER	PRIMER	TOPCOAT	DRY FILM THICKNESS AND AIR DRY TIMES [1]
Commercially Available	MIL-P-23377	MIL-C-85285	Refer to MIL Specifications
Columbia Paint Corp. Huntington, WV	P/N 18-017A (water reducible) No mixing required	P/N 11-358A (524 Gloss White) (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: .0002-.0005 in. 15 minutes min. (to touch or topcoat) 60 minutes (to handle) 4-24 hours (dry hard) Topcoat (including primer): .0008-.0014 in. 15 minutes (to touch) 30 minutes (to handle) 48 hours (dry hard)
Sherwin Williams Co. Cleveland, OH	2 parts washcoat (P/N P60G2) 3 parts catalyst reducer (P/N R7K44)	P/N F63W13 (White) 6 parts base 1 part catalyst (P/N V66V27) Thin using up to 20% polane reducer (P/N R7K84)	Primer: .0002-.0004 in. 3-10 minutes (to touch) 10-60 minutes (to topcoat) Topcoat (including primer): .0008-.0014 in. 20 minutes (to touch) 60 minutes (to handle) 24 hours (dry hard)

[1] Refer to Manufacturer's Data Sheet for forced dry schedule

PRIMER AND TOPCOAT TABLE
FIGURE 401

ASSEMBLY

1) Assembly Materials

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR ITEMS LISTED BELOW.	
Hydraulic Fluid. Petroleum Based Specification MIL-H-5606	Commercially Available
Silicone Grease Dow Molykote 55M	Dow Corning Corp. 2200 Salzburg Road Midland, MI 48686

2) General Assembly Procedures

Assemble the brake assembly in accordance with the following procedures (Ref. IPL).

CAUTION: ASSEMBLE THE BRAKE ON A CLEAN, FLAT SURFACE. AVOID DAMAGING BRAKE PARTS.

NOTE: IT IS RECOMMENDED THAT ALL O-RINGS AND BOTH INSULATOR SHIMS BE REPLACED.

A. If removed, press anchor bolts into brake housing and install P/N 095-10200 washers and P/N 103-10100 bolts. Dry torque the bolts to 60 – 90 in-lbs.

B. Lubricate all P/N 101-24600 O-Rings with Dow Corning Molykote 55M (or equivalent) silicone grease. Install P/N 101-24600 O-Ring on bleeder seat, and then screw bleeder seat into cylinder housing. Dry torque to 65 - 70 in-lbs. Install bleeder screw into bleeder seat. Install P/N 101-24600 O-Rings on P/N 104-04900 (207-01600 Hose Assembly used) or 104-04700 (if 207-07600 Hose Assembly used) fittings and install fitting into brake housing. Dry torque to 65 - 70 in-lbs.

CAUTION: DO NOT USE IMPACT OR POWER WRENCHES TO INSTALL OR TORQUE HYDRAULIC FITTINGS.

C. Lubricate threads of P/N 104-03100 fitting assembly and new P/N 101-20400 O-Ring with Dow Corning Molykote 55M. Install new O-Ring (Parker P/N 101-20400) onto fitting, and then screw fitting into port and dry torque to 65-70 in-lbs.

D. Install the four P/N 082-02000 drag rings onto the four P/N 139-09300 piston guides. Slide one P/N 095-10800 washer followed by one P/N 095-02600 seal onto each of the four P/N 103-00100 bolts. Install each of the four P/N 103-00100 bolts into the brake cylinders. Install each of the four P/N 139-09300 piston guides onto the P/N 103-00100 bolts, couterbore side first, and dry torque to 25 – 30 in-lbs.

E. Lubricate the four piston O-Rings (Parker P/N 101-26500) with hydraulic fluid. Install O-Rings into the cylinder housing O-Ring grooves. Place each piston into a piston bore and rotate to seat the drag ring and to insure that the piston and seal are in proper alignment. Tap the piston with a wooden, plastic, or rubber mallet while alternately rotating. If considerable effort is required, remove the piston and inspect both the bore and the pilot bore for damage. If the bore is damaged, check the corresponding area of the piston for damage. Repair if necessary, and repeat the above procedure once the piston is seated.

F. Install the piston insulators into the pistons (if removed).

G. Install the pressure plate assembly, the lining side must not face the pistons) by aligning the anchor bolt holes with the anchor bolts and slide the pressure plate onto the cylinder. The pressure plate MUST float freely on the anchor bolts.

H. Fasten the P/N 207-01600 hose assembly to the two P/N 104-04900 fitting assemblies. If 207-07600 hose assembly is used, fasten to the two P/N 104-04700 fitting assemblies.

I. Install each brake housing into the torque plate by aligning the anchor bolts with the torque plate holes and sliding the brake assembly onto the torque plate. It MUST slide freely.

J. Place a countersunk washer on each of the eight brake tie bolts, and insert these bolts into the respective brake housing holes.

NOTE: THE COUNTERSUNK SIDE OF THE WASHER MUST FACE THE BOLT HEAD OR BOLT FAILURE MAY RESULT.

K. Install two new insulator shims onto the brake housings.

L. Install the two backplate assemblies onto the brake housings, dry torque the brake tie bolts P/N 103-11800 to 85 – 90 in-lbs.

NOTE: BE SURE THAT THE BRAKE DISC IS SANDWICHED BETWEEN THE BACKPLATE AND THE PRESSURE PLATE. (AS SHOWN IN FIGURE 101).

M. Reconnect the hydraulic lines and bleed the system. Check the pedal for proper feel and travel.

FITS AND CLEARANCES

ITEM NO. (REF. IPL) (FIG. 1)	NOMENCLATURE	REPLACEMENT DIMENSION
12	BACKPLATE TOTAL LINING THICKNESS LINING OUT-OF-FLAT	 .030 (MINIMUM) .015 (MAXIMUM)
N/A	DISC TOTAL THICKNESS OUT-OF-FLAT	 REF. WHEEL ASS'Y OVERHAUL MANUAL
11	PRESSURE PLATE TOTAL LINING THICKNESS LINING OUT-OF-FLAT	 .030 (MINIMUM) .015 (MAXIMUM)
6	PISTON OUTSIDE DIAMETER	 1.873 (MINIMUM)
29	BUSHING INSIDE DIAMETER	 .445 (MAXIMUM)

WEAR AND DISTORTION TOLERANCES
FIGURE 601

ITEM NO. (REF. IPL) (FIG. 1)	NOMENCLATURE	TORQUE VALUE (ALL VALUES ARE DRY TORQUE)
10	ADJUSTER BOLT	25 - 30 IN-LBS
23	BOLT	60 - 90 IN-LBS
14	BRAKE BOLTS	85 - 90 IN-LBS
15 18 & 24	BLEEDER SEAT FITTING	65 - 70 IN-LBS
25	HOSE ASSEMBLY	100 - 110 IN-LBS
32	BOLT	80 - 90 IN-LBS
16	BLEEDER SCREW	TORQUE SNUG TO PREVENT LEAKAGE. DO NOT EXCEED 12 IN-LBS

TORQUE VALUE TABLE
FIGURE 602

TESTING

1. General

Test the brake assembly in accordance with the following procedure. (Ref. IPL Fig. 1)

2. Testing Procedure

A. Test brake assembly with a hydraulic test stand capable of applying 650 psi hydraulic pressure to brake. Attach inlet line from test stand to shuttle valve and tighten.

CAUTION: HYDRAULIC TEST STAND MUST CONTAIN PETROLEUM BASED HYDRAULIC FLUID PER MIL-H-5606

B. Apply pressure and bleed brake. Fitting should be open to the atmosphere.

C. Apply and release brake pressure (650 psi) several times and check for proper brake release. Discs should be free to rotate when brake is released.

D. Apply 650 psi for 15 to 30 seconds; check for leaks. Check carefully for leaks around pistons and inlet and bleeder fittings. If leakage is evident around pistons or inlet/bleeder, replace respective O-Ring and retest.

E. After carefully releasing hydraulic pressure in brake, drain excess hydraulic fluid from brake and install suitable protective caps over the inlet fitting.

F. If new linings were installed, perform conditioning procedure to obtain optimum performance and service life from brakes. The aircraft may now be returned to service.

TROUBLE SHOOTING

TROUBLE	CAUSE	CORRECTION
HYDRAULIC FLUID LEAKING FROM BRAKE ASSEMBLY	DEFECTIVE HYDRAULIC CONNECTION	TIGHTEN CONNECTION OR REPLACE FITTING
	DEFECTIVE OR WORN O-RING	REPLACE O-RING
	PISTON OR CYLINDER HOUSING WORN OR DAMAGED	REPLACE PISTON AND/OR CYLINDER HOUSING
BRAKE NOT ENGAGING CORRECTLY	AIR IN BRAKE	BLEED BRAKE
	OBSTRUCTION IN HYDRAULIC LINE OR FLUID PASSAGE	REMOVE OBSTRUCTION
	PISTONS STICKING	REPLACE PISTON O-RING OR INSPECT PISTON FOR DAMAGE AND REPLACE
	PISTONS DAMAGED	REPLACE PISTONS
	CYLINDER HOUSING DAMAGED	REPLACE CYLINDER HOUSING
	ANCHOR BOLT DAMAGED	REPLACE ANCHOR BOLTS
	PRESSURE PLATE, NOT MOVING FREELY ON ANCHOR BOLT	REPAIR OR REPLACE DEFECTIVE PRESSURE PLATE
BRAKE NOT RELEASING CORRECTLY	OBSTRUCTION IN HYDRAULIC LINE OR FLUID PASSAGE	REMOVE OBSTRUCTION
	PISTONS STICKING	REPLACE PISTON O-RING OR INSPECT PISTON FOR DAMAGE AND REPLACE

TROUBLE SHOOTING CHART
FIGURE 801 (SHEET 1 OF 2)

TROUBLE SHOOTING

TROUBLE	CAUSE	CORRECTION
BRAKE NOT RELEASING CORRECTLY (CONT'D)	PISTONS DAMAGED	REPLACE PISTONS
	CYLINDER HOUSING DAMAGED	REPLACE CYLINDER HOUSING
	ANCHOR BOLT DAMAGED	REPLACE ANCHOR BOLTS
	PRESSURE PLATE, NOT MOVING FREELY ON ANCHOR BOLTS	REPAIR OR REPLACE DEFECTIVE PRESSURE PLATE
	DISC, PRESSURE PLATE, OR BACK PLATE EXCESSIVELY DISHED	REPLACE DISC PRESSURE PLATE OR BACK PLATE

TROUBLE SHOOTING CHART
FIGURE 801 (SHEET 2 OF 2)

STORAGE INSTRUCTIONS

1. Brake Assembly

   A. Brake hydraulic inlet fitting should be protected during shelf storage by suitable caps or other means.

   B. The brake assembly should be stored in moisture-barrier material and a sealed corrugated cardboard container, or equivalent.

   C. The brake assembly should be stored in a clean, dry storeroom. The desirable storeroom temperature range is from 50° to 70° F. (10° to 21° C.). If this temperature range cannot be maintained, temperatures as high as +125° F. (+52° C.) and as low as -20° F. (-29° C.) can be tolerated for short periods.

