#### FAA-PMA

REV. A L 04-25-2016 (ECO-0048458 REV. AM 08-12-2020 (ECO-0115725 199-241 REV. NC

04-28-2000 (DCN 0339-28

#### AIRCRAFT WHEEL & BRAKE DIVISION PARKER HANNIFIN CORPORATION AVON, OHIO

#### PARTS LIST

#### 199-241 CONVERSION KIT

<u>PILATUS</u>

MODELS PC-12, PC-12/45, PC-12/47, and PC-12/47E

PART NUMBER	DRAWING REVISION	DESCRIPTION	<u>QUANTITY</u>
30-244	Rev. R dated 07-29-2015	Brake Assembly	2
40-424	Rev. T dated 06-27-2012	Wheel Assembly	2
221-01500		Pin, Cotter (Split), MS24665-69	2
199-251	Rev. NC dated 01-18-2001	Brake Pedal Lever Kit	1

#### Publication Package (P/N PP199-241)

IM199-241	Rev. K dated 02-06-2015	Installation Manual
50-155	Rev. C dated 03-08-2006	Installation Drawing
CM30-244	Rev. P dated 05-24-2020	Component Maintenance Manual – Brake
CM40-424	Rev. L dated 07-22-2020	Component Maintenance Manual - Wheel
PRM75	Rev. B dated 02-18-2016	Product Reference Memo
SA01376CH		Supplemental Type Certificate
EASA # 10027890		EASA Supplemental Type Certificate
ANAC # 2011503-19		ANAC (Brazil) Supplemental Type Certificate
AMMS199-241		Airplane Maintenance Manual Supplement
199-241AFMS		Airplane Flight Manual Supplement
		Pilot Operating Manual Inserts
		Product Registration Card

#### NOTES:

- 1. This kit will convert one aircraft to Cleveland Wheels and Brakes.
- 2. The 30-244 brake assembly is designed for use with MIL-H-83282 or MIL-PRF-83282 hydraulic fluid only.
- 3. The 40-424 wheel assembly is designed for use with an 8.50-10 10 PR TL tire.
- 4. Kit 199-251 contains all parts required for brake pedal replacement on Pilatus Models PC-12, PC-12/45, PC-12/47 and PC-12/47E, per Parker Hannifin Corp., Aircraft Wheel & Brake Conversion Kit 199-241 (Ref: Installation Manual IM199-241, Section 8.0). All parts are supplied by and FAA / JAA approved by Pilatus Aircraft Ltd. for use on PC-12 model aircraft.
- 5. A contract altered product configuration has been defined for this kit.

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## **Cleveland Wheels & Brakes**

## INSTALLATION MANUAL WITH ILLUSTRATED PARTS LIST

CONVERSION KIT PHC Part No. 199-241

PILATUS PC-12 Series PC-12, PC-12/45, PC-12/47, PC-12/47E

### IM199-241 Initial Issue August 01, 2000

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## **STOP!**

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



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<b>Revision</b>	<u>Date</u>	Section/Page No.	Description Of Change	<u>Apvd</u>
NC	08-01-2000	All sections/ All pages	Initial Release (DCN 0341-46)	BB
A	11-09-2000	Section 7.1	(NOW) "compatible with MIL-H-83282 or MIL-PRF-83282 hydraulic fluid only." (WAS) "compatible with MIL-H-5606 and MIL-H-83282 hydraulic fluid."	<b>BB</b> (DCN 0342-41)
		Section 8.4.2 d.	(NOW) "… two plain bushings" (WAS) "… four plain bushings"	
		Section 8.4.2 e.	<ul> <li>(NOW)</li> <li>"Discard the old lever assemblies (17) Pilatus P/N 532.42.12.058 [(including the two flange bushings (7), Pilatus P/N 914.14.11.109 (NAS77-3-011), which are fitted in the old lever assemblies (17)]. "</li> <li>(WAS)</li> <li>"Remove and discard the four flanged bushings (7), Pilatus P/N 914.14.109 (NAS77-3-011), which are fitted (1 each) in the old lever assemblies (Pilatus P/N 532.42.12.058. "</li> </ul>	
		Section 8.4.2 i to I	<ul> <li>Add new Para. i., remaning Para.'s renu (ADD)</li> <li>"i. If not already done, install the four new flanged bushings (7), Pilatus P/N 941.14.11.115 (NAS77-3-019), into the lever asseblies (17), Pilatus P/N 532.42.12.053. Insure that the bushing flange goes on the inside of the lever assembly fork. Each lever assembly requires two flanged bushings (7),"</li> </ul>	Imbered
		Section 8.4.2 m to p	Delete original Para. m (DELETE) "m. Install the four new flanged bushings (7) Pilatus P/N 941.14.11.115 (NAS77-3- 019), into the lever assemblies (17)."	),
		Section 9.2.2 g.	(NOW) " Aeroshell 22 Grease or MIL-G-4343 gr (WAS) " Aeroshell 22 Grease "	ease "



<b>Revision</b>	Date	Section/Page No.	Description Of Change	<u>Apvd</u>
В	01-18-2001	Table of Contents Page i	SECTIONS 11.0 & 13.0 titles: (NOW) "Pilot Operating Manual And Maintenance Manual Inserts" (WAS) "Pilot Operating Manual Inserts" (NOW) "List of Materials – 199-251 Kit" (WAS)	<b>BB</b> (DCN 0343-54)
		Section 1.2	(NOW) "Refer to Section 13.0, List of Materia Kit, which lists all parts (supplied in Wheel Conversion Kit 199-241) that are required to "	l – 199-251 & Brake for the Brake
			(WAS) "Refer to Section 13.0 for a list of parts included in Kit 199-241, to be obtained from required for the Brake"	s not n Pilatus,
		Section 10.0	(NOW) "Refer to the Airplane Equipment List, Pi No. 02047, located in the Pilot's Operating for the weight of the existing wheels and br (WAS)	latus Report Handbook akes"
		Section 10.1	"Weigh existing wheels and brakes         (NOW)         "Wheel assy         7.48 Kg. (16.5 lbs.)         Brake assy         12.56 Kg. (27.7 lbs.)         Total         20.04 Kg. (44.2 lbs.)"         (WAS)         "Wheel assy         16.5 lbs.         Brake assy         27.7 lbs.         Total         44.2 lbs."	
		Section 11.0	(NOW) "PILOT OPERATING MANUAL AND MAINTENANCE MANUAL INSERTS" (WAS) "PILOT OPERATING INSERTS" (NOW) "Inserts and supplements are" (WAS) "Inserts are"	



<u>Revision</u>	<u>Date</u>	Section/Page No.	Description Of Change	<u>Apvd</u>
В	01-18-2001	Section 11.0	(NOW) "Attach label in the Airplane Equipment List Section of the Pilot Operating Manual, as close as possible to the original entries labeled 'Hub, Main Wheel (2) (ea.)' and 'Assembly, Main Wheel Brake (2) (ea.).' " (WAS) "Attach label in pilot operating manual as close as possible to the original section labeled <u>Main Wheel Assembly</u> . "	BB
			Insert Reprint revised as follows: 2 places, (ADD)  "6.25  m"	
			Brake Weight: (NOW) "12.56 Kg. ea." (WAS) "27.7 Lb. ea."	
			Wheel Weight: (NOW) "7.48 Kg. ea." (WAS) "16.5 Lb. ea."	
			<ul> <li>(ADD)</li> <li>"An Airplane Flight Manual Supplement"</li> <li>(ADD)</li> <li>"An Airplane Maintenance Manual Supplement .</li> </ul>	"
		Section 12.0	(ADD) Line Item for 199-251 Kit " (4) 199-251 Brake Pedal Lever Kit" Qty "1	33
			<ul> <li>(ADD) Document Number: "AMMS199-241</li> <li>(ADD) Line Item</li> <li>"199-241 AFMS Airplane Flight Manual Supplement" Qty "1"</li> <li>(NOW)</li> <li>"Supplemental Type Certificate SA01376CH for (PC-12 &amp; PC-12/45)"</li> <li>(WAS)</li> <li>"Supplemental Type Certificate (PC-12 &amp; PC-12/45)"</li> <li>(ADD) Note 4</li> <li>"(4) For identification of Pilatus parts included in</li> </ul>	"
			Kit 199-251, refer to Section 13.0"	I
		Section 13.0	Title: (NOW) " –199-251 Kit" (WAS) " – Operator Supplied"	



<u>Revision</u>	Date	Section/Page No.	Description Of Change	<u>Apvd</u>
С	03-29-2001	Section 9.2.2. b.	(NOW) "…five screws (item 135…)" (WAS) "…five screws (item 120…)" (D	<b>BB</b> DCN
		Section 9.2.2. c.	(NOW) "by removing nuts (item 15)" 0 (WAS) "by removing (item 15)"	344-87)
		Section 9.2.2. d.	(NOW) "Remove the retaining rings (item 75), grease seals (item 70) and bearing cones (item 65), from the" (WAS) "Remove the retaining rings (item 60), grease seals (item 55) and bearing cones (item 50), from the"	
		Section 9.2.2. f.	(NOW) "inboard wheel half subassembly (item 25), on a clean," (WAS) "inboard wheel half subassembly (item 30), on a clean,"	
		Section 9.2.2. h.	(NOW) "outboard wheel half subassembl (item 45), on a flat surface" (WAS) "outboard wheel half subassembl (item 35), on a flat surface"	ly Y
		Section 9.2.2. i.	(NOW) "air valve assembly, (item 80)" (WAS) "air valve assembly, (item 65)"	
		Section 9.2.2. k.	(NOW) "lubricate bolt (item 5)" (WAS) "lubricate (item 5)"	
		Section 9.2.2. m.	(NOW) "located on the outboard wheel h subassembly (item 45)" (WAS) "located on the outboard wheel ha subassembly (item 35)"	alf alf
		Section 9.2.2. t.	(NOW) "Attach fairing (item 130) onto outboardwith screws (item 135)" (WAS) "Attach fairing (item 115) onto outboardwith screws (item 120)"	
D	06-20-2001	Section 1.2	(ADD) Note: Instead of using kit 199-25 , the installer has the option to purchase the brake pedal lever replacement parts of directly from Pilatus Business Aircraft. In the case, order "199-241 Kit – Less Brake Peo Lever Retrofit"	1 <b>BB</b> (DCN 0346-57) nis dal
		Section 13.0 Section 13.0	<ul> <li>(ADD) (2)</li> <li>(ADD) (2) Optional to install Pilatus parts</li> <li>(purchased from Pilatus Business Aircraft)</li> <li>listed, in lieu of kit 199-251. In this case, or</li> <li>"199-241 Kit – Less Brake Pedal Lever Ret</li> </ul>	as rder rofit."



Re	<u>evision</u>	Date	Section/Page No.	Description Of Change	<u>Apvd</u>
	E	05-10-2004	Section 8.4.2	(NOW) assemblies (WAS) asseblies	<b>BB</b> (DCN 0361-04)
		Section 9.2.2	(NOW) "Remove the five screws (item 1 ref. CM40-424 IPL Fig. 1) and five washers (item 145 ref. CM40-42 Fig. 1), that attach the fairing and remove wheel fairing." (WAS) "Remove the five screws (item 1 ref. CM40-424 IPL Fig. 1), that and the fairing and remove wheel fair	35 - /e 4 IPL d 35 - ttach ring."	
			Section 9.2.2	(NOW) "Install five grommets (item 140 - IPL Fig. 1) into fairing (item 130 IPL Fig. 1). Apply MIL-T-83483 a of fasteners and threads of faster ref. CM40-424 IPL Fig. 1). Insta (item 145 – ref. CM40-424 IPL F fastener (item 135 – ref. CM40-4 Attach fairing (item 130 – ref. CM Fig. 1) to outboard wheel half su 45 ref. CM40-424 IPL Fig1). Tor (item 135 – ref. CM40-424 IPL F in-lb (2.26 to 2.82 N-m). Note th designed to bottom in the wheel compressing the grommet."	- ref. CM40-424 - ref. CM40-424 anti-seize to end eners (item 135 – Il one washer ig. 1) onto each 424 IPL Fig. 1). A40-424 IPL bassembly (item rque fasteners ig. 1) to 20 to 25 at the screw is before fully
			(WAS) "Attach fairing (item 130 - ref. CM Fig. 1) onto outboard wheel half with screws (item 135 - ref. CM4 and torque fasteners to 35 to 45 5.08 N-m)."	M40-424 IPL subassembly 0-424 IPL Fig. 1) in-lb (3.95 to	
F	12-19-2	2006	Title Page, Sections 3.1 & 12.0	(ADD) new Aircraft Model "PC-1	2/47" <b>BB</b> (DCN 0373-03)
G	05-22-2	2008	Title Page, Sections 3.1 & 12.0	(ADD) new Aircraft Model "PC-1	2/47E" <b>BB</b> (DCN 0380-07)



<u>Date</u> 08-25-2008	Section/Page No.	Descri (DCN (	<b>ption Of Change</b> 0381-47)	<u>Apvd</u>
	Section 6.0/pg 2	(NOW) (WAS)	www.parker.com www.parker.com/cleveland	
	Section 8.0/pg 3	(NOW) "A Pila Numbe (WAS) "A Pila Numbe	tus design change at Aircraft Serial er MSN 231 through 475 incorporate tus design change at Aircraft Serial er MSN 231 incorporated…"	d"
	Section 8.1/pg 3 para b.	(NOW) "All Air 475." (WAS) "All Air subsec	craft, Serial Numbers MSN 231 throu craft, Serial Numbers MSN 231 and juent."	ugh
	Section 8.1/pg 3 para. c.	(ADD) c. If co have 476 asse 959	nverting PC-12 aircraft MSN 101-47 e incorporated Pilatus SB32-013 or N and on that are equipped Goodrich embly P/N 2-1674-1 (Pilatus P/N .56.01.512), please complete the foll	5 that VISN brake lowing:
		(1)	If converting PC-12 aircraft MSN 10 that have incorporated Pilatus SB32 or MSN 231 through 475, verify that aircraft is equipped with four Pilatus levers P/N 532.42.12.053. If the air not equipped with Pilatus pedal leve 532.42.12.053, please refer to para 8.0. Replace Pilatus brake hydraulic line 532.45.12.063 and 532.45.12.064 w Pilatus brake hydraulic line P/Ns 532.45.12.059 (LH) and 532.45.12.0	01-230 2-004 t the s pedal craft is ers P/N graph e P/Ns vith 060
	Date 08-25-2008	Date 08-25-2000Section 6.0/pg 2Section 8.0/pg 3Section 8.1/pg 3 para b.Section 8.1/pg 3 para. c.	Date 08-25-2008Section/Page No. (DCN ( Section 6.0/pg 2Descri (DCN ( WAS))Section 6.0/pg 2(NOW) (WAS)Section 8.0/pg 3(NOW) "A Pilai Number (WAS) "A Pilai Number (WAS)) "A Pilai Number (WAS)) "All Aim subsect Section 8.1/pg 3 para. c.(NOW) "All Aim subsect (ADD) c. If co have 476 assec 959. (1)(1)	Date 08-25-2008Section/Page No.Description Of Change (DCN 0381-47)Section 6.0/pg 2(NOW) www.parker.com (WAS) www.parker.com/clevelandSection 8.0/pg 3(NOW) "A Pilatus design change at Aircraft Serial Number MSN 231 through 475 incorporate (WAS) "A Pilatus design change at Aircraft Serial Number MSN 231 through 475 incorporate (WAS) "A Pilatus design change at Aircraft Serial Number MSN 231 incorporated"Section 8.1/pg 3 para b.(NOW) "All Aircraft, Serial Numbers MSN 231 throu 475." (WAS) "All Aircraft, Serial Numbers MSN 231 and subsequent."Section 8.1/pg 3 para. c.(ADD) c. If converting PC-12 aircraft MSN 101-47 have incorporated Pilatus SB32-013 or 1 476 and on that are equipped Goodrich assembly P/N 2-1674-1 (Pilatus P/N 959.56.01.512), please complete the fol (1) If converting PC-12 aircraft MSN 10 (1) If converting PC-12 aircraft MSN 10 expression of MSN 231 through 475, verify that aircraft is equipped with four Pilatus S32.42.12.053, please refer to para 8.0.(2)Replace Pilatus brake hydraulic line P/Ns S32.45.12.065 (LH) and 532.45.12.059 (LH) and 532.45.12.059



<u>Revision</u> J	<u>Date</u> 01-20-2010	Section/Page No.	Description Of ChangeApvd(DCN 0387-84)
		Section 8.0/pg 3	(ADD) <b>NOTE</b> : Pilatus introduced the model PC-12/478 with four brake pedal levers, P/N 532.42.12.088, installed. Brake pedal lever 532.42.12.088 is the same as 532.42.12.053 except for the color and is considered equivalent to the original design.
		Section 8.1/pg 3 Para. a.	(NOW) a. Aircraft Serial Numbers up to and including MSN 230 which meet both of the following conditions:
			<ol> <li>Were modified per Pilatus Service Bulletin 32 004 to use brake pedal levers P/N 532.42.12.058.</li> </ol>
			<ol> <li>Did not complete Pilatus Service Bulletin 32- 013 to replace brake pedal levers 532.42.12.058 with either brake pedal levers 532.42.12.053 or 532.42.12.088.</li> </ol>
			(WAS) a. Aircraft up to and including Serial Numbers MSN 230, only those modified per Pilatus Service Bulletin 32-004 to use Brake Lever Assembly P/N 532.42.12.058.
		Section 8.1/pg 3	(NOW)
		Para. b.	<ul> <li>All Aircraft, Serial Numbers MSN 231 up to MSN 475 that have not incorporated Pilatus Service Bulletin Number 32-013.</li> </ul>
			<b>NOTE:</b> All Aircraft MSN 476 and subsequent, delivered with steel brakes were also delivered with either pedal levers 532.42.12.053 or 532.42.12.088 installed.
			(WAS) b. All Aircraft, Serial Numbers MSN 231 through 475.
		Pages 4 to 16	(ADD) page 16 to accommodate changes.



<u>Revision</u>	<u>Date</u>	Section/Page No.	Description Of Change	<u>Apvd</u>
K	02-06-2	2015 as follows	as follows (ECO-0048458)	B.K.
(UPDATE) (NOW) on	TOC (pg pg 14:	i) to reflect page number u	pdates	
9.4	BRAKE LIN	NING CONDITIONING		
	To provide condition (g	optimum service life of the brake li glaze) the linings per the following p	ning material, it is necessary to properly procedure:	
	NOTE: If	the brakes are used exclusively for	r low speed (below 25 knots ground speed)	
	a. Perform	n two (2) consecutive full stop braki	ing applications (with flaps up and no reverse	
	(1) Fo	or aircraft take-off weight up to 870	00 lbs: 40-45 knots at one of the following:	
	•	6.0 ft/sec <sup>2</sup> deceleration 380-480 ft stop distance 11.0-13.0 second stop time		
	(2) Fo	or aircraft take–off weight from 870 illowing:	1 to 9800 lbs: 37-42 knots at one of the	
	•	6.0 ft/sec <sup>2</sup> deceleration 330-420 ft stop distance 10.0-12.0 second stop time		
	(3) Fo	or aircraft take–off weight over 980	0 lbs: 33-40 knots at one of the following:	
	•	6.0 ft/sec <sup>2</sup> deceleration 230-380 ft stop distance 9.0-11.0 second stop time		
	NOTE:	Do not allow or permit the brake	to cool substantially between stops.	
	b. After, ba	ack to back conditioning stops, allo	w the brakes to cool for ten to fifteen minutes.	
	c. Apply th	he brakes and check for restraint a	t high static throttle.	
	<u>NOTE:</u>	This step is to be done <b>ONLY</b> aft of itself. New brakes may pass t conditioning is still mandatory to	er steps 1 and 2 are completed and not in and his step right from the onset, however, ensure optimum service life.	
	(1) If	the brakes hold, the conditioning is	s complete.	
	(2) If ar	brakes cannot hold aircraft during nd repeat steps a. through c.	static run-up, allow brakes to cool completely	
(WAS) on p	og 13:			
9.4	BRAKE LI	NING CONDITIONING		
	When new follows:	/ brake rotor discs are installed, it	is important to condition them. Condition discs as	i
	a) Perfo allow b) Allow c) Apply	orm two (2) consecutive full stop b r the brake to cool substantially be r the brakes to cool for ten to fifte y the brakes and check for restrai	praking applications from 30 to 35 knots. Do not etween the stops. en minutes. nt at high static throttle. If brakes hold,	
	condi d) If bra repea	itioning is complete. ikes cannot hold aircraft during st at steps a through c.	atic run-up, allow brakes to cool completely and	
(MOVE) Se	ections 10	.0, 10.1, 11.0, 12.0, 13.0, t	o next page in sequence	



#### 1.0 INTRODUCTION

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

#### 1.1 PURPOSE

This manual provides the necessary procedures to accomplish the installation of a Cleveland Conversion Kit. For information regarding service limits, maintenance and component overhaul, a copy of the Cleveland Wheels and Brakes Component Maintenance Manuals, CM30-244 and CM40-424 are included in this kit. The manuals should be passed on to the owner or retained by the maintenance facility for future reference.

#### 1.2 KIT EQUIPMENT

Each kit contains all materials needed to replace existing equipment with Cleveland Wheels and Brakes. Kit 199-241 will completely retrofit one aircraft to Cleveland main wheels and brakes. For aircraft Serial Numbers MSN 231 and on, and for aircraft, Serial Numbers up to and including MSN 230, those which have incorporated Pilatus Service Bulletin No. 32-004, replacement of the Brake Pedal Levers is required as part of this installation. Refer to Section 13.0, List of Material - 199-251 Kit, which lists all parts (supplied in Wheel & Brake Conversion Kit 199-241) that are required for the Brake Pedal Lever replacement. Refer to Section 12.0, Kit Parts List, for a list of parts included in Kit 199-241. Note: Instead of using kit 199-251, the installer has the option to purchase the brake pedal lever replacement parts directly from Pilatus Business Aircraft. In this case, order "199-241 Kit – Less Brake Pedal Lever Retrofit".

#### 2.0 TSO NOTICE

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

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

#### 3.0 APPLICABILITY

#### 3.1 KIT 199-241

The equipment supplied under Kit No. 199-241 is applicable to the following aircraft.

MAKE	MODELS
Pilatus	PC-12, PC-12/45, PC-12/47 & PC-12/47E

#### TABLE I, APPLICABILITY



#### 4.0 <u>SAFETY</u>

Always follow proper safety precautions when handling or servicing any aircraft braking system or component(s) of such systems.

<u>CAUTIONS</u> and <u>WARNINGS</u> are noted throughout this manual, where applicable. Follow them when servicing aircraft wheel and brake equipment.

#### 5.0 PRODUCT REGISTRATION

The product registration card is located at the front of this manual. The card is our way of tracking the conversion kits and your guarantee of receiving any future airworthiness information applicable to Conversion Kit No. 199-241. Please fill out the registration card completely and return promptly. Postage is prepaid.

#### 6.0 ORDER INFORMATION

To order spare parts, contact Pilatus Business Aircraft or contact Aircraft Wheel and Brake at the following address or numbers:

Parker Hannifin Corporation Aircraft Wheel & Brake Division 1160 Center Road Avon, Ohio 44011 U.S.A. Attn: Technical Services/Hotline Phone: 1-800-272-5464 Fax: (440) 937-5409 www.parker.com Pilatus Business Aircraft Jeffco Airport 11755 Airport Way Broomfield, Colorado 80021 U.S.A. Phone: 303-465-9099 Fax: 303-465-9190 www.pc12.com

#### 7.0 EQUIPMENT DESCRIPTION

#### 7.1 BRAKE ASSEMBLY

The brake is a piston actuated, hydraulically operated, 3-rotor steel disc unit that is designed to be compatible with MIL-H-83282 or MIL-PRF-83282 hydraulic fluid only. The brake assembly is a non-handed unit and can be used on the opposite side of the aircraft by simply switching the fittings on top of the brake cylinder to the opposite port. The brake cylinder is machined from forged aluminum alloy.

#### 7.1.1. Brake Operation

Braking action begins when hydraulic pressure is applied to the brake, via the pilot's or co-pilot's master cylinder. The hydraulic pressure forces the brake pistons outward against the pressure plate (with wear pads) which compresses the brake stack (the rotor discs and stator discs) against the torque tube (with wear pads). This action creates frictional force. The pressure plate and two stationary discs have 6 slots which are driven by the 6 torque tube drive keys. The resulting torque is transmitted to the torque tube keys and transferred to the wheel/tire through the three rotors; which have drive slots to engage the main wheel drive keys. This action slows the aircraft.



#### 7.2 WHEEL ASSEMBLY

The wheel assembly is a 7.50-10 wheel designed for use with an 8.50-10 10PR tubeless tire. The divided type main wheel facilitates tire installation and removal. The two wheel halves are fastened together with high strength bolts, double countersunk washers and self-locking nuts. The wheel halves are machined from forged aluminum alloy.

#### 8.0 REPLACE BRAKE PEDAL LEVERS

A Pilatus design change at Aircraft Serial Number MSN 231 through 475 incorporated the use of Pilatus Lever Assembly, PN 532.42.12.058, replacing original Lever Assembly P/N 532.42.12.053. This change may have also been incorporated on earlier Serial Number Aircraft (e.g. MSN 101 through 230) per Pilatus Service Bulletin No. 32-004. Since the Cleveland brakes work best with the original brake pedal lever design, it is required to replace Lever Assembly P/N 532.42.12.058 (if so equipped) with P/N 532.42.12.053.

**NOTE:** Pilatus introduced the model PC-12/47E with four brake pedal levers, P/N 532.42.12.088, installed. Brake pedal lever 532.42.12.088 is the same as 532.42.12.053 except for the color and is considered equivalent to the original design.

#### 8.1 EFFECTIVITY

a. Aircraft Serial Numbers up to and including MSN 230 which meet both of the following conditions:

1. Were modified per Pilatus Service Bulletin 32-004 to use brake pedal levers P/N 532.42.12.058.

2. Did not complete Pilatus Service Bulletin 32-013 to replace brake pedal levers 532.42.12.058 with either brake pedal levers 532.42.12.053 or 532.42.12.088.

- b. All Aircraft, Serial Numbers MSN 231 up to MSN 475 that have not incorporated Pilatus Service Bulletin Number 32-013.
  - **NOTE:** All Aircraft MSN 476 and subsequent, delivered with steel brakes were also delivered with either pedal levers 532.42.12.053 or 532.42.12.088 installed.
- c. If converting PC-12 aircraft MSN 101-475 that have incorporated Pilatus SB32-013 or MSN 476 and on that are equipped with Goodrich brake assembly P/N 2-1674-1 (Pilatus P/N 959.56.01.512), please complete the following:
  - (1) If converting PC-12 aircraft MSN 101-230 that have incorporated Pilatus SB32-004 or MSN 231 through 475, verify that the aircraft is equipped with four Pilatus pedal levers P/N 532.42.12.053. If the aircraft is not equipped with Pilatus pedal levers P/N 532.42.12.053, please refer to paragraph 8.0.
  - (2) Replace Pilatus brake hydraulic line P/Ns 532.45.12.063 and 532.45.12.064 with Pilatus brake hydraulic line P/Ns 532.45.12.059 (LH) and 532.45.12.060 (RH).



#### 8.2 **DESCRIPTION**

- a. Remove both crew seats.
- b. Remove and discard the lever assemblies (Pilatus P/N: 532.42.12.058) and install the new lever assemblies (Pilatus P/N: 532.42.12.053).
- c. Adjust the brake rod length to 276 mm, between the rod end centers.
- d. Install both crew seats.

#### 8.3 REFERENCES

- a. Pilatus Service Bulletin 32-004.
- b. Pilatus PC12 Aircraft Maintenance Manual (AMM), Chapters 25-10-01 and 25-10-03.
- c. Pilatus PC12 Illustrated Parts Catalog (IPC), Chapters 27-20-00, Fig.03 and 32-40-00, Fig. 04.







#### 8.4 INSTRUCTIONS

#### 8.4.1. Preparation

- a. Prepare the aircraft for servicing in a hangar.
- b. Remove the LH bulkhead from behind the Pilot's seat (Ref. AMM 25-10-03, Page Block 401).
- c. Remove both crew seats (Ref. AMM 25-10-01, Page Block 401).

#### 8.4.2. Replace the Lever Assemblies (Ref. Fig. 8.4.2)

- **NOTE:** The procedure that follows is applicable to the two pilot side pedal assemblies, and must be repeated for the co-pilot side (Ref. Pilatus PC12 IPC 32-40-00, Fig. 04 and 27-20-00, Fig. 03).
- a. Remove and discard the cotter pins (1).
- b. Remove the nuts (2), the washers (3), and the bolts (4), which attach the brake master cylinders (10) to each lever assembly (17).
- c. Remove the nuts (9), the washers (6) and the bolts (5), which attach the lever assemblies (17) to the upper rod end (18) of each brake rod (11).
- Remove and discard the two plain bushings (8), Pilatus P/N 941.14.12.108 (NAS75-3-008), which are fitted (1 each) in the old lever assemblies (Pilatus P/N 532.42.12.058).
- e. Discard the old lever assemblies (17) Pilatus P/N 532.42.12.058 [(including the two flange bushings (7), Pilatus P/N 914.14.11.109 (NAS77-3-011), which are fitted in the old lever assemblies (17)].
- f. Remove and discard the cotter pin (16).
- g. Remove the nut (15), the washers (14 and 13) and the bolt (12) which attach the lever assemblies (17) to the pedal installation.
- h. Remove and discard the lever assemblies (17), Pilatus P/N 532.42.12.058.
- If not already done, install the four new flanged bushings (7), Pilatus P/N 941.14.11.115 (NAS77-3-019), into the lever assemblies (17), Pilatus P/N 532.42.12.053. Insure that the bushing flange goes on the inside of the lever assembly fork. Each lever assembly requires two flanged bushings (7).
- j. Install the new lever assemblies (17), Pilatus P/N 532.42.12.053, with the bolt (12), the washers (13 and 14) and the nut (15).
- k. Install the lever assemblies (17) onto the brake master cylinders (10) with the bolts (4), the washers (3) and the nuts (2).







- I. Check that each brake rod length is 276 mm between centers of the upper and lower rod ends. If not correct do as follows:
  - 1. Undo upper and lower lock-nuts (19 and 20).
  - 2. Turn brake rod body (11) to get the distance of 276 mm between centers of the upper and lower rod ends.
  - 3. Tighten the two lock-nuts (19 and 20).
- m. Do a safety check on each brake rod.
- n. Install the upper rod end (18) of each push rod (11) into the lever assemblies (17) with the bolts (5), the washers (6) and the nuts (9).
- o. Safety the nuts (15) with new cotter pins (16).
- p. Safety the nuts (2) with new cotter pins (1).

#### 8.4.3. Close up

- a. Make sure that the work area is clean and clear of tools and other items.
- b. Install both crew seats (Ref AMM 25-10-01, Page Block 401).
- c. Install the LH bulkhead (Ref. AMM 25-10-03, Page Block 401).

#### 9.0 KIT INSTALLATION



#### 9.1 REMOVE EXISTING EQUIPMENT

- a. Jack and support aircraft in accordance with Pilatus aircraft maintenance manual.
- b. Remove existing main gear wheels per Pilatus aircraft maintenance manual.
- c. Disconnect the brake from hydraulic pipe: Pilatus P/N 532.45.12.059 (left side) or P/N 532.45.12.060 (right side). Plug hydraulic pipe.
- d. Remove existing main gear brakes per Pilatus aircraft maintenance manual.
  - **NOTE:** Discard existing brake mounting nuts and washers. New brake attachment fasteners are supplied with the 30-244 brake assembly:

103-26400 Bolts, Qty 6 (item 20 - ref. CM30-244 IPL Fig. 1). 095-03100 Washers, Qty 12 (item 25 - ref. CM30-244 IPL Fig. 1). 094-15800 Nuts, Qty 6 (item 30 - ref. CM30-244 IPL Fig. 1).



#### 9.2 INSTALL CLEVELAND EQUIPMENT (Refer to Installation Drawing 50-155)

**<u>NOTE</u>**: For parts identification not found on drawing 50-155, refer to component maintenance manuals CM30-244 and CM40-424.

#### 9.2.1. Brake Installation

- a. The brakes are shipped from the factory as a complete assembly and may be installed as is.
- b. Prior to installing brake strut mounting hardware, lubricate bolt (item 20 ref. CM30-244 IPL Fig. 1) and nut (item 30 - ref. CM30-244 IPL Fig. 1) threads and bearing surfaces of bolt heads, washers (item 25 - ref. CM30-244 IPL Fig. 1) and nuts with anti-sieze compound, per MIL-T-83483. Refer to Figure 9.2.1.



Lubricating Mounting Hardware Figure 9.2.1

- c. Mount brake assembly onto the landing gear strut. Install (item 20 ref. CM30-244 IPL Fig. 1), washers (item 25 ref. CM30-244 IPL Fig. 1), and nuts (item 30 ref. CM30-244 IPL Fig. 1), and torque to 350-360 in-lb (39.54 to 40.67 N-m). The bolts shall be installed as shown on drawing 50-155. The countersunk side of washer (item 25 ref. CM30-244 IPL Fig. 1) shall interface with the bolt head.
- **NOTE:** The brakes are non-handed. The inlet fitting and bleeder may be exchanged as needed.



- **<u>NOTE</u>**: Clearance of .118 in. (3 mm) minimum is required between the hydraulic pipe and the landing gear trailing arm.
- d. Re-attach hydraulic pipe: Pilatus P/N 532.45.12.059 (left side) or P/N 532.45.12.060 (right side) to brake inlet fitting. Torque snug to preclude leakage.

**NOTE:** Hydraulic pipe should be tension free.

#### 9.2.2. Wheel Installation

a. The wheel assemblies are shipped from the factory as a complete assembly. The bearings are packed with Aeroshell 22 grease per MIL-G-81322 and installed in the wheel halves.

**NOTE:** Extended storage of lubricated bearings may require re-lubrication.

- b. Remove the five screws (item 135 ref. CM40-424 IPL Fig. 1) and five washers (item 145 ref. CM40-424 IPL Fig. 1), that attach the fairing and remove wheel fairing.
- c. Separate the wheel half subassemblies by removing nuts (item 15 ref. CM40-424 IPL Fig. 1), washers (item 10 ref. CM40-424 IPL Fig. 1), and bolts (item 5 ref. CM40-424 IPL Fig. 1).
- d. Remove the retaining rings (item 75 ref. CM40-424 IPL Fig. 1), grease seals (item 70 ref. CM40-424 IPL Fig. 1) and bearing cones (item 65 ref. CM40-424 IPL Fig. 1), from the outboard wheel half subassembly.
- e. Inspect bearing cones, for contamination and/or solidification. If not already lubricated, pack bearings with Aeroshell 22 grease per MIL-G-81322. Install cones, grease seals, and retaining rings.
- f. Place inboard wheel half subassembly (item 25 ref. CM40-424 IPL Fig. 1), on a clean, flat work surface with flange side down. Clean wheel flange, bead seat register and packing groove with a clean cloth dampened with isopropyl alcohol.



- **<u>CAUTION</u>**: THE PREFORMED PACKING (item 20 ref. CM40-424 IPL Fig. 1) MUST SEAT UNIFORMILY WITHOUT STRETCHING OR TWISTING.
- g. Lubricate wheel register preformed packing (item 20 ref. CM40-424 IPL Fig. 1) with a light coat of Aeroshell 22 Grease or MIL-G-4343 grease and install in wheel register groove of inboard wheel half subassembly (item 25 ref. CM40-424 IPL Fig. 1).
- h. Position outboard wheel half subassembly (item 45 ref. CM40-424 IPL Fig. 1), on a flat surface with the register side facing up.
- i. Place a serviceable 8.50-10, 10 PR tubeless tire over outboard wheel half subassembly, aligning the red balancing dot on the tire adjacent to the air valve assembly, (item 80 ref. CM40-424 IPL Fig. 1).
- j. Position the inboard wheel half subassembly in the tire so that the bolt holes in both wheel halves are aligned.
- k. Prior to installing wheel assembly hardware, lubricate bolt (item 5 ref. CM40-424 IPL Fig. 1) and nut (item 15 ref. CM40-424 IPL Fig. 1) threads and bearing surfaces of bolt heads, washers (item 10 ref. CM40-424 IPL Fig. 1) and nuts with anti-sieze compound, per MIL-T-83483. Refer to Figure 9.2.1.
- I. Slide a double countersunk washer (item 10 ref. CM40-424 IPL Fig. 1) onto each bolt (item 5 ref. CM40-424 IPL Fig. 1).
  - **<u>CAUTION</u>**: DO NOT USE IMPACT OR POWER WRENCHES TO INSTALL WHEEL NUTS AND BOLTS.
- m. Insert bolts with washer into the inboard wheel half subassembly. Compress the wheel halves together and install remaining double countersunk washers and nuts onto each of the nine bolts, thus fastening the wheel half subassemblies together.
  - **NOTE:** The nuts (item 15 ref. CM40-424 IPL Fig. 1) should be located on the outboard wheel half subassembly (item 45 ref. CM40-424 IPL Fig. 1) side.
- n. Preliminary torque nuts to 190 in-lb maximum (21.46 N-m) in criss-cross pattern. Final torque nuts to 170 to 190 in-lb (19.21 to 21.46 N-m) in clockwise sequence. Refer to Figure 9.2.2.
  - **NOTE:** A stripe of paint or inspector torque seal should be painted on the nuts and bolts (after final torquing) such that any rotation of the nuts relative to the bolts will be indicated by a broken stripe.





