AIRCRAFT WHEEL & BRAKE DIVISION **FAA-PMA**

PARKER HANNIFIN CORPORATION

AVON, OHIO

PARTS LIST

199-177 CONVERSION KIT
CESSNA MODEL S550 CITATION S/II

PART NUMBER	DRAWING REVISION	DESCRIPTION	QUANTITY
30-161A	Rev. V dated 04-13-2009	Brake Assembly	2
40-202	Rev. R dated 04-26-2007	Wheel Assembly	2
207-07000	----------	Hose Assembly (Pneumatic) Aeroquip AE3663218E0165	2
207-07100	----------	Hose Assembly (Hydraulic) Aeroquip AE3663218G0165	2
094-05200	----------	Nut (hose clamp) MS21044N3	2
095-06100	----------	Tanged Washer MS21258-28	2
067-12600	Rev. A dated 11-16-1989	Spacer-Axle	2
		Publication Package (P/N PP199-17700)	
199-177 P/L	----------	Kit Parts List (This document)	1
50-132	Rev. A dated 11-18-1992	Installation Drawing	1
199-177 Manual	INT. dated 11-1-1989	Installation Manual	1
CM 30-161A	Rev. E dated 04-20-2004	Brake Assembly, Component Maintenance Manual	1
CM40-202	Rev. M dated 11-01-2002	Wheel Assembly Component Maintenance Manual	1
STC SA1441GL	Amend Date 11-18-1993	Supplemental Type Certificate	1
		Warranty Registration Card	1

NOTES:

1. This Kit will convert one aircraft to Cleveland Wheels & Brakes.
2. For use with phosphate ester base(Skydrol 500B, 500C, Hyjet W, or Hyjet III) hydraulic fluid.

199-177
INT. 11-01-1989 (298-42)
REV. A 01-02-1990 (298-98)
REV. B 03-13-1990 (299-76)
REV. C 02-05-1991 (302-53)
REV. D 06-06-1991 (303-57)
REV. E 11-18-1992 (307-14)
REV. F 02-01-1993 (307-53)
REV. G 12-11-1993 (0310-10)
REV. H 12-15-1994 (0314-70)
REV. J 01-14-1997 (0323-89)
REV. K 12-10-2002 (0353-87)
REV. L 03-08-2004 (0360-01)
REV. M 06-01-2004 (0361-59)
REV. N 08-25-2008 (0381-40)
REV. P 06-08-2009 (0385-19)

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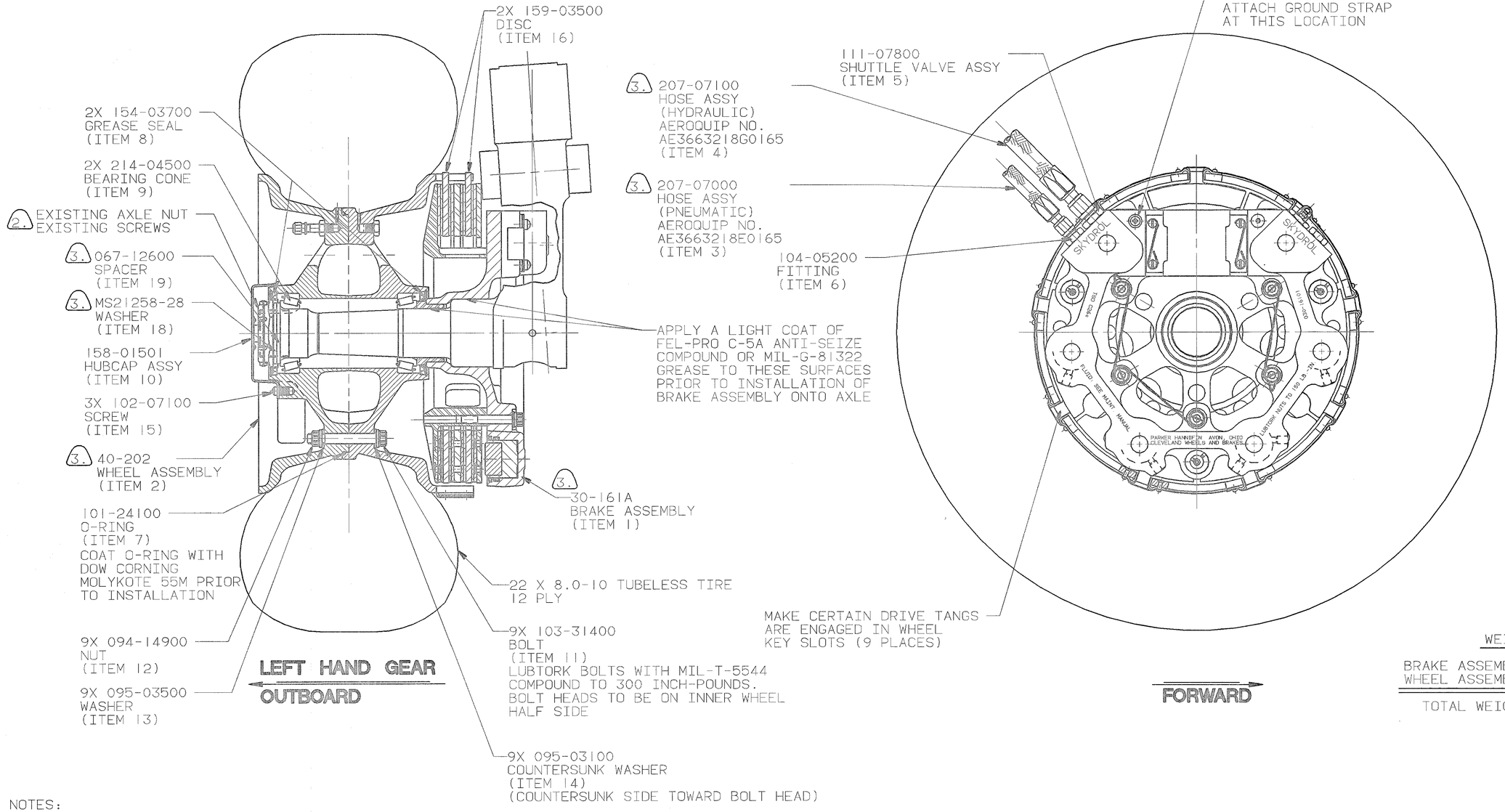
REV STATUS	
SHEET	LTR

			REVISIONS			
CHANGE NOTICE	ZONE	LTR	DESCRIPTION OF CHANGE	CHG BY	DATE	APPROVED
298/42	*	NC	INITIAL RELEASE TO PRODUCTION	P.H.	3-13 90	B.BARKER
307/14	*	A	PICTORIAL REVISION TO SHOW SAFETY WIRE IN BRAKE BOLTS	P.H.	11-18 92	

APPLICABILITY OF AIRCRAFT INSTALLATION CLEVELAND KIT P/N 199-177

MODEL	TIRE SIZE	INFLATION PRESSURE
CESSNA CITATION S/II: MODEL S550	22 X 8.0-10 12 PLY TUBELESS TIRE	PER MANUAL



WEIGHTS

BRAKE ASSEMBLY = 35.8 LBS.
WHEEL ASSEMBLY = 17.8 LBS.

TOTAL WEIGHT = 53.6 LBS.

NOTES:

1. THIS KIT IS TO BE USED WITH PHOSPHATE ESTER BASE (SKYDROL 500B, 500C, HYJET W, OR HYJET III) HYDRAULIC FLUID.
2. EXISTING HARDWARE (MS21025-28 AXLE NUT, TWO AN503-8-10 SCREWS AND ONE MS35207-260 SCREW) TO BE RETAINED AND REUSED
3. PARTS SUPPLIED IN 199-177 KIT
4. REFER TO 199-177 INSTALLATION MANUAL FOR DETAILED INSTALLATION INSTRUCTIONS.

QTY	QTY	ITEM	FSCM NO	50-132 PART NO.	WHL & BRK INSTALLATION DESCRIPTION	MATERIAL/SPEC.	ACT WGT -LB	CALC WGT -LB
USED ON	QTY	FINAL ASSY	QTY	NEXT ASSY	QTY	RAW STOCK NO		
P810		AIRCRAFT	2					

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DO NOT SCALE DRAWING

GENERAL MACHINED SURFACES TO BE 125 FINISH UNLESS NOTED

WTS	DATE	DWN P. HUNYAD	DATE 89-11-01
STRESS		CHK	
MFG ENGR		ENGR	
QUAL ASSUR		PROJ APPROVAL	

CLEVELAND WHEELS & BRAKES

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

DWG TITLE
INSTALLATION
WHEEL & BRAKE
CESSNA CITATION
S550 SERIES

SIZE	FSCM NO.	DWG. NO.
D	33269	50-132

SCALE 1/2 | RELEASE DATE: | REV. A | SHEET 1 OF 1

050-132001

CLEVELAND WHEELS & BRAKES
CONVERSION KIT
INSTALLATION MANUAL
KIT NUMBER 199-177
CESSNA MODEL S550
CITATION S/II

Parker Aerospace

Aircraft Wheel & Brake Division

Parker Hannifin Corporation
1160 Center Road U.S.A.
Avon, OH 44011

PD3410 10/86

INSTALLATION INSTRUCTIONS
Cleveland Wheels & Brakes Conversion Kit 199-177

TABLE OF CONTENTS

INSTALLATION INSTRUCTIONS
Cleveland Wheels & Brakes Conversion Kit 199-177

LIST OF REVISIONS

REVISION	DATE	PAGE	DESCRIPTION	APVD
Initial Release	11/01/89	---	Installation Instructions Cleveland Wheels & Brakes Conversion Kit 199-177	BB

INSTALLATION INSTRUCTIONS
Cleveland Wheels & Brakes Conversion Kit 199-177

Notes

INSTALLATION INSTRUCTIONS
Cleveland Wheels & Brakes Conversion Kit 199-177

INTRODUCTION

This manual is published for the guidance of personnel responsible for the installation of Cleveland Wheels & Brakes Conversion Kit 199-177.

Each kit contains all materials and instructions necessary to replace existing equipment with Cleveland wheels and brakes. Kit 199-177 will completely retrofit the aircraft to Cleveland main wheels and brakes.

TSO NOTICE

This assembly carries a "TSO" marking for commercial transport usage, which identifies it as having been fully tested in the laboratory and qualified to applicable FAA (Federal Aviation Administration) requirements and specifications.

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.

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

APPLICABILITY

Conversion Kit 199-177 applicable to Cessna Model S550 Citation S/II.

APPROVAL

Kit 199-177 is FAA - STC - PMA Approved. After installation of Kit 199-177, ensure that the Airplane Flight Manual has been revised per one of the following as applicable:

1. Airplanes using Cessna Model S550 Citation S/II FAA Approved Airplane Flight Manual; incorporate Revision 19 (or later).

2. Airplanes using Cessna Model S550 Citation S/II FAA Approved on behalf of Transport Canada Airplane Flight Manual; incorporate Revision 3 (or later).

3. Airplanes using Cessna Model S550 Citation S/II FAA Approved Airplane Flight Manual (Applicable to British Airplanes); incorporate Revision 2 (or later).

4. Airplanes using Cessna Model S550 Citation S/II Approved Airplane Flight Manual (Department of Aviation); incorporate Revision 1 (or later).

REFERENCE

For Citation Models S550, Unit Numbers -0001 thru -0085, Cessna Service Bulletin SBS550-11-1, Placards and Markings - Gross Weight Increase, must be incorporated prior to this installation.

ORDER INFORMATION

When it becomes necessary to order replacement parts for the Wheels and Brakes in this kit, contact the nearest Parker Hannifin, Aircraft Wheel & Brake distributor in your area, or write or call:

Parker Hannifin Corporation
Aircraft Wheel & Brake Division
Attn: Product Support Department
1160 Center Road, P.O. Box 158
Avon, Ohio 44011 USA

Phone: (216) 937-6211, 871-642 ...Telex: 212527 PHAVUR

1-800-272-5464 (Outside Ohio)
1-800-421-2401 (In Ohio)

DESCRIPTION

1. WHEEL ASSEMBLY

   A. Main wheel assembly is designed for a 22 x 8.0-10, 12 ply tubeless tire.

   B. Divided type main wheel to facilitate tire installation and removal.

   C. Two wheel halves (inner and outer wheel half assemblies) fastened together with high strength bolts, washers and self-locking nuts. Wheel halves machined from aluminum alloy forgings.

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

   E. Wheel assembly rotates on two tapered roller bearings. Bearings are protected by a molded type lip seal in each hub and an integrally forged spacer on the inside of the wheel prevents grease from entering the cavity between the wheel halves. Bearing cups are shrink-fitted into the hubs of the wheel.

   F. Flange of inner wheel half has nine slots that engage the drive tangs of the rotating brake discs. Steel key drives are riveted to the wheel flange to provide a hard wearing surface for the disc tangs and to prevent damage to the softer metal of the wheel. A stainless steel tire heat shield is held in place on the outer surface of the inner wheel half flange by the same rivets used to attach the key drives to the wheel.

   G. Three equally spaced fuse plugs installed in the inner wheel half will melt and release tire pressure in the event the wheel becomes overheated.

2. BRAKE ASSEMBLY

   A. The brake assembly is a piston actuated, hydraulically operated multiple disc unit designed for use with phosphate ester (Skydrol 500B, 500C, Hyjet W, or Hyjet III) hydraulic fluid. The right and left brake assemblies are directly interchangeable by simply switching the fittings on the top of the housing to the opposite respective ports.