Aerospace

OVERHAUL MANUAL WITH IPL
BRAKE ASSEMBLY 30-146

ILLUSTRATED PARTS LIST

1. Introduction

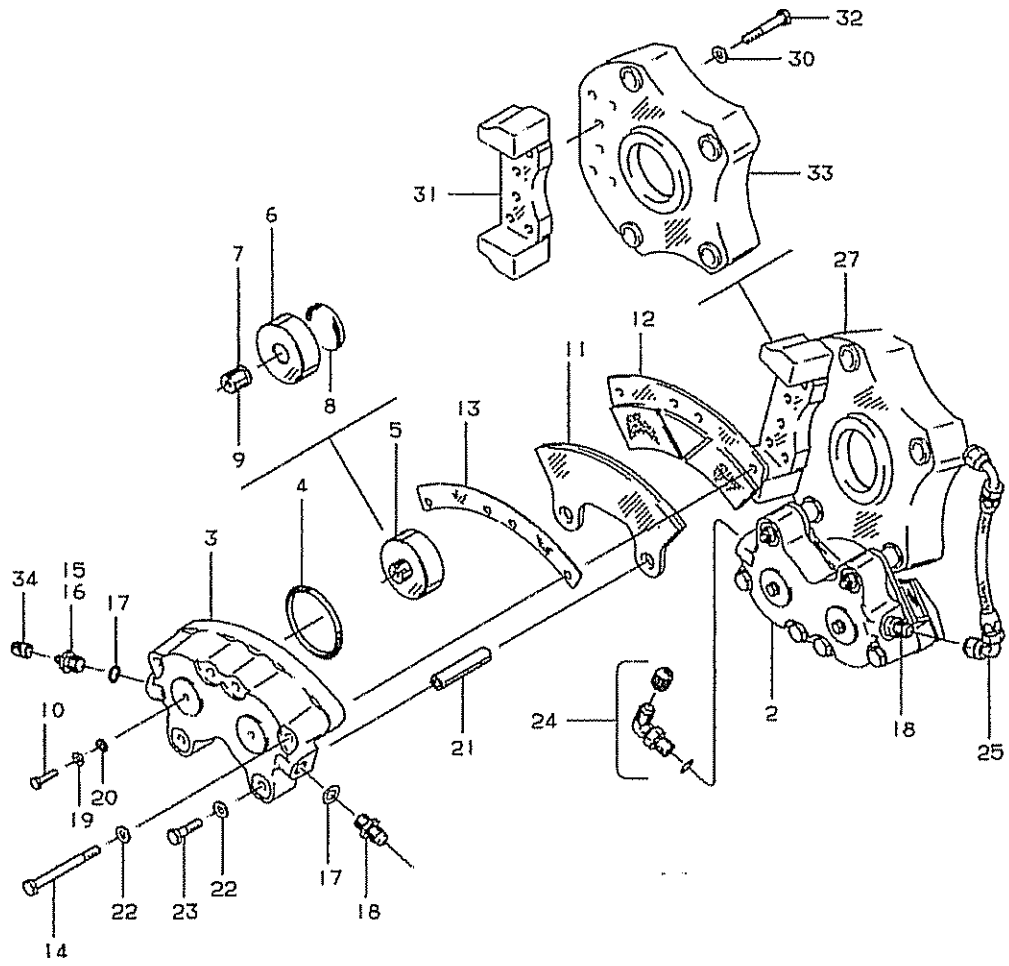
   A. The Illustrated Parts List (IPL) section lists and illustrates the procurable parts of the Parker Hannifin assembly covered in this publication. The components are listed in the order of disassembly.

   B. The Figure Item column provides the cross reference between the parts list and IPL Figure 1.

   C. The Part Number column gives the part number of the item, which is stamped on the part when practical. This number should be used when ordering parts.

   D. The Nomenclature column gives the basic noun name of each part, together with any specifications required to identify the part listed. The descriptions are indented under the column heading to show the relationship of the parts to their subassemblies and to the assembly.

   E. The Units Per Assembly column gives the number of parts required for each assembly or subassembly.



ILLUSTRATED PARTS LIST (IPL) FOR 30-146 BRAKE ASSEMBLY
FIGURE 1

OVERHAUL MANUAL WITH IPL
BRAKE ASSEMBLY 30-146

2. Parts List

FIGURE ITEM	PART NUMBER	NOMENCLATURE	UNITS PER ASSY
1	30-146	BRAKE ASSEMBLY	1
2	091-14000	CYLINDER ASSEMBLY	2
3	061-10700	CYLINDER	1
4	101-26500	O-RING	2
5	092-05200	PISTON ASSEMBLY	2
6	062-05600	PISTON	1
7	082-02000	SPRING	1
8	088-00200	INSULATOR	1
9	139-09300	PISTON GUIDE	1
10	103-00100	BOLT (AN3-5A)	2
11	066-09100	PRESSURE PLATE	1
12	066-09200	BACKPLATE	1
13	068-04100	SHIM	1
14	103-11800	BOLT (ABP4-21AM)	4
15	081-00200	BLEEDER SEAT	1
16	079-00300	BLEEDER SCREW	1
17	101-24600	O-RING	2
18	104-04700	FITTING ASSEMBLY	2
19	095-10800	WASHER (AN960-10L)	2
20	095-02600	SEAL	4
21	069-02000	ANCHOR BOLT	4
22	095-10200	WASHER (AN960-416L)	12
23	103-10100	BOLT (AN4H5A)	4
24	104-03100	TUBE FITTING	1
25	207-07600	HOSE ASSEMBLY	1
26	*	NAMEPLATE	1

FIGURE ITEM	PART NUMBER	NOMENCLATURE	UNITS PER ASSY
27	075-16200	TORQUE PLATE ASSEMBLY	1
28	*	BUSHING	1
29	*	BUSHING	4
30	095-10400	WASHER (AN960-416)	6
31	110-05800	BACKING PLATE	1
32	103-10300	BOLT (AN4-10A)	6
33	065-14000	TORQUE PLATE	1
34	183-00100	BLEEDER CAP	1

* = PART NOT PROCURABLE

CLEVELAND WHEELS AND BRAKES

OVERHAUL MANUAL

WITH ILLUSTRATED PARTS LIST

WHEEL ASSEMBLY

PART NO. 40-289

Parker Aerospace

Aircraft Wheel & Brake Division

Parker Hannifin Corporation
1160 Center Road U.S.A.
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Parker Aerospace

CLEVELAND WHEELS & BRAKES

OVERHAUL MANUAL

WITH

ILLUSTRATED PARTS LIST

FOR

WHEEL ASSEMBLY

40-289

FOR

BEECH SUPER KING AIR B200

AND

BEECH MODEL KING AIR 200

REVISION C, 15 JANUARY 2016

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

JANUARY 15, 2016

OVERHAUL MANUAL WITH IPL
WHEEL ASSEMBLY 40-289

RECORD OF REVISIONS

REV NO	ISSUE DATE	DATE INSERTED	BY	REV NO	ISSUE DATE	DATE INSERTED	BY	REV NO	ISSUE DATE	DATE INSERTED	BY
A	6-20-94	6-20-94	BB								
B	08-10-04	08-10-04	PH								
C	01-15-2016	01-15-2016	PH								

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RECORD OF TEMPORARY REVISIONS

TEMPORARY REVISION NO	PAGE NUMBER	ISSUE DATE	BY	DATE REMOVED	BY

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SERVICE BULLETIN LIST

SERVICE BULLETIN NO	REV NO	DATE INCORPORATED	SERVICE BULLETIN NO	REV NO	DATE INCORPORATED

OVERHAUL MANUAL WITH IPL
WHEEL ASSEMBLY 40-289

INITIAL RELEASE DATED 24 NOVEMBER 1993

Rev. No.	Page No.	Description of Change
A	p. 402	...is "coned" by more than .015 in. -was- ... is "coned" by more than .060 in.
	p. 403	.015 max. -was- .060 max.
	p. 602	Place serviceable 18 x 5.5, 10 ply tubeless tire. -was- Place serviceable 18 x 5.5, 10 ply tubeless
	p. 1003	153-04200 -was- 153-00300

November 24, 1993
Rev. A, June 20, 1994

OVERHAUL MANUAL WITH IPL
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REVISION B DATED 10 AUGUST 2004

Section/Page No.	Description of Change
As Follows: Record of Revisions, pg 1	Rev B. (DCN 0362-52) Update page to reflect Rev. B
Effective Pages, pg 1	Update applicable page dates to reflect Rev. B
Introduction, pg 1	Update contact information
Description and Operation, pg 2	para. 3, Leading Particulars updated: Correct wheel weight callout: (now) 18.0 (was) 19.3 Bolt torque: (now) 290-300 lb-in (was) 300 lb-in Bearing Lubricant: (now) Refer to the Assembly section (was) MIL-G-81322(Royco 22C or Aeroshell 22) Primer: (now) Refer to the Repair section. (was) Epoxy Polyamide per MIL-P-23377. Topcoat: (now) Refer to the Repair section. (was) White Polyurethane per MIL-C-83286.
Cleaning, pg 301	(Remove) "Isopropyl Alcohol" from materials list (now) para. 2.D. "Clean rubber parts by wiping with a clean, soft cloth dampened in a mild dish soap and water solution." (was) para. 2.D. "Clean rubber parts in isopropyl alcohol and dry with a clean, soft cloth."
Check, pg 401	(now) NOTE: "Penetrant inspection of wheel halves is recommended at the following intervals: First inspection after the fifth (5th) tire change, and then after the third (3rd) subsequent tire change for a total of twenty tire changes, and then at each and every tire change thereafter." (was) NOTE: "Penetrant inspection of wheel halves is recommended at the following intervals: First inspection after 3rd tire change, then at every tire change thereafter."
pg 402	(add) to para. 3.B. "NOTE: THE PROTECTIVE TOPCOAT PAINT AND PRIMER MUST BE REMOVED FROM THE WHEEL HALVES TO CONDUCT AN ACCURATE DYE-PENETRANT INSPECTION."
pg 404	(add) to para. I. "Examine the sealed hubcap also."

OVERHAUL MANUAL WITH IPL
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Section/Page No.	Description of Change	
Repair, pg 501	For Repair Materials list:	
	(add) Primer: P/N 18-017A (Gray) Topcoat: P/N 11-358A (524 Gloss White)	Columbia Paint Corp. 641 Jackson Ave. Huntington, WV 25728
	Primer: P/N P60G2 and R7K44 Topcoat: P/N F63W13 (White)	Sherwin Williams Co. 101-T Prospect Ave. N.W. Cleveland, OH 44115
	(add) "NOTE: BECAUSE OF EPA LOW VOC REQUIREMENTS, AIRCRAFT WHEEL & BRAKE USES THE COLUMBIA OR SHERWIN WILLIAMS PRIMERS AND TOPCOATS IN THE PRODUCTION OF THE WHEEL ASSEMBLY. THE USE OF MIL-P-23377 AND MIL-C-85285 IS PERMITTED AS AN ALTERNATE."	
pg 504	para. 4.C.: (now) "Apply the primer. Refer to table 501." (was) "Apply one coat of epoxy polyamide primer, specification MIL-P-23377 to reworked areas." para. 4.D.: (now) "Apply the topcoat. Refer to table 501." (was) "Apply one coat of White Polyurethane Topcoat, specification MIL-C-83286."	
pg 505	Figure 502: revise to follow Table 501 for primer/topcoat.	
pg 506	Figure 503: revise to follow Table 501 for primer/topcoat.	
pg 507	(add) Primer and Topcoat Table 501	
Assembly, pg 601	Materials List: (remove) "Isopropyl Alcohol" (add) "Mobile Aviation Grease SHC 100	
pg 602	para. E.: (now) "Clean wheel flange, bead seat,...with a cloth dampened with denatured alcohol followed by a soap and water solution. Dry thoroughly." (was) "Clean wheel flange, bead seat,...with a cloth dampened with isopropyl alcohol."	
pg 603	para. K.: (now) 290-300 lb-in (was) 300 inch-pounds. para. N.: (now) "Pack bearing cones with clean bearing grease listed in para. 1., Assembly Materials List and install in..." (was) "Pack bearing cones with clean bearing grease, specification MIL-G-81322 and install in..."	