Bolt Torquing Procedure Figure 9.2.2



INFLATION OF THE TIRE CAN BE EXTREMELY DANGEROUS AND IT IS RECOMMENDED THAT INFLATION BE PERFORMED IN AN INFLATION CAGE TO PREVENT INJURY TO PERSONNEL FROM POSSIBLE EXPLOSION.

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

- Place the wheel/tire assembly in an inflation cage for initial inflation. Inflate tire to tire manufacturer's specifications to seat the beads on wheel. Reduce tire pressure to recommended storage pressure (10 psig) and remove wheel/tire assembly from inflation cage.
- p. Check for burrs or rough threads on axle and axle nut.
- q. Mount the wheel and tire assembly on the axle over the brake assembly.
  - **NOTE:** Make sure the lugs on the wheel hub correctly engage in the slots on the brake discs.



- r. Install the Pilatus PC-12 axle nut, bolt, washer, nut and cotter pin (item 3 of drawing 50-155) per aircraft maintenance manual.
- s. Inflate tire to aircraft manufacturer's recommended inflation pressure.
- t. Install five grommets (item 140 ref. CM40-424 IPL Fig. 1) into fairing (item 130 ref. CM40-424 IPL Fig. 1). Apply MIL-T-83483 anti-seize to end of fasteners and threads of fasteners (item 135 ref. CM40-424 IPL Fig. 1). Install one washer (item 145 ref. CM40-424 IPL Fig. 1) onto each fastener (item 135 ref. CM40-424 IPL Fig. 1). Attach fairing (item 130 ref. CM40-424 IPL Fig. 1) to outboard wheel half subassembly (item 45 ref. CM40-424 IPL Fig1). Torque fasteners (item 135 ref. CM40-424 IPL Fig. 1) to 20 to 25 in-lb (2.26 to 2.82 N-m). Note that the screw is designed to bottom in the wheel before fully compressing the grommet.
- u. Complete installation per aircraft maintenance manual.

#### 9.3 BLEED BRAKES

Check brake system reservoir fluid level and bleed brakes per Pilatus maintenance manual.

**<u>CAUTION</u>**: DO NOT ALLOW THE RESERVOIR TO BECOME EMPTY DURING BLEEDING.



#### 9.4 BRAKE LINING CONDITIONING

To provide optimum service life of the brake lining material, it is necessary to properly condition (glaze) the linings per the following procedure:

**NOTE:** If the brakes are used exclusively for low speed (below 25 knots ground speed) applications, then periodic conditioning is recommended to optimize service life.

- a. Perform two (2) consecutive full stop braking applications (with flaps up and no reverse pitch of the propeller) at the following ground speeds per the following aircraft weights:
  - (1) For aircraft take–off weight up to 8700 lbs: 40-45 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 380-480 ft stop distance
    - 11.0-13.0 second stop time
  - (2) For aircraft take–off weight from 8701 to 9800 lbs: 37-42 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 330-420 ft stop distance
    - 10.0-12.0 second stop time
  - (3) For aircraft take–off weight over 9800 lbs: 33-40 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 230-380 ft stop distance
    - 9.0-11.0 second stop time

**NOTE:** Do not allow or permit the brake to cool substantially between stops.

- b. After, back to back conditioning stops, allow the brakes to cool for ten to fifteen minutes.
- c. Apply the brakes and check for restraint at high static throttle.
  - **NOTE:** This step is to be done **ONLY** after steps 1 and 2 are completed and not in and of itself. New brakes may pass this step right from the onset, however, conditioning is still mandatory to ensure optimum service life.
  - (1) If the brakes hold, the conditioning is complete.
  - (2) If brakes cannot hold aircraft during static run-up, allow brakes to cool completely and repeat steps a. through c.



#### 10.0 WEIGHT AND BALANCE COMPUTATIONS

Refer to the Airplane Equipment List, Pilatus Report No. 02047, located in the Pilot's Operating Handbook for the weight of the existing wheels and brakes. Subtract from new weights to derive weight increase created by the kit installation. Multiply weight increase by applicable aircraft moment and revise weight and balance information in logbook.

#### **10.1 WEIGHT AND BALANCE DATA**

New installed (per gear leg)

Wheel assy	7.48 Kg.	(16.5 lbs.)
Brake assy	12.56 Kg.	(27.7 lbs.)
Total	20.04 Kg.	(44.2 lbs.)

Complete form 337 and make appropriate log book entries.

#### 11.0 PILOT OPERATING MANUAL AND MAINTENANCE MANUAL INSERTS

Inserts and supplements are located in front with conversion kit documentation.

Attach label in the Airplane Equipment List Section of the Pilot Operating Manual, as close as possible to the original entries labeled "Hub, Main Wheel (2) (ea.)" and "Assembly, Main Wheel Brake (2) (ea.)". Enter the correct arm and moment in blocks provided. Zero items out for the original main wheel and brake assemblies that have been removed.

Inserts are reprinted below for reference:

Х	Two 6 piston internal 3-rotor disc Brake Assemblies,	12.56	6.25
	Cleveland P/N 30-244	Kg. ea.	m
Х	Two 7.50-10 forged aluminum Wheel Assemblies,	7.48	6.25
	Cleveland P/N 40-424	Kg. ea.	m

Cleveland brake P/N 30-244 is a single fixed cylinder, internal 3-rotor disc design, using 6 pistons per cylinder, which respond to fluid pressure from the master cylinders for brake application.

An Airplane Flight Manual Supplement, Parker Document No. 199-241 AFMS, is provided with this kit. Fill in the Aircraft Registration Number and Serial Number as appropriate, then add the supplement to the Pilot's Operating Handbook and Airplane Flight Manual.

An Airplane Maintenance Manual Supplement, Parker Document No. AMMS199-241 is provided with this kit. Fill in the Aircraft Model Number, Registration Number and Serial Number as appropriate, then add the supplement to the Airplane Maintenance Manual.



#### 12.0 KIT PARTS LIST – 199-241 Kit

NUMBER	PARKER PART NUMBER	NOMENCLATURE	QUANTITY
(2) 1	40-424	Wheel Assembly	2
(3) 2	30-244	Brake Assembly	2
3	221-01500	Pin, Cotter	2
(4)	199-251	Brake Pedal Lever Kit	1
	IM199-241	Installation Manual for Conversion Kit 199-241	1
	CM30-244	Component Maintenance Manual for 30-244 Brake Assembly	1
	CM40-424	Component Maintenance Manual for 40-424 Wheel Assembly	1
	50-155	Installation Drawing	1
	AMMS199-241	Airplane Maintenance Manual Supplemen	t 1
	199-241 AFMS	Airplane Flight Manual Supplement	1
		Supplemental Type Certificate SA01376CH for (PC-12, PC-12/45, PC-12/47 & PC-12/47E)	1
		Pilot Operating Manual Inserts	1
		Product Registration Card	1

- (1) Refer to 50-155 Installation Drawing
- (2) For Subassembly and Parts identification, refer to CM40-424, Main Wheel Assembly, Fig 1; IPL
- (3) For Subassembly and Parts identification, refer to CM30-244, Main Brake Assembly, Fig 1; IPL
- (4) For identification of Pilatus parts included in Kit 199-251, refer to Section 13.0



#### 13.0 LIST OF MATERIALS – 199-251 Kit

The following parts are contained in Kit 199-251, supplied by and FAA / JAA approved by Pilatus Aircraft Ltd. (certification enclosed) for use on PC-12 model aircraft.

(1) (2) ITEM <u>NUMBER</u>	PILATUS PART NUMBER	NOMENCLATURE	<u>QUANTITY</u>
17	532.42.12.053	Lever Assembly	4
7	941.14.11.115	Bushing, Flanged (NAS77-3-019)	8
1	940.17.02.226	Pin, Cotter (MS24665-134)	4
16	940.17.02.236	Pin, Cotter (MS24665-210)	2

- (1) Refer to Figure 8.4.2
- (2) Optional to install Pilatus parts (purchased from Pilatus Business Aircraft) as listed, in lieu of kit 199-251. In this case, order "199-241 Kit – Less Brake Pedal Lever Retrofit."



Wheels & Brakes

Parker Hannifin Corporation Aircraft Wheel & Brake 1160 Center Road Avon, Ohio 44011 USA 1-800-BRAKING (272-5464) 440-937-1272 • FAX 440-937-5409

# PRODUCT REFERENCE MEMO

#### PC-12 BRAKE LINING CONDITIONING PROCEDURE

EFFECTIVITY: All Parker Hannifin (Cleveland Wheels & Brakes) P/N 30-244 Brake Assemblies APPLICABILITY: PC-12, PC-12/45, PC-12/47, and PC-12/47E aircraft converted per STC No.

REASON: SA01376CH to use Cleveland main wheel and brake conversion kit 199-241. To provide optimum service life of the brake lining material used in conversion kit

DESCRIPTION: Brake linings can show accelerated wear if not properly conditioned.

The brakes should be conditioned after installation of the kit (ref Kit Installation Manual IM199-241) and prior to placing the aircraft back in service.

part number 199-241, it is necessary to properly condition (glaze) the linings.

To provide optimum service life of the brake lining material, it is necessary to properly condition (glaze) the linings per the following procedure:

- **NOTE:** If the brakes are used exclusively for low speed (below 25 knots ground speed) applications, then periodic conditioning is recommended to optimize service life.
- a. Perform two (2) consecutive full stop braking applications (with flaps up and no reverse pitch of the propeller) at the following ground speeds per the following aircraft weights:
  - (1) For aircraft take–off weight up to 8700 lbs: 40-45 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 380-480 ft stop distance
    - 11.0-13.0 second stop time
  - (2) For aircraft take–off weight from 8701 to 9800 lbs: 37-42 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 330-420 ft stop distance
    - 10.0-12.0 second stop time
  - (3) For aircraft take–off weight over 9800 lbs: 33-40 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 230-380 ft stop distance
    - 9.0-11.0 second stop time
  - **NOTE:** Do not allow or permit the brake to cool substantially between stops.

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#### PC-12 BRAKE LINING CONDITIONING PROCEDURE

- b. After, back to back conditioning stops, allow the brakes to cool for ten to fifteen minutes.
- c. Apply the brakes and check for restraint at high static throttle.
  - **NOTE:** This step is to be done **ONLY** after steps 1 and 2 are completed and not in and of itself. New brakes may pass this step right from the onset, however, conditioning is still mandatory to ensure optimum service life.
  - (1) If the brakes hold, the conditioning is complete.
  - (2) If brakes cannot hold aircraft during static run-up, allow brakes to cool completely and repeat steps a. through c.

COMPLIANCE: Recommended.

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

WEIGHT & BALANCE: Not applicable.

PUBLICATIONS: PRM75 is available from:

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

Phone: 1-800- BRAKING (272-5464) FAX: 440-937-5409

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## AIRPLANE MAINTENANCE MANUAL SUPPLEMENT

FOR

#### PILATUS AIRCRAFT LIMITED AIRCRAFT MODELS PC-12, PC-12/45, PC-12/47, AND PC-12/47E

#### THOSE AIRCRAFT MODIFIED IN ACCORDANCE WITH STC <u>SA01376CH</u>

This supplement, which includes the Component Maintenance Manuals for Cleveland Wheels & Brakes Main Wheel Model 40-424 and Main Brake Model 30-244, 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 insure 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.

Aircraft: Model Number

Registration Number

Serial Number



Page <u>1</u>

#### FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT And PILOT'S OPERATING HANDBOOK For The 199-241 Main Wheel & Brake Conversion Kit As Installed In The Pilatus PC-12, PC-12/45, PC-12/47, PC-12/47E

Reg. No. \_\_\_\_\_\_ Ser. No. \_\_\_\_\_\_

This supplement must be attached to the FOCA Approved Airplane Flight Manual when the aircraft is modified by the installation of the Parker Hannifin Corporation 199-241 Main Wheel & Brake Conversion Kit in accordance with

STC SA01376CH

The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this supplement; consult the basic Airplane Flight Manual.

FAA APPROVED:

Roy E. Boffe, Acting Manager Systems & Flight Test Branch Chicago Aircraft Certification Office Des Plaines, IL

Document No. 199-241 AFMS FAA APPROVED DATE: JUN 2 2 2009 PAGE 1 OF 8 Parker Hannifin Corporation Aircraft Wheel & Brake 1160 Center Road Avon, OH 44011

199-241 Main Wheel & Brake Conversion Pilatus PC-12, PC-12/45, PC-12/47, PC-12/47E

#### LOG OF REVISIONS

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•••••	All	Original issue.	M. W. Anderson ACE-117C	12/18/2000
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Parker Hannifin Corporation Aircraft Wheel & Brake 1160 Center Road Avon, OH 44011

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6	WEIGHT AND BALANCE	
7	AIRPLANE AND SYSTEMS DESCRIPTION	

Document No. 199-241 AFMS FAA APPROVED DATE: JUN 2 2 2009 PAGE 3 OF 8 199-241 Main Wheel & Brake Conversion Pilatus PC-12, PC-12/45, PC-12/47, PC-12/47E

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

#### SECTION 1- GENERAL

The 199-241 Main Wheel & Brake Conversion Kit replaces the PC-12 main wheels and carbon disc brakes with Cleveland main wheels and steel disc brakes. Steel disc brakes provide a consistent coefficient of friction and do not absorb and retain water. Carbon disc brakes tend to absorb and retain water and can have significant fluctuations in coefficient of friction.

Additionally, for aircraft serial numbers MSN 231 and on, as well as aircraft modified by SB 32-004, installation of the 199-241 conversion kit provides brake pedal geometry which results in improved brake pedal "feel" and less tendency for the pilot to inadvertently "ride" the brakes during taxiing.

#### **SECTION 2 - LIMITATIONS**

No Change

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

#### **SECTION 3 - EMERGENCY PROCEDURES**

#### 3.3 Rejected Takeoff

CAUTION

A REJECTED TAKEOFF WITHOUT THE BENEFIT OF PROPELLER REVERSE MAY CAUSE OVERHEATING OF WHEEL & BRAKE COMPONENTS WITH ASSOCIATED LOSS OF BRAKING EFFECTIVENESS. IF OVERHEATING IS SUSPECTED, REFER TO SECTION 3.20.7 OF THE BASIC AFM DURING SUBSEQUENT TAXIING. THE MAIN WHEELS & BRAKES SHOULD BE INSPECTED FOR DAMAGE IN ACCORDANCE WITH THE RESPECTIVE COMPONENT MAINTENANCE MANUAL PRIOR TO THE NEXT FLIGHT.

FOLLOWING A MAXIMUM BRAKING EFFORT REJECTED TAKEOFF WITHIN 10 KIAS OF V<sub>R</sub> AND WITHOUT THE BENEFIT OF PROPELLER REVERSE, THE AIRCRAFT MUST REMAIN ON THE GROUND FOR A MINIMUM OF 45 MINUTES PRIOR TO FURTHER FLIGHT TO ALLOW FOR ADEQUATE COOLING OF THE WHEELS & BRAKES. PRIOR TO ENGINE START, CONFIRM BRAKE PEDALS DO NOT EXHIBIT EXCESSIVE TRAVEL.

FOLLOWING ANY REJECTED TAKEOFF IN WHICH THE WHEEL FUSE PLUGS RELEASE, THE WHEELS & BRAKES MUST BE INSPECTED FOR DAMAGE IN ACCORDANCE WITH THE RESPECTIVE COMPONENT MAINTENANCE MANUAL PRIOR TO FURTHER FLIGHT.

Document No. 199-241 AFMS FAA APPROVED DATE: <u>111M 2 2 2009</u> PAGE 5 OF 8

#### 3.9.8 LANDING WITHOUT FLAPS (FLAPS 0°)

## CAUTION

FOLLOWING A MAXIMUM BRAKING EFFORT FLAPS 0° LANDING WITHOUT THE BENEFIT OF PROPELLER REVERSE, THE AIRCRAFT MUST REMAIN ON THE GROUND FOR A MINIMUM OF 45 MINUTES PRIOR TO FURTHER FLIGHT TO ALLOW FOR ADEQUATE COOLING OF THE WHEELS & BRAKES. PRIOR TO ENGINE START, CONFIRM BRAKE PEDALS DO NOT EXHIBIT EXCESSIVE TRAVEL.

FOLLOWING ANY MAXIMUM BRAKING EFFORT FLAPS 0° LANDING IN WHICH THE WHEEL FUSE PLUGS RELEASE, THE WHEELS & BRAKES MUST BE INSPECTED FOR DAMAGE IN ACCORDANCE WITH THE RESPECTIVE COMPONENT MAINTENANCE MANUAL PRIOR TO FURTHER FLIGHT.

Document No. 199-241 AFMS FAA APPROVED DATE: JUN 2 2 2009 PAGE 6 OF 8 Parker Hannifin Corporation Aircraft Wheel & Brake 1160 Center Road Avon, OH 44011 199-241 Main Wheel & Brake Conversion Pilatus PC-12, PC-12/45, PC-12/47, PC-12/47E

#### SECTION 4 - NORMAL PROCEDURES

No Change.

#### SECTION 5 - PERFORMANCE

No Change.

#### SECTION 6 - WEIGHT AND BALANCE

No Change.

Document No. 199-241 AFMS FAA APPROVED DATE: JUN 2 2 2009 PAGE 7 OF 8 Parker Hannifin Corporation Aircraft Wheel & Brake 1160 Center Road Avon, OH 44011 199-241 Main Wheel & Brake Conversion Pilatus PC-12, PC-12/45, PC-12/47, PC-12/47E

#### SECTION 7 – AIRPLANE AND SYSTEMS DESCRIPTION

#### BRAKES

Each brake assembly incorporates three retract mechanisms which act as brake lining wear indicators. As the brake linings wear, the retract studs will be pulled into the friction sleeve. When the studs are flush, or recessed below the friction sleeve, the brakes must be serviced in accordance witht the respective component maintenance manual. The function of the wear indicators is independent of the position of the parking brake.



# **Cleveland Wheels & Brakes**

# COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

# MAIN BRAKE ASSEMBLY PHC Part No. 30-244

## CM30-244 Initial Issue August 01, 2000

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

CAGE CODE 33269



CM30-244 Page T-1 May 25, 2020



Section/Page No.

#### CM30-244 COMPONENT MAINTENANCE MANUAL WITH IPL FOR MAIN BRAKE ASSEMBLY PART NO. 30-244

# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision A of CM30-244 (dated November 09, 2000)

### Revision A, Dated November 09, 2000

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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

#### **REVISION HIGHLIGHTS**

#### **Description Of Change**

All Sections/All Pa	ages	Initial Release (DCN 0341-45)
As Follows: Record of Rev. pg. RR-1 Effective Pages pg. LEP-1&2		Rev A (DCN 0343-06): Update page to reflect Rev. A Update applicable effective dates to reflect Rev. A
D&O	pg. 3	Table 1, (REMOVE) "MIL-H-5606" fluid reference
Testing	pg. 1001 pg. 1002 pg. 1003 pg. 1004 pg. 1005	Table 1, (REMOVE) "MIL-H-5606" fluid reference Para. 1.C.(3), (ADD) "(0.065cc)" reference Para. 1.E.(2) (b) <u>1</u> , (ADD) "(0.065cc)" reference Para. 1.E.(3) (a) <u>1</u> , (ADD) "(0.065cc)" reference Table 1002, Insufficient running clearance: (ADD) Stator Disc reference
Disassembly	pg. 3001 pg. 3002	Para. 1.B. (ADD) Reference to 50-155 Install Dwg. Para. 1.C.(2), (NOW) "double countersunk" (WAS) "single countersunk"
Inspection	pg. 5002 pg. 5003 pg. 5004 pg. 5005 pg. 5008	<ul> <li>Following additions will add pages 5009 and 5010 to section:</li> <li>(ADD) new para. 1.B. Maintenance Schedule</li> <li>(NOW) para. 1.C. General Inspection Procedure (WAS) para. 1.B.</li> <li>(ADD) warning re: penetrant fluid. (ADD) para 2.A.(6)</li> <li>re-order para.'s 2.A(2) thru 2.A.(5)</li> <li>(ADD) new Figure 5001, Heat Damage Test, (ADD) Table 5003</li> <li>(NOW) Figure 5002 (WAS) Figure 5001 (NOW) Figure 5003 (WAS) Figure 5002</li> <li>(NOW) Figure 5004 (WAS) Figure 5003 (NOW) Figure 5005 (WAS) Figure 5004</li> </ul>
Repair	pg. 6002 pg. 6010 pg. 6011 pg. 6012	Following additions will (REVISE) page 6012 to having text (WAS) blank Table 6001 (ADD) Draw Flattening Fixture, Spacer Tool, Support, HeliCoil tools Para 2.G.(2) (NOW) 2-inch plate (WAS) 1-inch plate. (ADD) reference to Special Tools Para 2.H.(4) (ADD) reference to Special Tools. Figure 6005 (REVISE) to better define procedure. (ADD) Para 2.I. Insert Repair. (ADD) Figures 6006 & 6007
Assembly thru	pg. 7001 pg. 7004	Para.'s 2 A.(2) , (3) & (19) (REMOVE) "MIL-H-5606" fluid reference Figure 7001 (REVISED) to show intent
Special Tools	pg. 9001 pg. 9003 pg. 9004 pg. 9005	Table 9001 (ADD) Draw Flattening Fixture, Spacer Tool, Support, HeliCoil tools Table 9002, (REMOVE) "MIL-H-5606" fluid reference Para. 1 (ADD) Black & Decker to Vendor List (ADD) page 9005 (ADD) Figure 9001 and 9002
IPL	pg. 10005 pg. 10007	Para. 4 Detailed Parts List (ADD) military P/N's to applicable hardware.
Storage	pg. 15001	Para. 1.A.(1) (ADD) "Drain oil



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision B of CM30-244 (dated January 10, 2001)

### Revision B, Dated January 10, 2001

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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

#### **REVISION HIGHLIGHTS**

<u>Section/Page No.</u> As Follows: Record of Rev. Effective Pages		Description Of ChangeRev B (DCN 0343-74):pg. RR-1Update page to reflect Rev. Bpg. LEP-1&2Update applicable effective dates to reflect Rev. B		



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision C of CM30-244 (dated October 01, 2001)

### Revision C, Dated October 01, 2001

REVISION C 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

#### **REVISION HIGHLIGHTS**

Section/Page No.		Description Of Change
As Follows: Record of Rev. Effective Pages	pg. RR-1 pg. LEP-1&2	Rev C (DCN 0347-71): Update page to reflect Rev. C Update applicable effective dates to reflect Rev. C
Testing	pg. 1009	Test Data Sheet: (NOW) "E. Pressure Test" (WAS) "F. Pressure Test"
Inspection	pg. 5002	Table 5002, Scheduled Interval: (ADD) "(165)" to O-rings (ADD) "wiper (50)Replace" under Every Heat Sink Change. (ADD) "penetrant inspect" for Torgue Tube (105)
	pg. 5002	<ul> <li>Table 5002, Unscheduled Interval:</li> <li>(NOW) "Overheating such that at least one of the three fusible plugs release in the mating main wheel assembly."</li> <li>(WAS) "Overheating due to: <ol> <li>RTO (Rejected Takeoff)</li> <li>Wheel Assembly fuse plugs releasing</li> <li>Zero degree flap landing"</li> </ol> </li> <li>(ADD) "(165)" to O-rings.</li> <li>(ADD) "wiper (50)Replace"</li> </ul>
	pg. 5003	paragraph 1.C.: (NOW) "…in accordance with this paragraph." (WAS) "…in accordance with this paragraph, 1.B."
	pg. 5003	paragraph 1.C.(6): (ADD) "wiper (50)"
	pg. 5004	paragraph 2.A.(1): (NOW)  "…per paragraph 1.C." (WAS)  "…per paragraph 1.B."
	pg. 5005	paragraph 2.B.(1) & 2.B.(2): (NOW)  "…per paragraph 1.C." (WAS)  "…per paragraph 1.B."
	pg. 5005	paragraph 2.C.: (NOW) "(Refer to Figure 5002)" (WAS) "(Refer to Figure 5001)"
	pg. 5005	paragraph 2.C.(1): (NOW) "…per paragraph 1.C." (WAS) "…per paragraph 1.B."
	pg. 5006	paragraph 2.C.(3): (NOW) "…(Refer to Figure 5002)" (WAS) "…(Refer to Figure 5001)"



### Section/Page No.

### **Description Of Change**

Inspection	pg. 5006	paragraph 2.D.: (NOW) "…(Refer to Figure 5003)" (WAS) "…(Refer to Figure 5002)"
	pg. 5006	paragraph 2.D.(1): (NOW) "per paragraph 1.C." (WAS) "per paragraph 1.B."
	pg. 5006	paragraph 2.D.(3): (NOW) "shown in Figure 5003," (WAS) "shown in Figure 5002,"
	pg. 5006	paragraph 2.D.(4): (ADD) "…or penetrant inspect per ASTM E1417 or MIL-STD-6866"
	pg. 5007	paragraph 2.E.: (NOW) "…See Figure 5004." (WAS) "…See Figure 5003."
	pg. 5007	paragraph 2.E.(1): (NOW) "…per paragraph 1.C." (WAS) "…per paragraph 1.B."
	pg. 5007	paragraph 2.E.(3): (NOW) "…shown in Figure 5004," (WAS) "…shown in Figure 5003."
	pg. 5007	paragraph 2.E.(4): (ADD) "or penetrant inspect per ASTM E1417 or MIL-STD-6866"
	pg. 5007	paragraph 2.F.(1): (NOW) "…per paragraph 1.C." (WAS) "…per paragraph 1.B."
	pg. 5007	paragraph 2.H.(1): (NOW) "…per paragraph 1.C." (WAS) "…per paragraph 1.B."
	pg. 5010	(NOW) "I. Inspect RotorsSee Figure 5005." (WAS) "I. Inspect RotorsSee Figure 5004."
	pg. 5010	paragraph 2.I.(1): (NOW) "…per paragraph 1.C." (WAS) "…per paragraph 1.B."
Repair	pg. 6001	Table 6001: (NOW) "63-J-1566-A" (WAS) "63-J-24A" (NOW) "563-DS-44" (WAS) "563-DS-138" (NOW) "824-1K-7" (WAS) "820-1K-6" (ADD) for "824-1K-7"…"Modified Per Figure 9006"
	pg. 6002	(ADD) "Cold Straightening Fixture Per Figure 9002 and 9003 SPECIAL TOOLS"
		(NOW) "Per Figure 9004" (WAS) "Per Figure 9002"
	pg. 6005	<ul> <li>For Support– Retract Subassembly:</li> <li>(NOW) "Per Figure 9005" (WAS) "Per Figure 9003"</li> <li>paragraph 2.D.:</li> <li>(NOW) "Polish out small nicks and scratches to a surface finish of 16 microinches</li> <li>RMS. Replace pistons if outside diameter is worn to Ø1.371 inches</li> <li>(34,823 mm) at any location."</li> <li>(WAS) "Polish out corrosion pits, small nicks and scratches not exceeding .003 inches max. (.0762 mm) deep."</li> </ul>

ction/Page No	Description Of Change
Aerospace	
-Zarker	FOR MAIN BRAKE ASSEMBLY PART NO. 30-244
	CM30-244 COMPONENT MAINTENANCE MANUAL WITH IPL
Darker	CM30-244 COMPONENT MAINTENANCE MANUAL WITH IF

Released: 8/12/2020

Repair	pg. 6007	paragraph 2.E.(3):
		(NOW) "Cold straighten or draw flattenper paragraph 2.G. of REPAIR."
	ng 6007	(WAS)Cold straighten of draw frattenper paragraph 2.G. of 2.H. of REFAIR.
	pg. 0007	(ADD) " <b>NOTE:</b> When using Milford rivet machine, the rollset tool must first be
		modified per Figure 9006."
	pg. 6010	paragraph 2.G.:
		(NOŴ) <sup>(</sup> Straightening Procedure For Stator Disc (IPL, 1-90) and Pressure Plate (IPL, 1-65)"
		(WAS) "Draw Flattening Procedure For Stator Disc Assembly (IPL, 1-85) and Pressure Plate Assembly (IPL, 1-60)"
		(ADD) " <u>CAUTION</u> : STRAIGHTENING OF THE ROTOR DISCS (80) ARE NOT PERMITED."
		(ADD) " <b>NOTE:</b> The following methods are not a guarantee of sustaining disc
		straightness conditions through continued service."
		(NOW) "Stator discs and pressure plates which do not meet the straightness
		requirements of this manual may be straightened in accordance with either of the following procedures."
		(WAS) "Stator discs and pressure plates which do not meet the flatness
		requirements of this manual may be straightened in accordance with the
		following procedure."
	pg. 6010	paragraph 2.G.:
		(NOW) "(1) Draw Flattening" procedures "(a) through (f)"
	pg 6010	(WAS) G. Draw Flattening procedures (1) through (6)
	pg. 0010	(NOW) "(a) Remove wear pade (70) (refer to 2 E. Wear Pad Replacement)."
		(WAS) "(1) Remove wear pads from assembly "
	pg. 6011	(ADD) paragraph "2.G.(2) Cold Straightening (refer to Figure 6005)"
	pg. 6011	(ADD) "Figure 6005"
	pg. 6012	paragraph 2.H. (4):
	10	(NOW) "Refer to Figure 6006."
		WAS) "Refer to Figure 6005."
	pg. 6012	(NOW) "Figure 6006" (WAS) "Figure 6005"
	pg. 6012	Figure 6006:
		(REVISED) to add figure callouts to spacer tool and support
	pg. 6013	paragraph 2.1. (1):
	P9.0010	(NOW) "Refer to Figure 6007."
		(WAS) "Refer to Figure 6006."
	pg. 6013	NOW) "Figure 6007" (WAS) "Figure 6006"
	pg. 6013	Figure 6007:
	10	(REVISED) to add "END OF COIL" reference.
	pg. 6013	paragraph 2.I. (2):
		(NOW) "Refer to Figure 6008."
		(WAS) "Refer to Figure 6007."
	pg. 6013	(NOW) "Figure 6008" (WAS) "Figure 6007"



Section/Page No.

CM30-244 COMPONENT MAINTENANCE MANUAL WITH IPL FOR MAIN BRAKE ASSEMBLY PART NO. 30-244

### **Description Of Change**

Assembly	pg. 7004 pg. 7005 pg. 8001	<ul> <li>(NOW) paragraph "2.B.(5)" (WAS) "2.B.(7)"</li> <li>(ADD) paragraph "2.C. Brake Lining Conditioning Procedure" Table 8001, Fig and Dimension Reference:</li> <li>(NOW) for Torque Tube Assy (100) "5002" (WAS) "5001"</li> <li>(NOW) for Stator Disc Assy (85) "5003" (WAS) "5002"</li> <li>(NOW) for Pressure Plate Assy (60) "5004" (WAS) "5003"</li> <li>(NOW) for Rotor Disc (80) "5005" (WAS) "5004"</li> </ul>
Special Tools	pg. 9002	Table 9001: (NOW) "63-J-1566-A" (WAS) "63-J-24A" (NOW) "563-DS-44" (WAS) "563-DS-138" (NOW) "824-1K-7" (WAS) "820-1K-6" (ADD) for "824-1K-7""Modified Per Figure 9006" (ADD) "Cold Straightening Fixture Per Figure 9002 and 9003 SPECIAL TOOLS"
		For Spacer Tool – Retract Subassembly: (NOW) "Per Figure 9004" (WAS) "Per Figure 9002"
	pg. 9004	For Support– Retract Subassembly: (NOW) "Per Figure 9005" (WAS) "Per Figure 9003" paragraph 1.C.: (ADD) for Milford Fastening Systems, "www.milfordrivet.com" (ADD) "National Rivet & Manufacturing Co., alternate for riveter"" (ADD) for Black & Decker Co., "www.emhart.com"
	pg. 9005	(NOW) "Draw Flattening and Cold Straightening Fixtures, Figures 9001 thru 9003" (WAS) "Draw Flattening Fixture, Figure 9001"
	pg. 9006	(NOW) "Retract Subassembly Tools, Figures 9004 and 9005" (WAS) "Retract Subassembly Tools, Figure 9001"
	pg. 9006	Figures 9004 and 9005: (ADD) Figure 9004 and Figure 9005 headings
	pg. 9006	(ADD) "Milford Rollset Modification, Figure 9006"



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision D of CM30-244 (dated July 19, 2002)

## Revision D, Dated July 19, 2002

REVISION D 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

#### **REVISION HIGHLIGHTS**

### Section/Page No.

### **Description Of Change**

As Follows:	
Record of Rev.	pg. RR-1
Effective Pages	pg. LEP-1
	pg. LEP-2

Rev D (DCN 0352-09): Update page to reflect Rev. D Update applicable effective dates to reflect Rev. D

Detailed Parts pg. 10005 List

(NOW)

50	107-02700	WIPER	6
50A	107-02701	WIPER WITH SCARF CUT	6
		(OPT - ALTERNATE FOR ITEM 50)	

	(WAS)		
50	107-02700	SCRAPER	6



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision E of CM30-244 (dated October 10, 2003)

### Revision E, Dated October 10, 2003

REVISION E 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

#### **REVISION HIGHLIGHTS**

Section/Page No	<u>o.</u>	Description Of Change Rev E (DCN 0358-02):		
As Follows:				
Record of Rev	pg. RR-1	Update page to reflect Rev. E		
List of Effective Pages	pg. LEP-1 &-2	Update applicable effective dates to reflect Rev. E		
Description and	pg. 1	Paragraph 1:		
Operation	pg. 2	(now) where (was) scrapering Figure 1, item callouts: (now) 55 (was) 45 (now) 50 (was) 55 (now) 45 (was) 50		
	pg. 3	Key to Figure 1: (now) 45. O-Ring (was) 45. Insulator (now) 50. Wiper (was) 50. O-Ring (now) 55. Insulator (was) 55. Scraper		
	pg. 3	Table 1: (add) "or MIL-PRF-83282" to Hydraulic Fluid parameter (add) "or MIL-PRF-83282" to Seal Compatibility parameter		
Testing and Fault Isolation	pg. 1001	<ul> <li>Table 1001:</li> <li>(add) "NOTE: Unless otherwise stated, equivalent substitutes may be used for items listed."</li> <li>(add) "or MIL-PRF-83282 <sup>1</sup>" to Hydraulic Fluid</li> <li>(add) "<sup>1</sup> CAUTION: THE USE OF HYDRAULIC FLUIDS IS LIMITED TO THOSE SPECIFIED IN TABLE 1001. THE HYDRAULIC FLUIDS SPECIFIED ARE COMPATIBLE AND INTERCHANGEABLE.</li> </ul>		



Testing and Fault Isolationpg. 1001Paragraph 1.B.: (now) "A test data sheet is given at the end of this section for reference." (was) "Prior to testing, make photocopies of the test data sheet provided at the end of this section. One photocopy of the data sheet is required for each brake assembly to be tested."pg. 1002Paragraph 1. C. (3): (now) "wiper" (was) "scraper" pg. 1003pg. 1003Paragraph E (1) (e): (now) "1 No fluid flow is cause for more examination. Refer to Table 1002, Brake Assembly Troubleshooting." (was) "1 No flow is cause rejection.pg. 1003Paragraph E (2): (now) "(b) Subject the brake to 3 cylces of 600 (41,37 ±1.38 bar) to zero [0] psig (0 bar)." (was) "(b) Subject the brake to 3 cylces of 620 ±20 psig (42,75 ±1.38 bar) to zero [0] psig (0 bar)."pg. 1003Paragraph E (2) (b): (remove) "1 Any leakage greater than 1 drop (0.065cc) is cause for rejection."pg. 1004Paragraph E (2) (b): (now) "aThere shall be no binding of the retract studs (115)." (was) "aAny binding of the retract studs (115) is cause for rejection."pg. 1004Paragraph E (2) (b): (now) "2 Check pistons" (was) "3 Check pistons" (now) "aAny binding of the pistons (40)." (was) "aAny binding of pistons (40) is cause for rejection."
<ul> <li>(was) "Prior to testing, make photocopies of the test data sheet provided at the end of this section. One photocopy of the data sheet is required for each brake assembly to be tested."</li> <li>pg. 1002 Paragraph 1. C. (3): (now) "wiper" (was) "scraper"</li> <li>pg. 1003 Paragraph E (1) (e): <ul> <li>(now) "1 No fluid flow is cause for more examination. Refer to Table 1002, Brake Assembly Troubleshooting." (was) "1 No flow is cause rejection.</li> </ul> </li> <li>pg. 1003 Paragraph E (2): <ul> <li>(now) "(b) Subject the brake to 3 cylces of 600 ±20 psig (41,37 ±1.38 bar) to zero [0] psig (0 bar)."</li> <li>(was) "(b) Subject the brake to 3 cylces of 620 ±20 psig (42,75 ±1.38 bar) to zero [0] psig (0 bar)."</li> </ul> </li> <li>pg. 1003 Paragraph E (2) (b): <ul> <li>(remove) "1 Any leakage greater than 1 drop (0.065cc) is cause for rejection."</li> </ul> </li> <li>pg. 1004 Paragraph E (2) (b): <ul> <li>(now) "1 Check retracts" (was) "2 Check retracts"</li> <li>(now) "1 Check retracts" (was) "2 Check retracts"</li> <li>(now) "1 Check pistons" (was) "3 Check pistons"</li> <li>(now) "2 Check pistons" (was) "3 Check pistons"</li> <li>(now) "2 Check not pistons (40) is cause for rejection."</li> </ul> </li> </ul>
assembly to be tested." pg. 1002 Paragraph 1. C. (3): (now) "wiper" (was) "scraper" pg. 1003 Paragraph E (1) (e): (now) "1 No fluid flow is cause for more examination. Refer to Table 1002, Brake Assembly Troubleshooting." (was) "1 No flow is cause rejection. pg. 1003 Paragraph E (2): (now) "(b) Subject the brake to 3 cylces of 600 ±20 psig (41,37 ±1.38 bar) to zero [0] psig (0 bar)." (was) "(b) Subject the brake to 3 cylces of 620 ±20 psig (42,75 ±1.38 bar) to zero [0] psig (0 bar)." pg. 1003 Paragraph E (2) (b): (remove) "1 Any leakage greater than 1 drop (0.065cc) is cause for rejection." pg. 1004 Paragraph E (2) (b): (now) "aThere shall be no binding of the retract studs (115)." (was) "aAny binding of the retract studs (115) is cause for rejection." pg. 1004 Paragraph E (2) (b): (now) "aThere shall be no binding of the pistons" (now) "aThere shall be no binding of the pistons (40)." (was) "aAny binding of pistons (40) is cause for rejection."
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(was) " <u>a</u> Any binding of pistons (40) is cause for rejection."
rejection."
,
pg. 1004 Paragraph E (2) (b):
(now) <u>"3</u> Release the hydraulic pressure."
(was) " $\frac{4}{2}$ Release the hydraulic pressure."
(now) " <u>a</u> The pressure plate assembly (60) should retract at all retract locations "
(was) "a Failure of pressure plate (60) retraction is
cause for rejection."
pg. 1004 Paragraph E (2):
(now) " <u>(c)</u> After successful completion of test, compress
pisions back into brake cylinder by" (was) "5. Compress pistons back into brake cylinder by"

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Section/Page No.		Description Of Change
Testing and Fault Isolation	pg. 1004	Paragraph E (2): (now) "(d) Test failure is cause for more examination. Refer to Table 1002, Brake Assembly Troubleshooting." (was) "(a) Beaard all results on the test data sheet "
	pg. 1004	(was) <u>(c)</u> Record all results of the test data sheet. Paragraph E (3): (now) <u>"(a)</u> Pressurize cylinders to <u>600</u> ±20 psig (41,37 ±1.38 bar)
		(was) (a) Pressurize cylinders to $620 \pm 20$ psig (42,75 ±1.38 bar)
	pg. 1004	Paragraph E (3) (a): (now) " <u>1</u> There shall be no leakage of the brake assembly." (was) " <u>1</u> Any leakage greater than 1 drop (0.065cc) is cause for rejection."
	pg. 1004	Paragraph E (3) (a): (now) " <u>2</u> Release the hydraulic pressure." (was) " <u>2</u> Release the hydraulic pressure and compress pistons (40) into brake cylinder (35) by hand using the pressure plate assembly (60). This is to verify piston retraction without binding, and to verify running clearance."
	pg. 1004	<ul> <li>Paragraph E (3) (a):</li> <li>(now) "<u>2 a</u> The pressure plate should retract at all retract locations."</li> <li>(was) "<u>2 a</u> Built in running clearance is .013 in. nominal (.330 mm). Minimum running clearance should be .004 in. (.102 mm). Failure of pressure plate (60) to retract (no running clearance), may be re-tested per (3) (a). Failure to pass second test is cause for rejection."</li> </ul>
	pg. 1004	Paragraph E (3) (a): (add) " <u>b</u> With the brake resting on the torque tube assembly (100), verify that the rotating disc (80) near the pressure plate assembly (60) can be easily rotated by hand."
	pg. 1004	Paragraph E (3) (b): (add) "After successful completion of test"
	pg. 1005	Paragraph E (3): (remove) "(d) Record all test results on the test data sheet "
	pg. 1005	Paragraph E (3): (now) "(d) <u>Install flat washer (180) and…"</u> (was) "(e) Install flat washer (180) and…"
	pg. 1005	Paragraph E (3): (add) "(e) <u>Test failure is cause for more examination.</u> Refer to Table 1002, Brake Assembly Troubleshooting."