2. BRAKE ASSEMBLY (Con't.)

B. Each brake assembly is composed of a pressure plate assembly, two rotating discs, a stationary center stator assembly, a torque plate assembly and a forged aluminum cylinder housing assembly containing six pistons. Five bolts hold the housing assembly and torque plate together as a unit. The inner perimeters of the pressure plate assembly and center stator assembly have six keyslots that engage the keys on the torque plate and prevent them from rotating. Drive tangs on the outer perimeter of the rotating discs engage drive slots in the inner wheel half flange, transmitting a braking force to the main wheel during a braking application.

C. O-rings and wiper rings installed in grooves in the housing cylinder walls prevent leakage past the pistons. An insulator in the end of each piston reduces the amount of brake heat transmitted into the pistons and housing.

D. In the event of hydraulic line failure, pneumatic pressure is applied into the pneumatic inlet fitting located directly below the hydraulic inlet. Upon actuation of pneumatic pressure, a spool valve in the shuttle valve assembly is actuated in the opposite direction sealing off inlet flow of fluid and allowing controlled pneumatic pressure to be applied directly to the pistons from the cockpit of the aircraft.

E. The brake assembly utilizes three self-adjusting retract assemblies installed in the cylinder housing. When brake pressure is released, the pressure plate assembly is pulled back toward the cylinder housing by the retracts thus maintaining a constant running clearance in the brake stack at all times.

OPERATION

Braking action begins to occur when hydraulic pressure applied to the brake, via the pilots and co-pilots master cylinders, moves the pistons out of the cylinder housing. As this pressure overcomes the spring force in the retract assemblies, the pistons will contact the pressure plate assembly and force the discs and center stator into the torque plate generating torque. This braking action is then transmitted to the wheel by the drive tangs on the discs.

INSTALLATION

A. REMOVING EXISTING EQUIPMENT

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

2. Depressurize hydraulic system to brakes.

3. Remove existing drive cap and outboard spacer if applicable.

4. Remove and retain two screws securing axle nut and anti-skid transducer, then remove the axle nut and tanged washer. Retain axle nut, and discard tanged washer.

5. Remove existing main gear wheel.

6. Disconnect and remove brake inlet hydraulic and pneumatic hoses. Retain the existing hose clamps, washers and screws, and discard nuts.

7. Remove and retain screw securing ground strap.

8. Remove existing brake assembly from axle.

B. INSTALLING NEW CLEVELAND BRAKES
(Refer to Installation Drawing 50-132)

1. Thoroughly clean axle surface that contacts brake assembly (Item 1) and apply a light coat of Fel-Pro C-5A anti-seize compound or MIL-G-81322 grease.

NOTE: The brake assemblies are shipped from the factory as complete assemblies and are ready for installation.

2. Apply a light coat of Fel-Pro C-5A anti-seize compound or MIL-G-81322 grease to axle bore of brake assembly (Item 1).

3. Slide brake assembly onto axle with the cylinder housing towards the landing gear strut, being careful to avoid damage to axle threads.

4. Remove caps from shuttle valve asssembly (Item 5) and pneumatic inlet fitting (Item 6).

5. Install new Hydraulic Hose (Item 4) and Pneumatic Hose (Item 3), connecting to shuttle valve and pneumatic inlet fitting of brake. Reinstall hose clamp with original screw and washer and new MS21044N3 nut (Item 17).

6. Attach ground strap to brake housing using screw retained from previous equipment.

C. INSTALLING NEW CLEVELAND WHEELS

NOTE: The wheel assemblies are shipped from the factory partially assembled. The wheel seal O-ring (Item 7), the grease seals (Item 8) and the bearing cones (Item 9) are bagged separately. The hubcap assembly (Item 10) is installed for shipment. In shipment, the wheel halves are held together by three lightly torqued bolts (Item 11), nuts (Item 12), washers (Item 13) and countersunk washers (Item 14). The remaining bolts, nuts, washers and countersunk washers are bagged separately.

CAUTION: ASSEMBLE WHEELS ON A CLEAN FLAT SURFACE. BE CAREFUL NOT TO NICK, SCRATCH, OR SCUFF PAINT OR PROTECTIVE FINISH FROM THE WHEEL HALVES.

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

1. Remove nuts (Item 12), washers (Item 13), countersunk washers (Item 14) and bolts (Item 11) holding wheel halves together for shipment to separate wheel halves.

2. Remove three screws (Item 15) and hubcap assembly (Item 10) from outer wheel half assembly.

3. Coat O-ring (Item 7) liberally with Dow Corning Molykote 55M and install in wheel register groove of outer wheel half assembly.

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

4. Position outer wheel half assembly on a flat surface with the register side facing up.

5. Place serviceable 22 x 8.0-10, 12 ply tubeless tire over outer wheel half assembly.

6. Place inner wheel half assembly in tire making sure to properly align lightening holes in each wheel half.

7. Coat bolt threads and bearing surfaces of bolt (Item 11) heads, washers (Item 13), countersunk washers (Item 14) and nuts (Item 12) with MIL-T-5544 anti-seize compound. Slide a countersunk washer (Item 14) onto each bolt, then slide bolts through inner wheel half assembly.

CAUTION COUNTERSUNK SIDE OF WASHER MUST BE TOWARD THE BOLT HEAD OR BOLT FAILURE MAY RESULT. INSTALL BOLT HEADS ON INNER WHEEL HALF.

C. INSTALLING NEW CLEVELAND WHEELS (Cont'd.)

8. Compress wheel halves and install a washer (Item 13) and a nut (Item 12) on each bolt (Item 11).

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

9. Torque nuts to a final lubtork value of 300 inch-pounds.

NOTE: Torque nuts in a criss-cross pattern to obtain a more even torque value.

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

11. Place wheel and tire assemblies in an inflation cage and inflate to operating pressure specified in aircraft maintenance manual.

NOTE: The wheel bearing cones are shipped from the factory packed with MIL-G-81322 grease. If at the time of installation, the bearings require additional lubrication, repack with clean MIL-G-81322 bearing grease.

CAUTION: HANDLE THE WHEEL BEARING CONES WITH EXTREME CARE. MANY BEARING FAILURES CAN BE TRACED TO DROPPING OR MISHANDLING THE CONES DURING MAINTENANCE. DO NOT DRIVE BEARING CONES ONTO THE AIRCRAFT AXLE, AND NEVER OVERTIGHTEN THE AXLE NUT.

12. Check for burrs or rough threads on axle and axle nut.

13. Insert bearing cone (Item 9) and grease seal (Item 8) into inner wheel half hub.

14. Align the drive tangs on the outer perimeter of the brake rotating discs (Item 16).

15. Carefully align the wheel and tire assembly with the axle and align the wheel key slots with the brake disc drive tangs.

CAUTION: MAKE CERTAIN THAT THE DRIVE TANGS ARE ENGAGED IN THE WHEEL KEY SLOTS.

16. Install bearing cone (Item 9) and grease seal (Item 8) into outer wheel half hub.

C. INSTALLING NEW CLEVELAND WHEELS (Cont'd.)

17. Install axle nut as follows:

    a) Apply MIL-G-81322 bearing grease to axle threads and axle nut threads, and to all load-bearing surfaces of the axle nut, spacer (Item 19) and tanged washer (Item 18).

    b) Place spacer (Item 19) in position on axle followed by tanged washer (Item 19), and rotate axle nut onto the axle until it is snug.

    c) Tighten axle nut to 100 inch-pounds while manually rotating the wheel. Back off the nut to zero inch-pounds but with all the parts still seated.

    d) Retorque axle nut to 50 inch-pounds while manually rotating the wheel. If not at a locking position, advance the nut to the nearest locking position.

18. Secure antiskid transducer and axle nut with two screws and lockwire as required.

19. Snap drive coupling which is attached to the hubcap onto antiskid transducer and attach hubcap onto outer wheel half assembly with three screws (Item 15).

NOTE: Use care that the drive coupling engages the antiskid transducer drive shaft when installing the hub cap.

20. Lockwire hubcap screws (Item 15) as required.

21. Bleed brakes using procedure specified in aircraft maintenance manual.

22. Perform a retraction of the landing gear to verify that the hydraulic and pneumatic hoses to the brake assemblies are not overstressed and proper clearance is achieved between the hoses and wheel well structure.

23. If contact is detected between the hoses and wheel well structure, lower the gear and reposition the hoses to gain proper clearance. Repeat retraction of the gear and check for proper clearance.

24. Lower aircraft and remove jacks.

WEIGHT AND BALANCE

One wheel and brake assembly weighs 53.6 pounds. This weight does not include a tire. Enter this information into the Weight and Balance Record and zero items out for the original main wheel and brake assemblies that have been removed.

METALLIC BRAKE LINING CONDITIONING PROCEDURE

CAUTION: THIS CONDITIONING PROCEDURE MUST ONLY BE ATTEMPTED BY A QUALIFIED PILOT WHO IS FAMILIAR WITH THE PROPER FIELD LENGTHS REQUIRED FOR VARIOUS ACCELERATION AND STOP DISTANCES.

The brake lining material utilized in this brake assembly is a copper based metallic composition. This material must be properly conditioned in order to provide optimum service life. Dynamometer tests have shown that at low braking energies, glazed linings experience greater wear and the brake discs become severely scored.

Condition Brake Linings as follows:

Following wheel and brake installation, perform one (1) full stop from 60 - 80 knots ground speed. Allow brakes to completely cool after stop.

This conditioning procedure will wear off high spots and remove the corrosion prevention preservatives from the friction surfaces.

NOTE: Avoid dragging the brakes during taxiing, this will glaze the linings and decrease the life of the brake stack.

CAUTION: DO NOT SET THE PARKING BRAKE WHILE THE BRAKES ARE HOT, THIS CAN CAUSE IRREGULAR FRICTION SURFACE MIX TRANSFER, RESULTING IN BRAKE CHATTER, NOISE, VIBRATION AND REDUCED BRAKE STACK LIFE.

WARRANTY REGISTRATION

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

KIT PARTS LIST

199-177 CONVERSION KIT

ITEM	PART NO.	DESCRIPTION	QUANTITY
1	30-161A	Brake Assembly	2
2	40-202	Wheel Assembly	2
3	207-07000	Hose Assembly (Pneumatic) Aeroquip P/N AE3663218E0165	2
4	207-07100	Hose Assembly (Hydraulic) Aeroquip P/N AE3663218G0165	2
17	094-05200	Nut (hose clamp) MS21044N3	2
18	095-06100	Tanged Washer MS21258-28	2
19	067-12600	Spacer-Axle	2
	50-132	Installation Drawing	1
		Installation Manual	1
		Brake Overhaul Manual	1
		Wheel Overhaul Manual	1
		Warranty Registration Card	1
		STC	1

This Kit will convert one aircraft to Cleveland Main Wheels & Brakes.

CLEVELAND WHEELS & BRAKES
CM30-161A
COMPONENT MAINTENANCE MANUAL
WITH ILLUSTRATED PARTS LIST
FOR
BRAKE ASSEMBLY
MODEL 30-161A

Cleveland
Wheels & Brakes

Parker
Aerospace

PARKER HANNIFIN CORPORATION - AIRCRAFT WHEEL & BRAKE
1160 Center Road - Avon, Ohio 44011 - Customer Service 1-800-Braking

Revision C, dated December 15, 1994
DCN Number 0313-91

Highlights

Revision C contains only revised pages of the manual. Pages which have been added or revised are outlined below with a description of change.

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

Page No.	Description of Change
ALL	”COMPONENT MAINTENANCE MANUAL” -was- “OVERHAUL MANUAL”
Desc. & Oper.	“SAE AS1241 Type IV, Class 2, Grade A” _-was- Skydrol 500B, 500C, Hyjet W or Hyjet III
Desc. & Oper. Page 2, Sect. 3.	“SAE AS1241 Type IV, Class 2, Grade A” -was- “Skydrol 500B, 500C, Hyjet W or Hyjet III”
Sect. 4.	“When the broached end of any of the three” -was- “When the broached end of all three”
401, Sect. 1.	“Cold Galvanizing Compound Specification MIL-P-26915A Type 1, Class A” -was- “Zinc Rich Cold Galvanizing Compound No. 740” “ZRC Products Quincy, MA” -was- “Sprayon Products Inc. Industrial Supply Division Bedford Heights, Ohio 44146”

Revision C Highlights (Cont'd)

Page No.	Description of Change
403, Sect. 3.B.5	"Cold Galvanizing Compound" -was- "Zinc Rich Cold Galvanizing Compound"
501, Sect. 1.	"SAE AS1241 Type IV, Class 2, Grade A" -was- "Skydrol 500B or Skydrol 500C, Hyjet W or Hyjet III"
Sect. 2.A.	"Dow Corning 55 O-ring Lubricant" -was- "Dow Molykote 55M"
502, Sect. 2.B.	"55 O-ring Lubricant" -was- "Molykote 55M, silicone grease"
Sect. 2.D.	"55 O-ring Lubricant" -was- "Molykote 55M"
701, Sect. 2.A.	"SAE AS1241 Type IV, Class 2, Grade A" -was- "SKYDROL 500B, SKYDROL 500C, HYJET W, OR HYJET III
1004	Add new page with supplemental Figure 1001
1005	was Page Number 1004
1006	Add new page with supplemental Figure 1001
1007	was Page Number 1005 "088-01900" -was- "088-00700 or 088-02100"

Revision D, dated February 20, 1996
DCN Number 0316-66

Highlights

Revision D contains all pages of the manual. Pages which have been added or revised are outlined below with a description of change.

