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

PARTS LIST
199-283 CONVERSION KIT
Piaggio Aircraft – Model P.180

PART NUMBER	DRAWING REVISION	DESCRIPTION	QUANTITY
30-289	Rev. A dated 01-17-2018	Brake Assembly	2
40-480	Rev. B dated 02-16-2018	Wheel Assembly	2
		Publication Package (P/N PP199-283)	
199-283		Kit Parts List (This Document)	
IM199-283	Rev. B dated 11-22-2019	Installation Manual	1
50-166	Rev. A dated 11-30-2017	Installation Drawing, Wheel & Brake	1
CM30-289	Rev. NC dated 12-20-2017	Component Maintenance Manual, Brake	1
CM40-480	Rev. NC dated 12-20-2017	Component Maintenance Manual, Wheel	1
PRM14A	Rev. A dated 07-01-1995	Conditioning Procedure, Metallic Linings	1
AMMS199-283	Rev. B dated 06-24-2019	Airplane Maintenance Manual Supplement	1
SA04348CH	----------	Supplemental Type Certificate	1
10068773	----------	EASA Supplemental Type Certificate	1

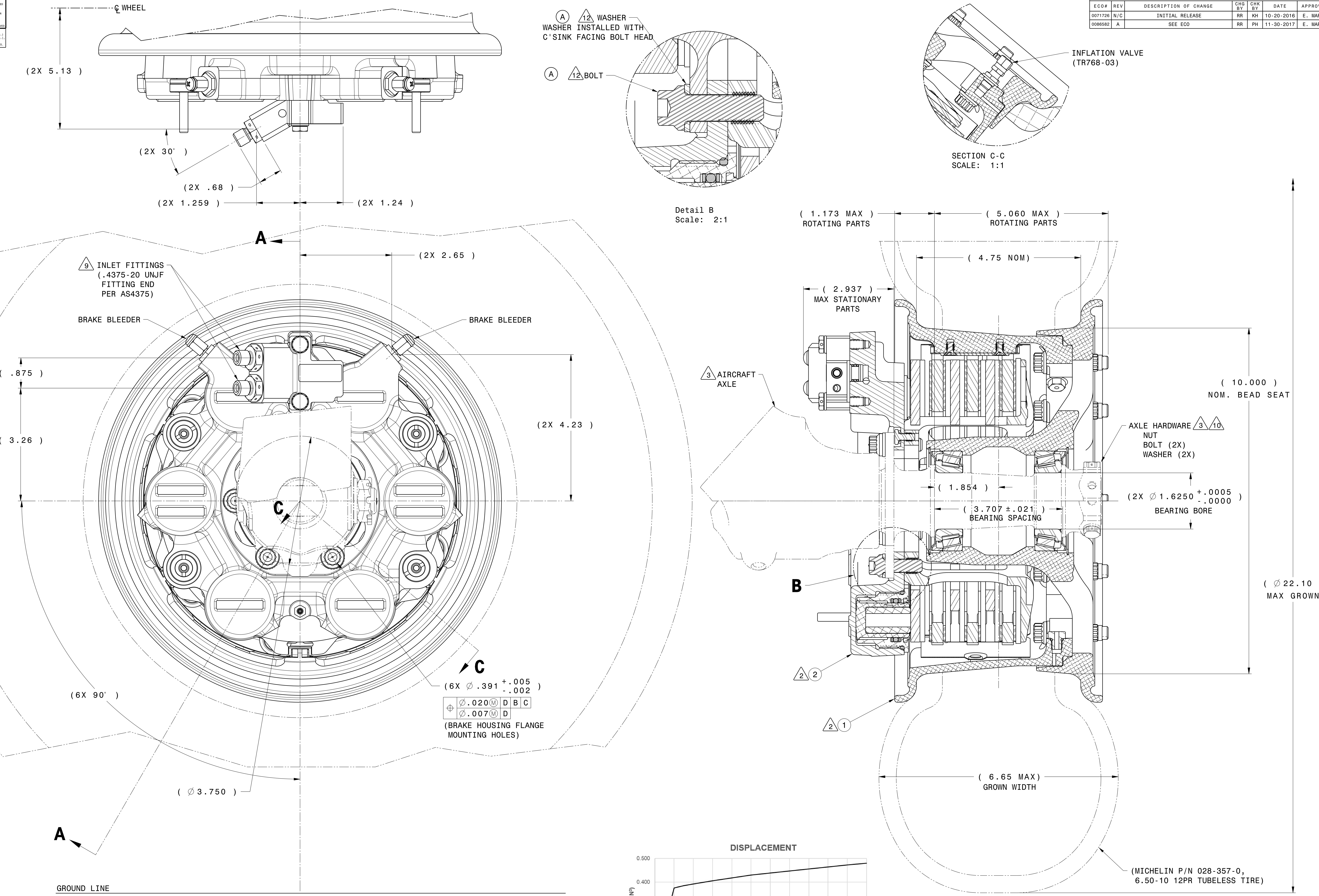
NOTES:

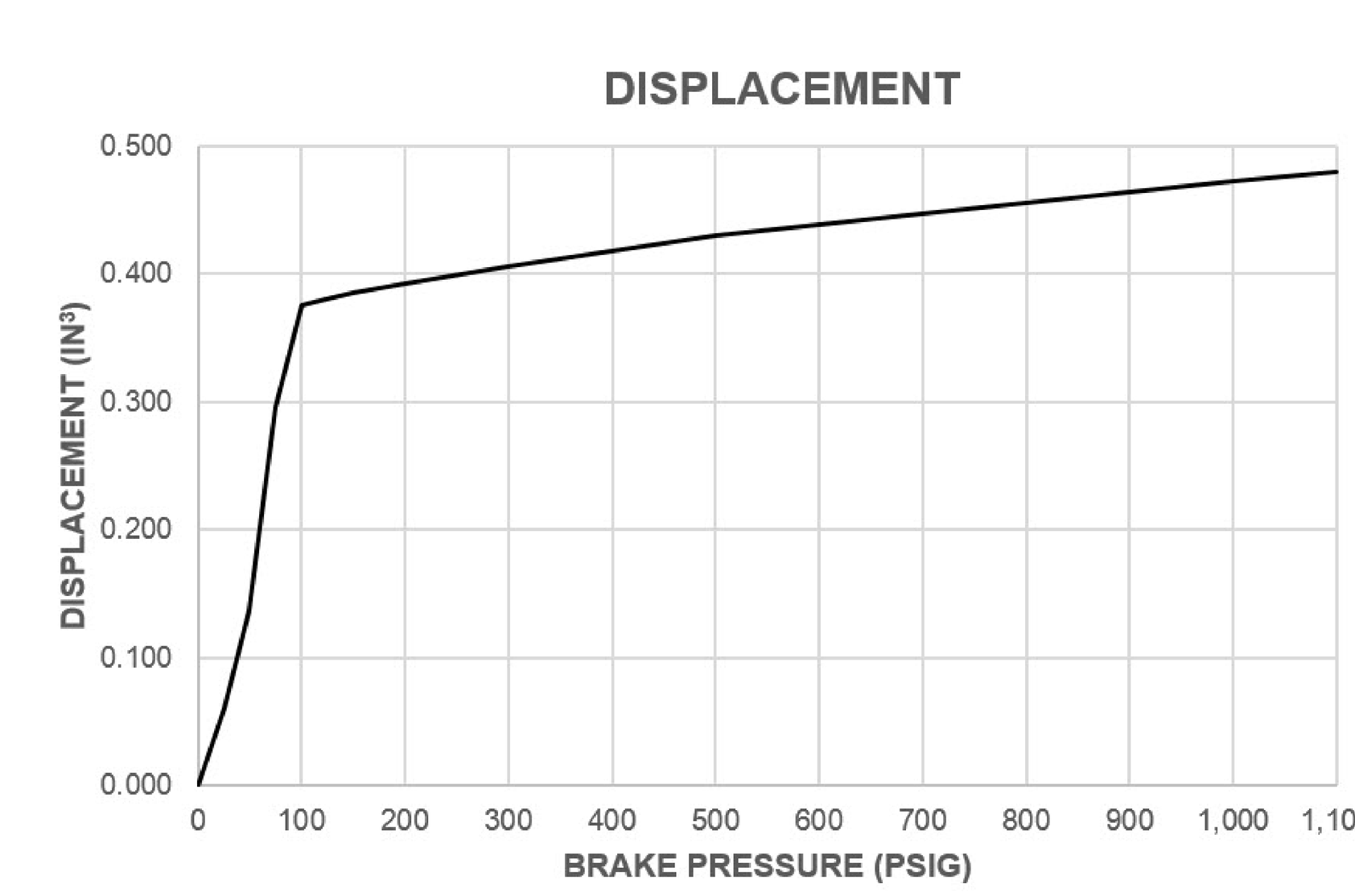
1. This kit will convert one aircraft to Cleveland Wheels and Brakes.
2. The 30-289 brake assembly is designed for use with hydraulic fluid per MIL-PRF-5606.
3. The 40-480 wheel assembly is designed for use with a Michelin 6.50-10, 12PR tubeless bias ply tire.

199-283
Rev. NC 06-05-2018 (ECO-0093573)
Rev. A 11-12-2018 (ECO-0098400)
Rev. B 06-24-2019 (ECO-0105058)
Rev. C 11-22-2019 (ECO-0109321)

REVISIONS

ECO#	REV	DESCRIPTION OF CHANGE	CHG BY	CHK BY	DATE	APPROVED
0071726	N/C	INITIAL RELEASE	RR	KH	10-20-2016	E. MARKS
0086582	A	SEE ECO	RR	PH	11-30-2017	E. MARKS





NOTES:

1. READ INSTALLATION MANUAL IM199-283 BEFORE INSTALLING.
2. (2) THESE PARTS ARE SUPPLIED AS PART OF THE 199-283 KIT.
3. (3) THIS EXISTING HARDWARE MUST BE RETAINED AND REUSED FOR THE INSTALLATION.
4. USE THIS KIT WITH MIL-PRF-5606 HYDRAULIC FLUID.
5. REFER TO INSTALLATION MANUAL IM199-283 FOR WEIGHT AND BALANCE DATA COMPUTATIONS.
6. (6) QUANTITIES ARE PER KIT (ONE SHIPSET).
7. WHEEL IS RATED FOR USE WITH MICHELIN TIRE P/N 028-357-0 (6.50-10, 12 PR TUBELESS).
8. WHEEL AND BRAKE COMPATIBLE WITH AXLE AS DEFINED IN CUSTOMER SPECIFICATION 180-PSP-3240-04202, REV 00, DRAFT 1.
9. (9) RIGHT SIDE MAIN LANDING GEAR POSITION SHOWN. TO CONFIGURE BRAKE FOR OPPOSITE SIDE INSTALLATION, REMOVE SHUTTLE VALVE ASSEMBLY AND REINSTALL WITH INLET PORTS FACING THE OPPOSITE DIRECTION.
10. (10) THE RECOMMENDED WHEEL BEARING PRELOAD ON AXLE IS 950±180 LB.
11. DRAWING AND DESIGN IN ACCORDANCE WITH FAA TSO-C26d (PART 23 USAGE) AND CUSTOMER SPECIFICATION 180-PSP-3240-04202, REV 00, DRAFT 1. THIS DRAWING IS NOT TO BE USED FOR FABRICATION OR INSPECTION.
12. (A) (12) TO INSTALL BRAKE ON AXLE, USE NEW BOLTS AND WASHERS WHICH ARE SUPPLIED AS PART OF THE 30-289 BRAKE ASSEMBLY.

(6)

Item No.	Quantity	Part Number	Nomenclature
1	2	40-480	WHEEL ASSEMBLY
2	2	30-289	BRAKE ASSEMBLY
3		"REMOVED"	
4		"REMOVED"	

(A)

A CONTRACT ALTERED ITEM EXISTS FOR THIS PART NUMBER

.	.	.	.
QTY	FINAL ASSY	QTY	NEXT ASSY

APPLICATION (NOT MAINTAINED)

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.

GENERAL NOTES: UNLESS OTHERWISE SPECIFIED
DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
DIMENSIONS ARE IN INCHES
TOLERANCES
2 PLACE (.XX): ±.03
3 PLACE (.XXX): ±.010
ANGULAR: ±0.5°
REMOVE ALL BURRS
BREAK CORNERS .010 MAX.
INTERNAL RADII .005-.010
GENERAL MACHINED SURFACES 125√ PER ANSI B46.1
THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS AND MICROFINISHES APPLY TO COMPLETED PART, LESS PAINT

PROGRAM/CONTRACT NO. C25	DATE
DRAWN SEE ECO	SEE ECO
CHECKED SEE ECO	SEE ECO
ENGINEER SEE ECO	SEE ECO
DESIGN APPROVAL SEE ECO	SEE ECO
PROJ APPROVAL SEE ECO	SEE ECO
MFG ENGRG SEE ECO	SEE ECO
QUAL ASSUR SEE ECO	SEE ECO

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

DWG. TITLE
INSTALLATION, WHEEL & BRAKE

SIZE	CAGE CODE	DWG. NO.	REV.
E	33269	50-166	A

SCALE: 1:1 UNIT WGT.: SHEET: 1 OF 1

DWG. NO. 50-166 SHEET REV. 1/1 A

PD-E-GENL-CT-01

Released: 12/12/2019

Kit Installation Publication

Main Wheel & Brake Conversion Kit
Parker Hannifin Part No. 199-283

Publication No.: IM199-283, Revision B

Manufacturer:

Parker

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

Cleveland
Wheels & Brakes

TO: HOLDERS OF IM199-283 INSTALLATION MANUAL FOR MAIN WHEEL ASSEMBLY PART NO. 40-480 AND MAIN BRAKE ASSEMBLY PART NO. 30-289.

Attached to this transmittal letter is Revision NC of IM199-283 (dated 2018-01-15)

Revision NC, Dated 2018-01-15

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

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

REVISION HIGHLIGHTS

Section/Page No.	Description Of Change
All Sections/All Pages	Initial Release (ECO-0088427)

TO: HOLDERS OF IM199-283 INSTALLATION MANUAL FOR MAIN WHEEL ASSEMBLY PART NO. 40-480 AND MAIN BRAKE ASSEMBLY PART NO. 30-289.

Attached to this transmittal letter is Revision A of IM199-283 (dated 2018-10-16)

Revision A, Dated 2018-10-16

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

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

REVISION HIGHLIGHTS

Section/Page No.	Description Of Change
As follows	Per ECO-0097602
Title Page/T-1	Updated to reflect current revision
Record of Revisions/RR-1	Updated to reflect current revision
Pg 2	Section 2.3 Aircraft model applicability (add) modification compatibility note.

TO: HOLDERS OF IM199-283 INSTALLATION MANUAL FOR MAIN WHEEL ASSEMBLY PART NO. 40-480 AND MAIN BRAKE ASSEMBLY PART NO. 30-289.

Attached to this transmittal letter is Revision B of IM199-283 (dated 2019-11-22)

Revision B, Dated 2019-11-22

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

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

REVISION HIGHLIGHTS

Section/Page No.	Description Of Change
As follows	Per ECO-0109321
Title Page/T-1	Updated to reflect current revision
Record of Revisions/RR-1	Updated to reflect current revision
Pg 13	Section 10.1 Brake conditioning procedure, Step 1 (now) Perform two [2] full stop braking applications from 30 to 35 knots, do not allow the brake discs to cool between each stop. Maximum pressure braking is not required for conditioning stops. (was) Perform two [2] full stop braking applications from 30 to 35 knots, allowing the brake disc to cool between each stop.

RECORD OF REVISIONS

Check in the following record that all earlier changes have been incorporated.

Rev	Incorporated date	by (signature)	Rev	Incorporated date	by (signature)
NC	2018-01-15	P. Hunyad			
A	2018-10-16	P. Hunyad			
B	2019-11-22	P. Hunyad			

STEP 1: VERIFY EQUIPMENT

VERIFY THAT THE ASSEMBLY PART NUMBERS AS LISTED ON THE KIT PARTS LIST MATCH THE PART NUMBERS AS INDICATED ON THE ASSEMBLY NAMEPLATES.

STEP 2: REVIEW KIT HIGHLIGHTS

REVIEW AIRCRAFT MODIFICATIONS (IF ANY), INSTALLATION HARDWARE, AND AIRCRAFT MODEL APPLICABILITY.

STEP 3: RETURN REGISTRATION CARD

COMPLETE AND RETURN THE REGISTRATION CARD. PLEASE PRINT INFORMATION LEGIBLY. THIS DATA WILL ASSIST PARKER HANNIFIN, AIRCRAFT WHEEL & BRAKE DIVISION TO NOTIFY END USERS OF SPECIFIC AIRWORTHINESS DOCUMENTS WHEN REQUIRED.

STEP 4: TECHNICAL ASSISTANCE

FOR TECHNICAL ASSISTANCE, CONTACT THE TECHNICAL SERVICES HOTLINE:

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

TABLE OF CONTENTS

1.0 INTRODUCTION

The 199-283 Kit is designed to replace the OEM equipment main wheels and brakes on the aircraft model listed in Table 1. The 199-283 Kit will retrofit one aircraft. Instructions are per landing gear.

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

CAUTION: READ THIS INSTALLATION MANUAL AND REVIEW THE INSTALLATION DRAWING, NO. 50-166, BEFORE DOING ANY WORK.

This manual provides the necessary procedures to accomplish the installation of an STC'd Parker Hannifin, Aircraft Wheel & Brake Division Conversion Kit. It is published for the guidance of qualified maintenance personnel responsible for the installation of a Parker Hannifin, Aircraft Wheel & Brake Division Conversion Kit.

Installation of this kit should be performed by a qualified, licensed Airframe and Powerplant mechanic (A & P).

Use the following publications in addition to this conversion kit publication for all kit component identification and installation instructions:

- Kit Parts List, P/N 199-283.
- Installation Drawing, No. 50-166.

The 199-283 Kit contains Parker Hannifin brake assembly P/N 30-289 and wheel assembly P/N 40-480.

1.1 Warnings, cautions and notes

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

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

2.0 KIT HIGHLIGHTS

2.1 Modifications

There are no modifications required to the aircraft.

2.2 Installation hardware

Refer to Installation Drawing, No. 50-166 for hardware details such as:

- Replacement hardware included in this conversion kit
- Installation specific hardware required for this conversion kit
- Existing hardware that will be reused for this conversion kit

2.3 Aircraft model applicability

The equipment supplied under Kit No. 199-283 is applicable to the following aircraft.

Table 1 Aircraft model applicability

MAKE	MODEL
Piaggio	P.180**

**__NOTE__: This modification has not been shown to be compatible with the antiskid system for the P.180 aircraft. If the antiskid system is installed, it must be removed or disabled prior to installation of this modification.

3.0 TSO NOTICE

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

Modifications to the wheel and brake assemblies provided in this kit or use of unapproved parts will void the TSO qualification and warranty for the wheel and brake assemblies.

4.0 PRODUCT REGISTRATION

A product registration card is included in the shipment of this conversion kit. The card is used to track the conversion kits and your guarantee of receiving any future airworthiness information applicable to Conversion Kit No. 199-283. Please fill out the registration card completely and return promptly. Postage is prepaid.

5.0 EQUIPMENT MAINTENANCE SUPPORT PUBLICATIONS

Refer to the following publications, published by Parker Hannifin, Aircraft Wheel & Brake Division, for illustrated parts list identification, service limits, maintenance, component overhaul and applicable related data. Always obtain the latest issue in effect.

CM40-480..... Component maintenance manual for 40-480 main wheel assembly (Includes Illustrated Parts List)

CM30-289..... Component maintenance manual for 30-289 main brake assembly (Includes Illustrated Parts List)

6.0 ORDERING INFORMATION

To order spare parts, contact the nearest Parker Hannifin, Aircraft Wheel & Brake distributor in your area, or contact Aircraft Wheel and Brake:

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

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

7.0 EQUIPMENT DESCRIPTION AND OPERATION

The brake assembly is a single fixed cylinder, six piston, hydraulically actuated. The brake is designed to operate with MIL-PRF-5606 hydraulic fluid.

The main wheel assembly is the primary interface between the main landing-gear strut and the tire during ground operation. The divided type design facilitates tire installation and removal. The wheel provides partial support of the weight of the aircraft and a means of steering control.

Braking action begins to occur when hydraulic pressure is applied to the brake, via the pilot's or co-pilot's braking input. As the hydraulic pressure reaches the brake it forces the pistons outward against the pressure plate assembly which compresses the brake stack against the torque tube assembly. This generated frictional force is transferred to the wheel/tire through the three rotor discs which have drive slots that engage the main wheel.

8.0 INSTRUCTIONS

Read this installation manual and review Installation Drawing, No. 50-166, before removing and installing components.

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

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

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

CAUTION: ALWAYS CHECK THE CONDITION OF ORIGINAL EQUIPMENT HARDWARE THAT WILL BE RETAINED. REPLACE THESE ITEMS AS NEEDED.

8.1 Remove the original equipment

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

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

2 Fully deflate the tire by depressing the valve stem plunger in the tube valve stem until air can no longer be heard escaping from the tube.

3 When all the tire pressure is released, then carefully remove the valve core from the valve stem.

4 Remove and retain the axle hardware.

5 Remove the wheel/tire unit from the axle.

6 Follow instructions per the airframe manufacturer's manual to disconnect and remove the brake assembly from the aircraft. Plug/cap all open lines and fittings.

7 Repeat steps 1 through 6 for the other landing gear wheels and brakes.

8.2 Brake assembly shuttle valve location

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

1. The shuttle valve is mounted to the brake housing in the right hand gear position. For left hand gear installation, the shuttle valve is reversed as follows.

1.1 Remove the two bolts and washers that attach the shuttle valve to the brake housing.

NOTE: The bolts and washers have had anti-seize applied. If an additional application is needed after removal, then apply anti-seize per Figure 1.

1.2 Check that the helical inserts in the housing have not backed out.

1.3 Check that the preformed packing and two backup rings have not dislodged from the shuttle valve to brake housing connection on the shuttle valve manifold.

1.4 Flip the valve to align with the hydraulic lines.

1.5 Reinstall the bolts and washers. Torque the bolts to 40 to 50 in-lb.

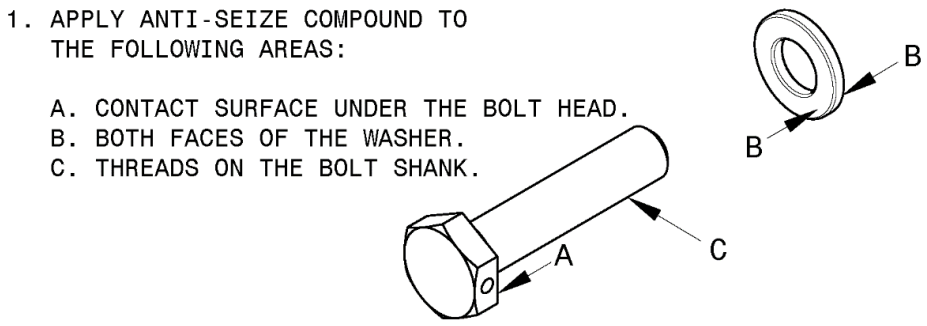


Figure 1 Apply anti-seize to shuttle valve mounting hardware

8.3 Apply anti-seize compound to the brake assembly mounting hardware.

CAUTION: DO NOT REINSTALL OLD BRAKE FASTENERS.

1 The brake assembly fasteners (6X bolts and 6X washers) are components of the brake assembly and are packaged in the kit. Remove the fasteners from the packaging. Prior to installing, lubricate the fasteners with anti-seize compound, per MIL-PRF-83483 as shown in Figure 2.

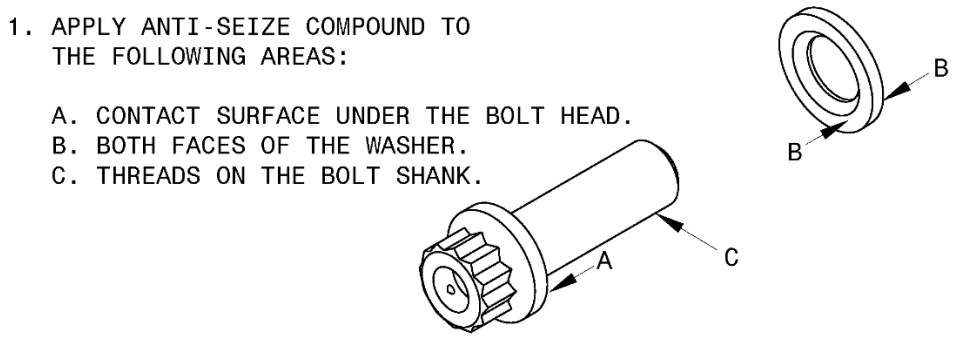


Figure 2 Apply anti-seize to brake assembly mounting hardware

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

8.4 Install the Parker brake assembly, P/N 30-289

Reference: Installation Drawing, No. 50-166.

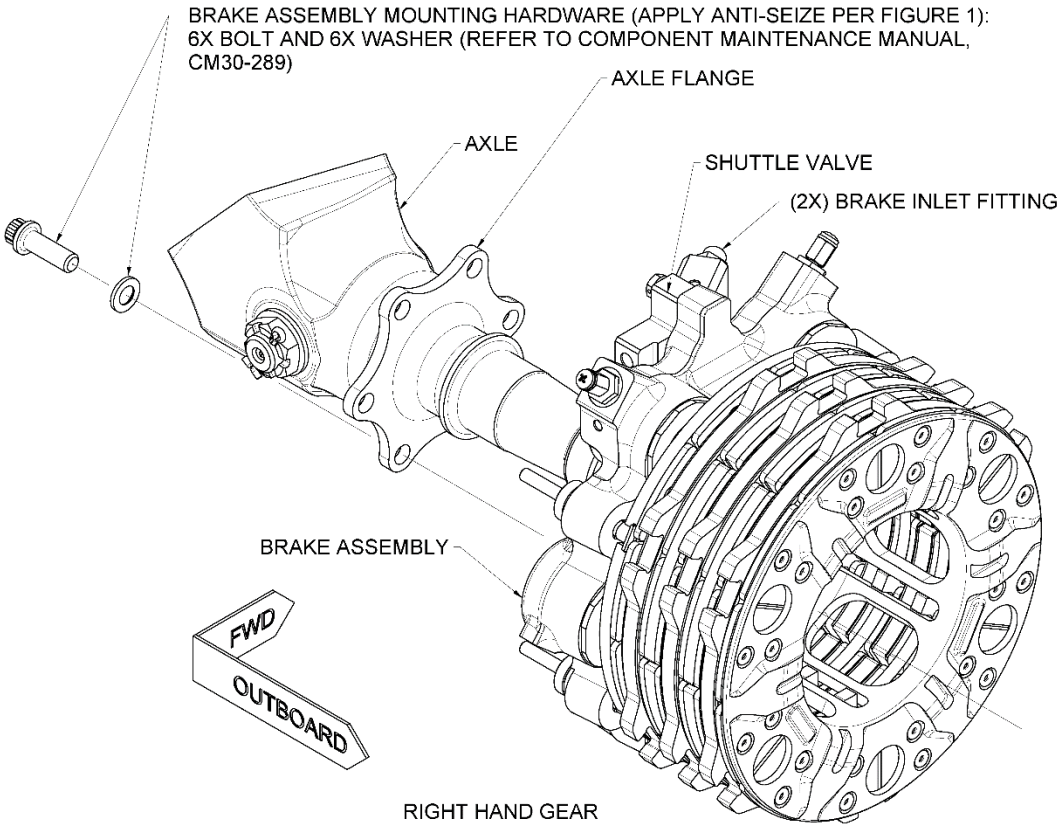
SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

1 Refer to Figure 3. Position the brake assembly on the axle. The shuttle valve and inlets will be located at the top.

CAUTION: WASHER IS INSTALLED WITH THE COUNTERSINK FACING THE BOLT HEAD.

2 Make sure anti-seize has been applied to the brake assembly fasteners (see Figure 2) and attach the brake assembly to the axle flange with the six washers and bolts. Torque the bolts to 335 to 345 in-lb.

3 Install/connect existing hydraulic lines per airframe manufacturer's instructions.



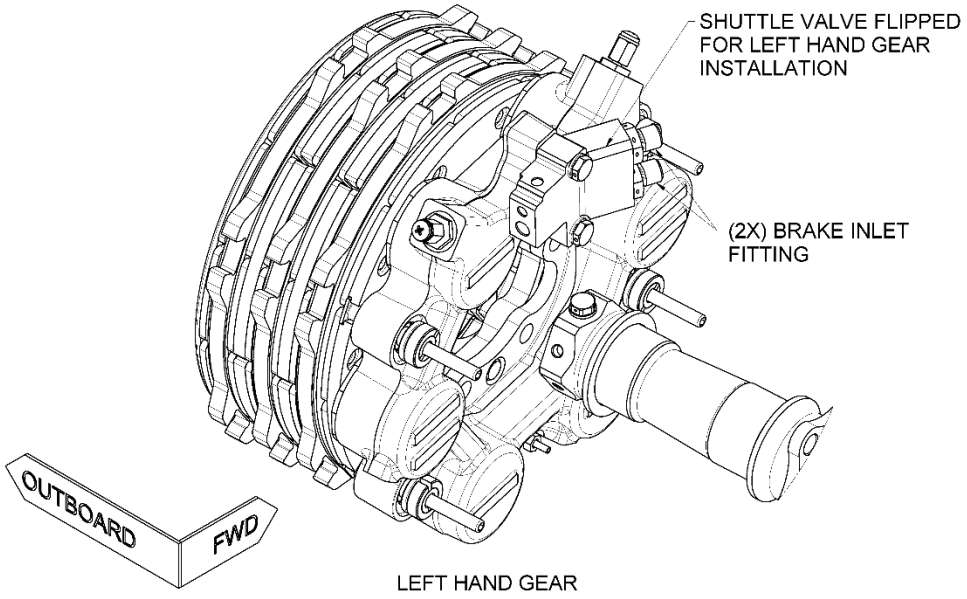


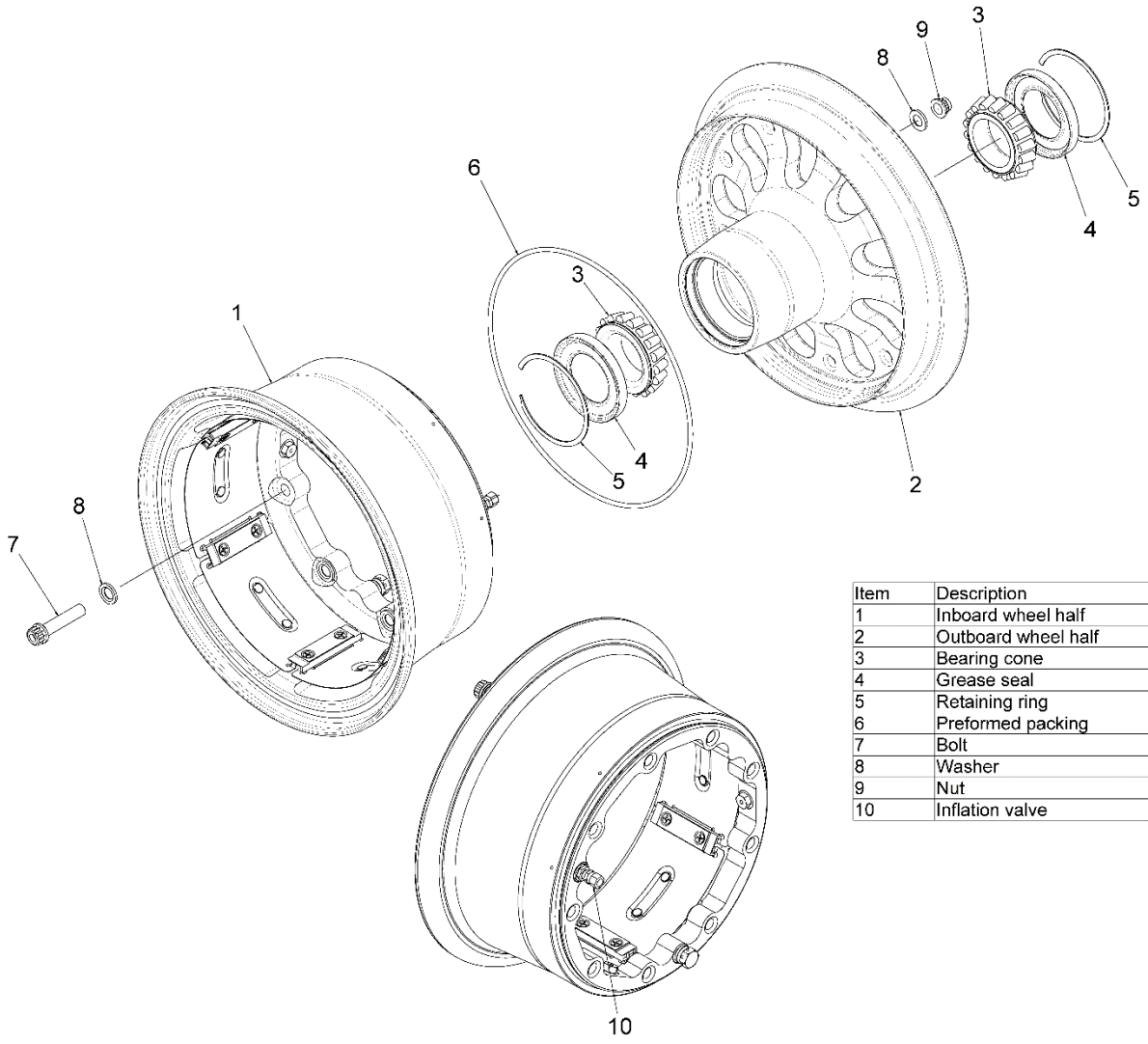
Figure 3 Install the brake assembly

8.5 Install the Parker wheel assembly, P/N 40-480

The wheel assembly must be disassembled to the level required for mounting a tire.

Refer to Figure 4 for identification of wheel assembly components. For complete parts identification, refer to Component Maintenance Manual, CM40-480.

NOTE: The wheel register preformed packing (6) is bagged for shipment.



Item	Description
1	Inboard wheel half
2	Outboard wheel half
3	Bearing cone
4	Grease seal
5	Retaining ring
6	Preformed packing
7	Bolt
8	Washer
9	Nut
10	Inflation valve

Figure 4 Disassemble the wheel assembly

8.6 Wheel and tire pre-assembly preparation

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

CAUTION: HANDLE BEARING CONES WITH CARE TO PREVENT CONTAMINATION OR DAMAGE.

1 To prevent possible damage or contamination of the hub components, remove the following items from each hub end of the outboard wheel half subassembly.

- Retaining ring (5), grease seal (4), and bearing cone (3).

CAUTION: DO NOT USE AN IMPACT WRENCH OR A POWER WRENCH TO REMOVE OR INSTALL THE WHEEL NUTS AND BOLTS. THESE TOOLS CAN DAMAGE THE EXTERNAL FEATURES OF THE NUTS AND BOLTS AND MATING COMPONENTS.

2 Remove the nuts (9), bolts (7), and washers (8).

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

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

5 The preformed packing groove in each wheel half should be examined for damage or other debris that would prevent the packing (6) from properly seating. Remove any lubricant, grease or foreign material with a clean cloth moistened with a mild soap and water solution or with denatured alcohol.

6 Verify that the tire is clean inside. If it is not clean, then wipe the bead base with a clean cloth dampened with a mild dishwashing liquid and water solution or a suitable rubber cleaner.

8.7 Mount the tire

Refer to Figure 4 for identification of wheel assembly components. For complete parts identification, refer to Component Maintenance Manual, CM40-480.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

1 Position the inboard wheel half (1) with the register side facing up.

2 Examine the preformed packing (6) for damage such as cuts, tears, cracking. Replace if necessary.

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

2.1 Apply a light coat of Dow Corning 55 O-ring lube to the preformed packing (6) and install the preformed packing carefully in the wheel register groove of the inboard wheel half without stretching or twisting.

3 Position the tire on the inboard wheel half being careful not to disturb the preformed packing (6).

4 Position the outboard wheel half (2) inside the tire and align the bolt holes of both wheel halves.

5 Align the red balance dot on the tire with the inflation valve (10).

5.1 If there is no balance dot on the tire, then align the tire serial number with the inflation valve.

8.8 Attach the wheel halves

Refer to Figure 4 for identification of wheel assembly components. For complete parts identification, refer to Component Maintenance Manual, CM40-480.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

1 Prior to installing, lubricate the wheel half fasteners (7), (8), (9), with anti-seize compound, per MIL-PRF-83483 as shown in Figure 5.

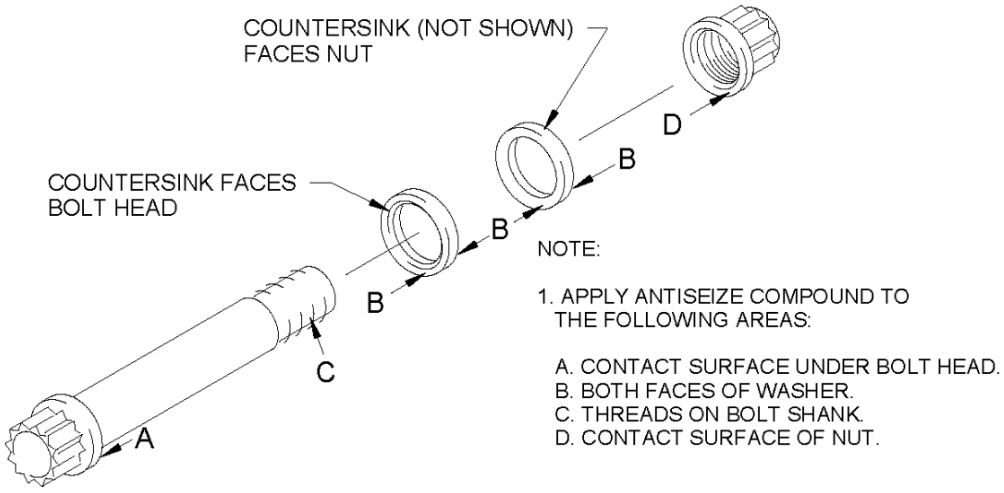


Figure 5 Apply anti-seize compound

CAUTION: WASHER (8) IS INSTALLED WITH THE COUNTERSINK FACING THE BOLT HEAD AND NUT.

2 Slide a countersunk washer (8) onto each bolt (7). Make sure the countersink side of the washer is facing the bolt head.

3 Install at least three bolts (7) [with washer (8)] into the inboard wheel half side. Compress the wheel halves together and install one washer (8) and nut (9) onto each bolt. Make sure the countersink side of the washer is facing the nut.

NOTE: The nuts (9) must be located on the outboard wheel half side.

4 Install the remaining bolts (7), washers (8) and nuts (9). Run the nuts down by hand as far as possible.

CAUTION: DO NOT USE POWER TOOLS FOR THE INSTALLATION OF WHEEL FASTENERS. POWER TOOLS CAN CAUSE OVER TIGHTENING.

CAUTION: THE FASTENERS MUST BE TIGHTENED BY APPLYING THE TORQUE TO THE NUT (9) WHILE SECURING THE BOLT HEAD.

CAUTION: DO NOT DAMAGE THE PREFORMED PACKING (6) DURING THE TORQUING PROCEDURE.

5 Wheel nuts should first be snugged in a criss-cross pattern to seat the flange. Apply the final torque evenly in a criss-cross pattern using calibrated tools until all nuts are properly torqued. Final torque is 335 to 345 in-lb.

8.9 Test the wheel/tire assembly

Refer to CM40-480, Component Maintenance Manual, for the wheel assembly.

1 Test the wheel/tire assembly. Refer to the TESTING AND FAULT ISOLATION section in Component Maintenance Manual, CM40-480.

SAFETY WARNING: ALWAYS FOLLOW PROPER TIRE INFLATION SAFETY PRACTICES. SERVICE THE TIRE WITH INFLATION SAFETY EQUIPMENT DESIGNED FOR THIS OPERATION.

8.10 Final assembly of the wheel

After successfully completing the 24-hour pressure retention test, complete the remaining assembly procedures as follows.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

SAFETY WARNING: ALWAYS FOLLOW PROPER TIRE INFLATION SAFETY PRACTICES. SERVICE THE TIRE WITH INFLATION SAFETY EQUIPMENT DESIGNED FOR THIS OPERATION.

1 Apply a light coat of wheel bearing grease (Mobil Aviation Grease SHC 100) to the following:

NOTE: Make sure the bearing cones (3) have been packed with fresh, clean grease.

- Exposed surfaces of the bearing cups.
- The elastomer of the grease seals (4).

2 Install the following into each hub of the outboard wheel half in the order listed:

- Bearing cone (3).
- Grease seal (4). Observe '**This Side Out'** instruction on seal.
- Retaining ring (5). Install the end of the retaining ring into the groove in the inner hub of the wheel half and wind or spiral the ring into the groove.

SAFETY WARNING: FOLLOW THE AIRFRAME MANUFACTURER'S INSTRUCTIONS AND SAFETY WARNINGS WHEN WORKING WITH AND AROUND THE AIRCRAFT.

SAFETY WARNING: ALWAYS FOLLOW PROPER TIRE INFLATION SAFETY PRACTICES. SERVICE THE TIRE WITH INFLATION SAFETY EQUIPMENT DESIGNED FOR THIS OPERATION.

8.11 Inflate the tire

1 Inflate the tire to the airframe manufacturer's recommended inflation pressure.

1.1 Install the inflation valve cap. The cap is the positive means of resisting pressure leakage and should always be used to prevent rapid deflation should a problem occur with the valve core.

8.12 Install the wheel/tire assembly

Reference: Installation Drawing, No. 50-166.

SAFETY WARNING: MAKE SURE THE DRIVE KEYS ON THE INBOARD WHEEL HALF ENGAGE IN THE SLOTS ON THE BRAKE ASSEMBLY ROTOR DISCS. DAMAGE TO THE WHEEL, TO THE LANDING GEAR/AIRCRAFT; AND PERSONAL INJURY COULD RESULT IF THE DRIVE KEYS DO NOT ENGAGE THE SLOTS WHEN EQUIPMENT IS IN OPERATION.

1 Slide the wheel/tire unit onto the axle and align with the brake assembly.

1.1 Make sure the drive keys on the inboard wheel half engage in the slots on the brake assembly rotor discs.

1.2 Make sure the bearing cones are seated.

2 Install the axle hardware in accordance with the airframe manufacturer's manual.

2.1 The recommended wheel bearing preload for Parker wheel assembly is 950 ±180 lb.

8.13 Completed installation

Refer to Figure 6.