Section/Page No.		Description Of Change	
Testing and pg. Fault Isolation	pg. 1005 pg. 1005 &	Paragraph E: (remove) "(3) <u>Sign and date the test data sheet."</u> Table 1002, 4 places: (now) "wiper" (was) "scraper"	
	pg. 1000 pg. 1007	Test Data Sheet: (remove) "A. Weight of Brake Assembly:lb/kg Maximum Weight: 27.70 lb (12.56kg)." (now) "A. Quality of Workmanship:" (was) "B. Quality of Workmanship:" (now) "B. Pretest Checks" (was) "C. Pretest Checks"	
	pg. 1009	Test Data Sheet, paragraph C: (now) "600 ±20 psig (41,37 ±1.38 bar) (was) "620 ±20 psig (42,75 ±1.38 bar) (remove) "Leakage Amount Accept Reject "	
Disassembly	pg. 1009 pg. 3003	<ul> <li>(add) "Pressure Plate Retraction: AcceptReject"</li> <li>Test Data Sheet, paragraph D: <ul> <li>(now) "600 ±20 psig (41,37 ±1.38 bar)"</li> <li>(was) "620 ±20 psig (42,75 ±1.38 bar)"</li> <li>(now) "Leakage YesNo"</li> <li>(was) "Leakage AmountAcceptReject"</li> <li>(now) "Pressure Plate Retraction:"</li> <li>(was) "Piston Retraction:"</li> <li>(was) "Piston Retraction:"</li> <li>(now) "Rotating Disc Rotation:"</li> <li>(was) "Running Clearance:"</li> </ul> </li> <li>Paragraph 1. C. (9), 2 places: (now) "wipers" (was) "scraper</li> </ul>	
Cleaning	pg. 4002	rings" Paragraph 2. D. (1): 2 places: (now) "wipers" (was) "scraper rings"	
Inspection/ Check	pg. 5002 pg. 5003	Table 5002: (now) "(75A)" (was) "(75)" (now) "(95A)" (was) "(95)" Paragraph 1. C. (6): (now) "(75A)" (was) "(75)" (now) "(95A)" (was) "(95)"	
Repair	pg. 6007 pg. 6007 pg. 6007 pg. 6007	Paragraph 2. E. (1): (now) "(75A)" (was) "(75)" (now) "(95A)" (was) "(95)" Paragraph 2. E. (3) (a): (now) "(75A)" (was) "(75)" Paragraph 2. E. (3) (b): (now) "(95A" (was) "(95)" Paragraph 2. E. (3) (c): (now) "(75A" (was) "(75)"	

Section/Page	<u>No.</u>	Description Of Change
Repair	pg. 6013	<ul> <li>Paragraph I. (2):</li> <li>(now) "(2) Refer to Figure 6008 and install inserts into retract base (160) to depth shown. Break off tang."</li> <li>(was) "(2) Refer to Figure 6008 and install inserts into retract base (160) such that insert is two to five threads below surface as shown. Break off tang."</li> </ul>
Assembly	pg. 7001	Table 7001: (now) " <u>NOTE:</u> Unless otherwise stated, equivalent substitution may be used…" (was) " <b>NOTE:</b> Equivalent substitutes may be used…"
	pg. 7001	<ul> <li>Table 7001:</li> <li>(add) "or MIL-PRF-83282 <sup>1</sup>" to Hydraulic Fluid</li> <li>(add) "<sup>2</sup>" flag to MIL-T-83483 callout</li> <li>(add) "<sup>1</sup> <u>CAUTION</u>: THE USE OF HYDRAULIC FLUIDS IS LIMITED TO THOSE SPECIFIED IN TABLE 7001. THE HYDRAULIC FLUIDS SPECIFIED ARE COMPATIBLE AND INTERCHANGEABLE."</li> <li>(add) "<sup>2</sup> <u>CAUTION</u>: DO NOT MIX ANTI-SEIZE COMPOUNDS. THIS CAN RESULT IN IMPROPER TORQUE SETTINGS AND COULD RESULT IN FAILU OF THE BOLT. THE USE OF ANTI-SEIZE COMPOUI IS LIMITED TO THAT SPECIFIED IN TABLE 7001."</li> </ul>
	pg. 7001	Paragraph 2. A.: (now) "(2) Lubricate O-rings (45) with hydraulic fluid…" (was) "(2) Lubricate O-rings (50) with MIL-H-83282 hydraulic fluid…" (now) "(3) Lubricate wipers (50) with hydraulic fluid…" (was) "(3) Lubricate scraper (55) with MIL-H-83282 hydraulic fluid "
	pg. 7003	Paragraph 2. A. (14): (now) "anti-seize" (was) "anti-sieze" (remove) "Apply anti-seize to nuts."
	pg. 7004	Paragraph 2. A.: (now) "(19) Coat O-ring (165) with hydraulic fluid…" (was) "(19) Coat O-ring (165) with MIL-H-83282 hydraulic fluid…"
	pg. 7004	Paragraph 2. B. (2): (now) "…anti-seize…" (was) "anti-sieze…"
Special Tools, Fixtures,	pg. 9003	Table 9002: (add) "or MIL-PRF-83282" to Hydraulic Fluid

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#### CM30-244 COMPONENT MAINTENANCE MANUAL WITH IPL FOR MAIN BRAKE ASSEMBLY PART NO. 30-244

Section/Page No.		Description Of Change
Illustrated Parts List	pg. 10004	IPL Figure 1 Main Brake Assembly: (add) in 2 places "75A" to "75" callouts (add) in 2 places "95A" to "95" callouts
	pg. 10005	Detailed Parts List: For line item 60, Assembly, Plate, Pressure: (add) for line Item 75, Rivet: "SUPSD BY Item 75A" (add) line Item "75A, 105-08701, Rivet, SUPSDS Item 75, Qty 24"
		<ul> <li>For line Item 85 Assembly, Disc, Stator: <ul> <li>(now) to line item 90, Disc, Rotor: Qty "1" (was) Qty "2"</li> <li>(add) for line Item 95, Rivet: "SUPSD BY Item 95A"</li> <li>(add) line Item "95A, 105-02401, Rivet, SUPSDS Item 95, Qty 24"</li> </ul> </li> <li>For line item 100, Assembly, Tube, Torque: <ul> <li>(add) for line Item 75, Rivet: "SUPSD BY Item 75A"</li> <li>(add) line Item "75A, 105-08701, Rivet, SUPSDS Item 75,</li> </ul> </li> </ul>
	pg. 10006	Qty 24" IPL Figure 1 Main Brake Assembly: (add) in 2 places "75A" to "75" callouts (add) in 2 places "95A" to "95" callouts



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision F of CM30-244 (dated September 16, 2004)

### Revision F, Dated September 16, 2004

REVISION F 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

### **REVISION HIGHLIGHTS**

#### Section/Page No.

## Description Of Change

As Follows:		Rev F (DCN 0363-01):
Record of Rev.	pg. RR-1	Update page to reflect Rev. F
Effective Pages	pg. LEP-2	Update applicable effective pages to reflect Rev. F

Detailed Parts pg. 10005 List

	(NOW)		
FIG. ITEM	PART NUMBER	NOMENCLATURE	UNITS PER ASSY
50	107-02700	WIPER – For extreme temperatures or dusty conditions	6
50A	107-03700	WIPER – For reduced drag and ease of installation (OPT – ALTERNATE FOR ITEM 50)	6

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	(11/10)		
50	107-02700	WIPER	6
50A	107-02701	WIPER WITH SCARF CUT	6
		(OPT - ALTERNATE FOR ITEM 50)	



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision G of CM30-244 (dated July 17, 2008)

## Revision G, Dated July 17, 2008

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

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

	REVISION HIGHLIGHTS
Section/Page No.	Description Of Change
As Follows:	DCN 0380-91
Record of Rev./pg. RR-1 Effective Pages/pg. LEP-2	Update page to reflect latest revision Update applicable effective pages to reflect latest revision
Introduction pg INTRO-1	(UPDATE) contact information
Inspection/Check	
pg 5008	(NOW) Figure 5002: identify rivets as -75A (WAS) -75.
pg 5009	(NOW) Figure 5003: identify rivets as -95A (WAS) -95.
Repair pg 6008 pg 6009	<ul> <li>(NOW) Figure 6002: identify rivet as (75A) (WAS) (75).</li> <li>(NOW) Figure 6003: identify rivet as (95A) (WAS) (95).</li> <li>(ADD) CAUTION to restrict rivet splitting.</li> </ul>
	(ADD) paragraph 2. E. (5) (b).
	(REVISE) Figure 6004 to show revised rivet criteria
Detailed Parts List	
pg 10004	(ADD) Item 50A to IPL graphics
pg 10005	(ADD) BOM for 199-575 and 199-575A overhaul kits
pg 10006	(ADD) Item 50A to IPL graphics
pg 10007	Specification for item 190, Fitting, Inlet (NOW) AS1038J0404 (WAS) AN833-4J (ADD) notes describing overhaul kits



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision H of CM30-244 (dated February 24, 2010)

## Revision H, Dated February 24, 2010

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

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

REVISION HIGHLIGHTS			
Section/Page No.	Description Of Change		
As Follows:	DCN 0388-35		
Record of Rev./pg. RR-1	Update to reflect latest revision		
Effective Pages/pg. LEP-2	Update to reflect latest revision		
Description & Operation pg 1	<ul> <li>Para 2.:</li> <li>(ADD) If brakes are locked by frozen water, apply and release brake pedals several times. Applying repeated brake pressure may be helpful in breaking the ice bond.</li> </ul>		
Inspection/Check pg 5003	<ul> <li>Para C.(1) (a):</li> <li>(NOW) Visually inspect for bent bolts (5 and 20). Scrap all bent bolts. Magnetic paticle inspect each bolt for cracks in accordance with ASTM E1444 or equivalent. Use crack definition in MIL-STD-1907. Scrap all bolts with cracks.</li> <li>(WAS) Inspect for bent, or cracked bolts (5 and 20). Inspect for evidence of cracks especially in the radius under the bolt head and in the threaded area adjacent to the bolt shank using magnetic particle inspection in accordance with ASTM E1444 or equivalent.</li> </ul>		
pg 5004	<ul> <li>Para 2.A.(5):</li> <li>(NOW) Use fluorescent penetrant inspection in accordance with ASTM E1417 or MIL-STD-6866, Type I, Method A, Sensitivity Level 2, to inspect brake cylinder for cracks. Use crack definition in MIL-STD-1907. No cracks are permitted.</li> <li>(WAS) Use fluorescent penetrant inspection in accordance with ASTM E1417 or MIL-STD-6866, Type I, Method A, Sensitivity Level 2, to inspect brake cylinder for cracks or structural damage. Any cracks are cause for replacement.</li> </ul>		



Section/Page No.	Description Of Change
Inspection/Check pg 5006	<ul> <li>Para C.(4):</li> <li>(NOW) Inspect the torque tube for cracks. Visually inspect and magnetic particle inspect (per ASTM E1444) or penetrant inspect (per ASTM E1417 or MIL-STD-6866 Type I, Method A, Sensitivity Level 2). Use crack definition in MIL-STD-1907. No cracks are permitted.</li> <li>(WAS) Visually inspect and magnetic particle inspect (per ASTM E1444) or penetrant inspect (per ASTM E1417 or MIL-STD-6866) torque tube for cracks around bolt holes and rivet holes. Any evidence of cracks requires replacement.</li> </ul>
pg 5006	<ul> <li>Para D.(4):</li> <li>(NOW) Inspect the stator disc for cracks. Visually inspect and magnetic particle inspect (per ASTM E1444) or penetrant inspect (per ASTM E1417 or MIL-STD-6866 Type I, Method A, Sensitivity Level 2). Use crack definition in MIL-STD-1907. No cracks are permitted.</li> <li>(WAS) Visually inspect and magnetic particle inspect stator disc per ASTM E1444 or penetrant inspect per ASTM E1417 or MIL-STD-6866 for cracks. Any evidence of cracks requires replacement.</li> </ul>
pg 5007	<ul> <li>Para E.(4):</li> <li>(NOW) Inspect the pressure plate for cracks. Visually inspect and magnetic particle inspect (per ASTM E1444) or penetrant inspect (per ASTM E1417 or MIL-STD-6866 Type I, Method A, Sensitivity Level 2). Use crack definition in MIL-STD-1907. No cracks are permitted.</li> <li>(WAS) Visually inspect and magnetic particle inspect per ASTM E1444 or penetrant inspect per ASTM E1417 or MIL-STD-6866 for cracks around rivet holes. Any evidence of cracks requires replacement.</li> </ul>



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision J of CM30-244 (dated October 15, 2011)

This revision contains all pages of the manual. Pages that added or revised are outlined below together with the highlights of the revision.

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

	<b>REVISION HIGHLIGHTS</b>
Section/Page No.	Description Of Change
As Follows:	DCN 0394-56
Title Page./T-1	(ADD) proprietary and export statements.
Record of Rev./RR-1	Update to reflect latest revision.
Effective Pages/ LEP-1 & LEP-2	Update to reflect latest revision.
Introduction/INTRO-1	Update proprietary statement. (ADD) export statement.
Illustrated Parts List/ 10005 and 10006	Clarify quantity callouts in overhaul kits.
10006	(ADD) 166-28300 nameplate provided in overhaul kits. Clarify notes section.

#### Revision Highlights Page 1 of 1 October 15, 2011 Use or disclosure of data contained on this sheet is subject to the restrictions contained on the first page of this document or presentation.



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision K of CM30-244 (dated February 28, 2014)

This revision contains all pages of the manual. Pages that added or revised are outlined below together with the highlights of the revision.

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

### **REVISION HIGHLIGHTS**

Section/Page No.	Description Of Change
As Follows:	ECO-0032713
Record of Rev./RR-1	Update to reflect latest revision.
Effective Pages/ LEP-1 & LEP-2	Update to reflect latest revision.
Disassembly 3003	Para. 1.C. (ADD) (8) Remove the six piston insulators (55). (RENUMBER) remaining steps (9) thru (14).
Inspection / Check 5005	Para. 2.B.(2) (NOW) …insulators (IPL, 1-55) (WAS) insulators (IPL, 1-45).
Assembly 7002	Para. 2.A.(4) (ADD) Install a piston insulator (55) into the pocket of each piston.



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision L of CM30-244 (dated October 29, 2014)

This revision contains all pages of the manual. Pages that added or revised are outlined below together with the highlights of the revision.

**REVISION HIGHLIGHTS** 

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

Section/Page No.	Description Of Change
As Follows:	ECO-0044680
Record of Rev./RR-1	Update to reflect latest revision.
Effective Pages/ LEP-1 & LEP-2	Update to reflect latest revision.
Assembly/ 7005	Para. 2.C. (NOW)

#### C. Brake Lining Procedure

To provide optimum service life of the brake lining material, it is necessary to properly condition (glaze) the linings per the following procedure:

NOTE: If the brakes are used exclusively for low speed (below 25 knots ground speed) applications, then periodic conditioning is recommended to optimize service life.

- (1) Perform two (2) consecutive full stop braking applications (with flaps up and no reverse pitch of the propeller) at the following ground speeds per the following aircraft weights:
  - (a) For aircraft take-off weight up to 8700 lbs: 40-45 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 380-480 ft stop distance
    - 11.0-13.0 second stop time
  - (b) For aircraft take-off weight from 8701 to 9800 [bs: 37-42 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 330-420 ft stop distance
    - 10.0-12.0 second stop time
  - (c) For aircraft take-off weight over 9800 lbs: 33-40 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 230-380 ft stop distance
    - 9.0-11.0 second stop time

NOTE: Do not allow or permit the brake to cool substantially between stops.

- (2) After, back to back conditioning stops, allow the brakes to cool for ten to fifteen minutes.
- (3) Apply the brakes and check for restraint at high static throttle.
  - <u>NOTE:</u> This step is to be done **ONLY** after steps 1 and 2 are completed and not in and of itself. New brakes may pass this step right from the onset, however, conditioning is still mandatory to ensure optimum service life.
  - (a) If the brakes hold, the conditioning is complete.
  - (b) If brakes cannot hold aircraft during static run-up, allow brakes to cool completely and repeat steps (1) through (3).



#### Section/Page No.

Assembly/ 7005 **Description Of Change** 

Para. 2.C. (WAS)

#### C. Brake Lining Conditioning Procedure

To provide optimum service life of the brake lining material, it is necessary to properly condition (glaze) the linings per the following procedure.

**NOTE:** If the brakes are used exclusively for low speed (below 25 knots) applications, then periodic conditioning is recommended to optimize service life.

(1) Perform two (2) consecutive full stop braking applications from 30 to 35 knots.

**NOTE:** Do not allow or permit the brake to cool substantially between the stops.

- (2) Allow the brakes to cool for ten to fifteen minutes.
- (3) Apply the brakes and check for restraint at high static throttle.
  - (a) If brakes hold, conditioning is complete.
  - (b) If brakes cannot hold aircraft during static run-up, allow brakes to cool completely and repeat steps (1) through (3).


# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision M of CM30-244 (dated June 30, 2015)

This revision contains all pages of the manual. Pages that added or revised are outlined below together with the highlights of the revision.

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

# **REVISION HIGHLIGHTS** Description Of Change

#### Section/Page No.

As Follows:	ECO-0054543
Record of Rev./RR-1	Update to reflect latest revision.
Effective Pages/ LEP-1 & LEP-2	Update to reflect latest revision.
Testing/ 1004	Step (3) (c) (NOW) Re-Install bleeder and torque to 35 to 38 inlb. (4.0 to 4.3 N-m). (WAS) Re-install bleeder and torque to 18 to 20 inlb. (2.03 to 2.26 N-m).
Assembly/	
7004	<ul> <li>Step (21)</li> <li>(NOW) Install bleeder (175) into bleeder seat (170) and after testing, torque to 35 to 38 inlb. (4.0 to 4.3 N-m).</li> <li>(WAS) Install bleeder (175) into bleeder seat (170) and after testing, torque to 18 to 20 inlb. (2.03 to 2.26 N-m).</li> </ul>
Fits and Clearances/ 8002	Table 8002 (NOW) Bleeder (175), 35 to 38 inlb. dry torque (4.0 to 4.3 N-m) (WAS) Bleeder (175), 18 to 20 inlb. dry torque (2.03 to 2.26 N-m)



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision N of CM30-244 (dated October 23, 2015)

This revision contains all pages of the manual. Pages that added or revised are outlined below together with the highlights of the revision.

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

#### **REVISION HIGHLIGHTS**

#### Section/Page No.

#### Description Of Change

As Follows:	ECO-0059804
Record of Rev./RR-1	Update to reflect latest revision.
Service Bulletin List/ SB-1	Add SB7110, Rev NC and Rev A.
Effective Pages/ LEP-1 & LEP-2	Update to reflect latest revision. Amend LEP-2 date to June 30, 2015.



# TO: HOLDERS OF CM30-244 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN BRAKE ASSEMBLY PART NO. 30-244.

Attached to this transmittal letter is Revision P of CM30-244 (dated May 25, 2020)

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

# **REVISION HIGHLIGHTS** Description Of Change

#### Section/Page No.

As Follows:	ECO-01150	15040	
Title Page./T-1	Updat	ated proprietary and export statements.	
Record of Rev./RR-1	Update to re	eflect latest revision.	
Effective Pages/ LEP-1 & LEP-2	Update to re	eflect latest revision.	
D&O pg. 2	Figure 1 g	graphics updated.	
Testing	pg.1006	Table 1002 (NOW) Torque tube (105 or 105A) (WAS) Torque tube (105)	
Inspection / Check	pg. 5002	Table 5002 (NOW) Torque tube (105 or 105A)	
	pg. 5008	(WAS) Torque tube (105) Figure 5002 graphics updated	
Repair	pg. 6007	Section E, Note (3)	
		(NOW) The torque tube (105 or 105A)	
	ng 6009	(WAS) The torque tube (105)	
	pg. 6008	Figure 6002 graphics updated	
	pg. 0010	(NOW) Torque Tube (IPL, 1-105 or 1-105A) (WAS) Torque Tube (IPL, 1-105)	
Fits and Clearances/			
8002	Table 8002 (NOW) MIL- <sup>-</sup> (WAS) MIL-1	T-83483 anti-seize on threads F-83488 anti-seize on threads	
Illustrated Parts List	pg. 10004 & <sup>-</sup>	10006 IPL Figure 1 Main Brake Assembly: (add) "105A" to "105" callouts	
	pg. 10007	Detailed Parts List: For line item 100, Assembly, TUBE, TORQUE: (add) for line Item 105, TUBE, TORQUE: "SUPSD BY Item 105A" Qty NP" (add) line Item "105A, 065-24000, TUBE, TORQUE, SUPSDS Item 105, Qty 1"	



# **RECORD OF REVISIONS**

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

REV.	DATE ISSUED	DATE INSERTED	BY	REV.	DATE ISSUED	DATE INSERTED	BY
NC	08-01-2000	08-01-2000	PHC				
А	11-09-2000	11-09-2000	PHC				
В	01-10-2001	01-10-2001	PHC				
С	10-01-2001	10-01-2001	PHC				
D	07-19-2002	07-19-2002	PHC				
Е	10-10-2003	10-10-2003	PHC				
F	09-16-2004	09-16-2004	PHC				
G	07-17-2008	07-17-2008	PHC				
Н	02-24-2010	02-24-2010	PHC				
J	10-15-2011	10-15-2011	PHC				
К	02-28-2014	02-28-2014	PHC				
L	10-29-2014	10-29-2014	PHC				
М	06-30-2015	06-30-2015	PHC				
Ν	10-23-2015	10-23-2015	PHC				
Р	05-25-2020	05-25-2020	JAS				



#### 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 Main Brake Assembly and components.

SERVICE BULLETIN			DATE
NUMBER	SUBJECT	REV	INCORPORATED
SB7110	P/N 30-244 BRAKE ASSEMBLY – INCREASED BLEEDER TORQUE VALUE	NC	06-30-2015 at Rev M
SB7110	P/N 30-244 BRAKE ASSEMBLY – INCREASED BLEEDER TORQUE VALUE	A	No Effect

# LIST OF EFFECTIVE PAGES

<u>SUBJECT</u>	PAGE	DATE	<u>SUBJECT</u>	PAGE	DATE
Title Page	T-1	May 25, 2020	Disassembly	3001	Nov 09/00
Record of Revisions	RR-1	May 25, 2020		3002 3003 3004	Nov 09/00 Feb 28, 2014 Blank
Service Bulletin List	SB-1	Oct 23, 2015	Cleaning	4001 4002	Aug 01/00 Oct 10/03
List of Effective Pages	LEP-1 LEP-2	May 25, 2020 May 25, 2020	Inspection And Check	5001 5002 5003	Aug 01/00 May 25, 2020 Feb 24, 2010
Table of Contents	T/C-1	Aug 01/00		5004 5005 5006	Feb 24, 2010 Feb 28, 2014 Feb 24, 2010
Introduction I	NTRO-1 2	Oct 15, 2011 Aug 01/00		5007 5008 5009	Feb 24, 2010 May 25, 2020
Description and Operation	1 2	Feb 24, 2010 May 25, 2020		5010	Oct 01/01
	3 4	Oct 10/03 Blank	Repair	6001 6002 6003	Oct 01/01 Oct 01/01 Aug 01/00
Testing	1001 1002 1003 1004 1005 1006 1007 1008 1009	Oct 10/03 Oct 10/03 Oct 10/03 June 30, 2015 Oct 10/03 May 25, 2020 Blank Oct 10/03 Blank		6004 6005 6006 6007 6008 6009 6010 6011 6012 6013 6014	Aug 01/00 Oct 01/01 Aug 01/00 May 25, 2020 May 25, 2020 July 17, 2008 May 25, 2020 Oct 01/01 Oct 01/01 Oct 01/01 Oct 10/03
				6014	Blank



# LIST OF EFFECTIVE PAGES

<u>SUBJECT</u>	<u>PAGE</u>	DATE	15002	Blank
Assembly	7001 7002 7003 7004 7005 7006	Oct 10/03 Feb 28, 2014 Oct 10/03 June 30, 2015 Oct 29, 2014 Blank		
Fits and Clearances	8001 8002	Oct 01/01 May 25, 2020		
Special Tools, Fixtures, Equipment, And Consumables	9001 9002 9003 9004 9005 9006	Nov 09/00 Oct 01/01 Oct 10/03 Oct 01/01 Oct 01/01 Oct 01/01		
Illustrated Parts List	10001 10002 10003 10004 10005 10006 10007 10008	Aug 01/00 Aug 01/00 Aug 01/00 May 25, 2020 Oct 15, 2011 May 25, 2020 May 25, 2020 Blank		
Storage	15001	Nov 09/00		



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REPAIR	6001
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FITS AND CLEARANCES	8001
SPECIAL TOOLS, FIXTURES, EQUIPMENT, AND CONSUMABLES.	
ILLUSTRATED PARTS LIST	
SPECIAL PROCEDURES	(Not Applicable)
REMOVAL	(Not Applicable)
INSTALLATION	(Not Applicable)
SERVICING	(Not Applicable)
STORAGE (Including Transportation)	
REWORK (Service Bulletin Accomplishment Procedures)	(Not Applicable)



#### INTRODUCTION

#### 1. General

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

This manual contains shop instructions for maintaining brake assembly 30-244, including testing, checking and repair procedures.

The instructions in this manual only apply to assembly part number 30-244. Ensure that the part number on the unit is listed on the cover page before performing any of these instructions.

**<u>NOTE</u>**: All torque values and specified limits or values set by Parker Hannifin Engineering and contained herein must be strictly observed.

The manufacturer has verified the contents of this manual by actual performance of Disassembly, Assembly and Testing prior to the distribution of printed copies.

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

Parker Hannifin Corporation Aircraft Wheel & Brake Division 1160 Center Road Avon, Ohio 44011 U.S.A. Attn: Technical Services/Hotline Website: www.parker.com E-mail: clevelandwbhelp@parker.com Fax: (440) 937-5409 Tel: 1-800-BRAKING (1-800-272-5464)

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#### INTRODUCTION

#### 3. TSO Notice

This assembly carries a "TSO C26c" marking for FAR Part 23 usage, which identifies it as having been fully tested in the laboratory and qualified to applicable FAA (Federal Aviation Administration) requirements and specifications. Substitutions of critical parts or changes of processes or materials are not permitted without the written approval of the manufacturer.

#### 4. Manual Use

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

When a section of text makes occasional reference to figure items for identification of components, the item number will be preceded with the associative figure number and enclosed in parentheses () such as:

".....Inspect for loose, cracked, or worn wear pads (IPL, 1-70)." – read as IPL Figure 1, item 70.

When a section of text makes numerous references to a particular figure for identification of components, a note shall precede the applicable text referencing the figure. The item numbers will then be enclosed in parentheses () such as:

"Refer to IPL, Figure 1"

".....Install nut (195) and torque to" - read as IPL Figure 1, item 195.



#### **DESCRIPTION AND OPERATION**

#### 1. Main Brake Description

The main brake assembly is a piston actuated, hydraulically operated, internal 3 rotor disc unit that is designed to be compatible with MIL-H-83282 and MIL-PRF-83282 hydraulic fluid. The brake assembly is a non-handed unit and can be used on the opposite side of the aircraft by simply switching the fittings on top of the brake cylinder to the opposite port.

Each brake assembly is composed of the following: One brake cylinder, one pressure plate assembly with replaceable steel wear pads, three rotating discs (rotors) with sintered friction material on a steel core, two stationary discs (stators) with replaceable steel wear pads, one torque tube assembly with replaceable steel wear pads, a set of six 1/4-28 high strength nuts and bolts to clamp the brake cylinder to the torque tube, and a set of six 3/8-24 high strength nuts and bolts to fasten the brake to the aircraft.

Each of the six piston bores contains an O-ring to prevent leakage of hydraulic fluid past the pistons, and a wiper to prevent contaminents from reaching the hydraulic fluid.

A piston insulator slides into the pocket of each piston in order to shield the brake fluid from the heat generated during braking.

#### 2. Main Brake Operation

Braking action begins to occur when hydraulic pressure is applied to the brake, via the pilot's or co-pilot's master cylinders. As the hydraulic pressure reaches the brake it forces the pistons outward against the pressure plate assembly (with wear pads) which compresses the brake stack (the rotors and stationary discs (stators)) against the torque tube assembly (with wear pads). This generated frictional force is transferred to the wheel/tire through the rotors; which have drive slots to engage the main wheel, and thus slows the aircraft.

If brakes are locked by frozen water, apply and release brake pedals several times. Applying repeated brake pressure may be helpful in breaking the ice bond.

#### 3. Main Brake Handling Procedures

Strictly observe the torque values specified in this manual. Do not overtighten any bolt, nut, or fitting. Handle and maintain the brake cylinder properly to protect the paint and surface finishes.



# **DESCRIPTION AND OPERATION**



Figure 1 30-244 Main Brake Assembly



#### DESCRIPTION AND OPERATION

#### Key to Figure 1

5. Bolt, External Wrenching (1/4-28) 85. Assembly, Disc, Stator 10. Washer, Double Countersunk 100. Assembly, Tube, Torque 15. Nut, Self-Locking (1/4-28) 115. Stud 20. Bolt, External Wrenching (3/8-24) 135. Spring 25. Washer, Single Countersunk 140. Ring, Retaining 30. Nut, Self-Locking (3/8-24) 145. Washer, Plain 35. Cylinder, Brake 150. Assembly, Retract Base 40. Piston 165. O-Ring 45. O-ring 170. Seat, Bleeder 50. Wiper 175. Bleeder 190. Fitting, Inlet 55. Insulator 60. Pressure Plate Assembly 195. Nut, Fitting 80. Disc, Rotor

Table 1 Leading Particulars

PARAMETER	SPECIFICATION		
Hydraulic Fluid	MIL-H-83282 or MIL-PRF-83282		
Operating Pressure	1000 psig (68.95 bar) maximum		
Assembly Weight	27.70 lbs. (12.56 kg) Maximum Guaranteed		
Brake Bolt Nut Torque	Torque 95-105 in-lb (10.73-11.86 N-m) with MIL-T-83483 Anti-seize		
Brake Cylinder Material	Aluminum Alloy Forging		
Seals	Compatible with MIL-H-83282 and MIL-PRF-83282 Hydraulic Fluid		
Brake Cylinder Coatings	Surface Pretreatment: MIL-A-8625, Type II, Class 1 Primer Coating: MIL-P-85582, Type I, Class C2 or MIL-PRF-85582C, Type I, Class C2 Finish Coating: MIL-C-85285B, Type I, Color No. 17925 per FED-STD-595 (Untinted White)		



# <u>TESTING</u>

#### 1. General

This section contains test procedures that can be used both as troubleshooting measures and means to test overhauled brake assemblies.

#### A. Test Equipment and Materials. Refer to Table 1001.

**NOTE:** Unless otherwise stated, equivalent substitutes may be used for items listed.

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
N/A	Fluid, Hydraulic	MIL-H-83282 <sup>1</sup> or MIL-PRF-83282 <sup>1</sup>	Commercial Source
N/A	Powered Hydraulic Test Stand	0 to 1000 psig capacity ± 40 psi gage increment (0 to 68.95 bar) ± 2.76 bar gage increment	Commercial Source
N/A	Hydraulic Filter	10 micron	Commercial Source
N/A	Pressure Regulator	0 to 1000 psig (0 to 68.95 bar)	Commercial Source
N/A	Pressure Gage	0 to 1000 psig (0 to 68.95 bar)	Commercial Source
N/A	Tubing	Ø0.156 in. I.D. (Ø3.96 mm)	Commercial Source
N/A	Hydraulic Hose	1000 psig minimum (68.95 bar)	Commercial Source

Table 1001	
Testing Equipment and Materials	List

# <sup>1</sup> **CAUTION:** THE USE OF HYDRAULIC FLUIDS IS LIMITED TO THOSE SPECIFIED IN TABLE 1001. THE HYDRAULIC FLUIDS SPECIFIED ARE COMPATIBLE AND INTERCHANGEABLE.

#### **B.** Preparation for Testing

A test data sheet is given at the end of this section for reference.

#### C. Pretest Check

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

Perform the following inspections and checks to qualify the brake assembly for testing. Do not perform testing on any brake assembly that exhibits visible signs of damage.

(1) Examine exposed cylinder (35) surfaces for breaks, cracks, or other visible damage.