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

Page No.	Description of Change
404	Add New Section 5.E., Rework procedure for damage caused by strut to cylinder interference.
405	Add New Figure.402, "Cylinder Rework Area……" Subsequent Figures renumbered as follows: 403 was 402, 404 was 403, 405 was 404
401-408	Generally rearranged this Section without substantive change. Condensed to delete last two pages 409 and 410.
1005	Item 37: "111-09801" was "111-07800" Delete Item 42: " * GLYD RING, qty 1" Footnote : "Shuttle Valve 111-09801 has superseded both P/N. 111-07800 and 111-09800. Refer to Service Bulletin SB7046. Note – SB7046 replaces PRM56, which Allowed an optional field replacement of 111-07800 With 111-09800." -was- "Optional Field Replacement: P/N 111-09800 provides improved sealing at low operating temperatures; installation per PRM56."

Revision E, dated April 20, 2004
DCN Number 0361-20

Highlights

Revision E contains all pages of the manual. Pages which have been added or revised are outlined below with a description of change.

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

Page No.	Description of Change
Record of Revisions	Update to show latest revision
List Of Effective Pages	Update to show latest page revisions
Introduction Page 1	Contact information updated.
Description & Operation Page 2	Reformatted section per addition and deletion of material. Para. 4. Brake lining wear check (now) "…brake assembly 30-161A requires overhaul per paragraph 5. (was) "…brake assembly 30-161A requires heat stack replacement per Section 5.B." Figure 1 Brake Lining Wear Check (delete) "Note: When retract stud is flush with friction sleeve (three places) remove brake assembly for overhaul."
Page 3	Para. 5. Maintenance (add) Table 1 Overhaul Intervals (delete) paragraph A and B Heat Stack Replacement including identification procedure.
Page 4	(now) Blank

Revision E, dated April 20, 2004

Page No.	Description of Change
Check	Reformatted section per addition and deletion of material.
Page 302	Para. 3.A.1) (now) "NOTE: THE PROTECTIVE TOP COAT PAINT AND PRIMER MUST BE REMOVED FROM THE CYLINDER HOUSING TO CONDUCT AN ACCURATE DYE-PENETRANT INSPECTION. REFER TO CLEANING SECTION FOR PAINT REMOVAL INSTRUCTIONS." (WAS) "NOTE: THE PROTECTIVE TOP COAT PAINT AND PRIMER SHOULD BE STRIPPED FROM THE CYLINDER HOUSING PRIOR TO INSPECTION BY PENETRANT METHODS (SEE PAINT REMOVAL PROCEDURES IN CLEANING). FALSE CRACK INDICATIONS COULD RESULT IF HOUSING IS NOT CLEAN OF PROTECTIVE PAINT FINISH. Para. 3.A. (now) "4) See Figure 300 and check bushing (56) for wear. Install new bushing in accordance with REPAIR if bushing is worn beyond limits shown and specified in Figure 601, FITS AND CLEARANCES." (was) "4) Check bushing (56) for wear. Install new bushing in accordance with REPAIR if inside diameter reaches 1.815 inches or more.
Page 303	(add) "Figure 300, Bushing Limits"
Page 304	Para. 3.E. (now) "1) Check torque plate (5) for cracks using magnetic particle or dye penetrant inspection techniques…" (was) "1) Check torque plate (5) for cracks either visually or with magnetic particle inspection techniques…" (now) "3) < DELETED >" (was) "3) Check torque plate for distortion. Replace torque plate if it is more than 0.020 inch out-of-flat."

Revision E, dated April 20, 2004

Page No.	Description of Change
Check Page 304	Para. 3.E. (now) "4) Replace all wear pads (7), regardless of condition, in accordance with REPAIR." (was) "4) Check wear pads (7) for wear. Replace all wear pads if four or more are worn to 1.375 inches or less in width on the horizontal centerline between rivets (Ref. Fig. 301), if any pad is cracked or loose or if any rivets are sheared. Replace all wear pads if one or more wear pads measure 0.086 inch or less in thickness. This measurement shall be taken on the flat area between wear pad rivet heads. Replace wear pads in accordance with REPAIR." (add) "5) Check torque plate lug outer surfaces for damage due to disk shrinkage. Blend out damaged areas in accordance with REPAIR."
Page 305	(now) Para. "3.F. Discs (8)" (was) Para. "3.H. Discs (8)" Para. 3.F. (now) "5) …, or if any tang is 0.457 inch or less in width." (was) "5) …, or if any tang is 0.442 inch or less in width." (now) Para. "3.G. Center Stator Subassembly (9)" (was) Para. "3.I. Center Stator Subassembly (9)" Para. 3.G. (now) "1) Check center stator (10) for cracks using magnetic particle or dye-penetrant inspection techniques." (was) "1) Check center stator (10) for cracks."
Page 305	Para. 3.G. (now) "2) Replace all wear pads (12), regardless of condition, in accordance with REPAIR. (was) "2) Check wear pads (12) for wear. Replace all wear pads if four or more per side are worn to 1.375 inches or less in width on the horizontal centerline between rivets (Ref. Fig. 301), if any pad is cracked or loose, or if any rivets are sheared. Replace wear pads in accordance with REPAIR."

Revision E, dated April 20, 2004

Page No.	Description of Change
Check	
Page 305	Para. 3.G. (now) "3) < DELETED >" (was) "3) Check center stator subassembly (9). The minimum allowable overall thickness of the center stator subassembly is 0.412 inch. If one or more wear pads per side of the center stator measure 0.086 inch or less, all of the pads on that side of the center stator shall be replaced. Measurements shall be taken on the flat area between wear pad rivet heads. Replace wear pads in accordance with REPAIR." (now) "4) < DELETED >" (was) "4) Check subassembly for dishing or distortion. Replace center stator subassembly if dished or warped 0.020 inch or more out-of-flat." (now) "6) …if keyslots are less than 0.770 inch wide or greater than 0.790 inch wide." (was) "6) …if keyslots are less than 0.745 inch wide or greater than 0.795 inch wide."
Page 306	(now) Para. "3.H. Pressure Plate Subassembly (27)" (was) Para. "3.J. Pressure Plate Subassembly (27)" Para. 3.H. (now) "1) Check pressure plate (28) for cracks using magnetic particle or dye-penetrant inspection techniques." (was) "1) Check pressure plate (28) for cracks." (now) "2) Replace all wear pads (30), regardless of condition, in accordance with REPAIR." (was) "2) Check wear pads (30) for wear. Replace all wear pads if four or more are worn to 1.375 inches or less in width on the horizontal centerline between rivets (Ref. Fig. 301), if any pad is cracked or loose, or if any rivets are sheared. Replace wear pads in accordance with REPAIR." (now) "3) < DELETED >" (was) "3) Check pressure plate subassembly (27). Replace all wear pads if total thickness of plate and pads is 0.274 inch or less. The measurement shall be taken on the flat area between wear pad rivet heads. Replace wear pads in accordance with REPAIR."

Revision E, dated April 20, 2004

Page No.	Description of Change
Check	
Page 306	Para. 3.H. (now) "4) …if keyslots are less than 0.770 inch wide or greater than 0.790 inch wide." (was) "4) …if keyslots are less than 0.745 inch wide or greater than 0.795 inch wide." (now) "5) < DELETED >" (was) "5) Check subassembly for distortion. Replace pressure plate subassembly if it is dished 0.020 inch or more out-of-flat." (now) Para. "3.I. Retract Assemblies (13)" (was) Para. "3.K. Retract Assemblies (13)"
Page 307	(add) Para. "4. Procedure For Overheated Brakes" (add) "Figure 302, Heat Damage Hardness Test – Brake Housing"
Page 308	(now) Blank
Repair	Reformatted section per addition of material.
Page 403	Figure 401, Limits for Newly Re-padded…Subassemblies (add) graphics and limits for torque plate subassembly
Page 404	Para. 4. (add) "B) Repair torque plate lug outer surfaces damaged by disk shrinkage to limits shown in Figure 406. No damage or rework is permitted in the radius indicated." Para. 5.B. (now) "…The axle bore diameter after rework should be no more than ∅ 2.528 inch." (was) "…The axle bore diameter after rework should be no less than 2.498 inch." Para. 5.C. (add) "…Maintain a surface finish of 32 microinches rms."

Revision E, dated April 20, 2004

Page No.	Description of Change
Repair Page 405	(revise) para. 5.E.) (now) "Rework procedure to eliminate potential strut to cylinder interference and to repair damage caused by interference." "1) Refer to rework dimensions in Figure 402." (was) "Rework procedure to repair damage caused by strut to cylinder interference." "1) Machine a 45° chamfer at area indicated and to dimensional limits as shown in Figure 402."
	(revise) Figure 402 (add) rework dimensions: 2X R 0.060; 2X 0.225 ± 0.025; 2X 0.0129 ± 0.025 X 45° ± 3° Chamfer
	Figure 403 (add) "rework not permissible in indicated areas."
Page 406	Para. 6.A. (add) "…Maintain a surface finish of 16 microinches rms."
Page 407	(move) Figure 405 to page 408
Page 408	(move) Figure 405 from page 407
Fits and Clearances Page 601	Figure 601, Wear and Distortion Tolerances For torque plate subassembly (4): (add) "lug height 0.407 (minimum)" For disc (8): (now) total thickness "0.250 (minimum)" (was) total thickness "0.025 (minimum)" (now) tang width "0.457 (minimum)" (was) tang width "0.442 (minimum)" For center stator subassembly (9): (now) "total thickness (including pads) 0.407 (minimum)" (was) "total thickness 0.412 (minimum)" (add) "total thickness (stator only) 0.235 (minimum)" (now) keyslot widths "0.770 (minimum)" and "0.790 (maximum)" (was) keyslot widths "0.745 (minimum)" and "0.795 (maximum)"

Revision E, dated April 20, 2004

Page No.	Description of Change
Fits and Clearances Page 601	Figure 601, Wear and Distortion Tolerances For pressure plate subassembly (27): (now) "total thickness (including pads) 0.269 (minimum)" (was) "total thickness 0.274 (minimum)" (add) "total thickness (plate only) 0.183 (minimum)" (add) "pad thickness 0.086 (minimum)" (now) keyslot widths "0.770 (minimum)" and "0.790 (maximum)" (was) keyslot widths "0.745 (minimum)" and "0.795 (maximum)" For bushing (56): (add) "(Dim. ∅A)" as identification for inside diameter (add) "overall length (Dim. B) 0.998 (minimum)"
Illustrated Parts List Page 1007	IPL parts list (add) " * * PART NOT ILLUSTRATED" (now) "* * *" for OPTIONAL REPLACEMENT EQUIPMENT" (was) " * *"

RECORD OF REVISIONS

REV NO.	ISSUE DATE	DATE INSERTED	BY	REV NO.	ISSUE DATE	DATE INSERTED	BY
A	06-03-91	06-03-91	AWB				
B	10-27-92	10-27-92	AWB				
C	12-15-94	12-15-94	AWB				
D	02-20-96	02-20-96	AWB				
E	04-20-04	04-20-2004	AWB				

SERVICE BULLETIN LIST

Note: 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 Brake Assembly and Components.

SERVICE BULLETIN NO.	REV NO.	DATE INCORPORATED	SERVICE BULLETIN NO	REV NO.	DATE INCORPORATED
SB7028	A	11-10-92			
SB7046	NC	10-01-95			

LIST OF EFFECTIVE PAGES

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INTRODUCTION

This manual is published for the guidance of personnel responsible for the overhaul and/or maintenance of the Parker Hannifin 30-161A Brake Assembly covered in this publication. The procedures outlined in this manual may be altered if better and/or more economical methods can be employed by the individual facilities. However, alternative procedures must not reduce the efficiency of operation of the assembly.

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

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

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

Phone: 1-800-272-5464
Fax: (440) 937-5409
Website: www.parker.com/cleveland

TSO NOTICE

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

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

DATA RIGHTS

The unit charge for this manual covers reproduction and handling costs only and does not constitute purchase of the data or design contained herein, nor does it convey to the purchaser any rights, patent or otherwise, to reproduce or manufacture from said data.

DESCRIPTION AND OPERATION

1. Description

A. The brake assembly is a piston actuated, hydraulically operated multiple disc unit designed for use with phosphate ester (SAE AS 1241 Type IV, Class 2, Grade A) hydraulic fluid. The right and left brake assemblies are directly interchangeable by simply switching the fittings on the top of the housing to the opposite respective ports.

B. Each brake assembly is composed of a pressure plate assembly, two rotating discs, a stationary center stator assembly, a torque plate assembly and a forged aluminum cylinder housing assembly containing six pistons. Five bolts hold the housing assembly and torque plate assembly together as a unit. The inner perimeters of the pressure plate assembly and center stator assembly have six keyslots that engage the keys on the torque tube and prevent them from rotating. Drive tangs on the outer perimeter of the rotating discs engage drive slots in the inner wheel half flange, transmitting a braking force to the main wheel during a braking application.

C. O-rings and wiper rings installed in grooves in the housing cylinder walls prevent leakage past the pistons. An insulator in the end of each piston reduces the amount of brake heat transmitted into the pistons and housing.

D. In the event of hydraulic line failure, pneumatic pressure is applied into the pneumatic inlet fitting located directly below the hydraulic inlet. Upon actuation of pneumatic pressure, a spool valve in the shuttle valve assembly is actuated in the opposite direction sealing off inlet flow of fluid and allowing controlled pneumatic pressure to be applied directly to the pistons from the cockpit of the aircraft.