OVERHAUL MANUAL WITH IPL
WHEEL ASSEMBLY 40-289

REVISION C DATED 15 JANUARY 2016

Section/Page No.	Description of Change
As Follows:	Rev C (ECO-0062612)
Record of Revisions, pg 1	Update to reflect Rev. C
Effective Pages, pg 1	Update to reflect Rev. C
Repair, pg 508	Figure 504, Bearing Cup Removal Tool (NOW) 2.290 dia. (WAS) 2.312 dia.

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WHEEL ASSEMBLY 40-289

LIST OF EFFECTIVE PAGES

SUBJECT	PAGE	DATE
Record of Revisions	1	01-15-16
Record of Temporary Revisions	1	11-24-93
Service Bulletin List	1	11-24-93
List of Effective Pages	1	01-15-16
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	1002	11-24-93
	1003	06-20-94

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OVERHAUL MANUAL WITH IPL
WHEEL ASSEMBLY 40-289

INTRODUCTION

This manual is published for the guidance of personnel responsible for the overhaul and/or maintenance of the Parker Hannifin 40-289 Wheel Assembly covered in this publication. The procedures outlined in this manual may be altered if better and/or more economical methods can be employed by the individual facilities. However, alternative procedures must not reduce the efficiency of operation of the assembly.

NOTE: All torque values and specified limits or values set by Parker Hannifin Engineering and contained herein must be strictly observed and not deviated from.

While Parker Hannifin Corporation represents that the information contained in this manual was current at the time of publication, it is recommended that the user inquire as to the latest revision level in existence before proceeding with overhaul or maintenance operations. This can be accomplished by contacting the Product Support Department of the Aircraft Wheel & Brake Division at the following address or numbers:

Parker Hannifin Corporation
Aircraft Wheel & Brake Division
Attn: Technical Support
1160 Center Road
Avon, Ohio 44011

Phone: 440-937-1315
1-800-272-5464
Fax: 440-937-5409

TSO NOTICE

This assembly carries a "TSO" marking for FAR Part 23 usage, which identifies it as having been fully tested in the laboratory and qualified to applicable FAA (Federal Aviation Administration) requirements and specifications. As a Part 23 category assembly, it is also tested and qualified to the requirements of Beech Aircraft Corporation. After final certification, substitution of critical parts or changes of processes or materials are not permitted without requalification of the assembly and resubmittal of the test data to the FAA for approval.

FAA regulations subject both Parker Hannifin, Aircraft Wheel & Brake Division and the user to constant surveillance to assure that uncompromising quality assurance material and processing controls are maintained in order to provide replacement parts that are the same as the parts originally certified in the assembly.

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OVERHAUL MANUAL WITH IPL
WHEEL ASSEMBLY 40-289

DESCRIPTION AND OPERATION

1. Description and Operation

   A. The Main wheel assembly is designed for an 18 x 5.5, 10 ply, tubeless tire.

   B. The divided type main wheel facilitates tire installation and removal.

   C. Two wheel halves and an external brake disc are fastened together with high strength bolts, washers and self-locking nuts. The wheel halves are machined from aluminum alloy castings.

   D. An O-ring is installed on the inner wheel half to provide an air seal at the juncture of the wheel halves. An inflation valve assembly is installed in the outer wheel half to inflate and deflate the tire.

   E. The wheel assembly rotates on two tapered roller bearings. The bearings are protected by a molded type lip seal in each hub. The bearing cups are shrink-fitted into the hubs of each wheel half.

2. Handling Procedures

   A. Strictly observe the deflation and inflation procedures, and the torque and lubtork values specified in this manual. Do not overtighten any bolt, nut, or fitting.

B. Handle the wheel bearing cones with extreme care. Many bearing failures can be traced to dropping or mishandling the cones during maintenance.

C. Handle and maintain the wheel halves properly to protect the paint and surface finishes. Exposed aluminum is susceptible to corrosion.

3. Leading Particulars

Wheel Tire Size and Type: 18 x 5.5, 10 Ply Tubeless

Material: Aluminum Alloy Casting.

Wheel Weight (Approx.): 18.0 Pounds.

Wheel Bolt Nut Torque: 290-300 lb-in Lubtork.

Bearing Lubricant: Refer to the Assembly section.

Paint Requirements: (Recommended)

Primer - Refer to the Repair section.

Topcoat - Refer to the Repair section.

TESTING

1. General

   Test the wheel assembly in accordance with the following procedure. (Ref. IPL Fig. 1)

2. Testing Procedures

   A. Clean bearing cones in dry cleaning solution, specification P-D-680, and visually check roller contacting surfaces for nicks, scratches, rust, corrosion, spalling, flat spots, pitting, heat discoloration and wear. Check bearing cage for dents or distortion and for wear of sides, corners and at ends of roller pockets. Replace bearing cones having any defects.

   B. Wipe bearing cups free of grease and visually check cup face for scratches, pitting, brinelling, spalling, heat discoloration, rust, corrosion and wear. Remove defective cups and install new cups per REPAIR.

   C. Visually check grease seals for cuts and wear on rubber sealing lip and bent or distorted reinforcing washer. Replace damaged grease seals.

   D. Cover hub openings of wheel halves to prevent contamination of bearing lubricant.

   E. Place wheel/tire assembly in an inflation cage and inflate to recommended operating pressure.

F. Coat juncture around inflation valve and tire beads with soap solution. Check carefully for air leaks in the form of soap bubbles. If air leaks occur around valve and/or plugs, check torque on leaking part. If air leaks occur around tire bead seat, completely deflate tire and remove assembly from inflation cage. Remove tire from wheel and examine wheel bead seat and tire for damage. If wheel bead seat is scratched, nicked or pitted, repair in accordance with REPAIR.

G. Place wheel/tire assembly in an inflation cage and inflate to recommended operating pressure. Check pressure after 24 hours. If reduction in pressure exceeds five percent of inflation pressure, replace wheel O-Ring and retest wheel/tire assembly in accordance with step F.

OVERHAUL MANUAL WITH IPL
WHEEL ASSEMBLY 40-289

DISASSEMBLY

1. General

Disassemble the main wheel assembly in accordance with the following instructions (Ref. IPL Fig. 1).

WARNING: DO NOT ATTEMPT TO DISASSEMBLE WHEEL UNTIL TIRE HAS BEEN COMPLETELY DEFLATED; OTHERWISE, SERIOUS INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT CAN RESULT.

2. Disassembly Procedures

A. Jack aircraft per aircraft maintenance manual until tire is clear of ground and fully deflate tire.

B. Remove snap ring and hubcap from outer wheel half subassembly. Remove and retain the bolts which fasten the two backplates to the brake housing. (See Figure 201)

C. Remove and retain axle nut, spacer, grease seal ring, and outer bearing cone.

D. Remove wheel assembly from axle and place on a clean flat surface.

E. Remove snap ring, grease seal and inner bearing cone.

F. Break tire beads away from both wheel flanges by applying pressure in even increments around entire sidewall as close to tire beads as possible.

CAUTION: DO NOT USE IMPACT OR POWER WRENCHES TO REMOVE WHEEL NUTS AND BOLTS.

G. Remove nuts, bolts and countersunk washers.

H. Separate the wheel halves and remove tire.

I. Remove O-Ring from wheel register groove of inner wheel half.

NOTE: IT IS RECOMMENDED THAT A NEW O-RING BE INSTALLED AT EACH OVERHAUL.

J. Bearing cups should not be removed from the wheel halves unless replacement is required. Refer to REPAIR for removal and installation procedures.

NOTE: THE INFLATION VALVE AND THE BEARING CUPS MUST BE REMOVED IF PAINT IS TO BE STRIPPED FROM THE WHEEL HALVES.

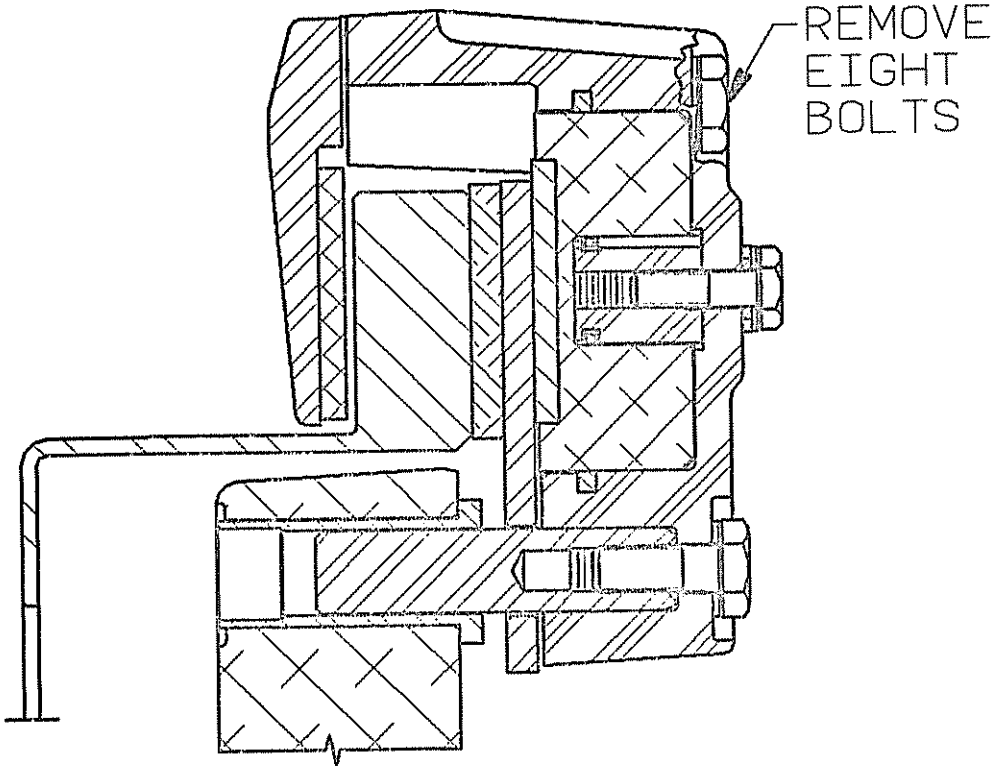


Figure 201

CLEANING

1. Cleaning Materials

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR ITEMS LISTED BELOW.	
Dry Cleaning Solution Specification P-D-680 Stoddard Solvent	Commercially Available
Soft Bristle Brush	Commercially Available
Clean Wiping Cloth	Commercially Available

2. Cleaning Procedures

WARNING: CLEANING SOLUTIONS SHOULD BE USED IN A WELL VENTILATED AREA. AVOID PROLONGED INHALATION OF FUMES.

A. Clean all metal parts by immersing in dry cleaning solution conforming to specification P-D-680. Use a soft bristle brush to remove hardened grease, dust, and dirt.

CAUTION: CLEAN BEARING CONES CAREFULLY IN A SEPARATE CONTAINER OF CLEAN SOLVENT TO AVOID CONTAMINATION.

B. Dry all metal parts thoroughly after cleaning, using filtered and dried compressed air.

C. Dry bearing cones thoroughly, using filtered and dried compressed air. Repack bearing cones with clean bearing grease, specification MIL-G-81322, immediately after drying.

CAUTION: DO NOT SPIN BEARING CONES WITH COMPRESSED AIR.

D. Clean rubber parts by wiping with a clean, soft cloth dampened in a mild dish soap and water solution.

3. Paint Removal Procedures

A. Remove paint from the wheel halves using chemical paint removal solvents or plastic media stripping in accordance with the following instructions.

WARNING: DUE TO THE TOXICITY OF CHEMICAL PAINT REMOVAL SOLVENTS, IT IS HIGHLY RECOMMENDED THAT PAINT REMOVAL BY THIS METHOD BE ACCOMPLISHED BY A COMMERCIAL FACILITY WITH THE PROPER EQUIPMENT AND CHEMICAL DISPOSAL CAPABILITIES.