## <u>TESTING</u>

- (2) Examine hydraulic fittings for deformation, pitting, damage to threads or scoring that would affect sealing.
- (3) Examine brake assembly for signs of leakage from piston seals: O-ring (45) and wiper (50), inlet fitting (190), and bleeder fitting (175). Measurable leakage is defined as more than one drop (0.065cc).
- **D. Brake Wear Check** (Refer to Figure 1001)

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

A brake wear check can be accomplished by parking the brake and checking the retract studs (115) on the retract subassembly (110). If the stud is flush or recessed below the friction sleeve (120), then the brake should be disassembled and detailed inspection of the individual wear components should be performed per <u>INSPECTION / CHECK</u> section.





#### <u>TESTING</u>

#### E. Procedure

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

A hydraulic test stand (consisting of a hydraulic pump, filter, regulator, automatic cycler, and applicable pressure gages) is required to conduct performance testing. The required test equipment is listed in Table 1001. If the brake assembly meets the pretest check requirements of paragraph 1.C., test the brake assembly in accordance with the following performance test procedures.

SAFETY WARNING:

BRAKE ASSEMBLIES BEING PRESSURE TESTED HAVE AN EXPLOSIVE POTENTIAL. USE SHATTER RESISTANT ENCLOSURE DURING PRESSURE TESTING. PERSONNEL MUST FOLLOW ALL SAFETY PRECAUTIONS AND WEAR PROTECTIVE CLOTHING AND SAFETY GLASSES. FAILURE TO COMPLY CAN RESULT IN DEATH OR PERSONAL INJURY.

# **<u>CAUTION</u>**: EXERCISE CARE TO PREVENT BRAKE FLUID FROM CONTACTING THE BRAKE FRICTION SURFACES.

- (1) Setup
  - (a) Mount brake assembly on test fixture.
  - (b) The 7/16-20 UNF inlet fitting (190) may be used to serve as a test fitting. Check all fittings for tightness and torque to specifications where required.
  - (c) Connect the hydraulic supply line to the brake and check all fittings for tightness.
  - (d) Remove the bleeder screw (185) and flat washer (180) and place an appropriate length of tubing over bleeder (175).
  - (e) Loosen bleeder and bleed the brake per the Aircraft Manual.
    - <u>1</u> No fluid flow is cause for more examination. Refer to Table 1002, Brake Assembly Troubleshooting.
- (2) Piston Actuation and Flow Through Test
  - (a) Connect the brake assembly on the test stand.
  - (b) Subject the brake to 3 cycles of 600 ±20 psig (41,37 ±1.38 bar) to zero [0] psig (0 bar).



#### <u>TESTING</u>

- 1 Check retracts.
  - <u>a</u> Retracts should move when stack is compressed. There shall be no binding of the retract studs (115).
- 2 Check pistons.
  - <u>a</u> There shall be no binding of the pistons (40).
- <u>3</u> Release the hydraulic pressure.
  - <u>a</u> The pressure plate (60) should retract at all retract locations.
- (c) After successful completion of test, compress pistons back into brake cylinder by hand using the pressure plate assembly (60).
- (d) Test failure is cause for more examination. Refer to Table 1002, Brake Assembly Troubleshooting.
- (3) Pressure Test
  - (a) Pressurize cylinders to 600 ±20 psig (41,37 ±1.38 bar). Hold pressure for a minimum of two [2] minutes.
    - <u>1</u> There shall be no leakage of the brake assembly.
    - <u>2</u> Release the hydraulic pressure.
      - <u>a</u> The pressure plate should retract at all retract locations.
      - b With the brake resting on the torque tube assembly (100), verify that the rotating disc (80) near the pressure plate assembly (60) can be easily rotated by hand.
  - (b) After successful completion of test, check for zero pressure to the brake and disconnect the hydraulic supply line. Remove bleeder (175) and drain the test fluid.
  - (c) Re-install bleeder and torque to 35 to 38 in-lb (4.0 to 4.3 N-m).



## **TESTING**

**<u>CAUTION</u>**: TORQUEING OF BLEEDER SCREW (185) IN EXCESS OF 12 IN-LB (1.36 N-M) MAY DAMAGE THE BLEEDER (175).

- (d) Install flat washer (180) and bleeder screw (185) into bleeder (175) and tighten snug to prevent leakage.
- (e) Test failure is cause for more examination. Refer to Table 1002, Brake Assembly Troubleshooting.

#### F. Troubleshooting

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

TROUBLE	PROBABLE CAUSE	CORRECTION
	Defective hydraulic connection	Tighten connection or replace fitting
	Worn or damaged O-rings (45) and wipers (50)	Replace O-rings and wipers
Hydraulic fluid leaking from brake assembly	Pistons (40) damaged	Check pistons per para. 2.B. of <u>INSPECTION/CHECK</u> and replace as necessary
	Piston bores of brake cylinder (35) damaged	Check brake cylinder per para. 2.A. of INSPECTION/CHECK and replace as necessary
Hydraulic fluid leaking from bleeder seat (170)	Worn or damaged O-ring (165)	Replace O-ring
Hydraulic fluid leaking from bleeder (175)	Damaged bleeder	Replace bleeder
Insufficient running clearance	Pressure plate assy (60) or stator disc assy (85) excessively dished	Check per para. 2.D. or 2.E. of <u>INSPECTION/CHECK</u> and replace as necessary
	Obstruction in hydraulic line or fluid passage	Remove obstruction
Brake not releasing correctly	Pistons (40) sticking	Replace O-ring (45) and/or wiper (50)
	Locked or jammed piston (40)	Check pistons per para. 2.B. of <u>INSPECTION/CHECK</u> and replace as necessary

#### Table 1002 (Sheet 1 of 2) Brake Assembly Troubleshooting



#### **TESTING**

#### Table 1002 (Sheet 2 of 2) Brake Assembly Troubleshooting

TROUBLE	PROBABLE CAUSE	CORRECTION	
	Air in brake	Bleed brake per 1.E.(1) steps (a) thru (d)	
	Obstruction in hydraulic line or fluid passage	Remove obstruction	
	Pistons (40) sticking	Replace O-ring (45) and/or wiper (50)	
Derlanderen eine	Pistons (40) damaged	Check per para. 2.B. of INSPECTION/CHECK and	
Brake not engaging		replace as necessary	
correctly	Brake cylinder (35) damaged	Check per para. 2.A. of INSPECTION/CHECK and	
	Torque tube (105 or 105A) damaged	Check per para. 2.C. of INSPECTION/CHECK and replace as pecessary	
	Pressure plate assy (60) not	Check per para, 2.F. of	
	sliding freely on torque tube	INSPECTION/CHECK and	
		replace as necessary	
	Rotors (80) not sliding freely on	Check per para. 2.I. of	
	wheel rotor keys	<b>INSPECTION/CHECK</b> and	
		replace as necessary	
	Stator disc assy's (85) not	Check per para. 2.D. of	
	sliding freely on torque tube	INSPECTION/CHECK and	
	- ((	replace as necessary	
	lorque tube assy (100) wear	Check per para. 2.C. of	
	pads (70) worn beyond	INSPECTION/CHECK and	
Maximum padal affort daga	minimum limits	Check per pere 2 E of	
not decolorate aircraft	pade (70) were beyond		
properly	minimum limts	INSPECTION/CHECK and	
property	Rotors (80) friction material	Check per para 21 of	
	worn beyond minimum limits	INSPECTION/CHECK and	
		replace as necessary	
	Stator disc assy's (85) wear	Check per para, 2.D. of	
	pads (70) worn beyond	INSPECTION/CHECK and	
	minimum limits	replace as necessary	

Work C	order No	Date	Brake Serial No.	
A. <u>Qu</u>	ality of Workmanship:	Accept	Reject	
Cor	nments:			
B. <u>Pre</u>	test Checks			
(1)	Brake cylinder condition		Accept	Reject
(2)	Brake assembly hardware	condition	Accept	Reject
(3)	Check for leakage from pis	ston seals	Accept	Reject
Cor	nments:			

2.57

Aerospace

#### CM30-244 COMPONENT MAINTENANCE MANUAL WITH IPL FOR MAIN BRAKE ASSEMBLY PART NO. 30-244

#### TEST DATA SHEET (Sheet 2 Of 2)

C.	Piston Actuation and Flow Through Tes	<u>t</u>	
	Pressure Applied: psig/bar	Required:	600 ±20 psig (41,37 ±1.38 bar) to 0 psig (0 bar)
	Number of Cycles:	Required:	3 cycles
	Retracts Operation: Accept	Reject	
	Piston Retraction: Accept	Reject	
	Pressure Plate Retraction: Accept	ot Reject	·
	Comments:		
D.	Pressure Test		
	Pressure Applied: psig/bar	Required:	600 ±20 psig 41,37 ±1.38 bar)
	Time:	Required:	Two [2] minutes minimum
	Leakage: No Yes _		
	Pressure Applied: psig/bar	Required:	0 psig (0 bar)
	Pressure Plate Retraction: Accept	otReje	ct
	Rotating Disc Rotation: Accept	otReje	ct
	Comments:		
Te	ster:		Date:
Ins	pector:		Date:



#### DISASSEMBLY

1. General

To service the brake assembly, it will be necessary to remove it from the aircraft.

- **NOTE:** Refer to <u>TESTING</u> section to establish the condition of the component or most probable cause of detected malfunction(s) to determine extent of disassembly required.
- A. Disassembly Equipment and Materials (Refer to Table 3001)

Disassembly Equipment and Materials List				
PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY	
N/A	Socket Set	Hex Head, Inch	Commercial Source	
N/A	Wrench Set	Hex Head, Open End, Inch	Commercial Source	
N/A	Ratchet	1/2 in. Square Drive	Commercial Source	
199-18	Preformed Packing Extraction Tool Set	N/A	Parker Hannifin Corp. Aircraft Wheel & Brake	
N/A	Internal Snap Ring Pliers	N/A	Commercial Source	
N/A	Wrench	5/32 in. Hex Head	Commercial Source	

# Table 3001 Disassembly Equipment and Materials List

#### B. Remove Brake Assembly

Refer to 50-155 Wheel and Brake Installation drawing and IPL Figure 1 for identification of brake assembly components.

SAFETY WARNING: 4

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

- (1) Jack and support aircraft per aircraft maintenance manual. Perform any additional preliminary functions to prep aircraft prior to equipment removal.
- (2) Remove the air valve assembly from the main wheel assembly.

#### CAUTION: AIR VALVE REMOVAL IS REQUIRED TO INSURE TIRE DEFLATION.

- (3) Support wheel/tire and remove and retain applicable axle mounting hardware.
- (4) Remove wheel/tire from axle as a unit and place on a clean flat surface.



#### DISASSEMBLY

- (5) After the main wheel and tire have been removed, disconnect brakes from hydraulic lines and cap open lines and fittings.
- (6) Remove and retain the six nuts (30), bolts (20), and washers (25) which fasten the brake assembly to the aircraft strut.
- (7) Slide the brake assembly off of the axle and place it on a clean flat surface.

#### C. Disassemble Brake Assembly

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



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 OR DEATH.

- **<u>CAUTION</u>**: EXERCISE CARE TO PREVENT BRAKE FLUID FROM CONTACTING THE BRAKE FRICTION SURFACES.
- **<u>CAUTION</u>**: DISPOSE OF ALL USED HYDRAULIC FLUID PER LOCAL REGULATIONS.
- **NOTE:** It is recommended that all O-rings (45 and 165) be replaced at each overhaul regardless of condition.
- (1) Remove bleeder (175) and drain the hydraulic fluid into an approved container.
- (2) Remove the six 1/4 -28 self-locking nuts (15), bolts (5), and double countersunk washers (10) from the brake assembly.
- (3) With the brake assembly stack now unrestrained, remove the torque tube assembly (100), rotors (80), and stator disc assemblies (85), from the stack.
- (4) The following steps are required prior to removing the pressure plate assembly (60).
  - (a) With a 5/32 in. hex head wrench, unthread the retract stud (115) from the retract base subassembly (110) and remove retract stud from the brake. Repeat for the other two retract studs.
    - **NOTE:** The retract base subassembly is a single unit. The retract spacer (130) is secured on the stud (115) by way of the friction sleeve (120) and sleeve retainer (125) which are a press fit onto the retract stud.



## DISASSEMBLY

- (5) Slide the retract base assembly (150) from it's pocket on the pressure plate assembly. Repeat for the other two retract base assemblies.
- (6) The pressure plate assembly (60) may now be removed from the brake stack.

SAFETY WARNING:

THE RETRACT SPRING (135) IS UNDER INSTALLED LOAD. USE CARE WHEN REMOVING THE RETAINING RING (145). PARTS MAY FLY OUT AND CAUSE INJURY, POSSIBLE DAMAGE, OR LOSS OF PARTS.

(7) With internal snap ring pliers, carefully remove the three snap rings (145) from the brake cylinder retract bore and remove the plain washer (140) and spring (135). Inspect spring (135). Repeat for the other two retracts.

**NOTE:** The insulators (55) are powdered stainless steel and clearance fit into the pistons.

- (8) Remove the six piston insulators (55).
- **<u>CAUTION</u>**: PULL OUT PISTONS WITH CARE. DO NOT COCK THE PISTONS WHEN PULLING THEM OUT. DO NOT USE HYDRAULIC OR PNEUMATIC PRESSURE TO REMOVE PISTONS.
- (9) Remove the six pistons (40) by threading an applicable bolt/rod into the 1/4-28-2B hole. Holding the bolt/rod, pull the pistons out.
- (10) Inspect wipers (50) for damage or wear. Replace if necessary. Wipers must be removed if the brake housing is to be penetrant inspected.
- (11) Remove and discard O-rings (45) from the piston bores.
- (12) Remove inlet fitting (190).
- (13) Remove the bleeder seat (170). Remove and discard O-ring (165).
- (14) Drain any remaining hydraulic fluid from the brake cylinder (35).



## **CLEANING**

- 1. General
  - A. Cleaning Equipment and Materials (Refer to Table 4001)
    - **NOTE:** Equivalent substitutes may be used for items listed.

Cleaning Equipment and Materials List				
PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY	
N/A	Air Supply, Compressed Dry Filtered	30 psig maximum (2.07 bar)	N/A	
N/A	Clean Cloths	N/A	Commercial Source	
N/A	Brushes	Non-abrasive, Non-metallic Bristle	Commercial Source	
N/A	Solvent, Stoddard, Type 1 (Mineral Spirits, White Spirits, Naphtha)	P-D-680	Commercial Source	
N/A	Isopropyl Alcohol	N/A	Commercial Source	

Table 4001

#### 2. Cleaning Procedures

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

#### WARNING: CLEANING SOLVENTS CAN BE TOXIC AND VOLATILE. USE ONLY IN WELL-VENTILATED AREAS. AVOID PHYSICAL CONTACT WITH SOLVENT AND DO NOT INHALE VAPORS. KEEP SOLVENT CONTAINERS COVERED WHEN NOT IN USE. OBSERVE FIRE PRECAUTIONS.

#### A. Cleaning Non-Aluminum Metallic Components

- (1) Non-Aluminum components, such as the torque tube assembly (100), pressure plate assembly (60), and the stator disc assemblies (85) can be washed with Type 1 Stoddard Solvent (per P-D-680) using a non-abrasive, non-metallic bristle brush to remove stubborn deposits.
- (2) Dry all metal parts thoroughly after cleaning, using low-pressure compressed air, 30 psig maximum (2.07 bar). Wipe dried parts with clean cloths.



#### <u>CLEANING</u>

**B. Cleaning Rotors** (IPL 1-80)

**<u>CAUTION</u>**: DO NOT USE CLEANING SOLUTIONS ON FRICTION MATERIAL SURFACES.

(1) Clean rotors with compressed air and a stiff bristle brush.

#### C. Cleaning Aluminum Components

- Aluminum components, such as the brake cylinder (35), and pistons (40), can be washed with Type 1 Stoddard Solvent (per P-D-680) using a non-abrasive, nonmetallic bristle cleaning brush to remove stubborn deposits.
- (2) Dry parts thoroughly after cleaning, using low pressure compressed air, 30 psig maximum (2.07 bar). Wipe dried parts with clean cloths.

#### D. Cleaning Rubber Components

- (1) Clean the O-rings and wipers with isopropyl alcohol. Wipe dry with clean cloths.
  - **<u>NOTE</u>**: It is recommended that all O-rings (45 and 165), and wipers (50) be replaced at each overhaul regardless of condition:


## **INSPECTION / CHECK**

#### 1. General

In order to facilitate inspection of components, parts must be cleaned prior to inspection. Refer to <u>CLEANING</u> section for applicable instructions. Refer to the illustrations in this section for important areas and areas of greatest wear. Where indicated, refer to <u>FITS AND</u> <u>CLEARANCES</u> section to find if the part can be used, repaired, or replaced.

#### A. Inspection/Check Equipment and Materials (Refer to Table 5001)

#### **NOTE:** Equivalent substitutes may be used for items listed.

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
N/A	Magnetic Particle Inspection Kit	ASTM E1444	Commercial Source
N/A	Fluorescent Penetrant Inspection Kit	MIL-STD-6866 or ASTM E1417, Type 1, Method A, Sensitivity Level 2	Commercial Source
N/A	Inspection Surface Plate	N/A	Commercial Source
N/A	Magnifier	X10 Magnification	Commercial Source
N/A	Vernier Dial Calipers	0 to 6.00 in. (0 to 150 mm)	Commercial Source
N/A	Micrometers	0 to 2.00 in. (0 to 50 mm)	Commercial Source

Table 5001 Inspection/Check Equipment and Materials List



## **INSPECTION / CHECK**

- B. Maintenance Schedule (Refer to Table 5002)
  - Refer to IPL Figure 1 for identification of brake assembly components.
  - **NOTE:** The heat sink is defined as the rotating discs (80), pressure plate assy (60), stationary disc assy (85), and torque tube wear pads (70).

Table 5002

Scheduled Maintenance			
SCHEDULED INTERVAL	ITEM	MAINTENANCE TASK	
Every heat sink change	All components	<ul><li>a. General inspection per para. 1.C.</li><li>b. Detailed inspection per para. 2 as applicable</li></ul>	
	O-Rings (45, 165)	Replace	
	Wiper (50)	Replace	
	Wear Pads (70) and Rivets (75A, 95A)	Replace	
	Brake Cylinder (35)	a. Visual inspection per para. 2.A. b. Penetrant inspect per para. 2.A.	
At the 5 <sup>th</sup> (fifth) heat sink change	Torque Tube (105 or 105A)	<ul> <li>a. Visual inspection per para. 2.C.</li> <li>b. Magnetic particle or penetrant inspect per para. 2.C.</li> </ul>	
every 3 <sup>rd</sup> (third) heat sink change thereafter	Stator Disc (90)	<ul> <li>a. Visual inspection per para. 2.D.</li> <li>b. Magnetic particle or penetrant inspect per para. 2.D.</li> </ul>	
	Pressure Plate (65)	<ul> <li>a. Visual inspection per para. 2.E.</li> <li>b. Magnetic particle or penetrant inspect per para. 2.E.</li> </ul>	

UNSCHEDULED INTERVAL	ITEM	MAINTENANCE TASK
Overheating such that at least one of the three fusible plugs release in the mating Main Wheel	All components	<ul><li>a. General inspection per para. 1.C.</li><li>b. Detailed inspection per para. 2 as applicable</li></ul>
Assembly	Brake Cylinder (35)	Hardness test per para. 2.A.(3).
	O-Rings (45, 165)	Replace
	Wiper (50)	Replace



## **INSPECTION / CHECK**

#### **C.** General Inspection Procedure

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

Items that do not require special detailed examination are to be given a general inspection in accordance with this paragraph. Refer to paragraph 2. Detailed Inspection Procedures for items that require specific examination.

Visually examine the following items for damage or looseness: bolts (5 and 20), washers (10 and 25), nuts (15 and 30), inlet fitting (190), and bleeder seat (170).
 Replace all parts with stripped or scored threads or obvious damage. Additionally:

**<u>CAUTION</u>**: NO REWORKING OF BOLTS IS PERMITTED. ANY STRIPPING OF PLATING FOR INSPECTION PURPOSES IS PROHIBITED.

(a) Visually inspect for bent bolts (5 and 20). Scrap all bent bolts. Magnetic paticle inspect each bolt for cracks in accordance with ASTM E1444 or equivalent. Use crack definition in MIL-STD-1907. Scrap all bolts with cracks.

**NOTE:** If <u>any</u> of the bolts are damaged, replace <u>all</u> of the bolts.

- (b) Inspect nuts (15 and 30) for damaged threads and for loss of self-locking feature. If nut can be turned by hand onto the bolts, past the top of the nut, then selflocking feature is destroyed.
  - **<u>NOTE</u>**: If <u>any</u> of the nuts are damaged, replace <u>all</u> of the nuts.
- (2) Visually examine all components of the brake assembly for wear, scoring, cracks, chips, nicks, burrs, pitting, corrosion, flaws, and other obvious signs of damage. Replace or repair all parts showing evidence of these defects.
- (3) Visually examine all components of the brake assembly with threaded features. Replace all parts with stripped or scored threads or obvious damage.
- (4) Check all parts with sealing surfaces and grooves for distortion, damage, burrs, or corrosion which might damage packings and rings during installation and/or operation or which might permit leakage. Replace part if sealing surfaces and grooves are damaged.
- (5) Check individual parts as indicated in paragraph 2. Detailed Inspections. Repair or replace any parts that do not meet <u>INSPECTION / CHECK</u> requirements.
- (6) The following items are to be replaced at each overhaul regardless of condition: All rotors (80), O-rings (45 and 165), wiper (50), wear pads (70), and rivets (75A and 95A).



## **INSPECTION / CHECK**

## 2. Detailed Inspections

#### WARNING: PENETRANT FLUID CAN BE TOXIC AND VOLATILE. USE ONLY IN WELL-VENTILATED AREAS. AVOID PHYSICAL CONTACT WITH FLUID AND DO NOT INHALE VAPORS. KEEP FLUID CONTAINERS COVERED WHEN NOT IN USE. OBSERVE FIRE PRECAUTIONS.

## A. Inspect Brake Cylinder (IPL, 1-35)

Repair per paragraph 2.A. of <u>REPAIR</u>, or replace.

Parker Hannifin recommends a thorough visual and fluorescent penetrant inspection of the brake cylinder in accordance with ASTM E1417 or MIL-STD-6866 (Type I, Method A, Sensitivity Level 2) at the following intervals:

First inspection:	At the 5 <sup>th</sup> (fifth) brake heat sink change
Additional inspections:	Every 3 <sup>rd</sup> (third) brake heat sink change thereafter

- **NOTE:** Paint must be removed from the brake cylinder to conduct an accurate method for the flourescent penetrant inspection. Refer to paragraph 2.B. of <u>REPAIR</u> for paint removal instructions.
- (1) Visually inspect the brake cylinder per paragraph 1.C.
- (2) Visually examine inlet and bleeder port threads for damage. Replace any cylinder with stripped or scored threads or threads showing any obvious damage.
- (3) Visually examine the sealing surfaces of the cylinder piston bores for nicks, scratches, wear, corrosion or other damage. (Parker Hannifin recommends the use of a 10-power magnifier for the visual examination). Replace severely corroded cylinders.
- (4) Visually inspect for missing surface paint caused by erosion, wear, inspection or surface repair.
- (5) Use fluorescent penetrant inspection in accordance with ASTM E1417 or MIL-STD-6866, Type I, Method A, Sensitivity Level 2, to inspect brake cylinder for cracks. Use crack definition in MIL-STD-1907. No cracks are permitted.
- (6) In the event of overheating (see Table 5002, Unscheduled Interval) a hardness must be performed per the following procedure. Refer to Figure 5001 and Table 5003 for locations and acceptance values.

**NOTE:** Paint must be removed from surfaces prior to being tested.

(a) Perform a hardness test in the area shown in Figure 5001. Obtain a minimum of three hardness readings, equally spaced between mounting holes. If any reading is below BHN 125 as specified in Table 5003, replace the brake cylinder.

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## CM30-244 COMPONENT MAINTENANCE MANUAL WITH IPL FOR MAIN BRAKE ASSEMBLY PART NO. 30-244

## **INSPECTION / CHECK**



#### Heat Damage Test – Brake Cylinder Figure 5001

ITEM	BRINELL TEST
BALL DIAMETER	10 mm
TEST LOAD	500 kg.
MINIMUM NUMBER OF READINGS (EQUALLY SPACED)	3
ACCEPTABLE MINIMUM AVERAGE HARDNESS	125

Hardness Test Readings Table 5003

#### **B.** Inspect Pistons (IPL, 1-40) Repair per paragraph 2.D. of REPAIR, or replace.

- (1) Visually inspect the pistons per paragraph 1.C.
- (2) Visually inspect the insulators (IPL, 1-55) per paragraph 1.C. Replace damaged insulators.
- **C.** Inspect Torque Tube Assembly (IPL, 1-100) (Refer to Figure 5002) Repair per paragraph 2.F. of <u>REPAIR</u>, or replace.
  - (1) Visually inspect the torque tube assembly per paragraph 1.C.



## **INSPECTION / CHECK**

- (2) Inspect for loose, cracked, or worn wear pads (IPL, 1-70). Check dimension A. If thickness is beyond the limit specified in <u>FITS AND CLEARANCES</u>, Table 8001, replace the wear pad. Replace loose, damaged or worn wear pads in accordance with paragaraph 2.E. of <u>REPAIR</u>.
  - **NOTE:** Replace wear pads and rivets at each heat sink change.
- (3) If wear pads are being replaced, inspect the torque tube for flatness and parallelism as required in figure 5002. If constraints exceed the limit, replace the torque tube.
- (4) Inspect the torque tube for cracks. Visually inspect and magnetic particle inspect (per ASTM E1444) or penetrant inspect (per ASTM E1417 or MIL-STD-6866 Type I, Method A, Sensitivity Level 2). Use crack definition in MIL-STD-1907. No cracks are permitted.
- (5) Inspect torque tube key width on six [6] drive keys. Width of keys must not exceed dimension B per <u>FITS AND CLEARANCES</u>, Table 8001. Replace torque tube if any key is does not meet the requirements or is damaged.
- **D.** Inspect Stator Disc Assembly (IPL, 1-85). See Figure 5003. Repair per paragraph 2.F. of <u>REPAIR</u>, or replace.
  - (1) Visually inspect the stator disc assembly per paragraph 1.C.
  - (2) Inspect for loose, cracked, or worn wear pads (IPL, 1-70). Check dimension A. If thickness is beyond the limit specified in <u>FITS AND CLEARANCES</u>, Table 8001, replace the wear pad. Replace loose, damaged or worn wear pads in accordance with paragaraph 2.E. of <u>REPAIR</u>. Replace wear pads at each lining change.

**NOTE:** Replace wear pads and rivets at each heat sink change.

- (3) Inspect the stator disc for straightness on wear pad mating surface if wear pads are being replaced. If straightness exceeds the limits shown in Figure 5003, stator may be draw flattened per paragraph 2.G., of <u>REPAIR</u>, or replace the stator disc.
- (4) Inspect the stator disc for cracks. Visually inspect and magnetic particle inspect (per ASTM E1444) or penetrant inspect (per ASTM E1417 or MIL-STD-6866 Type I, Method A, Sensitivity Level 2). Use crack definition in MIL-STD-1907. No cracks are permitted.
- (5) Inspect the stator slot width on six [6] drive slots (the slots which engage the torque tube) for wear or damage. Width of slots must not exceed dimension B per <u>FITS AND</u> <u>CLEARANCES</u>, Table 8001. Replace stator disc if any slot is found to exceed the limit or is damaged.



## **INSPECTION / CHECK**

- **E.** Inspect Pressure Plate Assembly (IPL, 1-60). See Figure 5004. Repair per paragraph 2.F. of <u>REPAIR</u>, or replace.
  - (1) Visually inspect the pressure plate assembly per paragraph 1.C.
  - (2) Inspect for loose, cracked, or worn wear pads (IPL, 1-70). Check dimension A. If thickness is beyond the limit specified in <u>FITS AND CLEARANCES</u>, Table 8001, replace the wear pad. Replace loose, damaged or worn wear pads in accordance with paragaraph 2.E. of <u>REPAIR</u>.

**<u>NOTE</u>**: Replace wear pads and rivets at each heat sink change.

- (3) Inspect the pressure plate for straightness on wear pad mating surface if wear pads are being replaced. If straightness exceeds the limits shown in Figure 5004, the pressure plate may be draw flattened per paragraph 2.G., of <u>REPAIR</u>, or replace the pressure plate.
- (4) Inspect the pressure plate for cracks. Visually inspect and magnetic particle inspect (per ASTM E1444) or penetrant inspect (per ASTM E1417 or MIL-STD-6866 Type I, Method A, Sensitivity Level 2). Use crack definition in MIL-STD-1907. No cracks are permitted.
- (5) Inspect the pressure plate drive slot width on six [6] drive slots (the slots which engage the torque tube) for wear or damage. Width of slots must not exceed dimension B per <u>FITS AND CLEARANCES</u>, Table 8001. Replace pressure plate if any slot is found to exceed the limit or is damaged.

## F. Inspect Retract Subassembly (IPL, 1-110)

Repair per paragraph 2.H. of <u>REPAIR</u>, or replace.

(1) Visually inspect the retract subassembly components per paragraph 1.C. Replace any retract assembly that shows evidence of being damaged .

#### G. Inspect Retaining Ring (IPL, 1-145)

(1) Replace ring if it becomes bent or twisted during removal.

#### H. Inspect Retract Base Assembly (IPL, 1-150)

(1) Visually inspect the pistons per paragraph 1.C. Replace damaged retract base assemblies.

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## **INSPECTION / CHECK**



Torque Tube Assembly and Wear Pad Inspection Limits Figure 5002 Я

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## CM30-244 COMPONENT MAINTENANCE MANUAL WITH IPL FOR MAIN BRAKE ASSEMBLY PART NO. 30-244



Pressure Plate Assembly and Wear Pad Inspection Limits Figure 5004



## **INSPECTION / CHECK**

I. Inspect Rotors (IPL, 1-80). See Figure 5005.

**NOTE:** Replace rotors at each overhaul regardless of condition.

- (1) Visually inspect the rotor disc per paragraph 1.C.
- (2) Inspect for cracks and lining material pitting, crumbling and edge chipping. Check lining material thickness dimensions, B and C. If thickness is beyond the limit specified in <u>FITS AND CLEARANCES</u>, Table 8001, replace the rotor disc. Replace damaged or worn discs.
- (3) Inspect drive slot width on six [6] wheel engagement drive slots for wear or damage. Width of slots must not exceed dimension A per <u>FITS AND CLEARANCES</u>, Table 8001. Replace rotor disc if any slot is found to exceed the limit or is damaged.





## <u>REPAIR</u>

## 1. General

Certify that a component is serviceable per <u>INSPECTION/CHECK</u> section prior to attempting repair. Disassemble the brake assembly only to the level necessary to do the repairs or replace components. Repairs are limited to the replacement of parts and to the repairs specified in this section. No attempt should be made to repair cracked, severely corroded or badly damaged parts.

A. Repair Equipment and Materials. Refer to Table 6001.

**NOTE:** Equivalent substitutes may be used for items listed.

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
Model 305	Rivet Machine	N/A	Milford Fastening Systems
57-082	Hopper Barrel	N/A	Milford Fastening Systems
AR-4015-9	Rivet Guide	N/A	Milford Fastening Systems
313-720-9	Slide Parts	N/A	Milford Fastening Systems
63-J-1566-A	Jaws	N/A	Milford Fastening Systems
563-DS-44	Driver	N/A	Milford Fastening Systems
824-1K-7	Roll Set	Modified Per Figure 9006	Milford Fastening Systems
N/A	Vise Jaws	Soft Brass or Hard Rubber	Commercial Source
N/A	Drill Bit	Ø0.187 in. (Ø5 mm)	Commercial Source
N/A	Drift Punch	Ø0.187 in. (Ø5 mm)	Commercial Source
N/A	Hand File	Flat	Commercial Source
N/A	Inside Micrometers	0 to 2.00 in. (0 to 50 mm)	Commercial Source
N/A	Aluminum Oxide Cloth	400 Grit or Finer Wet or Dry	Commercial Source
N/A	Oven	1500°F capacity (815°C)	Commercial Source
N/A	Plastic Media Type V (Acrylic)	MIL-P-85891	U.S. Technology Corp.
N/A	Plastic Media Stripping Equipment	N/A	Commercial Source
N/A	Corrosion Preventative Alodine 1200 or Equiv.	MIL-C-5541, Class 1A	Commercial Source

Table 6001 (Sheet 1 of 2) Repair Equipment and Materials List



## <u>REPAIR</u>

## Table 6001 (Sheet 2 of 2) Repair Equipment and Materials List

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
N/A	Paint Application Equipment	N/A	Commercial Source
44-GN-36 Components A and B	Primer Coating	MIL-PRF-85582C Type I, Class C2	Deft Chemical Coatings
44-GN-24 Components A and B	Primer Coating Alternate Product	MIL-P-85582B Type I, Class C2	Deft Chemical Coatings
03-W-127A Components A and B	Finish Coating	MIL-C-85285B, Type I No. 17925 (FED-STD-595) Untinted White	Deft Chemical Coatings
Various for Application Type	Galvanizing Compound	MIL-P-26915 Type I, Class A	ZRC Products Company
N/A	Draw Flattening Fixture	Per Figure 9001 SPECIAL TOOLS	Outside Manufacture
N/A	Cold Straightening Fixture	Per Figure 9002 and 9003 SPECIAL TOOLS	Outside Manufacture
N/A	Spacer Tool – Retract Subassembly	Per Figure 9004 SPECIAL TOOLS	Outside Manufacture
N/A	Support – Retract Subassembly	Per Figure 9005 SPECIAL TOOLS	Outside Manufacture
1227-6	Heli-Coil Extracting Tool	MIL-T-21309	Black & Decker Company
7552-3	Heli-Coil Installation Tool	MIL-T-21309	Black & Decker Company
3695-3	Heli-Coil Tang Removal Tool	MIL-T-21309	Black & Decker Company

- B. Items that need only a general repair (in accordance with this paragraph) are not included in this section. This section includes only those items that require special repair procedures. No attempt should be made to repair cracked, severely corroded or badly damaged parts.
  - (1) Simple repair will be limited to polishing minor burrs, nicks, scoring, and scratches in non-sealing surface areas with 400 grit or finer (wet or dry) aluminum oxide cloth in accordance with the limits specified in paragraph 2. Repair Procedures.
  - (2) Use 400 grit or finer, wet or dry aluminum oxide cloth to remove all corrosion and surface damage in accordance with the limits specified in paragraph 2. Repair Procedures.



## <u>REPAIR</u>

- (3) Clean all repaired parts in accordance with instructions given in <u>CLEANING</u>.
- (4) Treat all repaired areas in accordance with their respective repair procedures.

#### 2. Repair Procedures

- **CAUTION:** REPAIRS CAN BE MADE ONLY TO THOSE SURFACES SPECIFIED IN PARAGRAPH 1.B AND THOSE SPECIFIED IN PARAGRAPH 2. REPAIR MUST NOT AFFECT SEALING CHARACTERISTICS OF SEALING SURFACES.
- **CAUTION:** DO NOT USE ABRASIVES CONTAINING IRON SUCH AS STEEL WOOL, IRON OXIDE, BRASS OR STEEL WIRE. IRON OR COPPER PARTICLES WHICH BECOME EMBEDDED IN THE ALUMINUM COMPONENTS WILL ACCELERATE CORROSION.

#### A. Repair Procedure For Brake Cylinder (IPL, 1-35).

- (1) Blend out burrs, nicks, and scratches less than .030 inches (.762 mm) deep on the outside of the brake cylinder using hand filing techniques to relieve any sharp corners that may cause stress concentrations. Blend out tool marks.
- (2) Polish out small nicks and scratches, .003 inches max. deep (.0762 mm) on machined surfaces.
- (3) Polish out small nicks and scratches not exceeding .003 inches max. (.0762 mm) deep in piston bores.
- (4) Clean part per <u>CLEANING</u> section and treat repaired areas with corrosion preventative (Alodine 1200 or equivalent) per MIL-C-5541, Class 1A.
- (5) Mask applicable areas and apply primer and topcoat to the repaired areas on the outside of the brake cylinder per paragraph 2.C.



## <u>REPAIR</u>

## B. Paint Removal Procedure For Brake Cylinder (IPL, 1-35).

This procedure is necessary when performing the fluorescent penetrant inspection of the brake cylinder subassembly.

- <u>WARNING</u>: STRIPPING SOLVENTS CAN BE TOXIC AND VOLATILE. USE ONLY IN WELL-VENTILATED AREAS. AVOID PHYSICAL CONTACT WITH SOLVENTS AND DO NOT INHALE VAPORS. KEEP SOLVENT CONTAINERS COVERED WHEN NOT IN USE. OBSERVE FIRE PRECAUTIONS.
- **<u>CAUTION</u>**: REFER TO THE APPLICABLE MANUFACTURER'S INSTRUCTIONS FOR DISPOSAL OF CHEMICAL STRIPPING SOLUTIONS OR PLASTIC STRIPPING MEDIA.
- **NOTE:** Chemical stripping agents are commercially available and may be used only if plastic media stripping equipment is not available. For best results, always refer to the applicable chemical manufacturer's instructions for application and use.
- (1) Degrease brake cylinder per <u>CLEANING</u> section.
- (2) Strip paint from the brake cylinder (IPL, 1-35) using plastic media.
  - **<u>NOTE</u>**: For best results, always refer to the applicable plastic media manufacturer's instructions for application and use.
- (3) Clean part per <u>CLEANING</u> section prior to penetrant inspection.