E. The brake assembly utilizes three self-adjusting retract assemblies installed in the cylinder housing. When brake pressure is released, the pressure plate assembly is pulled back toward the cylinder housing by the retracts thus maintaining a constant running clearance in the brake stack at all times.

DESCRIPTION AND OPERATION

2. Operation

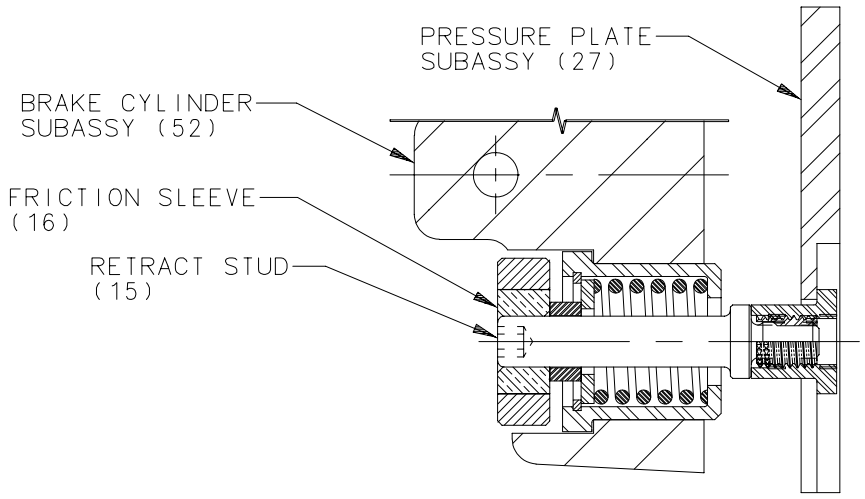
Braking action begins to occur when hydraulic pressure applied to the brake, via the pilots and co-pilots master cylinders, moves the pistons out of the cylinder housing. As this pressure overcomes the spring force in the retract assemblies, the pistons will contact the pressure plate assembly and force the discs and center stator into the torque plate generating torque. This braking action is then transmitted to the wheel by the drive tangs on the discs.

3. Leading Particulars

Hydraulic fluid.....SAE AS 1241, Type IV, Class 2, Grade A.
Normal Operating Pressures.....350-600 psi
Running Clearance of Stack..... .060 (nom.)
Weight of Assembly..... 35.8 lbs.
Cylinder Housing Material..... 2014 Forged Aluminum

4. Brake Lining Wear Check

The Parker Hannifin 30-161A brake assembly utilizes the retract stud in each of three retract mechanisms as a lining wear indicator. When the broached end of any of the three retract studs become flush with the brass friction sleeve (Ref. Fig. 1 below), brake assembly 30-161A requires overhaul per paragraph 5.



Brake Lining Wear Check
Figure 1

DESCRIPTION AND OPERATION

5. Maintenance

Refer to IPL Figure 1001 for identification of brake assembly components.

Table 1
Overhaul Intervals

SCHEDULED INTERVAL	ITEM	MAINTENANCE TASK (procedures per CHECK section)
When brake lining check indicates worn condition. See paragraph **4. Brake Lining Wear Check**	All components	a. General inspection per para. 2. b. Detailed inspection per para 3. as applicable
	O-Rings (34, 36, 38, 39, 41, 45, 49)	Replace
	Wiper Ring (48)	Replace
	Wear Pads (7, 12, 30) and Rivets (6, 11, 29)	Replace
	Brake Cylinder (53)	a. Detailed inspection per para. 3.A. b. Penetrant inspect.
	Torque Tube (5)	a. Detailed inspection per para. 3.E. b. Magnetic particle or penetrant inspect.
	Center Stator (10)	a. Detailed inspection per para. 3.I. b. Magnetic particle or penetrant inspect.
	Pressure Plate (28)	a. Detailed inspection per para. 3.J. b. Magnetic particle or penetrant inspect.

UNSCHEDULED INTERVAL	ITEM	MAINTENANCE TASK
1. Rejected Take-Off 2. Overheating such that at least one of the three fusible plugs release in the mating main wheel assembly. Additionally, the brake may show evidence of overheating, such as brake housing paint discoloration or melted seals.	All components	a. General inspection per para. 2. b. Detailed inspection per para. 3. as applicable
	Brake Cylinder (53)	Hardness test per para. 4.
	O-Rings (34, 36, 38, 39, 41, 45, 49)	Replace
	Wiper Ring (48)	Replace

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DISASSEMBLY

1. General

Disassemble the brake assembly in accordance with the following instructions after removal from aircraft (Ref. IPL Fig. 1001).

2. Disassembly Procedures

A. Place brake assembly on a clean, flat work surface.

B. Remove five bolts (2) and washers (3).

CAUTION: DO NOT USE IMPACT OR POWER WRENCHES TO REMOVE BRAKE BOLTS.

C. Remove torque plate subassembly (4), discs (8) and center stator subassembly (9).

D. Remove three adjuster subassemblies (14) from retract base subassemblies (19) with a 1/8 inch allen wrench. Remove and retain retract base subassemblies that engage pressure plate subassembly (27).

E. Remove pressure plate subassembly (27).

F. Remove three retract housing subassemblies (22) from cylinder subassembly (53). Remove snap rings (24), washers (25) and springs (26) from retract housings (23).

G. Remove bleeder cap (31) and bleeder screw (32) and drain hydraulic fluid from cylinder housing.

H. Remove bleeder seat (33), O-ring (34), plug (35) and O-ring (36).

I. Remove shuttle valve assembly (37), and O-rings (38 and 39). Remove fitting (44) and O-ring (45).

DISASSEMBLY

J. Remove insulators (46) and then remove pistons (47) by threading an AN-4 bolt into the threaded portion of the piston and pulling outward slowly, making sure not to cock the pistons.

K. Remove wiper rings (48) and O-rings (49) from piston bore grooves.

L. Remove screws (50) and torque liners (51) from cylinder subassembly (52).

CAUTION: **BUSHING (56) IS SHRINK FITTED INTO CYLINDER HOUSING (53) AND SHOULD NOT BE REMOVED UNLESS REPLACEMENT IS NECESSARY. REFER TO "CHECK" FOR LIMITS.**

CLEANING

1. Cleaning Materials

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

2. Cleaning Metallic Parts (Ref. IPL Fig. 1001)

A. Clean all metal parts of brake assembly, except discs (8), in dry-cleaning solution, Specification P-D-680 (Stoddard Solvent) or isopropyl alcohol and dry with filtered compressed air. A soft bristle brush may be used where necessary.

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

B. Dry discs (8) with compressed air and a bristle brush.

CLEANING

3. Cleaning Nonmetallic Parts (Ref. IPL Fig. 1001)

O-rings (34, 36, 38, 39, 45, and 49) and wiper rings (48) should be replaced at each overhaul. If necessary to reuse, clean them in isopropyl alcohol and dry with a clean cloth.

4. Paint Removal Procedures

A. Remove paint from the cylinder housing (53) using chemical paint removal solvents or plastic media stripping in accordance with the following instructions.

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

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

B. Completely disassemble the brake prior to paint removal.

NOTE: REFER TO "REPAIR" FOR RETREATING AND REPAINTING THE CYLINDER HOUSING.

CHECK

1. Check Materials

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR ITEMS LISTED BELOW:			
Type	Penetrant	Developer	Supplier
Fluorescent	Zyglo ZL-16	Zyglo ZP-13 (wet) optional	Magnaflux Corp. 7310 West Lawrence Ave. Chicago, IL. 60656
	Penetrex ZL-2A with emulsifier ZE-4	Penetrex ZP-4 (dry) or ZP-13 optional	
Red Dye	Spot Check	Spot Check	
	Dy-Chek	Dy-Chek	Turco Products Division of Purex Corp. P.O. Box 6200 Carson, CA 90749
	Met-L-Chek	Met-L-Chek	Met-L-Chek Company 1639 Euclid Street Santa Monica, CA 90404

CHECK

2. General (Ref. IPL Fig. 1001)

A. Check all parts for cracks, wear, structural damage, corrosion, and damaged threads. Replace all parts that show evidence of cracks, excessive wear, and structural and thread damage. Repair minor scratches and corrosion. Check specific parts in accordance with the following instructions (Ref. IPL Fig. 1001).

3. Detailed Check (Ref. IPL Fig. 1001)

A. Cylinder Subassembly (52)

1) Check cylinder housing (53) for cracks using a dye-penetrant method. Replace cylinder if cracks are present.

NOTE: THE PROTECTIVE TOP COAT PAINT AND PRIMER MUST BE REMOVED FROM THE CYLINDER HOUSING TO CONDUCT AN ACCURATE DYE-PENETRANT INSPECTION. REFER TO CLEANING SECTION FOR PAINT REMOVAL INSTRUCTIONS.

2) Check cylinder subassembly for condition of threads in inlet and bleeder ports. Replace all housings that have badly damaged threads in ports.

3) Check piston bores for wear. Replace housing if any piston bore exceeds 1.378 inches in diameter.

4) See Figure 300 and check bushing (56) for wear. Install new bushing in accordance with **REPAIR** if bushing is worn beyond limits shown and specified in Figure 601, FITS AND CLEARANCES.

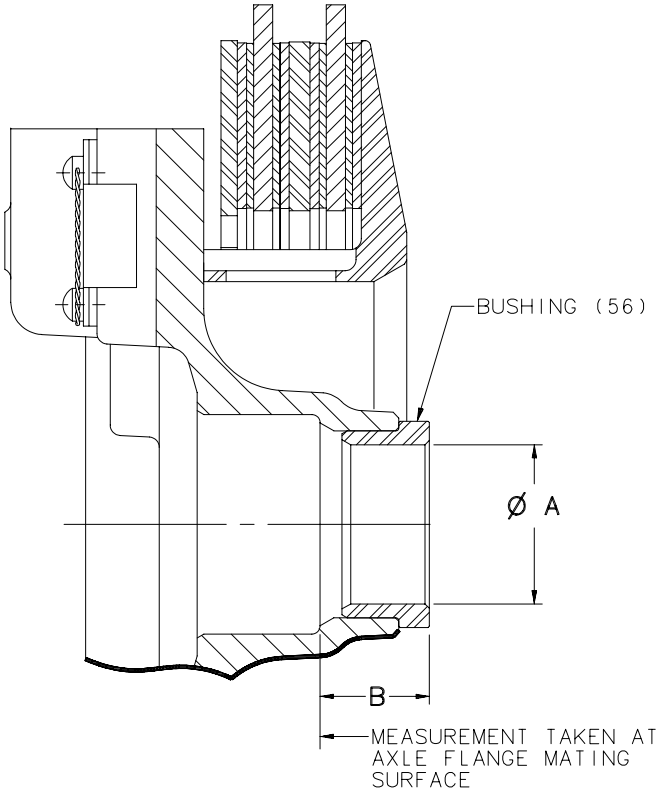
5) Check cylinder housing for nicks, scratches and corrosion. Blend out damage in accordance with **REPAIR**. Check cylinder housing axle bore for damage or corrosion. See **REPAIR** for damage limits and refurbishment.

B. Pistons (47)

1) Check pistons for wear. Measure diameter of pistons at three places around circumference. Replace pistons if diameter measures **1.370** inches or less at any point.

2) Check pistons for burrs, scratches, or nicks. Replace any pistons that are damaged more than 0.003 inch deep on seal contacting surfaces. Repair pistons that are damaged less than 0.003 inch deep as described in **REPAIR**.

CHECK



Bushing Limits
Figure 300

C. Insulators (46)

1) Check insulators for cracks. Replace cracked insulators.

D. Bolts (2)

1) Carefully check brake bolts for thread damage, and check for cracks in the radius under the bolt head and in threads adjacent to the bolt shank using magnetic particle inspection technique. Replace bent, cracked, or thread damaged bolts. No reworking or refinishing of bolts is permissible.

CHECK

E. Torque Plate Subassembly (4)

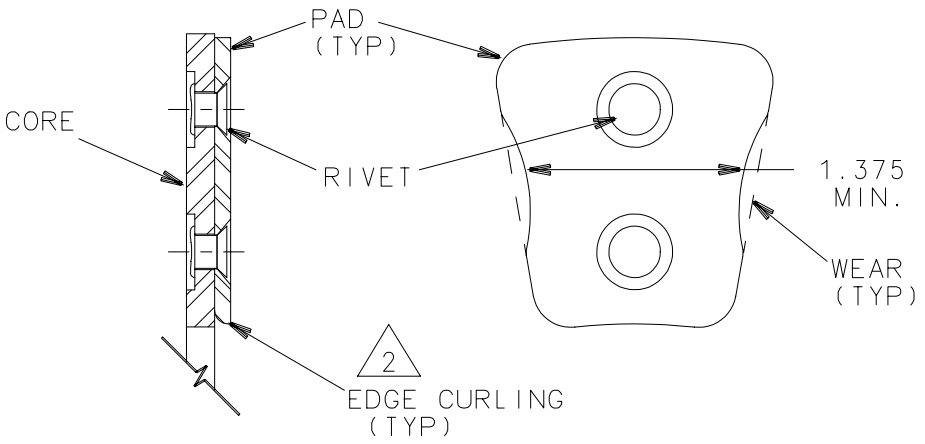
1) Check torque plate (5) for cracks using magnetic particle or dye-penetrant inspection techniques. Any evidence of cracks necessitates replacement.

2) Check width of torque plate lug. Replace torque plate if lug width is 0.695 inch or less at any point along length of any lug.

3) <DELETED>

4) Replace all wear pads (7), regardless of condition, in accordance with **REPAIR**.