CAUTION: REFER TO THE APPLICABLE MANUFACTURERS INSTRUCTIONS WHEN UTILIZING CHEMICAL PAINT REMOVAL SOLVENTS OR PLASTIC MEDIA STRIPPING EQUIPMENT.

B. Completely disassemble the wheel prior to paint removal. Remove inflation valve.

NOTE: REFER TO "REPAIR" FOR RETREATING AND REPAINTING WHEEL.

CHECK

1. Check Materials

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR ITEMS LISTED BELOW:			
Type	Penetrant	Developer	Supplier
Fluorescent	Zyglo ZL-16	Zyglo ZP-13 (wet) optional	Magnaflux Corp. 7300 West Lawrence Ave. Chicago, IL. 60656 (708) 867-8000
	Penetrex ZL-2A with emulsifier ZE-4	Penetrex ZP-4 (dry) or ZP-13 optional	
Red Dye	Spot Check	Spot Check	
	Dy-Chek	Dy-Chek	Turco Products Division of Purex Corp. P.O. Box 6200 Carson, CA 90749
	Met-L-Chek	Met-L-Chek	Met-L-Chek Company 1639 Euclid Street Santa Monica, CA 90404 (310) 450-1111

2. General (Ref. IPL Fig. 1)

   A. Check all components of the main wheel assembly for cracks, nicks, corrosion, and other damage. Replace any cracked, severely corroded, or badly damaged parts.

   B. Perform the specific checks listed below and refer to **REPAIR** for the appropriate repair procedures.

3. Detailed Check (Requires stripping topcoat and primer)

   A. Check wheel halves for cracks and structural damage. Take particular note of bead seat and valve areas. Check the underside of the wheel tubewell area paying particular attention to the critical area from the tire bead seat radius to the end of the toe of the tire.

NOTE:
Penetrant inspection of wheel halves is recommended at the following intervals: First inspection after the fifth (5th) tire change, and then after the third (3rd) subsequent tire change for a total of twenty tire changes, and then at each and every tire change thereafter.

NOTE: THE PROTECTIVE TOPCOAT PAINT AND PRIMER MUST BE REMOVED FROM THE WHEEL HALVES TO CONDUCT AN ACCURATE DYE-PENETRANT INSPECTION.

NOTE: CHECK WHEEL BY ZYGLO OR OTHER DYE-PENETRANT METHODS. REPLACE ALL CRACKED WHEELS.

B. Check carefully for corrosion on the surfaces that contact the tire beads. Remove corrosion and repair surface damage to limits defined in **REPAIR.**

C. Check bearing cups in the wheel halves for looseness, wear, corrosion, spalling, brinelling, scratches, pitting, and heat discoloration. Replace defective bearing cups in accordance with **REPAIR.**

D. Check roller surfaces of bearing cones for wear, corrosion, spalling, scratches, pitting, and heat discoloration. Check bearing cage for nicks, dents, distortion, and wear in the roller pockets. Replace bearing cones having any of the above defects.

E. Check brake disc thickness (See Figure 401). If the thickness is less than .436 in. then replace the brake disc. If the brake disc thickness varies by more than .0015 in., is out-of-flat by more than .005 in., is "coned" by more than .015 in., or has more than .005 in. run-out with respect to the surface that interfaces with the wheel, then the disc may be turned to conform to the above specifications provided that the thickness resulting from the turning operation is greater than .436 in. .

CAUTION:

WEARING BRAKE DISC TO LOWER THAN .436 IN. WILL LEAD TO DEGRADATION IN BRAKE PERFORMANCE AND SHOULD BE AVOIDED.

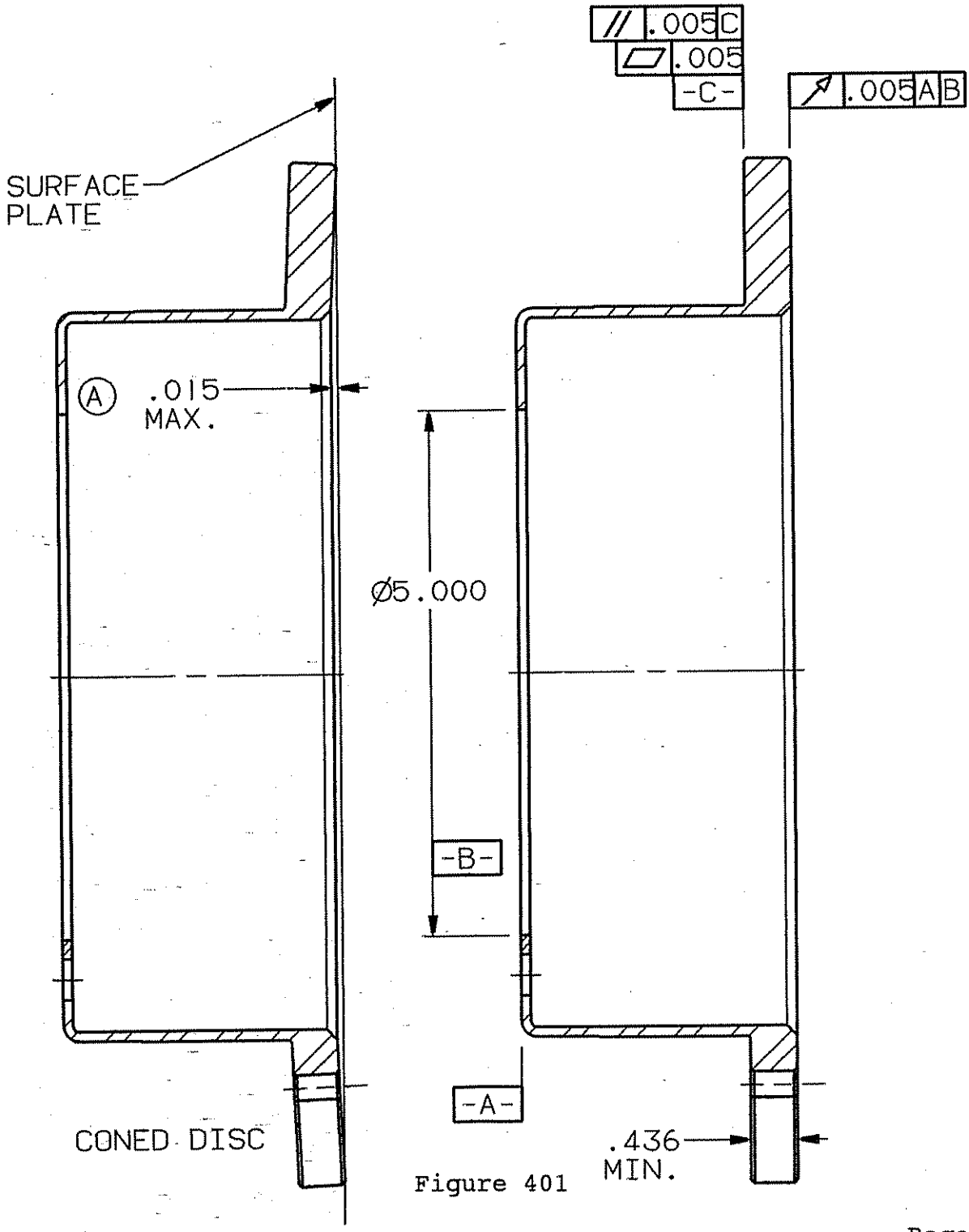


Figure 401

F. Check self-locking nuts for worn, stripped or crossed threads. Replace if any of the above damage exists. Check the nuts self-locking feature. Replace when the nut can be run down with the fingers after the locking feature engages the bolt.

G. Magnetic particle check wheel bolts for cracks, particularly in the areas near the bolt head radius and the threads. No reworking of wheel bolts is permissible.

H. New O-Rings should be installed at each overhaul. Remove burrs or other damage on the adjoining wheel components that could cause O-Ring damage.

I. Examine grease seals for cuts, nicks, distortion, and other damage. Check for security of rubber-to-metal bond. Replace seals having any of these defects. Examine the sealed hubcap also.

J. Replace bent or distorted snap rings.

REPAIR

1. Repair Materials

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR ITEMS LISTED BELOW.

Dry Cleaning Solution Specification P-D-680 Stoddard Solvent	Commercially Available
Aluminum Oxide Cloth 400 Grit Wet-Or-Dry	Commercially Available
Sulfuric-acid Anodize Specification MIL-A-8625 Type II, Class 1	Commercially Available
[1] Primer: MIL-P-23377 Topcoat: MIL-C-85285	Commercially Available
Primer: P/N 18-017A (Gray) Topcoat: P/N 11-358A (524 Gloss White)	Columbia Paint Corp. 641 Jackson Ave. Huntington, WV 25728
Primer: P/N P60G2 and R7K44 Topcoat: P/N F63W13 (White)	Sherwin Williams Co. 101-T Prospect Ave. N.W. Cleveland, OH 44115

2. General (Ref. IPL Fig. 1)

A. Repairs to the main wheel are limited to the replacement of parts and to the repairs specified in this section. No attempt should be made to repair cracked, severely corroded or badly damaged parts.

CAUTION: **REMOVAL OF CORROSION AND SURFACE DAMAGE WILL PREVENT STRESS CONCENTRATIONS AND PREMATURE WHEEL FAILURE. ANY REMOVAL OF MATERIAL WILL SHORTEN THE ROLL LIFE OF THE WHEEL; THEREFORE IT IS RECOMMENDED THAT MATERIAL REMOVED BY BLENDING BE LIMITED TO THE MINIMUM REQUIRED FOR REMOVING CORROSION OR SURFACE DAMAGE.**

[1] NOTE: BECAUSE OF EPA LOW VOC REQUIREMENTS, AIRCRAFT WHEEL & BRAKE USES THE COLUMBIA OR SHERWIN WILLIAMS PRIMERS AND TOPCOATS IN THE PRODUCTION OF THE WHEEL ASSEMBLY. THE USE OF MIL-P-23377 AND MIL-C-85285 IS PERMITTED AS AN ALTERNATE.

3. Repair of Wheel Halves (Ref. Figure 501)

A. Remove all corrosion and surface damage from wheel halves according to limits specified in the following paragraphs and defined in Figure 501. Use fine, wet-or-dry, aluminum oxide cloth for polishing. Unless otherwise specified, surface finish of repaired surfaces should not exceed a roughness of 150 rms.

B. In area 1, polish out corrosion pits, scratches, and tool marks to .015 inch deep and .5 inch long. Surface finish in bead seat radius should be 20 microinches rms.

C. In area 2, blend out and polish imperfections to .030 inch deep and 1 inch long. Reworked area is not to exceed 1 square inch. Do not remove metal if surface directly opposite was previously reworked.

D. In area 3, blend out and polish imperfections to .030 inch deep and one square inch area.

E. In area 4, polish out imperfections to .010 inch maximum depth in register area, provided sealing qualities are maintained.