## <u>REPAIR</u>

## C. Repaint Procedure For Brake Cylinder (IPL, 1-35)

Refer to Figure 6001 and repaint brake cylinder in accordance to the following procedure.

## **<u>CAUTION</u>**: REFER TO THE APPLICABLE PAINT MANUFACTURER'S INSTRUCTIONS FOR DISPOSAL OF PRIMER AND TOPCOAT MEDIA.

- **<u>NOTE</u>**: To achieve best results, always refer to the applicable paint manufacturer's instructions for application and use.
- (1) Mask and apply primer to brake cylinder. The dry film thickness of the primer shall be .0006 to .0009 inches (.0152 to .0229 mm).
- (2) Mask and apply topcoat to brake cylinder. The total dry film thickness (including primer and topcoat) shall be .0026 to .0032 inches (.066 to .081 mm).

#### D. Repair Procedure For Pistons (IPL, 1-40)

- (1) Polish out small nicks and scratches to a surface finish of 16 microinches RMS. Replace pistons if outside diameter is worn to Ø1.371 inches (34,823 mm) at any location.
- (2) Clean part per <u>CLEANING</u> section and treat repaired areas with corrosion preventative (Alodine 1200 or equivalent per MIL-C-5541, Class 1A).

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REPAIR



(2) PRIMER ONLY IN AREAS INDICATED

3. NO PRIMER OR TOPCOAT IN AREAS INDICATED

Brake Cylinder Masking Instructions Figure 6001



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## <u>REPAIR</u>

E. Wear Pad Replacement For Torque Tube Assembly (IPL, 1-100), Stator Disc Assembly (IPL, 1-85) and Pressure Plate Assembly (IPL, 1-60). Refer to IPL, Figure 1.

SAFETY WARNING:

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

- **CAUTION:** DO NOT ENLARGE THE RIVET HOLES IN THE TORQUE TUBE, STATOR DISC OR PRESSURE PLATE. IF THE RIVET HOLE EXCEEDS Ø .204 (5.182 MM.), THE TORQUE TUBE, STATOR DISC, OR PRESSURE PLATE MUST BE REPLACED.
- (1) Using a  $\emptyset$  0.187 in. (5mm) drill bit, drill out the shop head of the rivets (75A and 95A) and punch the rivets from the respective assembly. Discard rivets.
- (2) Remove and discard wear pads (70). Remove any burrs around rivet hole areas.
- (3) The torque tube (105 or 105A), stator disc (90), and pressure plate (65) should now be checked for continued service per paragraph 2.C., 2.D., and 2.E., respectively, of <u>INSPECTION/CHECK</u> and perform any repair for per paragraph 2.F., of <u>REPAIR</u>. Cold straighten or draw flatten stator and/or pressure plate per paragraph 2.G. of <u>REPAIR</u>.
  - **NOTE:** When using the Milford rivet machine, the rollset tool must first be modified per Figure 9006.
  - (a) After torque tube is judged serviceable, refer to Figure 6002 and locate the wear pads over the rivet holes on the torque tube and insert with rivets (75A).
    - <u>1</u> From the shop head of the rivet using a Milford model 305 or equivalent rivet machine with applicable attachments (driver, jaw, rollset, etc.).
  - (b) After stator disc is judged serviceable, refer to Figure 6003 and locate the wear pads over the rivet holes on both sides of the stator disc and insert with rivets (95A).
    - <u>1</u> Form the shop head of the rivet using a Milford model 305 or equivalent rivet machine with applicable attachments (driver, jaw, rollset, etc.).
  - (c) After pressure plate is judged serviceable, refer to Figure 6002 and locate the wear pads over the rivet holes on the pressure plate and insert with rivets (75A).
    - <u>1</u> Form the shop head of the rivet using a Milford model 305 or equivalent rivet machine with applicable attachments (driver, jaw, rollset, etc.).

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2. RIVETS MAY BE INSTALLED FROM EITHER SIDE.

Stator Disc Wear Pad Installation Figure 6003



## <u>REPAIR</u>

- **<u>CAUTION</u>**: THERE SHALL BE NO SPLITS RESULTING FROM THE CLINCHING OPERATION.
- (4) Refer to Figure 6004 and verify rivet installation requirements for torque tube, stator disc and pressure plate assemblies.
- (5) All parts assembled by riveting shall be fitted tightly together, and no perceptible movement shall be allowed between them.
  - (a) Parts shall not be distorted by splitting, bulging, buckling, or other characteristics which result from poor assembly procedure.
  - (b) Rivets shall not extend above the surface. The manufactured head and clinched end shall be uniform and full seated.



Rivet Installation Requirements Figure 6004



## <u>REPAIR</u>

- F. Repair Procedure For Torque Tube (IPL, 1-105 or 1-105A), Stator Disc (IPL, 1-90), and Pressure Plate (IPL, 1-65)
  - (1) Polish out small nicks and scratches, .003 in. max. (.0762 mm) deep provided that repaired area meets the minimum requirements of the Fits and Clearances section of this manual.
  - (2) Clean part per <u>CLEANING</u> section and treat repaired areas with corrosion preventative (Galvanizing compound per MIL-P-26915, Type I, Class A) in accordance with the following procedure.

**CAUTION:** REFER TO THE APPLICABLE PAINT MANUFACTURER'S INSTRUCTIONS FOR DISPOSAL OF COMPOUND MEDIA.

- **<u>NOTE</u>**: To achieve best results, always refer to the applicable coating manufacturer's instructions for application and use.
- (a) Apply galvanizing to all repaired areas of torque tube. The dry film thickness of the coating shall be .0015 inches min. to .0030 inches max. (.0381 to .0762 mm).
- **G.** Straightening Procedure For Stator Disc (IPL, 1-90) and Pressure Plate (IPL, 1-65) <u>CAUTION</u>: STRAIGHTENING OF THE ROTOR DISCS (80) ARE NOT PERMITTED.
  - **NOTE:** The following methods are not a guarantee of sustaining disc straightness conditions through continued service.

Stator discs and pressure plates which do not meet the straightness requirements of this manual may be straightened in accordance with either of the following procedures.

- (1) Draw Flattening
  - (a) Remove wear pads (70) (refer to 2.E., Wear Pad Replacement).
  - (b) Stack plates back-to-back between two 2-inch (50.8mm) thick steel plates (refer to Figure 9001, <u>SPECIAL TOOLS</u>...section) with long bolts through center of stack and steel plates.
  - (c) Place in an oven and heat slowly to a temperature range of 1100° to 1150°F (593° to 621°C) and hold that temperature range for one hour.
  - (d) Remove from oven and retighten bolts.



## <u>REPAIR</u>

- (e) Place in an oven and heat slowly to a temperature range of 1100° to 1150°F (593° to 621°C) and hold that temperature range for three hours.
- (f) Remove from oven and air cool at room temperature; then remove bolts and separate parts.
- (2) Cold Straightening (refer to Figure 6005)
  - **NOTE:** This procedure will only work on discs that exhibit a dished condition, in which the dishing is in the same direction, and will not reverse the effects of a warped disc.
  - (a) Remove wear pads (70) (refer to 2.E., Wear Pad Replacement).
  - (b) Fabricate upper and lower register plates (refer to Figures 6005).
  - (c) Mount upper and lower register plates in a press.
  - (d) Place dished plate or disc in lower register plate with domed side up.
  - (e) Apply sufficient pressure with press to straighten plate or disc.



Straightening Plates (65) and Discs (90) Figure 6005



## <u>REPAIR</u>

- H. Repair Procedure For Retract Subassembly (IPL, 1-110). Refer to IPL, Figure 1.
  - (1) During the overhaul procedure, the three retract subassemblies must be repaired before returning the brake to service.

```
SAFETY WARNING: A DO NOT ATTEMPT TO REMOVE CORROSION FROM THE
SPACER (130) OR SLEEVE RETAINER (125) BY SANDING.
THESE PARTS HAVE BEEN CADMIUM PLATED, AND
INHALATION OF CADMIUM DUST CAN BE HAZARDOUS TO
YOUR HEALTH.
```

- (2) Discard any severely corroded parts.
- (3) If the friction sleeve (120) can be moved on the stud (115) by a force of thirty pounds or less, replace the friction sleeve.
- (4) Refer to Figure 6006. If the friction sleeve (120) is not flush with the sleeve retainer (125), use a vice or an arbor press to install the friction sleeve flush into the sleeve retainer. Follow up by using the tools shown in Figure 6006 to reset the spacer (130), friction sleeve (120), and sleeve retainer (125) onto the stud (115) to dimension shown. Return retract subassembly to service.

**NOTE:** Stud will be flush with the spacer tool when the reset dimension is achieved.



Retract Reset Requirements Figure 6006



## <u>REPAIR</u>

## I. Insert Repair (IPL, 1-155)

Do not replace inserts unless damaged. Replace damaged inserts in accordance to the following procedure.

SAFETY WARNING:

# USE PROTECTIVE GOGGLES OR GLASSES WHEN STRIKING ANY TOOL.

(1) Refer to Figure 6007 and remove damaged inserts by applying the HeliCoil extracting tool to the insert, striking the head of the tool a light blow and turning it counterclockwise, maintaining steady downward pressure

TOOL POSITION TOP VIEW



HeliCoil Extracting Tool Figure 6007

(2) Refer to Figure 6008 and install inserts into retract base (160) to depth shown. Break off tang.



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## ASSEMBLY

#### 1. General

Use these procedures to assemble the brake assembly.

#### A. Assembly Equipment and Materials. Refer to Table 7001.

**NOTE:** Unless otherwise stated, equivalent substitutes may be used for items listed.

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
N/A	Fluid, Hydraulic	MIL-H-83282 <sup>1</sup> or MIL-PRF-83282 <sup>1</sup>	Commercial Source
51094 Moly-50	Anti-Seize Compound	MIL-T-83483 <sup>2</sup>	FEL-PRO Chemical
N/A	Socket Set	Hex Head, Inch	Commercial Source
N/A	Wrench Set	Hex Head, Open End, Inch	Commercial Source
N/A	Ratchet	1/2 in. Square Drive	Commercial Source
N/A	Torque Wrench	0 to 100 in-lb capacity (0 to 11 N-m)	Commercial Source
N/A	Internal Snap Ring Pliers	N/A	Commercial Source
N/A	Wrench	5/32 in. Hex Head	Commercial Source

Table 7001 Assembly Equipment and Materials List

- <sup>1</sup> <u>CAUTION</u>: THE USE OF HYDRAULIC FLUIDS IS LIMITED TO THOSE SPECIFIED IN TABLE 7001. THE HYDRAULIC FLUIDS SPECIFIED ARE COMPATIBLE AND INTERCHANGEABLE.
- <sup>2</sup> <u>CAUTION</u>: DO NOT MIX ANTI-SEIZE COMPOUNDS. THIS CAN RESULT IN IMPROPER TORQUE SETTINGS AND COULD RESULT IN FAILURE OF THE BOLT. THE USE OF ANTI-SEIZE COMPOUND IS LIMITED TO THAT SPECIFIED IN TABLE 7001.
- 2. Assembly Procedures
  - A. Assemble Main Brake Assembly (Refer to IPL, Figure 1)
    - (1) Place the brake cylinder (35) on a clean, flat work surface with piston bores facing up.
    - (2) Lubricate O-rings (45) with hydraulic fluid, and install in the inner most groove of the cylinder piston bore.
    - (3) Lubricate wipers (50) with hydraulic fluid, and install in the outer most groove of the cylinder piston bore.



## ASSEMBLY

#### **CAUTION:** WHEN INSTALLING THE PISTONS (40) INTO THE BRAKE CYLINDER (35), BE CAREFUL NOT TO MISALIGN OR COCK THE PISTON. THIS MAY CAUSE DAMAGE TO INNER SURFACES WHICH IS CAUSE FOR REPAIR OR REPLACEMENT OF THE CYLINDER (35).

- (4) With the tapped hole in piston (40) facing upward, press each piston into the brake cylinder (35). Install a piston insulator (55) into the pocket of each piston.
- (5) Drop retract springs (135), into the three [3] retract bores of the cylinder (35).
- (6) Place the plain washer (140) on top of the springs and compress while inserting the snap ring (145) into each bore.
- (7) Place the brake built up to this point to the side.
- (8) Place the torque tube assembly (100) on a clean, flat work surface with wear pads facing up.
- (9) Install and align the following components onto the torque tube assembly maintaining the following sequence: the first rotor disc (80), the first stator disc assembly (85), the second rotor disc, the second stator disc assembly, and the third rotor disc.

**NOTE:** The tanged outer drive slots of the stator disc assembly should slide onto and engage the drive lugs of the torque tube assembly.

- (10) Place the built up stack to the side.
- (11) Slide the three [3] retract base assemblies (150) into their pockets on the pressure plate assembly (60).
- (12) Attach the pressure plate assembly (60) to the brake per the following procedure:
  - (a) Place the pressure plate assembly with the wear pads facing up onto the built up brake cylinder.
    - **NOTE:** The retract base assemblies previously installed on the pressure plate assembly should align with the retract bores on the cylinder.
  - (b) Prior to installing the retract subassembly (110), lubricate the threads on the stud (115) with anti-seize compound, per MIL-T-83483. Turn the unit over and install the retract subassembly (110) into the retract bore of the brake cylinder. Thread the stud (115) of the retract subassembly into the retract base assembly (150). With a 5/32-in. hex head wrench, torque to between 30 to 40 in-lb (3.39 to 4.52 N-m).



## <u>ASSEMBLY</u>

- (13) Install the pressure plate assembly (60) onto the torque tube assembly (100).
  - **NOTE:** The inner drive slots of the pressure plate assembly should slide onto and engage the drive keys of the torque tube assembly.
- (14) Prior to installing brake attachment hardware, lubricate bolt (5) and nut (15) threads and bearing surfaces of bolt heads, washers (10) and nuts with anti-seize compound, per MIL-T-83483. Refer to Figure 7001.
- (15) Support the brake and install the six bolts (5), with one washer (10) installed on each bolt, through the mounting holes oriented as shown (ref. IPL Figure 1 of CM30-244).
- (16) Install remaining washers (10), and nuts (15) onto the bolts (5). Torque in a criss-cross pattern to between 95 to 105 in-lb (10.73 to 11.86 N-m).

#### NOTE :



Lubricating Attachment and Mounting Hardware Figure 7001

## ASSEMBLY

- (17) Install and align as required inlet fitting (190).
- (18) Install nut (195) onto fitting (190) and torque nut to 65 to 70 in-lb (7.34 to 7.91 N-m).
- (19) Coat O-ring (165) with hydraulic fluid and install on bleeder seat (170).
- (20) Install bleeder seat (170) into brake cylinder (35) and torque to 65 to 70 in-lb (7.34 to 7.91 N-m).
- (21) Install bleeder (175) into bleeder seat (170) and after testing, torque to 35 to 38 in-lb (4.0 to 4.3 N-m).
- **CAUTION:** TORQUEING OF BLEEDER SCREW (185) IN EXCESS OF 12 IN-LB (1.36 N-M) MAY DAMAGE THE BLEEDER (175).
- (22) Install flat washer (180) and bleeder screw (185) into bleeder (175) and tighten snug to prevent leakage.

#### B. Mount brake assembly onto aircraft.

- (1) Install the brake assembly onto the axle.
- (2) Prior to installing brake strut mounting hardware, lubricate bolt (20) and nut (30) threads and bearing surfaces of bolt heads, washers (25) and nuts with anti-seize compound, per MIL-T-83483. Refer to Figure 7001.

**<u>CAUTION</u>**: WASHERS (25) ARE SINGLE COUNTERSUNK. COUNTERSUNK SIDE OF WASHER MUST INTERFACE WITH BOLT HEAT.

- (3) Attach brake assembly to aircraft strut by installing the six 3/8-24 size bolts (20) with one washer (25) installed on each bolt, through the mounting holes oriented as shown (ref. Parker Hannifin Drawing 50-155). Install remaining washers (25) and nuts (30). Torque in a criss-cross pattern to between 350 to 360 in-lb (39.54 to 40.67 N-m).
- (4) Reconnect hydraulic pressure source; perform any additional post installation functions to complete aircraft readiness per aircraft maintenance manual; and bleed brakes per aircraft maintenance manual.
- (5) Test brake assembly per <u>TESTING</u>, paragraph E. Failure of the brake assembly to meet the acceptance parameters of <u>TESTING</u>, paragraph E, will be cause for rejection of the assembly. It is permissible to perform this test off-aircraft on an individual brake assembly with the use of a hydraulic test stand.



## ASSEMBLY

## C. Brake Lining Procedure

To provide optimum service life of the brake lining material, it is necessary to properly condition (glaze) the linings per the following procedure:

**NOTE:** If the brakes are used exclusively for low speed (below 25 knots ground speed) applications, then periodic conditioning is recommended to optimize service life.

- (1) Perform two (2) consecutive full stop braking applications (with flaps up and no reverse pitch of the propeller) at the following ground speeds per the following aircraft weights:
  - (a) For aircraft take–off weight up to 8700 lbs: 40-45 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 380-480 ft stop distance
    - 11.0-13.0 second stop time
  - (b) For aircraft take–off weight from 8701 to 9800 lbs: 37-42 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 330-420 ft stop distance
    - 10.0-12.0 second stop time
  - (c) For aircraft take–off weight over 9800 lbs: 33-40 knots at one of the following:
    - 6.0 ft/sec<sup>2</sup> deceleration
    - 230-380 ft stop distance
    - 9.0-11.0 second stop time

**NOTE:** Do not allow or permit the brake to cool substantially between stops.

- (2) After, back to back conditioning stops, allow the brakes to cool for ten to fifteen minutes.
- (3) Apply the brakes and check for restraint at high static throttle.
  - **NOTE:** This step is to be done **ONLY** after steps 1 and 2 are completed and not in and of itself. New brakes may pass this step right from the onset, however, conditioning is still mandatory to ensure optimum service life.
  - (a) If the brakes hold, the conditioning is complete.
  - (b) If brakes cannot hold aircraft during static run-up, allow brakes to cool completely and repeat steps (1) through (3).

Delivered from Parker Vault - VERIFY REVISION BEFORE USE



## FITS AND CLEARANCES

#### 1. General

#### A. Assembly Wear Limits (Refer to IPL, Figure 1)

Table 8001 gives the in-service wear limits for the component parts of the brake assembly. You must replace all components that are not within specified limits. Refer to the appropriate paragraphs in <u>INSPECTION / CHECK</u> for more data.

PART NAME (IPL, ITEM NO.)	FIG AND DIMENSION REFERENCE	WORN AREA DESCRIPTION	WORN DIMENSION inches (mm)
Torque Tube Assy (100)	5002, A 5002, B	Wear Pad Thickness (including torque tube) Drive Key Width	.510 inches minimum (12.95 mm) .302 inches minimum
			(7.67 mm)
Stator Disc Assy (85)	5003, A	Wear Pad Thickness	.377 inches minimum (9.58 mm)
	5003, B	Engagement Slot Width	.364 inches maximum (9.24 mm)
Pressure Plate Assy (60)	5004, A	Wear Pad Thickness (including pressure plate)	.287 inches minimum (7.29 mm)
	5004, B	Engagement Slot Width	.364 inches maximum (9.24 mm)
Rotor Disc (80)	5005, A	Drive Tang Slot Width	.687 inches maximum (17.40 mm)
	5005, B	Lining Material Thickness (single side)	.007 inches minimum (0.17 mm)
	5005, C	Rotor Thickness (overall)	.201 inches minimum (5.11 mm)

Table 8001 Assembly In-Service Wear Limits



## FITS AND CLEARANCES

## **B.** Assembly Torque Values (Refer to IPL, Figure 1)

Table 8002 provides the assembly torque values for the component parts of the brake assembly.

PART NAME (IPL, ITEM NO.)	TORQUE LIMITS in-lb or ft-lb (N-m)	
Retract Subassembly (110)	30 to 40 in-lb (3.39 to 4.52 N-m) use MIL-T-83483 anti-seize on threads	
Bolts (5) 1/4-28 size	95 to 105 in-lb (10.73-11.86 N-m) use MIL-T-83483 anti-seize on threads	
Bolts (20) 3/8-24 size	350 to 360 in-lb (39.5 – 40.7 N-m) use MIL-T-83483 anti-seize on threads	
Nut (195)	65 to 70 in-lb dry torque (7.34 to 7.91 N-m)	
Bleeder Seat (170)	65 to 70 in-lb dry torque (7.34 to 7.91 N-m)	
Bleeder (175)	35 to 38 in-lb dry torque (4.0 to 4.3 N-m)	
Bleeder Screw (185)	Tighten snug dry torque not to exceed 12 in-lb (1.36 N-m)	

#### Table 8002 Assembly Hardware Torque Values



## SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES

## 1. General

This section identifies the special tools, fixtures, equipment and consumables necessary to repair, maintain, and do tests on the main brake assembly. Special tools necessary to perform the requirements of this manual are shown in Table 9001. The materials (consumables list) necessary are shown in Table 9002.

**NOTE:** Equivalent substitutes may be used for items listed.

## A. Special Tools, Fixtures and Equipment

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
N/A	Powered Hydraulic Test Stand	0 to 1000 psig capacity $\pm$ 40 psi gage increment (0 to 68.95 bar) $\pm$ 2.76 bar gage increment	Commercial Source
N/A	Pressure Regulator	0 to 1000 psig (0 to 68.95 bar)	Commercial Source
N/A	Pressure Gage	0 to 1000 psig (0 to 68.95 bar)	Commercial Source
N/A	Tubing	Ø0.156 in. (Ø3.96 mm)	Commercial Source
N/A	Hydraulic Hose	1000 psig minimum (68.95 bar)	Commercial Source
N/A	Socket Set	Hex Head, Inch	Commercial Source
N/A	Wrench Set	Hex Head, Open End, Inch	Commercial Source
N/A	Ratchet	1/2 in. Square Drive	Commercial Source
199-18	Preformed Packing Extraction Tool Set	N/A	Parker Hannifin Corp. Aircraft Wheel & Brake
N/A	Internal Snap Ring Pliers	N/A	Commercial Source
N/A	Wrench	5/32 in. Hex Head	Commercial Source
N/A	Inspection Surface Plate	N/A	Commercial Source
N/A	Magnifier	X10 Magnification	Commercial Source

Table 9001 (Sheet 1 of 2) Special Tools, Fixtures and Equipment



## SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
Model 305	Rivet Machine	N/A	Milford Fastening Systems
57-082	Hopper Barrel	N/A	Milford Fastening Systems
AR-4015-9	Rivet Guide	N/A	Milford Fastening Systems
313-720-9	Slide Parts	N/A	Milford Fastening Systems
63-J-1566-A	Jaws	N/A	Milford Fastening Systems
563-DS-44	Driver	N/A	Milford Fastening Systems
824-1K-7	Roll Set	Modified Per Figure 9006	Milford Fastening Systems
N/A	Drill Bit	Ø0.187 in. (Ø5 mm)	Commercial Source
N/A	Drift Punch	Ø0.187 in. (Ø5 mm)	Commercial Source
N/A	Hand File	Flat	Commercial Source
N/A	Oven	1500°F capacity (815°C)	Commercial Source
N/A	Plastic Media Stripping Equipment	N/A	Commercial Source
N/A	Paint Application Equipment	N/A	Commercial Source
N/A	Torque Wrench	0 to 100 in-lb capacity (0 to 11 N-m)	Commercial Source
N/A	Vise Jaws	Soft Brass or Hard Rubber	Commercial Source
N/A	Draw Flattening Fixture	Per Figure 9001 SPECIAL TOOLS	Outside Manufacture
N/A	Cold Straightening Fixture	Per Figure 9002 and 9003 SPECIAL TOOLS	Outside Manufacture
N/A	Spacer Tool – Retract Subassembly	Per Figure 9004 SPECIAL TOOLS	Outside Manufacture
N/A	Support – Retract Subassembly	Per Figure 9005 SPECIAL TOOLS	Outside Manufacture
1227-6	Heli-Coil Extracting Tool	MIL-T-21309	Black & Decker Company
7552-3	Heli-Coil Installation Tool	MIL-T-21309	Black & Decker Company
3695-3	Heli-Coil Tang Removal Tool	MIL-T-21309	Black & Decker Company

Table 9001 (Sheet 2 of 2) Special Tools, Fixtures and Equipment



## SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES

## **B.** Consumables List

Table 9002 (Sheet 1 of 2) Consumables List

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
N/A	Fluid, Hydraulic	MIL-H-83282 or MIL-PRF-83282	Commercial Source
N/A	Hydraulic Filter	10 micron	Commercial Source
N/A	Air Supply, Compressed Dry Filtered	30 psig maximum (2.07 bar)	N/A
N/A	Clean Cloths	N/A	Commercial Source
N/A	Brushes	Non-abrasive, Non-metallic bristle	Commercial Source
N/A	Solvent, Stoddard Type 1	P-D-680	Commercial Source
N/A	Isopropyl Alcohol	N/A	Commercial Source
N/A	Magnetic Particle Inspection Kit	ASTM E1444	Commercial Source
N/A	Fluorescent Penetrant Inspection Kit	MIL-STD-6866 or ASTM E1417, Type 1, Method A, Sensitivity Level 2	Commercial Source
N/A	Aluminum Oxide Cloth	400 Grit or Finer Wet or Dry	Commercial Source
N/A	Plastic Media Type V (Acrylic)	MIL-P-85891	U.S. Technology Corp.
N/A	Corrosion Preventative Alodine 1200 or Equiv.	MIL-C-5541, Class 1A	Commercial Source
44-GN-36 Components A and B	Primer Coating	MIL-PRF-85582C Type I, Class C2	Deft Chemical Coatings
44-GN-24 Components A and B	Primer Coating Alternate Product	MIL-P-85582B Type I, Class C2	Deft Chemical Coatings



## SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES

Table 9002 (Sheet 2 of 2) Consumables List

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
03-W-127A Components A and B	Finish Coating	MIL-C-85285B, Type I No. 17925 (FED-STD-595) Untinted White	Deft Chemical Coatings
Various for Application Type	Galvanizing Compound	MIL-P-26915 Type I, Class A	ZRC Products Company

#### C. List of Manufacturers and Vendors

Name	Internet Address	Address
Parker Hannifin Corporation Aircraft Wheel & Brake Div.	www.parker.com/cleveland	1160 Center Rd Avon, OH 44011 U.S.A.
Milford Fastening Systems	www.milfordrivet.com	857 Bridgeport Ave. Milford, CT 06460 U.S.A.
Alternate Riveter: National Rivet & Mfg Co. Note: contact National for rivet tooling requirements	www.nationalrivet.com	21 E. Jefferson St. Waupun, WI 53963 U.S.A.
U.S. Technology Corporation		220-T 7 <sup>th</sup> Street S.E. Canton, OH 44702 U.S.A.
Deft Chemical Coatings	www.deftfinishes.com	17451 Von Karman Ave. Irvine, CA 92714 U.S.A.
ZRC Products Company		23-T Newport Ave. Quincy, MA 02171-9975 U.S.A
Black & Decker Company Emhart Industrial Division (Heli-Coil)	www.emhart.com	Shelter Rock Lane Danbury, CT 06810 U.S.A.
### SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES



Draw Flatteningand Cold Straightening Fixtures Figures 9001 thru 9003



## SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES





#### **ILLUSTRATED PARTS LIST**

#### 1. General

The illustrated parts list describes and illustrates the detail parts of the Main Brake Assembly.

All parts of the equipment are listed, except parts which lose their identities by being permanently fastened to other parts of assemblies and are not subject to disassembly.

#### A. Explanation of Columns

- (1) Figure/Item column: The figure and item numbers key the parts breakdown list to the applicable illustration. The first number represents the figure number of the illustration. The item numbers are arranged in sequence and generally reflect the order of disassembly.
- (2) Part Number column: This column contains the assigned Parker Hannifin Aircraft Wheel and Brake part number for the individual item.
- (3) Airline Stock Number column: This column contains the Airline Stock Number when applicable.
- (4) Nomenclature column: This column identifies the parts being listed by noun name followed by modifiers when applicable. The indenture system used in the parts list shows the relationship of the parts to their subassemblies and to the assembly:

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

- (5) Effectivity column: An effectivity code shows the difference in parts within various configurations. The effectivity code is used for more than one configuration of the basic part number. Effectivity codes only apply to the figure in which they are used.
- (6) Units Per Assembly column: This column indicates the total number required per assembly or per subassembly as applicable. These abbreviations may appear in the Units Per Assembly column:

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

RF ..... Reference (item listed for reference only)



#### **ILLUSTRATED PARTS LIST**

#### **B.** Part Numbering System

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

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

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

#### 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:

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



#### **ILLUSTRATED PARTS LIST**

#### D. Items Not Illustrated

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

#### E. Alpha Variant Item Numbers

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

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

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

#### 2. Optional Vendor Index

Not applicable

#### 3. Federal Supply Code for Manufacturers

Not applicable.



### **ILLUSTRATED PARTS LIST**



Main Brake Assembly IPL Figure 1



### **ILLUSTRATED PARTS LIST**

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

FIG. ITEM	PART NUMBER	AIRLINE STOCK NUMBER	NOMENCLATURE 1234567	EFF CODE	UNITS PER ASSY.	199-575 (2) (3) (4)	199-575A (2) (3) (4)
1 - 1	30-244		MAIN BRAKE ASSEMBLY		RF		
5	103-19100		BRAKE ATTACHING PARTS BOLT, EXTERNAL WRENCHING (MS21250-04008)		6		
10	095-14600		WASHER, DOUBLE C'SUNK (MS14155-4)		12		
15	094-17700		NUT, SELF-LOCKING (NAS1804-4N) *** STRUT MOUNTING PARTS		6		
20	103-26400		BOLT, EXTERNAL WRENCHING (MS21250-06018)		6		
25	095-03100		WASHER, SINGLE C'SUNK (MS20002C6)		12		
30	094-15800		NUT, SELF-LOCKING (NAS1804-6N)		6		
35	061-17000		. CYLINDER		1		
40	062-11100		. PISTON		6		
55	088-03800		. INSULATOR		6		
45	101-02500		. O-RING (MS28775-220)		6	6	6
50	107-02700		. WIPER – For extreme temperatures or dusty conditions		6	6	
50A	107-03700		WIPER – For reduced drag and ease of installation (OPT – ALTERNATE FOR ITEM 50)		6		6
60	073-10100		ASSEMBLY, PLATE, PRESSURE		1		
65	063-08400		PLATE. PRESSURE		1		
70	109-03000		PAD, WEAR		12	12	12
75	105-08700		RIVET, SUPSD BY Item 75A		NP		
75A	105-08701		RIVET, SUPSDS Item 75		24	(3)	(3)
80	159-07400		. DISC, ROTOR		3	3	3
85	242-01800		. ASSEMBLY, DISC, STATOR		2		
90	232-03500		DISC, STATOR		1		
70	109-03000		PAD, WEAR		24	48	48
95	105-02400		RIVET, SUPSD BY Item 95A		NP		
95A	105-02401		RIVET, SUPSDS Item 95		24	(3)	(3)

#### CM30-244 COMPONENT MAINTENANCE MANUAL WITH IPL FOR MAIN BRAKE ASSEMBLY PART NO. 30-244

# **ILLUSTRATED PARTS LIST**



Main Brake Assembly IPL Figure 1



### **ILLUSTRATED PARTS LIST**

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

FIG. ITEM	PART NUMBER	AIRLINE STOCK NUMBER	NOMENCLATURE 1234567	EFF CODE	UNITS PER ASSY.	<b>199-575</b> (2) (3) (4)	199-575A (2) (3) (4)
100	075-20600		. ASSEMBLY, TUBE, TORQUE		1		
105	065-20400		TUBE, TORQUE SUPSD BY Item 105A		NP		
105A	065-24000		TUBE, TORQUE SUPSDS Item 105		1		
70	109-03000		PAD, WEAR		12	12	12
75	105-08700		RIVET, SUPSD BY Item 75A		NP		
75A	105-08701		RIVET, SUPSDS Item 75		24	(3)	(3)
110	111-11500		. SUBASSEMBLY, RETRACT		3		
115	139-33700		STUD		3		
120	139-12000		SLEEVE, FRICTION		3		
125	139-11900		RETAINER, SLEEVE		3		
130	067-15000		SPACER, RETRACT		3		
135	082-14300		. SPRING		3		
140	095-13600		. WASHER, PLAIN (MS20002-5)		3		
145	155-07800		. RING, RETAINING		3		
150	111-11400		. ASSEMBLY, BASE, RETRACT		3		
155	230-05500 (1)		INSERT (MS21209F1-15L)		3		
160	139-33800		BASE, RETRACT		3		
165	101-00700		. O-RING (MS28775-012)		2	2	2
170	081-00200		. SEAT, BLEEDER		1		
175	079-00900		. BLEEDER		1		
180	095-01100		. WASHER, FLAT		1	1	1
185	102-32700		. SCREW, BLEEDER		1		
190	104-09600		. FITTING, INLET (AS1038J0404)		1		
195	094-05400		. NUT, FITTING (AN924-4J)		1		
200	215-00800		. CAP, SHIPPING		1		
205	166-21600		. NAMEPLATE		1		
	166-28300		. NAMEPLATE (For overhaul kit)			1	1

(1) Do not remove unless damaged.

- (2) Each overhaul kit contains the minimum recommended replacement parts for one 30-244 brake assembly. Additional replacement parts may be necessitated by the results of the inspection requirements in the manual.
- (3) Each brake assembly uses forty-eight P/N 105-02401 and forty-eight P/N 105-08701 rivets. Each overhaul kit provides fifty-five P/N 105-02401 and fifty-five P/N 105-08701 rivets thereby allowing for rivet attrition during assembly.
- (4) 199-575 contains the 107-02700 wiper. 199-575A contains the 107-03700 wiper.



### **STORAGE**

#### 1. Procedures

#### A. Storage

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

- **CAUTION:** BRAKES STORED IN CARDBOARD BOXES, WHICH HAVE BECOME WET OR HAVE BEEN EXPOSED TO HIGH HUMIDITY, CAN BECOME CORRODED.
- CAUTION: STORAGE LIFE OF RUBBER COMPONENTS ASSEMBLED IN BRAKES OR STORED AS SPARE PARTS IS 4 YEARS FROM CURE DATE. RUBBER COMPONENTS KEPT LONGER THAN 4 YEARS ARE NOT SERVICEABLE AND MUST BE REPLACED DUE TO AGE AND DETERIORATION. ATMOSPHERIC STORAGE LIFE MAY BE SHORTENED ΒY **EXPOSURE** TO SUNLIGHT, **EXTREME** TEMPERATURES, HUMIDITY, OZONE, CONTAMINATION OF FLUIDS, SEVERE OPERATING CONDITIONS, ETC.
- (1) Drain oil from brake assembly and install the shipping cap (IPL,1-200) on brake inlet fitting (IPL, 1-190) and tighten snug to prevent contaminants from entering.
- (2) Normal storage environmental temperatures of 10° to 25°C (50° to 77°F) are desired. If this temperature range cannot be maintained, temperatures as high as 51.7°C (125°F) and as low as -28.9°C (-20°F) can be tolerated for shorter periods. Total time above 37.8°C (100°F) shall not exceed three months.

#### **B.** Preparation for Shipment

- (1) Install the shipping cap (IPL, 1-200) on brake inlet fitting (IPL, 1-190) and tighten snug to prevent contaminants from entering.
- (2) Wipe all excess oil and foreign material from exposed surfaces of the brake assembly with a clean shop towel.

# **Cleveland Wheels & Brakes**

# COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

# MAIN WHEEL ASSEMBLY PHC Part No. 40-424

CM40-424 Revision L

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

CAGE CODE 33269



CM40-424 Page T-1 July 22, 2020



# TO: HOLDERS OF CM40-424 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-424.

Attached to this transmittal letter is Revision A of CM40-424 (dated December 15, 2000)

#### Revision A, Dated December 15, 2000

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 **<u>REVISION HIGHLIGHTS</u>** pages, inserting them into the manual for future reference.