5) Check torque plate lug outer surfaces for damage due to disc shrinkage. Blend out damaged areas in accordance with **REPAIR.**



NOTES:
1. WEAR PADS CONTAINING HEAT CHECKS OR CRACKS MUST BE REPLACED.
2. WEAR PADS HAVE A TENDENCY TO CURL AWAY AS SHOWN. CURLING IS NOT A REASON FOR REPLACEMENT.

Wear Pad Limits
Figure 301

CHECK

F. Discs (8)

1) Check discs for cracks. Pay close attention to relief slot terminal holes and drive tang radii. Replace any cracked discs.

2) Check discs for wear. Replace disc when minimum thickness across the mix reaches .250 inch or less, or if mix is worn to .015 inch thick or less at any point on either face of disc.

3) Check discs for distortion. Replace discs that are dished in excess of 0.020 inch.

4) Check condition of mix. Pitting is acceptable if area of pitting does not exceed 0.250 inch in diameter. Crumbling of mix along all edges of disc is acceptable, if loss from any edge does not exceed 0.125 inch.

5) Check disc drive tangs for wear and battering. Replace discs if one or more tangs are bent, or if any tang is 0.457 inch or less in width.

6) Check relief slot terminal holes for cracks, rust, and corrosion. Replace cracked discs. Repair rusted or corroded terminal holes in accordance with **REPAIR**.

G. Center Stator Subassembly (9)

1) Check center stator (10) for cracks using magnetic particle or dye-penetrant inspection techniques. Pay close attention to the relief slot terminal holes, rivet holes, and corners of keyslots. Replace cracked center stator.

2) Replace all wear pads (12), regardless of condition, in accordance with **REPAIR.**

3) <DELETED>

4) <DELETED>

5) Check relief slot terminal holes for rust and corrosion. Repair rusted or corroded terminal holes in accordance with **REPAIR**.

6) Check keyslots for wear. Replace center stator subassembly if keyslots are less than 0.770 inch wide or greater than 0.790 inch wide.

CHECK

H. Pressure Plate Subassembly (27)

1) Check pressure plate (28) for cracks using magnetic particle or dye-penetrant inspection techniques. Pay close attention to the relief slot terminal holes, rivet holes, retract slots and corners of keyslots. Replace cracked pressure plate.

2) Replace all wear pads (30), regardless of condition in accordance with **REPAIR**.

3) <DELETED>

4) Check keyslots for wear. Replace pressure plate subassembly if keyslots are less than 0.770 inch wide or greater than 0.790 inch wide.

5) <DELETED>

I. Retract Assemblies (13)

1) Check all adjuster subassemblies (14). Replace damaged and worn subassemblies. Replace subassembly if stud (15) has damaged threads or elevated nicks on the shaft surface.

2) Reset usable adjuster subassemblies in accordance with **REPAIR**.

3) Check all retract base subassemblies (19). Replace damaged and worn subassemblies. Check threaded inserts (21) for worn, stripped or crossed threads. Replace retract base subassembly if this condition exists. Check self-locking feature. Replace retract base subassembly if stud (15) can be run down into the retract base subassembly (19) with the fingers.

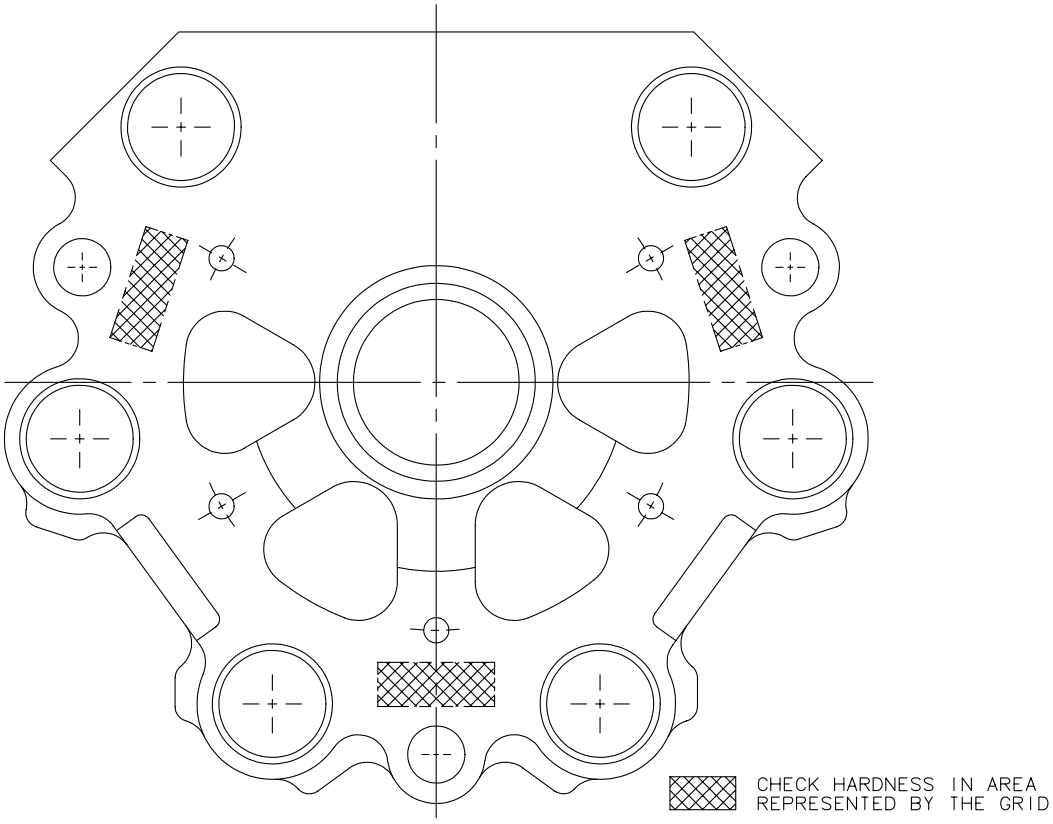
4) Inspect all retract housing subassemblies (22). Replace damaged and worn subassemblies. Replace snap ring (24) if it becomes bent or twisted during removal. Inspect springs (26) for load at installed height of 0.537 - 0.570. Replace any spring with pre-load less than 21 pounds at the installed height.

CHECK

4. Procedure For Overheated Brakes

Refer to IPL Figure 1001 for identification of brake assembly components.

A. In the event of overheating (see para. 2. Maintenance Schedule) a hardness test must be performed on the brake housing (53) per the following procedure. Refer to Figure 302 and acceptance values.



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

Heat Damage HardnessTest – Brake Housing
Figure 302

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REPAIR

1. Repair Materials

Equipment/Material	Description
NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR ITEMS LISTED BELOW.	
Aluminum Oxide Cloth (400 Grit Wet or Dry)	Commercially Available
Dry Cleaning Solvent Specification P-D-680	Commercially Available
Cold Galvanizing Compound Specification MIL-P-26915A Type 1, Class A	ZRC Products Quincy, MA
Epoxy-Polyamide Primer Specification MIL-P-23377	Commercially Available
Epoxy-Polyamide Topcoat Specification MIL-C-83286 Gloss Grey FED-STD-595 Color No. 16440	Commercially Available

2. General Repair Procedures

Repair of the brake is limited to the replacement of damaged parts and to the specific repairs listed in this section. (Ref. IPL Fig. 1001)

REPAIR

3. Repair of Pressure Plate Subassembly (27) Center Stator Subassembly (9) and Torque Plate Subassembly (4).

A. Removing Wear Pads

1) Using a 7/32 (.219) inch drill, drill out shop head of rivets and punch rivets from wear pads.

CAUTION: EXERCISE CARE TO AVOID DRILLING INTO AND DAMAGING OR ENLARGING RIVET HOLES IN PRESSURE PLATE (28), CENTER STATOR (10) AND TORQUE PLATE (5).

2) After removing wear pads, dry blast pressure plate (28), center stator (10) and torque plate (5). Use sand or glass blasting medium.

B. Re-padding Procedure

1) Check pressure plate, center stator and torque plate for cracks, using magnetic particle inspection methods. Replace pressure plate, center stator and/or torque plate if cracked. Replace pressure plate, center stator and/or torque plate if dished .020 or more.

2) Remove rust pits, corrosion pits, tool marks, and nicks up to .015 inch deep from relief slot terminal holes in center stator (10) and pressure plate (28). Terminal holes may be enlarged to a maximum diameter of .477 inch for center stator and 1.030 inch for pressure plate. After enlarging relief slot terminal holes, break sharp edges on both sides of hole. Maintain a surface finish of 50 microinches rms. Replace if pits or nicks remain in any hole after machining to maximum diameter.

3) Blend out and polish corrosion pits, tool marks, and nicks if present in outer diameter of lightning holes.

4) Clean torque plate (5), center stator (10) and pressure plate (28) in dry-cleaning solvent, specification P-D-680.

5) Repaint torque plate (except mounting bolt holes), center stator and pressure plate with Cold Galvanizing Compound. Apply a uniform coat over entire piece. Refer to manufacturers instructions for drying time.

6) Clean new wear pads in Dry-cleaning solvent, specification P-D-680, to remove protective coating, grease, and dirt.

7) Remove any burrs or raised metal around nicks on bottom of wear pads.

REPAIR

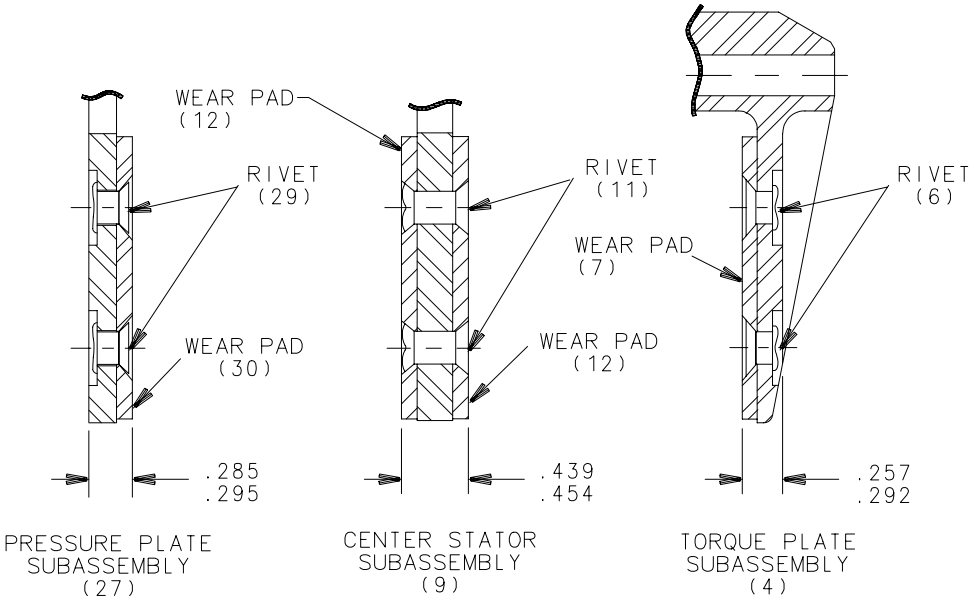
8) Rivet wear pads to pressure plate, center stator, and torque plate in accordance with the following instructions:

   a) Install rivets so that shop head of rivet is formed in base plate counter bore (Ref. Fig. 401).

      CAUTION: TWO CRACKS ARE PERMITTED IN THE SHOP HEAD OF THE RIVET, PROVIDED THE CRACKS DO NOT EXTEND INTO THE RIVET SHANK.

      CAUTION: CARE MUST BE EXERCISED TO PRODUCE THE PROPER RIVET SQUEEZE WHEN ADJUSTING RIVETING MACHINES. EXCESSIVE SQUEEZE PRESSURE WILL RESULT IN WEAR PAD CORNER LIFT-UP, WHILE INSUFFICIENT SQUEEZE PRESSURE WILL RESULT IN LOOSE PADS AND IMPROPERLY FORMED HEADS.

   b) Subassemblies must be flat within .010 inch. Thickness of newly padded subassemblies shall be as shown in Figure 401.



Limits for Newly Re-padded Pressure Plate,
Center Stator and Torque Plate Subassemblies
Figure 401

REPAIR

4. Repair of Torque Plate (5)

A. Repair torque plate lugs that have not worn to .695 or less by blending out indentations along sides of lugs.

B. Repair torque plate lug outer surfaces damaged by disk shrinkage to limits shown in Figure 406. No damage or rework is permitted in the radius indicated.

5. Repair of Cylinder Housing (53)

A. Blend out burrs, nicks and scratches less than .030 inch. deep on outside of housing with 400 grit, aluminum oxide paper.

B. Blend corroded or damaged areas of cylinder housing axle bore (Ref. Fig. 403) with 400 grit aluminum oxide cloth. Corrosion pits or damage shall not exceed 0.12 inch diameter by 0.020 inch deep, and if pits are concentrated in an area greater than 30% of the indicated axle bore area, replace cylinder housing. The axle bore diameter after rework should be no more than ∅ 2.528 inch.

C. Blend out and polish scratches not exceeding .003 inch deep in piston cavities and O-ring packing grooves with fine (400 grit) aluminum oxide paper. Maintain a surface finish of 32 microinches rms. Remove rough edges or burrs from edges of O-ring packing grooves. Break edges of O-ring packing grooves to a .005 to .010 inch radius.

D. Remove and install damaged cylinder housing bushing (56) as follows:

1) Heat housing area surrounding bushing in 180^{o} F. (82^{o} C.) water for 30 minutes and press bushing out of housing.