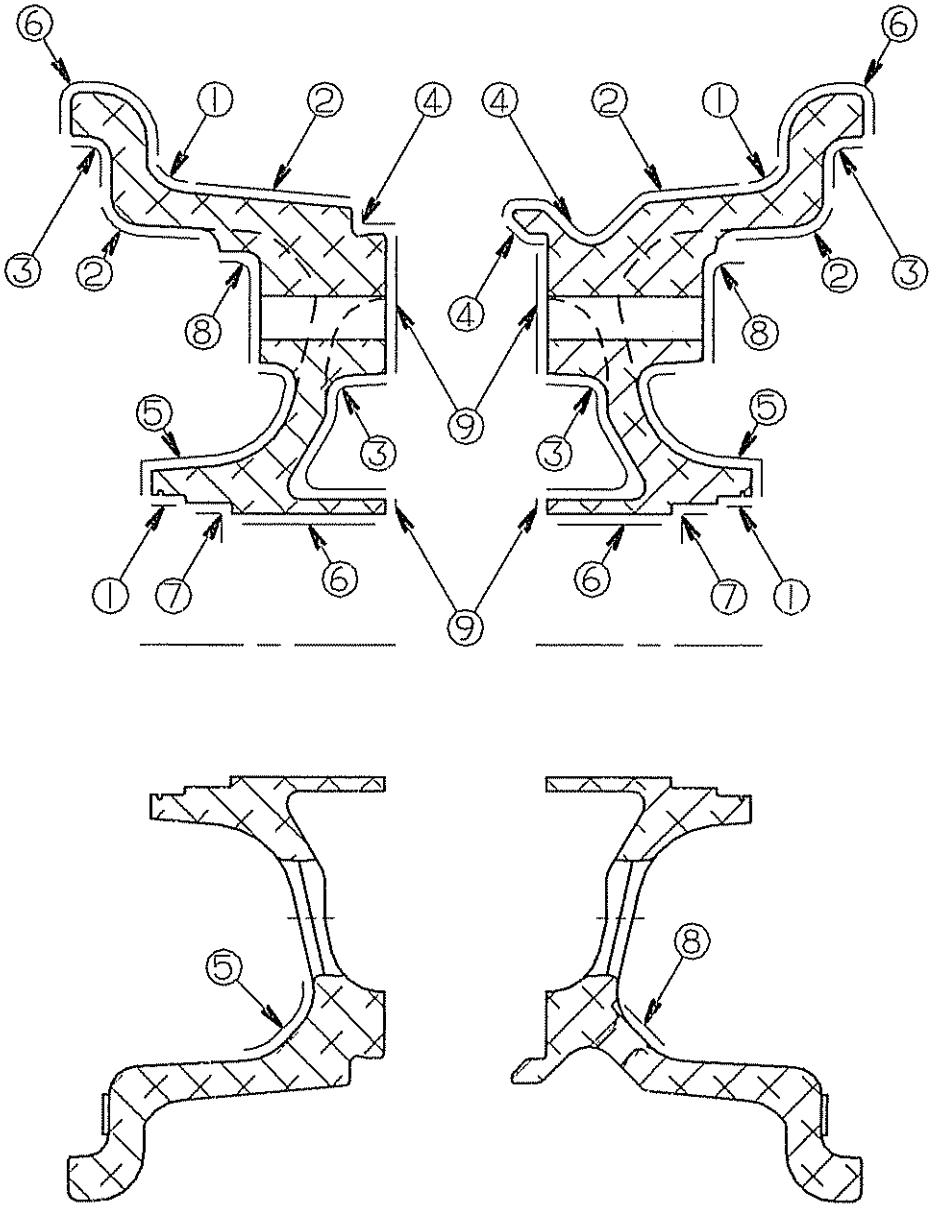
F. In area 5, blend out and polish imperfections to .030 inch deep and one square inch in area.

G. In area 6, rework is limited to .040 inch deep and .5 square inch in area at a maximum of two places.

H. In area 7, rework is limited to blending out scratches and corrosion, provided bearing cup retention is not affected.

I. In area 8, rework is limited to .010 inch maximum depth on face of each bolt boss.

J. In area 9, the maximum repair is .010 inch deep and one-half square inch on each interface boss.



INNER WHEEL HALF OUTER WHEEL HALF

NOTE: NUMBERS REFER TO REWORKED AREAS DISCUSSED IN THE REPAIR SECTION

FIGURE 501

4. Repainting

A. Rinse reworked areas with dry-cleaning solution, specification P-D-680 and dry thoroughly with filtered compressed air.

WARNING: **CLEANING SOLUTIONS SHOULD BE USED IN A WELL VENTILATED AREA. AVOID PROLONGED INHALATION OF FUMES.**

B. Treat reworked areas with sulfuric-acid anodize per MIL-A-8625 Type II, Class 1, or "Alodine" per MIL-C-5541 Class 1A.

C. Apply the primer. Refer to table 501.

CAUTION: **DO NOT GET PAINT ON ROLLER CONTACTING SURFACES OF BEARING CUPS. PAINT ON THESE SURFACES WILL CONTRIBUTE TO BEARING FAILURE (SEE FIGURE 502).**

D. Apply the topcoat. Refer to table 501.

5. Replacing Defective Bearing Cups

A. Heat wheel half in an oven not exceeding 175° F for 30 minutes.

B. Remove cup from bore by tapping it out evenly with a fiber or phenolic punch, or fabricate bearing cup removal tool (See Figure 504) and utilize by hand or adapt to arbor press. Exercise extreme care to avoid raising burrs in the hub bore.