Section	Page No.	Description Of Change
All sections	All pages	Initial Release (DCN 0341-45)
As Follows:		Rev A (DCN 0343-50):
Record of Rev.	RR-1	Update page to reflect Rev. A
Effective Pages	LEP-1&2	Update applicable effective dates to reflect Rev. A
D&O	1,2,3	Para 1., line 2, (NOW) "tubeless" tire (WAS) "tube-type" tire
		Para 1., line 15, (REMOVE) "by bolts and nuts (115 and 120)"
Testing	1001	Para 1.C.(2), (NOW) " minimum of 1-1/2 threads" (WAS) "flush to 1-1/2 threads"
0	1003	Para 1.D.(3), (NOW) "(tire growth stabilization)" (WAS) "(growth stabilization)"
Disassembly	3001	Table 3001 (ADD) torg-set® driver bit. Para 1.B. (ADD) reference to 50-155 dwg.
,	3002	Para 1.C.(3) (ADD) "7/16 and 11/32 hex socket" references
Inspection/Check	s 5001	Table 5001. (ADD) "eddy current' and "fuse plug/rupture disc fixture"
	5002	(ADD) Para, B., "Maintenance Schedule" and Table 5002
	5003	(NOW) Para. "C. General Inspection" (WAS) Para. "B."
		Para C.(1) (NOW) reference to Table 5002, (WAS) detailed inspection interval
		Para. C(2), (ADD) identification for "metal" components
	5004	Para. C(6) (NOW) "at each tire change" (WAS) "at each overhaul" (REMOVE) ref
		to items 70 and 85. Para. 2. (ADD) penetrant fluid warning. Para. 2.B.(ADD) ref to
		Table 5002 and para. 1.G. Para. 2.B.(2) (ADD) "Repack cones with Aeroshell Grease"
	5005	Para 2.D. (ADD) "eddy current", Table 5002 and Figure 5003 reference.
		(NOW) reference to Table 5002 (WAS) detailed inspection interval
	5006	Para 2.D.(3) consolidate figures 5002 and 5003 into 5002.
	5007	(ADD) para 2.D. (4) eddy current. (NOW) Figure 5003 references eddy current
		probe criteria (WAS) inboard wheel half inspection
	5008	Para 2.E. (ADD) rupture disc assy inspection (WAS) para. 2.F.
	5009	Fig 5004 (NOW) "fuse plugs - rupture disc test" (WAS) "outbrd whi heat damage".
	5040	(NOW) para 2.F "procedure for overheated whis" (WAS) "inspect rupture disc".
	5010	(ADD) Fig 5005 "fuse plugs and rupture disc test".
Denein	0004 0000	(ADD) Fig 5006 "outbrd whi heat damage" (NOW Table 5003 (WAS) Table 5001.
Repair	6001,6002	Table 6001, (ADD) hub support fixture and hell-coll tools.
	6006	Para 1.E. (ADD) "paint material toxic warning" and "1.E.(1) "clean part per"
	6009, 6010	Para T.F. (ADD) restriction to bearing cup removal. Para T.G. (ADD) reeler gauge check.
	6011	Para 1.G consolidated Fig 6004 and 6005 into Fig 6004. Fig 6005 (WAS) 6006.
	0012	(ADD) Fara. 1.n. Insert repair. Fig 6006 (NOW) helicoli tool (WAS) bearing cup install.
A e e e e e la la c	7004 7000	(ADD) FIG 6007 INSERT INSTALL Table 7004 (ADD) term actor driven hit. Date 4 D (7) and (0) (NOM) # 5 C5 N m <sup>2</sup>
Assembly	7001, 7002	(MAS) " 65 N m" Eig 7001 (PEV/SED) to remove put thread area of eaverage
Fite/Clearences	7003	(WAS)05 N-III. FIG 7001 (REVISED) to remove hut imeduated of coverage
Fils/Clearances	1000	Table 8002 (ADD) torq-set@driver bit reference for screws (100)
Special Tools	9001, 9002	Table 9001 (ADD) tools: hub support, torq-set@driver bit, tuse plug/rupture disc fixture
	0003 0004	Para 1 C (WAS) on ng 0003 ADD) Philling Screw and Embart Heli-Coil
	9005 9006	(ADD) figures 9003 and 9004
IPI	10004	IPL Fig 1 re-numbered figure items
	10005	Para, 4 re-numbered detailed parts list and add melt temp, range for fuse plug (item 105)
Storage	15001	Para 1 Note, (ADD) "Lubricate the bearings cups". Para 1.A.(2) –28.9°C (WAS) –6.7°C



# TO: HOLDERS OF CM40-424 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-424.

Attached to this transmittal letter is Revision B of CM40-424 (dated October 02, 2001)

#### Revision B, Dated October 02, 2001

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 **<u>REVISION HIGHLIGHTS</u>** pages, inserting them into the manual for future reference.

Section	Page No.	Description Of Change
As Follows:		Rev B (DCN 0347-77):
Record of Rev.	RR-1	Update page to reflect Rev. B
Effective Pages	LEP-1	Update applicable effective dates to reflect Rev. B
Description &	1	Para 1., (NOW) "cups (55) are shrink-fit into the hubs of the outboard wheel half."
Operation		(WAS) "…cups (55) are shrink-fit into the hubs of each wheel half."
Testing	1001	para. 1.C.(4):
		(NOW) " Visually inspect air valve assembly, rupture disc assembly and fuse plug O-rings (85 and 100) for damage."
		(WAS) "Visually inspect air valve assembly O-ring (85) for damage."
	1002	Para. 1.D.(2) (a):
		<ul> <li>(NOW) "If air leaks occur around air valve assembly (80), rupture disc assembly</li> <li>(90) or fusible plugs (105), check torque or replace O-ring (85 or 100) or replace component "</li> </ul>
		(WAS) "If air leaks occur around air valve assembly (80), check torque or replace
		O-ring (85) or replace air valve assembly "
	1002	Para, 1,D,(2) (a):
		(ADD) <b>"NOTE:</b> If leakage persists, remove leaking component, check interface
		surfaces and replace O-ring. Insert into test fixture (Figure 9003) and
		test component per INSPECTION / CHECK, then reinstall or replace."
	1003	(NOW) heading "Table 1002" (WAS) "Table 1001"
	1003	Table 1002: (NOW) "Preformed packings (85 and 100)"
		(WAS) "Preformed packings (70 and 85)"
	1004	(NOW) heading "Table 1002" (WAS) "Table 1001"
Disassembly	3001	Para 1.B.:
,		(ADD) "SAFETY WARNING: COMPLETELY DEFLATE THE TIRE BEFORE REMOVING THE VALVE CORE. VALVE CORES UNDER PRESSURE CAN BE EJECTED LIKE A BULLET."
	3001	(ADD) "(2) Remove cap from air valve assembly (80) and remove air from tire by
		depressing valve stem plunger until air can no longer be heard escaping from the tire."
	3001	(ADD) "(3) When all pressure has been relieved, remove the valve core."
	3002	Para 1.B.
		(NOW) re-identify lines (4) thru (6) (WAS) identified as lines (2) thru (4)
Inspection/Check	5002	Table 5002, Unscheduled Maintenance:
		(REMOVE) task, "b. Detailed inspection per para. 2" from "At every tire change"
		(ADD) task for "All Components", "Detailed inspection per para. 2" to applicable tire
		change schedules (2 places).
		(NOW) "Overheating such that at least one of the three fusible plugs release in the Main Wheel Assembly."
		(WAS) "Overheating due to: Wheel Assembly fuse plugs releasing"



<u>Section</u>	Page No.	Description Of Change
Inspection/Check	5003	<ul> <li>Para 1.C. (REMOVE) "1.B" reference (REMOVE) "Refer to paragraph 2. Detailed Inspection Procedures for items that require specific examination."</li> <li>(ADD) to para. 1.C. (1), "rupture disc assembly (90), fusible plugs (105), fairing screws</li> </ul>
		(REMOVE) para. "1.C.(3). Visually examine all components of the wheel assembly with threaded features. Replace all parts with stripped or scored threads or obvious damage."
	5004	<ul> <li>(NOW) renumbered para. "1.C.(3)" and "1.C.(4)" (WAS) para. "1.C.(4)" and "1.C.(5)"</li> <li>(NOW) renumbered para. "1.C.(5)" and "1.C.(6)" (WAS) para. "1.C.(6)" and "1.C.(7)"</li> <li>(REMOVE) from para. 1.C.(6). "Check individual parts as indicated in paragraph 2. Detailed Inspections."</li> </ul>
	5007 5008	Figure 5003: (NOW) "R .073" (WAS) "R .438" Para 2.E.: (NOW) "E. Inspect Fuse Plugs, Rupture Disc Assy and Air Valve Assy (IPL, 1-105,
	5008	(WAS) "E. Inspect Fuse Plugs and Rupture Disc Assembly (IPL, 1-105, and 1-90)" Para 2.E.(1): (ADD) "and air valve Para 2.E.(1): (NOW) "Figure 5004" (WAS) "Figure 5003" Para 2.E.(1) (a): (NOW) "Install rupture disc or air valve and fuse plugs"
		(WAS) "Install rupture and fuse plugs" Para 2.E.(1) (a): (NOW) "preformed packings (100 or 85) installed" (WAS) "preformed packing (100) installed" Para 2.E.(1) (a): (NOW) "Torque each to"
		(WAS) "Torque to" Para 2.E.(1) (c): (NOW) "Apply a soapy water solution to the components" (WAS) "Apply a soapy water solution to the plugs"
		Para 2.E.(1) (d): (NOW) "Discard all components that leak." (WAS) "Discard all plugs that leak." (ADD) para "2.E.(e) Replace all parts with stripped or scored threads or other obvious
Repair	5009 6004	Figure 5004: (ADD) "Air Valve Assy" reference Para 1.C.(4): (ADD) "For rupture disc, fuse plugs, and air valve bosses, the maximum repair is
	6005	.010 inch deep." Figure 6001: For disc, plug, & valve bosses, (NOW) designated area "4" (WAS) designated area "3"
		For inboard hub faces (NOW) designated area "4" (WAS) designated area "3" For bolt mounting faces (NOW) designated area "4" (WAS) designated area "3" or "2"
	6010	Para 1.G.(2): (NOW) " <u>CAUTION</u> : USE PROTECTIVE GLOVES WHEN HANDLING CHILLED PARTS."
	6012	(WAS) " <u>CAUTION</u> : USE PROTECTIVE GLOVES WHEN WORKING WITH DRY ICE." Figure 6006:
Special Tools	9004	(ADD) for Black & Decker Co., "www.emhart.com"
	9006 9006	Figure 9003, heading: (ADD) "and Air Valve" Figure 9003, port callout: (NOW) "and tap for 0.3125-24 UNF-3B" (WAS) "and tap for 0.3125-24 UNF-2B"
IPL	10005	Para 4, Detailed Parts List: (NOW) nomenclature for item 20, "MS28775-268 (WAS) "MS287750268"



TO: HOLDERS OF CM40-424 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-424.

Attached to this transmittal letter is Revision C of CM40-424 (dated October 10, 2003)

#### Revision C, Dated October 10, 2003

REVISION C 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

Section/Page No	<u>).</u>	Description Of Change
As Follows:		Rev C (DCN 0358-02):
Record of Rev	pg. RR-1	Update page to reflect Rev. C
List of Effective Pages	pg. LEP-1	Update applicable effective dates to reflect Rev. C
Description and Operation	pg. 1 pg. 2	Paragraph 1: (now) "(110A)" (was) "(110)" Figure 1, item callout: (now) 110A (was) 110
Testing and Fault Isolation	pg. 1001 pg. 1001 pg. 1005	<ul> <li>Paragraph 1.B.: (now) "A test data sheet is given at the end of this section for reference."</li> <li>(was) "Prior to testing, make photocopies of the test data sheet provided at the end of this section. One photocopy of the data sheet is required for each wheel assembly to be tested."</li> <li>Paragraph 1. C. (3): (now) "(110A)" (was) "(110)"</li> <li>Test Data Sheet: (remove) "A. Weight of Wheel Assembly:lb/kg Maximum Weight: 16.50 lb (7.49kg)."</li> <li>(now) "A. Quality of Workmanship:" (was) "B. Quality of Workmanship:" (now) "B. Pretest Checks" (was) "C. Pretest Checks"</li> </ul>
		(was) "D. Pressure Test" (now) "D. 24 Hour Pressure Test" (was) "E. 24 Hour Pressure Test"

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Section/Page No	<u>.</u>	Description Of Change
Disassembly	pg. 3003	Paragraph 1. C. (10): (now) "(110A)" (was) "(110)"
Inspection/ Check	pg. 5004	Paragraph 2. A.: (now) "Inspect Drive Keys (IPL, 1-110A)" (was) "Inspect Drive Keys (IPL, 1-110)"
Repair	pg. 6007	Figure 6002, cross section view: (remove) flange tab graphics. (remove) "overspray permissible (∅.201 holes-6 places)" (now) "6X 1.86" (was) "6X 2.08"
Assembly	pg. 7001	<ul> <li>Table 7001:</li> <li>(now) "NOTE: Unless otherwise stated, equivalent substitutes may be used"</li> <li>(was) "NOTE: Equivalent substitutes may be used"</li> <li>(add) "<sup>1</sup> flag to MIL-T-83483 callout</li> <li>(add) "<sup>1</sup> CAUTION: DO NOT MIX ANTI-SEIZE</li> <li>COMPOUNDS. THIS CAN RESULT IN IMPROPER</li> <li>TORQUE SETTINGS AND COULD RESULT IN FAILURE</li> <li>OF THE BOLT. THE USE OF ANTI-SEIZE COMPOUND</li> <li>IS LIMITED TO THAT SPECIFIED IN TABLE 7001."</li> </ul>
Fits and Clearances	pg. 8001	Table 8001: (now) "(110A)" (was) "(110)"
Illustrated Parts List	pg. 10004	IPL Figure 1 Main Wheel Assembly: (add) in 1 places "110A" to "110" callouts (remove) inboard wheel flange tab graphics
	pg. 10005	Detailed Parts List: For line item 110, Assembly, Plate, Pressure: (add) for line Item 75, Key, Drive: "SUPSD BY Item 110A" (add) line Item "110A, 205-05201, Key, Drive, SUPSDS Item 110, Qty 6"



TO: HOLDERS OF CM40-424 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-424.

Attached to this transmittal letter is Revision D of CM40-424 (dated May 10, 2004)

#### Revision D, Dated May 10, 2004

REVISION D 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

Section/Page No	<u>.</u>	Description Of Change
As Follows:		Rev D (DCN 0361-04):
Record of Rev	pg. RR-1	Update page to reflect Rev. D
Service Bulletin List	pg. SB-1	Update page to reflect issuance of SB7075
List of Effective Pages	pg. LEP-1	Update applicable effective dates to reflect Rev. D
Description and Operation	pg. 2	
		(Now (ref. Figure 1)) (Was)
		10,15 140,145 10,15
Description and Operation	pg. 3	(Add) 140. GROMMET 145. WASHER
Testing	pg. 1002 Pg. 1003	(Now) (30 and 50) (Was) (30 and 40) (Now) (25 & 45) (Was) (25 & 35)
Disassembly Disassemble Wheel Assembly	pg. 3002	<ul> <li>Paragraph C.: (Now) "Remove screws (135), washers (145), grommets (140), and fairing (130) from the outboard wheel half subassembly (45)."</li> <li>(Was) "Remove screws (135), and fairing (130) from the outboard wheel half subassembly (45)."</li> </ul>

Parker Aerospace	CM40-424 FOF	4 COMPONENT MAINTENANC R MAIN WHEEL ASSEMBLY PA	E MANUAL WITH IPL ART NO. 40-424
Section/Page No	) <u>.</u>	Description Of Change	
Cleaning Inspection/Check	pg. 4002 pg. 5002	(Now) (25 and 45) (Was) ( Table 5002 - Scheduled Main (Add)	25 and 35) tenance:
	At every ti	re change Grommets (145)	Replace
Assembly	pg. 7005	Paragraph 1. B. (23): (Now) "Install five grommets ( MIL-T-83483 Anti-Seize to end fasteners (135). Install one wa (135). Attach fairing (130) to c Torque fastener (135) to 20 – 2 Note that the fastener is design wheel half subassembly before	140) into fairing (130). Apply d of fasteners and threads of asher (145) onto each fastener outboard wheel half subassembly. 25 inlbs. (2.26 – 2.82 N-m). ned to bottom in the outboard e fully compressing the grommet."
		(Was) "Attach fairing (130) on subassembly with screws (135 45 in-lb (3.95 to 5.08 N-m)."	to outboard wheel half 5) and torque fasteners to 35 to
Fits and granders	pg. 8001	Table 8002 <u>(</u> Now)	
		Screws (135) - Fairing	20 to 25 in-lb (2.26 to 2.82 N-m).
		(Was)	$25 \text{ to } 45 \text{ in } \ln (2.05 \text{ to } 5.09 \text{ N m})$
Illustrated Parts	pg. 10004	Figure 1	(Was)
	ng 10005	(1000)	
List	pg. 10005	(Now)	
		130 157-03500	FAIRING 1
		135 102-35000	SUREW 5
		140 217-01200	GRUMMET (MS35489-4) 5
		(Was)	VVASHER (AN900-10) 5
		130 157-02100	FAIRING 1
		135 102-33400	SCREW (MS35207-260) 5



TO: HOLDERS OF CM40-424 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-424.

Attached to this transmittal letter is Revision E of CM40-424 (dated June 15, 2004)

#### Revision E, Dated June 15, 2004

REVISION E 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

Section/Page No	<u>).</u>	Description Of Change
As Follows:		Rev E (DCN 0361-78):
Record of Rev	pg. RR-1	Update page to reflect Rev. E
List of Effective Pages	pg. LEP-1	Update applicable effective dates to reflect Rev. E
Repair	pg. 6004	(now) paragraph C.(6) (was) identified as paragraph C.(5)
		(add) CAUTION and paragraph to be identified as C.(5):
		"CAUTION: DO NOT ATTEMPT TO REPAIR WEAR RUTS."
		"(5) In area 5, wear ruts of .050 inch maximum depth are permissible.



TO: HOLDERS OF CM40-424 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-424.

Attached to this transmittal letter is Revision F of CM40-424 (dated July 17, 2008)

#### Revision F, Dated July 17, 2008

REVISION F 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

Section/Page No.	Description Of Change
As Follows:	DCN 0380-92
Record of Rev/pg RR-1	Update page to reflect latest revision
Service Bulletin List/pg SB-1	(ADD) SB7087 listing
List of Effective Pages pg LEP-1	Update applicable effective dates to reflect latest revision
Introduction pg INTRO-1	(UPDATE) contact information
Assembly pg 7002	Paragraphs E. (8) (NOW) 'disc assembly (90)' (WAS) 'disc assembly (100)'
Illustrated Parts List	
pg 10004	IPL Figure 1: (ADD) items 70A and 100A
pg 10005	(ADD) line item 70A, 154-08401 grease seal (ADD) line item 100A, 101-00500 preformed packing
pg 10006	(ADD) line item 100A, 101-00500 preformed packing



# TO: HOLDERS OF CM40-424 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-424.

Attached to this transmittal letter is Revision G of CM40-424 (dated May 11, 2010)

#### Revision G, Dated May 11, 2010

REVISION G 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

Section/Page No.	Description Of Change
As Follows:	DCN 0388-22
Record of Rev/RR-1	Update page to reflect latest revision
Service Bulletin List/SB-1	Update rev levels of SB7075 and SB7087
List of Effective Pages LEP-1 and LEP-2	Update applicable effective dates to reflect latest revision
Table of Contents/pg TC-1	(ACTIVATE) SPECIAL PROCEDURES section
Description & Operation/pg 3	<ul> <li>Table 1 Leading Particulars</li> <li>(NOW) Bearing Lubricant: Primary: Mobil Aviation Grease SHC100 Optional: Aeroshell Grease 22 per MIL-G-81322</li> <li>(WAS) Aeroshell Grease 22 per MIL-G-81322</li> <li>(ADD) <u>CAUTION</u>: DO NOT INTERMIX AVIATION BEARING GREASES.</li> </ul>
Disassembly/pg 3002	<ul> <li>(CORRECTION) Para C.(5) (WAS) C.(6)</li> <li>(CORRECTION) Para C.(6) (WAS) C.(7)</li> <li>Para C. (6)</li> <li>(NOW) Remove bolts (5), countersunk washers (10), tire change counter (150), if used, and nuts (15).</li> <li>(WAS) Remove bolts (5), countersunk washers (10), and nuts (15).</li> <li>(WAS) Remove bolts (5), countersunk washers (10), and nuts (15).</li> <li>(ADD) NOTE: Refer to the SPECIAL PROCEDURES section for</li> </ul>
	information on the optional tire change counter.
	(CORRECTION) Para C.(7) (WAS) C.(8)

# Revision G, Dated May 11, 2010

Section/Page No.	Description Of Change
Inspection & Check/pg 5002	<ul> <li>Table 5002 Scheduled Maintenance</li> <li>(ADD) to 'At every tire change': Refer to the <u>SPECIAL PROCEDURES</u> section for instructions on the use of the tire change counter.</li> </ul>
pg 5004	<ul> <li>Para. B. (2)</li> <li>(ADD) <u>CAUTION</u>: DO NOT INTERMIX AVIATION BEARING GREASES.</li> <li>(NOW) Repack cones with bearing grease (<u>ASSEMBLY</u> section, Table 7001)</li> <li>(WAS) Repack cones with Aeroshell Grease 22 per MIL-G-81322, grade A or equivalent.</li> </ul>
Assembly	
pg 7001	<ul> <li>Table 7001, Assembly Equipment and Materials List</li> <li>(ADD) Mobile Aviation Grease SHC100</li> <li>(REVISE) Aeroshell Grease 22 to be listed as the optional grease.</li> <li>(ADD) <u>CAUTION</u>: DO NOT INTERMIX AVIATION BEARING GREASES.</li> </ul>
pg 7002	<ul> <li>Para. B. (5)</li> <li>(NOW) Lubricate wheel register preformed packing with a light coat of bearing grease (refer to Table 7001).</li> <li>(WAS) Lubricate wheel register preformed packing with a light coat Aeroshell Grease 22</li> </ul>
pg 7003	<ul> <li>Para. B(11)</li> <li>(ADD) <u>STOP!</u> If using the optional tire change counter (150), refer now to the <u>SPECIAL PROCEDURES</u> section for installation instructions of the tire change counter and mounting hardware. If not using the optional tire change counter, continue to instruction (11) below.</li> </ul>
pg 7003	Figure 7001, standardize graphics

Aerospace	FOR MAIN WHEEL ASSEMBLY PART NO. 40-424	
Revision G, Dated May 11, 2010		
Section/Page No.	Description Of Change	
Assembly		
pg 7005	Para. B. (16) (NOW) Pack bearing cones (65) with bearing grease (refe Table 7001). (WAS) Pack bearing cones (65) with Aeroshell Grease 22 MIL-G-81322, grade A or equivalent.	
pg 7005	Para. B. (20) thru B. (25) (ADD) Test the wheel assembly. Refer to the <u>TESTING A</u> <u>FAULT ISOLATION</u> section. (RENUMBER) B.(20) thru B.(25)	
Special Tools, Fixtures pg 9003	Table 9002 (Sheet 2 of 2) Consumables List (ADD) Mobile Aviation Grease SHC100 (REVISE) Aeroshell Grease 22 to be listed as an optional gre (ADD) Uni-Paint markers (ADD) <u>CAUTION</u> : DO NOT INTERMIX AVIATION BEARING GREASES.	
pg 9004	Para. C List of Manufacturers and Vendors (ADD) Sanford Corporation (ADD) Exxon-Mobil Oil Company, Aviation Lubricants	
Illustrated Parts List		
pg 10004	IPL Figure 1 Main Wheel Assembly (ADD) item (150) graphics (ADD) items 30A and 50A	
pg 10005	Detailed Parts List - Main Wheel Assembly (ADD) item 30A, 151-19902 (ADD) item 50A, 152-19902 (ADD) flagnote (2): <sup>(2)</sup> 151-19902/152-19902 and 151-19901/152-19901 are procured thru different forging suppliers.	
Illustrated Parts List pg 10006	<ul> <li>(ADD) item 150, 139-39000, Tire Change Counter, qty. 1</li> <li>(ADD) flagnote (3):</li> <li><sup>(3)</sup> The optional tire change counter must be ordered as a separate kit (ref. Parker P/N 199-272). Refer to the SPECIAL PROCEDURES section for installation of the SPECIAL PROCEDURES sectin procedures section for installation of the SPECIAL PROCEDUR</li></ul>	



### Revision G, Dated May 11, 2010

#### **Description Of Change**

Special Procedures pg 11001 to 11006

Section/Page No.

Storage pg 15001 (ADD) Section for optional tire change counter

Para. 1. General

(NOW) for NOTE:

Lubricate the bearing cups (55) and cones (65) with bearing grease (refer to <u>ASSEMBLY</u> section, Table 7001).

(WAS) Lubricate the bearing cups (55) and cones (65) with Aeroshell Grease 22 per MIL-G-81322, grade A or equivalent...



# TO: HOLDERS OF CM40-424 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-424.

Attached to this transmittal letter is Revision H of CM40-424 (dated October 15, 2011)

This revision 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

	<b>REVISION HIGHLIGHTS</b>	
Section/Page No.	Description Of Change	
As Follows:	DCN 0394-56	
Title Page./T-1	(ADD) proprietary and export statements.	
Record of Rev./RR-1	Update to reflect latest revision.	
Effective Pages/ LEP-1 & LEP-2	Update to reflect latest revision.	
Introduction/INTRO-1	Update proprietary statement. (ADD) export statement.	
Illustrated Parts List/ 10006	(NOW) 095-10800 (AN960-10L) (WAS) 095-10300 (AN960-10)	



TO: HOLDERS OF CM40-424 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-424.

Attached to this transmittal letter is Revision J of CM40-424 (dated April 05, 2014)

#### Revision J, Dated April 05, 2014

REVISION J 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

Section/Page No.	Description Of Change
As Follows:	ECO-0034053
Record of Rev/pg RR-1	Update page to reflect latest revision
List of Effective Pages pg LEP-2	Update applicable effective dates to reflect latest revision
Illustrated Parts List pg 10004	IPL Figure 1 Main Wheel Assembly (ADD) items 30B and 50B
pg 10005	Detailed Parts List - Main Wheel Assembly (sheet 1 of 2) (ADD) item 30B, 151-19903 (ADD) item 50B, 152-19903 (NOW) flagnote (2): <sup>(2)</sup> 151-19903/152-19903, 151-19902/152-19902 and 151- 19901/152-19901 are procured thru different forging suppliers. (WAS) flagnote (2): <sup>(2)</sup> 151-19902/152-19902 and 151-19901/152-19901 are
pg 10006	procured thru different forging suppliers. Detailed Parts List - Main Wheel Assembly (sheet 2 of 2) (MOVE) items 80 thru 100A from pg 10005



TO: HOLDERS OF CM40-424 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-424.

Attached to this transmittal letter is Revision K of CM40-424 (dated July 16, 2019)

#### Revision K, Dated July 16, 2019

REVISION K 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 <u>**REVISION HIGHLIGHTS**</u> pages, inserting them into the manual for future reference.

Section/Page No.	Description Of Change
As Follows:	ECO-0105780
Title Page/T-1	Update page to reflect latest revision
Record of Rev/pg RR-1	Update page to reflect latest revision
List of Effective Pages pg LEP-1	Update applicable effective dates to reflect latest revision
Introduction/ pg 1	(DELETE) 2. Data Rights and export statement. Now on title page
Inspection/Check pg 5002 The maint testing wh requireme affect the their opera continued	Table 5002, Maintenance Intervals (ADD) Introductory paragraph: enance schedule is intended to be a guideline based on laboratory ose purpose is to maintain continued airworthiness. Field operating onts can vary from aircraft to aircraft. These variations will directly wear rate of the wheel assembly components. Users may evaluate ating conditions to determine a suitable schedule provided that airworthiness is maintained.



TO: HOLDERS OF CM40-424 COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST FOR MAIN WHEEL ASSEMBLY PART NO. 40-424.

Attached to this transmittal letter is Revision L of CM40-424 (dated July 22, 2020)

#### Revision L, Dated July 22, 2020

REVISION L 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 **<u>REVISION HIGHLIGHTS</u>** pages, inserting them into the manual for future reference.

#### **REVISION HIGHLIGHTS**

**Description Of Change** 

#### Section/Page No.

ECO-0109319

Title Page/T-1

As Follows:

Update page to reflect latest revision

Update page to reflect latest revision

Record of Rev/pg RR-1

List of Effective Pages pg LEP-1

Repair pg 6012

Figure 6007, Insert Installation

(NOW)

(WAS)

Update applicable effective dates to reflect latest revision



Illustrated Parts List pg 10006

4. Detailed Parts List Items 85, 100 (NOW) (AS3582-010) (WAS) (MS9068-010) Item 145, (NOW) (NAS1149F0332P) (WAS) (AN960-10)

> Revision Highlights Page 1 of 1 July 22, 2020

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# **RECORD OF REVISIONS**

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

REV.	DATE ISSUED	DATE INSERTED	BY	REV.	DATE ISSUED	DATE INSERTED	ВҮ
NC	00-08-01	00-08-01	PHC				
Α	00-12-15	00-12-15	PHC				
В	10-02-2001	10-02-2001	PHC				
С	10-10-2003	10-10-2003	PHC				
D	05-10-2004	05-10-2004	PHC				
Е	06-15-2004	06-15-2004	PHC				
F	07-17-2008	07-015-2008	PHC				
G	05-11-2010	05-11-2010	PHC				
Н	10-15-2011	10-15-2011	PHC				
J	04-05-2014	04-05-2014	PHC				
K	07-16-2019	07-16-2019	PHC				
L	07-22-2020	07-22-2020	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 Main Wheel Assembly and components.

SERVICE BULLETIN NUMBER	SUBJECT	REV.	DATE INCORPORATED
SB7075	P/N 157-02100 Fairing – Inspect/Rework Or Replace	A	01-04-2010
SB7087	Main Wheel Assembly 40-424 – P/N 154-08400 Grease Seal Replacement	В	01-04-2010



# LIST OF EFFECTIVE PAGES

<u>SUBJECT</u>	PAGE	DATE	<u>SUBJECT</u>	PAGE	DATE
Title Page	T-1	July 22, 2020	Inspection	5008 5009	Oct 02, 2001
Record of Revisions	RR-1	July 22, 2020		5010	Dec 15, 2001
Service Bulletin List	SB-1	May 11, 2010	Repair	6001 6002 6003	Dec 15, 2000 Dec 15, 2000 Aug 01, 2000
List of Effective Pages	LEP-1 LEP-2	July 22, 2020 July 22, 2020		6004 6005 6006	June 15, 2004 Oct 02, 2001 Dec 15, 2000
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Introduction	INTRO-1 2	July 16, 2019 Aug 01, 2000		6008 6009 6010	Aug 01, 2000 Dec 15, 2000 Oct 02, 2001
Description and	1	Oct 10, 2003		6011 6012	Dec 15, 2000 July 22, 2020
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# **INTRODUCTION**

#### 1. General

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

This manual contains shop instructions for maintaining wheel assembly 40-424, including testing, checking and repair procedures.

The instructions in this manual only apply to assembly part number 40-424. Ensure that the part number on the unit is listed on the cover page before performing any of these instructions.

**<u>NOTE</u>**: All torque values and specified limits or values set by Parker Hannifin Engineering and contained herein must be strictly observed.

The manufacturer has verified the contents of this manual by actual performance of Disassembly, Assembly and Testing prior to the distribution of printed copies.

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

Parker Hannifin Corporation Aircraft Wheel & Brake Division 1160 Center Road Avon, Ohio 44011 U.S.A. Attn: Technical Services/Hotline Website: www.parker.com E-mail: clevelandwbhelp@parker.com Fax: (440) 937-5409 Tel: 1-800-BRAKING (1-800-272-5464)

# 2. Data rights and export statement

(Deleted)

# **INTRODUCTION**

# 3. TSO Notice

This assembly carries a "TSO C26c" marking for FAR Part 23 usage, which identifies it as having been fully tested in the laboratory and qualified to applicable FAA (Federal Aviation Administration) requirements and specifications. Substitutions of critical parts or changes of processes or materials are not permitted without the written approval of the manufacturer.

### 4. Manual Use

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

When a section of text makes occasional reference to figure items for identification of components, the item number will be preceded with the associative figure number and enclosed in parentheses () such as:

" If nut can be turned by hand onto the bolt (IPL, 1-5) ....." – read as IPL Figure 1, item 5

When a section of text makes numerous references to a particular figure for identification of components, a note shall precede the applicable text referencing the figure. The item numbers will then be enclosed in parentheses () such as:

"Refer to IPL, Figure 1"

"...install air valve assembly (80) in outboard ....." – read as IPL Figure 1, item 65



### **DESCRIPTION AND OPERATION**

#### 1. Main Wheel Description (Figure 1)

The main wheel assembly is a 7.50-10, Type III wheel designed for use with an 8.50-10, 10 PR tubeless tire. The divided type main wheel facilitates tire installation and removal. The two wheel halves are fastened together with high strength bolts (5), double countersunk washers (10), and self-locking nuts (15). The wheel halves are machined from forged aluminum alloy.

An O-ring (20) is installed on the inner wheel half to provide an air seal at the juncture of the wheel halves. An inflation valve assembly is installed in the outer wheel half to inflate and deflate a tubeless tire.

The wheel assembly rotates on two tapered roller bearings consisting of the cups (55) and cones, (65). The bearing cups (55) are shrink-fit into the hubs of the outboard wheel half. Rubber molded type seals (70) provide protection and lubricant retention for the bearing.

The inner wheel half has six drive lugs that engage the drive slots of the rotating brake discs. The drive lugs are lined with steel drive keys (110A) which are held in place by two screws (115) to provide a hard wearing surface for the rotor drive slots and to prevent damage to the softer metal of the wheel.

A stainless heat shield (120) is secured in the inboard wheel half.

Three fusible plugs (105) installed in the inboard wheel half will melt and release the tire presure if the wheel becomes overheated. A rupture disc assembly (90) installed in the inboard wheel half will release if the tire is overpressurized.

#### 2. Main Wheel 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. Main Wheel Handling Procedures

Strictly observe the deflation and inflation procedures, and the torque and lubtork values specified in this manual. Do not overtighten any bolt, nut, or fitting. 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 halves properly to protect the paint and surface finishes.

Careful handling of wheel components will assure a long service life and trouble-free operation.



# **DESCRIPTION AND OPERATION**



40-424 Main Wheel Assembly Figure 1



# **DESCRIPTION AND OPERATION**

# Key to Figure 1

5.	Bolt, External Wrenching	80. Assembly, Valve, Air
10.	Washer, Double Countersunk	85. Packing, Preformed
15.	Nut, Self-Locking	90. Assembly, Disc, Rupture
20.	Packing, Preformed	100. Packing, Preformed
25.	Subassembly, Wheel Half, Inboard	105. Plug, Fusible
35.	Insert	110. Key, Drive
45.	Subassembly, Wheel Half, Outboard	115. Screw
55.	Cup, Bearing	120. Shield, Heat
65.	Cone, Bearing	130. Fairing
70.	Seal, Grease	135. Screw
75.	Ring, Retaining	140. Grommet
		145. Washer

# Table 1 Leading Particulars

PARAMETER	SPECIFICATION
Wheel Size and Type	7.50-10, Type III for use with 8.50-10 10PR Tubeless Tire
Assembly Weight	16.50 lb (7.49 kg) Maximum Guaranteed
Wheel Bolt Nut Torque	Torque 170-190 in-lb (19.21-21.47 N-m) with MIL-T-83483 Anti-seize
Wheel Material	Aluminum Alloy Forging
Bearing Lubricant	<sup>1</sup> Primary: Mobil Aviation Grease SHC100 Optional: Aeroshell Grease 22 per MIL-G-81322
Wheel Half Coatings	Surface Pretreatment: MIL-A-8625, Type II, Class 1 Primer Coating: MIL-P-85582B, Type I, Class C2 or MIL-PRF-85582C, Type I, Class C2 Finish Coating: MIL-C-85285B, Type I, Color No. 17925 per FED-STD-595 (Untinted White)

<sup>1</sup> **<u>CAUTION</u>**: DO NOT INTERMIX AVIATION BEARING GREASES.

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# <u>TESTING</u>

### 1. General

This section contains test procedures that can be used both as troubleshooting measures and means to test overhauled wheel assemblies

### A. Test Equipment and Materials. Refer to Table 1001.

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
N/A	Inflation Cage	N/A	Commercial Source
N/A	Tire Pressure Gage	To assure recommended inflation pressure (per airframe mfr.)	Commercial Source
N/A	Socket Set with Assorted Wrenches	12 pt. External Drive and Hex Head, Inch	Commercial Source
N/A	Torque Gage	0 to 200 in-lb capacity (0 to 22.60 N-m)	Commercial Source
N/A	Soap Solution	N/A	Commercial Source
N/A	Screw Driver Bits	Regular, Phillips	Commercial Source
N/A	Torq-Set® Driver Bit	(NASM33781)	Phillips Screw Company

# Table 1001 Testing Equipment and Materials List

# B. Preparation for Testing

A test data sheet is given at the end of this section for reference.

#### C. Pretest Check (Refer to IPL, Figure 1)

Perform the following inspections and checks to prepare the main wheel assembly for testing. Do not perform testing on any main wheel assembly that exhibits visible signs of wheel or tire damage.

- (1) Visually inspect the wheel for corrosion, cracks, or other visible damage.
- (2) Check wheel nuts (15) to be sure they are properly installed and have not worked loose. Bolt threads should have a minimum of 1-1/2 threads extending beyond the nut.
- (3) Check for loose or worn drive keys (110A).
- (4) Visually inspect air valve assembly, rupture disc assembly and fuse plug O-Rings (85 and 100) for damage.