2) Clean bushing seat in housing of all oil, primer residue, dirt and grease.

3) Heat bushing seat area of housing to 180^{o} F. (82^{o} C.) for 30 minutes and dry thoroughly with clean compressed air or a lint-free cloth.

4) Coat housing contacting surface of bushing (56) with a generous but not dripping application of MIL-P-23377 Epoxy-Polyamide Primer. Install bushing (56) immediately into heated housing while primer is still wet.

CAUTION: **SUPPORT HOUSING IN AREA IMMEDIATELY AROUND BUSHING DURING PRESS-OUT AND PRESS-IN OPERATION.**

REPAIR

E. Rework procedure to eliminate potential strut to cylinder interference and to repair damage caused by interference.

1) Refer to rework dimensions in Figure 402.

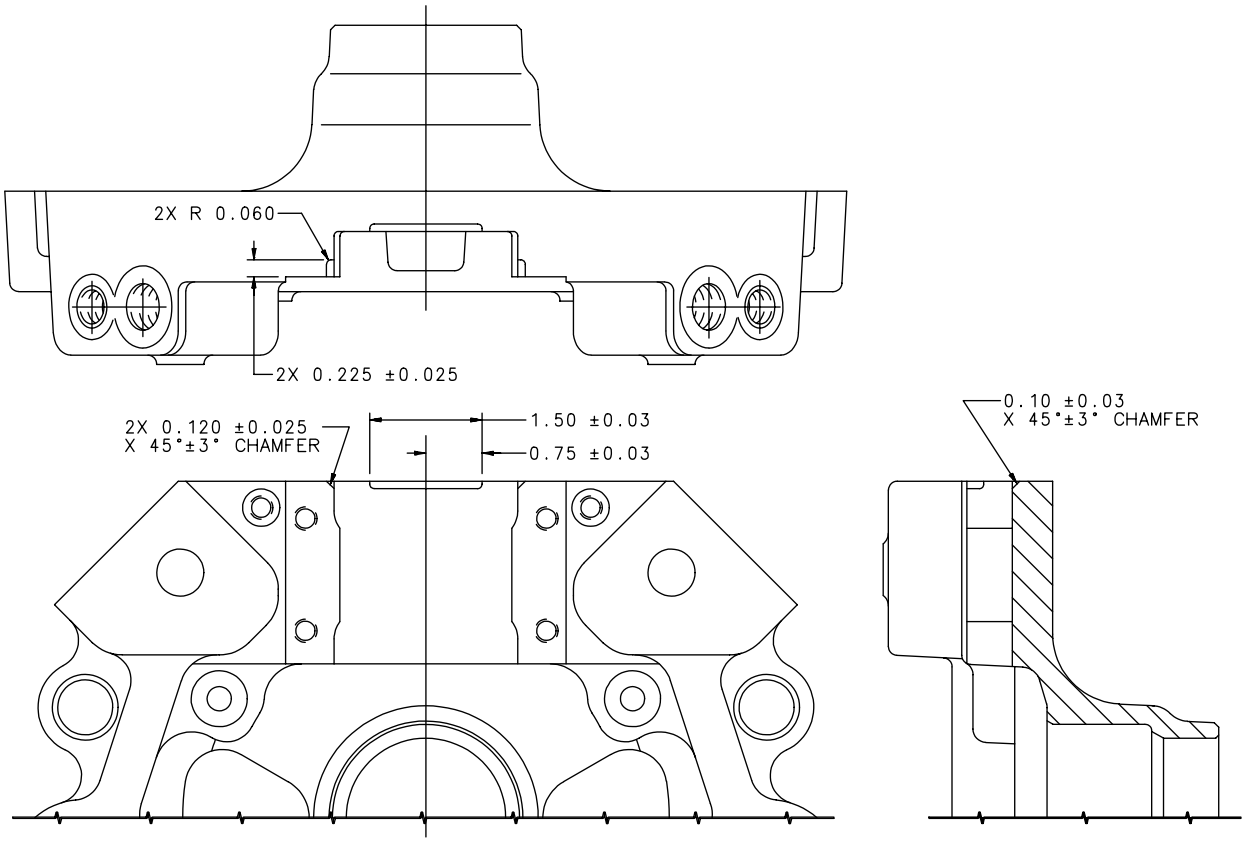


Figure 402 Cylinder Rework Area and Dimensional Limits

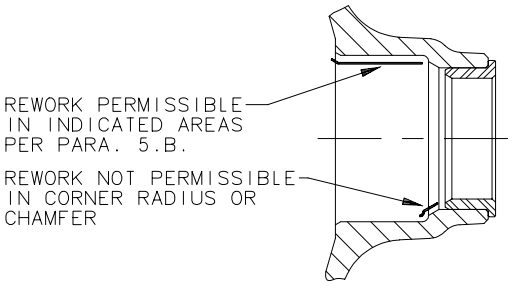


Figure 403 Axle Bore Repair Areas

REPAIR

6. Repair of Pistons (47)

A. Blend out and polish scratches, nicks and burrs on seal contacting surfaces of piston to .003 inch deep. Blend repair areas into surrounding surfaces to avoid local indentation. Maintain a surface finish of 16 microinches rms. Replace pistons that are damaged deeper than .003 inch.

7. Retreating and Repainting Cylinder Housing Subassembly (52)

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

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

B. Treat reworked areas with chromate conversion coating, specification MIL-C-5541, Class 1A.

C. Apply one coat of epoxy-polyamide primer, specification MIL-P-23377 to reworked areas.

CAUTION: DO NOT GET PAINT OR PRIMER IN CYLINDER BORES, INLET OR BLEEDER PORTS, OR ON INSIDE OR END SURFACES OF CYLINDER HOUSING BUSHING (56).

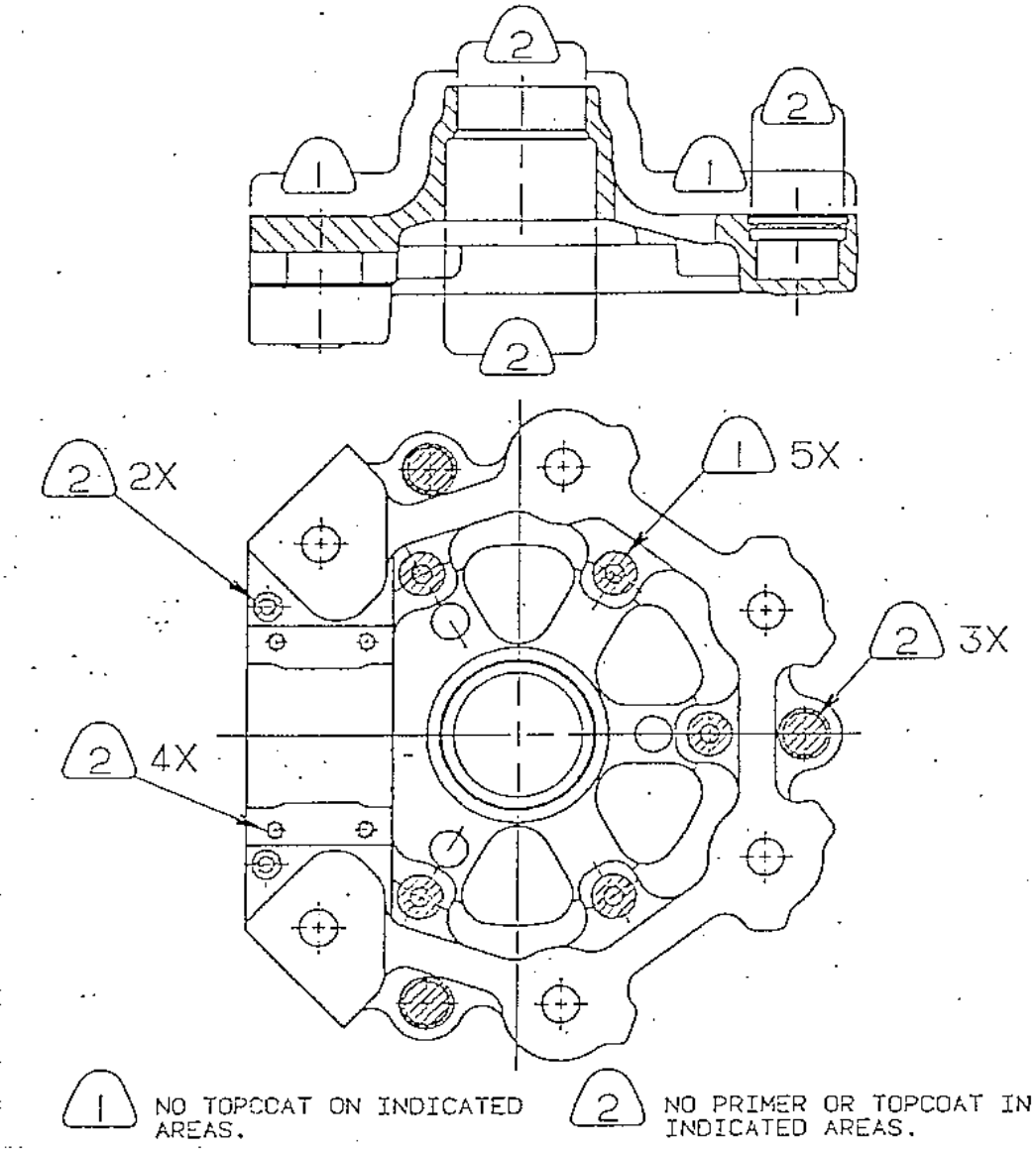
D. Apply two coats of epoxy-polyamide topcoat, specification MIL-C-83286, gloss grey, FED-STD-595 color no. 16440 to reworked areas.

NOTE: REFERENCE FIGURE 404 FOR LOCATIONAL PAINT REQUIREMENTS.

9. Resetting Adjuster Assembly (14)

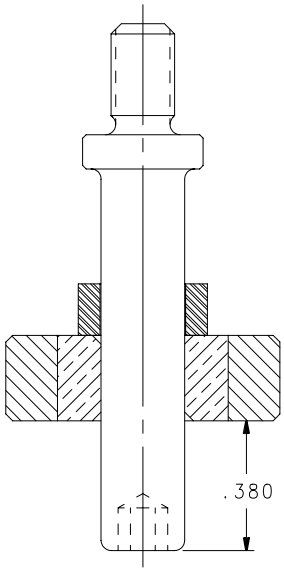
A. Press retract stud (15) through friction sleeve (16) to dimension shown in Figure 405. Replace any adjuster subassembly (14) that requires less than the force specified in **FITS AND CLEARANCES** (Ref. Fig. 603) to move the stud (15) through the friction sleeve (16).

REPAIR

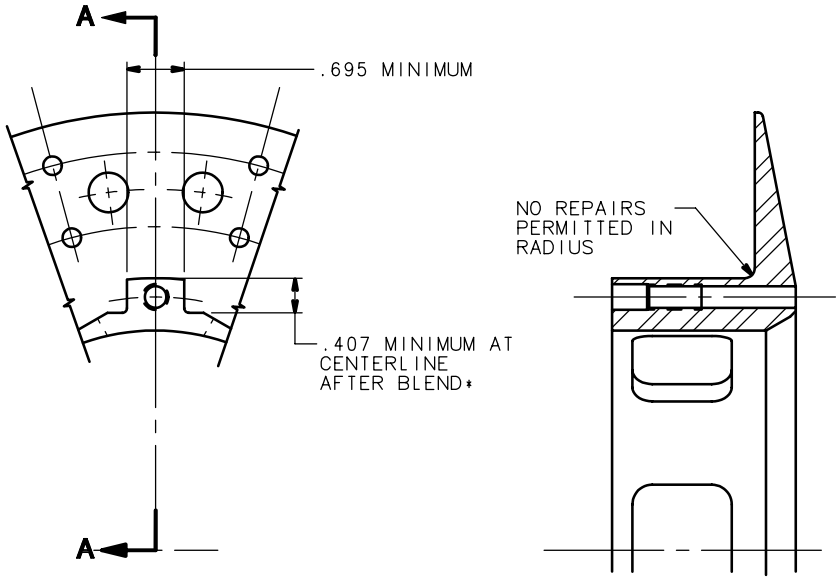


Paint Requirements
Figure 404

REPAIR



Adjuster Reset Dimension
Figure 405



Torque Plate Lug Repair Limits
Figure 406

ASSEMBLY

1. Assembly Materials

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

Hydraulic Fluid SAE AS1241 Type IV, Class 2, Grade A	Monsanto Chemical Corp. St. Louis, MO or Standard Oil of CA San Francisco, CA
Antiseize Thread Compound Specification MIL-T-5544	W.J. Ruscoe & Co. 479 Kenmore Blvd. Akron, OH 44301
Silicone Grease Dow Corning 55 O-Ring Lubricant	Dow Corning Corp. Box 1767 Midland, Michigan 48640

2. General Assembly Procedures

Assemble the brake assembly in accordance with the following procedures (Ref. IPL Fig. 1001):

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

NOTE: IT IS RECOMMENDED THAT ALL O-RINGS AND WIPER RINGS REMOVED AT DISASSEMBLY BE REPLACED WITH NEW O-RINGS AND WIPER RINGS AT ASSEMBLY.

A. Lubricate threads of bleeder seat (33) and O-ring (34) with Dow Corning 55 O-ring Lubricant. Install O-ring on bleeder seat, and then screw bleeder seat into cylinder housing (53). Torque to 200 pound-inches. Screw bleeder screw (32) into bleeder seat.