1 Repeat installation instructions for the other side of the landing gear.

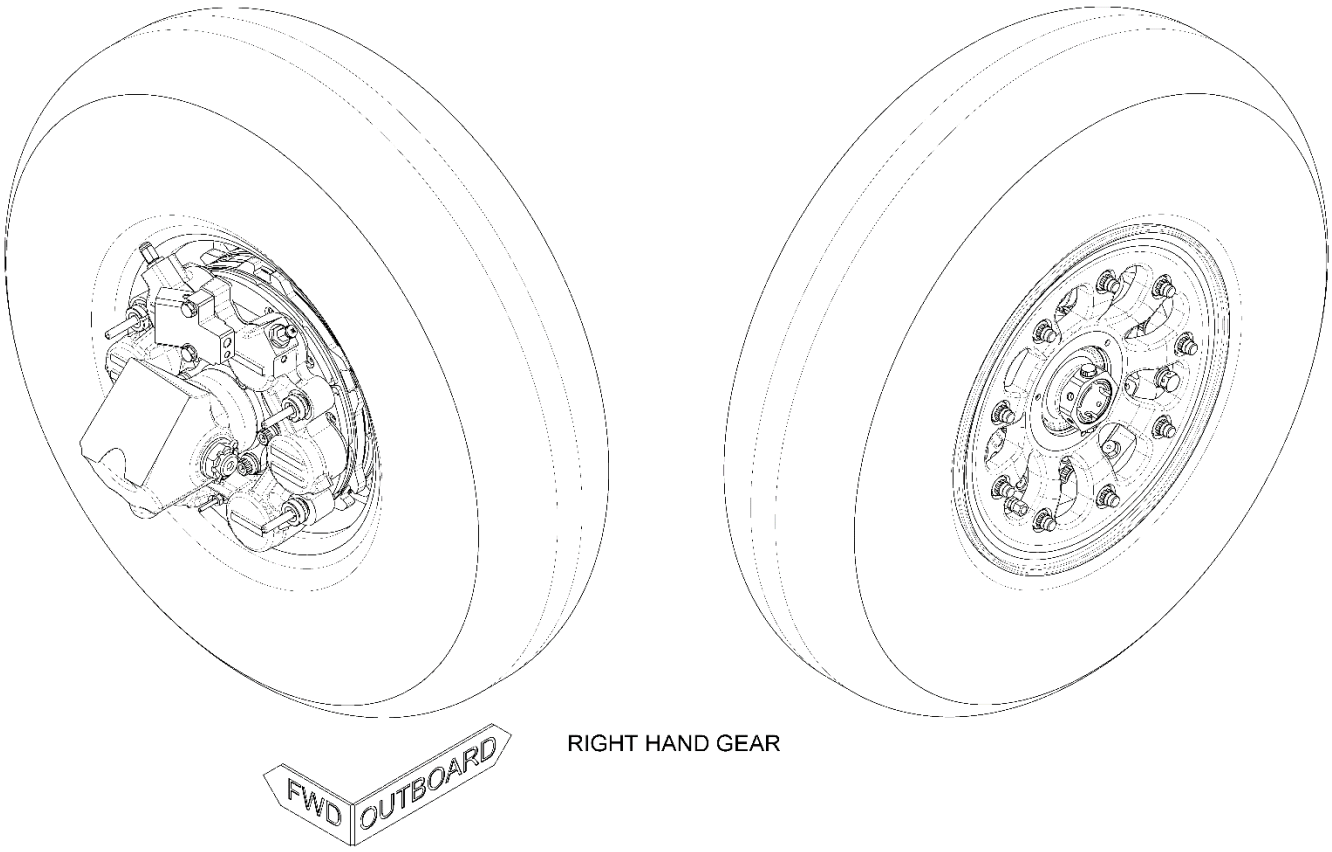


Figure 6 Parker equipment installed (right hand gear shown)

9.0 RETURN TO SERVICE AND SYSTEM CHECKS

1 After left and right hand brake assemblies have been installed and connected to the aircraft hydraulic system, bleed the hydraulic system and perform the following:

1.1 Pressure test the brake assembly at 600 psig and check for leakage.

1.2 Check the pedal for proper feel and travel.

1.3 Check the mating wheel assemblies rotate freely. There should be no evidence of binding or excessive brake drag.

1.4 Check for proper operation of main gear and that no hoses are binding.

10.0 BRAKE LINING CONDITIONING

The brake lining material must be properly conditioned (glazed) to provide optimum service life. Dynamometer tests have shown that at low braking energies, unglazed linings experience greater wear and the brake discs become severely scored.

10.1 Conditioning procedure

1 Perform two [2] full stop braking applications from 30 to 35 knots, do not allow the brake discs to cool between each stop. Maximum pressure braking is not required for conditioning stops.

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

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

11.0 WEIGHT AND BALANCE COMPUTATIONS

Weights do not include the tire.

New installed (per gear leg):

Brake assembly: .....35.5 lb. (maximum guaranteed)
Wheel assembly: .....15.5 lb. (maximum guaranteed)

Complete FAA Form 337 and make the appropriate log book entries.

12.0 AIRCRAFT FLIGHT MANUAL AND EQUIPMENT LIST ENTRIES

Update the ‘Weight and Balance’ section of the Aircraft Flight Manual as well as the Aircraft Equipment List for the change in both weight and moment created by the installation of this conversion kit.

Released: 10/31/2019

Parker Aerospace

AIRPLANE MAINTENANCE MANUAL SUPPLEMENT
WITH
INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

FOR

PIAGGIO AERO INDUSTRIES S.p.A.
AIRCRAFT MODEL
PIAGGIO P.180

THOSE AIRCRAFT MODIFIED IN
ACCORDANCE WITH
STC SA04348CH

This supplement, which includes the Component Maintenance Manuals for Cleveland Wheels & Brakes Main Wheel Model 40-480 and Main Brake Model 30-289, must be attached to the Airplane Maintenance Manuals when the aircraft is modified per the above listed STC.

In addition, an aircraft logbook entry referring to this document must be made to ensure that maintenance personnel have available a record of this inspection requirement.

The information in this document supplements or supersedes the basic airplane maintenance manual only where covered in the items contained herein. For limitations and procedures not contained in this supplement, consult the basic Airplane Maintenance Manuals.

It is intended that these instructions be employed as Federal Aviation Administration (FAA) approved data for installation of STC SA04348CH on aircraft Serial No. _____ in accordance with 14 CFR Part 43. These instructions for continued airworthiness apply only to this aircraft and may not be extended to other aircraft without written permission from Parker Hannifin Corporation ("Parker"). An STC permission statement is required from Parker in order to install the STC approved design on to an aircraft; this statement is provided separately from these instructions.

Aircraft: Registration Number _____

Serial Number _____

Parker Aerospace

LOG OF REVISIONS

REV	PAGE(S)	DESCRIPTION	APPROVAL	DATE
N/C	All	Original Issue	E. Marks	06/11/2018
A		Revision A is a Minor STC Data Change as described below:	E. Marks	11/09/2018
	All	Added Export Warning stamp to document footer. Updated spacing between sections as required based on size of updated document headers and footers and refreshed Table of Contents.		
	2, 4, 6, 8	Added Proprietary Stamp to indicated pages.		
	1	Added STC number (2 places).		
	4	Added word "brake" to end of first sentence of Section 2.1 to improve sentence clarity.		
	5-6	Added Note 1 to bottom of Parker Hannifin Publications table (pg. 5) and Industry table (pg. 6) and remove information identifying document revision and date, to be consistent with Piaggio Aircraft Publications table on Page 5.		
	7	Added reference to brake CMM in Section 5.2 to help clarify definition of heavy braking event.		
	7	Added reference to installation manual in Sections 6.1 and 6.2 to clarify installation documentation.		
	8	Correct typo in Sections 7.1 and 7.2. IS: "maintain," WAS: "main."		
	8	Add document number for Parker conditioning procedure to Section 7.3.		
B	5	Correct typo in installation drawing number. IS: 50-166, WAS: 50-165.	E. Marks	06/24/2019

Parker Aerospace

TABLE OF CONTENTS

Parker Aerospace

1.0 INTRODUCTION

The Parker Hannifin Corporation Main Wheel & Brake Conversion Kit, P/N 199-283, includes wheel assemblies, as well as brake assemblies, for replacement of the wheel and brake at each main wheel on the Piaggio P.180. The instructions for continued airworthiness contained within this document address the modification of the Piaggio P.180 aircraft through installation of the Parker Hannifin Corporation wheels and brakes.

2.0 DESCRIPTION

2.1 General

The brake assembly is a single fixed cylinder, six piston, hydraulically actuated brake. The brake is designed to operate with MIL-PRF-5606 hydraulic fluid.

The main wheel assembly is the primary interface between the main landing-gear strut and the tire during ground operation. The divided type design facilitates tire installation and removal. The wheel provides partial support of the weight of the aircraft and a means of steering control.

Braking action begins to occur when hydraulic pressure is applied to the brake, via the pilot's or co-pilot's braking input. As the hydraulic pressure reaches the brake it forces the pistons outward against the pressure plate assembly which compresses the brake stack against the torque tube assembly. This generated frictional force is transferred to the wheel/tire through the three rotor discs which have drive slots that engage the main wheel.

2.2 Applicability

The instructions for continued airworthiness specified in this document apply only to the Piaggio P.180 aircraft.

2.3 Major Components

The conversion kit, P/N 199-283 includes the following major components:

Description	Part Number
Wheel Assembly	40-480
Brake Assembly	30-289

Also required for installation of the wheels and brakes, but not included in the conversion kit, are the following:

Description	Part Number
Tire, 6.50-10 12 PR Tubeless Tire	028-357-0 (Michelin)

Parker Aerospace

2.4 Record Retention

The instructions for continued airworthiness will be included in the aircraft's permanent records.

2.5 Reference Documentation

The following publications, or later approved revisions, may be referenced during continued maintenance of the Parker Hannifin Corporation wheels and brakes:

Parker Hannifin Publications

Document Number (Note 1)	Document Title
50-166	Installation, Wheel & Brake
199-283	Parts List, 199-283 Conversion Kit, Piaggio Aircraft – Model P.180
CM30-289	Component Maintenance Manual, Main Brake Assembly, Parker Hannifin Part No. 30-289
CM40-480	Component Maintenance Manual, Main Wheel Assembly, Parker Hannifin Part No. 40-480
IM199-283	Kit Installation Publication, Main Wheel & Brake Conversion Kit, Parker Hannifin Part No. 199-283

Notes:
1. Latest approved revision

Piaggio Aircraft Publications

Document Number (Note 1)	Document Title
6591	Piaggio P.180 Pilot Operating Handbook and Aircraft Maintenance Manual (S/N 1004 through 1025 incorporating SB 80-0023 or 1026 through 1104)
180-MAN-0010-01100	Piaggio P.180 Airplane Flight Manual (S/N 1002 and 1105 to subsequent)
180-MAN-0200-01105	P.180 AVANTI II Maintenance Manual

Notes:
1. Latest approved revision

Parker Aerospace

Industry Publications

Document Number (Note 1)	Document Title
AC 43.13-1	Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair

Notes:
1. Latest approved revision

2.6 Ordering Information

To order replacement parts, contact the nearest Parker Hannifin, Aircraft Wheel & Brake distributor in your area, or contact Aircraft Wheel and Brake:

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

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

3.0 OPERATION

There is no change in operation between the original wheels and brakes and the Parker Hannifin Corporation wheels and brakes.

4.0 AIRWORTHINESS LIMITATIONS

NOTE: The airworthiness limitations section is FAA approved and describes maintenance required under 14 CFR Part §43.16 and §91.403 of the Federal Aviation Regulations, unless an alternate FAA approved program has been identified.

There are no airworthiness limitations associated with the wheels and brakes or their installation on the Piaggio P.180 aircraft.

5.0 INSPECTIONS

5.1 Scheduled

The wheel and brake assemblies must be inspected at all Annual and 100 Hour (if required) inspections.

While remaining installed on the aircraft, the brake assembly shall be inspected as follows:

- Visually inspect all components for corrosion, cracks, or other visible damage.
- Check brake lines and brake line fittings for signs of damage or leakage.
- Check for proper torque and proper safetying on all visible bolts.

Parker Aerospace

- Check wear pin per Parker Hannifin Publication No. *CM30-289, Component Maintenance Manual, Main Brake Assembly.*

The brake assembly shall be maintained in accordance with Parker Hannifin Publication No. CM30-289, *Component Maintenance Manual, Main Brake Assembly*.

While remaining installed on the aircraft, the wheel assembly shall be inspected as follows:

- Visually inspect the wheel for corrosion, cracks, nicks, or other visible damage.
- Check the condition of the axle attaching hardware.

The wheel assembly shall be maintained in accordance with Parker Hannifin Publication No. CM40-480, *Component Maintenance Manual, Main Wheel Assembly*.

5.2 Unscheduled

Conduct an inspection when there is indication of a problem with the wheel and brake system. Reference Section 8.0 for troubleshooting information.

Conduct an inspection after a rejected take off, or heavy braking event as defined in *CM30-289, Component Maintenance Manual, Main Brake Assembly*.

6.0 REMOVAL AND REPLACEMENT

6.1 Brake Assembly

Lift and support the aircraft per *Piaggio P.180 Aircraft Maintenance Manual* (reference Piaggio Aircraft Publications listed in Section 2.5 for document number).

Remove and install all axle hardware per *Piaggio P.180 Aircraft Maintenance Manual* (reference Piaggio Aircraft Publications listed in Section 2.5 for document number).

Remove, disassemble, assemble, and install the brake assembly in accordance with *CM30-289, Component Maintenance Manual, Main Brake Assembly* and *IM199-283, Kit Installation Publication*.

6.2 Wheel Assembly

Lift and support the aircraft per *Piaggio P.180 Aircraft Maintenance Manual* (reference Piaggio Aircraft Publications listed in Section 2.5 for document number).

Remove and install all axle hardware per *Piaggio P.180 Aircraft Maintenance Manual* (reference Piaggio Aircraft Publications listed in Section 2.5 for document number).

Remove, disassemble, assemble, and install the wheel assembly in accordance with *CM40-480, Component Maintenance Manual, Main Wheel Assembly* and *IM199-283, Kit Installation Publication*.

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7.0 MAINTENANCE

7.1 Brake Assembly

Maintenance schedule and tasks shall be completed in accordance with CM30-289, *Component Maintenance Manual, Main Brake Assembly*.

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

7.2 Wheel Assembly

Maintenance schedule and tasks shall be completed in accordance with Parker Hannifin Publication No. CM40-480, Component Maintenance Manual, Main Wheel Assembly.

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

7.3 Conditioning

When new brake lining segments have been installed, brake lining conditioning must be accomplished per *Parker Hannifin Product Reference Memo PRM14A, Metallic Brake Lining Conditioning Procedure*, Rev A, July 1, 1995, or later Parker Hannifin approved revision.

8.0 TROUBLESHOOTING INFORMATION

For troubleshooting a problem with the brake assembly refer to the TESTING AND FAULT ISOLATION section of CM30-289, *Component Maintenance Manual, Main Brake Assembly*.

For troubleshooting a problem with the main wheel assembly refer to the TESTING AND FAULT ISOLATION section of CM40-480, Component Maintenance Manual, Main Wheel Assembly.

Component Maintenance Manual

Main Brake Assembly
Parker Hannifin Part No. 30-289

Publication No.: CM30-289, Initial Release

Manufacturer:

Parker

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

Cleveland
Wheels & Brakes

REVISION HIGHLIGHTS

TO: HOLDERS OF CM30-289 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR BRAKE ASSEMBLY PART NO. 30-289.

Revision NC, Dated 2017-12-20

Section/Page No.	Description Of Change
All Sections/All Pages	Initial Release (ECO-0087368)

RECORD OF REVISIONS

Check in the following record that all earlier changes have been incorporated.

Rev	Incorporated date	by (signature)	Rev	Incorporated date	by (signature)
NC	2017-12-20	PHC			

SERVICE BULLETIN LIST

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

Number	Subject	Rev	Date incorporated at manual revision

LIST OF EFFECTIVE PAGES

SUBJECT	PAGE	DATE	SUBJECT	PAGE	DATE
Title Page	T-1	2017-12-20	Cleaning	4001	2017-12-20
				4002	2017-12-20
Record of Revisions	RR-1	2017-12-20		4003	2017-12-20
				4004	Blank
Service Bulletin List	SB-1	2017-12-20	Checks	5001	2017-12-20
				5002	2017-12-20
				5003	2017-12-20
List of Effective Pages	LEP-1	2017-12-20		5004	2017-12-20
	LEP-2	2017-12-20		5005	2017-12-20
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				5010	2017-12-20
Introduction	INTRO-1	2017-12-20			
	INTRO-2	2017-12-20	Repair	6001	2017-12-20
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Operation	3	2017-12-20		6005	2017-12-20
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				6007	2017-12-20
Testing and	1001	2017-12-20		6008	2017-12-20
Fault Isolation	1002	2017-12-20		6009	2017-12-20
	1003	2017-12-20		6010	2017-12-20
	1004	2017-12-20		6011	2017-12-20
	1005	2017-12-20		6012	2017-12-20
	1006	2017-12-20		6013	2017-12-20
	1007	2017-12-20		6014	2017-12-20
	1008	2017-12-20		6015	2017-12-20
				6016	Blank
Disassembly	3001	2017-12-20			
	3002	2017-12-20			
	3003	2017-12-20			
	3004	2017-12-20			
	3005	2017-12-20			
	3006	2017-12-20			
	3007	2017-12-20			
	3008	2017-12-20			

N = New page No.
C = Changed page

LIST OF EFFECTIVE PAGES

SUBJECT	PAGE	DATE
Assembly	7001	2017-12-20
	7002	2017-12-20
	7003	2017-12-20
	7004	2017-12-20
	7005	2017-12-20
	7006	2017-12-20
	7007	2017-12-20
	7008	2017-12-20
	7009	2017-12-20
	7010	2017-12-20
	7011	2017-12-20
	7012	Blank
Fits and Clearances	8001	2017-12-20
	8002	2017-12-20
Special Equipment and Consumables	9001	2017-12-20
	9002	2017-12-20
Illustrated Parts List	10001	2017-12-20
	10002	2017-12-20
	10003	2017-12-20
	10004	2017-12-20
	10005	2017-12-20
	10006	Blank
Storage	15001	2017-12-20
	15002	Blank

N = New page No.
C = Changed page

TABLE OF CONTENTS

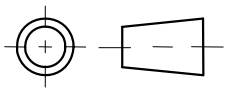
INTRODUCTION

1. General

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

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

THIRD ANGLE PROJECTION



Third angle projection is used in this manual. All weights and measurements are in U.S. English units with metric units, when applicable, in parentheses.

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

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

Substitutions of critical parts or changes of processes or materials are not permitted without the written approval of the manufacturer.

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

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

INTRODUCTION

2. Manual use

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

3. Warnings, cautions, and notes

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

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

4. Replacement parts

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

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

DESCRIPTION AND OPERATION

1. Description

Refer to IPL Figure 1 for component identification.

SAFETY WARNING: THIS ASSEMBLY CONTAINS PARTS THAT HAVE A CADMIUM PLATING FINISH: (50), (65), (85), (95), (115), (120), (155), (160), (275), (280). REMOVING THE CADMIUM PLATING CAN CREATE EXPOSURE TO CADMIUM DUST AND CADMIUM COMPOUNDS. THIS CAN BE A POTENTIAL HEALTH HAZARD.

The brake assembly provides the primary decelerating and holding forces during aircraft ground operations. The brake assembly is a single fixed housing, 6-piston, hydraulically actuated three rotating disc design. The brake is designed to operate with MIL-PRF-5606 hydraulic fluid.

Each brake assembly is composed of the following base parts:

- one brake housing subassembly (5). The housing is made from an aluminum alloy and is surface treated and painted for corrosion protection.
- one pressure plate assembly (165) with replaceable steel wear pads (175).
- three rotor discs (185) with sintered friction material on a steel core.
- two steel stator disc assemblies (190) with replaceable steel wear pads (200).
- one torque tube assembly (210) with replaceable steel wear pads (220).
- four retract subassemblies (75).
- one set of wear indicator components (140), (145), (150).
- one shuttle valve assembly (240).

2. Operation

The brake stack components (165), (185), (190) are sandwiched between the brake housing subassembly (5) and the torque tube assembly (210). Braking action begins to occur when hydraulic pressure is applied to the brake, via the pilot's or co-pilot's braking input. As the hydraulic pressure reaches the brake it forces the pistons outward against the pressure plate assembly (165) which compresses the brake stack against the torque tube assembly (210). This generated frictional force is transferred to the wheel/tire through the three rotor discs (185) which have drive slots that engage the main wheel.

3. Handling procedures

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

DESCRIPTION AND OPERATION

4. Leading particulars

Hydraulic fluid		MIL-PRF-5606
Brake housing material		Aluminum alloy forging
Brake housing coatings	Surface treatment:	Refer to the REPAIR section
	Primer coating:	Refer to the REPAIR section
	Finish coating:	Refer to the REPAIR section

5. Brake wear check – on aircraft

Refer to Figure 1. Make sure the parking brake is on. Starting at 0 psig, slowly apply hydraulic pressure of 1050 ± 50 psig to the brake. Examine the wear indicator pin (145). When the pin is flush with the wear pin retainer (140), the brake must be removed from the aircraft and is ready for further inspection leading up to an overhaul.

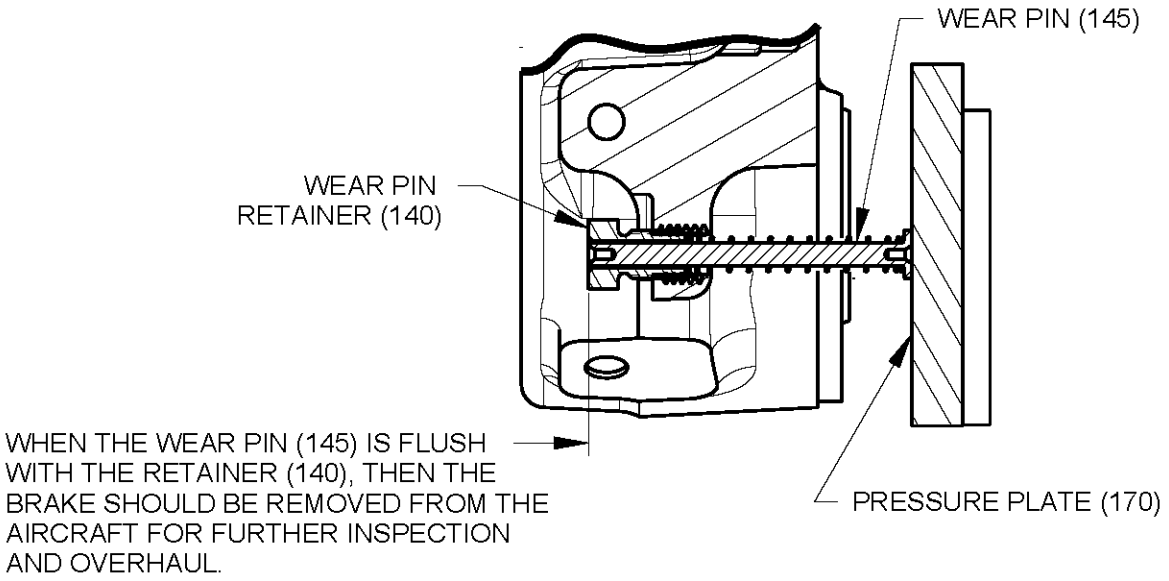


Figure 1 Examine the wear pin

DESCRIPTION AND OPERATION

6. Maintenance schedule

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

Table 1 Maintenance schedule (sheet 1 of 2)

INTERVAL OR CONDITION	ITEM	TASK (refer to the CHECKS section)
Every time a component of the heat stack has reached the in-service wear limit (refer to Table 8001) or when a brake wear check has warranted further action (refer to para. 5. Brake wear check-on aircraft, in this section). Heat stack components: ➢ Wear pads (175), (200), (220) ➢ Three rotor discs (185)	All components	Visual and detailed examination.
	Bolts (55), (275)	➢ Visual and detailed examination. ➢ Magnetic particle inspection.
	Seals: (20), (25), (30), (35), (125), (135), (250), (255), (265)	Replace.
	Washer (65), spring (70)	Replace.
	Wear pads: (175), (200), (220)	Replace.
	Pressure plate (170)	➢ Check flatness. ➢ Visual and detailed examination. ➢ Liquid penetrant or magnetic particle inspection.
	Rotor discs (185)	Replace all three.
	Stator disc (195)	➢ Check flatness. ➢ Visual and detailed examination. ➢ Liquid penetrant or magnetic particle inspection.
	Threaded inserts (10), (110), (230), (235)	➢ Check for backing out condition.
At the 5th replacement interval and every 3rd replacement interval thereafter of the heat stack components: ➢ Wear pads (175), (200), (220) ➢ Three rotor discs (185)	Brake housing subassy (5)	➢ Visual and detailed examination. ➢ Liquid penetrant inspection.
	Torque tube (215)	➢ Visual and detailed examination. ➢ Liquid penetrant or magnetic particle inspection. ➢ Check flatness of wear pad interface.

DESCRIPTION AND OPERATION

Table 1 Maintenance schedule (sheet 2 of 2)

UNSCHEDULED INTERVAL	ITEM	TASK (refer to the CHECKS section)
After an over speed braking event or an indication of overheating: One of the fusible plugs in the mating main wheel assembly releases the tire pneumatic pressure.	All components	Visual and detailed examination.
	Pressure plate (170)	➢ Check flatness. ➢ Visual and detailed examination. ➢ Liquid penetrant or magnetic particle inspection.
	Rotor discs (185)	➢ Check flatness. ➢ Visual and detailed examination.
	Stator discs (195)	➢ Check flatness. ➢ Visual and detailed examination. ➢ Liquid penetrant or magnetic particle inspection.
	Brake housing subassy (5)	➢ Visual and detailed examination. ➢ Hardness test. ➢ Liquid penetrant inspection.
	Torque tube (215)	➢ Hardness test. ➢ Visual and detailed examination. ➢ Liquid penetrant or magnetic particle inspection. ➢ Check flatness of wear pad interface.
	Bolts (55), (275)	➢ Visual and detailed examination. ➢ Magnetic particle inspection
	Seals: (20), (25), (30), (35), (125), (135), (250), (255), (265)	Replace.

TESTING AND FAULT ISOLATION

1. General

Refer to IPL Figure 1 for component identification.

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

A. Equipment and consumables

The term “Commercial Source” allows the repair facility to acquire the product from a supplier of choice.

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 1001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Hydraulic fluid	MIL-PRF-5606	Commercial
Hydraulic test stand	• Hydraulic test stand with hydraulic pump. • Filter • Regulator • Automatic cycler, range: 0-100, accuracy ± 1 count • Timer, range: 0-60 minutes, accuracy ± 1 second • Pressure gages: o high pressure range: 0-2000 psig, accuracy ± 0.5% o low pressure range: 0-200 psig, accuracy ± 0.5%	Commercial
Standard tools (inch units)	Wrenches/sockets: • 6-pt (hex head), external: for (120), (140) Torque wrench Feeler gages: 0.010 inch and 0.100 inch	Commercial

TESTING AND FAULT ISOLATION

2. Testing

Examine all brake assemblies that do not meet the test standards of this section. Refer to Table 1002 Troubleshooting for possible causes.

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

SAFETY WARNING: DO NOT PERFORM TESTING ON ANY BRAKE ASSEMBLY THAT SHOWS SIGNS OF DAMAGE.

SAFETY WARNING: USE SHATTER RESISTANT ENCLOSURES DURING TESTING. CHECK ALL LINES AND FITTINGS. BRAKE ASSEMBLIES ARE UNDER PRESSURE DURING TESTING. FAILURE TO OBEY THESE SAFETY INSTRUCTIONS CAN RESULT IN SERIOUS INJURY OR DEATH.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

NOTE: Discard all used hydraulic fluid. Obey local regulations.

NOTE: The term dry torque refers to the torqueing of hardware without the application of anti-seize compound.

A. Pretest examination of product

(1) Examine the housing subassembly (5) surfaces for visible defects such as cracks, or any other imperfections.

(2) Examine all fasteners and threaded components for loose fit. Tighten loose fasteners. Refer to Table 8002, Assembly torque values.

(3) Examine all moving parts to ensure that they operate freely without sticking or binding.

B. Static leakage test

Brake inlet ports are designated P1 and P2 and engraved on the shuttle valve (240).

(1) Connect the hydraulic pressure line to the brake inlet port P1. Check all fittings for tightness.

(a) Apply 155 ± 5 psig to port P1.

(b) Reduce pressure supplied to the brake inlet port P1 to less than 3 psig.

(2) Remove the bleeder screw (130) and washer (125) from one side of the housing.

NOTE: Bleeder screw and washer can be removed from both sides of housing if needed.

(3) Place a convenient length of tubing over the bleeder valve (120).

CAUTION: KEEP BRAKE FLUID FROM CONTAMINATING THE BRAKE FRICTION MATERIAL SURFACES OF THE ROTOR DISCS (185). BRAKE FLUID THAT HAS SOAKED INTO THE FRICTION MATERIAL SURFACES OF A DISC CAN DEGRADE BRAKE PERFORMANCE.

(4) Loosen the bleeder valve (120) and bleed the brake by applying 15 ± 5 psig to the inlet port P1.

(a) If there is no flow from the bleeder valve (120), slowly increase pressure to a maximum of 160 psig.

(b) Bleed the brake until entrapped air has escaped.

(c) No fluid flow from the bleeder valve (120) at 160 psig is cause for further examination.

(5) Remove the tubing from the bleeder valve (120) and tighten the bleeder valve to a dry torque of 35 to 38 in-lb.

TESTING AND FAULT ISOLATION

(6) Apply 1050 ± 50 psig to brake inlet port P1 and hold for a minimum of two minutes.

(a) Leakage at the static seals: bleeder seat (115), cylinder sleeve (15), and the brake housing/shuttle valve interface or the Lee plugs in the shuttle valve or cylinder housing shall not exceed a trace.

(b) Leakage at the dynamic seals: piston (40) shall not exceed one drop per seal.

(7) Reduce pressure to less than 3 psig.

(a) Any binding of the pistons is cause for further examination.

(b) Leakage from the open inlet port P2 shall not exceed one drop per minute.

(8) Apply 5 ± 2 psig to brake inlet port P1 and hold for a minimum of five minutes.

(a) Leakage at the static seals: bleeder seat (115), cylinder sleeve (15), and the brake housing/shuttle valve interface or the Lee plugs in the shuttle valve or cylinder housing shall not exceed a trace.

(b) Leakage at the dynamic seals: piston (40) shall not exceed one drop per seal.

(c) Leakage from the open inlet port P2 shall not exceed one drop per minute.

C. Dynamic leakage test

(1) With the hydraulic pressure supply line connected to brake inlet port P1; the bleeder valve (120) tightened to a dry torque of 35 to 38 in-lb; a convenient length of tubing over the bleeder valve (120) and entrapped air removed, apply 25 cycles of brake hydraulic pressure from 1050 ± 50 psig to 0-5 psig.

(2) Reduce pressure to brake inlet port P1 to less than 3 psig.

(a) Leakage at the static seals: bleeder seat (115), cylinder sleeve (15), and the brake housing/shuttle valve interface or the Lee plugs in the shuttle valve or cylinder housing shall not exceed a trace.

(b) Leakage at the dynamic seals: piston (40) shall not exceed one drop per seal.

(c) Leakage from the open inlet port P2 shall not exceed one drop per minute.

(d) Any binding of the pistons is cause for further examination.

TESTING AND FAULT ISOLATION

D. Shuttle valve test

(1) With the hydraulic pressure supply line connected to brake inlet port P1 at less than 1 psig, remove the hydraulic pressure supply line from brake inlet P1.

(2) Connect the hydraulic pressure supply line to the opposite inlet port P2. Check all fittings for tightness.

(3) Apply 155 ± 5 psig to port P2.

(4) Reduce pressure supplied to brake inlet port P2 to less than 3 psig.

(5) Remove the bleeder screw (130) and washer (125).

(6) Place a convenient length of tubing over the bleeder valve (120).

CAUTION: KEEP BRAKE FLUID FROM CONTAMINATING THE BRAKE FRICTION MATERIAL SURFACES OF THE ROTOR DISCS (185). BRAKE FLUID THAT HAS SOAKED INTO THE FRICTION MATERIAL SURFACES OF A DISC CAN DEGRADE BRAKE PERFORMANCE.

(7) Loosen the bleeder valve (120) and bleed the brake by applying 15 ± 5 psig to inlet port P2.

(a) If there is no flow from the bleeder valve (120), slowly increase pressure to a maximum of 160 psig.

(b) Bleed the brake until entrapped air has escaped.

(c) No fluid flow from the bleeder valve (120) at 160 psig is cause for further examination.

(8) Remove the tubing from the bleeder valve (120) and tighten the bleeder valve to a dry torque of 35 to 38 in-lb.

(9) Apply 1050 ± 50 psig to brake inlet port P2 and hold for a minimum of two minutes.

(a) Leakage at brake inlet port P1 shall not exceed one drop per minute.

(10) Reduce pressure to less than 3 psig.

(11) Apply 5 ± 2 psig to brake inlet port P2 and hold for a minimum of five minutes.

(a) Leakage at brake inlet port P1 shall not exceed one drop per minute.

E. Brake running clearance test

(1) Begin at zero psig, slowly increase brake hydraulic pressure applied to brake inlet port P2 to 150 ± 10 psig.

(a) Verify that all pistons are in contact and that the rotor discs (185) cannot be rotated by hand.

(2) Reduce hydraulic pressure to 45 ± 5 psig and hold.

(3) Position the brake assembly so that the torque tube (215) side is resting on a work surface.

(a) Verify the minimum brake running clearance by inserting a 0.010 inch feeler gauge between the pressure plate assembly (165) and the closest rotor disc (185).

1 If the feeler gauge cannot be inserted, further examination is required.

(b) Verify that the maximum brake running clearance does not exceed 0.100 inch. A 0.100 inch feeler gauge shall not pass between the pressure plate assembly (165) and the closest rotor disc (185).

1 If the feeler gauge can be inserted, further examination is required.

TESTING AND FAULT ISOLATION

F. Set the wear pin (145)

Refer to Figure 1001. For an overhauled brake with a new brake stack, wear pin adjustment shall be accomplished as follows.

(1) Apply 1050 ± 50 psig to brake inlet port P2 and hold.

(2) While maintaining pressure; adjust the wear pin retainer (140) so that the wear pin (145) extends 0.300 ± 0.010 inch beyond the retainer hex surface.

(3) Release pressure to the brake and disconnect the hydraulic pressure line.

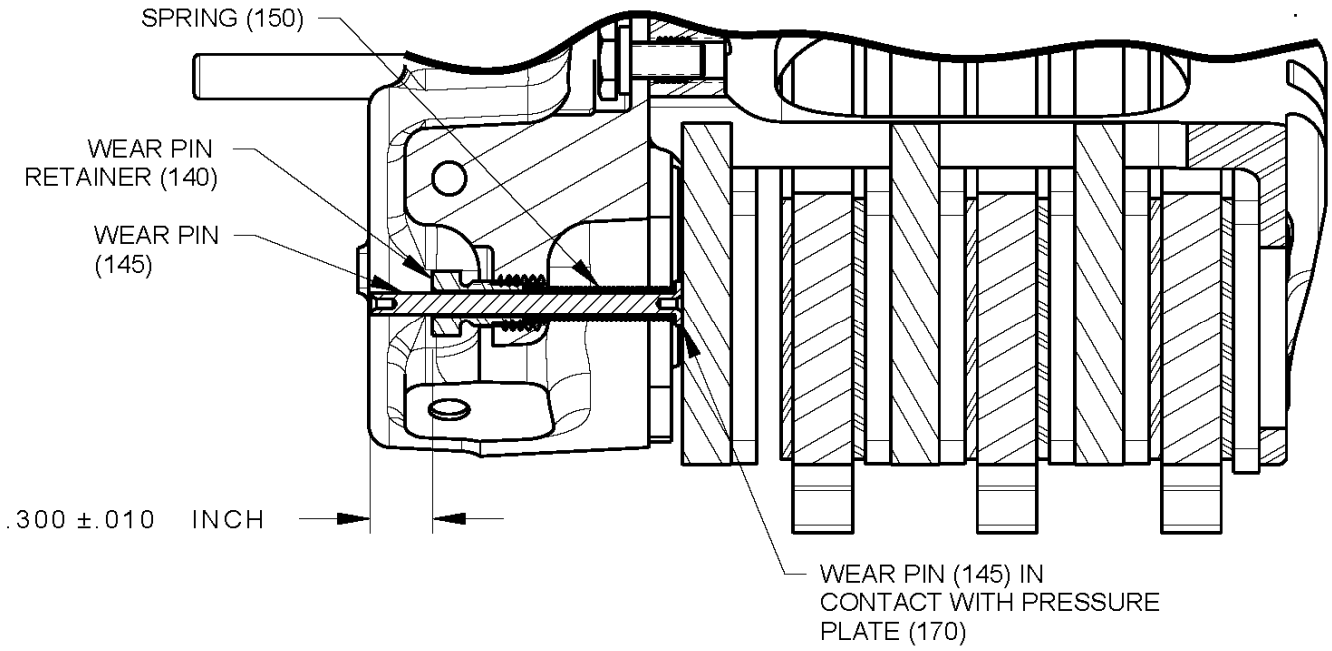


Figure 1001 Adjust the wear pin (145)

G. Preparation for return to service

CAUTION: DO NOT TIGHTEN THE BLEEDER SCREW (130) TO A VALUE GREATER THAN 12 IN-LB. TORQUE GREATER THAN 12 IN-LB MAY DAMAGE THE SEAT.

(1) Wipe excessive oil or foreign material off the brake housing.

(2) Install a washer (125) on each bleeder screw (130) and install the bleeder screw into each bleeder valve (120). Tighten the bleeder screw (130) snug to preclude leakage.

TESTING AND FAULT ISOLATION

3. Troubleshooting

Table 1002 cannot list all possible problems and is intended to assist with troubleshooting.

Table 1002 Troubleshooting

PROBLEM	COMMON CAUSE	CORRECTION
Hydraulic fluid leaking from piston area.	Worn or damaged seal: (20), (25), (30), (35)	Replace the component.
	Piston (40) or cylinder sleeve (15) damaged.	Replace the component.
	Brake housing piston bore damaged.	Replace the housing subassembly (5)
Hydraulic fluid leaking from one of the housing ports or bleeder components.	Loose hydraulic connection, worn or damaged seal (135), or damaged bleeder component.	Tighten the hydraulic connection or replace the seal or bleeder component.
Hydraulic fluid leaking from the brake shuttle valve connection, or ports or fittings.	Worn or damaged seal (250), (255), (265), or damaged fitting (260), or damaged shuttle valve manifold.	Replace the seal, fitting or the shuttle valve assembly (240).
Brake not engaging or releasing correctly.	Air in brake.	Bleed the brake.
	Obstruction in hydraulic line or fluid passage.	Remove the obstruction.
	Pistons (40) sticking, binding or damaged.	Replace seals: (20), (25), (30), (35) Examine piston per CHECKS section.
	Pressure plate (170), rotor disc (185), stator disc (195), or torque tube (215) is excessively dished or warped.	Examine per CHECKS section.
	Brake housing subassembly (5) is damaged.	Examine per CHECKS section.
	Torque tube (215) is damaged.	Examine per CHECKS section.
	Pressure plate (170) is not sliding freely on torque tube (215).	Examine per CHECKS section.
	Stator disc (195) is not sliding freely on torque tube (215).	Examine per CHECKS section.
	Rotor disc (185) is not sliding freely on wheel drive keys.	Examine per CHECKS section.
Insufficient running clearance	Pressure plate (170), rotor disc (185), stator disc (195), or torque tube (215) is excessively dished or warped.	Examine per CHECKS section.
Maximum pedal effort does not decelerate aircraft properly or does not actuate brake.	Air in brake.	Bleed the brake.
	Wear pads (175), (200), (220) are worn beyond limits.	Replace wear pads.
	Friction material on the rotor disc (185) is worn beyond limits.	Replace rotor discs.
	Brakes have overheated.	Examine per CHECKS section.

TESTING AND FAULT ISOLATION

(Sheet 1 of 2)

	(Check One)	**Accept**	**Reject**
1. Brake Assembly Weight: _____ (lb.) (35.5 lb max.) (use MIL-PRF-5606 hydraulic fluid)		_____	_____
2. Examination of Product:		_____	_____
3. Static Leakage Test			
Flow: (160 psig max.)		_____	_____
1100 psig Leakage (1050 ± 50 psig for 2 minutes)			
Dynamic Seals (Less than one drop per seal)		_____	_____
Static Seals and Lee Plugs (Less than a trace)		_____	_____
Open Inlet Port P2 (Less than one drop per minute)		_____	_____
5 psig Leakage (5 ± 2 psig for 5 minutes)			
Dynamic Seals (Less than one drop per seal)		_____	_____
Static Seals and Lee Plugs (Less than a trace)		_____	_____
Open Inlet Port P2 (Less than one drop per minute)		_____	_____
4. Dynamic Leakage Test			
25 Cycle Leakage (0-5 psig to 1050 ± 50 psig)			
Dynamic Seals (Less than one drop per seal)		_____	_____
Static Seals and Lee Plugs (Less than a trace)		_____	_____
Open Inlet Port P2 (Less than one drop per minute)		_____	_____
5. Shuttle Valve Test:			
Flow: (160 psig max.)		_____	_____
Leakage:			
1100 psig (1050 ± 50 psig for 2 minutes)		_____	_____
5 psig (5 ± 2 psig for 5 minutes)		_____	_____
Open Inlet Port P1 (Less than one drop per minute)		_____	_____
6. Brake Running Clearance:			
At 150 ± 10 psig (rotors tight)		_____	_____
At 45 psig (0.010 inch minimum clearance)		_____	_____
At 45 psig (0.100 inch maximum clearance)		_____	_____

TESTING AND FAULT ISOLATION

(Sheet 2 of 2)

	(Check One) Accept	Reject
7. Set Wear Pin (0.300 ± 0.010 in)	_____	_____
8. Used MIL-PRF-5606 hydraulic fluid for all testing	_____	_____

Test: Passed _____ **Failed** _____

Description of Defect or Imperfection (if applicable):

_____

_____

_____

_____

_____

_____

_____

_____

Tested By: _____ **Inspected By:** _____

Test Date: _____ **Inspection Date:** _____

DISASSEMBLY

1. General

Refer to IPL Figure 1 for component identification.

A. Equipment and consumables

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

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 3001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Preformed packing tool set	199-18	Parker Hannifin Corp. Aircraft Wheel & Brake Division or Parker Hannifin distributor
Standard tools (inch units)	Wrenches/sockets: • 12-pt, external: for (275) • 6-pt (hex head), external: for (55), (115), (120), (140), (160), (260) • 6-pt 1-7/8 socket (may require modification): for (15) 5/32 inch hex key, internal: for (80) Internal snap ring pliers: for (60) Phillips head screwdriver: for (130)	Commercial

2. Replace components

A. In addition to replacement at the scheduled maintenance interval, replace the preformed packings (20), (25), (135), (250), (265), backup rings (30), (255), and wiper rings (35) if they are removed for any reason. Seals can take a set over time and should not be reused.

DISASSEMBLY

2. Remove the brake assembly

In order to gain access to the brake assembly, the wheel/tire unit must first be removed. Refer to the mating main wheel assembly component maintenance manual for the instructions to remove the wheel assembly.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

SAFETY WARNING: FOLLOW THE AIRFRAME MANUFACTURER'S INSTRUCTIONS AND SAFETY WARNINGS WHEN WORKING WITH AND AROUND THE AIRCRAFT.

SAFETY WARNING: FOLLOW THE MAIN WHEEL ASSEMBLY COMPONENT MAINTENANCE MANUAL INSTRUCTIONS AND DEFLATE THE TIRE IMMEDIATELY AFTER JACKING THE AIRCRAFT AND BEFORE THE AXLE NUT IS LOOSENED. FAILURE TO DEFLATE THE TIRE BEFORE REMOVING THE WHEEL COULD RESULT IN SEVERE PERSONAL INJURY.

A. Remove the main wheel/tire unit. Disconnect the brake system pressure line from the brake assembly in accordance with the airframe manufacturer's instructions. Cap all open lines and fittings.

B. Remove the six bolts (275) and washers (280) that attach the brake assembly to the axle.

C. Slide the brake assembly off the axle.

3. Disassemble the brake assembly

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

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

CAUTION: KEEP BRAKE FLUID FROM CONTAMINATING THE BRAKE FRICTION MATERIAL OF THE ROTOR DISCS (185). BRAKE FLUID THAT HAS SOAKED INTO THE FRICTION MATERIAL CAN DEGRADE BRAKE PERFORMANCE.

NOTE: Do not remove the following components unless replacement if necessary due to damage or loss of self-locking feature: housing helicoil inserts (10); torque tube assembly helical coil inserts (230), (235); retract base assembly inserts (110). Refer to the REPAIR section for replacement instructions.

NOTE: Do not disassemble the retract subassembly (75) unless part replacement if necessary due to damage. If a component of the retract subassembly is replaced, the retract will require a reset procedure before being placed back into service. Refer to the ASSEMBLY section for detailed instructions.

A. Position the brake assembly so that the torque tube assembly (210) is resting on the bottom. The brake housing subassembly (5) will be the top component.

B. Remove the two fittings (260) from the shuttle valve assembly (240). Discard the preformed packings (265).

C. Remove the two bolts (160) and washers (155) that attach the shuttle valve assembly (240) to the brake housing subassembly (5).

DISASSEMBLY

CAUTION: BRAKE FLUID MAY SPILL OUT WHEN REMOVING THE SHUTTLE VALVE ASSEMBLY (240). PROVIDE NECESSARY FLUID CONTAINMENT.

D. Remove the shuttle valve assembly (240). Discard the preformed packing (250) and backup rings (255).

E. Remove the two bolts (55) and washers (50) that attach the brake housing subassembly (5) to the torque tube assembly (210).