# <u>TESTING</u>

- (5) Visually inspect tires for cuts, flat spots, and tread or sidewall damage.
  - **<u>NOTE</u>**: Refer to tire manufacturer's service and maintenance manuals for recommended servicing procedures.

### D. Procedure

Mounted wheel assemblies may be tested in accordance with the following procedure. Refer to IPL, Figure 1.



INFLATION OF TIRE CAN BE EXTREMELY DANGEROUS AND IT IS RECOMMENDED THAT INFLATION BE PERFORMED IN AN INFLATION CAGE TO PREVENT INJURY TO PERSONNEL FROM POSSIBLE EXPLOSION.

**<u>CAUTION</u>**: COVER HUB OPENINGS OF WHEEL HALVES TO PREVENT CONTAMINATION OF BEARING AREA.

- (1) Place wheel/tire assembly in an inflation cage and inflate to recommended operating pressure.
- (2) Coat entire wheel/tire assembly with soap solution. Check carefully for air leaks in the form of soap bubbles.
  - (a) If air leaks occur around air valve assembly (80), rupture disc assembly (90) or fusible plugs (105), check torque or replace O-ring (85 or 100) or replace component.
    - **NOTE:** If leakage persists, remove leaking component, check interface surfaces and replace O-ring. Insert into test fixture (Figure 9003) and test component per <u>INSPECTION / CHECK</u>, then reinstall or replace.
  - (b) If air leaks occur around tire bead seat, completely deflate tire and remove wheel/tire assembly from inflation cage.
    - <u>1</u> Remove tire from wheel and examine wheel bead seat and tire for damage. If wheel bead seat is scratched, nicked or pitting, repair in accordance with paragraph 1.C. of <u>REPAIR</u> section.

**NOTE:** Refer to <u>DISASSEMBLY</u> section for removal of tire.

- (c) If air leaks through wheel, completely deflate tire and remove wheel/tire assembly from inflation cage.
  - <u>1</u> Remove tire from wheel and penetrant inspect wheel halves (30 and 50) for cracks in accordance with <u>INSPECTION/CHECK</u> section. Replace cracked wheel halves.
    - **NOTE:** Refer to <u>DISASSEMBLY</u> section for removal of tire.



# <u>TESTING</u>

- (3) Place wheel/tire assembly in an inflation cage and inflate to recommended operating pressure. After the initial 24 hours (tire growth stabilization), re-inflate to recommended operating pressure.
  - (a) Check pressure after an additional 24 hours. If the reduction in pressure exceeds five percent of inflation pressure, replace wheel O-ring (20) and retest wheel/tire assembly in accordance with step (2).

**NOTE:** Refer to <u>DISASSEMBLY</u> section for removal of wheel O-ring.

E. Troubleshooting (Refer to IPL, Figure 1)

TROUBLE	PROBABLE CAUSE	CORRECTION
Loss of tire pressure	Preformed packing (20) on wheel register worn, damaged or twisted on Wheel register groove	Replace preformed packing (20) and realign on register taking care not to twist packing
	Preformed packings (85 and 100)	Replace preformed packings
	Loss of preload on wheel tie bolts	Inspect and replace self-locking nuts (15) if locking feature is destroyed
	Crack in inboard or outboard wheel half subassemblies (25 & 45)	Penetrant inspect wheel half assemblies (25 & 45) per <u>INSPECTION AND CHECK</u> section and replace with new part if crack is found
Excessive drag on wheel when rotating	Improper preload or torque on axle nut	Loosen and retighten per <u>ASSEMBLY</u> section
	Damage to bearing cones (65) and or bearing cups (55)	Inspect bearing cones (65) and cups (55). Replace if damaged or corroded. Repack new cones with grease

#### Table 1002 (Sheet 1 of 2) Wheel Assembly Troubleshooting



# **TESTING**

# Table 1002 (Sheet 2 of 2) Wheel Assembly Troubleshooting

TROUBLE	PROBABLE CAUSE	CORRECTION
Cracked or distorted wheel or wheel half	Hitting rocks or other hard objects during landing or takeoff	Inspect wheel per <u>INSPECTION/CHECK</u> section to determine condition and replace with new part if crack is found
	Use of sharp objects to break tire bead Landing with flat tire or	
	abnormally hard landing Landing in crabbing position in crosswind causing excessive side force	Replace wheel or wheel half
	Normal fatigue failure when used beyond expected wheel life	
Damaged bearing cone	Misalignment of bearings	Replace bearing cone (65)
	Axle nut improperly torqued	Replace and torque axle nut to aircraft manufacturer's specifications
	Foreign matter in bearing grease	Check bearing cone (65) integrated grease seals for damage. Replace cones and be sure bearing grease is free from foreign matter
	Lack of bearing grease	Replace bearing cones (65) and cups (55) and repack with grease
Worn or damaged bearing grease seals	Normal wear or improper installation	Replace bearing grease seals (70)

		TEST	DATA SHE	ET	
Wc	ork Order No	_ Date		Wheel Serial No.	
Α.	Quality of Workmanship:	Accep	ot	Reject	
	Comments:				
В.	Pretest Checks				
	<ol> <li>Wheel condition</li> <li>Wheel assembly hardware</li> <li>Tire condition</li> <li>Comments:</li> </ol>	condition		Accept Accept Accept	Reject _ Reject _ Reject _
C.	Pressure Test			Accept	Reject _
	Tire inflation pressure:	osig	Required:	Recommended operatin	g pressure
	Leakage around inflation valve:		Yes	No	
	Leakage around bead seat:		Yes	No	
	Leakage through wheel:		Yes	No	
	Comments:				
D.	24 hour Pressure Test			Accept	Reject _
	Tire inflation pressure:	osig	Required:	Recommended operating	g pressure
	Pressure after 24 hrs.:	osig	Required:	Only 5% allowable press	ure loss
	Pass (less than 5% p	ressure loss)			
	Fail (more than 5%	pressure loss	s) – Retest pe	er step D. <u>Pressure Test</u>	
	Comments:				
Te	ster:			C	Date:
Ins	spector:			C	ate:

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# DISASSEMBLY

1. General

To service the main wheel assembly, it will be necessary to remove it from the aircraft.

- **NOTE:** Refer to <u>TESTING</u> section to establish the condition of the component or most probable cause of detected malfunction(s) to determine extent of disassembly required.
- A. Disassembly Equipment and Materials. Refer to Table 3001.

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
199-18	Preformed Packing Extraction Tool Set	N/A	Parker Hannifin Corp. Aircraft Wheel & Brake
N/A	Socket Set with Assorted Wrenches	12 pt. External Drive and Hex Head, Inch	Commercial Source
N/A	Portable Tire Bead Breaker	N/A	Commercial Source
N/A	Soap Solution	N/A	Commercial Source
N/A	Screw Driver Bits	Regular, Phillips	Commercial Source
N/A	Torq-Set® Driver Bit	(NASM33781)	Phillips Screw Company

Table 3001 Disassembly Equipment and Materials List

#### **B.** Remove Wheel Assembly

Refer to 50-155 Wheel and Brake Installation drawing and IPL Figure 1 for identification of wheel assembly components.

SAFETY WARNING:

SAFETY WARNING:

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

COMPLETELY DEFLATE THE TIRE BEFORE REMOVING THE VALVE CORE. VALVE CORES UNDER PRESSURE CAN BE EJECTED LIKE A BULLET.

- (1) Jack and support aircraft per aircraft maintenance manual. Perform any additional preliminary functions to prep aircraft prior to equipment removal
- (2) Remove cap from air valve assembly (80) and remove air from tire by depressing valve stem plunger until air can no longer be heard escaping from the tire.
- (3) When all pressure has been relieved, remove the valve core.



# DISASSEMBLY

**<u>CAUTION</u>**: AIR VALVE REMOVAL IS REQUIRED TO INSURE TIRE DEFLATION.

- (4) Remove air valve assembly (80). Discard preformed packing (85).
- (5) Support wheel/tire; remove and retain applicable axle mounting hardware.
- (6) Remove wheel/tire from axle as a unit and place on a clean flat surface.
- C. Disassemble Wheel Assembly (Refer to IPL, Figure 1)

SAFETY WARNING:

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

- (1) Confirm that tire is fully deflated.
- (2) Remove screws (135), washers (145), grommets (140), and fairing (130) from the outboard wheel half subassembly (45).
- With a 7/16 inch hex socket remove rupture disc assy (90), and with a 11/32 inch (9mm) hex socket remove fuse plug assy's (105) from the outboard wheel half subassembly (45). Discard preformed packings (100).
- (4) Remove retaining rings (75), grease seals (70), and bearing cones (65) from the outboard wheel half subassembly (45).
- **CAUTION**: DO NOT USE TIRE IRONS OR SCREW DRIVERS TO PRY THE TIRE AWAY FROM THE WHEEL FLANGES AS THEY MAY DAMAGE THE SEALING SURFACE OF THE WHEEL. APPLICATION OF A MILD SOAP SOLUTION AROUND THE TIRE BEAD AND WHEEL FLANGE WILL USUALLY BE ENOUGH TO WORK THE TIRE LOOSE.
- (5) Using a tire bead breaker, unseat tire beads from both wheel flanges by applying pressure in even increments around entire sidewall as close to tire beads as possible.
- **<u>CAUTION</u>**: DO NOT USE IMPACT OR POWER WRENCHES TO REMOVE WHEEL NUTS AND BOLTS.
- (6) Remove bolts (5), countersunk washers (10), tire change counter (150), if used, and nuts (15).

**NOTE:** Refer to the <u>SPECIAL PROCEDURES</u> section for information on the optional tire change counter.

(7) Separate the wheel halves and remove tire.



# DISASSEMBLY

- (9) Remove and discard preformed packing (20) from wheel register groove of inboard wheel half subassembly (25).
  - **<u>NOTE</u>**: It is recommended that a new preformed packing (20) be installed at each tire change.
- (10) Drive keys (110A) should only be removed if excessively worn, cracked, loose, for inspection of the inboard wheel half, or for inspection of the drive key.

**<u>CAUTION</u>**: THE BEARING CUPS MUST BE REMOVED IF CHEMICALS ARE USED TO REMOVE PAINT FINISH FROM THE INBOARD WHEEL HALF.

(11) Bearing cups (55) <u>should not</u> be removed from the outboard wheel half subassembly unless cups are damaged or loose and replacement is required. Refer to <u>REPAIR</u> section for removal and installation procedures. Delivered from Parker Vault - VERIFY REVISION BEFORE USE



# **CLEANING**

- 1. General
  - A. Cleaning Equipment and Materials. Refer to Table 4001.
    - **NOTE:** Equivalent substitutes may be used for items listed.

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY	
N/A	Air Supply, Compressed Dry Filtered	30 psig maximum (2.07 bar)	N/A	
N/A	Cleaning Cloths	Lint Free	Commercial Source	
N/A	Brushes	Soft Bristled	Commercial Source	
N/A	Solvent, Stoddard Type 1	P-D-680	Commercial Source	
N/A	Cleaner/Degreaser, Water Based	AMS 1526	Commercial Source	
N/A	Isopropyl Alcohol	N/A	Commercial Source	

Table 4001 Cleaning Equipment and Materials List



# **CLEANING**

### WARNING: CLEANING SOLVENTS CAN BE TOXIC AND VOLATILE. USE ONLY IN WELL VENTILATED AREAS. AVOID PHYSICAL CONTACT WITH SOLVENT AND DO NOT INHALE VAPORS. KEEP SOLVENT CONTAINERS COVERED WHEN NOT IN USE. OBSERVE FIRE PRECAUTIONS.

- B. Cleaning Metallic Components (Refer to IPL, Figure 1)
  - Clean metallic hardware (bolts, washers, nuts) in Type 1 Stoddard Solvent (per P-D-680). Use a soft bristled cleaning brush to remove stubborn deposits.
  - **<u>CAUTION</u>**: CLEAN BEARING CONES (65) CAREFULLY IN A SEPARATE CONTAINER OF CLEAN SOLVENT TO AVOID CONTAMINATION.
  - (2) In a separate container, clean bearing cones in Type 1 Stoddard Solvent (per P-D-680). Use a soft bristled cleaning brush to remove stubborn deposits.
    - **<u>NOTE</u>**: Bearing cones will be repacked with grease in accordance with <u>ASSEMBLY</u> section.

**<u>CAUTION</u>**: DO NOT SPIN BEARING CONES WHEN USING COMPRESSED AIR.

- (3) Dry all metal parts thoroughly after cleaning, using low-pressure compressed air, 30 psig maximum (2.07 bar). Wipe dried parts with lint free cleaning cloths.
- C. Cleaning Aluminum Components (Refer to IPL, Figure 1)
  - Inner and outer wheel half subassemblies (25 and 45) can be washed with Type 1 Stoddard Solvent (per P-D-680). Use a soft bristled cleaning brush to remove stubborn deposits.
  - (2) Finish cleaning aluminum parts in a water based cleaner/degreaser (per AMS 1526).
  - (3) Dry parts thoroughly after cleaning, using low pressure compressed air, 30 psig maximum (2.07 bar). Wipe dried parts with lint free cleaning cloths.

### **D.** Cleaning Rubber Components

(1) Clean rubber parts with a mild detergent cleaner or a water based cleaner/degreaser (per AMS 1526) or isopropyl alcohol. Follow up by wiping with a clean, lint free cloth.



# **INSPECTION / CHECK**

### 1. General

In order to facilitate inspection of components, parts must be cleaned prior to inspection. Refer to <u>CLEANING</u> section for applicable instructions. Refer to the illustrations in this section for important areas and areas of greatest wear. Where indicated, refer to <u>FITS AND</u> <u>CLEARANCES</u> section to find if the part can be used, repaired, or replaced.

### A. Inspection/Check Equipment and Materials. Refer to Table 5001.

### **NOTE:** Equivalent substitutes may be used for items listed.

Table 5001
Inspection/Check Equipment and Materials List

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
N/A	Magnetic Particle Inspection Kit	ASTM E1444	Commercial Source
N/A	Fluorescent Penetrant Inspection Kit	ASTM E1417 or MIL-STD-6866, Type 1, Method A, Sensitivity Level 2	Commercial Source
N/A	Eddy Current Inspection Equipment	ASNT-460 or MIL-HDBK-728/2	Commercial Source
N/A	Magnifier	X10 Magnification	Commercial Source
N/A	Vernier Dial Calipers	0 to 6.00 in. (0 to 150 mm)	Commercial Source
N/A	Fuse Plug and Rupture Disc Test Fixture	Per Figure 9003 SPECIAL TOOLS	Outside Manufacture



# **INSPECTION / CHECK**

# **B.** Maintenance Schedule (Refer to Table 5002)

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

The maintenance schedule is intended to be a guideline based on laboratory testing whose purpose is to maintain continued airworthiness. Field operating requirements can vary from aircraft to aircraft. These variations will directly affect the wear rate of the wheel assembly components. Users may evaluate their operating conditions to determine a suitable schedule provided that continued airworthiness is maintained.

SCHEDULED MAINTENANCE	ITEM	TASK	
	All components	General inspection per para. 1.C.	
At every tire change Refer to the <u>SPECIAL</u>	Fasteners (115)	Check torque (Torq-Set® driver bit) 35- 45 in-lb (3.95-5.08 N-m)	
PROCEDURES section for	O-Rings (20)	Replace	
change counter.	Grommets (145)	Replace	
At the following tire changes:	Wheel Halves (30 and 50)	<ul><li>a. Visual inspection per para. 2.D.</li><li>b. Penetrant or eddy current inspect per para. 2.D.</li></ul>	
21 <sup>st</sup> , 24 <sup>th</sup>	Bolts (5)	<ul> <li>a. Visual inspection per para. 1.C.(1)</li> <li>b. Magnetic particle inspect per para. 1.C.(1)(a).</li> </ul>	
	All Components	Detailed inspection per para. 2.	
	O-Rings (85, 100)	Replace	
At the 25 <sup>th</sup> tire change and	Wheel Halves (30 and 50)	<ul> <li>a. Visual inspection per para. 2.D.</li> <li>b. Mandatory penetrant inspect per para. 2.D.</li> </ul>	
every tire change thereafter	Bolts (5)	<ul> <li>a. Visual inspection per para. 1.C.(1)</li> <li>b. Magnetic particle inspect per para. 1.C.(1)(a).</li> </ul>	
	All Components	Detailed inspection per para. 2.	
	O-Rings (85, 100)	Replace	
Every tire change – or – 12 months whichever comes first	Bearing Cones (65)	Re-pack per para. 2.B.(2).	
UNSCHEDULED MAINTENANCE	ITEM	TASK	
Overheating such that at least one	All Components	a. General inspection per para. 1.C. b. Detailed inspection per para. 2	
in the Main Wheel Assembly	Inner Whl Half (30)	Hardness test per para. 2.E.(2).	
,	Fuse plugs (105)	Replace as necessary	
	O-Rings (20, 85, 100)	Replace	

# Table 5002 Scheduled Maintenance



### **INSPECTION / CHECK**

### **C.** General Inspection Procedure

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

Items that do not require special detailed examination are to be given a general inspection in accordance with this paragraph.

(1) Visually examine the following items for damage or looseness: bolts (5), washers (10), nuts (15), air valve assembly (80), rupture disc assembly (90), fusible plugs (105), fairing screws (135), and drive key screws (115). Replace all parts with stripped or scored threads or obvious damage. Additionally:

**<u>CAUTION</u>**: NO REWORKING OF BOLTS IS PERMITTED. ANY STRIPPING OF PLATING FOR INSPECTION PURPOSES IS PROHIBITED.

- **NOTE:** Parker Hannifin recommends inspection of the bolts at the intervals shown in Table 5002.
- (a) Inspect for bent, or cracked or thread damaged bolts (5). Inspect for evidence of cracks especially in the radius under the bolt head and in the threaded area adjacent to the bolt shank using magnetic particle inspection in accordance with ASTM E1444 or equivalent.

**<u>NOTE</u>**: If <u>any</u> of the bolts are damaged, replace <u>all</u> of the bolts.

(b) Inspect nuts for damaged threads and for loss of self-locking feature. If nut can be turned by hand onto the bolt (5) past the top of the nut, then self-locking feature is destroyed.

**<u>NOTE</u>**: If <u>any</u> of the nuts are damaged, replace <u>all</u> of the nuts.

- (2) Visually examine all metal components of the wheel assembly such as (70, 75, 110, 120 and 130) for wear, scoring, cracks, chips, nicks, burrs, pitting, corrosion, flaws, and other obvious signs of damage. Replace or repair all parts showing evidence of these defects.
- (3) Check all parts with sealing surfaces and grooves for distortion, damage, burrs, or corrosion which might damage preformed packings during installation and/or operation or which might permit leakage. Replace part if sealing surfaces and grooves are damaged.
- (4) Check heat shield bumpers (125) for heat discoloration and/or cracking.



### **INSPECTION / CHECK**

- (5) The following items are to be replaced at each tire change regardless of condition: All preformed packings (20).
- (6) Repair or replace any parts that do not meet <u>INSPECTION / CHECK</u> requirements.
- 2. Detailed Inspections

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

- A. Inspect Drive Keys (IPL, 1-110A). See Figure 5001
  - Inspect the drive keys for cracks, battering, or excessive corrosion. Replaced cracked, battered or corroded parts. Width must not exceed dimension A per <u>FITS AND</u> <u>CLEARANCES</u>, Table 8001. Replace drive key if constraint exceeds the limit or the area is damaged.



Drive Key Inspection Limits Figure 5001

- B. Inspect Bearing Cups and Cones (IPL, 1-55 and 1-65) Refer to Table 5002 for maintenance interval. Replace damaged cups and cones in accordance with paragraph 1.F. and 1.G. of <u>REPAIR</u> section.
  - **NOTE:** Bearing cups are a designed shrink fit into the outboard wheel half (IPL, 1-50) and should not be removed unless replacement is necessary due to damage or if chemicals are used to remove paint finish from wheel half.
  - (1) Inspect cups in the wheel half for looseness, wear, corrosion, spalling, brinelling, nicks, scratches, water staining, pitting, and heat discoloration.

#### **CAUTION:** DO NOT INTERMIX AVIATION BEARING GREASES.

(2) Inspect roller surfaces of cones for wear, corrosion, spalling, pitting and heat discoloration. Repack cones with bearing grease (<u>ASSEMBLY</u> section, Table 7001).



# **INSPECTION / CHECK**

(3) Inspect bearing cage for dents or distortion and for wear of sides, corners and at ends of roller pockets.

**NOTE:** <sup>1</sup> See bearing manufacturer's brochure for visual illustrations.

- (4) Visually inspect the bearing cone integrated grease seals for cuts, nicks, distortion or other damage. Inspect the integrity of the rubber-to-metal interface. Replace seals that have any tears in the rubber-to-metal interface. If the rubber is cracked or if seal is distorted and unable to fit snug in hub cavity, then sealing characteristics of the seal are damaged and should be replaced.
- C. Inspect Grease Seals (IPL, 1-70)
  - (1) Examine seals for cuts, nicks, distortion, and other damage. Check for security of rubber-to-metal bond. Replace seals having any of these defects.
- **D.** Inspect Inner and Outer Wheel Halves (IPL, 1-30 and 1-50) Repair damaged areas in accordance with paragraph 1.C. of <u>REPAIR</u> section.

Examine the wheel half assemblies for cracks and corrosion using penetrant or eddy current inspection procedures. Refer to Table 5002 and Figure 5003.

- **NOTE:** Paint must be removed from inboard and outboard wheel half assemblies (IPL, 1-25 and 1-45) to conduct an accurate method for the flourescent penetrant inspection. Refer to paragraph 1.B. of <u>REPAIR</u> section for paint removal instructions.
- (1) Visually inspect wheel halves for nicks, corrosion or other damage. Replace severely corroded wheels.
- (2) Inspect inner and outer wheel half register grooves. Damage to register sections hampering sealing of wheel O-ring (IPL, 1-20) is cause for wheel half replacement.

<sup>&</sup>lt;sup>1</sup> <u>How to Recognize and Prevent Tapered Roller Bearing Damage</u> available from Timken Company, Canton, Ohio 44706 U.S.A.



### **INSPECTION / CHECK**

- (3) Refer to Figure 5002 and visually inspect wheel halves for cracks and structural damage. Take particular note of the bead seat, fusible plug, rupture disc and valve areas. The tire bead seat area of a wheel is typically an area of stress concentration and possibly subjected to trauma from tire beads and tools used to remove tires. For the outboard wheel half, specifically, check the areas between the lightening holes. For the inboard wheel half, specifically, check the bolt bosses. These areas should receive special attention when inspecting for defects at a tire change to determine airworthiness.
  - **NOTE:** These cracks may not be visible without the aid of eddy current or penetrant inspection methods. Any cracks are cause for replacement.







### **INSPECTION / CHECK**

- (4) Eddy Current Inspection Requirements
  - (a) Examine the beadseat area shown in Figure 5003. Examination of the other areas is recommended.
  - (b) Calibrate the eddy current equipment to detect a 0.060 inch (1.52mm) long by 0.030 inch (0.76mm) deep elox notch. An elox notch is produced by electrical discharge machining.
  - (c) Remove all dirt and grease from the wheel half assemblies. If the wheel has no scratches, chips, nicks, and cracks, the paint does not need to be removed.
  - (d) Eddy current probe must fit the beadseat area defined in Figure 5003.



TYPICAL FOR BOTH WHEEL HALVES

Eddy Current Probe Criteria Figure 5003



### **INSPECTION / CHECK**

- E. Inspect Fuse Plugs, Rupture Disc Assy and Air Valve Assy(IPL, 1-105, 1-90, and 1-80)
  - (1) Visually examine fuse plugs, rupture disc and air valve for damage. If required, check for leaks using the fixture shown in Figure 5004 and the following procedure:
    - (a) Install rupture disc or air valve and fuse plugs in the fixture, with preformed packings (100 or 85) installed on each. Torque each to 50 to 60 in-lb (5.65 to 6.78 N-m).
    - (b) Connect air hose to fixture inlet and pressurize to 75 to 95 psig (5.2 to 6.6 bars).
    - (c) Apply a soapy water solution to the components and looks for bubbles for two minutes.
    - (d) Discard all components that leak.
    - (e) Replace all parts with stripped or scored threads or other obvious damage.
  - (2) Check the fusible plugs (105) in the outboard wheel subassembly (45) for melting of the fusible material. Replace fusible plugs that are blown or that show evidence of melting. This is indicated by the loss of 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 plugs.
    - **NOTE:** Refer to paragraph 2.F., Procedure for Overheated Wheels if the fuse plugs have blown or melted.
    - (a) Inspect packing (100) for damage. Replace old or damaged packing.
      - **NOTE:** It is recommended that a new packing (100) be installed at each tire change.
  - (3) Check the rupture disc (95) in the outboard wheel subassembly (45) for loss of the inlet body (disc material). The rupture disc shall rupture when subjected to a pneumatic pressure of  $185 \pm 25$  psi and a temperature of  $-40^{\circ}$ F ( $-40^{\circ}$ C) to  $212^{\circ}$ F ( $100^{\circ}$ C). Replace disc that is blown or that shows evidence of damage.
    - (a) Inspect packing (100) for damage. Replace old or damaged packing.
      - **NOTE:** It is recommended that a new packing (100) be installed at each tire change.

# **INSPECTION / CHECK**



Fuse Plugs and Rupture Disc and Air Valve Test Figure 5004

#### F. Procedure for Overheated Wheels

(1) If any fuse plugs (105) are blown or melted, perform the following hardness check on the inboard wheel half (30). Refer to Figure 5005 and Table 5003 for locations and acceptance values.

**NOTE:** Topcoat and primer must be removed from surfaces prior to being tested.

- (a) Perform a hardness test in the area shown in Figure 5005. Obtain a minimum of three hardness readings, equally spaced. If any reading is below BHN 125 as specified in Table 5003, replace the wheel half.
- (b) Inspect the outboard wheel half (50) on the mating face between the bolt holes as shown in Figure 5006 only if the inboard wheel half fails the hardness test. Obtain a minimum of three hardness readings, equally spaced. If any reading is below BHN 125 as specified in Table 5003, replace the wheel half

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# **INSPECTION / CHECK**





ITEM	BRINELL TEST
BALL DIAMETER	10 mm
TEST LOAD	500 kg.
MINIMUM NUMBER OF READINGS (EQUALLY SPACED)	3
ACCEPTABLE MINIMUM AVERAGE HARDNESS	125

Hardness Test Readings Table 5003



# <u>REPAIR</u>

### 1. General

Certify that a component is serviceable per <u>INSPECTION/CHECK</u> section prior to attempting repair. Disassemble the wheel assembly only to the level necessary to do the repairs or replace components. Repairs are limited to the replacement of parts and to the repairs specified in this section. No attempt should be made to repair cracked, severely corroded or badly damaged parts.

### A. Repair Equipment and Materials. Refer to Table 6001.

**NOTE:** Equivalent substitutes May be used for items listed.

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
N/A	Aluminum Oxide Cloth	400 Grit or Finer Wet or Dry	Commercial Source
N/A	Plastic Media, Acrylic	MIL-P-85891, Type V	U.S. Technology Corp.
N/A	Plastic Media Stripping Equipment	N/A	Commercial Source
N/A	Sub-Zero Freezer	-30°F to -60°F (-34.4°C to -51.1°C)	Commercial Source
N/A	Dry Ice (Alternate for Sub-Zero Freezer)	N/A	Commercial Source
N/A	Oven	250°F capacity (121°C)	Commercial Source
N/A	Corrosion Preventative Alodine 1200 or Equiv.	MIL-C-5541, Class 1A	Commercial source
N/A	Paint Application Equipment	N/A	Commercial source
N/A	Removal Tool, Bearing Cup	Per Figure 9001 SPECIAL TOOLS	Outside Manufacture
N/A	Installation Tool, Bearing Cup	Per Figure 9002 SPECIAL TOOLS	Outside Manufacture
N/A	Hub Support, Wheel Half	Per Figure 9004 SPECIAL TOOLS	Outside Manufacture

#### Table 6001 (Sheet 1 of 2) Repair Equipment and Materials List


# <u>REPAIR</u>

# Table 6001 (Sheet 2 of 2) Repair Equipment and Materials List

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY	
N/A	Arbor Press	N/A	Commercial Source	
44-GN-36 Components A and B	Primer Coating	MIL-PRF-85582C Type I, Class C2	Deft Chemical Coatings	
44-GN-24 Components A and B	Primer Coating, Alternate	MIL-P-85582B Type I, Class C2	Deft Chemical Coatings	
03-W-127A Finish Coating Components A and B		MIL-C-85285B, Type I No. 17925 (FED-STD-595) Untinted White	Deft Chemical Coatings	
1227-6	Heli-Coil Extracting Tool	MIL-T-21309	Black & Decker Co.	
7552-3	Heli-Coil Installation Tool	MIL-T-21309	Black & Decker Co.	
3695-3 Heli-Coil Tang Removal Tool		MIL-T-21309	Black & Decker Co.	

- **B.** Paint Removal Procedure For Wheel Halves (IPL, 1-30 and 1-50)
  - WARNING: STRIPPING SOLVENTS CAN BE TOXIC AND VOLATILE. USE ONLY IN WELL VENTILATED AREAS. AVOID PHYSICAL CONTACT WITH SOLVENTS AND DO NOT INHALE VAPORS. KEEP SOLVENT CONTAINERS COVERED WHEN NOT IN USE. OBSERVE FIRE PRECAUTIONS.
  - **<u>CAUTION</u>**: REFER TO THE APPLICABLE MANUFACTURER'S INSTRUCTIONS FOR DISPOSAL OF CHEMICAL STRIPPING SOLUTIONS OR PLASTIC STRIPPING MEDIA.
  - **<u>CAUTION</u>**: MAIN WHEEL MUST BE DISASSEMBLED TO THE LEVEL REQUIRED FOR STRIPPING AND REPAINTING.
  - **<u>CAUTION</u>**: IF CHEMICAL STRIPPING IS USED, IT IS RECOMMENDED THAT THE BEARING CUP (IPL, 1-55) BE REMOVED FROM THE WHEEL HALF SUBASSEMBLY PRIOR TO PROCEEDING.
  - (1) Degrease inner and outer wheel halves per <u>CLEANING</u> section.



# <u>REPAIR</u>

- (2) Strip paint from the inboard and outboard wheel halves (IPL, 1-30 and 1-50) using plastic media.
  - **<u>NOTE</u>**: For best results, always refer to the applicable plastic media manufacturer's instructions for application and use.
  - **NOTE:** Chemical stripping agents are commercially available and may be used only if plastic media stripping equipment is not available. Refer to the manufacture of the primer and finish coating for recommended stripping agents. For best results, always refer to the applicable chemical manufacturer's instructions for application and use.

#### C. Corrosion and Surface Repair Procedure For Wheel Halves (IPL, 1-30 and 1-50)

Refer to Figure 6001 and using 400 grit or finer, wet or dry aluminum oxide cloth, remove all corrosion and surface damage from wheel halves (IPL, 1-30 and 1-50) in accordance with the limits specified in the following procedure.

- WARNING: CLEANING SOLVENTS CAN BE TOXIC AND VOLATILE. USE ONLY IN WELL VENTILATED AREAS. AVOID PHYSICAL CONTACT WITH SOLVENTS AND DO NOT INHALE VAPORS. KEEP SOLVENT CONTAINERS COVERED WHEN NOT IN USE. OBSERVE FIRE PRECAUTIONS.
- **CAUTION:** REMOVAL OF CORROSION AND SURFACE DAMAGE WILL PREVENT STRESS CONCENTRATIONS AND PREMATURE WHEEL FAILURE, BUT ANY EXCESSIVE REMOVAL OF MATERIAL WILL SHORTEN THE ROLL LIFE OF THE WHEEL; THEREFORE IT IS RECOMMENDED THAT MATERIAL REMOVED BY BLENDING BE LIMITED TO THE MINIMUM REQUIRED FOR REMOVING CORROSION OR SURFACE DAMAGE.
- **<u>CAUTION</u>**: REPAIR MUST NOT AFFECT SEALING CHARACTERISTICS OF SEALING SURFACES.



# <u>REPAIR</u>

Dimensional tolerances unless otherwise specified:

 $.xxx = \pm .010$  $.xx = \pm .030$ Angular =  $\pm 1/2^{\circ}$ Surface Finish = not to exceed 125 microinches RMS

- (1) In area 1, polish out corrosion pits, scratches, and tool marks to .015 in. max. depth and .50 in. long. Surface finish should be 32 microinches RMS.
- (2) In area 2, blend out and polish imperfections to .020 in. max. depth and 1.00 in. long. Reworked area is not to exceed 1.00 square inch. Do not remove metal if surface directly opposite was previously reworked. Surface finish should be 32 microinches RMS.
- (3) In area 3, blend out and polish imperfections to .030 in. max. deep and reworked area not to exceed 1.00 square inch in area. Surface finish should be 63 microinches RMS.
- (4) In area 4, the maximum repair is .010 inch deep and .50 square inch. For rupture disc, fuse plugs, and air valve bosses, the maximum repair is .010 inch deep.

**CAUTION:** DO NOT ATTEMPT TO REPAIR WEAR RUTS.

- (5) In area 5, wear ruts of .050 inch maximum depth are permissible.
- (6) Clean part per <u>CLEANING</u> section.

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# <u>REPAIR</u>





# <u>REPAIR</u>

- D. Surface Treatment Procedure For Wheel Halves (IPL, 1-30 and 1-50)
  - (1) Treat repaired areas with corrosion preventative (Alodine 1200 or equivalent) per MIL-C-5541, Class 1A.
- E. Repaint Procedure For Wheel Halves (IPL, 1-30 and 1-50)

Refer to Figures 6002 and 6003 and repaint wheel halves in accordance to the following procedure.

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

- **<u>CAUTION</u>**: DO NOT GET PAINT ON ROLLER CONTACTING SURFACES OF BEARING CUPS. PAINT ON THESE SURFACES WILL CONTRIBUTE TO BEARING FAILURE.
- **<u>CAUTION</u>**: REFER TO THE APPLICABLE PAINT MANUFACTURER'S INSTRUCTIONS FOR DISPOSAL OF PRIMER AND TOPCOAT MEDIA.
- **<u>NOTE</u>**: To achieve best results, always refer to the applicable paint manufacturer's instructions for application and use.
- (1) Clean part per <u>CLEANING</u> section.
- (2) Mask and apply primer to wheel halves. The dry film thickness of the primer shall be .0006 to .0009 inches (.015 to .023 mm).
- (3) Mask and apply topcoat to wheel halves. The total dry film thickness (including primer and topcoat) shall be .0023 to .0032 inches (.058 to .081 mm).



Inner Wheel Half Masking Instructions Figure 6002



**REPAIR** 





# <u>REPAIR</u>

F. Remove Bearing Cups (IPL, 1-55)

Both bearing cups are a designed shrink fit into the outboard wheel half (IPL, 1-50). Bearing cups should only be removed if determined to be damaged or chemicals are used to remove paint from wheel half. Refer to Figures 6004 and 6005 and remove bearing cups in accordance to the following procedure.

- **<u>CAUTION</u>**: DO NOT HEAT WHEEL ABOVE  $200^\circ \pm 15^\circ$ F (93.3°  $\pm 8.3^\circ$ C)
- (1) Heat outboard wheel half (IPL, 1-50) to  $200^{\circ} \pm 15^{\circ}$ F (93.3°  $\pm 8.3^{\circ}$ C) for not longer than 30 minutes.
- **CAUTION:** USE PROTECTIVE GLOVES WHEN HANDLING HEATED PARTS.
- **<u>CAUTION</u>**: DURING BEARING CUP REMOVAL, ALWAYS SUPPORT THE WHEEL HALF ON THE HUB, NOT ON THE FLANGE. FAILURE TO DO SO COULD DAMAGE THE FLANGE.
- **<u>CAUTION</u>**: AVOID RAISING BURRS IN THE HUB BORE WHEN REMOVING BEARING CUP.
- (2) Remove wheel half from heat source and place wheel on a support block. Place fabricated removal tool (refer to Figure 9001) on back face of cup. Use an arbor press to apply even pressure to the removal tool. Bearing cup should drop out.
  - **<u>NOTE</u>**: An alternate method would be to tap the cup out evenly with a fiber drift pin or phenolic punch after removing from heat source.
- (3) Turn the wheel half over and repeat step (2) for remaining cup.



# <u>REPAIR</u>

**G. Install Bearing Cups** (IPL, 1-55)

Refer to Figure 6006 and install bearing cups in accordance to the following procedure.

**<u>CAUTION</u>**: WORK SWIFTLY AS THERMAL EXPANSION AND CONTRACTION OF PARTS WILL PRECLUDE EASE OF INSTALLATION.

(1) Make sure that bearing bore and shoulder are clean and free of burrs.

**<u>CAUTION</u>**: USE PROTECTIVE GLOVES WHEN HANDLING CHILLED PARTS.

(2) Prior to installation, chill the bearing cups to between -30°F to -60°F (-34°C to -51°C) for a minimum of 30 minutes.

**<u>CAUTION</u>**: DO NOT HEAT WHEEL ABOVE  $200^{\circ} \pm 15^{\circ}$ F (93.3°  $\pm 8.3^{\circ}$ C)

(3) Heat outboard wheel half (IPL, 1-50) to 200° ± 15°F (93.3° ± 8.3°C) for not longer than 30 minutes.