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

ASSEMBLY

B. Lubricate threads of plug (35) and O-ring (36) with Dow Corning 55 O-ring Lubricant. Install O-ring (36) on plug (35), and then screw plug into port below the bleeder seat (33). Torque to 150 pound-inches.

C. Lubricate O-rings (38 & 39) and threads of shuttle valve body (40) with Dow Corning 55 O-ring Lubricant. Install O-ring (39) in groove on the bottom end of shuttle valve body (40). Install O-ring (38) on shuttle valve body in radius between the hex head and top of the body threads. Screw shuttle valve into top port in cylinder housing (53) and torque to 200 pound-inches.

D. Lubricate threads of fitting (44) and O-ring (45) with Dow Corning 55 O-ring Lubricant. Install O-ring on fitting, and then screw fitting in inlet port below the shuttle valve subassembly (37). Torque to 150 pound-inches.

E. Install torque liners (51) onto cylinder housing (53) and secure with screws (50). Make sure edge of torque liner mates flat with edge of torque slot in cylinder housing to insure adequate clearance between cylinder and strut of aircraft. After screws have been tightened, lockwire as required.

F. Lubricate O-ring packings (49) with a coat of the same fluid used in the brake assembly then install the O-rings in the inner groove of the piston bore.

G. Install wiper rings (48) into outer groove of piston bore (groove nearest machined face.)

H. Lubricate the inside edge of the wiper rings and the piston bore with a liberal amount of brake fluid. Place the piston (47) into the bore and work in by hand alternately rotating until piston seats in the bottom of the bore. Insulators (46), may then be placed in the pistons (chamfered end first).

I. Prior to installing retract housing subassembly (22) into cylinder housing (53), pre-install spring (26), washer (25) and snap ring (24) into retract housing (23). Retract housings may now be inserted into the cylinder housing.

NOTE: LIP ON RETRACT HOUSING SHOULD MATE WITH SURFACE OF COUNTERBORE WHEN CORRECTLY INSTALLED.

J. Install pressure plate subassembly (27). Place three retract base subassemblies (19) into slots in pressure plate. Thread adjuster subassemblies (14) into their respective retract base subassemblies. Torque 30 - 35 pound-inches.

ASSEMBLY

K. Install disc (8), Center Stator subassembly (9), disc (8) onto torque plate subassembly (4).

L. Install Cylinder Subassembly (53) with Pressure Plate Subassembly (27) attached onto the torque plate subassembly (4), aligning holes with the tapped holes on the lugs of the torque plate (5).

M. Coat threads of bolts (2) and bearing surfaces of bolt heads and washers (3) with antiseize compound, specification MIL-T-5544.

N. Install countersunk washer (3) onto bolt (2) and slide five bolts through cylinder housing and thread into torque plate (5).

NOTE: WHEN INSTALLING WASHER (3) ONTO BOLT (2) THE COUNTERSINK ON THE WASHER MUST FACE BOLT HEAD OR BOLT FAILURE MAY RESULT.

Lubtork bolts to 150 pound-inches, and safety wire with MS20995C32 per MS33540.

CAUTION: DO NOT USE IMPACT OR POWER WRENCHES TO INSTALL OR TIGHTEN BRAKE BOLTS.

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FITS AND CLEARANCES

ITEM NO. (REF. IPL) (FIG. 1001)	NOMENCLATURE	REPLACEMENT DIMENSION (IN INCHES)
4	TORQUE PLATE SUBASSEMBLY	
	PAD THICKNESS	0.086 (MINIMUM)
	OUT-OF-FLAT	0.020 (MAXIMUM)
	LUG WIDTH	0.695 (MINIMUM)
	LUG HEIGHT	0.407 (MINIMUM)
8	DISC	
	TOTAL THICKNESS	0.250 (MINIMUM)
	MIX THICKNESS PER SIDE	0.015 (MINIMUM)
	OUT-OF-FLAT	0.020 (MAXIMUM)
	TANG WIDTH	0.457 (MINIMUM)
9	CENTER STATOR SUBASSEMBLY	
	PAD THICKNESS PER SIDE	0.086 (MINIMUM)
	TOTAL THICKNESS (including pads)	0.407 (MINIMUM)
	TOTAL THICKNESS (stator only)	0.235 (MINIMUM)
	OUT-OF-FLAT	0.020 (MAXIMUM)
	KEYSLOT WIDTH	0.770 (MINIMUM)
	KEYSLOT WIDTH	0.790 (MAXIMUM)
27	PRESSURE PLATE SUBASSEMBLY	
	PAD THICKNESS	0.086 (MINIMUM)
	TOTAL THICKNESS (including pads)	0.269 (MINIMUM)
	TOTAL THICKNESS (plate only)	0.183 (MINIMUM)
	OUT-OF-FLAT	0.020 (MAXIMUM)
	KEYSLOT WIDTH	0.770 (MINIMUM)
	KEYSLOT WIDTH	0.790 (MAXIMUM)
7, 12 AND 30	WEAR PAD	
	WIDTH (MEASURED ON HORIZONTAL CENTERLINE)	1.375 (MINIMUM)
47	PISTON	
	OUTSIDE DIAMETER	1.370 (MINIMUM)
52	CYLINDER SUBASSEMBLY	
	PISTON BORE DIAMETER	1.378 (MAXIMUM)
56	BUSHING (ref Figure 300)	
	INSIDE DIAMETER (DIM. ∅A)	1.815 (MAXIMUM)
	OVERALL LENGTH (DIM. B)	1.237 (MINIMUM)

Wear and Distortion Tolerances
Figure 601

FITS AND CLEARANCES

ITEM NO. (REF. IPL) (FIG. 1001)	NOMENCLATURE	TORQUE VALUE
2	BRAKE BOLTS	150 POUND-INCHES (LUBTORK)
14	ADJUSTER SUBASSEMBLY	30 TO 35 POUND-INCHES
33	BLEEDER SEAT	200 POUND-INCHES
35	PLUG	150 POUND-INCHES
37	SHUTTLE VALVE	200 POUND-INCHES
44	FITTING	150 POUND-INCHES

Torque Value Table
Figure 602

ITEM NO. (REF. IPL) (FIG. 1001)	NOMENCLATURE	PULL THROUGH FORCE	
		MINIMUM	MAXIMUM
14	ADJUSTER SUBASSEMBLY	50 LBS.	150 LBS.

Adjuster Subassembly
Pull Through Force Data
Figure 603

TESTING

1. General

Test the brake assembly in accordance with the following procedure.
(Ref. IPL Fig. 1001)

2. Testing Procedure

A. Test brake assembly with a hydraulic test stand capable of applying 820 psi hydraulic pressure to brake. Attach inlet line from test stand to shuttle valve (37) and tighten.

CAUTION: HYDRAULIC TEST STAND MUST CONTAIN SAE AS1241 Type IV, Class 2, Grade A HYDRAULIC FLUID.

B. Apply pressure and bleed brake. Fitting (44) should be open to the atmosphere.

C. Apply and release brake pressure (820 psi) several times and check for proper brake release. Discs (8) should be free to rotate when brake is released.

D. Apply 820 psi for 15 to 30 seconds; check for leaks. Check carefully for leaks through the emergency pneumatic inlet fitting (44). No leaks are permitted.

E. Disconnect inlet line from shuttle valve (38) and connect to emergency pneumatic inlet fitting (44). Shuttle valve should be open to atmosphere.

F. Apply 820 psi for 15 to 30 seconds. Check carefully for leaks through the shuttle valve. No leakage through shuttle valve is permissible.

G. If any leakage is observed through fitting (44) or shuttle valve (37), replace shuttle valve and retest.

H. Drain excess hydraulic fluid from brake after completion of test and install suitable protective caps over shuttle valve and emergency pneumatic inlet fitting.

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TROUBLE SHOOTING

Trouble	Cause	Correction
Hydraulic fluid leaking from brake assembly	Defective hydraulic Connection	Tighten connection or replace fitting
	Defective O-ring	Replace O-ring
	Piston or cylinder housing worn or damaged	Replace piston and/or cylinder housing
Brake not engaging correctly	Air in brake	Bleed brake
	Obstruction in hydraulic line or fluid passage	Remove obstruction
	Pistons sticking	Replace piston O-ring and wiper rings
	Pistons damaged	Replace pistons
	Cylinder housing damaged	Replace cylinder housing
	Torque plate damaged	Replace torque plate
	Pressure plate, rotating disk or center stator not moving freely on torque plate	Repair or replace defective plate or disk
Brake not releasing correctly.	Obstruction in hydraulic line or fluid passage	Remove obstruction
	Pistons sticking	Replace piston O-Ring and wiper rings

Trouble Shooting Chart
(Sheet 1 of 2)
Figure 801

TROUBLE SHOOTING

Trouble	Cause	Correction
Brake not releasing correctly (cont'd.)	Pistons damaged	Replace pistons
	Cylinder housing damaged	Replace cylinder housing
	Torque plate damaged	Replace torque plate
	Pressure plate, rotating disc or center stator not moving freely on torque plate	Repair or replace defective plate or disc
	Disc or center stator excessively dished	Replace disc or center stator

Trouble Shooting Chart
(Sheet 2 of 2)
Figure 801

STORAGE INSTRUCTIONS

1. Brake Assembly

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

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

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

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ILLUSTRATED PARTS LIST

1. Introduction

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

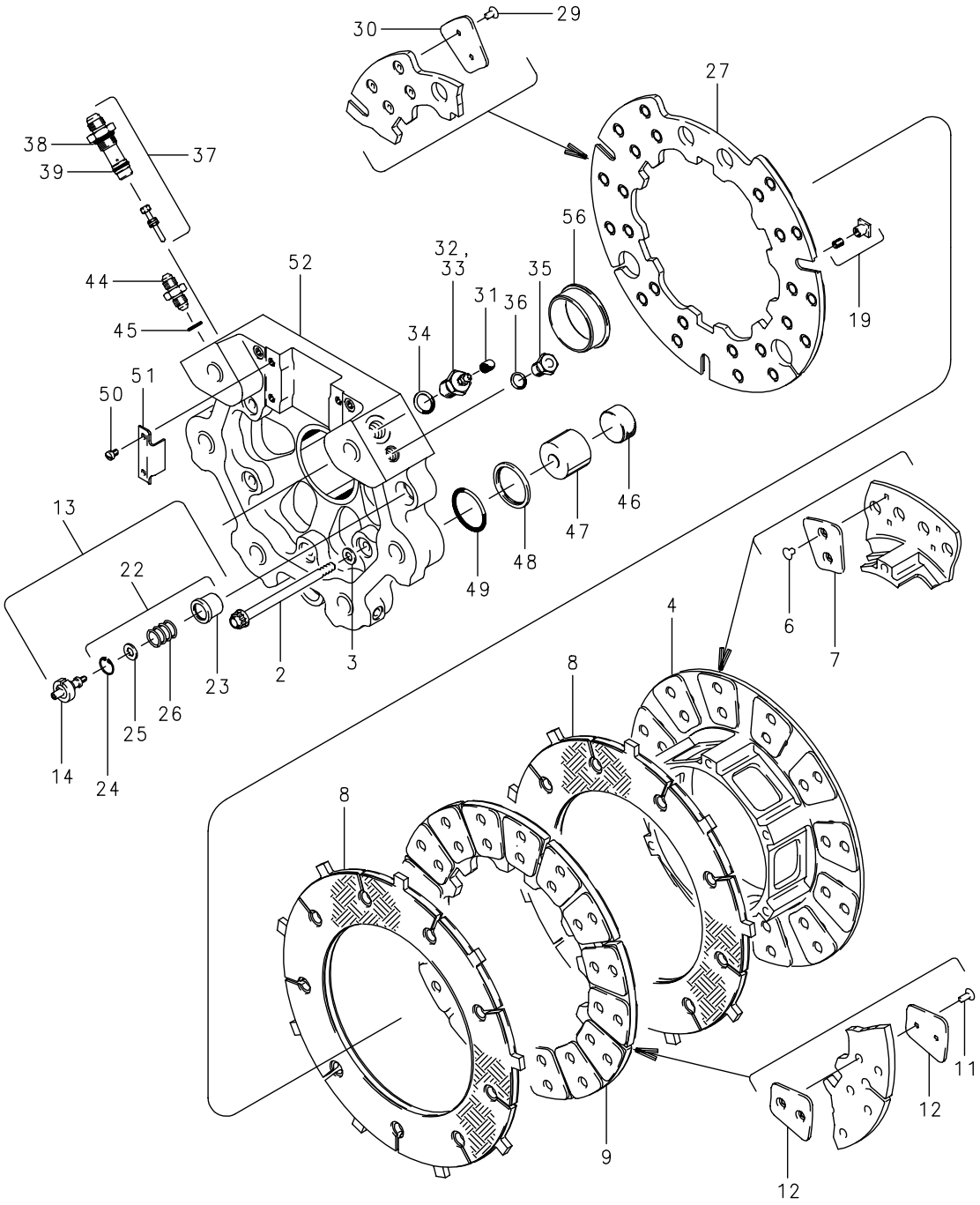
B. The Figure Item column provides the cross reference between the parts list and IPL Figure 1001.