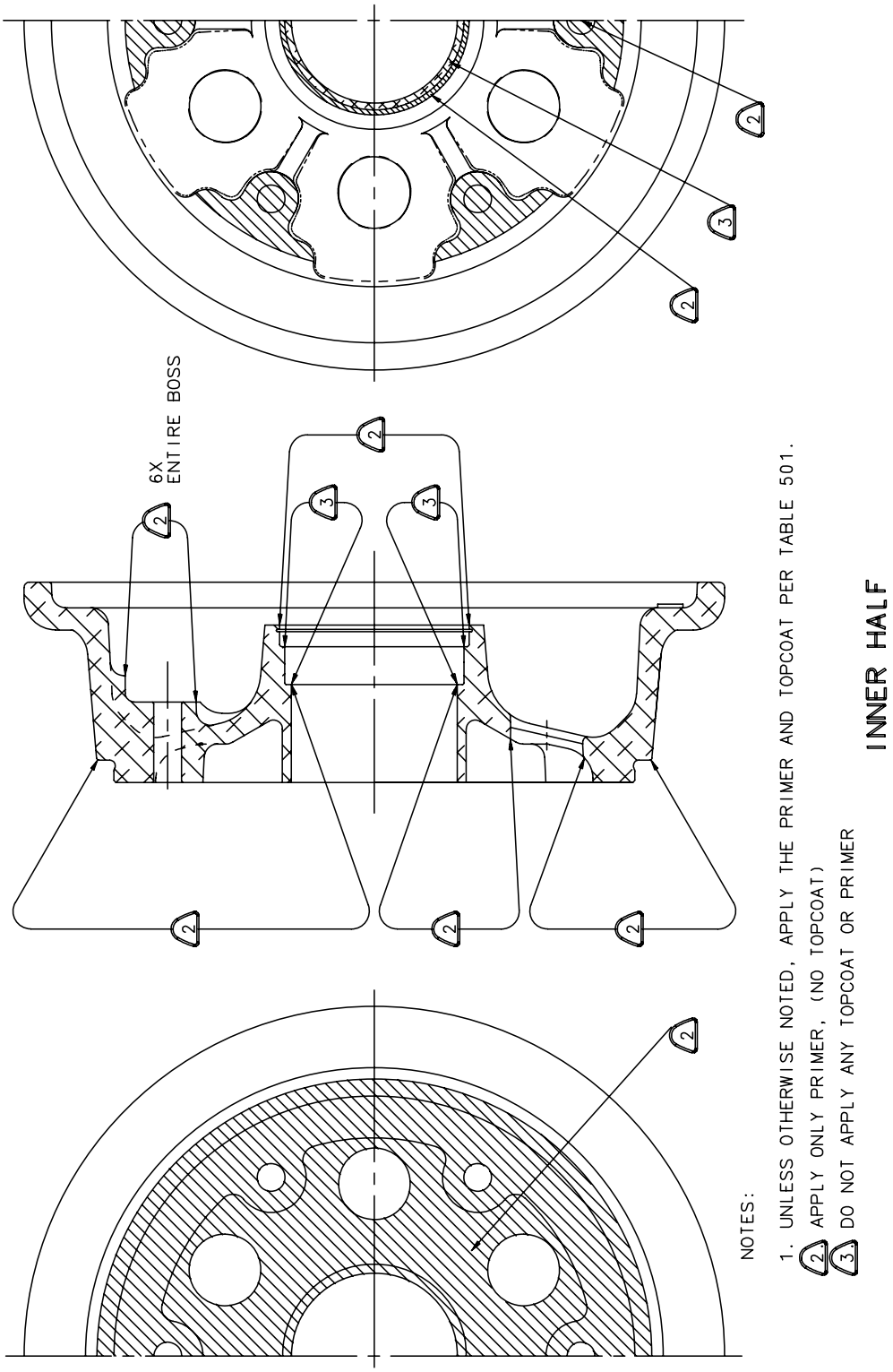


FIGURE 503

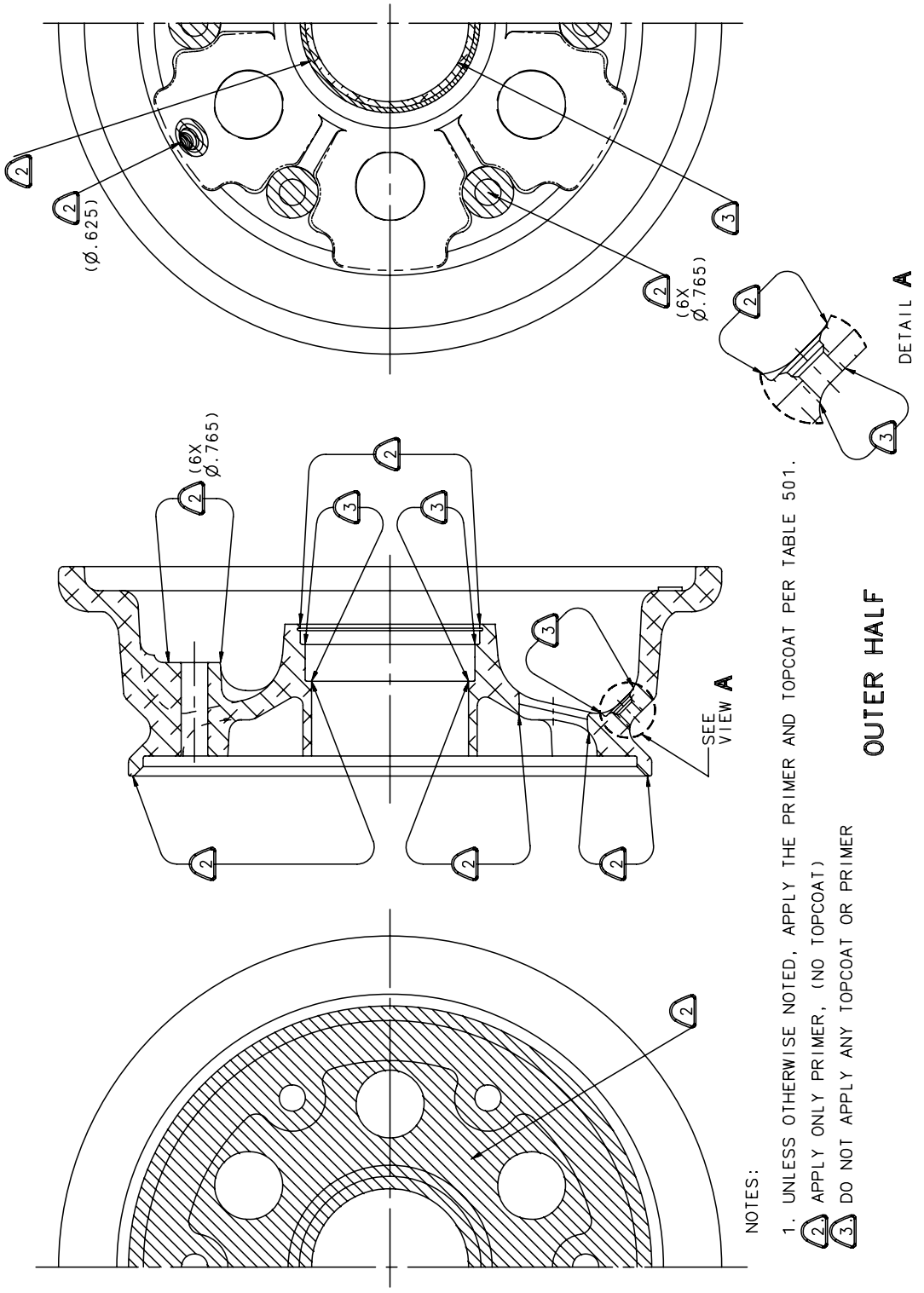


FIGURE 503

NOTE: **ALWAYS SUPPORT WHEEL HALF ON THE HUB, NOT ON THE FLANGE.**

C. Make sure that bearing bore and shoulder are clean and free of burrs.

D. Prior to installation, chill new bearing cup with dry ice.

E. Heat wheel half in oven not exceeding 175° F. for 30 minutes.

F. Remove wheel half from heat source and remove bearing cup from dry ice. Dry cup thoroughly.

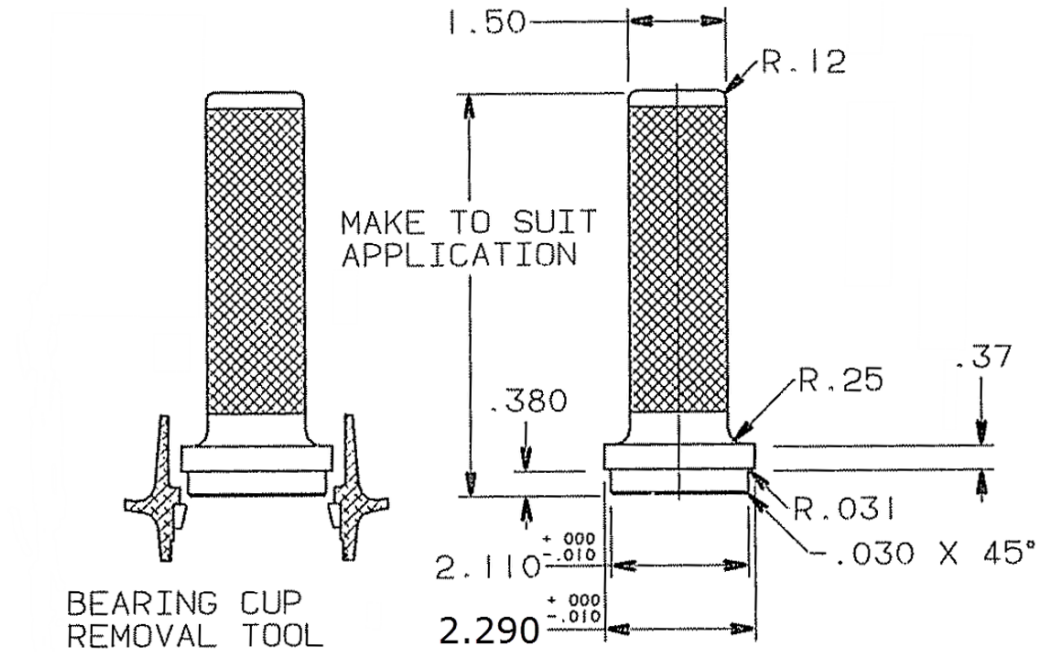
G. Brush a wet coat (generous but not dripping) of primer into the bearing bore.

H. Hand press the bearing cup into the coated housing making sure the backing surface of the cup mates to the shoulder of the bearing bore. Avoid cocking the cup during installation. (Installation tool for cup is pictured in Figure 504 if desired)

I. Remove excess primer compound with a clean shop towel so that a fillet of not more than .08 wide extends beyond the cup.

MANUFACTURER	PRIMER	TOPCOAT	DRY FILM THICKNESS AND AIR DRY TIMES[1]
Commercially Available	MIL-P-23377	MIL-C-85285	Refer to MIL Specifications
Columbia Paint Corp. Huntington, WV	P/N 18-017A (water reducible) No mixing required	P/N 11-358A (524 Gloss White) (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: .0002-.0005 in. 15 minutes min. (to touch or topcoat) 60 minutes (to handle) 4-24 hours (dry hard) Topcoat (including primer): .0008-.0014 in. 15 minutes (to touch) 30 minutes (to handle) 48 hours (dry hard)
Sherwin Williams Co. Cleveland, OH	2 parts washcoat (P/N P60G2) 3 parts catalyst reducer (P/N R7K44)	P/N F63W13 (White) 6 parts base 1 part catalyst (P/N V66V27) Thin using up to 20% polane reducer (P/N R7K84)	Primer: .0002-.0004 in. 3-10 minutes (to touch) 10-60 minutes (to topcoat) Topcoat (including primer): .0008-.0014 in. 20 minutes (to touch) 60 minutes (to handle) 24 hours (dry hard)

[1] Refer to Manufacturer's Data Sheet for forced dry schedule



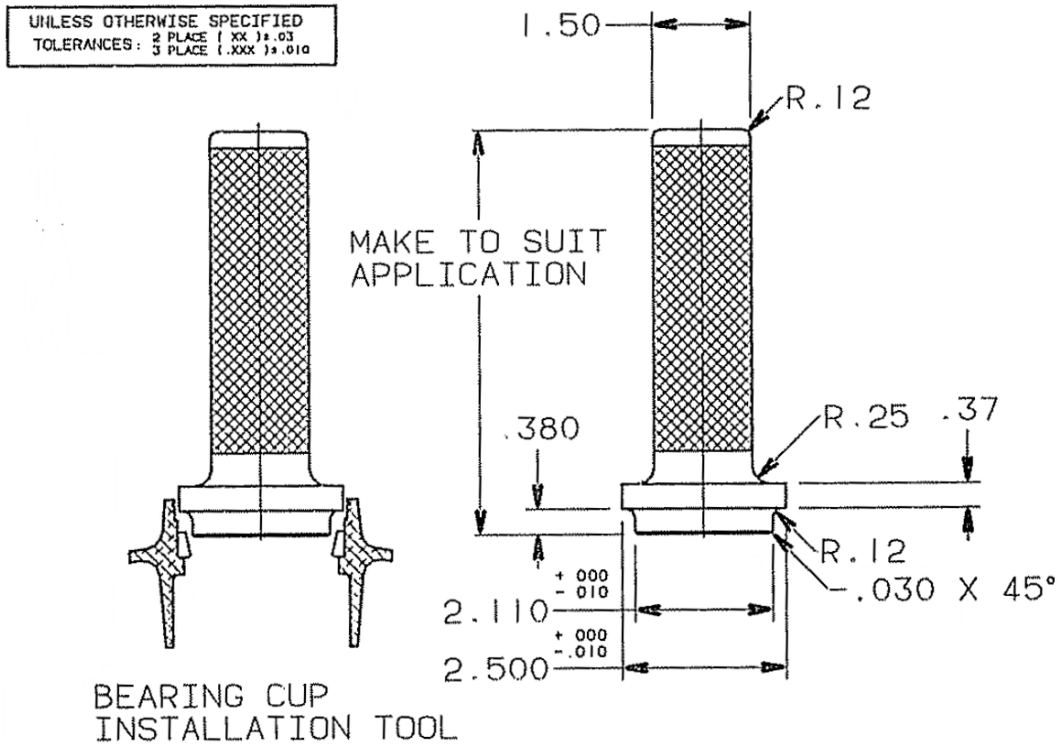


FIGURE 504

ASSEMBLY

1. Assembly Materials

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR ITEMS LISTED BELOW.

Mobile Aviation Grease SHC 100	Shell Oil Company, Metairie, LA
Aeroshell Grease 22 MIL-PRF-81322, grade 2 and DOD-G-24508A	ExxonMobil Corp. Beaumont, TX 77704
Antiseize Compound (Lubtork) Specification MIL-T-5544 Royco 44 or Esso 5544	W.J. Ruscoe & Company 483 Kenmore Boulevard Akron, Ohio 44301
Silicone Grease Dow Molykote 55M Specification MIL-G-4343	Dow Corning Corp. Box 1767 Midland, Michigan 48640

2. Assembly Procedures (Ref. IPL Fig. 1)

A. Assemble wheel on a clean flat surface.

B. New O-Rings should be installed at each reassembly.

C. Install inflation valve in outer wheel half. Apply Dow Molykote 55M or equivalent to grommet prior to installation of inflation valve.

D. If removed, install the bearing cups per Section 5 "Replacing Defective Bearing Cups".

E. Place inner wheel half subassembly on work surface with flange down. Clean wheel flange, bead seat, register and packing groove with a cloth dampened with denatured alcohol followed by a mild dish soap and water solution. Dry thoroughly.

F. Lubricate O-Ring with Dow Molykote 55M grease or equivalent and install in wheel register groove of inner wheel half (11).

CAUTION: SEAL SHOULD NOT BE TWISTED, BUT FULLY ALIGNED IN GROOVE.

G. Place serviceable 18 x 5.5, 10 Ply tubeless tire over outer wheel half subassembly.

H. Position disc and inner wheel half subassembly in tire so bolt holes in both wheel halves are aligned.

I. Lubricate bolt and nut threads and bearing surfaces of bolt heads, washers and nuts with antiseize compound, specification MIL-T-5544. Slide a washer onto each bolt, then slide bolts through brake disc and inner wheel half subassembly.

J. Compress wheel halves and install a washer and a nut on each bolt.

CAUTION: DO NOT USE IMPACT OR POWER WRENCHES TO TIGHTEN OR TORQUE WHEEL BOLTS OR NUTS.

K. Torque nuts to a final lubtork value of 290-300 lb-in.

NOTE: **TORQUE NUTS IN A CRISS-CROSS PATTERN TO OBTAIN A MORE EVEN TORQUE VALUE.**

L. When all nuts have been torqued, torque a second time to insure the required value has been achieved. Often, O-Ring compression will give a FALSE initial reading.

M. Place wheel/tire assembly in an inflation cage for initial inflation. Inflate tire just enough to seat the beads. Reduce tire pressure to recommended storage pressure (40 psi) and remove wheel/tire assembly from inflation cage.

WARNING: **DO NOT INFLATE TIRE TO FULL OPERATING PRESSURE UNTIL WHEEL ASSEMBLY HAS BEEN MOUNTED ON AIRCRAFT.**

N. Pack bearing cones with clean bearing grease listed in para. 1., Assembly Materials list and install in wheel assembly.

O. Install grease seals, hub cap and snap rings.

P. Test wheel assembly in accordance with **TESTING.**

STORAGE INSTRUCTIONS

1. Wheels Stored with Tires Installed

   A. Length of time that a wheel assembly can be stored is governed by the storage life of its rubber components.

   B. The wheel/tire assembly should be stored in a clean, cool, dry storeroom out of direct sunlight. The desirable storeroom temperature range is 32^{o} - 75^{o} F. If this temperature range cannot be maintained, temperatures as high as 100^{o} F. or even 125^{o} F. can be tolerated for short periods.