**CAUTION:** USE PROTECTIVE GLOVES WHEN HANDLING HEATED PARTS.

- (4) Remove the wheel half from the heat source and remove the bearing cups from refrigeration source.
- (5) Eliminate condensation by drying bearing cups thoroughly and then apply a wet film of primer coating into the bearing bore.
- (6) Place wheel half on a clean flat work surface and align bearing cup over bore. Place fabricated installation tool (refer to Figure 9002) on front face of cup. Press the bearing cup into the bearing bore by applying even pressure to the installation tool. Make sure the backing surface of the cup rests flush against the shoulder of the bearing bore.

**NOTE:** Avoid cocking the cup during installation. If bearing cup does not seat properly in wheel half, repeat procedure or replace wheel half subassembly.

- (7) Try inserting a 0.002 (0.051mm) feeler gauge between the cup and the base of the bearing bore in three places equally spaced. If the gauge can be put into the clearance below the cup, the cup is not seated. Repeat pressing operation.
- (8) Wipe off excess primer after installation.
- (9) Turn the wheel half over and repeat steps (5) through (7) for remaining cup.



*Released: 2/1/2021* 

# **REPAIR**



# Figure 6005. Bearing Cup Installation



# <u>REPAIR</u>

H. Insert Repair (IPL, 1-35)

Do not replace inserts unless damaged. Replace damaged inserts in accordance to the following procedure.

SAFETY WARNING: USE PROTECTIVE GOGGLES OR GLASSES WHEN STRIKING ANY TOOL.

(1) Refer to Figure 6006 and remove damaged inserts by applying the HeliCoil extracting tool to the insert, striking the head of the tool a light blow and turning it counterclockwise, maintaining steady downward pressure



HeliCoil Extracting Tool Figure 6006

(2) Install inserts into wheel halves (30 or 50) as shown by Figure 6007. Break off tang.





# ASSEMBLY

# 1. General

Assembly of the main wheel is essentially the reverse of the disassembly procedures described in this manual.

A. Assembly Equipment and Materials. Refer to Table 7001.

**NOTE:** Unless otherwise stated, equivalent substitutes may be used for items listed.

PART NUMBER NOMENCLATURE **SPECIFICATION** SOURCE OF SUPPLY Mobil Aviation <sup>2</sup> Lubricating Grease N/A Exxon-Mobil Oil Co. Grease SHC100 Equivalent substitutes **Aviation Lubricants** Primary are not allowed. Aeroshell <sup>2</sup> Lubricating Grease MIL-G-81322, Grade A Shell Oil Company Grease 22 Equivalent substitutes Lubricant Division Optional are not allowed. MIL-T-83483 1 **FEL-PRO Chemical** 51094 Moly-50 Anti-seize Compound N/A Isopropyl Alcohol N/A **Commercial Source** N/A **Cleaning Cloths** Lint Free **Commercial Source** N/A Rubber Cleaner N/A Commercial Source 199-18 Preformed Installation N/A Parker Hannifin Corp. Aircraft Wheel & Brake Extraction Tool Set N/A Socket Set with 12 pt. External Drive and **Commercial Source** Assorted Wrenches Hex Head, Inch N/A Torque Gage 0 to 200 in-lb capacity Commercial Source (0 to 22.60 N-m) Commercial Source N/A Inflation Cage N/A **Tire Pressure Gage Commercial Source** N/A To assure recommended inflation pressure (per airframe mfr.) N/A Screw Driver Bits **Commercial Source** Regular, Phillips N/A Torq-Set® Driver Bit (NASM33781) Phillips Screw Company

Table 7001 Assembly Equipment and Materials List

<sup>1</sup> <u>CAUTION</u>: DO NOT MIX ANTI-SEIZE COMPOUNDS. THIS CAN RESULT IN IMPROPER TORQUE SETTINGS AND COULD RESULT IN FAILURE OF THE BOLT. THE USE OF ANTI-SEIZE COMPOUND IS LIMITED TO THAT SPECIFIED IN TABLE 7001.

<sup>2</sup> **<u>CAUTION</u>**: DO NOT INTERMIX AVIATION BEARING GREASES.



# ASSEMBLY

#### **B.** Assemble Main Wheel Assembly (Refer to IPL, Figure 1)

Assemble the wheel on a clean, flat work surface being careful not to nick, scratch or damage the protective finish or wheel halves.

- (1) If removed, install the bearing cups (55) now per paragraph 1.G. of <u>REPAIR</u> section.
- (2) New drive keys (115), if required, should be installed now.
  - (a) Align heat shield (120) between drive keys on the inboard wheel half subassembly (25). Place a drive key on a drive lug and the lip edge of each heat shield.
  - (b) Use Torq-Set® screw driver bit to fasten each drive key (115) onto the drive lug on the inboard wheel half (30) using two screws (120) for each drive key. Torque to 35 to 45 in-lb (3.95 to 5.08 N-m).
- (3) Inboard (25) and outboard (45) wheel half subassemblies are now ready for assembly.
- (4) Place inboard wheel half assembly (25) on clean, flat work surface with flange side down. Clean wheel flange, bead seat register and packing groove with a clean cloth dampened with isopropyl alcohol.

**<u>CAUTION</u>**: THE PREFORMED PACKING (20) MUST SEAT UNIFORMILY WITHOUT STRETCHING OR TWISTING.

(5) Lubricate wheel register preformed packing (20) with a light coat of bearing grease (refer to Table 7001) and install in wheel register groove of inboard wheel half subassembly (25).

**NOTE:** It is recommended that a new preformed packing (20) be installed at each tire change.

- (6) Inspect air valve assembly preformed packing (85) for damage. Replace if necessary. Install air valve assembly (80) in outboard wheel half subassembly (45). Torque to 50 to 60 in-lb (5.65 to 6.78 N-m).
- (7) Inspect fuse plug preformed packing (100) for damage. Replace if necessary. Install fuse plugs (105) in outboard wheel half subassy (45). Torque to 50 to 60 in-lb (5.65 to 6.78 N-m).
- (8) Inspect rupture disc preformed packing (100) for damage. Replace if necessary. Install rupture disc assembly (90) in outboard wheel half subassy (45). Torque to 50 to 60 in-lb (5.65 to 6.78 N-m).



# <u>ASSEMBLY</u>

- Place serviceable 8.50-10, 10 PR tubeless tire over outboard wheel half subassembly (45) aligning the Red balancing dot on the tire adjacent to the air valve assembly (80).
  - **NOTE:** When mounting tires, bead lubrication is often desirable. A light coat of talc or approved liquid bead lubricant may be used.
- (10) Position the inboard wheel half subassembly (25) in the tire so that the bolt holes in both wheel halves are aligned.

#### STOP!

If using the optional tire change counter (150), refer now to the <u>SPECIAL PROCEDURES</u> section for installation instructions of the tire change counter and mounting hardware. If not using the optional tire change counter, continue to instruction (11) below.

(11) Prior to installing mounting hardware, lubricate bolt (5) and nut (15) threads and bearing surfaces of bolt heads, washers (10) and nuts with anti-sieze compound, per MIL-T-83483. Refer to Figure 7001.



Figure 7001 Lubricating Mounting Hardware

- (12) Slide a double countersunk washer (10) onto each bolt (5).
- (13) Insert bolts (5) [with washer (10)] into the inboard wheel half subassembly (25). Compress the wheel halves together and install remaining double countersunk washers (10) and nuts (15) onto each of the nine bolts (5), thus fastening the wheel half subassemblies together.
  - **NOTE:** The nuts (15) should be located on the outboard wheel half subassembly (45) side.



# ASSEMBLY

- **<u>CAUTION</u>**: DO NOT USE IMPACT OR POWER WRENCHES TO INSTALL WHEEL NUTS AND BOLTS.
- (14) Preliminary torque nuts (15) to 190 in-lb maximum (21.46 N-m) in criss-cross pattern. Final torque nuts (15) to 170 to 190 in-lb (19.21 to 21.46 N-m) in clockwise sequence. See Figure 7002.
  - **NOTE:** A stripe of paint or inspector torque seal should be painted on the nuts and bolts (after final torquing) such that any rotation of the nuts relative to the bolts will be indicated by a broken stripe.



Figure 7003 Bolt Torquing Procedure



# ASSEMBLY



INFLATION OF THE TIRE CAN BE EXTREMELY DANGEROUS, AND IT IS RECOMMENDED THAT INFLATION BE PERFORMED IN AN INFLATION CAGE TO PREVENT INJURY TO PERSONNEL FROM POSSIBLE EXPLOSION.

# <u>WARNING</u>: DO NOT INFLATE TIRE TO FULL OPERATING PRESSURE UNTIL THE WHEEL ASSEMBLY HAS BEEN MOUNTED ON AIRCRAFT.

- (15) Place the wheel/tire assembly in an inflation cage for initial inflation. Inflate tire to tire manufacturer's specifications to seat the beads on wheel. Reduce tire pressure to recommended storage pressure (10 psig) and remove wheel/tire assembly from inflation cage.
- (16) Pack bearing cones (65) with bearing grease (refer to Table 7001).
- (17) Install bearing cone (65), into the outboard wheel half subassembly.
- (18) Install other bearing cone (65), into the other side of the outboard wheel half subassembly.
- (19) Install grease seals (70). Observe "**this side out**" instructions on seal. Install retaining rings (75) into appropriate grooves in outboard wheel half.
- (20) Test the wheel assembly. Refer to the <u>TESTING AND FAULT ISOLATION</u> section.
- (21) Mount wheel and tire assembly on the axle over the brake assembly.

**NOTE:** Make sure the lugs on the wheel hub correctly engage in the slots on the brake discs.

- (22) Install the axle nut and additional axle mounting hardware per aircraft maintenance manual.
- (23) Inflate tire to aircraft manufacturer's recommended inflation pressure.
- (24) Install five grommets (140) into fairing (130). Apply MIL-T-83483 Anti-seize to end of fasteners (135). Install one washer (145) onto each fastener (135). Attach fairing (130) to outboard wheel half subassembly. Torque fastener (135) to 20 25 in.-lbs.
  (2.26 2.82 N-m). Note that the fastener is designed to bottom in the outboard wheel half subassembly before fully compressing the grommet.
- (25) Perform any additional post installation functions to complete aircraft readiness per aircraft maintenance manual.

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# **FITS AND CLEARANCES**

- 1. General
  - A. Assembly Wear Limits (Refer to IPL, Figure 1)

Table 8001 gives the in-service wear limits for the component parts of the wheel assembly. You must replace all components that are not within specified limits. Refer to the appropriate paragraphs in <u>INSPECTION / CHECK</u> section for more data.

Table 8001 Service Wear Limits

PART NAME (IPL ITEM NO.)	FIG AND DIMENSION REFERENCE	WORN AREA DESCRIPTION	WORN DIMENSION inches (mm)
Drive Key (110A)	5001, A	Drive Key Thickness	.636 in. minimum (16.15 mm) Use Torq-Set® driver bit

**B.** Assembly Torque Values (Refer to IPL, Figure 1)

Table 8002 provides the assembly torque values for the component parts of the wheel assembly.

**<u>NOTE</u>**: Refer to Figure 7001, <u>ASSEMBLY</u> section, for applying anti-seize compound per MIL-T-83483 to all applicable hardware.

PART NAME (IPL ITEM NO.)	TORQUE LIMITS in-lb or ft-lb (N-m)
Screws (115) - Drive Key	35 to 45 in-lb (3.95 to 5.08 N-m). use Torq-Set® driver bit
Air Valve Assembly (80)	50 to 60 in-lb (5.65 to 6.78 N-m)
Nuts (15)	170 to 190 in-lb (19.21 to 21.46 N-m) final torque apply MIL-T-83483 anti-seize per Figure 7001
Rupture Disc Assy (90)	50 to 60 in-lb (5.65 to 6.78 N-m).
Fuse Plug (105)	50 to 60 in-lb (5.65 to 6.78 N-m).
Screws (135) - Fairing	20 to 25 in-lb (2.26 to 2.82 N-m).

Table 8002 Assembly Hardware Torque Values

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# SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES

#### 1. General

This section identifies the special tools, fixtures, equipment and consumables necessary to repair, maintain, and do tests on the main wheel assembly. Special tools necessary to perform the requirements of this manual are shown in Table 9001. The materials (consumables list) necessary are shown in Table 9002.

**NOTE:** Equivalent substitutes may be used for items listed.

# A. Special Tools, Fixtures and Equipment. Refer to Table 9001.

PART NUMBER	IBER NOMENCLATURE SPECIFICATION		SOURCE OF SUPPLY	
N/A	Inflation Cage	N/A	Commercial Source	
N/A	Tire Pressure Gage	To assure recommended inflation pressure (per airframe mfr.)	Commercial Source	
N/A	Torque Gage	0 to 200 in-lb capacity (0 to 22.60 N-m)	Commercial Source	
199-18 Preformed Packing Extraction Tool Set		N/A	Parker Hannifin Corp. Aircraft Wheel & Brake	
N/A	Socket Set with Assorted Wrenches	12 pt. External Drive and Hex Head, Inch	Commercial Source	
N/A Portable Tire Bead Breaker		N/A	Commercial Source	
N/A	Plastic Media Stripping Equipment	N/A	Commercial Source	
N/A	Sub-Zero Freezer	-30°F to -60°F (-34.4°C to -51.1°C)	Commercial Source	
N/A	Oven	200°F capacity (93°C)	Commercial Source	
N/APaint Application EquipmentN/ARemoval Tool, Bearing Cup		N/A	Commercial source	
		Per Figure 9001	Outside Manufacture	

Table 9001 (Sheet 1 of 2) Special Tools, Fixtures and Equipment



#### SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY	
N/A	Installation Tool, Bearing Cup	Per Figure 9002	Outside Manufacture	
N/A	Hub Support, Wheel Half	Per Figure 9004	Outside Manufacture	
N/A	Arbor Press	N/A	Commercial Source	
N/A	Magnifier	X10 Magnification	Commercial Source	
N/A	Vernier Dial Calipers	0 to 6.00 in. (0 to 150 mm)	Commercial Source	
N/A	Screw Driver Bits	Regular, Phillips	Commercial Source	
N/A	Torq-Set® Driver Bit	(NASM33781)	Phillips Screw Company	
N/A Fuse Plug and Rupture Disc Test Fixture		Per Figure 9003	Outside Manufacture	
1227-6	Heli-Coil Extracting Tool MIL-T-21309		Black & Decker Co.	
7552-3	Heli-Coil Installation Tool	MIL-T-21309	Black & Decker Co.	
3695-3     Heli-Coil Tang Removal Tool       N/A     Eddy Current Inspection Equipment		MIL-T-21309	Black & Decker Co.	
		ASNT-460 or MIL-HDBK-728/2	Commercial Source	

Table 9001 (Sheet 2 of 2) Special Tools, Fixtures and Equipment

**B.** Consumables List. Refer to Table 9002.

#### Table 9002 (Sheet 1 of 2) Consumables List

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY	
N/A	Magnetic Particle Inspection Kit	ASTM E1444	Commercial Source	
N/A	Fluorescent Penetrant Inspection Kit	ASTM E1417 or MIL-STD-6866, Type 1, Method A, Sensitivity Level 2	Commercial Source	
N/A	Aluminum Oxide Cloth	400 Grit or Finer Wet or Dry	Commercial Source	



# SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY	
N/A	Corrosion Preventative Alodine 1200 or Equiv.	MIL-C-5541, Class 1A	Commercial source	
N/A	Cleaner/Degreaser	AMS 1526	Commercial Source	
44-GN-36 Components A and B	Primer Coating	MIL-PRF-85582C Type I, Class C2	Deft Chemical Coatings	
44-GN-24 Components A and B	Primer Coating, Alternate	MIL-P-85582B Type I, Class C2	Deft Chemical Coatings	
03-W-127A Components A and B	Finish Coating	MIL-C-85285B, Type I No. 17925 (FED-STD-595) Untinted White	Deft Chemical Coatings	
Mobil Aviation <u>1</u> Grease SHC100 Primary	Lubricating Grease Equivalent substitutes are not allowed.	N/A	Exxon-Mobil Oil Co. Aviation Lubricants	
Aeroshell <u>1</u> Grease 22 Optional	Lubricating Grease Equivalent substitutes are not allowed.	MIL-G-81322, Grade A	Shell Oil Company Lubricant Division	
N/A	Plastic Media, Acrylic	MIL-P-85891, Type V	U.S. Technology Corp.	
51094 Moly-50	Anti-seize Compound	MIL-T-83483	FEL-PRO Chemical	
N/A	Isopropyl Alcohol	N/A	Commercial Source	
N/A	Rubber Cleaner	N/A	Commercial Source	
N/A	Soap Solution	N/A	Commercial Source	
N/A	Air Supply, Compressed Dry Filtered	30 psig maximum (2.07 bar)	N/A	
N/A	Cleaning Cloths	Lint Free	Commercial Source	
N/A Dry Ice (Alternate for Sub-Zero Freezer)		N/A	Commercial Source	
N/A	Brushes	Soft Bristled	Commercial Source	
N/A Solvent, Stoddard Type 1		P-D-680	Commercial Source	
Uni-Paint 63602 – Red 63603 - Blue	Paint Marker – medium point	Oil-based, permanent, quick drying, weatherproof, fade proof and acid free	Sanford Corporation	

Table 9002 (Sheet 2 of 2) Consumables List

<sup>1</sup> **<u>CAUTION</u>**: DO NOT INTERMIX AVIATION BEARING GREASES.



# SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES

#### C. List of Manufacturers and Vendors

<u>Name</u>	Internet Address	Address
Parker Hannifin Corporation Aircraft Wheel & Brake Div.	www.parker.com/cleveland	1160 Center Rd Avon, OH 44011 USA
U.S. Technology Corporation		220-T 7 <sup>th</sup> Street S.E. Canton, OH 44702 USA
Deft Chemical Coatings	www.deftfinishes.com	17451 Von Karman Ave. Irvine, CA 92714 USA
Shell Oil Lubricant Div.	www.shell.com	One Shell Plaza Houston, TX 77002 USA
Phillips Screw Company	www.phillips-screw.com	508 Edgewater Drive Wakefield, MA 01880 USA
Black & Decker Company Emhart Industrial Division (Heli-Coil)	www.emhart.com	Shelter Rock Lane Danbury, CT 06810 USA
Sanford Corporation	www.sanfordcorp.com	2707 Butterfield Road Oak Brook, IL 60523 USA
Exxon-Mobil Oil Company Aviation Lubricants	www.mobil.com	3225 Gallows Road Fairfax, VA_22037 USA



# SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES



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# SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES



3. BREAK UNSPECIFIED SHARP EDGES .005-.015 (.127-.381mm)

# Fuse Plug and Rupture Disc and Air Valve Test Fixture Figure 9003



# Hub Support (Cup Removal and Installation) Figure 9004



# **ILLUSTRATED PARTS LIST**

#### 1. General

The illustrated parts list describes and illustrates the detail parts of the Main Wheel Assembly.

All parts of the equipment are listed, except parts which lose their identities by being permanently fastened to other parts of assemblies and are not subject to disassembly.

#### A. Explanation of Columns

- (1) Figure/Item column: The figure and item numbers key the parts breakdown list to the applicable illustration. The first number represents the figure number of the illustration. The item numbers are arranged in sequence and generally reflect the order of disassembly.
- (2) Part Number column: This column contains the assigned Parker Hannifin Aircraft Wheel and Brake part number for the individual item.
- (3) Airline Stock Number column: This column contains the Airline Stock Number when applicable.
- (4) Nomenclature column: This column identifies the parts being listed by noun name followed by modifiers when applicable. The indenture system used in the parts list shows the relationship of the parts to their subassemblies and to the assembly:

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

- (5) Effectivity column: An effectivity code shows the difference in parts within various configurations. The effectivity code is used for more than one configuration of the basic part number. Effectivity codes only apply to the figure in which they are used.
- (6) Units Per Assembly column: This column indicates the total number required per assembly or per subassembly as applicable. These abbreviations may appear in the Units Per Assembly column:

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



# **ILLUSTRATED PARTS LIST**

#### B. Part Numbering System

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

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

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

#### 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:

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



# **ILLUSTRATED PARTS LIST**

#### D. Items Not Illustrated

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

#### E. Alpha Variant Item Numbers

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

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

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

# 2. Optional Vendor Index

Not applicable.

#### 3. Federal Supply Code for Manufacturers

Not applicable.



# **ILLUSTRATED PARTS LIST**



IPL Figure 1 Main Wheel Assembly



# **ILLUSTRATED PARTS LIST**

# 4. Detailed Parts List – Main Wheel Assembly (sheet 1 of 2)

		AIRLINE			UNITS
FIG.	PART	STOCK	NOMENCLATURE	EFF	PER
TIEM	NUMBER	NUMBER	1234567	CODE	ASSY.
1 - 1	40-424		MAIN WHEEL ASSEMBLY		RF
5	103-22700		. BOLT (MS21250-05022)		9
10	095-14700		. WASHER, DBL C'SUNK (MS14155-5)		18
15	094-16400		. NUT, SELF-LOCKING (NAS1804-5N)		9
20	101-50268		. PACKING, PREFORMED (MS28775-268)		1
- 25	161-20501		. SUBASSEMBLY, WHEEL HALF, INBOARD		1
30	151-19901 <sup>(2)</sup>		WHEEL HALF, INBOARD (alternate for item 30B)		NP
30A	151-19902 <sup>(2)</sup>		WHEEL HALF, INBOARD (alternate for item 30B)		NP
30B	151-19903 <sup>(2)</sup>		WHEEL HALF, INBOARD		NP
35	230-04700 (1)		INSERT (MS21209F1-10L)		12
- 45	162-20501		. SUBASSEMBLY, WHEEL HALF, OUTBOARD		1
50	152-19901 <sup>(2)</sup>		WHEEL HALF, OUTBOARD (alternate for item 50B)		NP
50A	152-19902 <sup>(2)</sup>		WHEEL HALF, OUTBOARD (alternate for item 50B)		NP
50B	152-19903 <sup>(2)</sup>		WHEEL HALF, OUTBOARD		NP
55	214-13100		CUP, BEARING		2
35	230-04700 (1)		INSERT (MS21209F1-10L)		5
40	166-19700		NAMEPLATE		1
60	166-20000		NAMEPLATE "WARNING"		1
65	214-13200		. CONE, BEARING		2
70	154-08400		. SEAL, GREASE, SUPSD BY Item 70A		NP
70A	154-08401		. SEAL, GREASE, SUPSDS Item 70		2
75	155-14200		. RING, RETAINING		2

<sup>(1)</sup> Do not remove unless damaged.

<sup>(2)</sup> 151-19903/152-19903, 151-19902/152-19902 and 151-19901/152-19901 are procured thru different forging suppliers.



# **ILLUSTRATED PARTS LIST**

# 4. Detailed Parts List – Main Wheel Assembly (sheet 2 of 2)

		AIRLINE			UNITS
FIG.	PART	STOCK	NOMENCLATURE	EFF	PER
IIEM	NUMBER	NUMBER	1234567	CODE	ASSY.
80	160-00700		. ASSY., VALVE, AIR		1
85	101-29700		PACKING, PREFORMED (AS3582-010)		1
90	106-01201		. ASSY., DISC, RUPTURE		1
95	106-01200		DISC, RUPTURE		1
100	101-62300		. PACKING, PREFORMED (AS3582-010) SUPSD BY Item 100A		NP
100A	101-00500		. PACKING, PREFORMED (MS28775-010) SUPSDS Item 100		1
105	106-01600		PLUG, FUSIBLE (271°-291°F melt range)		3
100	101-62300		PACKING, PREFORMED (AS3582-010) SUPSD BY Item 100A		NP
100A	101-00500		PACKING, PREFORMED (MS28775-010) SUPSDS Item 100		3
110	205-05200		. KEY, DRIVE, SUPSD BY ITEM 110A		NP
110A	205-05201		. KEY, DRIVE, SUPSDS ITEM 110		6
115	102-33300		. SCREW (NAS1102E3-6)		12
120	157-02600		. SHIELD, HEAT		6
125	110-15300		. BUMPERS, SHIELD, HEAT		12
130	157-03500		. FAIRING		1
135	102-35000		. SCREW		5
140	217-01200		GROMMET (MS35489-4)		5
145	095-10800		WASHER (NAS1149F0332P)		5
150	139-39000 <sup>(3)</sup>		TIRE CHANGE COUNTER - Optional		RF

<sup>(3)</sup> The optional tire change counter may be ordered as a separate kit (ref. Parker P/N 199-272). Refer to the <u>SPECIAL PROCEDURES</u> section for installation of the tire change counter.



# SPECIAL PROCEDURES

#### 1. General

This section contains special procedures for the 40-424 main wheel assembly.

#### 2. Optional Tire Change Counter

The following instructions are to be followed for installation of the optional tire change counter (150).

#### A. Tire Change Counter Equipment and Materials

**NOTE:** Unless otherwise stated, equivalent substitutes may be used for items listed.

Table 11001 Tire Change Counter Equipment and Materials List

PART NUMBER	NOMENCLATURE	SPECIFICATION	SOURCE OF SUPPLY
199-272 <sup>2</sup> Tire Change Counter Kit		N/A	Parker Hannifin Corp. Aircraft Wheel & Brake
51094 Moly-50 Anti-seize Compound		MIL-T-83483 <sup>1</sup>	FEL-PRO Chemical
N/A	Socket Set with Assorted Wrenches	12 pt. External Drive and Hex Head, Inch	Commercial Source
N/A Torque Gage		0 to 200 in-lb capacity (0 to 22.60 N-m)	Commercial Source
Uni-Paint 63602 – Red 63603 - Blue	Paint Marker – medium point	Oil-based, permanent, quick drying, weatherproof, fade proof and acid free	Sanford Corporation

<sup>1</sup> <u>CAUTION</u>: DO NOT MIX ANTI-SEIZE COMPOUNDS. THIS CAN RESULT IN IMPROPER TORQUE SETTINGS AND COULD RESULT IN FAILURE OF THE BOLT. THE USE OF ANTI-SEIZE COMPOUND IS LIMITED TO THAT SPECIFIED IN TABLE 11001.

<sup>2</sup> The 199-272 Tire Change Counter Kit contains the following component(s):

Part Number	Description	<b>Quantity</b>
139-39000	Tire Change Counter	1



# SPECIAL PROCEDURES

#### B. Install the Tire Change Counter

- **<u>NOTE</u>**: The tire change counter is approved for use on the outboard wheel half (50) only. The tire change counter is installed during assembly of the wheel.
- (1) Refer to the **ASSEMBLY** section and assemble the wheel following the instructions starting with paragraph 1.B.(1) up to and including paragraph 1.B.(10). This will include mounting a serviceable tire and position the wheel halves for tire change counter and mounting hardware installation.
- (2) Prior to installing the tire change counter and mounting hardware, apply anti-seize per MIL-T-83483 to the following per figure 11001:
  - > All 9 bolts (5)
  - All 9 nuts (15)
  - $\succ$  17 of the washers (10)
  - The tire change counter (150)



Figure 11001 Lubricating Mounting Hardware



# SPECIAL PROCEDURES

- (3) Install the hardware as follows:
  - first, insert the 9 bolts (5) [each with a countersunk washer (10)] into the inboard wheel half subassembly (25).
  - next, compress the wheel halves together and install a countersunk washer (10) onto 8 of the bolts (5).
  - next, install 8 nuts (15) onto eight of the bolts (5), thus fastening the wheel half subassemblies together.
    - **<u>NOTE</u>**: The nuts (15) should be located on the outboard wheel half subassembly (45) side.
  - finally, install the tire change counter (150) onto the remaining bolt (5) as shown in Figure 11002 and install the remaining washer (10) and nut (15) onto the bolt.



This end of the tire change counter will be positioned around the circumference of the washer/bolt as shown. This positional location will prevent the tire change counter from rotating.

Figure 11002 Install the Tire Change Counter

(4) Torque hardware set A and B to 40 in-lb (4,52 N-M) to properly locate the tire change counter before applying the preliminary and final torque limits.



# SPECIAL PROCEDURES

- **<u>CAUTION</u>**: DO NOT USE IMPACT OR POWER WRENCHES TO INSTALL WHEEL NUTS AND BOLTS.
- (5) Preliminary torque nuts (15) to 190 in-lb maximum (21.46 N-m) in criss-cross pattern. Final torque nuts (15) to 170 to 190 in-lb (19.21 to 21.46 N-m) in clockwise sequence. See Figure 7003.
  - **NOTE:** A stripe of paint or inspector torque seal should be painted on the nuts and bolts (after final torquing) such that any rotation of the nuts relative to the bolts will be indicated by a broken stripe.



Figure 11003 Bolt Torquing Procedure

(6) To complete assembly of the wheel, refer to the **ASSEMBLY** section and follow the instructions starting with paragraph 1.B.(15).



# SPECIAL PROCEDURES

#### **B.** Recording Tire Changes

- (1) Record tire changes as shown in Figure 11004 and the following procedure.
  - (a) Wipe away any anti-seize residue from areas that are to be marked with the paint marker. Anti-seize residue will make it hard to apply the marker. Use a dry, clean cloth.
  - (b) At the location indicated, mark the tire change counter with the outboard wheel subassembly serial number. The tire change counter may be marked with the serial number by painting, engraving, dot peening, or vibro etching. Use the format: "S/N XXXX".
  - (c) The tire change counter has 26 drilled hole cavities. Use the red paint marker to paint one drilled hole cavity for each tire change. If the tire change count for the wheel exceeds 26 tire changes, a blue marker can be used to mark over each red mark. This will double the counter to a possible 52 tire changes.



Figure 11004 Tire Change Counter
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CM40-424 COMPONENT MAINTENANCE MANUAL WITH IPL FOR MAIN WHEEL ASSEMBLY PART NO. 40-424

# STORAGE

### 1. General

Wheel storage procedures differ depending on whether the wheels are stored with or without tires installed.

- **<u>CAUTION</u>**: WHEELS STORED IN CARDBOARD BOXES, WHICH HAVE BECOME WET OR HAVE BEEN EXPOSED TO HIGH HUMIDITY, CAN BECOME CORRODED.
- **NOTE:** Lubricate the bearing cups (55) and cones (65) with bearing grease (refer to <u>ASSEMBLY</u> section, Table 7001) and plug or cover bearing hub area during storage to prevent contamination.

### 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. The usable life may be shortened by exposure to sunlight, ozone, extrememe temperatures, low humidity; and contamination by fluids.
- (2) The wheel assembly should be stored in a clean, dry storeroom. The desirable storeroom temperature range is from 50° to 77°F (10° to 25°C). If this temperature range cannot be maintained, temperatures as high as 125°F (51.7°C) and as low as -20°F (-28.9°C) can be tolerated for shorter periods. Total time above 100°F (37.8°C) shall not exceed three months. The recommended storage pressure for tires is 10 psig (0.69 bar).

### **B.** Wheels Stored Without Tires Installed

- (1) Short-term storage of tubeless wheel assemblies may be stored with the wheel O-ring packing installed between the two halves.
- (2) Storage of components containing rubber for longer than two years should be assembled without the rubber based components. Those rubber based components, e.g., O-ring packings, molded rubber grease seals, etc., are to be placed in an ultraviolet protective package.
- (3) Wheels stored without rubber components installed have an indefinite storage life.

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#### **CERTIFICADO SUPLEMENTAR DE TIPO**

(Supplemental Type Certificate)

# NÚMERO 2011S03-19

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

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

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

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

Produto Original - Número do Certificado de Tipo: 9605 (ANAC) (Original Product - Type Certificate No:)

Fabricante: Pilatus Aircraft Limited

Modelo(s): PC-12, PC-12/45, PC-12/47 and PC-12/47E.

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

Installation of Parker Hannifin Wheel/Brake Assembly P/N 40-424/30-244 (Conversion Kit N° 199-241) in accordance with Parker Hannifin's Installation Manual N° IM199-241, Rev. J, dated 20 Jan. 2010 or later revisions.

This CST validates in Brazil the STC # SA01376CH, issued by FAA (USA).

LIMITAÇÕES E CONDIÇÕES: (Limitations and Conditions:)

See continuation sheet for applicable data.

DATAS: (Dates of:)

Do Requerimento: 03 Nov. 2010 (Application:)

Da emissão: 31 Mar. 2011

101 HÉLIO TARQUÍNIO JÚNIOR

Gerente-Geral, Certificação de Produto Aeronáutico (General Manager, Aeronautical Product Certification) Da reemissão: (Reissue:)

Superintendente de Aeronavegabilidade (Airworthiness Superintendent)



Folha de Continuação ao

## **CERTIFICADO SUPLEMENTAR DE TIPO**

(Supplemental Type Certificate)

NÚMERO 2011S03-19

LIMITAÇÕES E CONDIÇÕES: (Limitations and Conditions:)

- I. The approval of this type design change should not be extended to other aircraft of these models on which other previously approved modifications are incorporated unless it is determined by the installer that the relationship between this change and any of those other previously approved modifications, including changes in Type Design, will introduce no adverse effect upon the airworthiness of that aircraft.
- II. If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.
- III. Operation must be performed in accordance with FAA approved Airplane Flight Manual Supplement (AFMS), Document No. 199-241, Rev. B, dated 22 June 2009 or later approved revisions.
- IV. A copy of this Certificate and the Supplement referred on item III above shall be maintained as part of the permanent records of the modified aircraft.

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**European Aviation Safety Agency** 



# SUPPLEMENTAL TYPE CERTIFICATE

# 10027890, REV. 1

This Supplemental Type Certificate is issued by EASA, acting in accordance with Regulation (EC) No. 216/2008 on behalf of the European Community, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation and in accordance with Commission Regulation (EC) No. 1702/2003 to

#### PARKER HANNIFIN CORP., AIRCRAFT WHEEL & BRAKE DIV. 1160 CENTER ROAD AVON 44011 USA

and certifies that the change in the type design for the product listed below with the limitations and conditions specified meets the applicable Type Certification Basis and environmental protection requirements when operated within the conditions and limitations specified below:

Original Product TC Number: EA TC Holder: PIL Model: PC Model: PC

EASA.A.089 PILATUS AIRCRAFT LTD. PC-12, PC-12/45, PC-12/47, PC-12/47E

EASA Certification Basis: CS-23.B NSC

Description of Design Change: EASA Validation of STC SA01376CH

Associated Technical Documentation: Airplane Flight Manual Supplement AFMS199-241 Airplane Maintenance Manual Supplement AMMS199-241 Installation Manual IM 199-241 Component Maintenance Manuals: CM 30-244 / CM 40-424

Limitations: None

See Continuation Sheet(s)

For the European Aviation Safety Agency,

Date of issue: 04.12.2009

Roger HARDY Certification Manager General Aviation

Note: The following numbers are listed on the certificate: EASA current Project Number: 0010001242-001 EASA old Project Number: P-EASA.IM.A.S.03272, REV. 1 SUPPLEMENTAL TYPE CERTIFICATE - 10027890, REV. 1 - PARKER HANNIFIN CORP.,



### **Conditions:**

1) Prior to installation of this modification the installer must determine that the interrelationship between this modification and any other previously installed modification will introduce no adverse effect upon the airworthiness of the product.

2) The installation of this modification by third persons is subject to written permission of the approval holder and holding and disposal of the approved appropriate documentation.

3) The approval holder shall fulfil the obligations of Part 21, Paragraph 21.A109.

This Certificate shall remain valid unless otherwise surrendered or revoked.

- end -

# Supplemental Type Certificate

Number SA01376CH

This cortificate issued to

Aircraft Wheel & Brake Division Parker Hannifin Corporation 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 hereen meets the airmorthiness requirements of Part 23 of the Federal Aviation Regulations. (See Type Certificate Data Sheet A78EU for complete certification basis)

Criginal Product Type Certificate Number : A78EU

. *Wake*: Pilatus Aircraft Limited . *Wodel*: PC-12, PC-12/45, PC-12/47, PC-12/47E

### Lescription of Type Design Change:

Installation of Parker Hannifin Wheel/Brake Asembly P/N 40-424/30-244 (Conversion Kit No. 199-241) in accordance with Parker Hannifin's Installation Manual No. IM199-241, Revision G, dated May 22, 2008, or later FAA approved revisions.

#### Limitations and Conditions .

- 1. Compatibility of this design change with previously approved modifications must be determined by the installer.
- 2. FAA approved Airplane Flight Manual Supplement (AFMS), Document No. 199-241 AFMS, approved June 22, 2009, or later FAA approved revision, is required with this installation.
- 3. If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

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

Late of application . May 18, 2000

Late of issuance . January 10, 2001



Date reissued :

Sate amended : June 22, 2009

By direction of the Administrator Son EDM

Roy E. Boffo, Acting Manager Systems and Flight Test Branch Chicago Aircraft Certification Office

(Title)

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



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

Date: \_ \_/\_ \_/20\_ \_

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

To whom it may concern:

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

KIT NUMBER: 199-\_\_\_\_\_

FAA APPROVAL: 1) STC # \_\_\_\_\_

NO OTHER APPROVALS NECESSARY

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

A/C MAKE:

A/C MODEL\_\_\_\_\_

TAIL # \_\_\_\_\_

Regards,

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