CAUTION: THE WEAR PIN SPRING (150) IS UNDER A LIGHT COMPRESSION LOAD AGAINST THE PRESSURE PLATE (170). LIFTING THE BRAKE HOUSING SUBASSEMBLY (5) BY ITSELF WILL UNLOAD THE SPRING (150) AND THE WEAR PIN (145) AND SPRING (150) WILL FALL OUT.

F. Take hold of both the brake housing subassembly (5) and the pressure plate assembly (165). Lift both together to remove them from the brake stack. Reposition them to the side of the remaining brake stack so that the pressure plate assembly (165) is resting on the bottom. The brake housing subassembly (5) will be the top component.

G. Lift and remove each of the three rotor discs (185) and 2 stator disc assemblies (190) from the torque tube assembly (210).

H. Refer to Figure 3001

(1) With a 5/32 inch internal hex key wrench (Allen wrench), unthread the retract stud (80) from each retract base assembly (100) and remove each retract subassembly (75) from the brake.

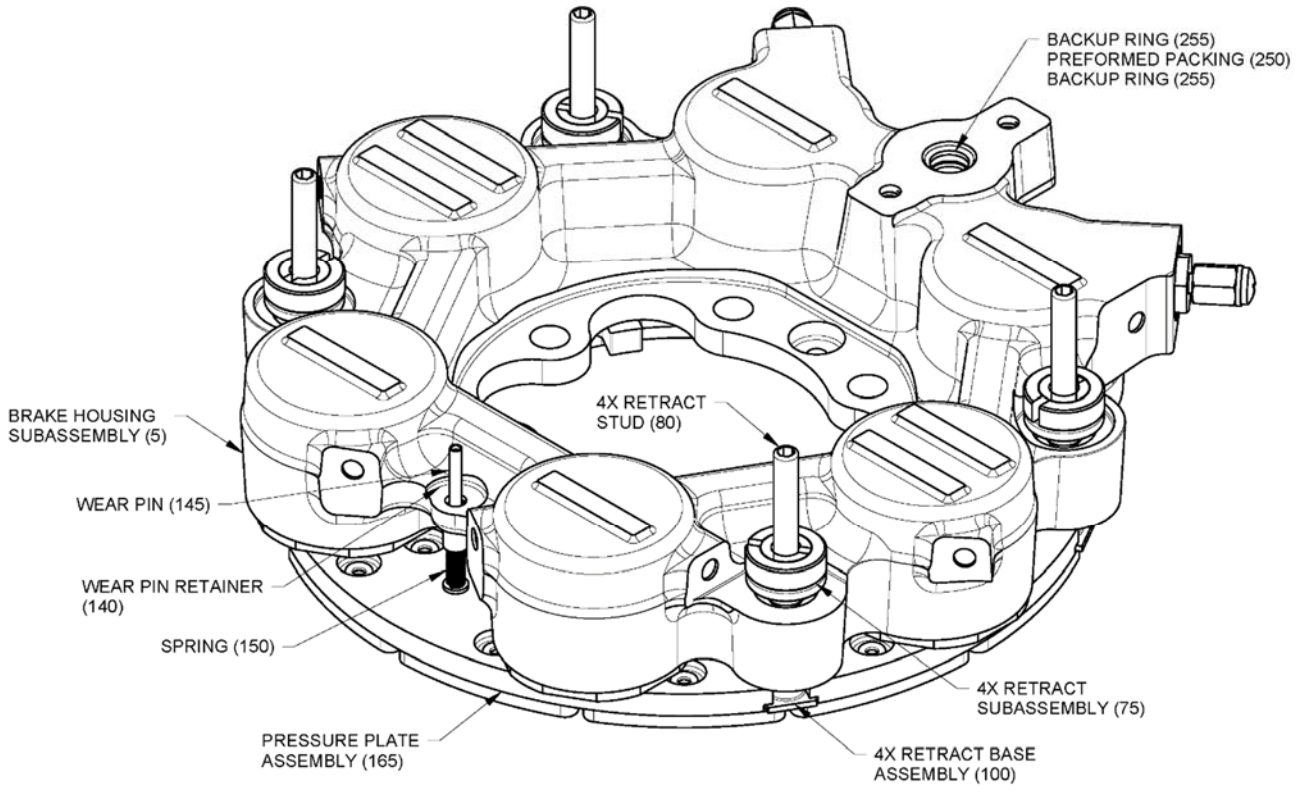


Figure 3001 Remove the retract subassemblies (75)

DISASSEMBLY

CAUTION: THE WEAR PIN SPRING (150) IS UNDER A LIGHT COMPRESSION LOAD AGAINST THE PRESSURE PLATE (170). LIFTING THE BRAKE HOUSING SUBASSEMBLY (5) BY ITSELF WILL UNLOAD THE SPRING (150) AND THE WEAR PIN (145) AND SPRING (150) WILL FALL OUT.

I. Take hold of both the brake housing subassembly (5) and the pressure plate assembly (165). Lift both together and turn over so that the brake housing subassembly (5) is resting on the bottom. The pressure plate assembly (165) will be the top component.

J. Refer to Figure 3002. Carefully lift and remove the pressure plate assembly (165) from the brake housing subassembly (5).

K. Lift out the following from the brake housing (5):

- Wear pin (145) and spring (150).
- Unthread and remove the wear pin retainer (140).

L. Slide out each of the four retract base assemblies (100) from the corresponding pockets in the pressure plate (170).

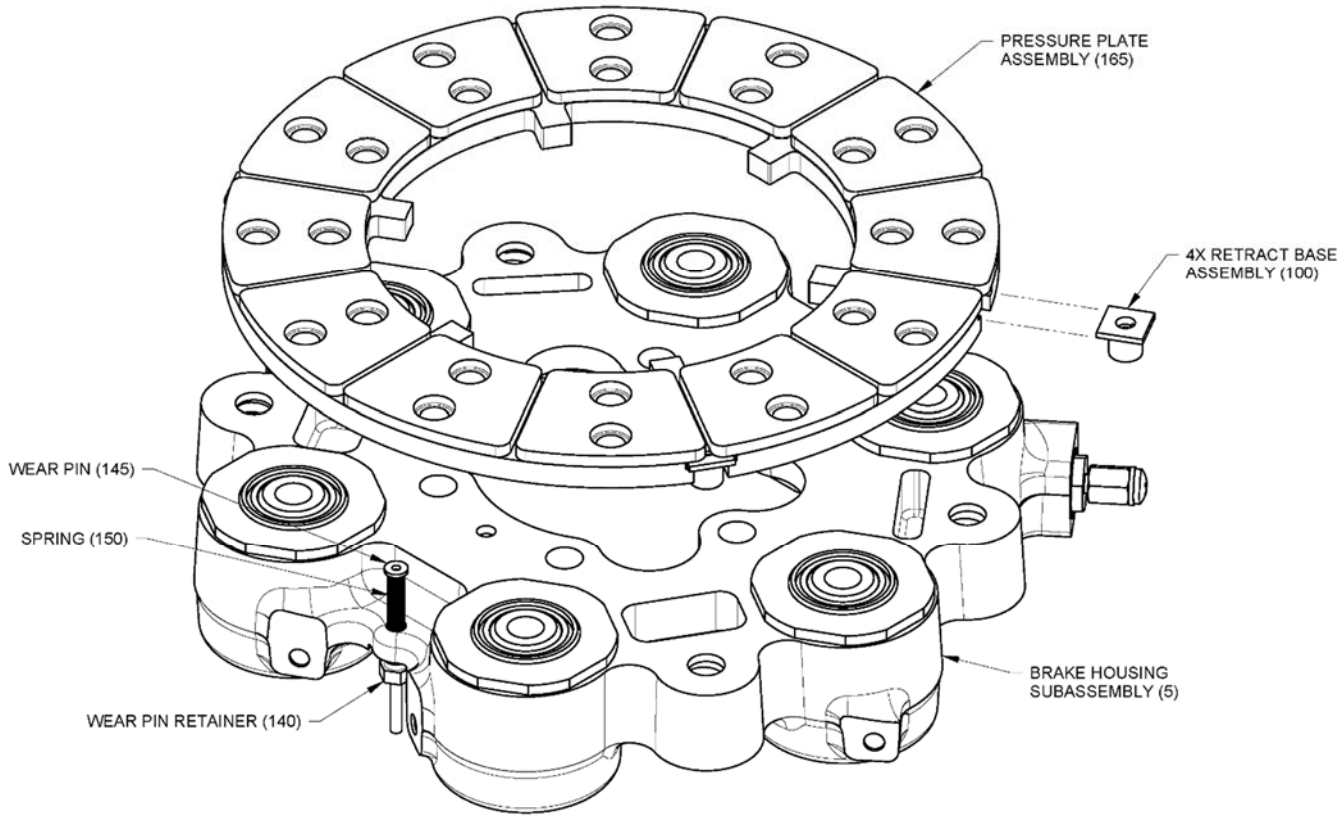


Figure 3002 Remove retract base assemblies (100) and wear indicator components (140), (145), (150)

DISASSEMBLY

CAUTION: BRAKE FLUID MAY SPILL OUT WHEN REMOVING THE BLEEDER COMPONENTS (115), (120), (125), (130), (135). PROVIDE NECESSARY FLUID CONTAINMENT.

M. See Figure 3003. Remove the bleeder components:

- two bleeder screws (130).
- two washers (125).
- two bleeder valves (120).
- two bleeder seats (115). Remove and discard the preformed packing (135) from each.

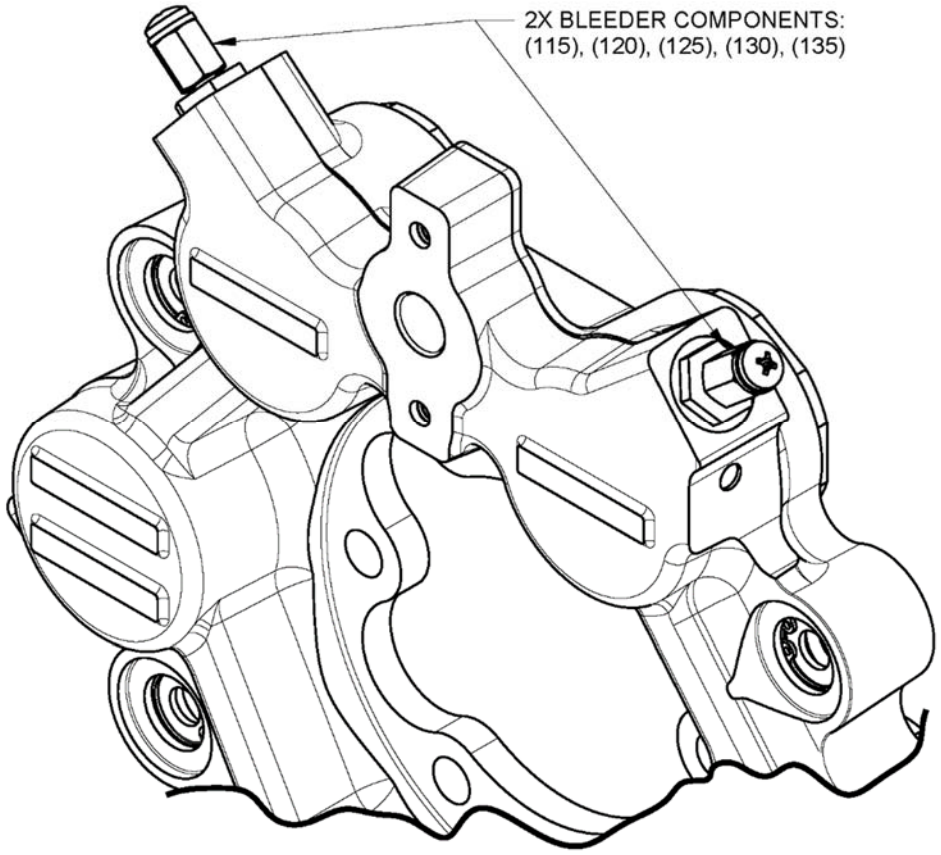


Figure 3003 Remove the bleeder components (115), (120), (125), (130), (135)

DISASSEMBLY

CAUTION: THE PISTON (40) MAY PULL OUT WHEN THE CYLINDER SLEEVE (15) IS UNTHREADED AND REMOVED FROM THE BRAKE HOUSING. THE PISTON IS NOT ATTACHED TO THE CYLINDER SLEEVE, BUT SEAL FRICTION MAY CAUSE THE PISTON TO MOVE WITH THE CYLINDER SLEEVE.

NOTE: Firmly secure the brake housing subassembly (5) before unthreading and removing the cylinder sleeves (15). Once the housing is firmly secured; it will be easier to apply the necessary leverage to overcome the install torque of the cylinder sleeves (15) which is 450 to 500 in-lb.

NOTE: Depending on the design of the 6-pt, 1-7/8 socket obtained, it may be necessary to modify the socket by grinding down the head flat to confirm 100% engagement of the cylinder sleeve hex feature.

N. See Figure 3004. Use a 6-pt, 1-7/8 socket to unthread and then remove the six cylinder sleeves (15).

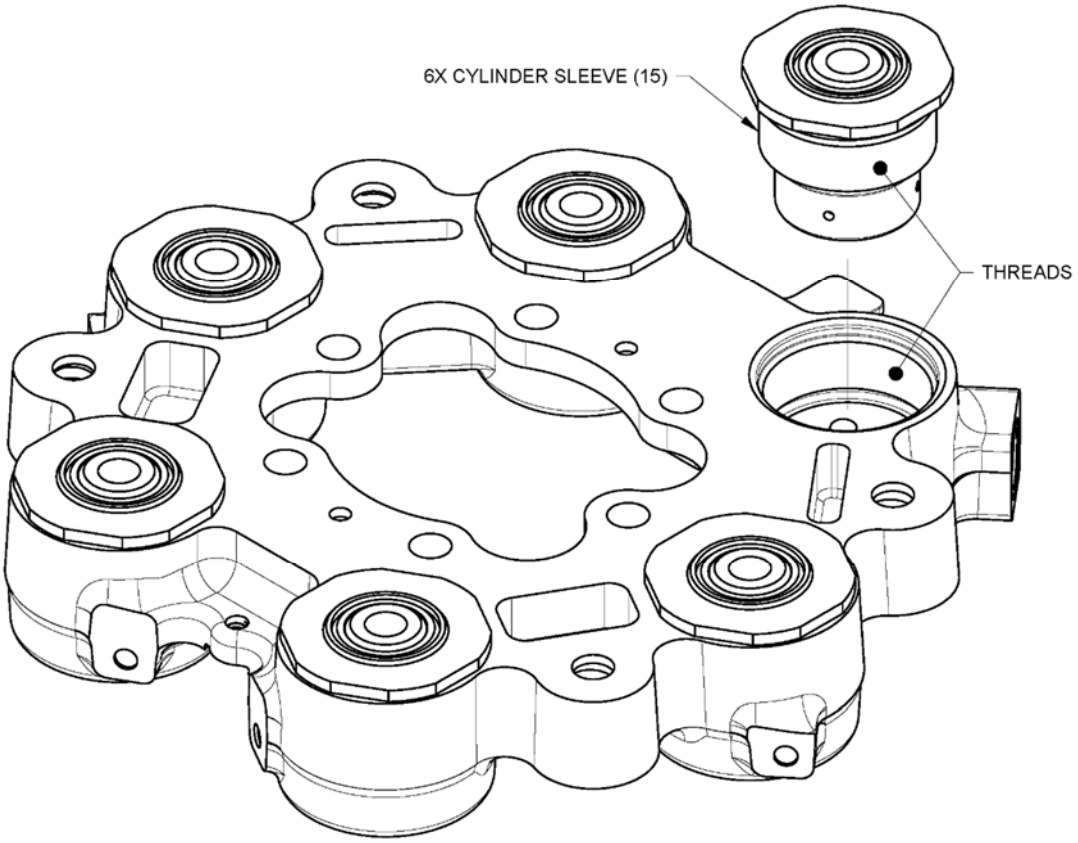


Figure 3004 Remove cylinder sleeves (15)

O. Drain any remaining hydraulic fluid from the brake housing.

DISASSEMBLY

P. See Figure 3005. Disassemble the cylinder sleeve and remove and discard the following seals:
- 1 preformed packing (20).
- 1 wiper ring (35).
- 2 backup ring (30).
- 1 preformed packing (25).

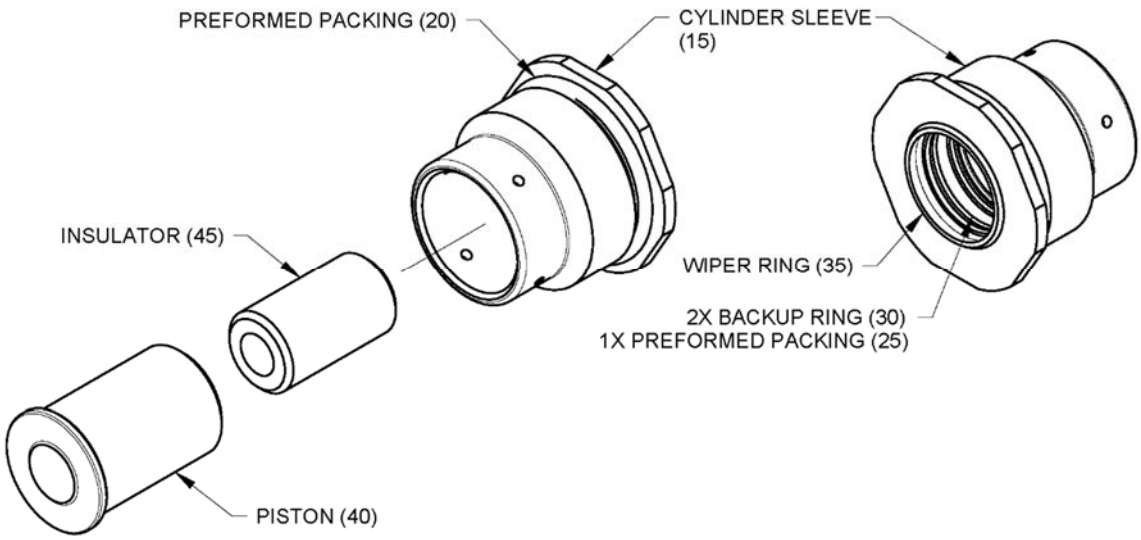


Figure 3005 Disassemble cylinder sleeve (15)

DISASSEMBLY

SAFETY WARNING: THE RETRACT SPRING (70) IS UNDER INSTALLED LOAD. USE CARE WHEN REMOVING THE RETAINING RING (60). PARTS CAN FLY OUT AND CAUSE INJURY, POSSIBLE DAMAGE, OR LOSS OF PARTS.

NOTE: A tool to compress the spring (70) can be fabricated to relieve the installed load on the retaining ring (60).

R. Refer to Figure 3006. Remove the following from the four retract bores: Use internal snap ring pliers and carefully remove the retaining ring (60). Then remove the washer (65) and spring (70).

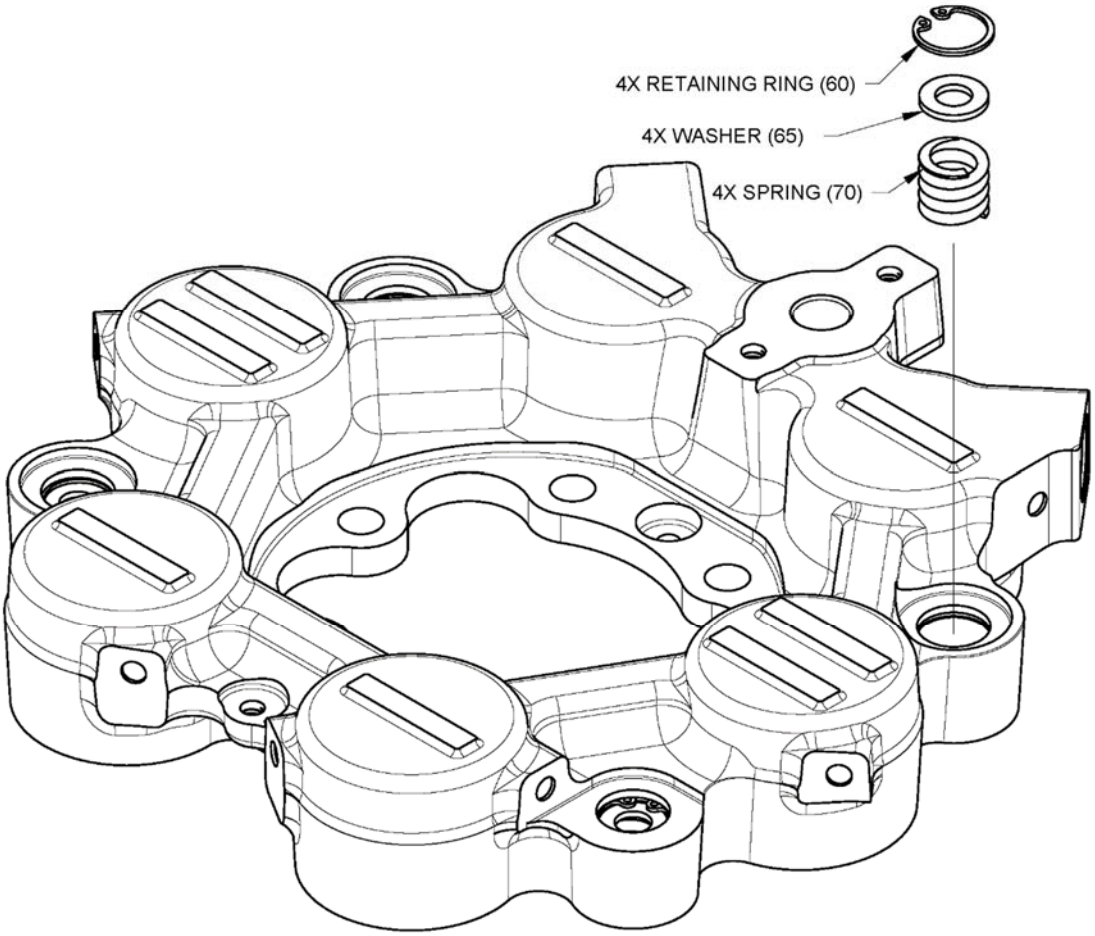


Figure 3006 Remove retract hardware (60), (65), (70)

CLEANING

1. General

Refer to IPL Figure 1 for component identification.

A. Equipment and consumables

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

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 4001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Blast stripping equipment	• Plastic blast media: MIL-P-85891, Type II or V, Grade 20/30, 3.5 MOH max. • Abrasive blast media: 80 Grit aluminum oxide	U.S. Technology Corp.
Air supply	30 psig maximum	Commercial
Clean cloths	Lint free	Commercial
Brushes	Nonmetallic soft and stiff bristle	Commercial
Stoddard solvent	Type 1 per MIL-PRF-680	Commercial
Cleaner/degreaser	Alkaline based	Commercial
Soap solution	Mild dishwashing liquid	Commercial

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

SAFETY WARNING: USE NO MORE THAN 30 PSIG AIR PRESSURE WHEN USING AIR TO DRY PARTS. EYE PROTECTION IS NECESSARY. EYE INJURY FROM DIRT PARTICLES OR SOLVENT SPRAY IS POSSIBLE WHEN COMPRESSED AIR IS USED.

2. Clean the hardware

The hardware is made from steel (45), (50), (55), (60), (65), (70), (100), (115), (120), (130), (140), (145), (150), (155), (160), (260), (275), (280). The retract subassembly (75) contains steel and brass components.

SAFETY WARNING: FOLLOW THE MANUFACTURER’S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

A. Use an alkaline based degreasing solution or Stoddard Solvent (per MIL-PRF-680) and a nonmetal soft bristle brush to remove any hardened dirt or grease deposits.

B. Rinse in clean water and dry thoroughly.

3. Clean the nonmetallic hardware

A. Wipe the nylon washer (125) with a clean soft cloth dampened in a mild soap and water solution, then dry thoroughly.

CLEANING

4. Clean the piston (40)

The piston is made from aluminum alloy.

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

A. Use an alkaline based degreasing solution or Stoddard Solvent (per MIL-PRF-680) and a nonmetal soft bristle brush to remove any hardened dirt or grease deposits.

B. Rinse in clean water and dry thoroughly.

5. Clean the brake housing subassembly (5) and shuttle valve assembly (240)

The brake housing is made from aluminum alloy. The shuttle valve manifold is made from aluminum alloy. To remove the protective coating (primer and topcoat) from the brake housing and the shuttle valve manifold, refer to step C.

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

CAUTION: THE CLEANING PROCESS MAY DAMAGE OR REMOVE THE SHUTTLE VALVE NAMEPLATE (245). A NAMEPLATE THAT IS DAMAGED OR REMOVED DURING THE CLEANING PROCESS WILL REQUIRE REPLACEMENT. REFER TO IPL FIGURE 1 FOR THE NAMEPLATE PART NUMBER.

A. Use an alkaline based degreasing solution and a nonmetal soft bristle brush to remove any hardened dirt or grease deposits.

B. Rinse in clean water and dry thoroughly.

C. Remove the protective coating (primer and topcoat) from the brake housing and shuttle valve manifold.

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

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

(1) Part must be clean. This will remove dirt and grease deposits that can contaminate the blast media.

(2) Blast the part per MIL-STD-1504 with plastic media.

CLEANING

6. Clean the torque tube (215)

The torque tube is made from alloy steel. The helical coil inserts (230), (235) are made from corrosion resistant steel. The abrasive blast process will also help to remove any surface corrosion.

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

A. After the wear pads have been removed, use an alkaline based degreasing solution or Stoddard Solvent (per MIL-PRF-680) and a nonmetal soft bristle brush to remove any hardened dirt or grease deposits.

B. Rinse in clean water and dry thoroughly.

C. Protective coating and corrosion removal

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

(1) Part must be clean. This will remove dirt and grease deposits that can contaminate the blast media.

(2) Blast the part per MIL-STD-1504 with aluminum oxide media.

CAUTION: FLASH RUST WILL BEGIN TO DEVELOP ON THE BARE METAL IF PROTECTIVE COATING IS NOT APPLIED.

D. Refer to the REPAIR section to apply protective coat on the torque tube.

7. Clean the pressure plate (170) and stator disc (195)

The pressure plate and stator disc are made from alloy steel

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

A. After the wear pads have been removed, use an alkaline based degreasing solution or Stoddard Solvent (per MIL-PRF-680) and a nonmetal soft bristle brush to remove any hardened dirt or grease deposits.

B. Rinse in clean water and dry thoroughly.

C. Corrosion removal of the pressure plate (170) and stator disc (195)

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

(1) Part must be clean. This will remove dirt and grease deposits that can contaminate the blast media.

(2) Blast the parts per MIL-STD-1504 with aluminum oxide media.

8. Clean the rotor disc (185)

The rotating discs are made from alloy steel and friction material.

CAUTION: DO NOT USE CLEANING SOLUTIONS ON THE FRICTION MATERIAL SURFACES OF THE ROTATING DISC. CLEANING SOLUTION THAT HAS SOAKED INTO THE FRICTIONAL MATERIAL WILL DEGRADE BRAKE PERFORMANCE.

A. Clean the rotating disc with compressed air and a nonmetal stiff bristle brush.

CHECKS

1. General

Refer to IPL Figure 1 for component identification.

NOTE: All parts must be cleaned before examination. Refer to the CLEANING section.

NOTE: In addition to the general inspection, follow detailed inspection of applicable components.

A. Equipment and consumables

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

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 5001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Inspection surface plate	Commercial source	Commercial
Magnifier	X10 Magnification	Commercial
Micrometers	Commercial source	Commercial
Vernier dial calipers	Commercial source	Commercial
Magnetic particle inspection kit	ASTM E1444	Commercial
Liquid penetrant inspection kit	ASTM E1417 Type 1, method A, sensitivity level 2	Commercial
Hardness tester for (5), (215)	Commercial source	Commercial

SAFETY WARNING: THIS ASSEMBLY CONTAINS PARTS THAT HAVE A CADMIUM PLATING FINISH: (50), (65), (85), (95), (115), (120), (155), (160), (275), (280). REMOVING THE CADMIUM PLATING CAN CREATE EXPOSURE TO CADMIUM DUST AND CADMIUM COMPOUNDS. THIS CAN BE A POTENTIAL HEALTH HAZARD.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

CAUTION: REPAIR OR REWORK OF PLATED HARDWARE INCLUDING STRIPPING AND RE-PLATING IS NOT ALLOWED. DO NOT STRIP PLATING MATERIAL TO INSPECT A BOLT. REMOVAL OF PLATING MATERIAL WILL CAUSE THE BOLTS TO CORRODE.

2. General inspection

NOTE: Replace hardware that has damage to any protective coating, such as cad plate.

A. Examine visible surfaces of the following for corrosion, distortion, wear, burrs, pitting, nicks, cracks, chips, or other visible signs of damage: (5), (15), (40), (45), (50), (55), (60), (65), (70), (75), (100), (115), (120), (130), (140), (145), (150), (155), (160), (170), (175), (185), (195), (200), (215), (220), (240), (260), (275), (280).

(1) Examine parts with sealing surfaces and grooves. Damage to the sealing surfaces could damage preformed packings during installation.

(2) Examine parts with threads for damage to threaded areas.

B. Examine the following nonmetallic parts for deformation, cuts, tears, cracks, breaks, nicks or other visible signs of damage: (125).

CHECKS

3. Examine the bolts (55), (160), (275)

NOTE: If replacing one or more of the same bolts, it is good practice to replace all of those same bolts. Example: If replacing one of the (55) bolts, then replace both. If replacing one of the (275) bolts, then replace all six.

A. In accordance with the maintenance schedule (Table 1, DESCRIPTION AND OPERATION), use magnetic particle inspection (ASTM E1444) to examine for cracks in the radius under the bolt head and in the threaded area next to the bolt shank.

4. Examine the brake housing subassembly (5)

Refer to Figure 5001.

A. Examine the exterior surface for missing paint.

B. Examine for dents, surface cracks, nicks, burrs, corrosion, or other damage.

C. Examine the 2 bleeder ports for corrosion or damage to the sealing surfaces or threads. Replace the brake housing subassembly if corrosion or damage is indicated.

D. Examine the shuttle valve port. Use a 10X magnifier and examine the port for scratches, wear, corrosion or other damage. If the diameter exceeds Ø 0.486 inch, replace the brake housing subassembly.

E. Examine the pin plugs and helical coil inserts (10).

(1) Examine the six pin plugs for leakage. The pin plugs are not replaceable. If there is leakage from a pin plug, the brake housing subassembly must be replaced.

(2) Examine the three helical coil inserts (10) for looseness, thread damage or loss of self-locking feature. Replace loose or damaged insert in accordance with the REPAIR section.

F. Use a 10X magnifier and examine the six piston bores for scratches, wear, corrosion or other damage. Examine the preformed packing groove for scratches, nicks, burrs, or other damage that could damage or alter the sealing function of the preformed packing (20). Measure the piston bores. If a bore diameter measures more than ∅ 1.470 inch, the brake housing subassembly must be replaced.

(1) Examine the piston bore threads. If threads are damaged, the brake housing subassembly must be replaced.

CHECKS

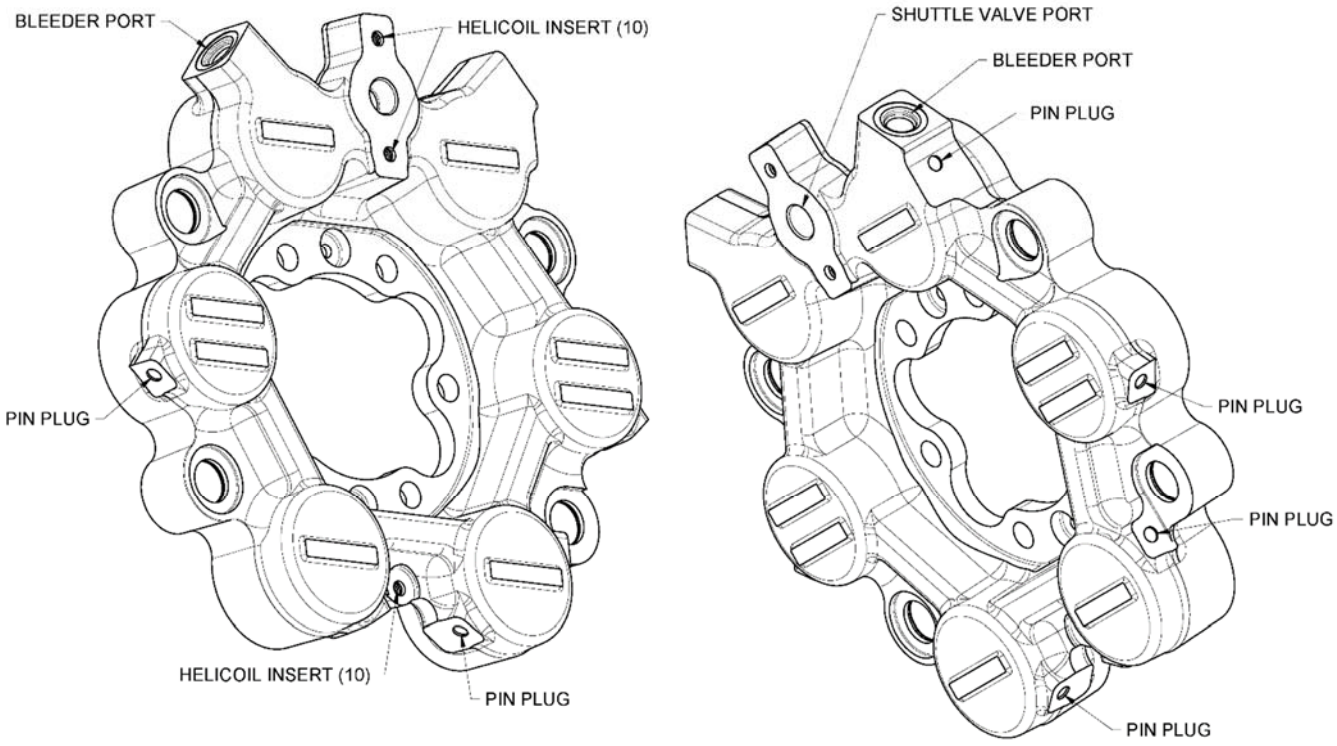


Figure 5001 Inspect brake housing subassembly (5)

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

G. In accordance with the maintenance schedule (Table 1, DESCRIPTION AND OPERATION), examine the brake housing for cracks using liquid penetrant inspection (ASTM E1417, Type 1, Method A, Sensitivity Level 2; acceptance criteria per MIL-STD-1907, Grade B).

NOTE: The protective coating (topcoat and primer) must be removed from the part and the part must be clean before using liquid penetrant inspection methods.

(1) Remove the protective coating (topcoat and primer) from the housing. Refer to the CLEANING section for paint removal instructions.

(2) Examine the housing for cracks. Replace the brake housing subassembly if cracks are found.

CHECKS

5. Examine the pistons (40)

A. Examine for minor scratches, nicks, burrs, or other damage and replace.

B. Examine the outside diameter for wear of the surface coating, minor scratches, nicks, burrs.

(1) Examine the piston O.D. for wear by measuring at three places around the circumference. If the O.D. measures less than ∅ .996 inch at any point, replace the piston.

6. Examine the piston insulator (45)

A. Examine for minor scratches, nicks, burrs, or other damage and replace.

B. Measure the insulator height. If the height measures less than 1.295 inch , replace the insulator.

7. Examine the retract subassembly (75)

NOTE: Refer to the ASSEMBLY section for resetting the components of the retract subassembly.

A. Examine the retract subassembly components: retract stud (80), friction sleeve (90), sleeve retainer (85) and spacer (95) for the following conditions and replace as needed:

- Nicks, burrs, scoring and corrosion that would obstruct the operation of the subassembly.
- Damaged retract stud (80) internal hex wrenching mechanism.
- Distortion of the retract stud (80).
- Stripped or scored threads on the retract stud (80).

8. Examine the retract base assembly (100)

NOTE: Refer to the REPAIR section for replacement of a damaged insert (110).

A. Examine and replace the retract base assembly components: retract base (105) and insert (110) for the following conditions:

- Nicks, burrs, or other damage to the retract base (105) that would affect the operation of the retract base assembly.
- Damage to the locking feature of the insert (110).

CHECKS

9. Examine the torque tube assembly (210)

A. Examine the exterior surface for missing coating (galvanizing compound) caused by erosion or wear.

B. Examine for surface cracks, corrosion or other damage.

C. Refer to Figure 5002 and examine the following.

(1) Examine for loose, cracked or worn wear pads (220). Replace loose rivets (225) and damaged or worn wear pads per the REPAIR section.

(a) Check wear pad worn condition. If any wear pad is worn down to dimension “B”, all the wear pads must be replaced. Overall measurement can also be made at dimension “C” from the back of torque tube flat (not at the rib).

(2) Examine the six drive slots that engage the pressure plate (170) and stator disc (195) drive tangs for wear of damage.

(a) Check dimension “A”. If the width of a slot is more than the limit shown, replace the torque tube.

(3) Examine the helical coil inserts (230), (235) for thread damage and positioning/backing out. Replace a damaged insert in accordance with the REPAIR section.

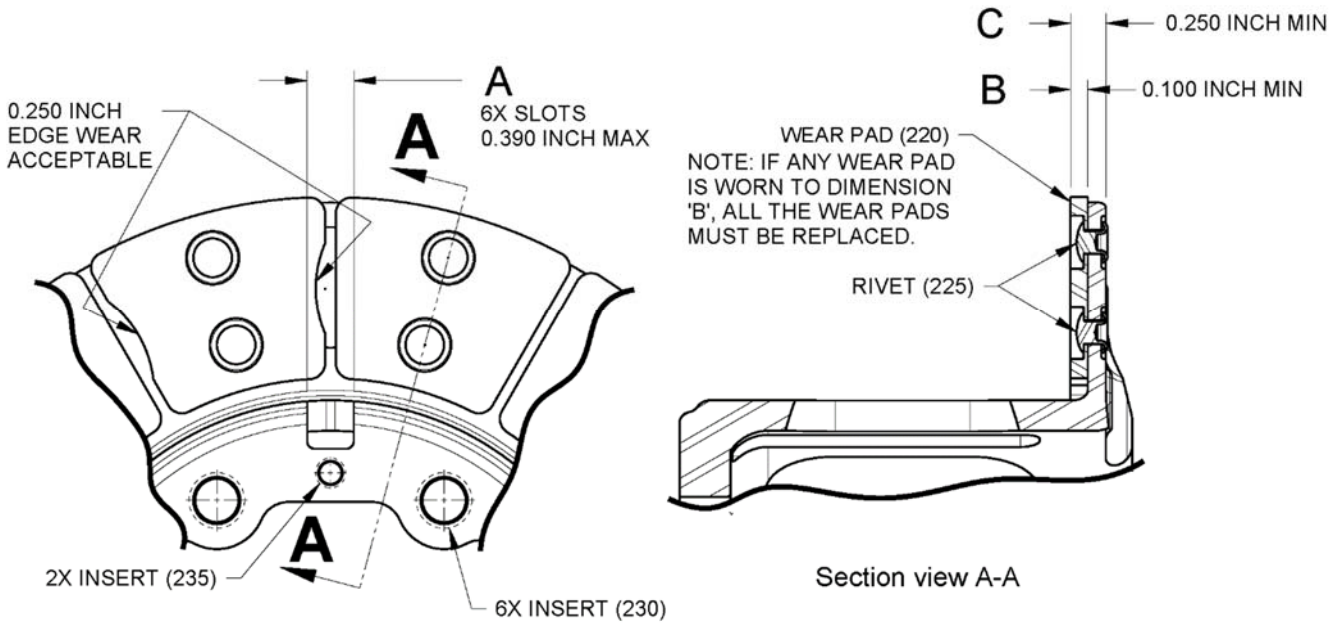


Figure 5002 Inspect torque tube assembly (210)

CHECKS

D. Examine the torque tube (215) for the following before installing new wear pads.

(1) Examine for distortion and out-of-flatness on wear pad mating surface. Replace the torque tube if out-of-flatness more than 0.005 inch. Check for gapping between torque tube and wear pads.

(2) Examine for distortion of the rivet holes and cracks at the rivet hole areas. Cracks are not allowed. Rivet holes must not exceed ∅ 0.205 inch maximum.

(3) In accordance with the maintenance schedule (Table 1, DESCRIPTION AND OPERATION), examine the torque tube for cracks using liquid penetrant inspection. As an alternate, magnetic particle inspection can be used.

NOTE: The protective coating (cold galvanizing compound) must be removed from the part and the part must be clean before doing a liquid penetrant inspection procedure.

(a) Remove the protective coating (cold galvanizing compound) from the torque tube. Refer to the CLEANING section for coating removal instructions.

(b) Examine the torque tube for cracks.

10. Examine the rotor disc (185)

A. Examine for wear, surface cracks near the thermal relief slots, corrosion or other damage.

B. Examine for distortion. Replace any disc that is out-of-flatness more than 0.009 inch.

C. Refer to Figure 5003 and examine the following.

(1) Examine the lining material of the disc for wear, crumbling and pitting.

(a) If the disc is worn down to less than dimension “B” on either side, replace the disc. Overall measurement can also be made at dimension “C”.

(2) Examine for cracks at the six thermal relief slot areas. Cracks are not allowed.

(3) Examine the six drive slots that engage the wheel drive keys for wear or damage.

(a) Check dimension “A”. If the width of a drive slot is more than the limit shown, replace the disc.

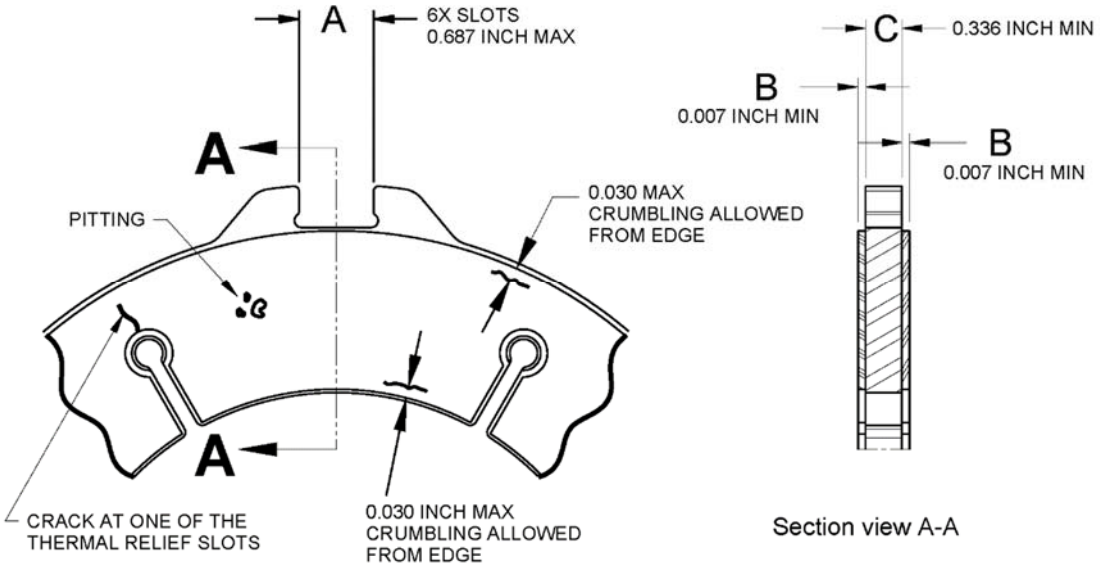


Figure 5003 Inspect rotor disc (185)

CHECKS

11. Examine the stator disc assembly (190)

A. Examine the stator for surface cracks, corrosion or other damage.

B. Refer to Figure 5004 and examine the following.

(1) Examine for loose, cracked or worn wear pads (200). Replace loose rivets (205) and damaged or worn wear pads per the REPAIR section.

(a) Check wear pad worn condition. If any wear pad is worn down to dimension “B”, all the wear pads must be replaced. Overall measurement can also be made at dimension “C”.

(2) Examine the six drive tangs that engage the torque tube (215) drive slots for wear or damage.

(a) Check dimension “A”. If the width of a tang is less than the limit shown, replace the stator.

C. Examine the stator disc (195) for the following before installing new wear pads.

(1) Examine for distortion and out-of-flatness on wear pad mating surface. Replace the stator disc if out-of-flatness more than 0.006 inch. Check for gapping between stator and wear pads.

(2) Examine for cracks at the six thermal relief slot areas. Cracks are not allowed.