   C. The recommended storage pressure for tires is 40 psi.

2. Wheels Stored Without Tires Installed

   A. Store without the O-Ring installed between the two halves.

3. Plug Or Cover Bearing Hub Area During Storage To Prevent Contamination.

OVERHAUL MANUAL WITH IPL
WHEEL ASSEMBLY 40-289

ILLUSTRATED PARTS LIST

1. Introduction

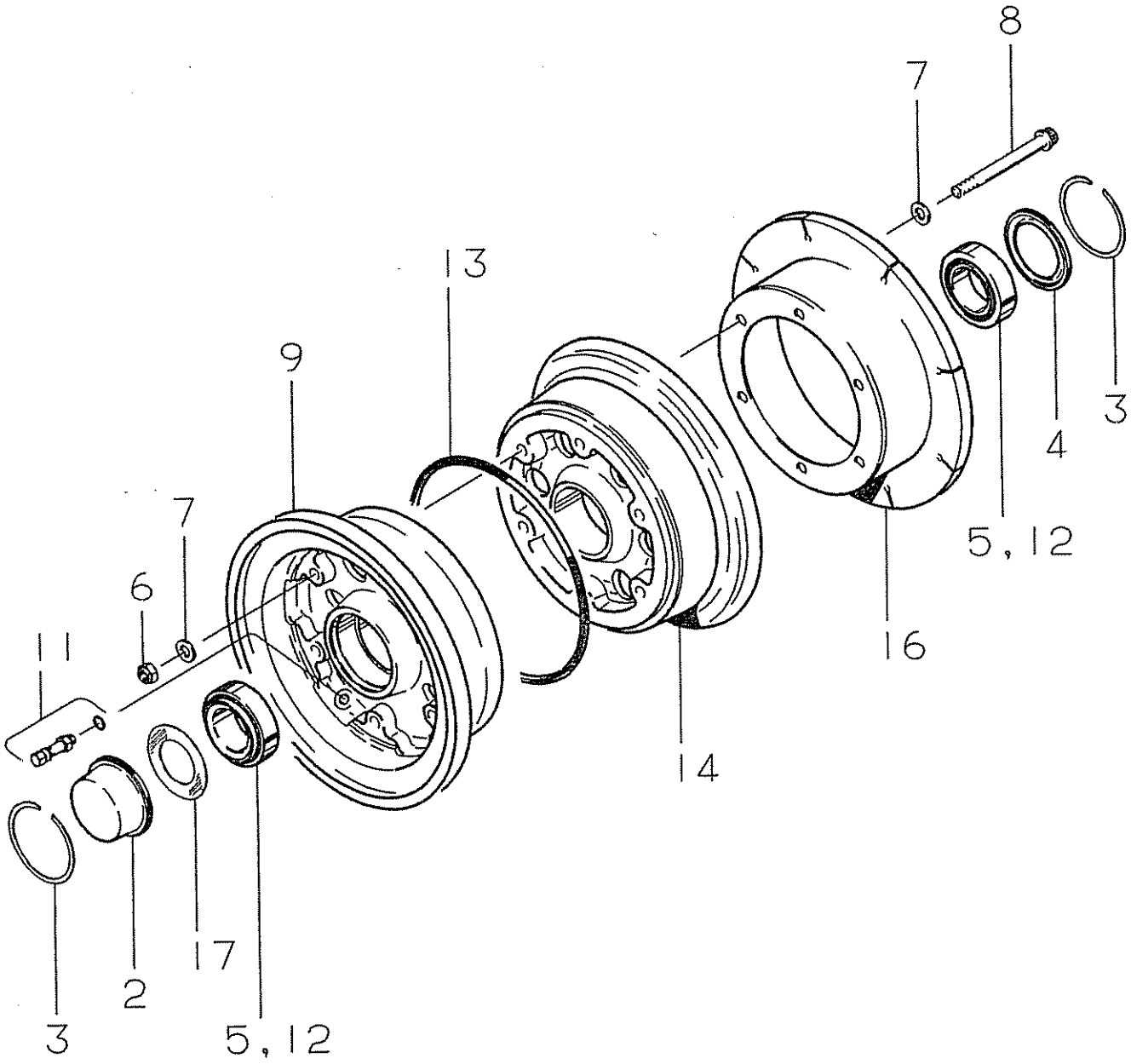
   A. The Illustrated Parts List (IPL) section lists and illustrates the procurable parts of the Parker Hannifin assembly covered in this publication. The components are listed in the order of disassembly.

   B. The Figure item column provides the cross reference between the parts list and IPL Figure 1.

   C. The Part Number column gives the part number of the item, which is stamped on the part when practical. This number should be used when ordering parts.

   D. The Nomenclature column gives the basic name of each part, together with any specifications required to identify the part listed. The descriptions are indented under the column heading to show the relationship of the parts to their subassemblies and to the assembly.

   E. The Units Per Assembly column gives the number of parts required for each assembly or subassembly.



ILLUSTRATED PARTS LIST (IPL) FOR 40-289 WHEEL ASSEMBLY
FIGURE 1

2. PARTS LIST

FIGURE ITEM	PART NUMBER	NOMENCLATURE	UNITS PER ASSY
1	40-289	WHEEL ASSEMBLY	1
2	158-02000	HUBCAP	1
3	155-00100	SNAP RING	2
4	154-03600	GREASE SEAL	1
5	214-00200	CONE-BEARING (TIMKEN 13889)	2
6	094-15800	NUT (NAS1804-6N)	6
7	095-14900	WASHER (MS14155-06)	12
8	103-32900	BOLT (MS21250-06044)	6
9	162-18000	OUTER WHEEL HALF SUBASSEMBLY	1
10	*	OUTER WHEEL HALF	1
11	160-00700	INFLATION VALVE (TR762-03)	1
12	214-06300	CUP-BEARING (TIMKEN 13830)	2
13	101-26600	O-RING (MS28775-261)	1
14	161-18000	INNER WHEEL HALF SUBASSEMBLY	1
15	*	INNER WHEEL HALF	1
16	164-21000	BRAKE DISC	1
(A) 17	153-04200	RING, GREASE SEAL	1

* - NOT PROCURABLE

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, P.O. Box 158
Avon, Ohio 44011 USA
1-800-BRAKING (272-5464)
216-937-1272 ● FAX 216-937-5409

PRODUCT REFERENCE MEMO

ALTERNATE CYLINDER CONNECTING LINE INSTALLATION FOR BRAKE MODEL 30-146

APPLICABILITY: All aircraft converted to Cleveland Main Wheels and Brakes per Parker Hannifin, Aircraft Wheel & Brake Conversion Kit No.199-110, per STC's SA646GL, SA650GL and SA890GL:

Beech Models 99, 99A, A99A, B99, C99, 100, A100, B100, F90, 200, 200C, 200CT, 200T, A200, A200C, A200CT, B200, B200C, B200CT and B200T

PURPOSE: Provides for fabrication and installation of an alternate cylinder connecting line. Use of alternate line gives added brake to ground clearance for operations on unimproved runways.

NOTE: This is an OPTIONAL installation.

PROCEDURE: At owner's discretion:

1. Jack aircraft and remove wheels and brakes per Manual.
2. Remove existing hose assembly P/N 207-01600 and fittings P/N 104-04900 or P/N 207-07600 hose assembly and fittings P/N 104-04700 from each brake.
3. Install 90° fittings, P/N 104-03100 (Parker 4-C50X), one in each cylinder positioned, as in Figure 1.
4. Fabricate a brake line, bent as shown in Figure 1, cut and double flared to length needed for proper fit. Brake line to be made of 1/4" stainless steel brake line with AN819-4 sleeves and AN818-4 nuts. Fabrication to be per "Airframe and Powerplant Mechanics General Handbook", FAA publication EA-AC65-9A, Chapter 5.
5. Install brake line, as shown in Figure 1, and tighten per above referenced handbook.
6. After line nuts and fittings are tightened, assure that both cylinders slide freely (as a unit) in the torque plate. If not, adjust tubing bend as needed for a free fit.
7. Repeat procedure for all four (4) brakes, then reinstall wheels and brakes per manual.
8. Bleed brake system and remove aircraft from jacks.
9. Make a log book entry referencing this activity and return the aircraft to service.

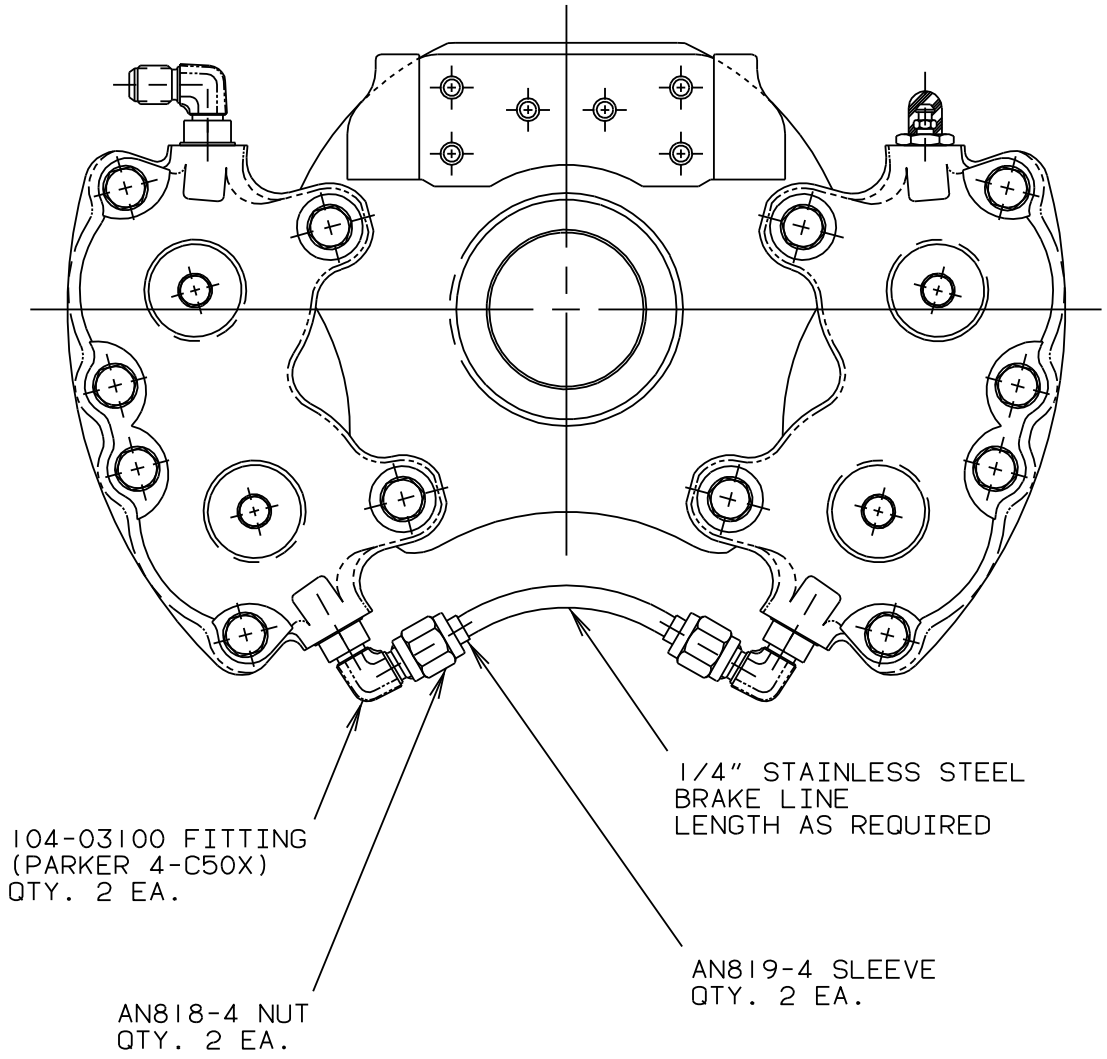


Figure 1
30-146 Brake Assembly - Connecting Hose Modification

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.