(3) Examine for distortion of the rivet holes and cracks at the rivet hole areas. Cracks are not allowed. Rivet holes must not exceed ∅ 0.205 inch maximum.

(4) In accordance with the maintenance schedule (Table 1, DESCRIPTION AND OPERATION), examine the pressure plate for cracks using liquid penetrant inspection. As an alternate, magnetic particle inspection can be used.

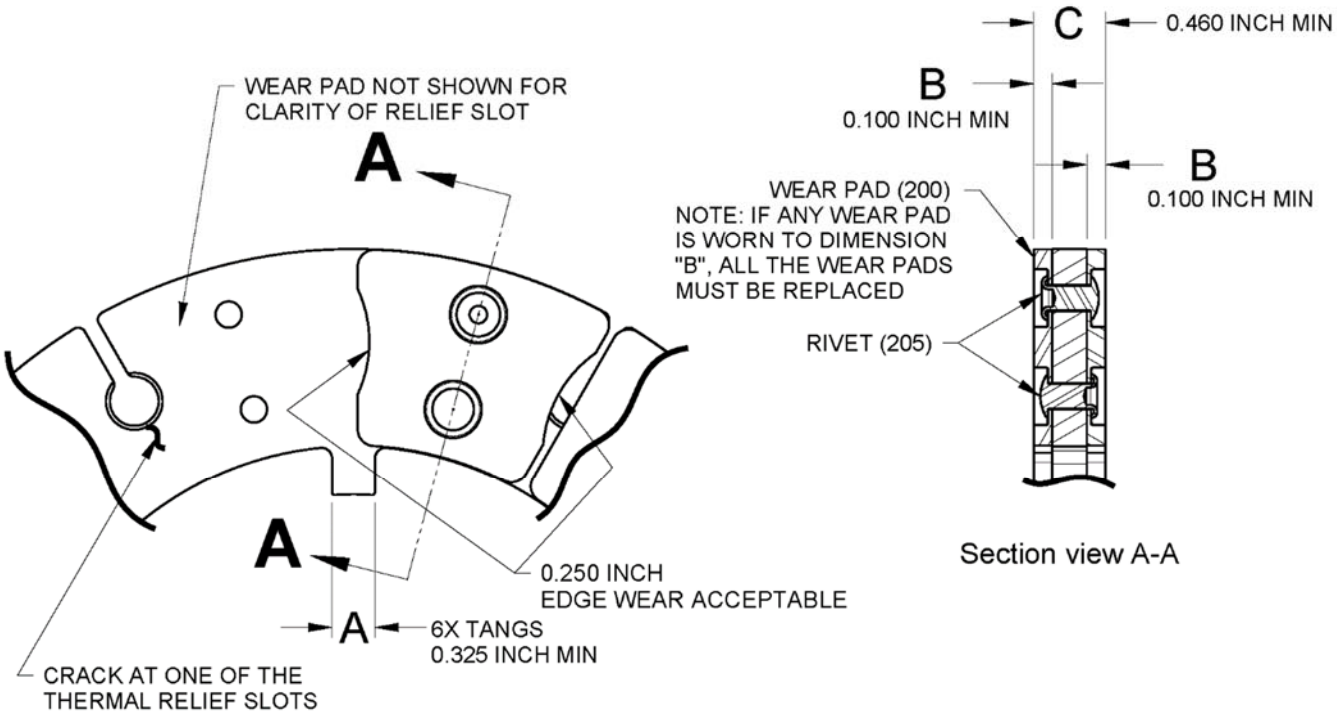


Figure 5004 Inspect stator disc assembly (190)

CHECKS

12. Examine the pressure plate assembly (165)

A. Examine the pressure plate for surface cracks, corrosion or other damage.

B. Refer to Figure 5005 and examine the following.

(1) Examine for loose, cracked or worn wear pads (175). Replace loose rivets (180) and damaged or worn wear pads per the REPAIR section.

(a) Check wear pad worn condition. If any wear pad is worn down to dimension “B”, all the wear pads must be replaced. Overall measurement can also be made at dimension “C”.

(2) Examine the six drive tangs that engage the torque tube (215) drive slots for wear or damage.

(a) Check dimension “A”. If the width of a tang is less than the limit shown, replace the pressure plate.

C. Examine the pressure plate (170) for the following before installing new pads.

(1) Examine for distortion and out-of-flatness on wear pad mating surface. Replace the pressure plate if out-of-flatness more than 0.006 inch. Check for gapping between pressure plate and wear pads.

(2) Examine for distortion of the rivet holes and cracks at the rivet hole areas. Cracks are not allowed. Rivet holes must not exceed ∅ 0.205 inch maximum.

(3) In accordance with the maintenance schedule (Table 1, DESCRIPTION AND OPERATION), examine the pressure plate for cracks using liquid penetrant inspection. As an alternate, magnetic particle inspection can be used.

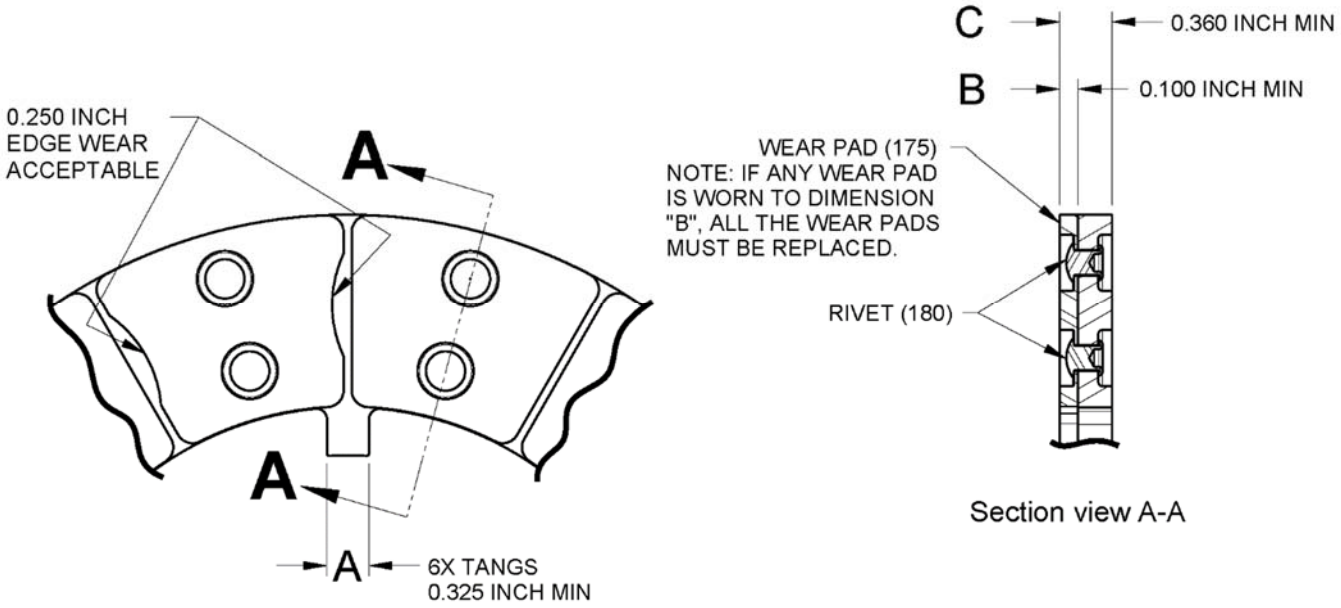


Figure 5005 Inspect pressure plate assembly (165)

CHECKS

13. Procedure for overheated brakes

Result of RTO (Rejected Take Off) or heavy braking event. Indication of overheating: brake housing paint is charred or blistered or one of the fusible plugs in the mating main wheel assembly releases the tire pneumatic pressure.

A. Perform a hardness check on the brake housing subassembly (5).

NOTE: To obtain an accurate reading, remove paint from the test areas (where the hardness ball will actually contact the surface). Use 400 grit or finer wet or dry aluminum oxide cloth. Refer to the REPAIR section for repaint instructions.

(1) Perform a hardness test in the area shown in Figure 5006. Obtain a minimum of three hardness readings (equally spaced). If any reading is below the limit specified in Table 5002, replace the brake housing subassembly.

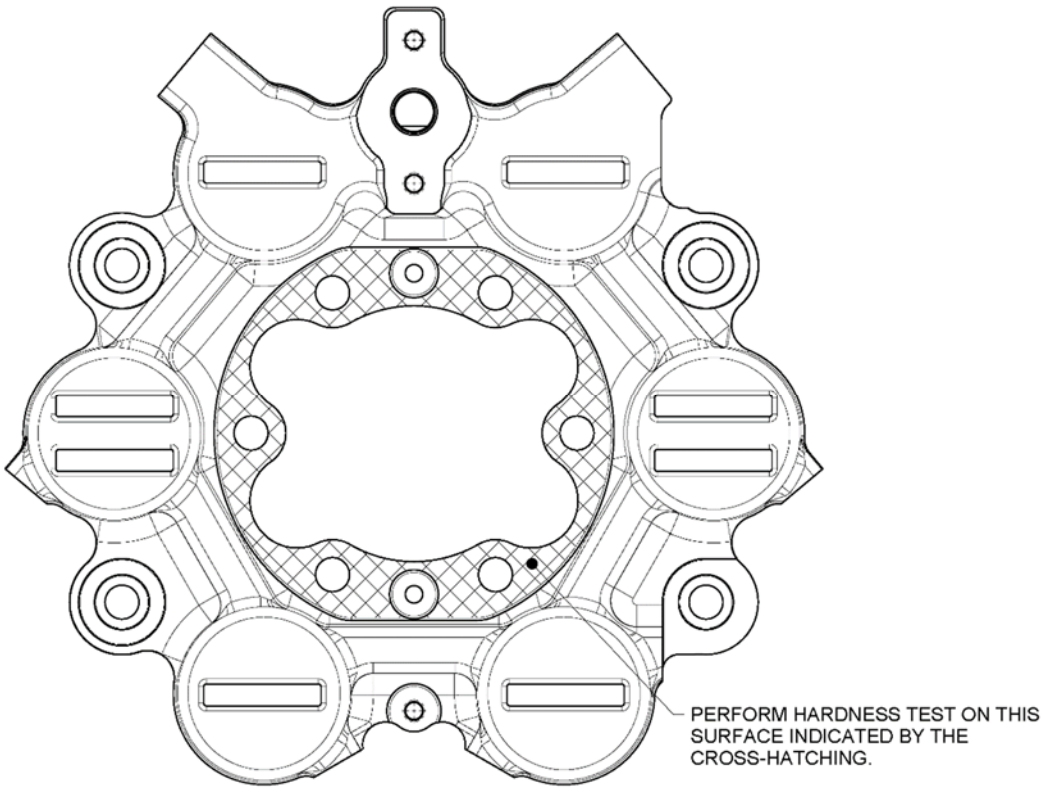


Figure 5006 Hardness test – brake housing subassembly (5)

Table 5002 Hardness test readings – brake housing subassembly

ITEM	BRINELL TEST
Ball Diameter	10 mm
Test Load	500 kg
Minimum number of readings (equally spaced)	3
Acceptable minimum average hardness	135 Bhn

CHECKS

B. Perform a hardness check on the torque tube (215).

NOTE: To obtain an accurate reading, remove paint from the test areas (where the hardness ball will actually contact the surface). Use 400 grit or finer wet or dry aluminum oxide cloth. Refer to the REPAIR section for repaint instructions.

(1) Perform a hardness test on the flat surfaces shown in Figure 5007. There are a total of 12 flat locations. Obtain a minimum of three hardness readings (equally spaced). If any reading is below the limit specified in Table 5003, replace the torque tube assembly.

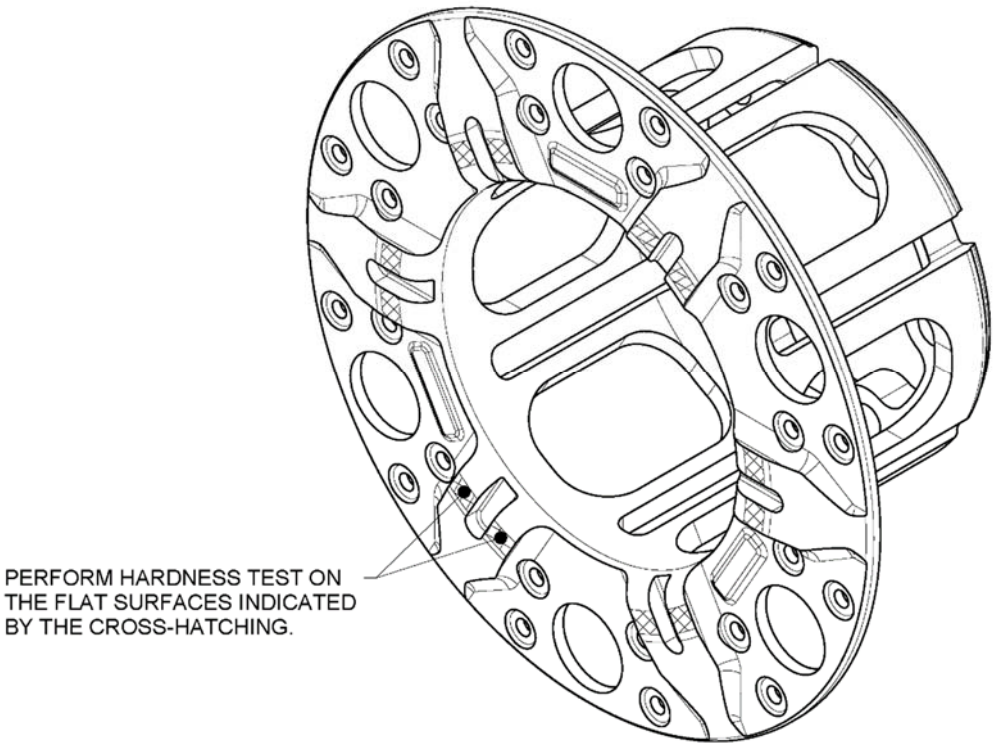


Figure 5007 Hardness test – torque tube (215)

Table 5003 Hardness test readings – torque tube

ITEM	ROCKWELL TEST
Minimum number of readings (equally spaced)	3
Acceptable minimum average hardness	Rc 39

REPAIR

1. General

Refer to IPL Figure 1 for component identification.

A. Equipment and consumables

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

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 6001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Aluminum oxide cloth	400 to 600 grade or finer, wet or dry	Commercial
Surface treatment	Alodine 1200 or equivalent MIL-C-5541, Class 1A	Commercial
Hand files	Assorted	Commercial
Riveting equipment for (180), (205), (225) Jaws Driver Rollset **Note:** Suitable standard equipment can also be used as additional source for riveting equipment.	Model 305 riveter 63-J-1566-A 563-DS-44 824-1K-7 Contact Source for tooling requirements.	Orbitform Fastening Systems Alternative riveter: National Rivet & Mfg. Co.
Threaded insert tools for (10), (110), (230), (235) Extraction tool Installation tool Tang removal tool	MIL-T-21209 for (110), (235): for (10): for (230): 1227-6 1227-6 1227-6 7552-3 7552-4 7552-6 3695-3 3695-4 3692-6	Emhart Fastening Teknologies
Paint application equipment	Commercial source	Commercial
Protective coatings for (5)	Refer to Table 6002	Deft Chemical Coatings
Protective coating for (215)	ZRC Galvilite, P/N 11011-10014 MIL-PRF-26915, Type I	ZRC Products Company
Stoddard solvent	Type 1 per MIL-PRF-680	Commercial

REPAIR

SAFETY WARNING: THIS ASSEMBLY CONTAINS PARTS THAT HAVE A CADMIUM PLATING FINISH: (50), (65), (85), (95), (115), (120), (155), (160), (275), (280). REMOVING THE CADMIUM PLATING CAN CREATE EXPOSURE TO CADMIUM DUST AND CADMIUM COMPOUNDS. THIS CAN BE A POTENTIAL HEALTH HAZARD.

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

CAUTION: REPAIR IS LIMITED TO THE PARTS LISTED IN THIS SECTION. THE FOLLOWING ITEMS ARE NOT REPAIRABLE AND MUST BE REPLACED IF WORN OR DAMAGED:

- HARDWARE: (10), (15), (40), (45), (50), (55), (60), (65), (70), (75), (110), (115), (120), (125), (130), (140), (145), (150), (155), (160), (175), (200), (220), (230), (235), (260), (275), (280)
- COMPONENTS THAT CONTAIN ELASTOMERS OR NONMETALLIC: (20), (25), (30), (35), (125), (135), (250), (255), (265)

CAUTION: THE FOLLOWING ITEMS ARE NOT PROCURABLE. ORDER THE NEXT HIGHER ASSEMBLY IF ITEM CANNOT BE REPAIRED:

- BRAKE HOUSING, PIN PLUGS. MUST ORDER ITEM (5).
- MANIFOLD, SHUTTLE VALVE, PIN PLUGS. MUST ORDER ITEM (240).

2. Repair and paint the brake housing subassembly (5)

The housing is made from aluminum alloy. Repair is limited to the following.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Repair the brake housing

(1) External surface damage repair.

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

(2) Piston bore repair

(a) Polish out light scratches and nicks. Surface finish must be 125 rms or better. Repair must not exceed ∅ 1.470 inch maximum.

B. Clean the brake housing. Refer to the CLEANING section.

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

C. Apply a surface pretreament (Alodine 1200 or equivalent) to repaired areas.

REPAIR

D. Paint the brake housing

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

(1) For small area paint touchup.

(a) Prepare the area by sanding lightly with 400 to 600 grade or finer, wet or dry aluminum oxide cloth and feather out all edges of the adjacent area.

(b) Clean the area.

(c) Touch up the area with primer and topcoat.

(2) For complete primer and topcoat application.

NOTE: Performed if primer and topcoat was removed from entire part by plastic media blasting.

(a) Confirm that the part has been cleaned and surface treatment applied if repair work was performed.

(b) Mask the brake housing. Refer to Figure 6001.

(c) Apply the primer and the topcoat. Refer to Table 6002.

NOTE: Results can vary and depend on the environment and the equipment used. To achieve the best results, always refer to the manufacturer's instructions for mixing, application and use.

Table 6002 Brake housing primer and topcoat specifications

MANUFACTURER	PRIMER	TOPCOAT
Deft Chemical Coatings Irvine, CA	P/N 44-GN-36, Components A and B MIL-PRF-85582D Type 1, Class C2	P/N 03-W-127A, Components A and B MIL-PRF-85285D Type 1, Class H, Color 17925 (Untinted White)
	Primer Thickness [1]: 0.0006-0.0009 inch Drying Time (air dry) [2]: Touch, mask, topcoat: 1 hour minimum Stack: 4 to 6 hours Hard cure: 14 days minimum	Topcoat Thickness [1]: 0.0017-0.0023 inch Drying Time (air dry) [2]: Recoat: 15 minutes minimum Stack: 4 to 8 hours Hard cure: 7 days minimum

[1] The total dry film thickness of the primer and topcoat to be 0.0023 to 0.0032 inch. This excludes the anodic coating thickness.

[2] Refer to the manufacturer's data sheet for the forced dry (heat accelerated cure) schedule.

REPAIR

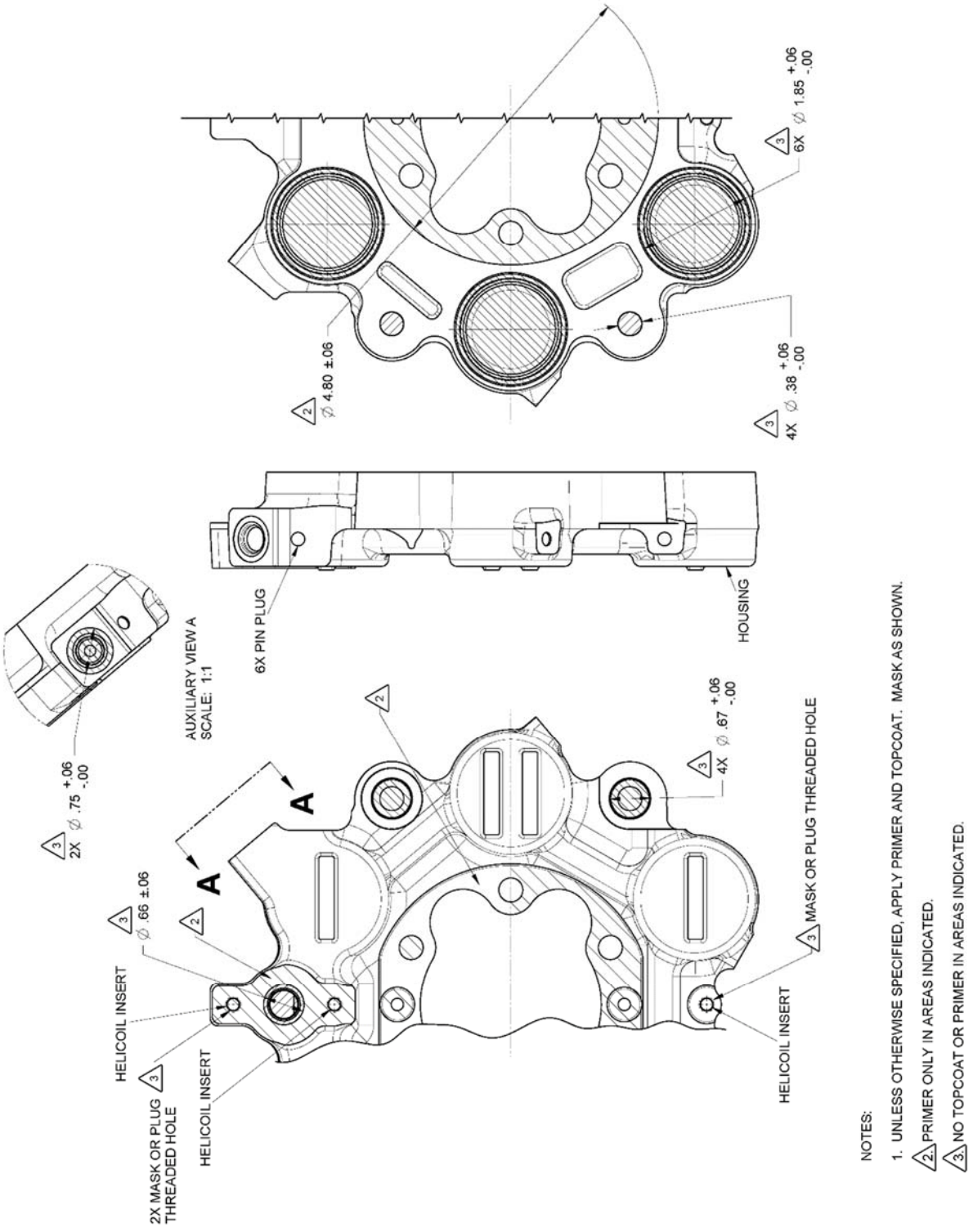


Figure 6001 Mask the brake housing subassembly (5)

REPAIR

3. Replace the brake housing inserts (10)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

Table 6003 Heli-Coil insert tools

EXTRACTING TOOL	INSTALLATION TOOL	TANG REMOVAL TOOL
1227-6	7552-4	3695-4

A. Removal

Refer to Figure 6002 and the following procedure.

(1) Remove damaged inserts by applying the extracting tool to the insert, striking the head of the tool a light blow and turning it counterclockwise, maintaining steady downward pressure.

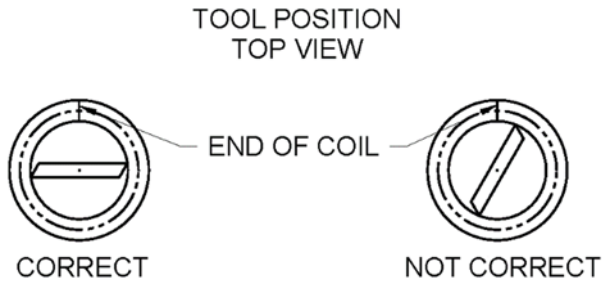


Figure 6002 Use the extracting tool

B. Installation

(1) Use the installation tool and install the insert into the brake housing so that the top coil is 0.035 inch below the surface. Use the tang removal tool to break off the tang.

REPAIR

4. Replace the wear pads (175), (200), and (220)

Procedure for removing the wear pads is the same for the pressure plate assembly (165), stator disc assembly (190), and torque tube assembly (210).

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

CAUTION: DO NOT ENLARGE THE RIVET HOLES IN THE PRESSURE PLATE (170), STATOR DISC (195) OR TORQUE TUBE (215). IF A RIVET HOLE EXCEEDS ∅ 0.205 INCH, THE PRESSURE PLATE, STATOR DISC, OR TORQUE TUBE MUST BE REPLACED.

NOTE: If a wear pad needs to be replaced, then all wear pads must be replaced.

NOTE: The stator disc assembly (190) has wear pads attached on both sides. Each pad has rivets installed from opposite directions.

A. Remove the wear pads

Refer to Figure 6003 and the following procedure.

(1) Use a twist drill bit and carefully drill into the clinched end of the rivet. Remove only enough material to weaken the clinch and allow a press punch or pin punch to force the rivet out of the hole without deforming or enlarging the hole.

(2) Remove and discard the wear pads. Remove any burrs around rivet hole areas without deforming or enlarging the hole.

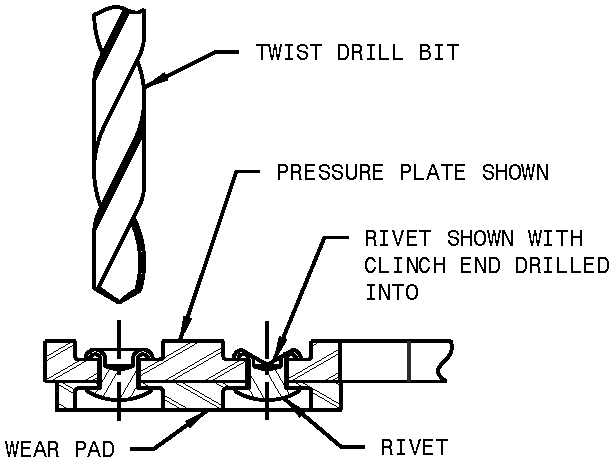


Figure 6003 Remove the rivets (180), (205), (225)

B. Examine the base parts: pressure plate (170), stator disc (195), torque tube (215)

Prior to installing new wear pads, perform the following:

(1) Examine the pressure plate for continued service and applicable repairs. Refer to the CHECKS section for examination and REPAIR paragraph 8. for repair procedures.

(2) Examine the stator disc for continued service and applicable repairs. Refer to the CHECKS section for examination and REPAIR paragraph 8. for repair procedures.

(3) Examine the torque tube for continued service and applicable repairs. Refer to the CHECKS section for examination and REPAIR paragraph 5. for repair procedures.

REPAIR

C. Install new wear pads

Refer to Figure 6004 and the following procedure.

(1) Clean new wear pads (175), (200), (220) with Stoddard Solvent (per MIL-PRF-680) to remove rust inhibitive coating.

NOTE: Failure to degrease wear pads prior to putting brakes back in service may result in smoking brakes during initial braking applications when brakes are returned to service.

(2) Confirm that the pressure plate, stator, and torque tube are clean.

(3) Attach the wear pads to the applicable part: pressure plate (170), stator disc (195), or torque tube (215).

(a) For the pressure plate and torque tube: Rivets are installed so that the head of the rivet is on the wear pad side.

(b) For the stator disc: Wear pads are attached to both sides of the stator disc. Rivets must be oriented as shown. Each pad shall have rivets installed from opposite directions.

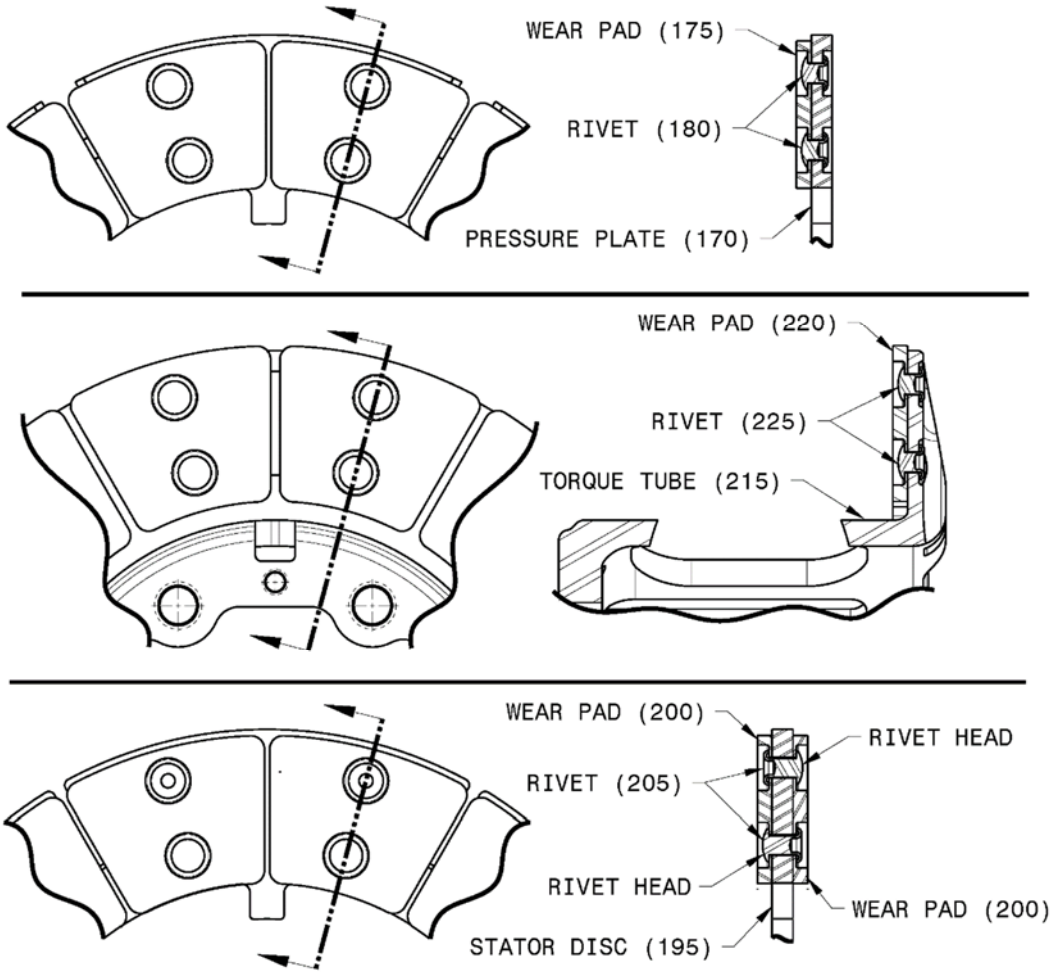


Figure 6004 Install the wear pads (175), (200), (220)

REPAIR

(4) Refer to Figure 6005. All parts assembled by riveting shall fit tightly together, and no perceptible movement shall be allowed between them. In addition:

(a) Parts shall not be distorted by splitting, bulging, buckling, or other characteristics which result from poor assembly procedures.

(b) Splits resulting from the clinching operation are permitted as follows:

1 The split shall not occur inside the crest of the clenched surface.

2 No more than two splits shall occur in a 90 ° area.

3 A total of no more than three splits shall be allowed.

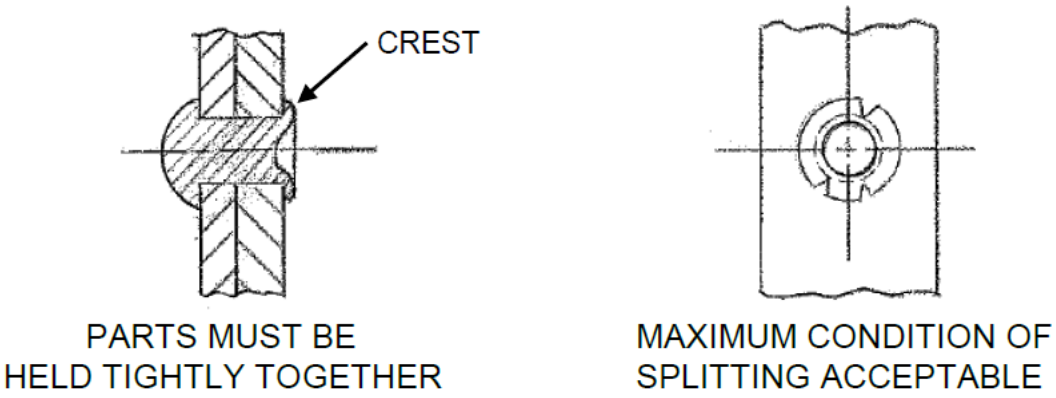


Figure 6005 Installation criteria for the rivets (180), (205), (225)

REPAIR

5. Repair the torque tube (215)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Torque tube surface damage repair.

The torque tube is made from alloy steel. Repair is limited to the following.

(1) Removing all contaminants such as grease, rust, and scale from the torque tube. Refer to the CLEANING section.

(2) Blending out burrs, sharp edges, small nicks and scratches .005 inch max.

B. Paint the torque tube

(1) For small area paint touchup.

(a) Prepare the area by sanding lightly with 400 to 600 grade or finer, wet or dry aluminum oxide cloth and feather out all edges of the adjacent area.

(b) Clean the area.

(c) Touch up the area with MIL-PRF-26915, Type I.

(2) For complete topcoat application.

NOTE: Performed protective coating was removed from entire part by abrasive media blasting.

(a) Confirm that the torque tube has been cleaned.

(b) Mask the eight threaded holes.

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

(c) Apply MIL-PRF-26915, Type I. Apply to the entire part except the eight threaded holes. Thickness to be .0015 to .0030 inch.

NOTE: Results can vary and depend on the environment and the equipment used. To achieve the best results, always refer to the manufacturer's instructions for mixing, application and use.

(d) Allow the part to dry for a minimum of thirty minutes before handling.

REPAIR

6. Replace the torque tube inserts (230), (235)

Repair a damaged insert in accordance with the following procedure.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

Table 6004 Heli-Coil insert tools

IPL ITEM NO.	EXTRACTING TOOL	INSTALLATION TOOL	TANG REMOVAL TOOL
230	1227-6	7552-6	3695-6
235	1227-6	7552-3	3695-3

A. Removal

Refer to Figure 6006 and the following procedure.

(1) Remove damaged inserts by applying the extracting tool to the insert, striking the head of the tool a light blow and turning it counterclockwise, maintaining steady downward pressure.

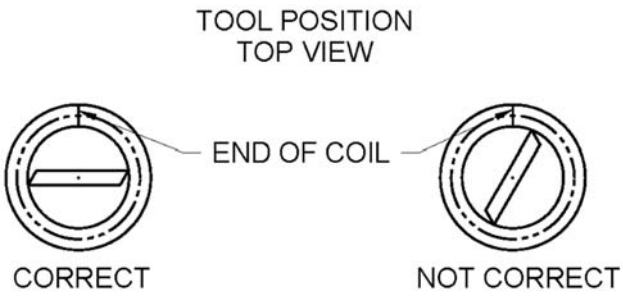


Figure 6006 Use the extracting tool

REPAIR

B. Installation

Refer to Figure 6007 and the following procedure.

(1) Use the installation tool and install the insert into the torque tube as shown. Use the tang removal tool to break off the tang.

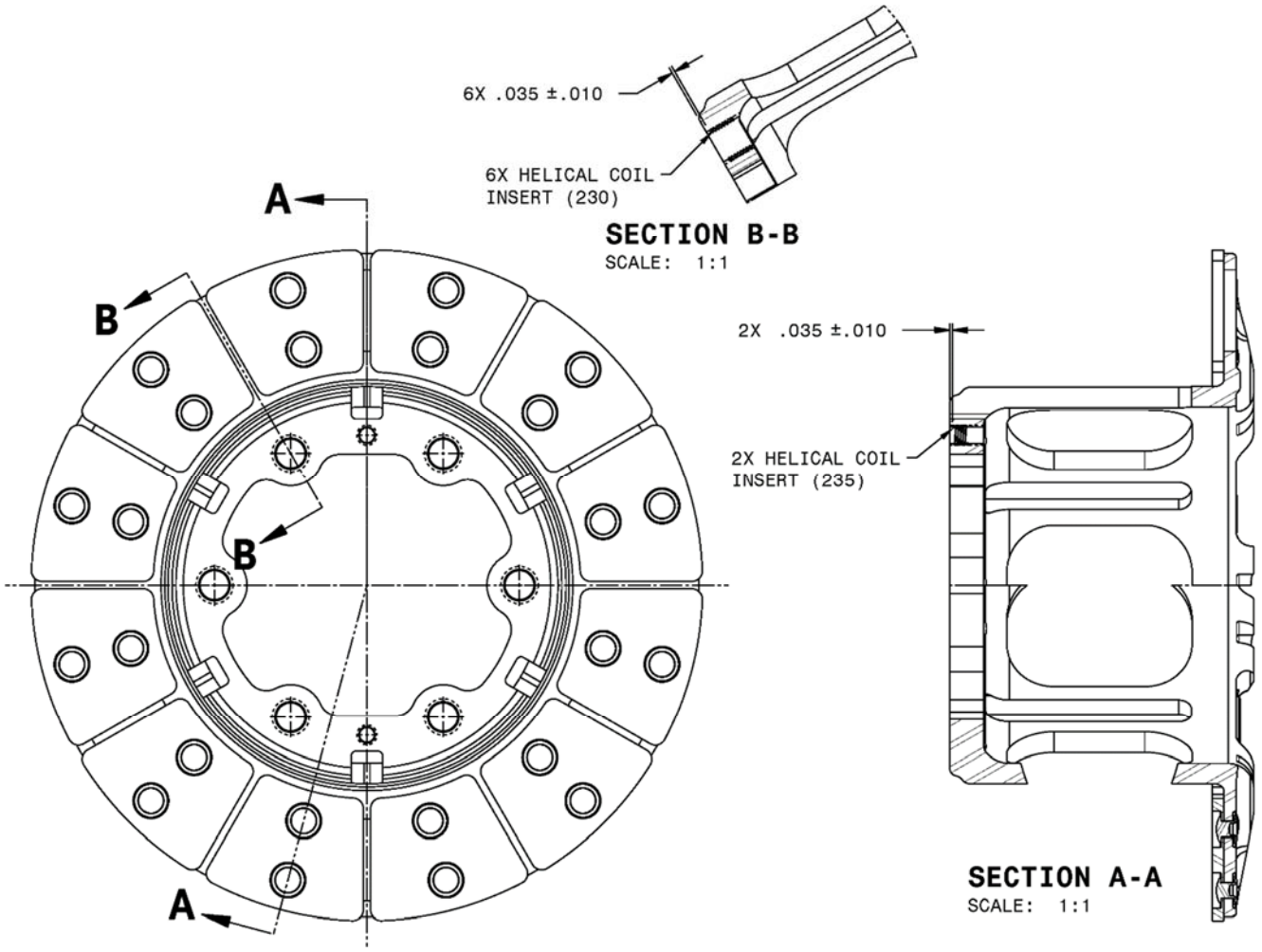


Figure 6007 Install the helical coil inserts (230), (235)

REPAIR

7. Repair the retract base assembly (100)

Repair is limited to replacing the threaded insert (110)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Threaded insert (110)

Repair a damaged insert in accordance with the following procedure.

Table 6005 Heli-Coil insert tools

EXTRACTING TOOL	INSTALLATION TOOL	TANG REMOVAL TOOL
1227-6	7552-3	3695-3

(1) Removal

Refer to Figure 6008 and the following procedure.

(a) Remove a damaged insert by applying the extracting tool to the insert, striking the head of the tool a light blow and turning it counterclockwise, maintaining steady downward pressure.

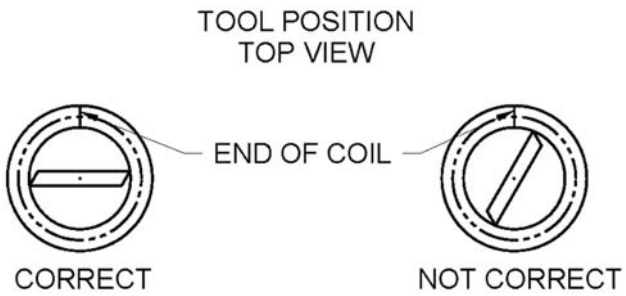


Figure 6008 Use the extracting tool

REPAIR

(2) Installation

Refer to Figure 6009 and the following procedure.

(a) Use the installation tool and install the insert into the retract base as shown. Use the tang removal tool to break off the tang.

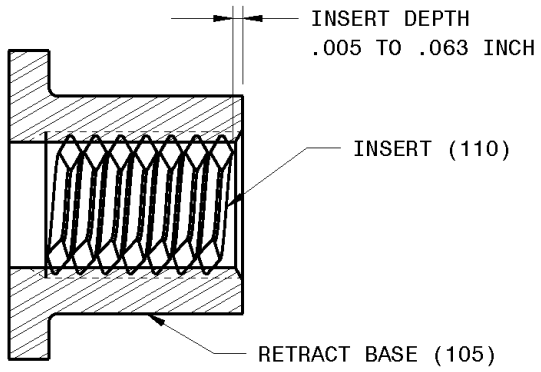


Figure 6009 Install the threaded insert (110)

8. Repair the pressure plate (170) and stator disc (195)

The pressure plate and stator disc are made from alloy steel.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Remove all contaminants such as grease, rust, and scale. Refer to the CLEANING section

B. Steel surface damage repair

(1) Blend out any burrs, sharp edges, small nicks and scratches .005 inch max. deep.

9. Repair the rotating disc (185)

Repair is limited on the rotating disc to the steel core.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Steel surface damage repair

(1) Blend out any burrs, sharp edges, small nicks and scratches in the steel core only .005 inch max. deep.

REPAIR

10. Repair the shuttle valve assembly (240)

Repair is limited to the manifold body.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Manifold surface damage repair

The manifold body is made from aluminum alloy.

(1) Polishing and blending out any corrosion, burrs, sharp edges, small nicks and scratches on the outer surfaces up to 0.005 inch maximum. Blend out the tool marks.

B. Clean the shuttle valve assembly. Refer to the CLEANING section.

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

C. Apply a surface pretreament (Alodine 1200 or equivalent) to repaired areas.

D. Paint the manifold.

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

(1) For small area paint touchup.

(a) Prepare the area by sanding lightly with 400 to 600 grade or finer, wet or dry aluminum oxide cloth and feather out all edges of the adjacent area.

(b) Clean the area.

(c) Touch up the area with primer and topcoat.

(2) For complete primer and topcoat application.

NOTE: Performed if primer and topcoat was removed from entire part by plastic media blasting.

(a) Confirm that the part has been cleaned and surface treatment applied if repair work was performed.

(b) Mask the manifold. Refer to Figure 6010.

(c) Apply the primer and the topcoat. Refer to Table 6006.

NOTE: Results can vary and depend on the environment and the equipment used. To achieve the best results, always refer to the manufacturer's instructions for mixing, application and use.

REPAIR

Table 6006 Manifold Primer and Topcoat Requirements

MANUFACTURER	PRIMER	TOPCOAT
Deft Chemical Coatings Irvine, CA	P/N 44-GN-36 Components A and B MIL-PRF-85582C Type 1, Class C2	P/N 03-W-127A Components A and B MIL-PRF-85285D Type 1 Color 17925 (Untinted White)
	Primer Thickness [1]: 0.0006-0.0009 inch Drying Time (air dry) [2]: Touch, mask, topcoat: 1 hour minimum Stack: 4 to 6 hours Hard cure: 14 days minimum	Topcoat Thickness [1]: 0.0017-0.0023 inch Drying Time (air dry) [2]: Recoat: 15 minutes minimum Stack: 4 to 8 hours Hard cure: 7 days minimum

[1] The total dry thickness of the primer and topcoat is to be 0.0023 to 0.0032 inch. This excludes the anodic coating thickness.

[2] Refer to the manufacturer's data sheet for the forced dry (heat accelerated cure) schedule.

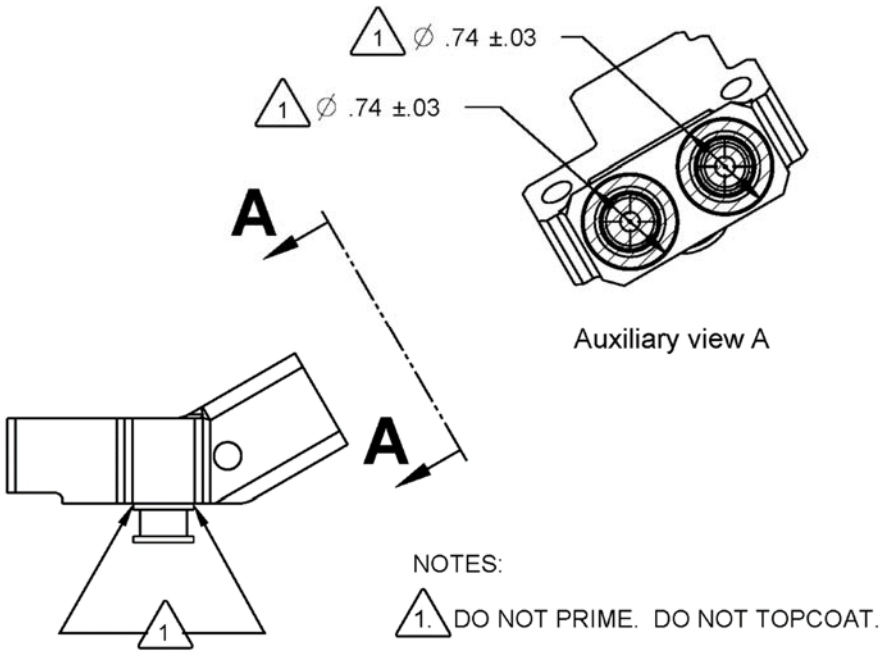


Figure 6010 Mask the shuttle valve manifold

ASSEMBLY

1. General

Refer to IPL Figure 1 for component identification.

NOTE: The term dry torque refers to the torqueing of hardware without the application of anti-seize compound.

A. Equipment and consumables

The term “Commercial Source” lets the repair facility get the product from a supplier of choice.
NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 7001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Hydraulic fluid	MIL-PRF-5606 (equivalent alternatives are not allowed)	Commercial
Preformed packing tool set	199-18	Parker Hannifin Corp. Aircraft Wheel & Brake Division or Parker Hannifin distributor
Standard tools (inch units)	Wrenches/sockets: • 12-pt, external: for (275) • 6-pt (hex head), external: for (55), (115), (120), (140), (160), (260) • 6-pt 1-7/8 socket (may require modification): for (15) 5/32 inch hex key, internal: for (80) Internal snap ring pliers: for (60) Phillips head screwdriver: for (130) Torque wrench	Commercial
Anti-seize compound	MIL-PRF-83483 (equivalent alternatives are not allowed)	FEL-PRO Chemical Products
Retaining compound	RC 680	Loctite Corp.
Assembly/reset tools for (75)	Figures 9001, 9002, and 9003	Fabrication

ASSEMBLY

2. Reset procedure for the retract subassembly (75)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. During the overhaul procedure, the retract subassembly must be examined for continued service before being reassembled into the brake assembly. Refer to the CHECKS section for examination.

B. Check that the friction sleeve (90) is still flush with the sleeve retainer (85).

(1) If the friction sleeve is not flush with the sleeve retainer, remove the two components using an arbor press and reinstall as follows. Refer to Figure 7001.

(a) Clean any old residue of retaining compound from the friction sleeve and sleeve retainer.

(b) Apply retaining compound (RC 680) to the ID of the sleeve retainer (85). Position the sleeve retainer on the friction sleeve (90). Make sure the split in each part is approximately 180° apart.

(c) Press the friction sleeve (90) into the sleeve retainer (85) so that the two components are flush. A rubber mallet may also be used to strike the friction sleeve and force it into the sleeve retainer. Remove excess retaining compound from mated parts.

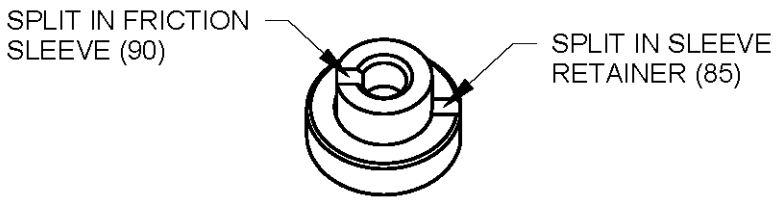


Figure 7001 Installing friction sleeve (90) into sleeve retainer (85)

C. If replacing the retract spacer (95), slide the new spacer onto the retract stud (80).

D. Refer to Figure 7002 to reset the retract subassembly (75) to the dimension shown.

ASSEMBLY

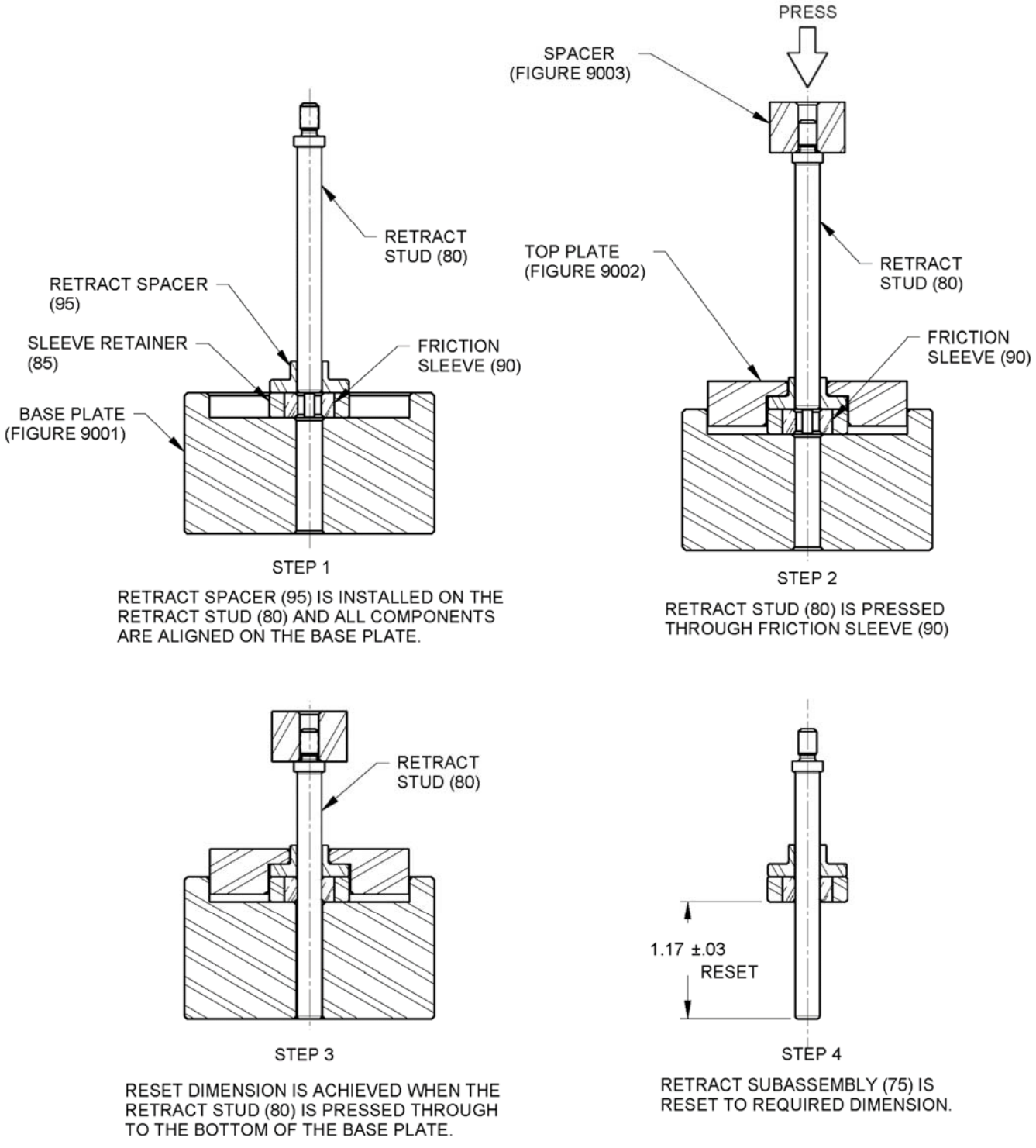


Figure 7002 Retract subassembly (75) reset requirements

ASSEMBLY

3. Install the retract components: spring (70), washer (65), and retaining ring (60)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Refer to Figure 7003. Place the brake housing subassembly on a clean, flat work surface with the four retract bores facing up.

(1) Install the spring (70) into the bore.

(2) Install the washer (65) on the spring and compress while installing the retaining ring (60).

(3) Repeat for the remaining retract bores.

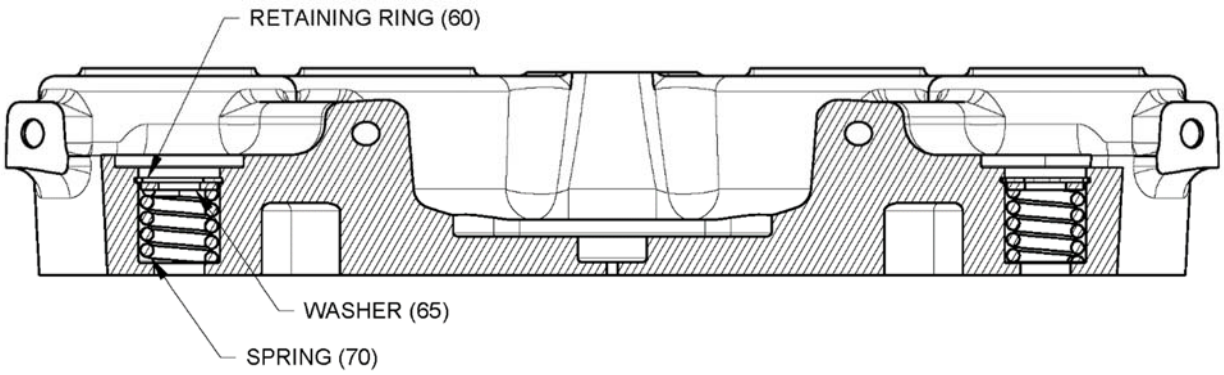


Figure 7003 Install spring (70), washer (65), and retaining ring (60)

4. Sub-assemble the piston (40) and cylinder sleeve (15)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Refer to Figure 7004.

(1) Lubricate the preformed packings (20), (25) with the hydraulic fluid.

(2) Refer to Figure 7004. Install the backup rings (30), preformed packings (20), (25), and wiper ring (35) on the cylinder sleeve (15) as shown.

(3) Repeat for the remaining cylinder sleeves.

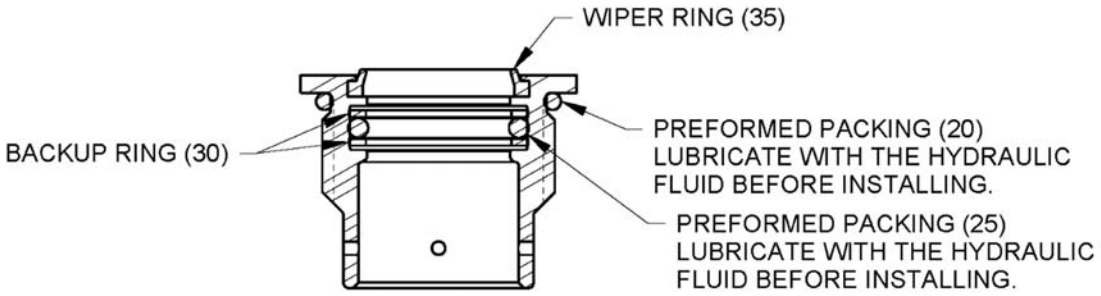


Figure 7004 Install seals (20), (25), (30), (35) on cylinder sleeve (15)

ASSEMBLY

B. Refer to Figure 7005 and insert the piston (40) into the cylinder sleeve (15). Repeat for the remaining pistons.

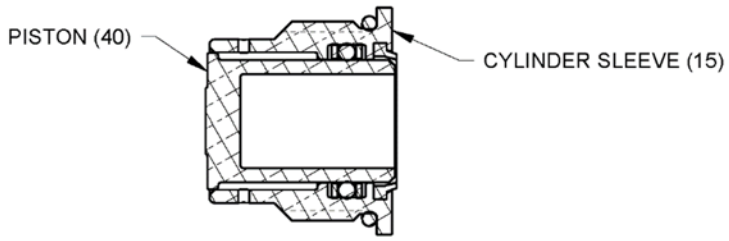


Figure 7005 Insert the piston (40) into the cylinder sleeve (15)

5. Install the piston (40)/cylinder sleeve (15) units

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Refer to Figure 7006 and install the piston/cylinder sleeve units into the brake housing subassembly (5).

(1) Lubricate the six housing bores with hydraulic fluid.

NOTE: Depending on the design of the 6-pt, 1-7/8 socket obtained, it may be necessary to modify the socket by grinding down the head flat to confirm 100% engagement of the cylinder sleeve hex feature.

(2) Thread the six piston/cylinder sleeve units into the housing. Use a 6-pt, 1-7/8 socket and torque each cylinder sleeve to 450 to 500 in-lb dry torque.

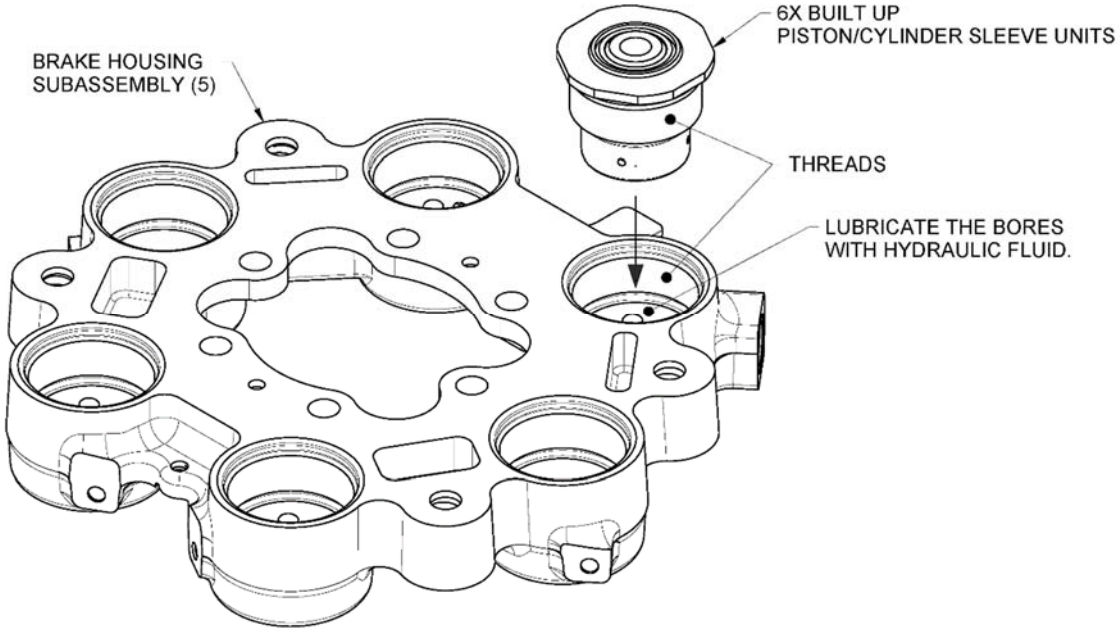


Figure 7006 Install the piston/cylinder sleeve units

ASSEMBLY

6. Install the bleeder components: (115), (120), (125), (130), (135)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Lubricate the preformed packings (135) with the hydraulic fluid and install a preformed packing on each bleeder seat (115).

B. Install the two bleeder seats (115) in brake housing and torque to 65 to 70 in-lb, dry torque.

C. Install a bleeder valve (120) in each bleeder seat (115). Torque the bleeder valve to 35 to 38 in-lb, dry torque.

CAUTION: DO NOT TIGHTEN THE BLEEDER SCREW (130) TO A VALUE GREATER THAN 12 IN-LB. TORQUE GREATER THAN 12 IN-LB MAY DAMAGE THE SEAT.

D. Install a washer (125) on each bleeder screw (130) and install the bleeder screw into each bleeder valve (120). Tighten the bleeder screw (130) snug to preclude leakage.

7. Install the shuttle valve assembly (240)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Lubricate the preformed packing (250) with the hydraulic fluid.

B. Refer to Figure 7007. Install the two backup rings (255) and preformed packing (250) on the shuttle valve manifold.

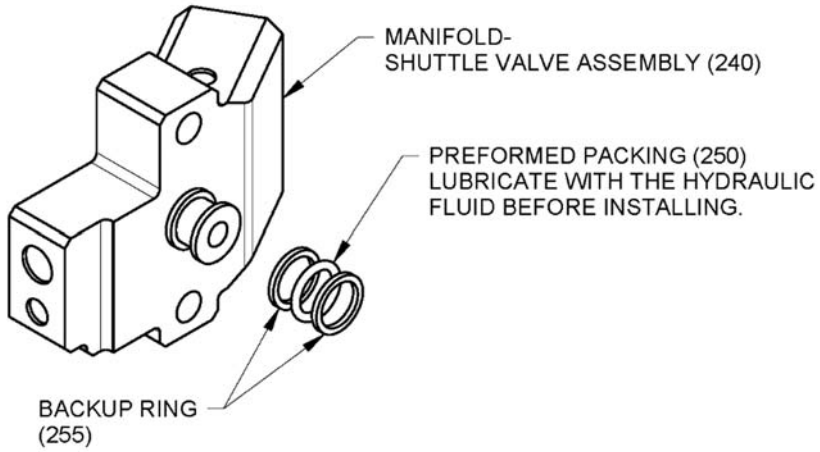


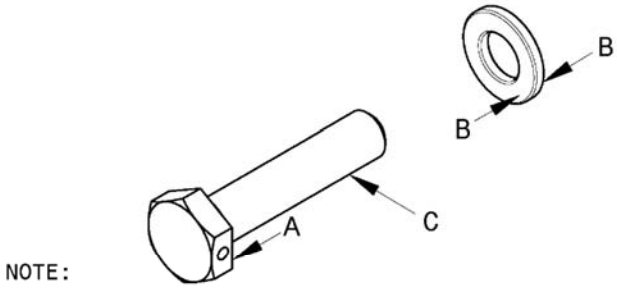
Figure 7007 Install shuttle valve seals (250), (255)

ASSEMBLY

C. Refer to Figure 7008. Prior to installing, lubricate the bolts and washers with anti-seize compound, per MIL-PRF-83483.

D. Install a washer (155) on each bolt (160).

E. Install the shuttle valve assembly on the brake housing subassembly and secure with the bolts and washers. Torque the bolts 40 to 50 in-lb.



NOTE:

1. APPLY ANTIZEIZE COMPOUND TO THE FOLLOWING AREAS:
   A. CONTACT SURFACE UNDER THE BOLT HEAD
   B. BOTH FACES OF THE WASHER
   C. THREADS ON THE BOLT SHANK

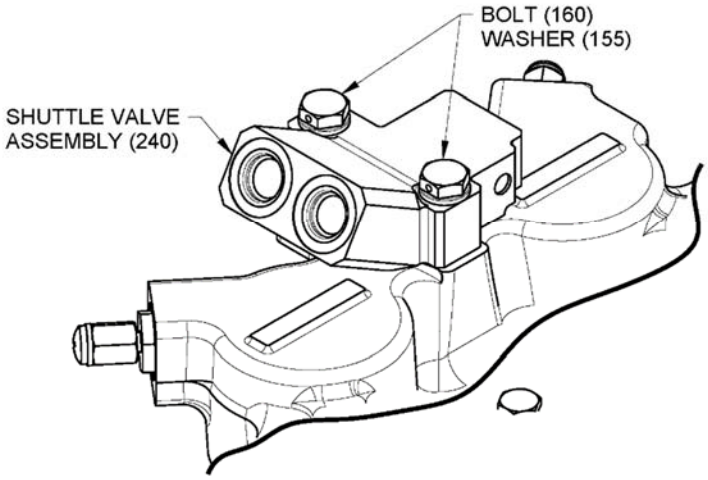


Figure 7008 Installing the shuttle valve assembly (240)

ASSEMBLY

8. Install the piston insulators (45), wear pin (145) and spring (150)

Refer to Figure 7009.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Insert a piston insulator (45) in each piston (40).

B. Slide the spring (150) over the wear pin (145) and insert wear pin in the brake housing subassembly (5).

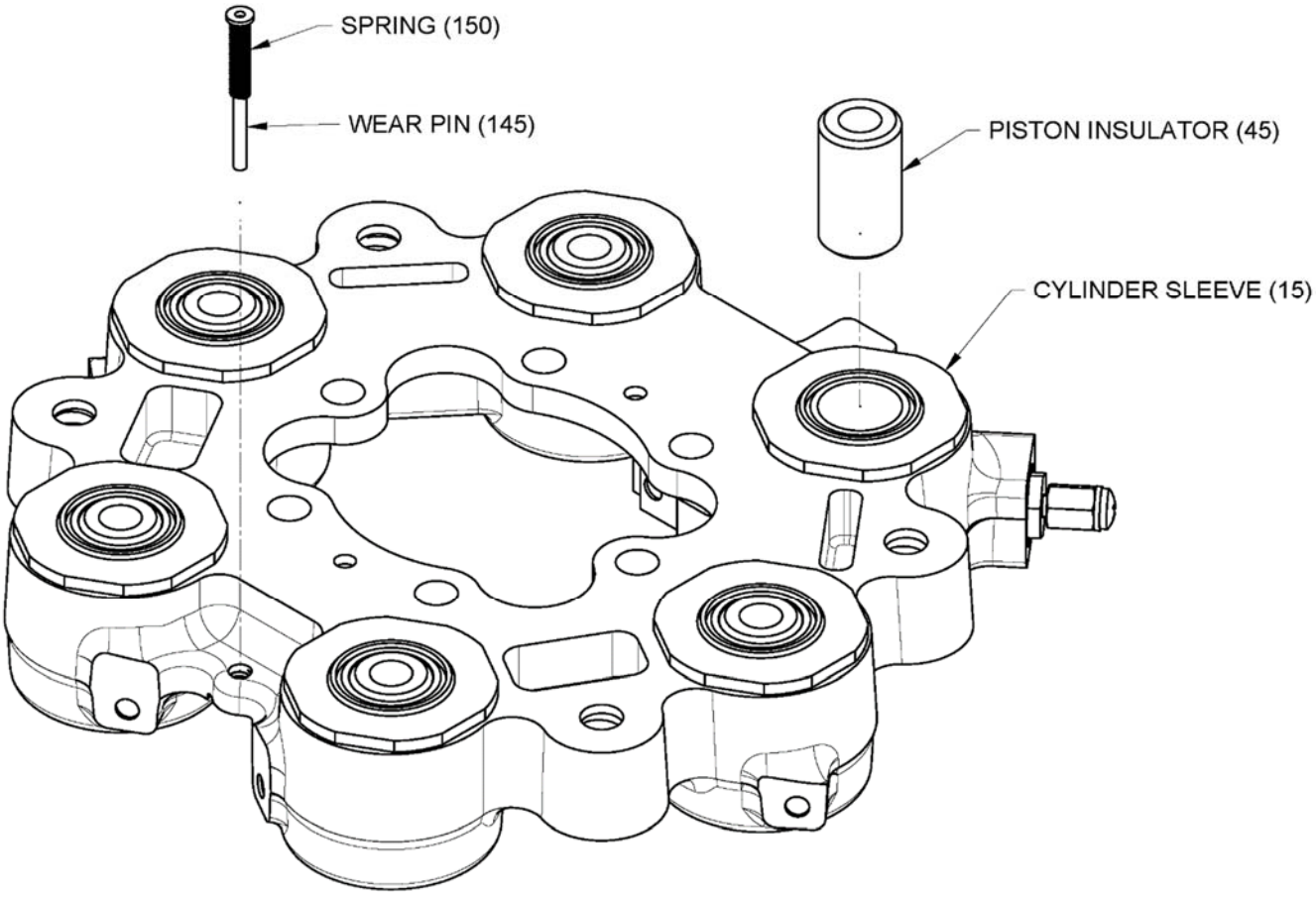


Figure 7009 Install the piston insulators (45), wear pin (145), and spring (150)

ASSEMBLY

9. Assemble the stack

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Refer to Figure 7010.

(1) Position the torque tube assembly (210) with the wear pads (220) facing up.

(2) Stack in place the following components on the torque tube assembly:

- first, a rotor disc (185)
- second, a stator disc assembly (190). The drive tangs of the stator disc will engage the drive slots on the torque tube.
- third, a rotor disc (185)
- fourth, a stator disc assembly (190). The drive tangs of the stator disc will engage the drive slots on the torque tube.
- Fifth, a rotor disc (185).

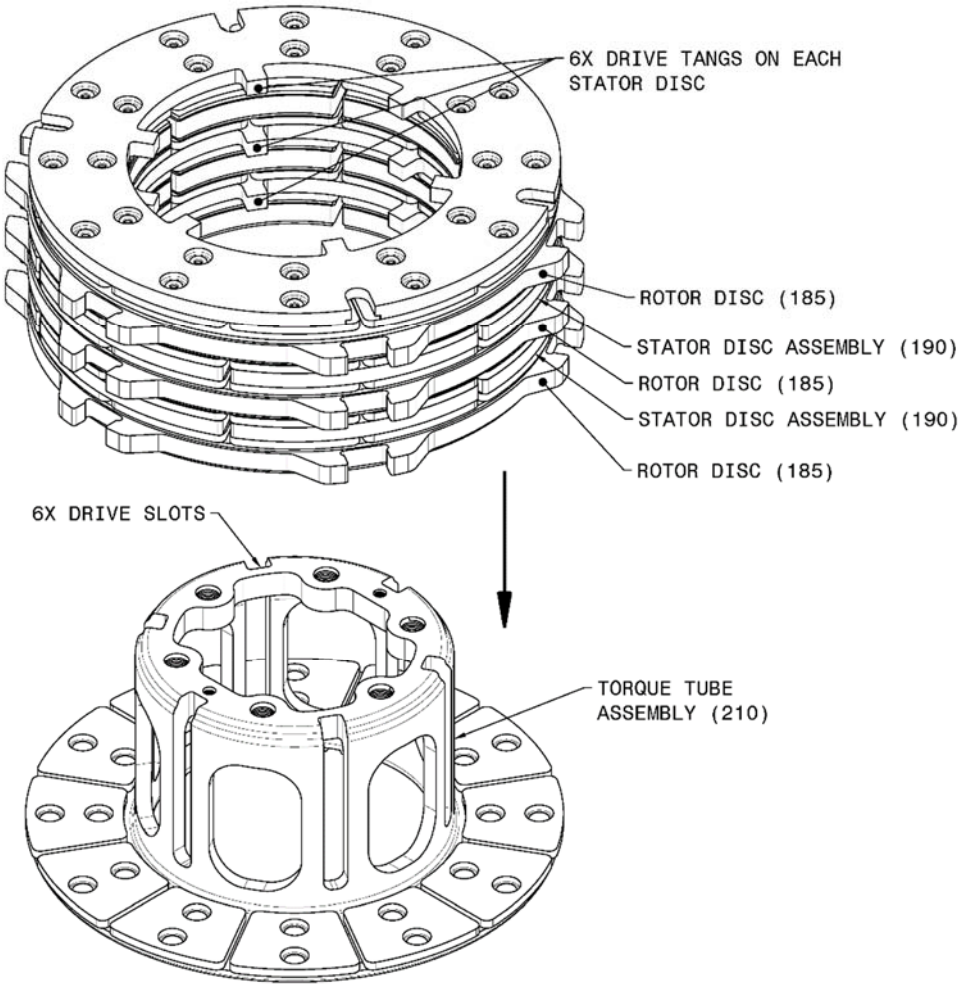


Figure 7010 Assemble the stack

ASSEMBLY

10. Assemble the pressure plate assembly (165), retract base assemblies (100), wear pin retainer (140), and retract subassemblies (75)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Put the pressure plate assembly (165) (with wear pads facing away) on the brake housing subassembly (5).

B. Take hold of both and turn over and put on the torque tube stack.

C. Refer to Figure 7011.

(1) Slide wear pin retainer (140) over the wear pin (145) and thread into the brake housing subassembly (5). Do not thread the wear pin retainer all the way. Final adjustment will be done after testing of the brake assembly.

(2) Slide the retract base assemblies (100) into the pockets of the pressure plate.

(3) Lubricate the threads of the retract studs with anti-seize compound per MIL-PRF-83483.

(4) Insert the retract subassemblies (75) in the brake housing retract bores.

(5) Thread each retract stud into each retract base assembly. Torque the retract stud to 30 to 40 in-lb.

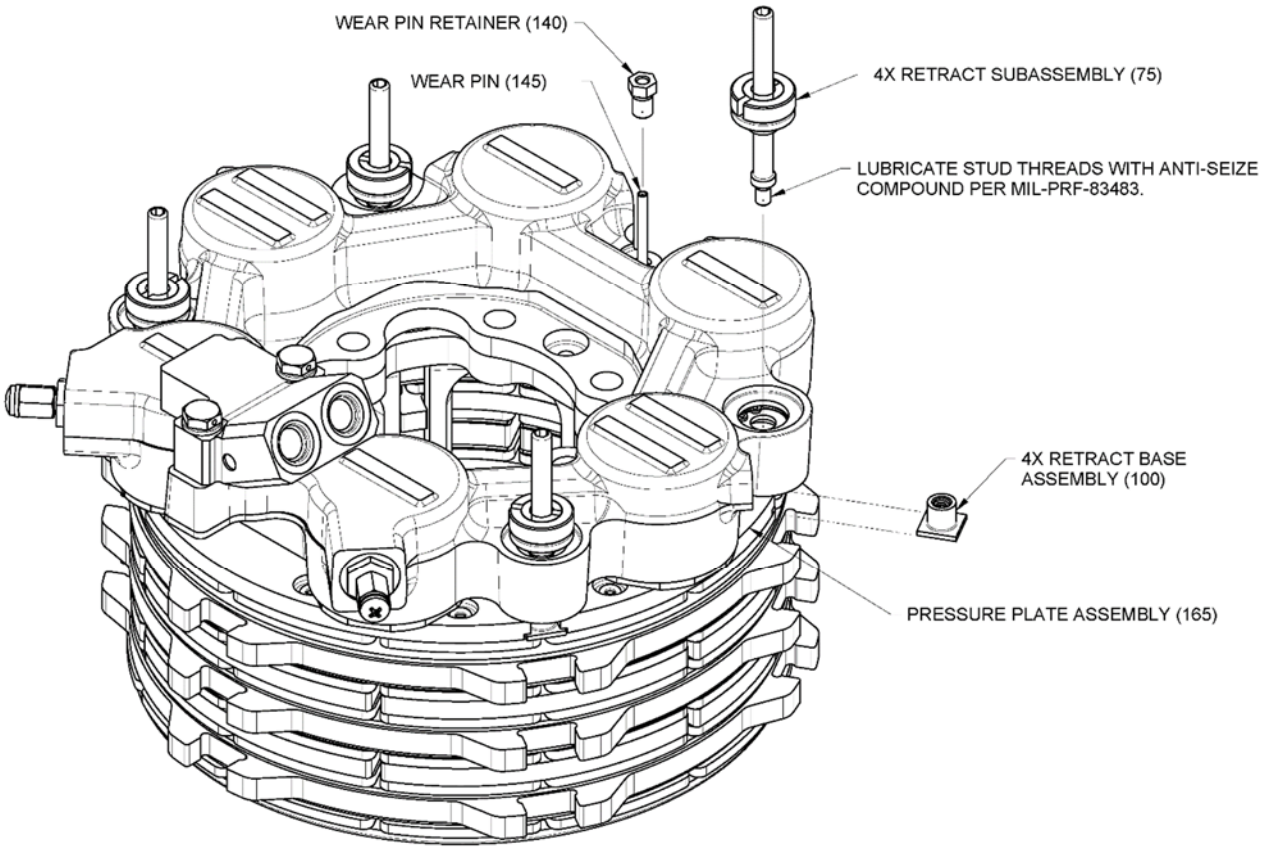


Figure 7011 Install the retract and wear indicator components

ASSEMBLY

11. Install the bolts (55) and washers (50)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

CAUTION: WASHER (50) IS INSTALLED WITH THE COUNTERSINK FACING THE BOLT HEAD.

B. Install each bolt (55) and washer (50) through the two holes in the brake housing and thread into the two mating holes of the torque tube assembly (210). Torque the bolts to 25 to 35 in-lb, dry torque.

12. Install the fittings (260)

A. Lubricate the preformed packings (265) with the hydraulic fluid.

B. Install a preformed packing on each fitting (260).

C. Install the fittings (260) into the shuttle valve assembly (240) and torque the fittings to 65 to 70 in-lb, dry torque.

13. Test the brake assembly

A. Test the brake and perform the wear pin (145) adjustment in accordance with the TESTING AND FAULT ISOLATION section.

B. Apply any required nameplates.

14. Return to service

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

SAFETY WARNING: FOLLOW THE AIRFRAME MANUFACTURER'S INSTRUCTIONS AND SAFETY WARNINGS WHEN WORKING WITH AND AROUND THE AIRCRAFT.

CAUTION: USE ONLY THE ANTI-SEIZE COMPOUND LISTED IN TABLE 7001. THE USE OF ANOTHER COMPOUND WILL RESULT IN IMPROPER FASTENER TENSION AND COULD LEAD TO FAILURE OF THE FASTENERS AND SUBSEQUENT FAILURE OF THE BRAKE.

A. Prior to installing, lubricate the bolts and washers with anti-seize compound, per MIL-PRF-83483.

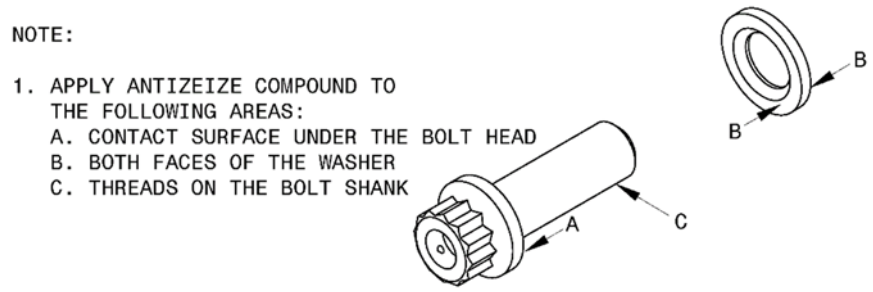


Figure 7012 Apply anti-seize compound to bolts (275) and washers (280)

CAUTION: WASHER (280) IS INSTALLED WITH THE COUNTERSINK FACING THE BOLT HEAD.

A. Install the brake assembly on the aircraft with the six bolts (275) and washers (280). Torque the bolts to 335 to 345 in-lb.

B. Reconnect the aircraft system hydraulic lines to the brake assembly.

FITS AND CLEARANCES

1. General

Refer to IPL Figure 1 for component identification.

A. Assembly wear limits

Table 8001 In-service wear limits

PART NAME (IPL item number)	FIGURE/ DIMENSION	WORN AREA DESCRIPTION	WORN LIMIT
Brake housing subassembly (5)	N/A N/A	Piston bore diameter Shuttle valve port diameter	Ø 1.470 inch max. Ø 0.486 inch max.
Piston (40)	N/A	Outside diameter	Ø 0.996 inch min.
Insulator (45)	N/A	Height	1.295 inch minimum
Torque tube assembly (210)	5002/A 5002/B 5002/C 5002	Slot width Wear pad thickness Wear pad thickness (overall) Wear pad: Allowable edge wear	0.390 inch maximum 0.100 inch minimum 0.250 inch minimum 0.250 inch
Rotor disc (185)	5003/A 5003/B 5003/C	Slot width Lining material thickness (per side) Lining material thickness (overall measurement)	0.687 inch maximum 0.007 inch minimum 0.336 inch minimum
Stator disc assembly (190)	5004/A 5004/B 5004/C 5004	Tang width Wear pad thickness Wear pad thickness (overall measurement) Wear pad: Allowable edge wear	0.325 inch minimum 0.100 inch minimum 0.460 inch minimum 0.250 inch
Pressure plate assembly (165)	5005/A 5005/B 5005/C 5005	Tang width Wear pad thickness Wear pad thickness (overall measurement) Wear pad: Allowable edge wear	0.325 inch maximum 0.100 inch minimum 0.360 inch minimum 0.250 inch

FITS AND CLEARANCES

B. Assembly torque values

NOTE: The term dry torque refers to the torqueing of hardware without the application of anti-seize.

Table 8002 Assembly torque values

PART NAME (IPL item no.)	TORQUE LIMITS
Bolt (55)	25 to 35 in-lb, dry torque
Retract subassembly (75)	30 to 40 in-lb Apply anti-seize compound to threads of item (80). Refer to ASSEMBLY.
Bleeder seat (115)	65 to 70 in-lb, dry torque
Bleeder valve (120)	35 to 38 in-lb, dry torque
Bleeder screw (130)	Tighten snug to preclude leakage **CAUTION:** DO NOT EXCEED 12 IN-LB. TORQUE GREATER THAN 12 IN-LB MAY DAMAGE THE SEAT.
Piston sleeve (15)	450 to 500 in-lb, dry torque
Bolt (160)	40 to 50 in-lb Apply anti-seize compound to items (155), (160). Refer to ASSEMBLY
Fitting (260)	65 to 70 in-lb, dry torque
Bolt (275)	335 to 345 in-lb Apply anti-seize compound to items (275), (280). Refer to ASSEMBLY

SPECIAL EQUIPMENT AND CONSUMABLES

1. General

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

A. Source of supply

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 9001 List of manufacturers

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Preformed packing tool set	199-18	Parker Hannifin Corp. Aircraft Wheel & Brake Div. Avon, OH 44011 U.S.A. www.parker.com or Parker Hannifin distributor
Blast stripping equipment	• Plastic blast media: MIL-P-85891, Type II or V, Grade 20/30, 3.5 MOH max. • Abrasive blast media: 80 Grit aluminum oxide	U.S. Technology Corp. www.ustechnology.com
Riveting equipment for (180), (205), (225) Jaws Driver Rollset Note: Suitable standard equipment can also be used as additional source for riveting equipment.	Model 305 riveter 63-J-1566-A 563-DS-44 824-1K-7 Contact Source for tooling requirements.	Orbitform Fastening Systems Jackson, MI 49203 U.S.A. Alternative riveter: National Rivet & Mfg. Co. Waupun, WI 53963 U.S.A.
Threaded insert tools for (10), (110), (230), (235) Extraction tool Installation tool Tang removal tool	MIL-T-21209 for (110), (235): for (10): for (230): 1227-6 1227-6 1227-6 7552-3 7552-4 7552-6 3695-3 3695-4 3692-6	Emhart Fastening Teknologies Shelton, CT 06484 U.S.A.
Protective coatings for (5)	Refer to Table 6002	Deft Chemical Coatings Irvine, CA 92714 U.S.A.
Protective coating for (215)	ZRC Galvilite, P/N 11011-10014 MIL-PRF-26915, Type I	ZRC Products Company Marshfield, MA 02050 U.S.A.
Anti-seize compound	MIL-PRF-83483 (equivalent alternatives are not allowed)	FEL-PRO Chemical Products Skokie, IL 60076 U.S.A.
Retaining compound	RC 680	Loctite Corp. www.loctite.com
Special tools Assembly/reset tools for (75)	Figures 9001, 9002, 9003	Fabrication

SPECIAL EQUIPMENT AND CONSUMABLES

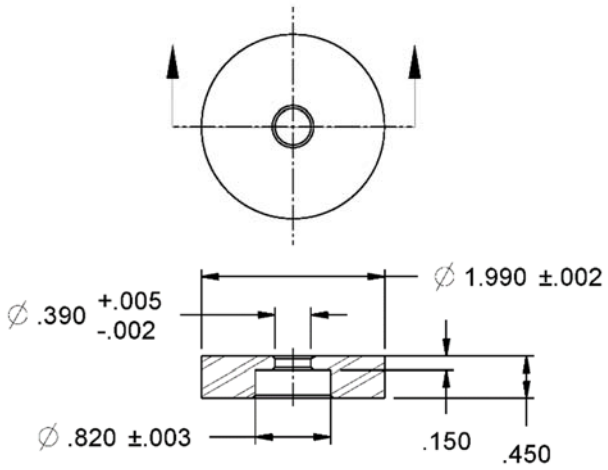


FIGURE 9002 TOP PLATE

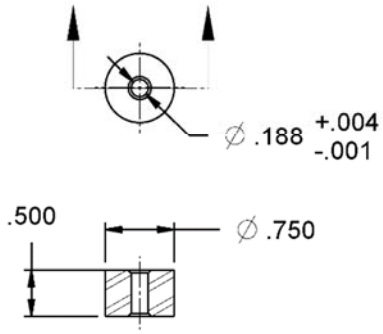


FIGURE 9003 SPACER

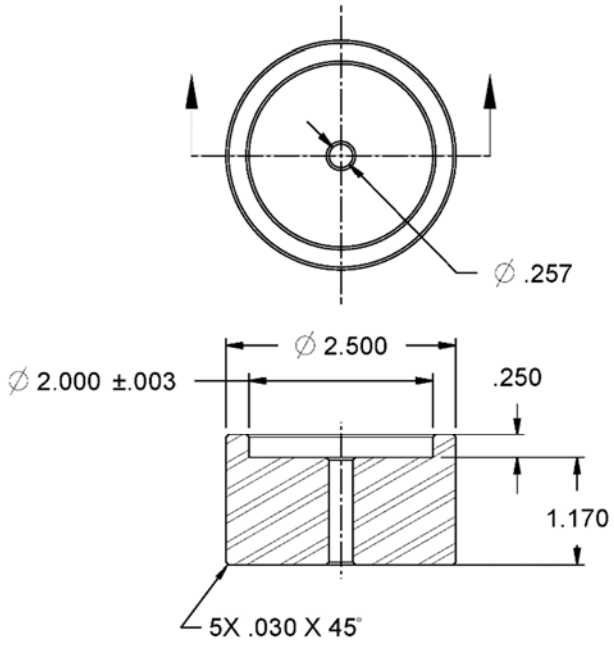


FIGURE 9001 BASE PLATE

NOTES: FOR FIGURES 9001 THRU 9003

1. MATERIAL: 4130 STEEL OR EQUIVALENT.
   HEAT TREAT TO 40-50 R.C.

2. TOLERANCES UNLESS OTHERWISE SPECIFIED:
   .XXX ±.005 INCH
   .XX ±.030 INCH

3. REMOVE ALL BURRS AND BREAK ALL
   UNSPECIFIED CORNERS.

4. DIMENSIONS IN INCH UNITS.

Figures 9001, 9002, 9003 Retract subassembly (75) tools

ILLUSTRATED PARTS LIST

1. General

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

A. Explanation of columns

(1) Fig: Refers to the applicable illustrated parts figure. A hyphen "-" is used to indicate that the item is not illustrated.

(2) Item: Refers to the applicable item in the illustrated parts list figure.

(3) Units per assembly: Number of units required for the next higher assembly.
AR..... As Required (for bulk items) REF..... Reference
NP..... Item is Not Procurable

(4) CAGE: Commercial and Government Entity code of part supplier.

(5) Part No.: Part number of the item.

(6) Description: This column identifies the parts being listed by noun name followed by modifiers when applicable. An indenture system using dots are used to show the relationship of the parts to the assembly.

Assembly
- Subassembly or Item
- • Item

(7) Usable on code: This code is used to identify more than one configuration of the basic part number. Effectivity codes only apply to the figure in which they are used.

B. Part numbering system

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

C. Parts replacement data

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

Term	Abbreviation	Definition
Optional	OPT	This part is optional to and interchangeable with other parts in the same item number variant group or other item number if designated.
Superseded by	SUPSD BY	The part is replaced by and is not interchangeable with the item listed.
Supersedes	SUPSDS	The part replaces and is not interchangeable with the item listed.
Replaced by	REPLD BY	The part is replaced by and interchangeable with the item listed.
Replaces	REPLS	The part replaces and is interchangeable with the item listed.