ANAC
AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL

CERTIFICADO SUPLEMENTAR DE TIPO

(Supplemental Type Certificate)

NÚMERO (Number) **2013S08-15**

Este certificado, emitido com base na Lei nº 7565 "Código Brasileiro de Aeronáutica", de 19 de dezembro de 1986,
(This certificate, issued in the basis of the Law No. 7565 "Código Brasileiro de Aeronáutica", dated 19 December 1986,

é conferido ao (à): (is granted to:)
Parker Hannifin Corporation
Aircraft Wheel & Brake Division
1160 Center Road
Avon, Ohio 44011
USA

por ter a modificação ao projeto de tipo do produto abaixo citado, observadas as limitações e condições
(for having the change to the type design of the product mentioned below, with the limitations and conditions therefor as)

especificadas, satisfeito aos requisitos de aeronavegabilidade aplicáveis.
(specified hereon, met the applicable airworthiness requirements.)

Produto Original - Número do Certificado de Tipo: (Original Product – Type Certificate No:) A24CE (FAA).

Fabricante: (Manufacturer:) Hawker Beechcraft Corporation.

Modelo(s): (Model(s):) 200, 200T, A200, B200, B200T, B200GT and B200CGT.

DESCRIÇÃO DA MODIFICAÇÃO AO PROJETO DE TIPO:
(Description of Type Design Change:)

Installation of Parker Hannifin Corporation Aircraft Wheel & Brake Conversion Kit 199-110, Rev. AD, dated 11 Nov. 2011 or later approved revisions and if applicable, installation of Parker Hannifin Corporation Aircraft Wheel & Brake Division Hot Air Manifold Kit 199-168, Rev. G, dated 06 Jun. 2011, or later revisions; in accordance with Installation Drawing No. 50-79, Rev. P, dated 19 Jan. 2011, or later approved revisions.

This CST validates in Brazil the STC # SA890GL, issued by FAA (USA).

LIMITAÇÕES E CONDIÇÕES:
(Limitations and Conditions:)

See continuation sheet for applicable data.

DATAS:
(Dates of:)

Do Requerimento: (Application:) 20 June 2013 **Da emissão**: (Issuance:) 21 Aug. 2013 **Da reemissão**: (Reissuance:) **Da emenda**: (Amendment:)

HÉLIO TARQUINIO JÚNIOR
Gerente-Geral, Certificação de Produto Aeronáutico
(General Manager, Aeronautical Product Certification)

DINO ISHIKURA
Superintendente de Aeronavegabilidade
(Airworthiness Superintendent)

ANAC
AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL

Folha de Continuação ao
(Continuation Sheet to)

CERTIFICADO SUPLEMENTAR DE TIPO

(Supplemental Type Certificate)

NÚMERO (Number) **2013S08-15**

LIMITAÇÕES E CONDIÇÕES:
(Limitations and Conditions:)

I. The approval of this type design change should not be extended to other aircraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the relationship between this change and any of those other previously approved modifications, including changes in Type Design, will introduce no adverse effect upon the airworthiness of that aircraft.

II. 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.

III. For B200GT and B200CGT models, information regarding operation of the Brake De-Ice System is contained in the Main Body of Airplane Flight Manual. For all other models the operation must be performed in accordance with FAA Brake De-ice Airplane Flight Manual Supplement, approved on 19 Oct 1988, or later FAA approved revision.

IV. This installation is restricted to those aircraft with standard landing gear (18 x 5.5 Main Wheel & Brakes)

V. A copy of this Certificate and the Supplement referred on item III above shall be maintained as part of the permanent records of the modified aircraft.

----------END----------

European Aviation Safety Agency

SUPPLEMENTAL TYPE CERTIFICATE

10043296

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 (EU) No. 748/2012 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 Type Certificate Number : 1- EASA.IM.A.277
Original Type Certificate Number : 2- FAA A24CE
Type Certificate Holder : HAWKER BEECHCRAFT CORPORATION
Type Design - Model : 1- B200, B200C, B200GT,B200CGT
Type Design - Model : 2- 200, 200C, 200CT, 200T,A200
Type Design - Model : 2- A200C, A200CT, B200CT,B200T
Original STC Number : FAA STC SA890GL

Description of Design Change:
Installation of Parker Hannifin Corporation, Aircraft Wheel & Brake Division Conversion Kit 199-110, revision AB, dated June 18, 2010, and if applicable, installation of Parker Hannifin Corporation, Aircraft Wheel & Brake Division Hot Air Manifold Kit 199-168, revision F, dated June 18, 2010.

EASA Certification Basis:
The Certification Basis for the original product remains applicable to this certificate/ approval.
The requirements for environmental protection and the associated certified noise and/ or emissions levels of the original product are unchanged and remain applicable to this certificate/ approval.

See Continuation Sheet(s)

For the European Aviation Safety Agency,

Date of issue: 18 January 2013

European Aviation Safety Agency
Manfred REICHEL
Project Certification Manager
General Aviation

Note:
The following numbers are listed on the certificate:
EASA current Project Number: 0010020364-001

Associated Technical Documentation:
Installation in accordance with Installation Drawing 50-79, revision N, dated June 18, 2010;
Continued Airworthiness in accordance with Parker Hannifin Corporation, Component Maintenance Manual CM30-146, revision D, dated January 19, 2011 and Component Maintenance Manual CM40-289, revision B, dated August 10, 2004;
For B200GT and B200CGT models information regarding operation of the Brake De-Ice System is contained in the Main Body of the Aircraft Flight Manual. For all other models the Brake De-Ice System Aircraft Flight Manual Supplement, approved on October 19,1988;
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)" and/ or the Technical Implementation Procedures of EU/ USA Bilateral Agreement.

Limitations:
This installation is restricted to those aircraft with standard landing gear (18x5.5 Main Wheel & Brakes).

Conditions:
None

- end -

Note:
The following numbers are listed on the certificate:
EASA current Project Number: 0010020364-001

Luftfahrt-Bundesamt
I312/15/95-2047

Braunschweig, 21.6.1995

Mitteilung über die Ergänzung der Musterzulassung **Nr. 0618/2047**
2047-1

STC-Inhaber: Aircraft Wheel and Brake Division
Parker Hannifin Corporation

Änderung: Einrüstung Parker Hannifin Main Wheel and Brake Conversion Kit 199-110

Muster/Baureihe: Beech 200, 200C, B200, B200C u. B200T

Geräte-Kennblatt Nr.: 2047, 2047-1

Die Musterzulassung des/der o.a. Musters/Baureihe wird durch folgende Angaben ergänzt:

Die Verwendung des Parker Hannifin Main Wheel and Brake Conversion Kit 199-110 in Beech 200, 200C, B200, B200C und B200T entsprechend dem FAA Supplemental Type Certificate **SA890GL** ist zugelassen.

So umgerüstete Flugzeuge sind zu betreiben nach:

1) Installation Manual Kit No. 199-110, FAA-anerkannt am 20.06.94
2) Installation Manual Kit No. 199-168, FAA-anerkannt am 02.12.88
3) Installation Drawing No. 50-79, FAA-anerkannt am 20.06.94

oder jede spätere FAA-anerkannte Fassung.

Unterlagen sind zu beziehen bei:

1) **Beechcraft Vertriebs- und Service GmbH**
Flughafenstr. 5
86169 Augsburg

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. 2047, der jeweils gültigen Ausgabe.

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 SA646GL

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

certifies that the change in the type design for the following product with the limitations and conditions thereof as specified hereon meets the airworthiness requirements of Part 23 *of the* Federal Aviation *Regulations.* See Type Certificate Data Sheet A14CE for complete certification basis.

Original Product—Type Certificate Number A14CE

Make Beech

Model 99, 99A, A99A, B99, C99, 100, A100, B100

Description of Type Design Change

Installation of Cleveland Wheel and Brake Conversion Kit 199-110 in accordance with Cleveland Drawing 50-79, revision A, dated May 26, 1983, and Parts List 199-110, revision A, dated May 26, 1983, and Cleveland Hot Air Manifold Kit 199-168, revision A, dated November 9, 1988 or later FAA Approved revisions.

Limitations and Conditions The Brake De-Ice System Airplane Flight Manual Supplement FAA Approved on October 19, 1988, or later FAA approved revision, must be carried in the aircraft at all times. This approval should not be extended to other aircraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the interrelationship between this change and any other of those previously approved modifications will introduce no adverse effect upon the airworthiness of that aircraft.

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

Date of application April 22, 1982

Date of issuance September 3, 1982

Date reissued

Date amended August 2, 1984, November 9, 1988

By direction of the Administrator

W. F. Horn *(Signature)*
Manager, Chicago Aircraft Certification Office
ACE-115C, Central Region *(Title)*

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

This certificate may be transferred in accordance with FAR 21.47

FAA Form 8110-2 (10-68)

United States of America

Department of Transportation—Federal Aviation Administration

Supplemental Type Certificate

Number SA650GL

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

certifies that the change in the type design for the following product with the limitations and conditions thereof as specified hereon meets the airworthiness requirements of Part 23 *of the* Federal Aviation *Regulations.* See Type Certificate Data Sheet A31CE for complete certification basis.

Original Product—Type Certificate Number A31CE
Make Beech
Model F90

Description of Type Design Change

Installation of Cleveland Brake Conversion Kit 199-110 in accordance with Cleveland Drawing 50-79, no revision, dated October 13, 1981 and Parts List 199-110, dated May 4, 1982; and Cleveland Hot Air Manifold Kit 199-168, Rev. A, dated November 9, 1988 or later FAA Approved revisions.

Limitations and Conditions The Brake De-Ice System Airplane Flight Manual Supplement FAA Approved on October 19, 1988, or later approved revision, must be carried in the aircraft at all times. This approval should not be extended to other aircraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the interrelationship between this change and any other of those previously approved modifications will introduce no adverse effect upon the airworthiness of that aircraft.

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

Date of application April 22, 1982 *Date reissued*

Date of issuance September 17, 1982 *Date amended* November 9, 1988

By direction of the Administrator

W. F. Horn *(Signature)*
Manager, Chicago Aircraft Certification Office
ACE-115C, Central Region
(Title)

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

This certificate may be transferred in accordance with FAR 21.47.

FAA Form 8110-2 (10-68)

United States of America

Department of Transportation -- Federal Aviation Administration

Supplemental Type Certificate

Number SA890GL

This certificate issued to

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

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 23 *of the* Federal Aviation *Regulations.*
See Type Certificate Data Sheet No. A24CE for complete certification basis.

Original Product—Type Certificate Number: A24CE

Make: Hawker Beechcraft Corporation

Model: 200, 200C, 200CT, 200T, A200, A200C
A200CT, B200, B200C, B200CT, B200T
B200GT, B200CGT

Description of Type Design Change:
Install Parker Hannifin Corporation, Aircraft Wheel & Brake Division Conversion Kit 199-110, revision AB, dated June 18, 2010, and if applicable, install Parker Hannifin Corporation, Aircraft Wheel & Brake Division Hot Air Manifold Kit 199-168, revision F, dated June 18, 2010, in accordance with Installation Drawing 50-79, revision N, dated June 18, 2010, or later FAA approved revisions.

Limitations and Conditions:

1) This installation is restricted to those aircraft with standard landing gear (18x5.5 Main Wheel & Brakes).
2) The installer must determine whether this design change is compatible with previously approved modifications.
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.
4) For B200GT and B200CGT models, information regarding operation of the Brake De-Ice System is contained in the Main Body of the Airplane Flight Manual. For all other models the Brake De-Ice System Airplane Flight Manual Supplement, approved on October 19, 1988, or later FAA Approved revision must be carried in the aircraft at all times.

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: February 13, 1985

Date of issuance: April 16, 1985

Date reissued:

Date amended: December 15, 2010

By direction of the Administrator

(*Signature*)
Steven L. Lardinois
Manager, Systems and Flight Test Branch
Chicago Aircraft Certification Office

(*Title*)

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

This certificate may be transferred in accordance with FAR 21.47.