D. Alpha variant item numbers

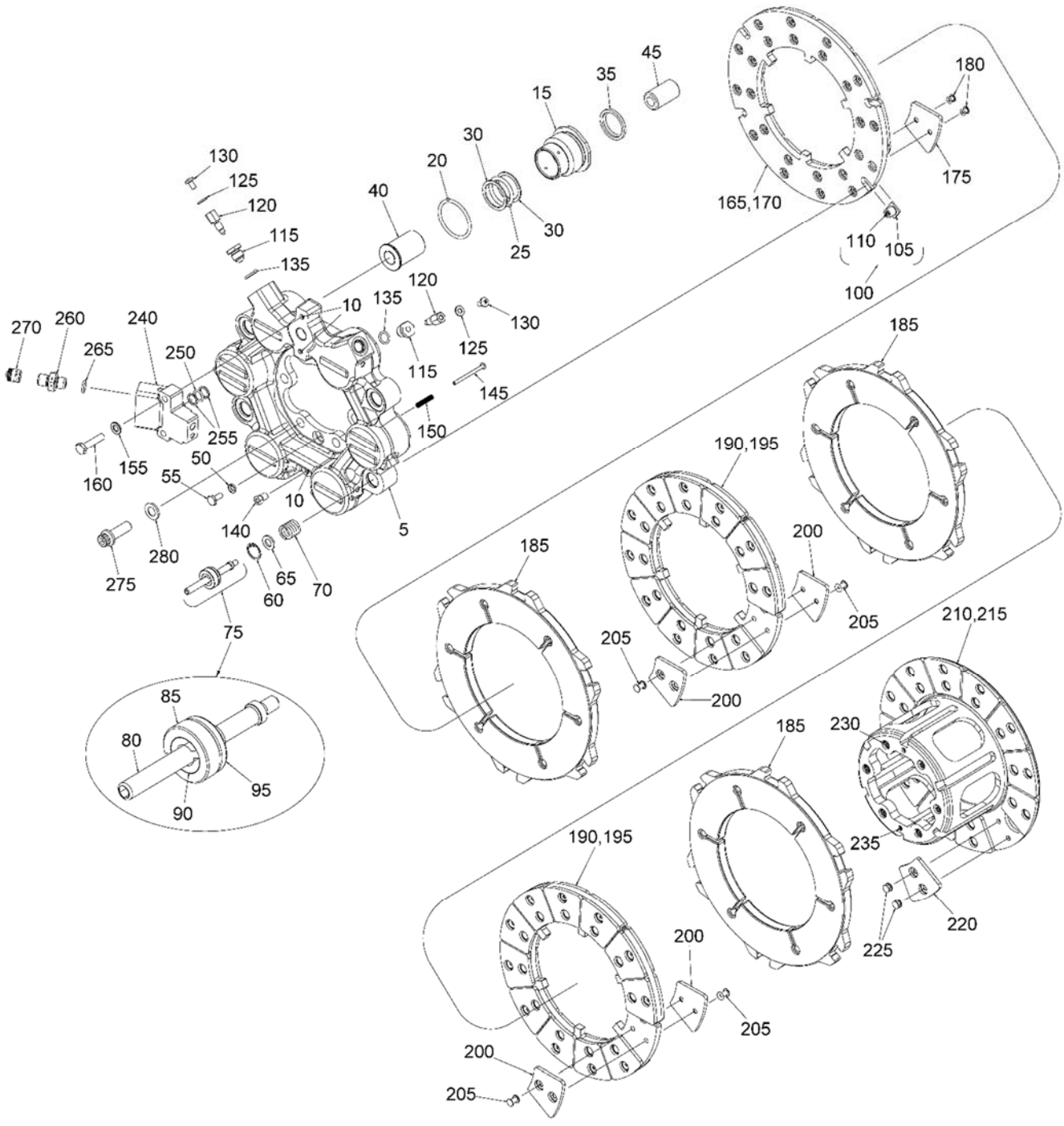
Alpha variants A through Z (except I and O) are assigned to existing numbers when necessary to show:

(1) Added items

(2) Modification or configuration differences

(3) Optional parts

ILLUSTRATED PARTS LIST



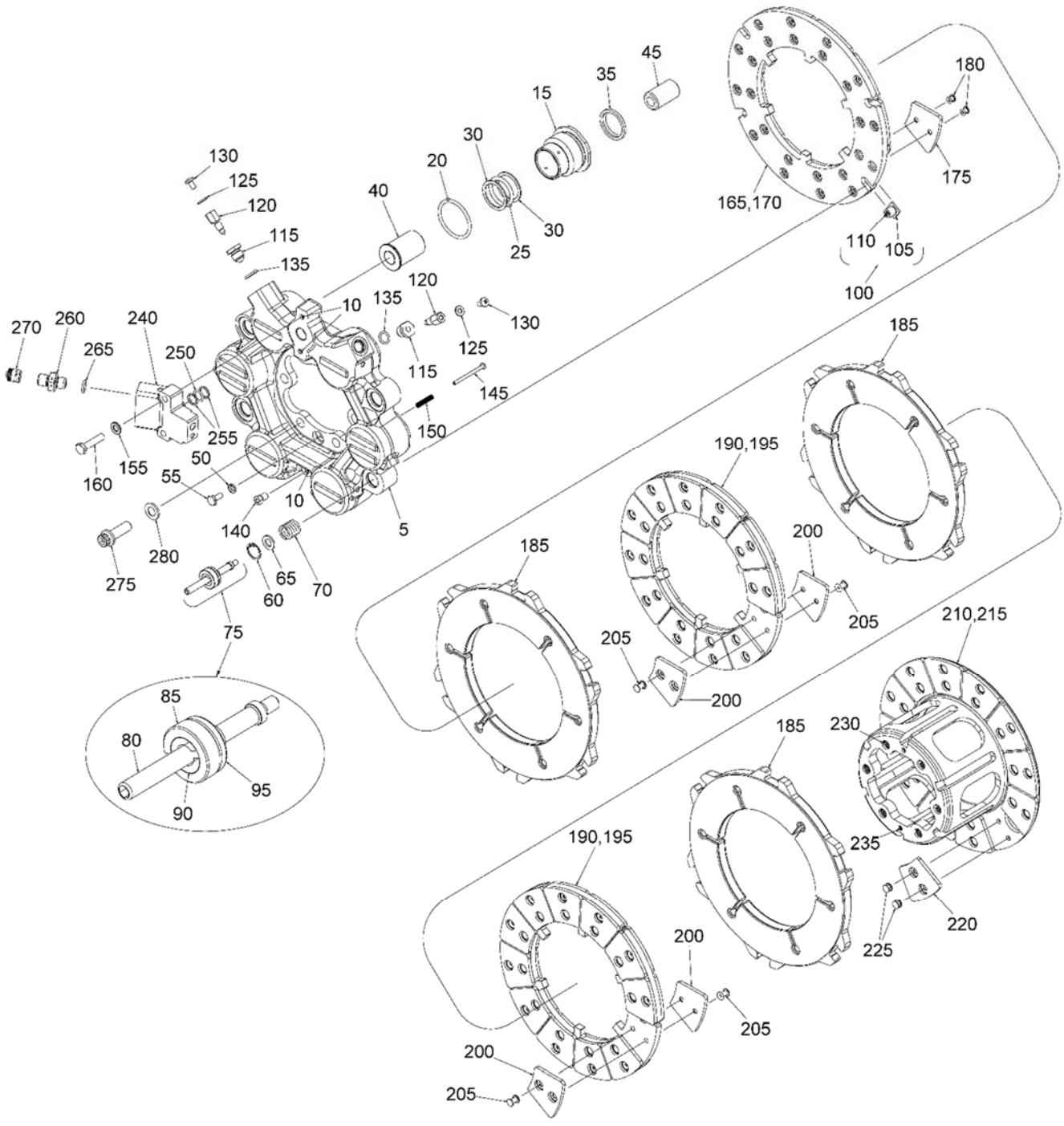
IPL Figure 1 Main brake assembly, exploded view

ILLUSTRATED PARTS LIST

2. Detailed parts list (sheet 1 of 2)

Fig	Item	Units per assembly	CAGE	Part No.	Description
1	1	REF	33269	30-289	Brake assembly, main
	5	1		091-25400	• Subassembly, housing, brake
	10	3		230-07300	• • Helicoil insert (MS21209F4-10L)
	15	6		098-03100	• Sleeve, cylinder
	20	6		101-43600	• Packing, preformed
	25	6		101-10600	• Packing, preformed (MS28775-214)
	30	12		100-15400	• Ring, backup (MS28774-214)
	35	6		107-05400	• Ring, wiper
	40	6		062-14400	• Piston
	45	6		088-06700	• Insulator, piston
	50	2		095-72900	• Washer, countersunk (MS21299-C3)
	55	2		103-41000	• Bolt (AN3CH3)
	60	4		155-07800	• Ring, retaining
	65	4		095-13600	• Washer (MS20002-5)
	70	4		082-22500	• Spring
	75	4		111-16300	• Subassembly, retract
	80	1		139-40900	• • Retract stud
	85	1		139-11900	• • Sleeve retainer
	90	1		139-12000	• • Friction sleeve
	95	1		067-18900	• • Spacer, retract
	100	4		111-11400	• Assembly, retract base
	105	1		139-33800	• • Retract base
	110	1		230-05500	• • Insert (MS21209F1-15L)
	115	2		081-00200	• Seat, bleeder
	120	2		079-00900	• Valve, bleeder
	125	2		095-01100	• Washer
	130	2		102-32700	• Screw, bleeder (MS51958-60)
	135	2		101-00700	• Packing, preformed (MS28775-012)

ILLUSTRATED PARTS LIST



IPL Figure 1 Main brake assembly, exploded view

ILLUSTRATED PARTS LIST

2. Detailed parts list (sheet 2 of 2)

Fig	Item	Units per assembly	CAGE	Part no.	Description
1					
	140	1		202-00700	• Retainer, wear pin
	145	1		177-10000	• Pin, wear
	150	1		082-24100	• Spring
	155	2		095-10400	• Washer (AN960-416)
	160	2		103-40900	• Bolt (AN4H11A)
	165	1		073-12600	• Assembly, plate, pressure
	170	1		063-10800	• • Plate, pressure
	175	12		109-04900	• • Pad, wear
	180	24		105-14200	• • Rivet (MS16535-431)
	185	3		159-12200	• Disc, rotor
	190	2		242-02400	• Assembly, disc, stator
	195	1		232-04900	• • Disc, stator
	200	24		109-04900	• • Pad, wear
	205	24		105-14100	• • Rivet (MS16535-499)
	210	1		075-24700	• Assembly, tube, torque
	215	1		065-22800	• • Tube, torque
	220	12		109-04900	• • Pad, wear
	225	24		105-08701	• • Rivet (MS16535-496)
	230	6		230-07400	• • Helical coil insert (MS21209F6-10L)
	235	2		230-05800	• • Helical coil insert (MS21209F1-10)
	240	1		111-15500	• Assembly, shuttle valve
–	245	1		166-33900	• • Nameplate
	250	1		101-00700	• Packing, preformed (MS28775-012)
	255	2		100-10150	• Ring, backup (MS28774-012)
	260	2		104-12400	• Fitting (AS931J04L)
	265	2		101-39800	• Packing, preformed (M83461/2-904)
	270	2		215-03700	• Cap, shipping
	275	6		103-41100	• Bolt (MS21250-06008)
	280	6		095-03100	• Washer, countersunk (MS20002C6)

STORAGE

1. General

Refer to IPL Figure 1 for component identification.

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

A. Equipment and consumables

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 15001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Rust foil 2675	VV-L-800	Fuchs Lubricants Company

2. Procedures

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

A. Cap all fittings.

B. Storage life is governed by the elastomer components. The storage life may be shortened by exposure to sunlight, extreme temperatures, humidity, ozone, contamination of fluids, severe operating conditions, etc.

C. Prepare the pressure plate assembly (165), stator disc assemblies (190), and rotor discs (185) as follows if they need to be stored for an unknown period of time:

(1) Lubricate the entire part with a rust inhibitor that conforms to specification VV-L-800.

(2) Wrap the part in a moisture barrier material.

D. Normal storage environmental temperatures of 50°F to 77°F are desired. If this temperature range cannot be maintained, temperatures as high as 125°F and as low as -20°F can be tolerated for shorter periods. Total time above 100°F shall not exceed three months.

Component Maintenance Manual

Main Wheel Assembly
Parker Hannifin Part No. 40-480

Publication No.: CM40-480, Initial Release

Manufacturer:

Parker

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

Cleveland
Wheels & Brakes

REVISION HIGHLIGHTS

TO: HOLDERS OF CM40-480 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR WHEEL ASSEMBLY PART NO. 40-480.

Revision NC, Dated 2017-12-20

Section/Page No.	Description Of Change
All Sections/All Pages	Initial Release (ECO-0087368)

RECORD OF REVISIONS

Check in the following record that all earlier changes have been incorporated.

Rev	Incorporated date	by (signature)	Rev	Incorporated date	by (signature)
NC	2017-12-20	PHC			

SERVICE BULLETIN LIST

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

Number	Subject	Rev	Date incorporated at manual revision

LIST OF EFFECTIVE PAGES

SUBJECT	PAGE	DATE	SUBJECT	PAGE	DATE
Title Page	T-1	2017-12-20	Checks	5001	2017-12-20
				5002	2017-12-20
Record of Revisions	RR-1	2017-12-20		5003	2017-12-20
				5004	2017-12-20
				5005	2017-12-20
Service Bulletin List	SB-1	2017-12-20		5006	2017-12-20
				5007	2017-12-20
				5008	Blank
List of Effective Pages	LEP-1	2017-12-20			
	LEP-2	2017-12-20	Repair	6001	2017-12-20
				6002	2017-12-20
				6003	2017-12-20
Table of Contents	TC-1	2017-12-20		6004	2017-12-20
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Introduction	INTRO-1	2017-12-20		6007	2017-12-20
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				6009	2017-12-20
Description	1	2017-12-20		6010	2017-12-20
And Operation	2	2017-12-20		6011	2017-12-20
				6012	2017-12-20
Testing and	1001	2017-12-20			
Fault Isolation	1002	2017-12-20	Assembly	7001	2017-12-20
	1003	2017-12-20		7002	2017-12-20
	1004	2017-12-20		7003	2017-12-20
	1005	2017-12-20		7004	2017-12-20
	1006	2017-12-20		7005	2017-12-20
				7006	2017-12-20
Disassembly	3001	2017-12-20			
	3002	2017-12-20	Fits and	8001	2017-12-20
	3003	2017-12-20	Clearances	8002	Blank
	3004	Blank			
			Special	9001	2017-12-20
Cleaning	4001	2017-12-20	Equipment	9002	2017-12-20
	4002	2017-12-20	and	9003	2017-12-20
			Consumables	9004	2017-12-20
				9005	2017-12-20
				9006	Blank

N = New page No.
C = Changed page

LIST OF EFFECTIVE PAGES

SUBJECT	PAGE	DATE
Illustrated	10001	2017-12-20
Parts List	10002	2017-12-20
	10003	2017-12-20
	10004	Blank
Storage	15001	2017-12-20
	15002	Blank

N = New page No.
C = Changed page

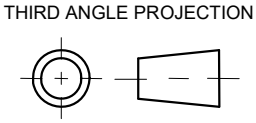
TABLE OF CONTENTS

INTRODUCTION

1. General

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

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



Third angle projection is used in this manual. All weights and measurements are in U.S. English units.

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

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

Substitutions of critical parts or changes of processes or materials are not permitted without the written approval of the manufacturer.

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

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

INTRODUCTION

2. Manual use

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

3. Warnings, cautions, and notes

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

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

4. Replacement parts

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

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

DESCRIPTION AND OPERATION

1. Description

Refer to IPL Figure 1 for component identification.

SAFETY WARNING: THIS ASSEMBLY CONTAINS PARTS THAT HAVE A CADMIUM PLATING FINISH: (55), (60), (65), (115). REMOVING THE CADMIUM PLATING CAN CREATE EXPOSURE TO CADMIUM DUST AND CADMIUM COMPOUNDS. THIS CAN BE A POTENTIAL HEALTH HAZARD.

The wheel assembly conforms to the Tire and Rim Association, Inc., standards for use with a 6.50-10, 12 PR tubeless, bias ply tire. The main wheel assembly is the load bearing structural member that interfaces with the main landing gear and the main tire during ground operations.

Each wheel assembly is composed of the following base parts:

- two wheel half subassemblies: inboard (5) and outboard (20). The wheel halves are made from aluminum alloy forging and are surface treated and painted for corrosion protection.
- two sets of tapered roller bearings consisting of cups (25) and cones (40).
- one inflation valve (85) to inflate and deflate a tubeless tire.
- one rupture disc (105) to release tire pressure if tire is overpressurized.
- three fusible plugs (115) to release tire pressure if the wheel becomes overheated.
- high-strength bolts (55), single-countersunk washers (60), and self-locking nuts (65).

A preformed packing (70) provides an air seal at the juncture of the wheel halves.

Bearing cups (25) are press-fit into each bearing hub end of the outboard wheel half. Elastomer based seals (45) provide protection and lubricant retention for the bearings.

The inboard wheel half has drive lugs that engage the drive slots of the rotating brake discs. The drive lugs are lined with steel drive keys (75) each of which are held in place by screws (80). Stainless steel heat shields (95) are located between the drive keys.

2. Operation

The main wheel assembly provides partial support of the weight of the aircraft and a means of steering control. When mated with the brake assembly, the wheel assembly provides the braking operation by driving the rotating disc members of the brake assembly.

3. Handling procedures

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

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

4. Leading particulars

Bearing lubricant		Mobil Aviation Grease SHC 100
Wheel half material		Aluminum alloy forging
Wheel half coatings	Surface treatment:	Refer to the REPAIR section
	Primer coating:	Refer to the REPAIR section
	Finish coating:	Refer to the REPAIR section

DESCRIPTION AND OPERATION

5. Maintenance schedule

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

Table 1 Maintenance schedule

INTERVAL	ITEM	TASK (refer to the CHECKS section)
At every tire change	All components	Visual and detailed examination.
	Preformed packings: (70), (90), (110), (120)	Replace.
	Screws (80)	Check torque (Torq-Set® driver bit) 35 to 45 in-lb.
At the following tire changes: 3rd, 6th, 9th, 12th then every tire change after.	Wheel half subassemblies (5), (20)	➢ Visual and detailed examination. ➢ Liquid penetrant inspection.
	Bolts (55)	➢ Visual examination. ➢ Magnetic particle inspection.
Every tire change or every 12 months (whichever occurs first)	Bearing cones (40)	Clean and repack with clean grease. Refer to the ASSEMBLY section.
UNSCHEDULED INTERVAL	ITEM	TASK (refer to the CHECKS section)
Indication of overheating: One of the three fusible plugs releases the tire pneumatic pressure.	All components	Visual and detailed examination.
	Wheel half subassemblies (5), (20)	Hardness test.
	Fusible plugs (115)	Replace.
	Preformed packings (70), (90), (110), (120) Heat shield bumpers (100)	Replace.

TESTING AND FAULT ISOLATION

1. General

Refer to IPL Figure 1 for component identification.

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

A. Equipment and consumables

The term “Commercial Source” allows the repair facility to acquire the product from a supplier of choice.

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 1001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Tire inflation safety equipment	Commercial source	Commercial
Dry nitrogen	Commercial source	Commercial
Standard tools (inch units)	Wrenches/sockets: • 12pt, external: for (55), (65) • Hex head, external: for (85), (105), (115) Torque wrench Tire pressure gage	Commercial
Soap solution	Mild dishwashing liquid	Commercial
Torq-Set® driver bit for (80)	NASM33781	Phillips Screw Company

TESTING AND FAULT ISOLATION

2. Testing

Examine all wheel assemblies that do not meet the test standards of this section. Refer to Table 1002 Troubleshooting for possible causes.

SAFETY WARNING: DO NOT PERFORM TESTING ON ANY WHEEL ASSEMBLY THAT SHOWS SIGNS OF DAMAGE.

SAFETY WARNING: ALWAYS FOLLOW PROPER TIRE INFLATION SAFETY PRACTICES. SERVICE THE TIRE WITH INFLATION SAFETY EQUIPMENT DESIGNED FOR THIS OPERATION.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Tire inflation guidelines

- Use a clip-on chuck and an extension hose.
- Use a direct reading or dial type pressure gauge that is calibrated on a regular basis.
- When inflating a tire, regulate the supply line to a pressure no more than 50% higher than the tire service pressure.
- Use only dry nitrogen to inflate the tire.
- Inflate the tire to no more than the tire rated inflation pressure to seat the tire beads, then adjust inflation pressure to the airframe manufacturer's recommended inflation pressure.

B. Pretest examination of product

(1) Examine the wheel for corrosion, loose bearing cups, or visible damage.

(2) Check the rupture disc (105) for an indication of pressure release or damage.

(3) Check for evidence of melted fusible plugs (115).

(4) Examine all fasteners and threaded components for loose fit. Tighten loose fasteners. Refer to Table 8002, Assembly torque values.

(a) The self-locking feature of the nuts (65) is defective if the nut is loose and you cannot tighten the nut to the assembly torque value. If one nut is damaged, then replace all of the nuts.

(5) Check for loose, worn or damaged drive keys (75).

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

NOTE: Refer to tire manufacturer's service and maintenance manual.

TESTING AND FAULT ISOLATION

C. 24 hour pressure retention test

CAUTION: COVER OR PLUG THE BEARING HUB OPENINGS OF THE OUTBOARD WHEEL HALF TO PREVENT CONTAMINATION OF THE BEARING BORE AREAS.

(1) Use the proper tire inflation safety equipment.

(2) Inflate the tire with dry nitrogen to the airframe manufacturer's recommended inflation pressure.

(a) Deflate the tire to equalize stretch.

(b) Re-inflate the tire to the airframe manufacturer's recommended inflation pressure.

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

(d) Measure the tire pressure. If necessary, re-inflate the tire to the airframe manufacturer's recommended inflation pressure.

(3) The wheel/tire assembly must hold the airframe manufacturer's recommended inflation pressure for 24 hours. A maximum 5% pressure drop is allowed.

(4) If pressure drop is 5% or less:

(a) The pressure retention test is successfully completed.

(b) Refer to F. Preparation for return to service.

(5) If pressure drop is greater than 5%:

(a) Inflate the tire with dry nitrogen to the airframe manufacturer's recommended inflation pressure.

(b) Apply a soap and water solution to the following:

- juncture around the inflation valve (85)
- juncture around the rupture disc (105)
- juncture around the fusible plugs (115)
- the tire bead area
- wheel half interface

(c) Examine for air leaks. Refer to D. Leakage diagnosis for additional procedures.

D. Leakage diagnosis

(1) Perform the following examinations to determine if an air leak exists at the inflation valve (85), rupture disc (105), or a fusible plug (115).

(a) Inflation valve, rupture disc, or fusible plug could be loose and not seated. Refer to Table 8002 and torque to specification. Inflate the tire with dry nitrogen to the airframe manufacturer's recommended inflation pressure.

1 If the leakage continues, deflate the tire completely and remove the leaking component. Examine the components for damage.

a Examine the component preformed packing (90), (110), (120) for cuts, tears, deformation or other damage that would prevent the preformed packing from properly sealing and replace as necessary.

(b) Inboard wheel half subassembly (5) could be damaged. Examine the mating surfaces for the inflation valve (85), rupture disc (105) and fusible plugs (115) for damage that would prevent the corresponding preformed packing (90), (110), or (120) from properly sealing.

1 Wheel half must be replaced if the mating surface is damaged.

TESTING AND FAULT ISOLATION

(c) After leakage diagnosis has been resolved and corrected, inflate the tire with dry nitrogen to the airframe manufacturer's recommended inflation pressure and perform the 24 hour pressure retention test.

(2) Perform the following examinations to determine if an air leak exists at the tire bead area or wheel interface. The wheel interface seal is provided by the preformed packing (70).

(a) Deflate the tire completely.

(b) Remove the tire from the wheel assembly.

(c) Examine the tire bead and wheel bead seats for damage. Examine the wheel interface surfaces and preformed packing (70) for damage.

1 Examine the tire bead for cuts or other damage that would prevent the tire from properly sealing. Replace tire, if damaged.

2 Examine the wheel bead seat on both wheel halves for damage that would prevent the tire from properly sealing.

a Repair the damaged area in accordance with the repair limits or replace the part if damage exceeds the repair limits.

3 Examine the wheel interface on both wheel halves for damage that would prevent the preformed packing (70) from properly sealing. Replace the part if damage is found.

4 Examine and replace the preformed packing (70) if damage is found.

(d) After leakage diagnosis has been resolved and corrected, then:

1 Reassemble the wheel/tire and inflate the tire with dry nitrogen to the airframe manufacturer's recommended inflation pressure.

2 Perform the 24 hour pressure retention test.

(3) An air leak can occur through the wheel if a wheel half is cracked. Perform the following examinations to determine if an air leak exists due to a cracked wheel half.

(a) Deflate the tire completely.

(b) Remove the tire from the wheel assembly and disassemble the wheel to the level necessary to examine the wheel halves.

1 Liquid Penetrant inspect the wheel halves and check for cracks. If cracks are found in either wheel half, then replace both wheel half subassemblies.

(c) After leakage diagnosis has been resolved and corrected, reassemble the wheel/tire and perform the 24 hour pressure retention test.

E. Preformed packing (70)

It is possible for leakage to occur where the wheel halves mate. If the wheel is disassembled for other possible leakage examinations, check the following:

(1) Examine the preformed packing (70) for cuts, tears, deformation, or other damage that would prevent a positive seal.

(2) Examine the wheel halves in the register/sealing groove areas for damage that would prevent a positive seal.

F. Preparation for return to service

(1) Complete the final assembly of the wheel by installing any remaining components. Refer to the ASSEMBLY section.

TESTING AND FAULT ISOLATION

3. Troubleshooting

Table 1002 cannot list all possible problems and is intended to assist with troubleshooting.

Table 1002 Troubleshooting

PROBLEM	POSSIBLE CAUSE	CORRECTION
Loss of tire pressure at the: • inflation valve • rupture disc • fusible plug	Damage to the inflation valve (85) or preformed packing (90).	Replace the damaged part.
	Damage to the rupture disc (105) or preformed packing (110).	
	Damage to a fusible plug (115) or preformed packing (120).	
	Damage to the mating sealing surface on the inboard wheel half subassembly(5).	
Loss of tire pressure at the tire bead	Damage to the tire	Replace the damaged part.
	Damage to the bead seat area of the wheel half.	
Loss of tire pressure - other	Loss of the preload on wheel bolts (55).	Examine bolts for damage and the nuts (65) for damage to self-locking feature.
	A possible cracked wheel half.	Use Liquid Penetrant Inspect to examine the wheel half for cracks. Refer to the CHECKS section.
	Possible damage to preformed packing (70) or register/sealing groove areas of wheel halves.	Replace preformed packing. Examine wheel halves.
Excessive drag on the wheel when rotating.	Incorrect preload or torque on the axle nut.	Loosen and retighten the axle nut to the aircraft manufacturer's specifications.
	Damage to a bearing cone (40) or cup (25). **NOTE:** Damage could result from incorrect axle nut torque, misalignment of bearings; lack of or contamination of bearing grease.	Examine the bearing cones and cups. If a cup or cone is damaged or corroded, replace all cups and cones. Cups and cones should be replaced as a matched set. Pack new cones with clean bearing grease. Refer to the ASSEMBLY section.

TESTING AND FAULT ISOLATION

Test Date: _____ **Wheel P/N:** _____ **Wheel Serial No.:** _____

Pretest examination of product

(1) Wheel condition **Pass** _____ **Fail** _____

(2) Wheel assembly hardware condition **Pass** _____ **Fail** _____

(3) Tire condition **Pass** _____ **Fail** _____

Comments: _____

_____

_____

_____

24 hour pressure retention test **Pass** _____ **Fail** _____

Tire inflation pressure: _____ psig

Pressure after 24 hr: _____ psig Pressure Drop Allowed: 5% max.

Pass ____ 5% or less.

Fail ____ greater than 5%.

Leakage at inflation valve (85): Yes ____ No ____

Leakage at rupture disc (105): Yes ____ No ____

Leakage at a fusible plug (115): Yes ____ No ____

Leakage at bead seat: Yes ____ No ____

Leakage through wheel: Yes ____ No ____

Leakage due to damage at wheel register/sealing groove or preformed packing (70): Yes ____ No ____

Comments: _____

_____

_____

_____

Tester: _____ **Date:** _____

DISASSEMBLY

1. General

Refer to IPL Figure 1 for component identification.

A. Equipment and consumables

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

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 3001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Preformed packing tool set	199-18	Parker Hannifin Corp. Aircraft Wheel & Brake Division or Parker Hannifin distributor
Standard tools (inch units)	Wrenches/sockets: • 12pt, external: for (55), (65) • Hex head, external: for (85), (105), (115) Flat blade screwdriver	Commercial
Portable tire bead breaker	Commercial source	Commercial
Soap solution	Mild dishwashing liquid	Commercial
Valve core tool	Commercial source	Commercial
Torq-Set® driver bit for (80)	NASM33781	Phillips Screw Company

2. Replace Components

A. In addition to replacement at the scheduled maintenance interval, replace the preformed packings (70), (90), (110), (120) if they are removed for any reason. Seals can take a set over time and should not be reused.

3. Remove the wheel assembly

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

SAFETY WARNING: FOLLOW THE AIRFRAME MANUFACTURER’S INSTRUCTIONS AND SAFETY WARNINGS WHEN WORKING WITH AND AROUND THE AIRCRAFT.

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

B. Refer to the airframe manufacturer’s instructions to remove the wheel/tire unit from the aircraft.

DISASSEMBLY

4. Disassemble the wheel assembly

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

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

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

NOTE: The bearing cups (25) are press-fit into both hub ends of the outboard wheel half subassembly (20) Removal is based on the following conditions or requirements:

- For replacement due to damage.
- For a more thorough inspection of the wheel half, e.g. liquid penetrant inspection.

Refer to the REPAIR section for removal/installation instructions.

NOTE: Do not remove the threaded inserts (10) from the inboard wheel half or threaded inserts (30) from the outboard wheel half unless damaged or for loss of locking feature. Refer to the REPAIR section for replacement instructions.

A. Remove air from the tire by depressing the valve stem plunger in the inflation valve (85) until air can no longer be heard escaping from the tire.

B. When all the tire pressure is released, then carefully remove the valve core from the valve stem.

CAUTION: INFLATION VALVE REMOVAL IS REQUIRED TO ENSURE TIRE DEFLATION.

C. Unthread and remove the inflation valve (85). Remove and discard the preformed packing (90).

D. Unthread and remove the rupture disc (105). Remove and discard the preformed packing (110).

E. Unthread and remove the three fusible plugs (115). Remove and discard the preformed packing (120).

DISASSEMBLY

CAUTION: BE CAREFUL NOT TO DAMAGE THE RETAINING RING GROOVE OR WHEEL BORE DURING REMOVAL OF THE RETAINING RING (50).

F. Refer to Figure 3001. Use a flat blade screwdriver to remove the retaining rings (50) from the outboard wheel half. There is one retaining ring on each hub end of the wheel half. Then, remove the grease seals (45) and bearing cones (40).

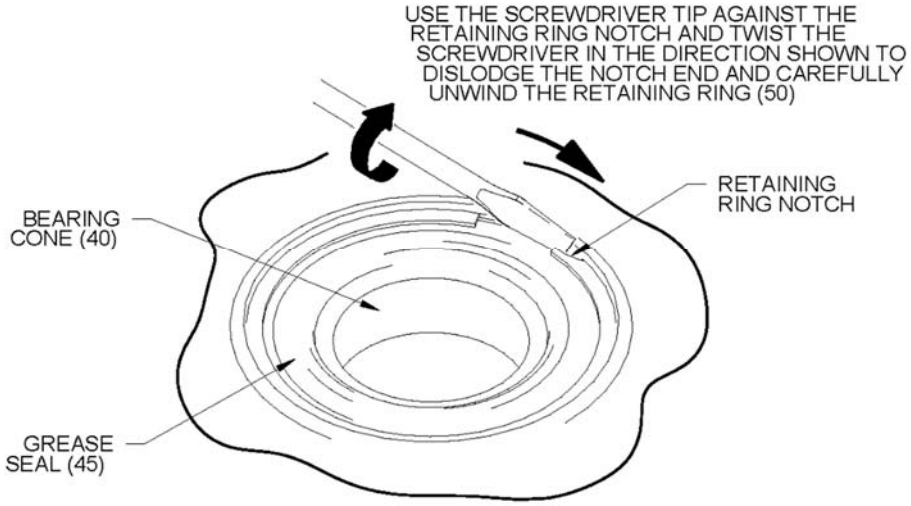


Figure 3001 Remove the retaining ring (50)

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

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

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

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

I. Remove the nuts (65), bolts (55), and washers (60).

J. Separate the wheel halves and remove the tire.

K. Remove and discard the preformed packing (70).

L. If the drive keys (75) are very worn or damaged, remove the drive keys. Drive keys should also be removed for a more detailed inspection of the inboard wheel half. Screws (80) attach the drive keys.

M. If a heat shield (95) is damaged or a more detailed inspection of the inboard wheel half is required, then remove as follows:

(1) Remove the drive key screws (80) and drive keys (75).

(2) Carefully pry each end of the heat shield. Pry until the end tangs are away from the drive lugs.

CLEANING

1. General

Refer to IPL Figure 1 for component identification.

A. Equipment and consumables

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

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 4001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Blast stripping equipment for plastic blast media	Plastic media: MIL-P-85891, Type II or V, Grade 20/30, 3.5 MOH max.	U.S. Technology Corp.
Air supply	30 psig maximum	Commercial
Clean cloths	Lint free	Commercial
Brushes	Nonmetallic soft and stiff bristle	Commercial
Stoddard solvent	Type 1 per MIL-PRF-680	Commercial
Cleaner/degreaser	Alkaline based	Commercial
Soap solution	Mild dishwashing liquid	Commercial
Mineral spirits	Commercial source	Commercial

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

SAFETY WARNING: USE NO MORE THAN 30 PSIG AIR PRESSURE WHEN USING AIR TO DRY PARTS. EYE PROTECTION IS NECESSARY. EYE INJURY FROM DIRT PARTICLES OR SOLVENT SPRAY IS POSSIBLE WHEN COMPRESSED AIR IS USED.

2. Clean the hardware

The hardware is made from steel: (50), (55), (60), (65), (75), (80), (85), (95), (105), or brass (115).

SAFETY WARNING: FOLLOW THE MANUFACTURER’S INSTRUCTIONS AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

CAUTION: REMOVE THE HEAT SHIELD BUMPERS (100) BEFORE CLEANING THE HEAT SHIELD (95).

A. Use an alkaline based degreasing solution or Stoddard Solvent (per MIL-PRF-680) and a nonmetal soft bristle brush to remove any hardened dirt or grease deposits.

B. Rinse in clean water and dry thoroughly.

CLEANING

CAUTION: CLEAN THE BEARING CUPS (25) AND CONES (40) CAREFULLY IN A SEPARATE CONTAINER OF CLEAN SOLVENT TO AVOID CONTAMINATION.

CAUTION: DO NOT USE COMPRESSED AIR TO DRY BEARING CONES. SPINNING CAN RESULT IN DAMAGE TO THE BEARINGS. LET THEM AIR DRY.

C. Clean bearing cups (25) and cones (40) in a separate container of mineral spirits. Use a nonmetal soft bristle brush to remove all deposits of dirt, grease, and other contamination, then dry thoroughly.

NOTE: Repack bearing cones with clean grease in accordance with ASSEMBLY section.

3. Clean the grease seals (45) and heat shield bumpers (100)

The grease seals have a bonded nitrile material on a metal ring. Wipe the seals and heat shield bumpers with a clean soft cloth dampened in a mild soap and water solution, then dry thoroughly.

4. Clean the wheel halves

The wheel halves are made from aluminum alloy.

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

A. Use an alkaline based degreasing solution and a nonmetal soft bristle brush to remove any hardened dirt or grease deposits.

B. Rinse in clean water and dry thoroughly.

C. Remove the protective coatings (primer and topcoat).

CAUTION: IN ADDITION TO REMOVING THE COATING, THE PLASTIC MEDIA WILL ALSO REMOVE ANY NAMEPLATES (15), (35), (125) THAT ARE ATTACHED. A NAMEPLATE THAT IS DAMAGED OR REMOVED DURING THE PLASTIC MEDIA PROCESS WILL REQUIRE REPLACEMENT. REFER TO IPL FIGURE 1 FOR THE NAMEPLATE PART NUMBER.

NOTE: Removal of the protective coating is necessary when doing the liquid penetrant inspection.

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

(1) Part must be clean. This will remove dirt and other deposits that can contaminate the blast media.

(2) Blast the part per MIL-STD-1504 with plastic media.

CHECKS

1. General

Refer to IPL Figure 1 for component identification.

NOTE: All parts must be cleaned before examination. Refer to the CLEANING section.

NOTE: In addition to the general inspection, follow detailed inspection of applicable components.

A. Equipment and consumables

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

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 5001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Inspection surface plate	Commercial source	Commercial
Magnifier	X10 Magnification	Commercial
Micrometers	Commercial source	Commercial
Vernier dial calipers	Commercial source.	Commercial
Magnetic particle inspection kit	ASTM E1444	Commercial
Liquid penetrant inspection kit	ASTM E1417 Type 1, method A, sensitivity level 2	Commercial
Air test fixture for (85), (105), (115)	Figure 9007	Fabrication
Hardness tester for (5), (20)	Commercial source	Commercial

CHECKS

SAFETY WARNING: THIS ASSEMBLY CONTAINS PARTS THAT HAVE A CADMIUM PLATING FINISH: (55), (60), (65), (115). REMOVING THE CADMIUM PLATING CAN CREATE EXPOSURE TO CADMIUM DUST AND CADMIUM COMPOUNDS. THIS CAN BE A POTENTIAL HEALTH HAZARD.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

CAUTION: REPAIR OR REWORK OF PLATED HARDWARE INCLUDING STRIPPING AND RE-PLATING IS NOT ALLOWED. DO NOT STRIP PLATING MATERIAL TO INSPECT A BOLT. REMOVAL OF PLATING MATERIAL WILL CAUSE THE BOLTS TO CORRODE.

2. General inspection

NOTE: Replace hardware that has damage to any protective coating, such as cad plate.

A. Examine visible surfaces of the following for corrosion, distortion, wear, burrs, pitting, nicks, cracks, chips, or other visible signs of damage: (5), (20), (25), (40), (45), (50), (55), (60), (65), (75), (80), (85), (95), (105), (115).

(1) Examine parts with sealing surfaces and grooves. Damage to the sealing surfaces could damage preformed packings during installation.

(2) Examine parts with threads for damage to threaded areas.

3. Examine the bolts (55) and nuts (65)

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS FOR USE AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

NOTE: If a bolt or nut needs to be replaced, then replace all of the bolts and nuts at the same time.

A. In accordance with the maintenance schedule (Table 1, DESCRIPTION AND OPERATION): use magnetic particle inspection (ASTM E1444) to examine the bolts for cracks in the radius under the bolt head and in the threaded area next to the bolt shank.

B. Examine the nuts for damage to the self-locking feature. If the nut can be turned onto the bolt by hand, past the nut's self-locking section or the nut cannot be tightened to the required torque value, then replace.

4. Examine the heat shield bumpers (100)

A. Examine and replace any bumper that shows signs of heat discoloration and/or cracking.

5. Examine the grease seals (45)

A. Examine the elastomer to metal bond. Replace the seal if there is a tear in the elastomer to metal bond or if the elastomer shows signs of damage.

CHECKS

6. Examine the drive keys (75) and screws (80)

A. Examine the drive keys for cracks, battering, or excessive corrosion. Refer to Figure 5001 and measure the width of the key. The width must not exceed the minimum dimension shown. Replace the drive key if conditions exceed the limit or the key is damaged or corroded.

B. If drive keys are replaced, examine the screws for corrosion, distortion or damage to the driving form and the screw threads.

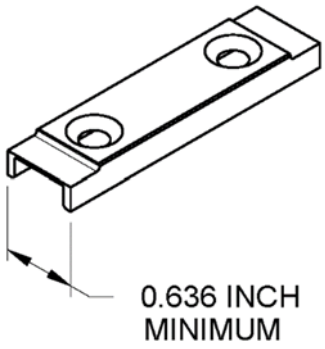


Figure 5001 Drive key inspection

7. Examine the bearing cups (25) and cones (40)

The bearing cups are press-fit into both hub ends of the outboard wheel half (20) Refer to the REPAIR section for removal/installation instructions.

NOTE: [1] Refer to the bearing manufacturer's brochure/manual for detailed information.

NOTE: Replace bearing cups and cones as a matched set. It is recommended that both inboard and outboard sets of cups and cones be replaced at the same time.

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

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

C. Examine the bearing cone cage for dents or distortion. Examine the roller pocket sides, corners, and ends for wear.

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

CHECKS

8. Examine the inflation valve (85), rupture disc (105), and fusible plugs (115)

A. Visually examine for stripped or scored threads. Examine the sealing surfaces and preformed packing grooves for burrs, corrosion, or other damage that could damage the preformed packing (90), (110), or (120). If required, check for leaks using the fixture shown in Figure 5002 and the following procedure:

(1) Install component (with corresponding preformed packing) in the fixture. Tighten each component to torque listed below.

NOTE: The term dry torque refers to the torqueing of hardware without the application of anti-seize.

- Inflation valve (85): 40 to 50 in-lb dry torque
- Rupture disc (105): 50 to 60 in-lb dry torque
- Fusible plugs (115): 50 to 60 in-lb dry torque

(2) Connect an air hose to fixture inlet and pressurize to 75 to 95 psig.

(3) Apply a soapy water solution to the components and looks for bubbles for two minutes.

(4) Replace all components that leak or are damaged.

B. Examine the fusible plugs (115) for melting of the fusible material. Replace fusible plugs that show evidence of melting. This is indicated by the loss of the fusible alloy or by irregular openings in the fusible alloy at either end of the plug. If one plug shows evidence of melting, replace all the plugs.

NOTE: Refer to procedure for overheated wheels if the fusible plugs have blown or melted.

C. Examine and replace the rupture disc (105) for loss of the inlet body (disc material).

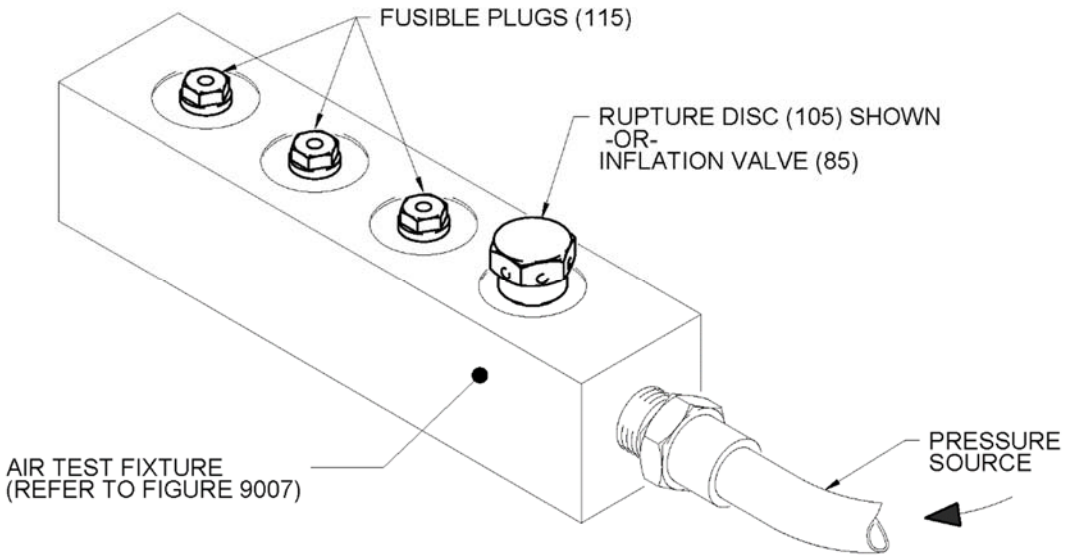


Figure 5002 Leakage test – inflation valve, rupture disc, fusible plugs

CHECKS

9. Examine the wheel halves

NOTE: Replace bearing cups and cones as a set. The outboard wheel half subassembly (20) includes installed bearing cups. If replacing the outboard wheel half subassembly (5), replace both bearing cones.

NOTE: Replace wheel half subassemblies as a set. If one wheel half subassembly requires replacement, then replace both wheel half subassemblies.

A. Examine the exterior surface for missing paint.

B. Examine the wheel halves for surface cracks, nicks, corrosion, or other damage.

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

C. Examine the inboard and outboard wheel half register grooves. Examine for burrs, corrosion, or other raised edges that could damage the preformed packing (70) during installation or prevent an effective seal during operation.

D. Examine the inboard wheel half for the following:

(1) The three fusible plug (115) bosses for corrosion, burrs, or other raised edges that could damage the preformed packing (120) during installation or prevent an effective seal during operation.

(2) The rupture disc (105) boss for corrosion, burrs, or other raised edges that could damage the preformed packing (110) during installation or prevent an effective seal during operation.

(3) The inflation valve (85) boss for corrosion, burrs, or other raised edges that could damage the preformed packing (90) during installation or prevent an effective seal during operation.

(4) If drive keys screws (80) cannot be tightened, check the threaded inserts (10) for loss of self-locking feature or if inserts are backing out. Replace damaged inserts per the REPAIR section.

E. Examine the outboard wheel half for the following:

(1) The outboard wheel half has threaded inserts (30) in the the hub for attaching optional mating components. Replace damaged inserts per the REPAIR section.

- If component attachment fasteners cannot be tightened, check the threaded inserts for loss of self-locking feature.
- Check that inserts have not backed out.

CHECKS

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

F. In accordance with the maintenance schedule (Table 1, DESCRIPTION AND OPERATION), examine the wheel halves for cracks using liquid penetrant inspection (ASTM E1417, Type 1, Method A, Sensitivity Level 2; acceptance criteria per MIL-STD-1907, Grade B).

(1) Refer to Figure 5003 and visually inspect wheel halves for surface cracks, nicks, corrosion or other damage. Examine these areas carefully to determine if the wheel is serviceable. If cracks are found in either wheel half, then replace both wheel half subassemblies.

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

- Examine the tire bead seat area. The tire bead seat area is typically an area of stress concentration and possibly subjected to trauma from tire beads and tools used to remove tires.
- Examine the bolt bosses.
- Examine the fusible plugs, rupture disc and inflation valve areas on the inboard wheel half.
- Examine the areas between the weight reduction cutouts on the outboard wheel half.

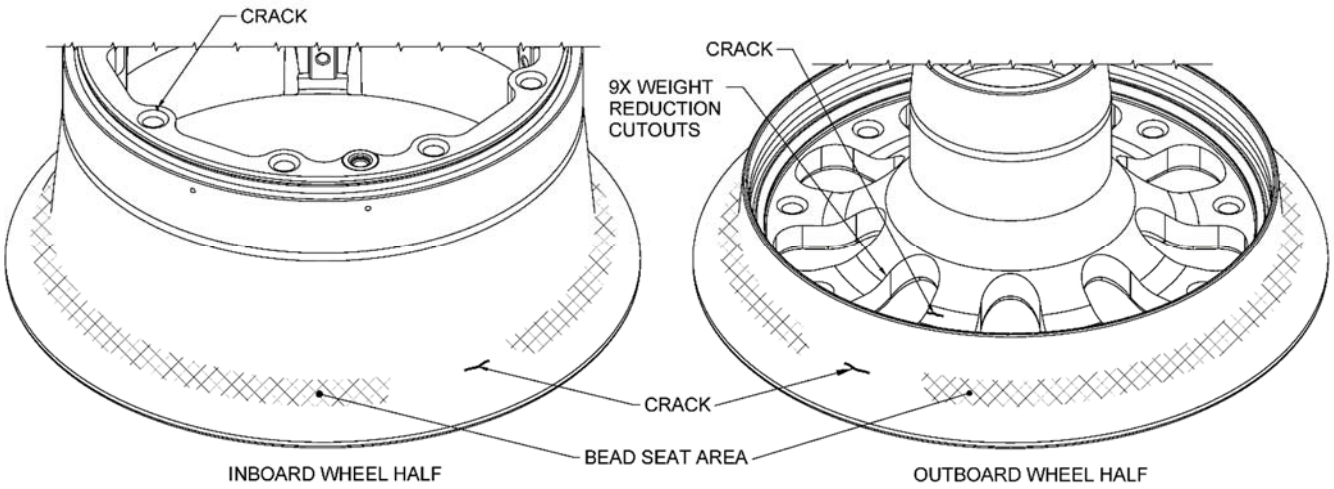


Figure 5003 Wheel half inspection

CHECKS

10. Procedure for overheated wheels

Indication of overheating: One of the three fusible plugs (115) releases the tire pneumatic pressure.

A Perform the following hardness check on the inboard wheel half and the outboard wheel half.

NOTE: To obtain an accurate reading, remove paint from the test areas (where the hardness ball will actually contact the surface). Use 400 grit or finer wet or dry aluminum oxide cloth. Refer to the REPAIR section for repaint instructions.

(1) Perform a hardness test in the area shown in Figure 5004. Obtain a minimum of three hardness readings, equally spaced. If any reading is below the limit specified in Table 5002 for either wheel half, then replace both wheel half subassemblies.

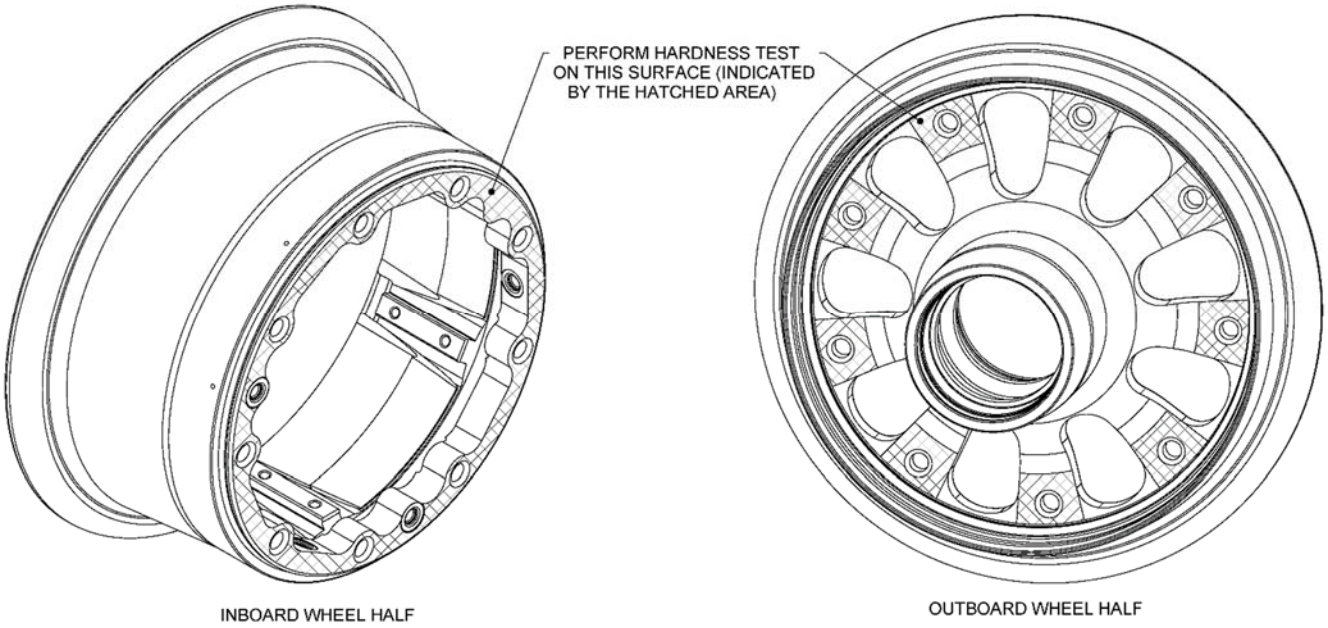


Figure 5004 Hardness test

Table 5002 Hardness test readings

ITEM	BRINELL TEST
BALL DIAMETER	10 mm
TEST LOAD	500 kg.
MINIMUM NUMBER OF READINGS (EQUALLY SPACED)	3
ACCEPTABLE MINIMUM AVERAGE HARDNESS	135 Bhn

REPAIR

1. General

Refer to IPL Figure 1 for component identification.

A. Equipment and consumables

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

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 6001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Aluminum oxide cloth	400 to 600 grade or finer, wet or dry	Commercial
Surface treatment for (5), (20)	Alodine 1200 or equivalent MIL-C-5541, Class 1A	Commercial
Paint application equipment	Commercial source	Commercial
Protective coatings for (5), (20)	Refer to Table 6002	Deft Chemical Coatings
Threaded insert tools for (10), (30)	MIL-T-21209 1227-6 (extraction) 7552-3 (installation) 3695-3 (tang removal)	Emhart Fastening Teknologies
Tools for bearing cups (25)		
Inner and outer hub tools	Figures 9001, 9002, 9003, 9004, 9005, 9006	Fabrication
Heat source methods for wheel halves	Range capacity: up to 200°F: • Infrared lamp • Continuous run temperature chamber • Temperature control LOCALIZED thermal A/C Cover (TACCO) • Induction heating system	Commercial
Refrigeration source methods for cups (25)	Range capacity: -25°F to -65°F: • Subzero freezer • Dry ice	Commercial
Primer	MIL-PRF-23377, Type 1, Class C2	Commercial
Arbor press	Commercial source	Commercial
Feeler gauge	0.002 inch	Commercial

REPAIR

SAFETY WARNING: THIS ASSEMBLY CONTAINS PARTS THAT HAVE A CADMIUM PLATING FINISH: (55), (60), (65), (115). REMOVING THE CADMIUM PLATING CAN CREATE EXPOSURE TO CADMIUM DUST AND CADMIUM COMPOUNDS. THIS CAN BE A POTENTIAL HEALTH HAZARD.

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

CAUTION: REPAIR IS LIMITED TO THE PARTS LISTED IN THIS SECTION. THE FOLLOWING ITEMS ARE NOT REPAIRABLE AND MUST BE REPLACED IF WORN OR DAMAGED:

- HARDWARE: (10), (25), (30), (40), (50), (55), (60), (65), (75), (80), (85), (105), (115), (95)
- COMPONENTS THAT CONTAIN ELASTOMERS: (45), (100)

CAUTION: THE FOLLOWING ITEMS ARE NOT PROCURABLE. ORDER THE NEXT HIGHER ASSEMBLY IF ITEM CANNOT BE REPAIRED:

- INBOARD WHEEL HALF. MUST ORDER ITEM (5).
- OUTBOARD WHEEL HALF. MUST ORDER ITEM (20).

2. Repair and paint the wheel halves

The wheel halves are made from an aluminum alloy. Repair is limited to the following.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. External surface damage repair.

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

B. Clean the wheel halves. Refer to the CLEANING section.

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

C. Apply a surface treatment (Alodine 1200 or equivalent) to repaired areas.

REPAIR

D. Paint the wheel halves

SAFETY WARNING: FOLLOW THE MANUFACTURER'S INSTRUCTIONS AND REFER TO THE MATERIAL DATA SAFETY SHEET FOR SAFETY INSTRUCTIONS.

(1) For small area paint touchup.

(a) Prepare the area by sanding lightly with 400 to 600 grade or finer, wet or dry aluminum oxide cloth and feather out all edges of the adjacent area.

(b) Clean the area.

(c) Touch up the area with primer and topcoat.

(2) For complete primer and topcoat application:

NOTE: Performed if primer and topcoat was removed from entire part by plastic media blasting.

(a) Confirm that the part has been cleaned and surface treatment applied if repair work was performed.

(b) Mask the wheel halves. Refer to Figures 6001 and 6002.

(c) Apply the primer and the topcoat. Refer to Table 6002.

NOTE: Results can vary and depend on the environment and the equipment used. To achieve the best results, always refer to the manufacturer's instructions for mixing, application and use.

Table 6002 Wheel halves primer and topcoat specifications

MANUFACTURER	PRIMER	TOPCOAT
Deft Chemical Coatings Irvine, CA	P/N 44-GN-36, Components A and B MIL-PRF-85582C, Type 1, Class C2	P/N 03-W-127A, Components A and B MIL-PRF-85285D, Type 1 Color 17925 (Untinted White)
	Primer Thickness [1]: 0.0006-0.0009 inch Drying Time (air dry) [2]: Touch, mask, topcoat: 1 hour minimum Stack: 4 to 6 hours Hard cure: 14 days minimum	Topcoat Thickness [1]: 0.0017-0.0023 inch Drying Time (air dry) [2]: Recoat: 15 minutes minimum Stack: 4 to 8 hours Hard cure: 7 days minimum

[1] The total dry film thickness of the primer and topcoat to be 0.0023 to 0.0032 inch. This excludes the anodic coating thickness.

[2] Refer to the manufacturer's data sheet for the forced dry (heat accelerated cure) schedule.

REPAIR

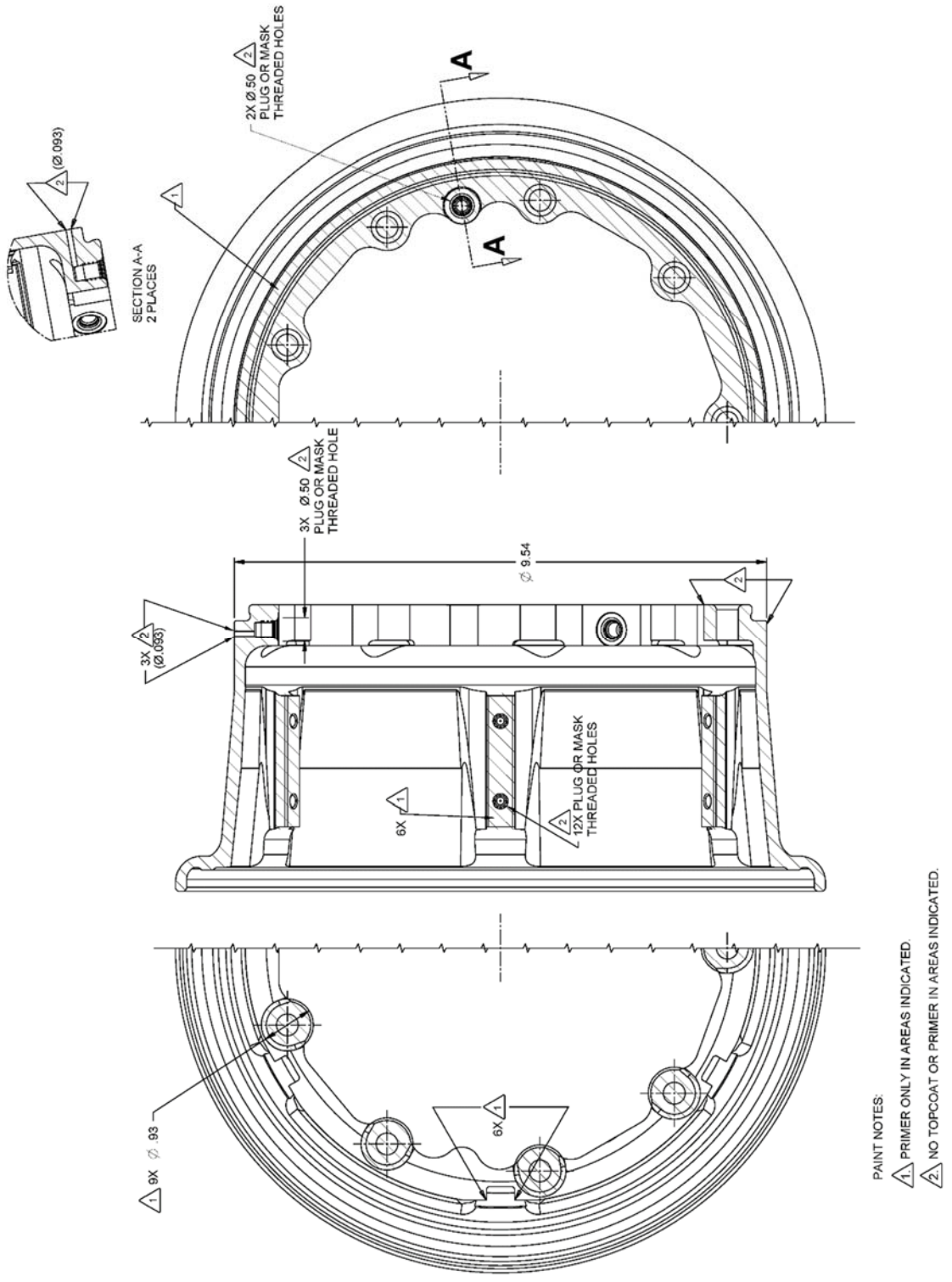


Figure 6001 Mask the inboard wheel half

REPAIR

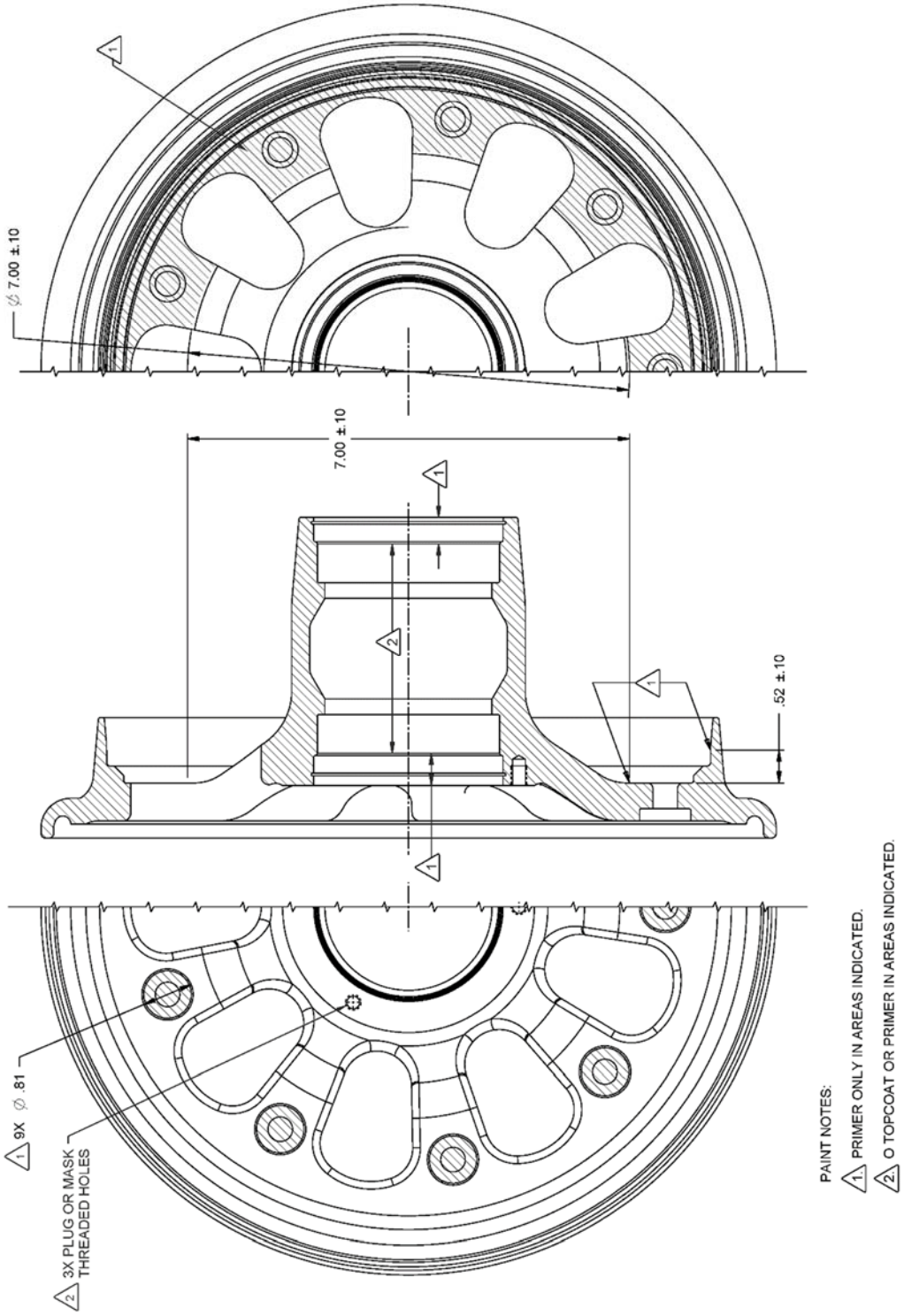


Figure 6002 Mask the outboard wheel half

REPAIR

3. Replace the bearing cups (25)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

CAUTION: BEARING CUPS AND CONES MUST BE REPLACED AS A SET. WHEN REPLACING BEARING CUPS, ALSO REPLACE THE BEARING CONES. REPLACE BOTH SETS OF CUPS AND CONES AT THE SAME TIME.

CAUTION: REMOVE THE INFLATION VALVE (85), RUPTURE DISC (105), AND FUSIBLE PLUGS (115) BEFORE HEATING THE INBOARD WHEEL HALF.

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

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

CAUTION: AVOID RAISING BURRS IN THE WHEEL HALF BORE WHEN REMOVING AND INSTALLING THE BEARING CUP.

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

A. Removal

The bearing cups (25) are press-fit into both hub ends of the outboard wheel half. Instructions are included to remove a bearing cup from each hub end. It does not matter which bearing cup is removed first. Read the instructions completely before doing any work.

CAUTION: DO NOT HEAT THE WHEEL HALF ABOVE 200°F.

NOTE: As an option, the removal of the bearing cups can be made easier when the wheel half is heated to 175°F. See Table 6001 for a list of methods.

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

REPAIR

(1) Refer to Figure 6003. The following procedure will remove a bearing cup from the outer hub end.

(a) If wheel half was heated, remove from the heat source.

(b) Thread the pilot guide pin into the support base. Tighten snug.

(c) Position the wheel half on the support base.

(d) Insert the push plate into the wheel hub, over the pilot guide pin and on the back face of the bearing cup.

(e) Position the push bar over the pilot guide pin and on top of the push plate.

(f) Use an arbor press to apply even pressure to the push bar until the bearing cup drops out of the hub.

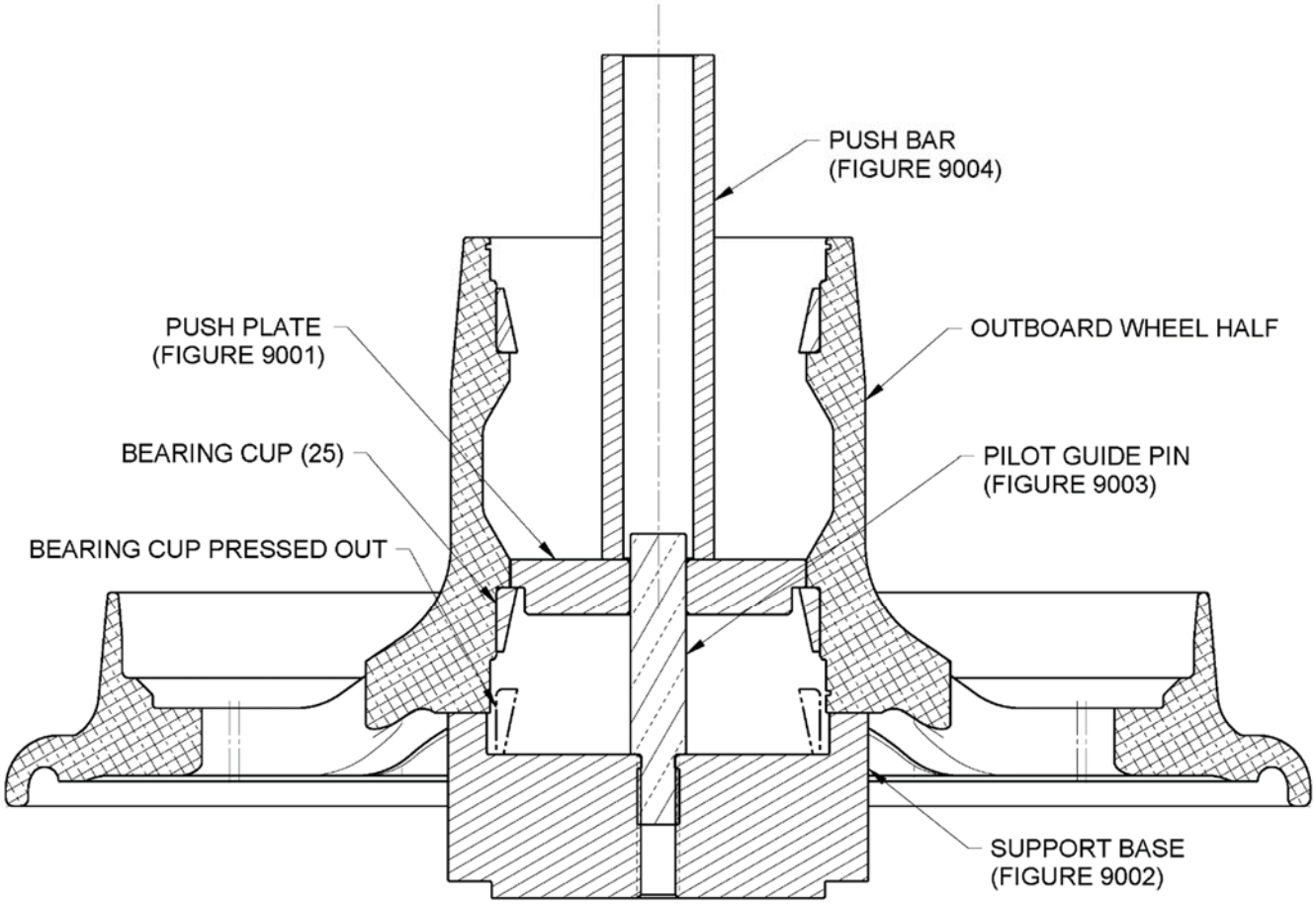


Figure 6003 Remove the bearing cup-outer hub end

REPAIR

(2) Refer to Figure 6004. The following procedure will remove a bearing cup from the inner hub end.

(a) If wheel half was heated, remove from the heat source.

(b) Thread the pilot guide pin into the support base. Tighten snug.

(c) Position the wheel half on the support base.

(d) Insert the push plate into the wheel hub, over the pilot guide pin and on the back face of the bearing cup.

(e) Position the push bar over the pilot guide pin and on top of the push plate.

(f) Use an arbor press to apply even pressure to the push bar until the bearing cup drops out of the hub.

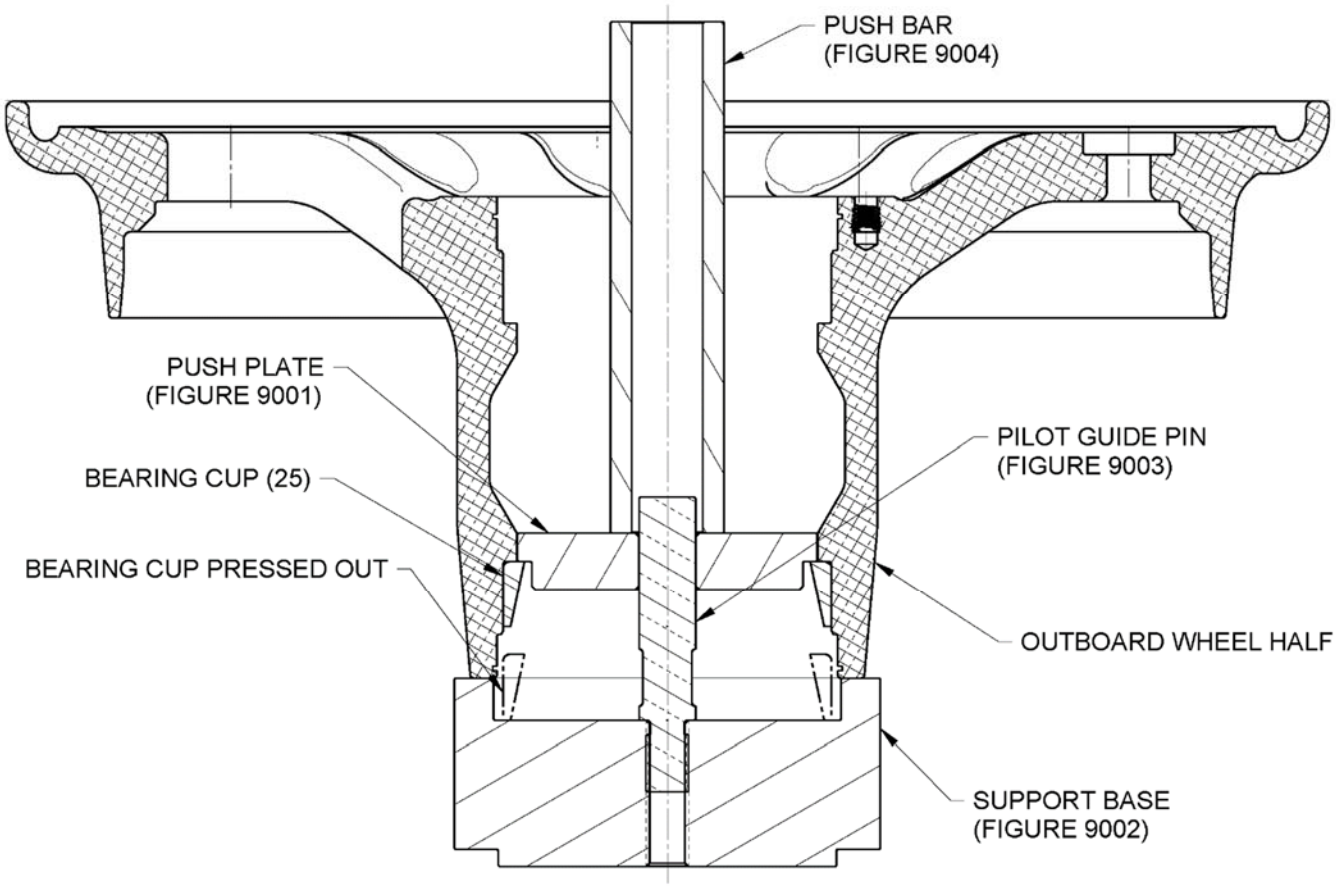


Figure 6004 Remove the bearing cup-inner hub end

REPAIR

B. Installation

The bearing cups (25) are press-fit into both the inner and outer hub ends of the outboard wheel half. Instructions are included to install a bearing cup into each hub end. It does not matter which bearing cup is installed first. Read the instructions completely before doing any work.

CAUTION: THE FOLLOWING PROCEDURE SHOULD BE ACCOMPLISHED QUICKLY WITH SPECIAL ATTENTION GIVEN TO ALIGNMENT OF PARTS. THIS PROCEDURE SHOULD NOT BE DELAYED AS THE PRIMER WILL BEGIN TO CURE IN THE BORE AND LOSE IT'S LUBRICITY.

CAUTION: DO NOT LET THE PRIMER COATING DRY BEFORE INSTALLING THE BEARING CUP.

CAUTION: AVOID COCKING THE CUP DURING INSTALLATION.

CAUTION: DO NOT CHILL THE BEARING CUP BELOW -65°F

NOTE: The installation of a bearing cup is made easier when the bearing cup is chilled to between -25° to -65°F, 4 hours chill time is recommended. See Table 6001 for a list of refrigeration methods.

(1) Refer to Figure 6005. The following procedure will install a bearing cup into the inner hub end.

(a) Make sure that the bearing bore and the bearing cup are clean and free of burrs.

(b) Remove the bearing cup from the refrigeration source and wipe off any condensation.

(c) Brush a light wet coat of the MIL-PRF-23377, Type 1, Class C2 primer into the bearing bore. This will help prevent corrosion.

(d) Position the wheel half on the support base and align the bearing cup over the bore.

(e) Position the push plate on the front face of the bearing cup.

(f) Insert the push bar into the push plate hole.

(g) Use an arbor press to apply even pressure to the cup press. Make sure that the back face of the bearing cup is flush against the surface (shoulder) of the bearing bore.

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

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

(i) Remove excess primer with a clean shop towel so that a fillet of not more than 0.08 inch wide extends beyond the cup.

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

REPAIR

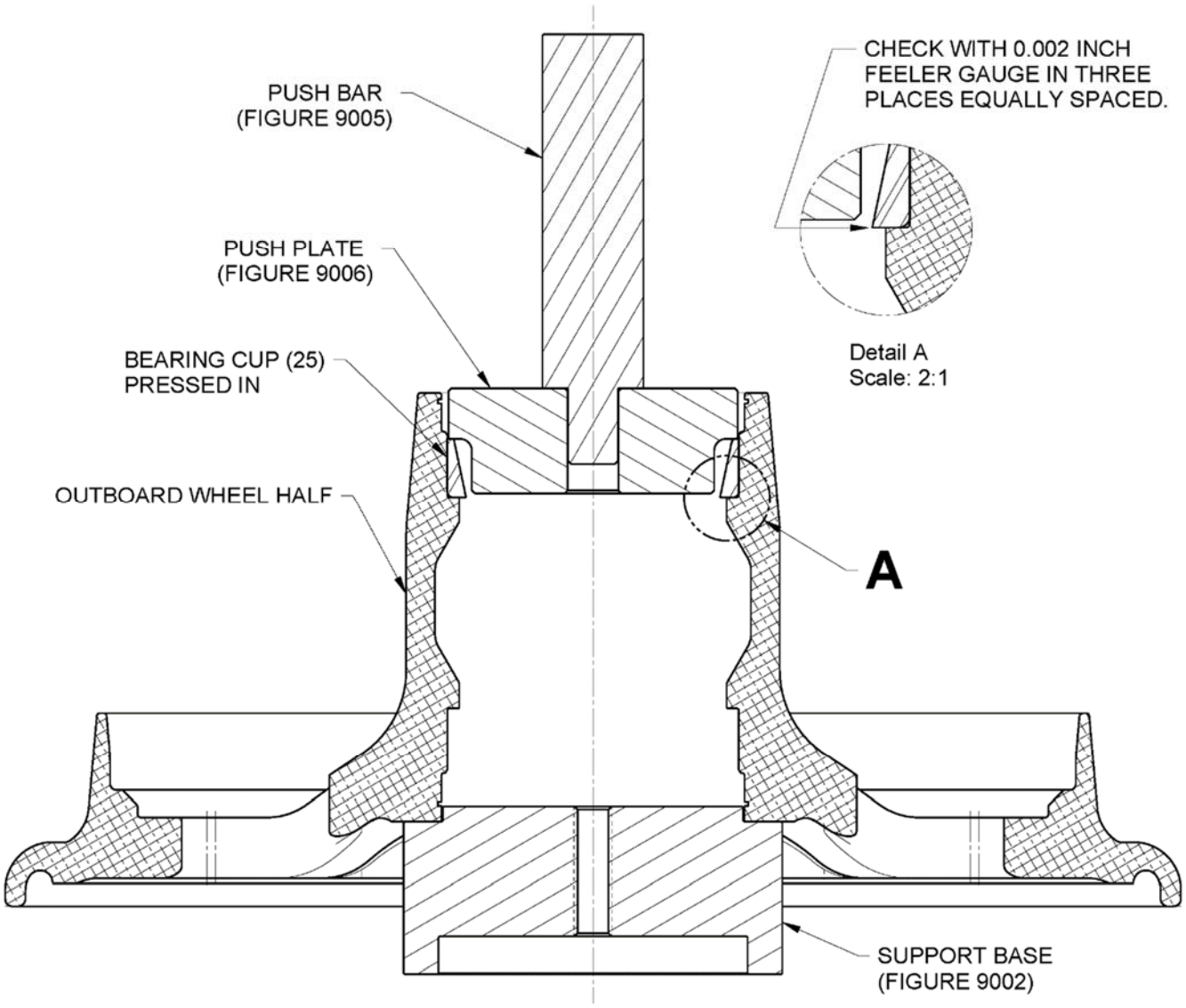


Figure 6005 Install the bearing cup-inner hub end

(2) Refer to Figure 6006. The following instructions will install a bearing cup into the outer hub end.

(a) Make sure that the bearing bore and the bearing cup are clean and free of burrs.

(b) Remove the bearing cup from the refrigeration source and wipe off any condensation.

(c) Brush a light wet coat of the MIL-PRF-23377, Type 1, Class C2 primer into the bearing bore. This will help prevent corrosion.

(d) Position the wheel half on the support base and align the bearing cup over the bore.

(e) Position the push plate on the front face of the bearing cup.

REPAIR

(f) Insert the push bar into the push plate hole.

(g) Use an arbor press to apply even pressure to the cup press. Make sure that the back face of the bearing cup is flush against the surface (shoulder) of the bearing bore.

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

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

(i) Remove excess primer with a clean shop towel so that a fillet of not more than 0.08 inch wide extends beyond the cup.

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

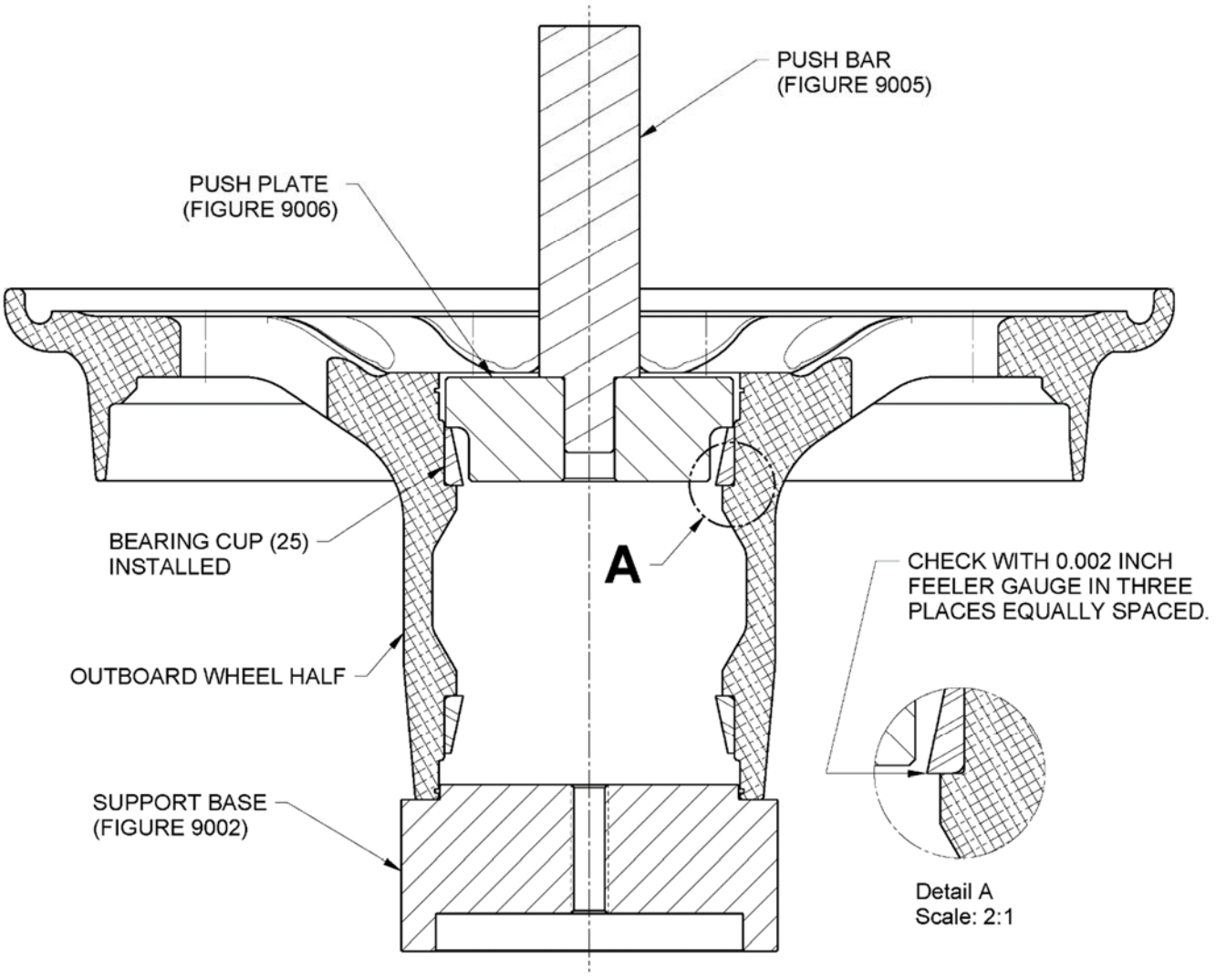


Figure 6006 Install the bearing cup-outer hub end

REPAIR

4. Replace wheel half inserts (10) and (30)

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Removal

Refer to Figure 6007 and use the following procedure.

(1) Remove damaged inserts by applying the extracting tool to the insert, striking the head of the tool a light blow and turning it counterclockwise, maintaining steady downward pressure.

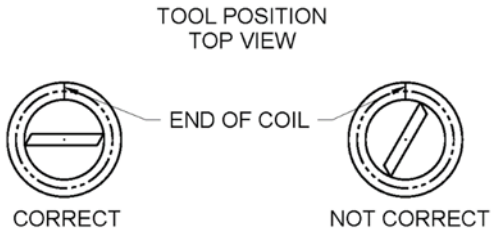


Figure 6007 Use the extracting tool

B. Installation

Refer to Figure 6008.

(1) Use the installation tool and install the inserts into the applicable wheel half so that the top coil is a minimum of 0.093 inch below the wheel surface. Break off the tang.

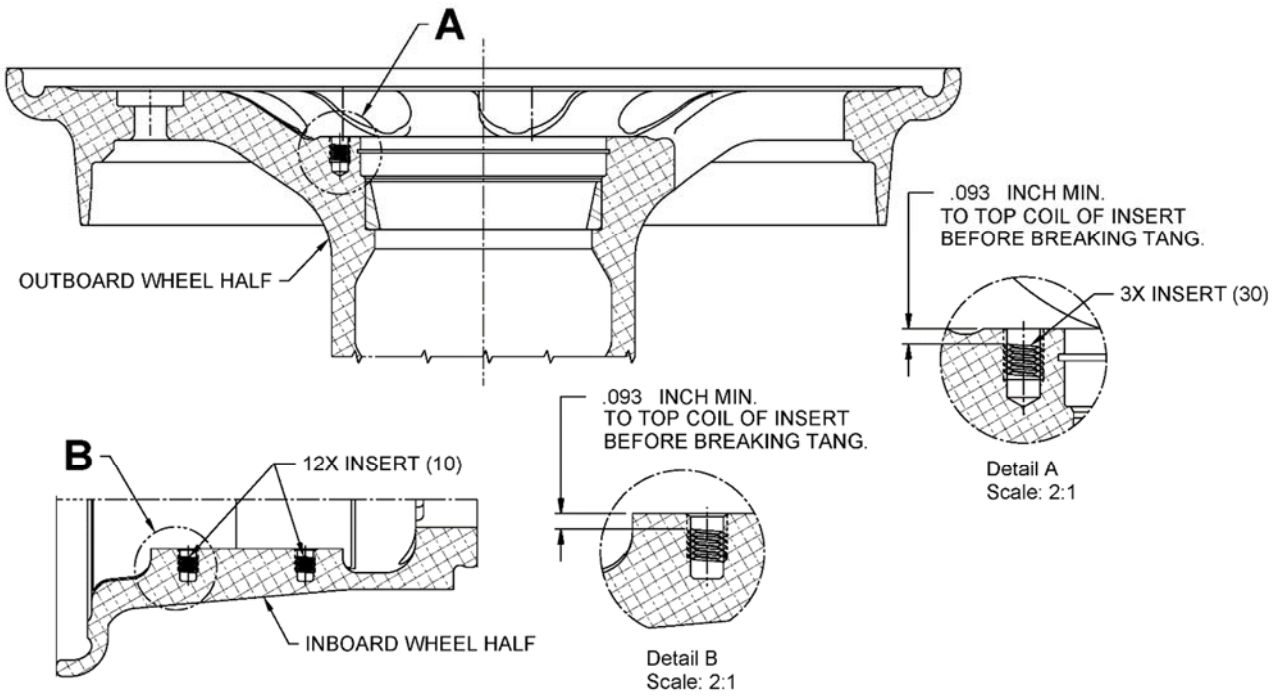


Figure 6008 Install the threaded insert

ASSEMBLY

1. General

Refer to IPL Figure 1 for component identification.

NOTE: The term dry torque refers to the torqueing of hardware without the application of anti-seize compound.

A. Equipment and consumables

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

NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

Table 7001 Equipment and consumables

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Bearing grease	Mobil Aviation Grease SHC 100 (equivalent alternatives are not allowed)	ExxonMobil Oil Corporation
Preformed packing tool set	199-18	Parker Hannifin Corp. Aircraft Wheel & Brake Division or Parker Hannifin distributor
Standard tools (inch units)	Wrenches/sockets: • 12pt, external: for (55), (65) • Hex head, external: for (85), (105), (115) Torque wrench Tire pressure gage	Commercial
Torq-Set® driver bit for (80)	NASM33781	Phillips Screw Company
Anti-seize compound for (55), (60), (65)	MIL-PRF-83483 (equivalent alternatives are not allowed)	FEL-PRO Chemical Products
Tire inflation safety equipment	Commercial source	Commercial
Dry nitrogen	Commercial source	Commercial
Soap solution	Mild dishwashing liquid	Commercial
Clean cloths	Lint free	Commercial
Lubricant for (70), (90), (110), (120)	Dow Corning 55 Lube	Dow Corning Corporation

ASSEMBLY

B. Bearing cone grease packing procedure

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

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

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

(1) Make sure the bearing cones are clean. Refer to the CLEANING section.

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

NOTE: Shaded area shows the recommended quantity of grease.

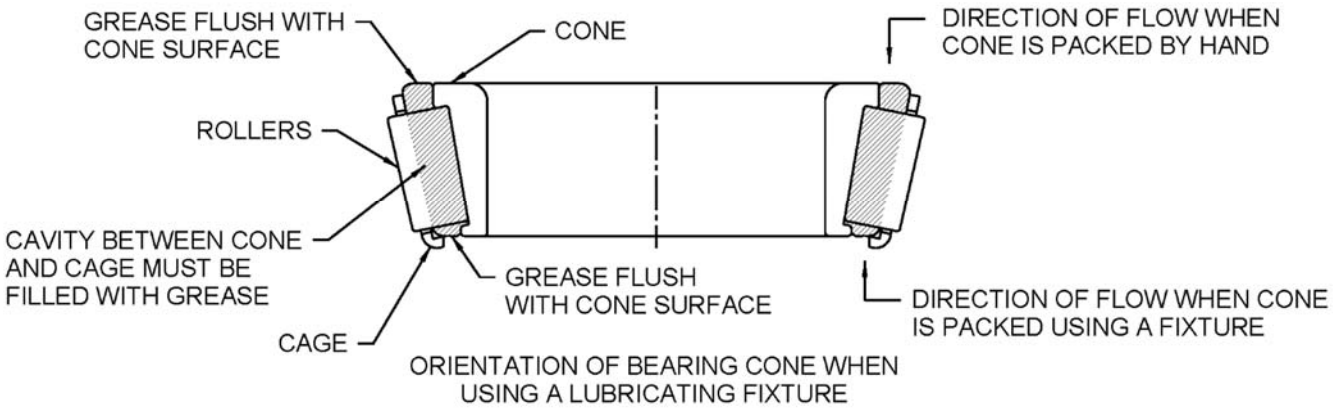


Figure 7001 Pack the bearing cones (40)

C. Wheel pre-assembly verification

(1) Verify that the bearing cups (25) have been installed in the outboard wheel half.

ASSEMBLY

(2) Refer to Figure 7002. Verify that the heat shield (95) and heat shield bumpers (100) are properly installed on the inboard wheel half.

(a) Position each heat shield between the drive key lugs with the heat shield tabs positioned on each end of a drive key lug.

NOTE: The drive keys (75) will keep the heat shields in place.

(3) Refer to Figure 7002. Verify that the drive keys (75) are properly installed on the inboard wheel half.

(a) Screws (80) fasten the drive keys to the inboard wheel half. Screw torque value is 35 to 45 in-lb dry torque.

NOTE: Requires Torq-Set® driver bit.

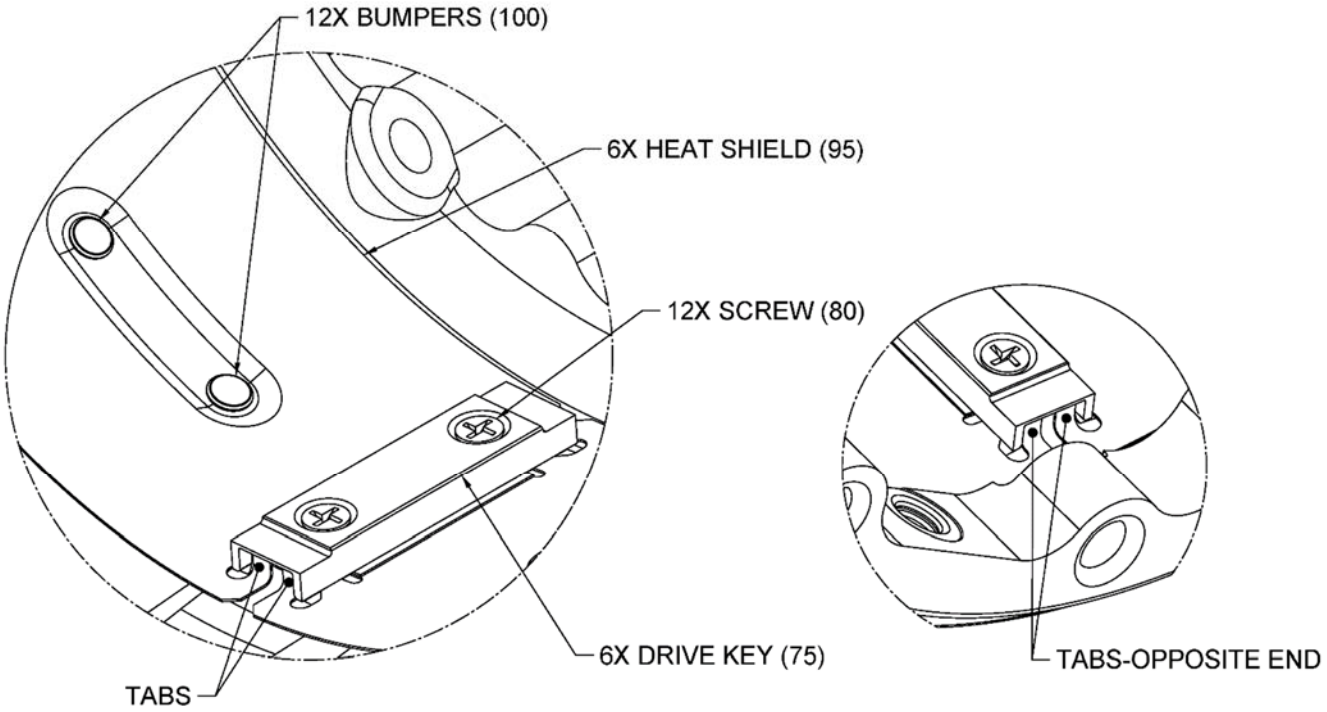


Figure 7002 Install the heat shields (95) and drive keys (75)

ASSEMBLY

2. Wheel and tire pre-assembly preparation

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Examine the bead seat area of the wheel halves. If necessary, remove dirt with a clean cloth moistened with a mild soap and water solution or with denatured alcohol.

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

C. The preformed packing groove in each wheel half should be examined for damage or other debris that would prevent the packing (70) from properly seating. Remove any lubricant, grease or foreign material with a clean cloth moistened with a mild soap and water solution or with denatured alcohol.

D. Verify that the tire is clean inside. If it is not cean, then wipe the bead base with a clean cloth dampened with a mild dishwashing soap and water solution or a suitable rubber cleaner.

E. Install the inflation valve (85), rupture disc (105), and fusible plugs (115) in the inboard wheel half as follows.

NOTE: The inflation valve (85) and rupture disc assembly (105) ports are identical and interchangeable.

NOTE: The term dry torque refers to the torqueing of hardware without the application of anti-seize.

(1) Examine the preformed packings (90), (110), (120) for damage such as cuts, tears, cracking. Replace if necessary.

(2) Apply a light coat of Dow Corning 55 O-ring lube to the preformed packings (90), (110), (120).

(3) Install the preformed packing (90) on the inflation valve (85). Install the inflation valve and tighten to 40 to 50 in-lb dry torque.

(4) Install the preformed packing (110) on the rupture disc (105). Install the rupture disc and tighten to 50 to 60 in-lb dry torque.

(5) Install a preformed packing (120) on each of the three fusible plugs (115). Install the fusible plugs and tighten to 50 to 60 in-lb dry torque.

3. Mount the tire

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Position the inboard wheel half subassembly (5) with the register side facing up.

B. Examine the preformed packing (70) for damage such as cuts, tears, cracking. Replace if necessary.

CAUTION: THE PREFORMED PACKING (70) MUST BE INSTALLED UNIFORMLY. IT SHOULD BE FREE OF KINKS AND TWISTS.

(1) Apply a light coat of Dow Corning 55 O-ring lube to the preformed packing (70) and install the preformed packing carefully in the wheel register groove of the inboard wheel half without stretching or twisting.

C. Position the tire on the inboard wheel half being careful not to disturb the preformed packing (70).

D. Position the outboard wheel half subassembly (20) inside the tire and align the bolt holes of both wheel halves.

E. Align the red balance dot on the tire with the inflation valve (85).

(1) If there is no balance dot on the tire, then align the tire serial number with the inflation valve.

ASSEMBLY

4. Attach the wheel halves

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

A. Prior to installing, lubricate the wheel half fasteners (55), (60), (65), with anti-seize compound, per MIL-PRF-83483.

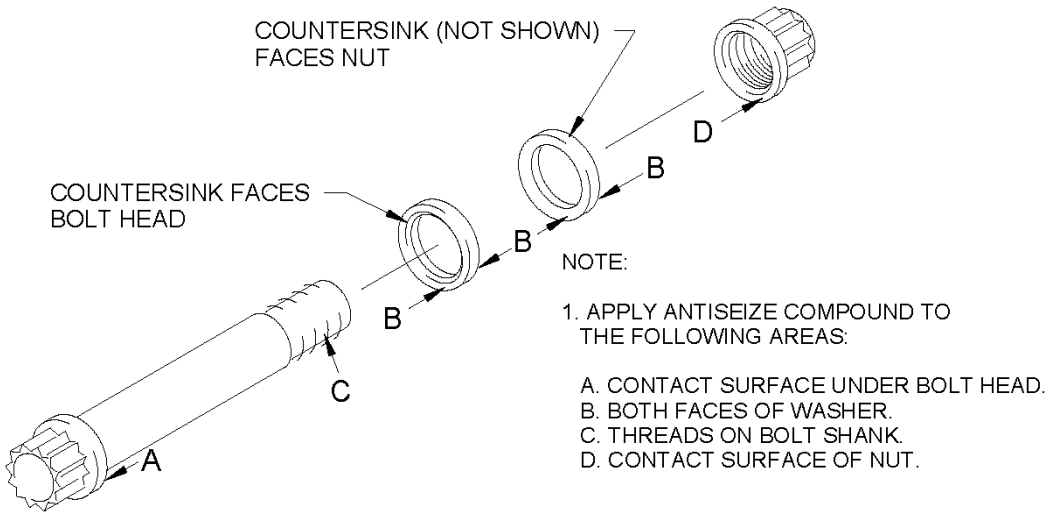


Figure 7003 Apply anti-seize compound

CAUTION: WASHER (60) IS INSTALLED WITH THE COUNTERSINK FACING THE BOLT HEAD AND NUT.

B. Slide a countersunk washer (60) onto each bolt (55). Make sure the countersink side of the washer is facing the bolt head.

C. Install at least three bolts (55) [with washer (60)] into the inboard wheel half side. Compress the wheel halves together and install one washer (60) and nut (65) onto each bolt. Make sure the countersink side of the washer is facing the nut.

NOTE: The nuts (65) must be located on the outboard wheel half side.

D. Install the remaining bolts (55), washers (60) and nuts (65). Run the nuts down by hand as far as possible.

CAUTION: DO NOT USE POWER TOOLS FOR THE INSTALLATION OF WHEEL FASTENERS. POWER TOOLS CAN CAUSE OVER TIGHTENING.

CAUTION: THE FASTENERS MUST BE TIGHTENED BY APPLYING THE TORQUE TO THE NUT (65) WHILE SECURING THE BOLT HEAD.

CAUTION: DO NOT DAMAGE THE PREFORMED PACKING (70) DURING THE TORQUING PROCEDURE.

E. Wheel nuts should first be snugged in a criss-cross pattern to seat the flange. Apply the final torque evenly in a criss-cross pattern using calibrated tools until all nuts are properly torqued. Final torque is 335 to 345 in-lb.

5. Test the wheel/tire assembly

A. Refer to the TESTING AND FAULT ISOLATION section.

ASSEMBLY

6. Final assembly of the wheel

After successfully completing the 24-hour pressure retention test, complete the remaining assembly procedures as follows.

SAFETY WARNING: WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND EYEWEAR BEFORE DOING THE WORK.

SAFETY WARNING: ALWAYS FOLLOW PROPER TIRE INFLATION SAFETY PRACTICES. SERVICE THE TIRE WITH INFLATION SAFETY EQUIPMENT DESIGNED FOR THIS OPERATION.

A. Apply a light coat of wheel bearing grease to the following:

NOTE: Make sure the bearing cones (40) have been packed with fresh, clean grease.

- Exposed surfaces of the bearing cups (25).
- The elastomer of the grease seals (45).

B. Install the following into each hub of the outboard wheel half in the order listed:

- Bearing cone (40).
- Grease seal (45). Observe '**This Side Out'** instruction on seal.
- Retaining ring (50). Install the end of the retaining ring into the groove in the inner hub of the wheel half and wind or spiral the ring into the groove.

7. Return to service

SAFETY WARNING: FOLLOW THE AIRFRAME MANUFACTURER'S INSTRUCTIONS AND SAFETY WARNINGS WHEN WORKING WITH AND AROUND THE AIRCRAFT.

SAFETY WARNING: ALWAYS FOLLOW PROPER TIRE INFLATION SAFETY PRACTICES. SERVICE THE TIRE WITH INFLATION SAFETY EQUIPMENT DESIGNED FOR THIS OPERATION.

A. Inflate the tire to the airframe manufacturer's recommended inflation pressure.

(1) Install the inflation valve cap. The cap is the positive means of resisting pressure leakage and should always be used to prevent rapid deflation should a problem occur with the valve core.

SAFETY WARNING: MAKE SURE THE DRIVE KEYS ON THE INBOARD WHEEL HALF ENGAGE IN THE SLOTS ON THE BRAKE ASSEMBLY ROTOR DISCS. DAMAGE TO THE WHEEL, TO THE LANDING GEAR/AIRCRAFT; AND PERSONAL INJURY COULD RESULT IF THE DRIVE KEYS DO NOT ENGAGE THE SLOTS WHEN EQUIPMENT IS IN OPERATION.

B. Slide the wheel/tire unit onto the axle and align with the brake assembly.

(1) Make sure the drive keys on the inboard wheel half engage in the slots on the brake assembly rotor discs.

(2) Make sure the bearing cones are seated.

C. Install the axle hardware in accordance with the airframe manufacturer's manual.

FITS AND CLEARANCES

1. General

Refer to IPL Figure 1 for component identification.

A. Assembly wear limits

Table 8001 In-service wear limits

PART NAME (IPL item number)	FIGURE	WORN AREA DESCRIPTION	WORN DIMENSION
Drive key (75)	5001	Width	0.636 inch minimum

B. Assembly torque values

NOTE: The term dry torque refers to the torqueing of hardware without the application of anti-seize.

Table 8002 Assembly torque values

PART NAME (IPL item number)	TORQUE LIMITS
Nut (65)	335 to 345 in-lb Apply anti-seize compound to items (55), (60), (65). Refer to ASSEMBLY.
Screw (80)	35 to 45 in-lb dry torque. Requires Torq-Set® driver bit.
Inflation valve (85)	40 to 50 in-lb dry torque.
Rupture disc (105)	50 to 60 in-lb dry torque.
Fusible plugs (115)	50 to 60 in-lb dry torque.

SPECIAL EQUIPMENT AND CONSUMABLES

1. General

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

A. Source of supply

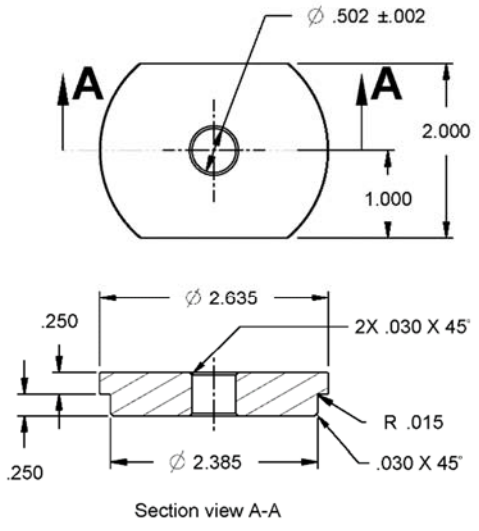
NOTE: Unless specified differently, equivalent alternatives can be used for the items listed.

NOTE: Fabricated tools are for reference only. They are meant to provide design guidance and can be adjusted to meet the needs of the Repair Facility.

Table 9001 List of manufacturers

NOMENCLATURE	SPECIFICATION / PART NO.	SOURCE
Preformed packing tool set	199-18	Parker Hannifin Corp. Aircraft Wheel & Brake Division Avon, OH 44011 U.S.A. www.parker.com or Parker Hannifin distributor
Blast stripping equipment for plastic blast media	Plastic media: MIL-P-85891, Type II or V, Grade 20/30, 3.5 Mohs max.	U.S. Technology Corporation www.ustechnology.com
Tools for bearing cups (25) Inner and outer hub tools	Figure 9001, 9002, 9003, 9004, 9005, 9006	Fabrication
Air test fixture for (85), (105), (115)	Figure 9007	Fabrication
Bearing lubricant	Mobil Aviation Grease SHC 100 (equiv. alternatives are not allowed)	Exxon-Mobil Oil Corporation Fairfax, VA 22037 U.S.A.
Anti-seize compound for (55), (60), (65)	MIL-PRF-83483	FEL-PRO Chemical Products Skokie, IL 60076 U.S.A.
Threaded insert tools for (10), (30)	MIL-T-21209 1227-6 (extraction) 7552-3 (installation) 3695-3 (tang removal)	Emhart Fastening Teknologies Shelton, CT 06484 U.S.A.
Protective coatings for (5), (20)	Refer to Table 6002	Deft Chemical Coatings Irvine, CA 92714 U.S.A.
Lubricant for (70), (90), (110), (120)	Dow Corning 55 Lube	Dow Corning Corporation Midland, MI, 48640 U.S.A.
Torq-Set® driver bit for (80)	NASM33781	Phillips Screw Company phillips-screw.com

SPECIAL EQUIPMENT AND CONSUMABLES

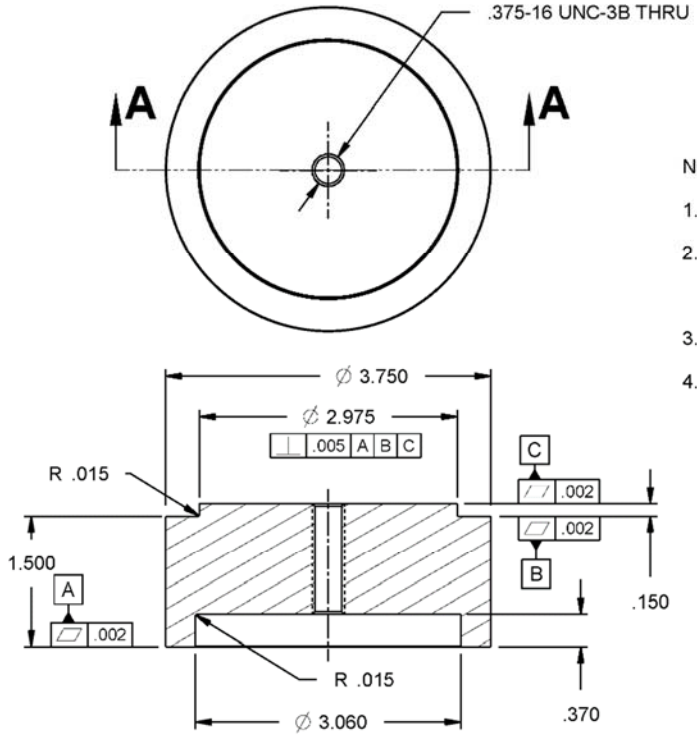


NOTES:

1. MATERIAL: 4130 STEEL OR EQUIVALENT.
2. TOLERANCES UNLESS OTHERWISE SPECIFIED:
   .XXX ± 0.010
   ANGULAR: ± 0.5°
3. BREAK CORNERS 0.010 MAX.
4. DIMENSIONS IN INCH UNITS.

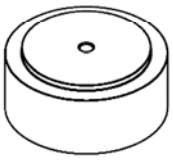
Isometric view
Scale: 1:2

Figure 9001 Push plate
(Bearing cup removal)



NOTES:

1. MATERIAL: 4130 STEEL OR EQUIVALENT.
2. TOLERANCES UNLESS OTHERWISE SPECIFIED:
   .XXX ± 0.010
   ANGULAR: ± 0.5°
3. BREAK CORNERS 0.010 MAX.
4. DIMENSIONS IN INCH UNITS.



Isometric view
Scale: 1:2

(Figure 9002 Support base
(Bearing cup removal/installation)

Figures 9001 and 9002 Bearing cup tools

SPECIAL EQUIPMENT AND CONSUMABLES

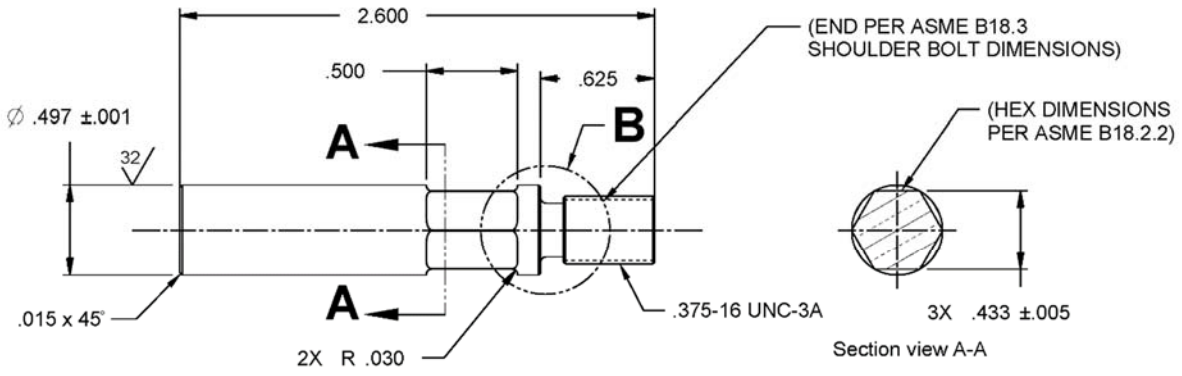
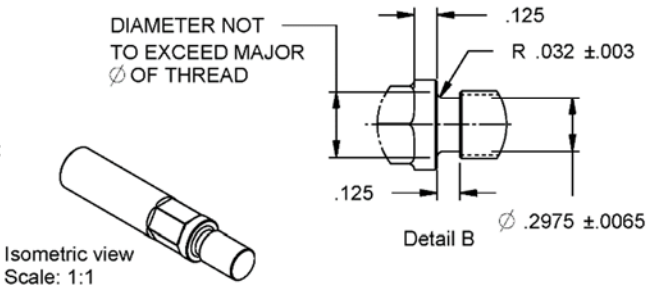


Figure 9003 Pilot guide pin
(Bearing cup removal)
Scale: 2:1

NOTES:

1. MATERIAL: 4130 STEEL OR EQUIVALENT.
2. TOLERANCES UNLESS OTHERWISE SPECIFIED:
   .XXX ± 0.010
   ANGULAR: ± 0.5°
3. BREAK CORNERS 0.010 MAX.
4. DIMENSIONS IN INCH UNITS.



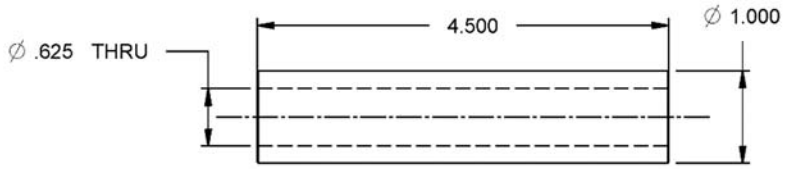
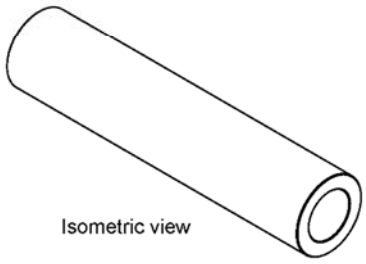


Figure 9004 Push bar
(Bearing cup removal)

NOTES:

1. MATERIAL: 4130 STEEL OR EQUIVALENT.
2. TOLERANCES UNLESS OTHERWISE SPECIFIED:
   .XXX ± 0.010
   ANGULAR: ± 0.5°
3. BREAK CORNERS 0.010 MAX.
4. DIMENSIONS IN INCH UNITS.



Figures 9003 and 9004 Bearing cup tools

SPECIAL EQUIPMENT AND CONSUMABLES

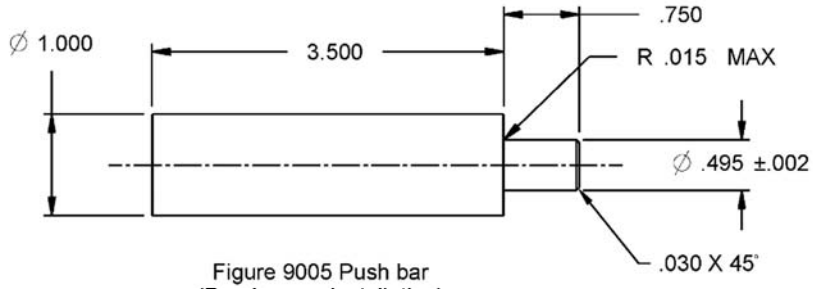
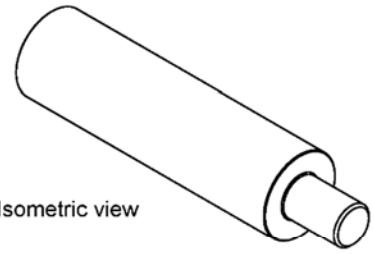


Figure 9005 Push bar
(Bearing cup installation)

NOTES:

1. MATERIAL: 4130 STEEL OR EQUIVALENT.
2. TOLERANCES UNLESS OTHERWISE SPECIFIED:
   .XXX ± 0.010
   ANGULAR: ± 0.5°
3. BREAK CORNERS 0.010 MAX.
4. DIMENSIONS IN INCH UNITS.



Isometric view

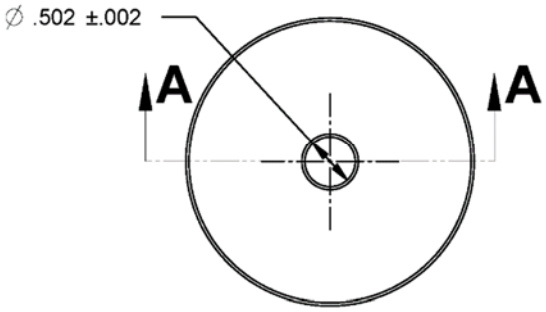
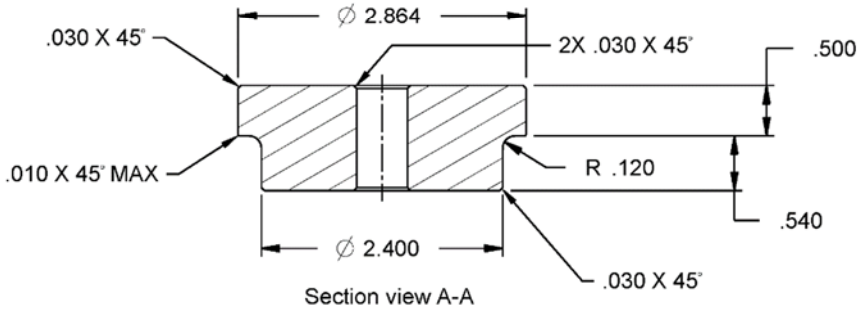


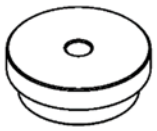
Figure 9006 Push plate
(Bearing cup installation)

NOTES:

1. MATERIAL: 4130 STEEL OR EQUIVALENT.
2. TOLERANCES UNLESS OTHERWISE SPECIFIED:
   .XXX ± 0.010
   ANGULAR: ± 0.5°
3. BREAK CORNERS 0.010 MAX.
4. DIMENSIONS IN INCH UNITS.



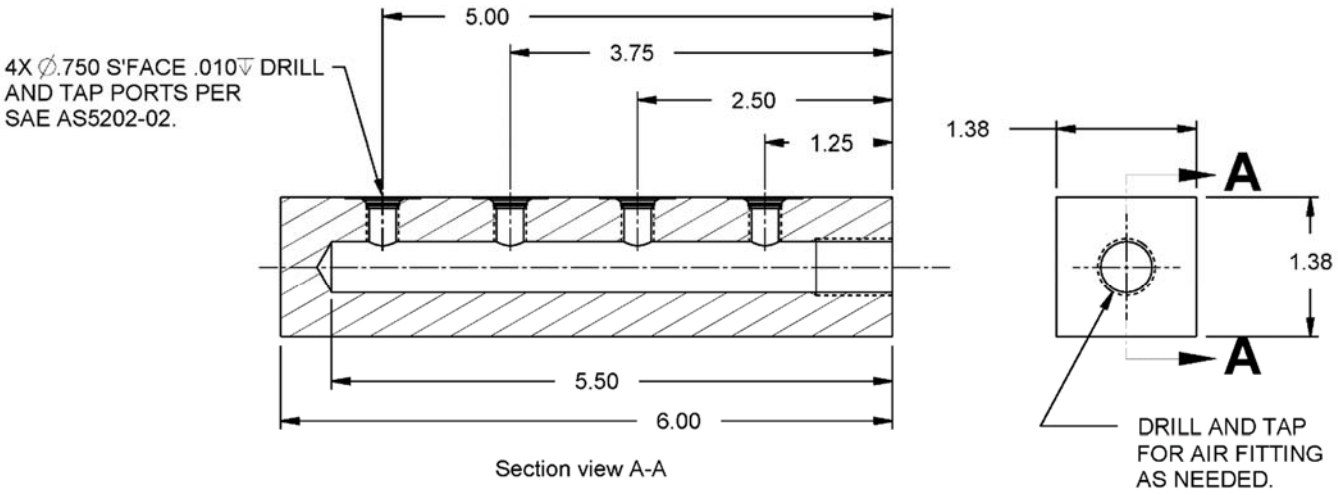
Section view A-A



Isometric view
Scale: 1:2

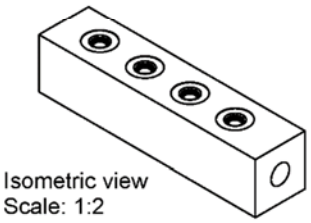
Figures 9005 and 9006 Bearing cup tools

SPECIAL EQUIPMENT AND CONSUMABLES



NOTES:

1. DIMENSIONS GIVEN ARE FOR A 4 PORT FIXTURE AND CAN BE ADJUSTED AS NEEDED.
2. MATERIAL: 4130 STEEL OR EQUIVALENT.
3. TOLERANCES UNLESS OTHERWISE SPECIFIED:
   .XXX ± 0.010
   .XX ±.03
4. BREAK CORNERS 0.010 MAX.
5. DIMENSIONS IN INCH UNITS.



Figures 9007 Air test fixture

ILLUSTRATED PARTS LIST

1. General

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

A. Explanation of columns

(1) Fig: Refers to the applicable illustrated parts figure. A hyphen "-" is used to indicate that the item is not illustrated.

(2) Item: Refers to the applicable item in the illustrated parts list figure.

(3) Units per assembly: Number of units required for the next higher assembly.
AR..... As Required (for bulk items) REF..... Reference
NP..... Item is Not Procurable

(4) CAGE: Commercial and Government Entity code of part supplier.

(5) Part No.: Part number of the item.

(6) Description: This column identifies the parts being listed by noun name followed by modifiers when applicable. An indenture system using dots are used to show the relationship of the parts to the assembly.

Assembly
- Subassembly or Item
- • Item

(7) Usable on code: This code is used to identify more than one configuration of the basic part number. Effectivity codes only apply to the figure in which they are used.

B. Part numbering system

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

C. Parts replacement data

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

Term	Abbreviation	Definition
Optional	OPT	This part is optional to and interchangeable with other parts in the same item number variant group or other item number if designated.
Superseded by	SUPSD BY	The part is replaced by and is not interchangeable with the item listed.
Supersedes	SUPSDS	The part replaces and is not interchangeable with the item listed.
Replaced by	REPLD BY	The part is replaced by and interchangeable with the item listed.
Replaces	REPLS	The part replaces and is interchangeable with the item listed.

D. Alpha variant item numbers

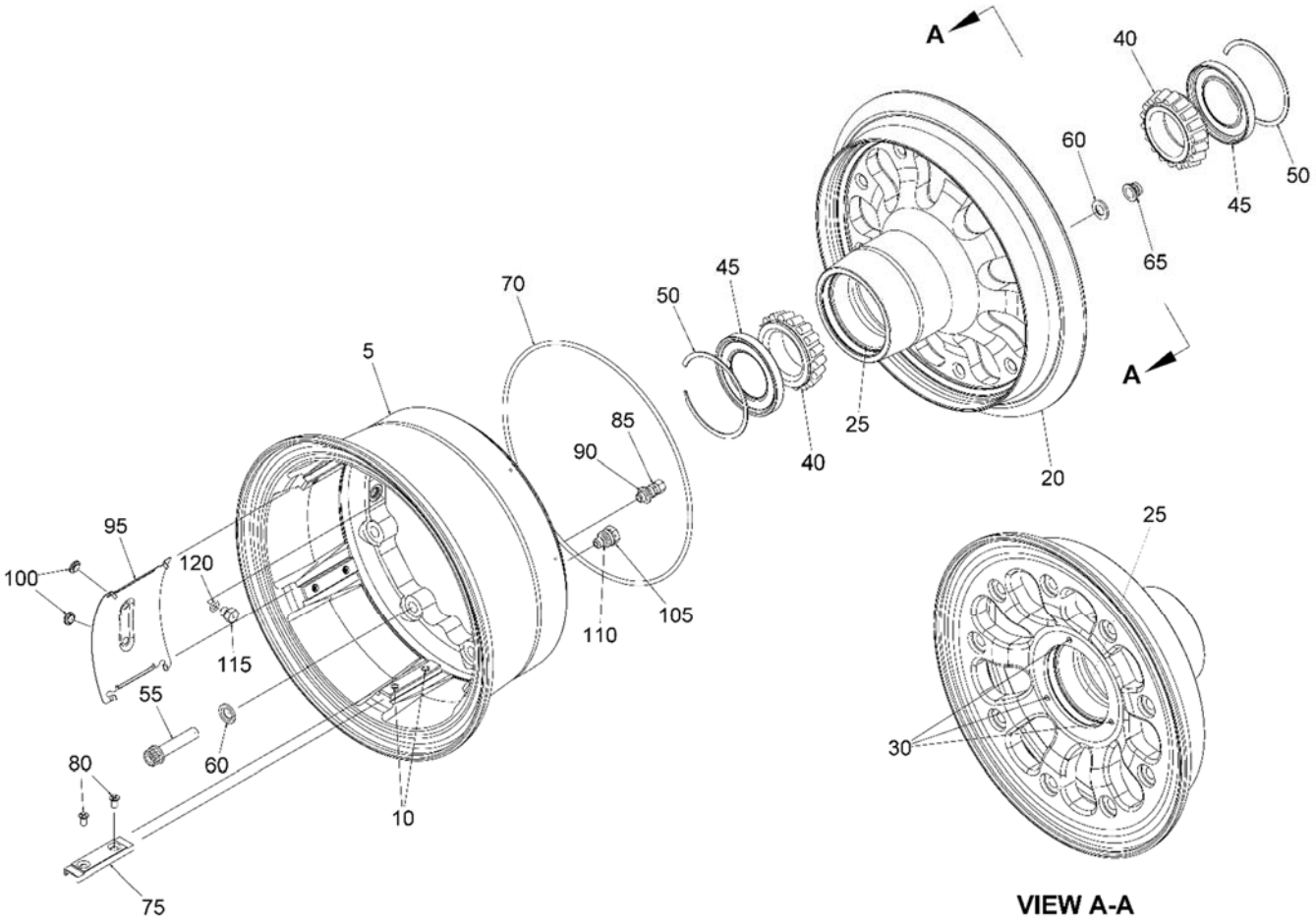
Alpha variants A through Z (except I and O) are assigned to existing numbers when necessary to show:

(1) Added items

(2) Modification or configuration differences

(3) Optional parts

ILLUSTRATED PARTS LIST



IPL Figure 1 Main wheel assembly, exploded view

ILLUSTRATED PARTS LIST

2. Detailed parts list

Fig	Item	Units per assembly	CAGE	Part no.	Description	Usable on code
1	1	REF	33269	40-480	Wheel assembly, main	
	5	1		161-24701	• Subassembly, wheel half, inboard	
	10	12		230-04700	• • Insert (MS21209F1-10L) or Heli-Coil® P/N 3591-3CNW190	
–	15	1		166-19700 [1]	• • Nameplate (when item 5 is ordered as spares)	
	20	1		162-24701	• Subassembly, wheel half, outboard	
	25	2		214-02900	• • Cup, bearing	
	30	3		230-04700	• • Insert (MS21209F1-10L) or Heli-Coil® P/N 3591-3CNW190	
–	35	1		166-19700 [1]	• • Nameplate (when item 20 is ordered as spares)	
	40	2		214-02800	• Cone, bearing	
	45	2		154-14000	• Seal, grease	
	50	2		155-04400	• Ring, retaining	
	55	9		103-26400	• Bolt, external wrenching (MS21250-06018)	
	60	18		095-03100	• Washer, countersunk (MS20002C6)	
	65	9		094-15800	• Nut (NAS1804-6N)	
	70	1		101-50268	• Packing, preformed (MS28775-268)	
	75	6		205-07200	• Key, drive	
	80	12		102-33300	• Screw (NAS1102E3-6)	
	85	1		160-03100	• Valve, inflation (MS27436C2) (Tire & Rim P/N TR 768-03)	
	90	1		- - - - - - - - -	• • Packing, preformed (MS9068-010 or AS3582-010) (Tire & Rim P/N TR RG-30)	
	95	6		157-06200	• Shield, heat	
	100	12		110-15300	• Bumper, heat shield	
	105	1		106-03400	• Disc, rupture	
	110	1		101-00500	• Packing, preformed (MS28775-010)	
	115	3		106-03300	• Plug, fusible	
	120	3		101-00500	• Packing, preformed (MS28775-010)	
–	125	1		166-19700 [1]	• Nameplate	

[1] Item 125, 166-19700, is used at the top assembly level to identify the 40-480 and at the wheel half subassembly level (item 15 or 35) to identify the 161-24701 and 162-24701 respectively when those items are ordered as spares.

STORAGE

1. General

Refer to IPL Figure 1 for component identification.

Wheel storage procedures differ depending on whether the wheels are stored with or without tires installed.

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

NOTE: Lubricate the bearing cups (25) and cones (40) with the wheel bearing grease and plug or cover bearing hub area during storage to prevent contamination.

2. Procedures

A. Wheels stored with tires installed

(1) The length of time that a wheel assembly can be stored is governed by the storage life of its rubber components. Basically, rubber components are considered to have a usable life of up to 10 years from the date of cure. The usable life may be shortened by exposure to sunlight, extreme temperatures, low humidity; and contamination by fluids; severe operating conditions, etc.

(2) The wheel assembly should be stored in a clean, dry storeroom. The desirable storeroom temperature range is from 50°F to 77°F. If this temperature range cannot be maintained, temperatures as high as 125°F and as low as -20°F can be tolerated for shorter periods. Total time above 100°F shall not exceed three months. The recommended storage pressure for tires is 10 psig.

(3) Plug or cover bearing hub area to prevent contamination of grease or bearing damage during storage of wheel.

B. Wheels stored without tires installed

(1) Short term storage of tubeless wheel assemblies may be stored with the wheel preformed packing installed between the two halves.

(2) Storage of components containing rubber longer than two years should be assembled without the preformed packing. Preformed packings to be placed in an ultraviolet protective package.

(3) The storage life of wheel assemblies (stored without rubber components installed) depends upon the storage conditions. Under ideal conditions, the storage life is indefinite. However, humid conditions will eventually lead to corrosion. Dust, dirt, or water will contaminate the wheel bearing grease etc.

(4) Plug or cover bearing hub area to prevent contamination of grease or bearing damage during storage of wheel.

SUPPLEMENTAL TYPE CERTIFICATE

10068773

This Certificate/Approval is issued by EASA, acting in accordance with Regulation (EU) 2018/1139 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 129 of that Regulation and in accordance with Commission Regulation (EU) No. 748/2012 to

PARKER HANNIFIN CORPORATION
AIRCRAFT WHEEL AND 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, if applicable, environmental protection requirements when operated within the conditions and limitations specified below:

Type Certificate Number: EASA.A.059
Type Certificate Holder: PIAGGIO AVIATION S.p.A.
Type: P.180
Model: Avanti, Avanti II
Original STC Number: FAA STC SA04348CH

Description of Design Change:
Installation of Parker Hanifin Corporation Aircraft Wheel & Brake Division, Wheel and Brake Conversion Kit, Part Number 199-283.

EASA Certification Basis:
The Certification Basis for the original product remains applicable to this certificate/ approval, except where amended by additional or later amendments if indicated on FAA STC.
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.

Associated Technical Documentation:
Document Number IM199-283, Kit Installation Publication: Main Wheel & Brake Conversion Kit Parker Hanifin Part No. 199-283, Revision A, dated 16 October 2018, or later FAA approved revision and drawing number

See Continuation Sheet(s)

For the European Aviation Safety Agency

Cologne, Germany, 14 February 2019

Dominique ROLAND
Head of General Aviation and
Remotely Piloted Aircraft Systems (RPAS)

50-166, Installation, Wheel & Brake Revision A, dated 30 November 2017, or later FAA approved revision.

Maintain aircraft wheels and brakes in accordance with FAA accepted Instructions for Continued Airworthiness, Document No. AMMS199-283, Revision N/C, dated 11 June 2018, or later FAA accepted revision.

Limitations/Conditions:
Prior to installation of this design change it must be determined that the interrelationship between this design change and any other previously installed design change and/ or repair will introduce no adverse effect upon the airworthiness of the product.

- End -

United States of America

Department of Transportation -- Federal Aviation Administration

Supplemental Type Certificate

Number SA04348CH

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*

*Original Product-Type Certificate Number :** A59EU

*Make :** Piaggio Aero Industries S.p.A.

*Model :** P-180

Description of Type Design Change:

Installation of Parker Hannifin Corporation, Aircraft Wheel & Brake Division, Wheel and Brake Conversion Kit, part number 199-283, in accordance with document number IM199-283, Kit Installation Publication: Main Wheel & Brake Conversion Kit Parker Hannifin Part No. 199-283, Revision A, dated October 16, 2018 or later FAA approved revision, and drawing number 50-166, Installation, Wheel & Brake, Revision A, dated November 30, 2017, or later FAA approved revision.

Limitations and Conditions:

1. A copy of this certificate shall be maintained as part of the permanent records for the modified aircraft.
2. Maintain aircraft wheels and brakes in accordance with FAA accepted Instructions for Continued Airworthiness, Document No. AMMS199-283, Revision N/C, dated June 11, 2018, or later FAA accepted revision.
3. Compatibility of the design change with previously approved modifications must be determined by the installer.
4. If the holder agrees to permit another person to use this certificate to alter a product, the holder must give the other person written evidence of that permission.

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

Date of application : April 6, 2017

Date of issuance : October 17, 2018

Date reissued :

Date amended :

By direction of the Administrator

(*Signature*)

Steven L. Lardinois
Manager, Systems Section
Chicago ACO Branch

(*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.

INSTRUCTIONS: The transfer endorsement below may be used to notify the appropriate FAA Regional Office of the transfer of this Supplemental Type Certificate.

The FAA will reissue the certificate in the name of the transferee and forward it to him.

TRANSFER ENDORSEMENT

Transfer the ownership of Supplemental Type Certificate Number _____

to *(Name of transferee)* _____

(Address of transferee) _____
(Number and street)

_____
(City, State, and ZIP code)

from *(Name of grantor) (Print or type)* _____

(Address of grantor) _____
(Number and street)

_____
(City, State, and ZIP code)

Extent of Authority (if licensing agreement): _____

_____

_____

_____

Date of Transfer: _____

Signature of grantor *(In ink)*: _____

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.