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

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

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

ILLUSTRATED PARTS LIST



Illustrated Parts List (IPL) for 30-161A Brake Assembly
Figure 1001

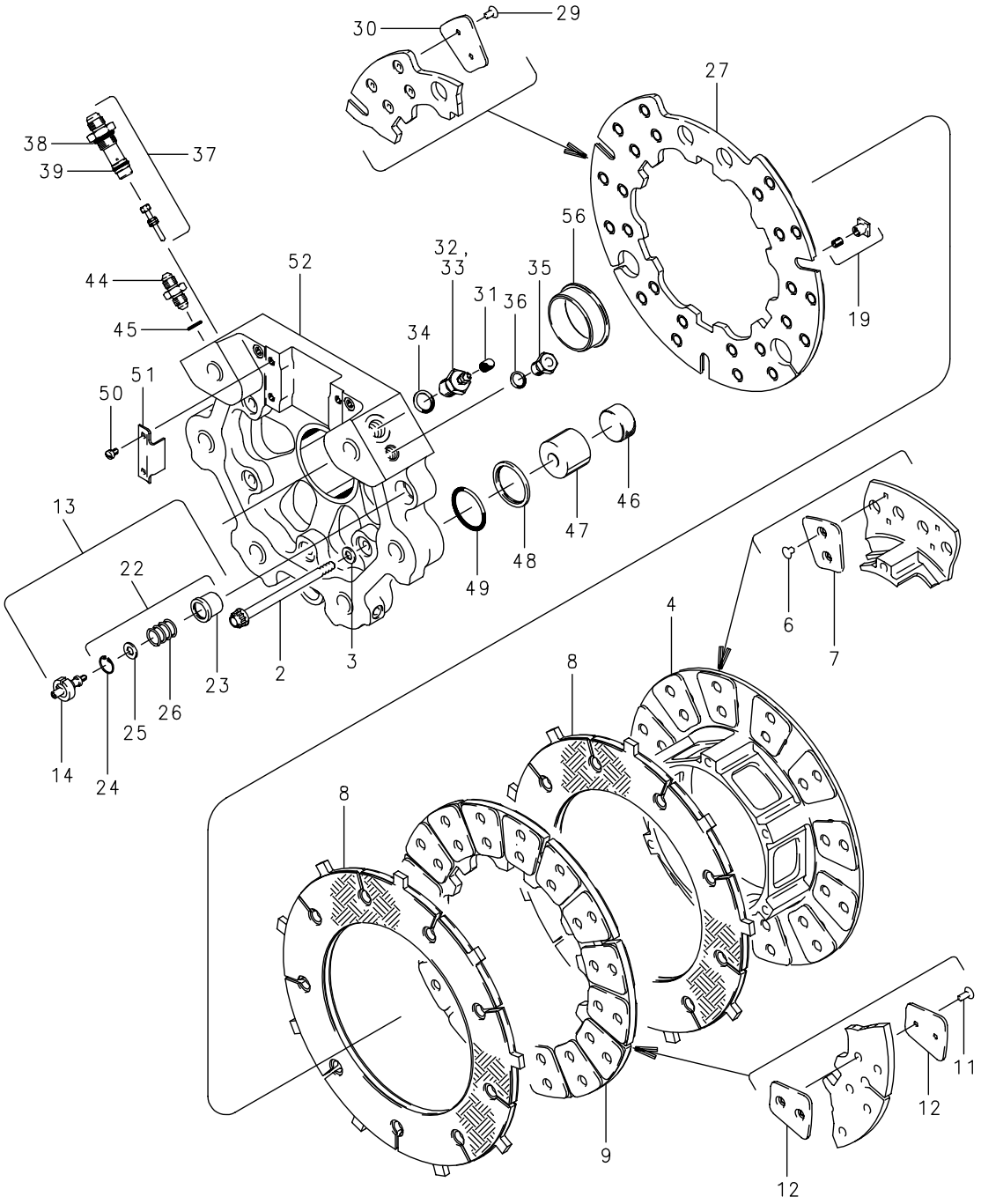
ILLUSTRATED PARTS LIST

2. Parts List

FIGURE ITEM	PART NUMBER	NOMENCLATURE	UNITS PER ASSY
1	30-161A	BRAKE ASSEMBLY	1
2	103-85300	BOLT (MS21250H05022)	5
3	095-02800	WASHER (MS20002C5)	5
4	075-17600	TORQUE PLATE SUBASSEMBLY	1
5	*	TORQUE PLATE	1
6	105-01300	RIVET	24
7	109-00100	WEAR PAD	12
8	159-03500	DISC	2
9	242-00700	CENTER STATOR SUBASSEMBLY	1
10	*	CENTER STATOR	1
11	105-01200	RIVET	32
12	109-00100	WEAR PAD	32
13	111-07900	RETRACT ASSEMBLY	3
14	111-08200	ADJUSTER SUBASSEMBLY	3
15	*	STUD	3
16	*	FRICTION SLEEVE	3
17	*	SLEEVE RETAINER	3
18	*	SPACER	3
19	111-08300	RETRACT BASE SUBASSEMBLY	3
20	*	RETRACT BASE	3
21	*	INSERT	3

* PART NOT PROCURABLE

ILLUSTRATED PARTS LIST



Illustrated Parts List (IPL) for 30-161A Brake Assembly
Figure 1001

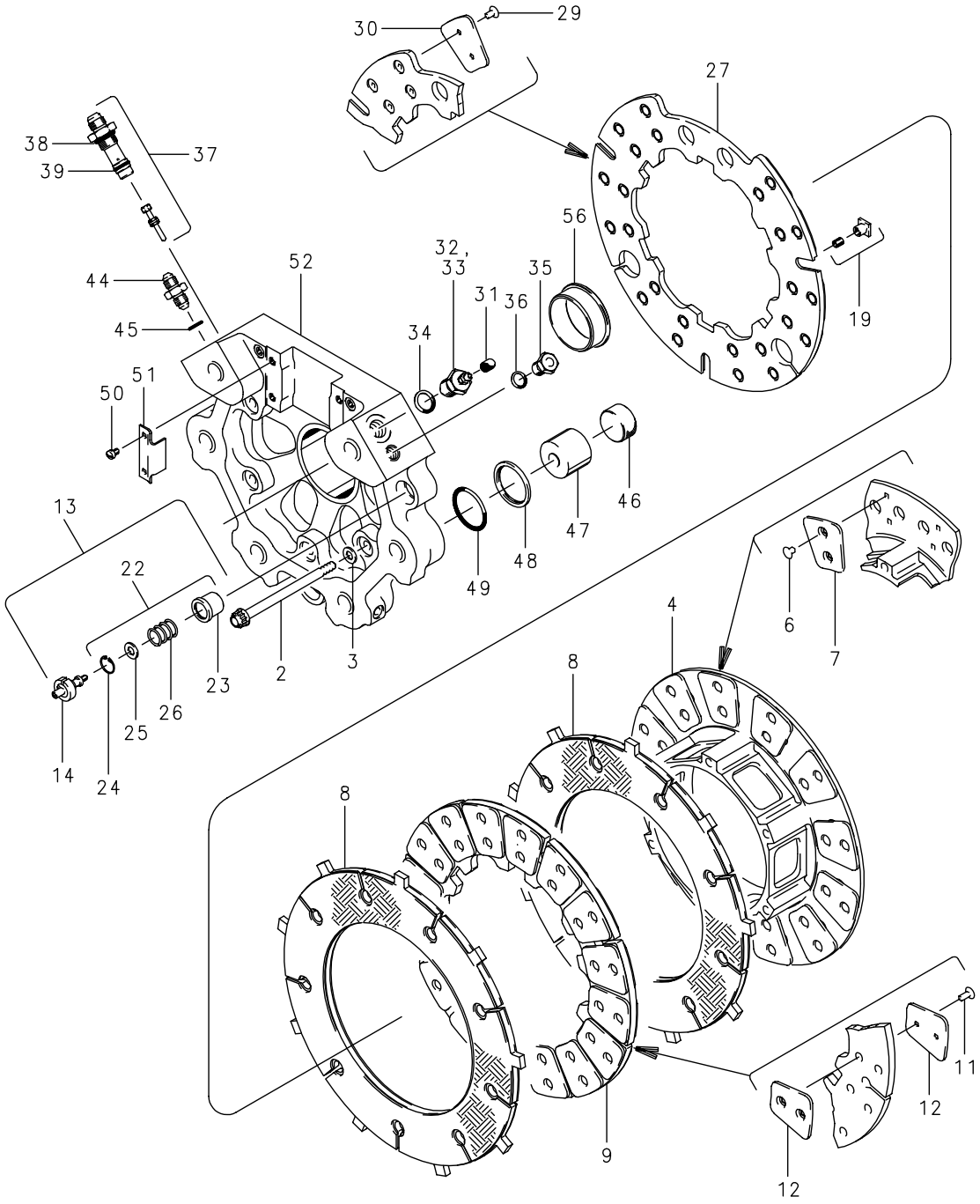
ILLUSTRATED PARTS LIST

FIGURE ITEM	PART NUMBER	NOMENCLATURE	UNITS PER ASSY
22	111-08400	RETRACT HOUSING SUBASSEMBLY	3
23	071-00200	RETRACT HOUSING	3
24	155-07800	SNAP RING(WALDES N5000-62MD)	3
25	095-13600	WASHER (MS20002-5)	3
26	082-10400	SPRING (LEE LC-072H-2)	3
27	073-08200	PRESSURE PLATE SUBASSEMBLY	1
28	*	PRESSURE PLATE	1
29	105-01100	RIVET	24
30	109-00100	WEAR PAD	12
31	183-00100	BLEEDER CAP	1
32	079-00300	BLEEDER SCREW	1
33	081-00600	BLEEDER SEAT	1
34	101-28000	O-RING (PARKER 3-907)	1
35	104-05400	PLUG (AN814-4LK)	1
36	101-28200	O-RING (NAS1612-4)	1
37	111-09801	‡ SHUTTLE VALVE ASSEMBLY	1
38	101-28000	O-RING (PARKER 3-907)	1
39	101-28100	O-RING (NAS 1611-013)	1
40	*	SHUTTLE VALVE BODY	1
41	*	O-RING	1
		(DELETED)	
43	*	SPOOL VALVE	1

* PART NOT PROCURABLE

‡ Shuttle Valve 111-09801 has superseded both P/N 111-07800 and 111-09800. Refer to Sevice Bulletin SB7046. Note - SB7046 replaces PRM56, which allowed an optional field replacement of 111-07800 with 111-09800.

ILLUSTRATED PARTS LIST



Illustrated Parts List (IPL) for 30-161A Brake Assembly
Figure 1001

ILLUSTRATED PARTS LIST

FIGURE ITEM	PART NUMBER	NOMENCLATURE	UNITS PER ASSY
44	104-05200	FITTING (AN815-4K)	1
45	101-28200	O-RING (NAS1612-4)	1
46	088-01900	INSULATOR	6
47	062-06300	PISTON	6
48	107-00500	WIPER RING	6
49	101-27900	O-RING (NAS1611-220)	6
50	102-07100	SCREW (AN501A10-6)	4
51	205-00900	TORQUE LINERS	2
52	091-15600	CYLINDER SUBASSEMBLY	1
53	*	CYLINDER HOUSING	1
54	*	* * PLUG	5
55	*	* * INSERT (TRIDAIR RKKA1032)	6
56	145-08500	BUSHING	1
* * *	235-01100	HEAT STACK-FACTORY REBUILT	1
		DISC (NEW)	2
		PRESSURE PLATE SUBASSEMBLY (REBUILT)	1
		CENTER STATOR SUBASSEMBLY (REBUILT)	1
		TORQUE PLATE SUBASSEMBLY (REBUILT)	1

* PART NOT PROCURABLE
* * PART NOT ILLUSTRATED
* * * OPTIONAL REPLACEMENT EQUIPMENT

CLEVELAND WHEELS & BRAKES
CM40-202
COMPONENT MAINTENANCE MANUAL
WITH ILLUSTRATED PARTS LIST
FOR
WHEEL ASSEMBLY
MODEL 40-202

Cleveland
Wheels & Brakes

Parker
Aerospace

PARKER HANNIFIN CORPORATION - AIRCRAFT WHEEL & BRAKE
1160 Center Road - Avon, Ohio 44011 - Customer Service 1-800-Braking

CLEVELAND WHEELS & BRAKES
COMPONENT MAINTENANCE MANUAL
WITH
WITH ILLUSTRATED PARTS LIST
FOR
WHEEL ASSEMBLY
40-202
FOR
CESSNA CITATION MODEL 552 SERIES AIRCRAFT
AND
CESSNA CITATION MODEL S550 SERIES AIRCRAFT

Cleveland
Wheels & Brakes

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

Revision No. 9 dated May 01, 1988

Revision No 9 contains all pages of the manual. This manual has been completely rewritten and revised.

NOTE: Revisions 1-8 pertain to now inactive 40-202/30-161 Maintenance Manual.

Rev. No.	Page No.	Description of Change
1	1-31	Manual revised & resubmitted
2	5, 6, 8, 9, 11 15, 17, 18, 22 23, 24, 28, 29	Manual revisions per Cessna eng. review
3	12	Lee plug P/N 139-14100 was P/N 139-11300; 62-63 anodized pistons changed to Nituff coating.
4	17A (added)	Service data sheet; routine maintenance (disc-restack) – Out-of-flatness limits revised.
5	----------	Title page revised to show equipment approved for use on Cessna model S550 aircraft.
6	12	Removed items 16 & 17 (P/N's 105-00300 and 088-00800) from P/L per Cessna letter 178-13-87-46 dated 4 June 1987.
	21	Removed pressure plate insulator from view in figure 4.
	18	Added following NOTE: between paragraphs H. & I. on Section 2.3.2: on brake assemblies S/N 001-295, in the field prior to pressure plate insulators P/N 088-00800 and rivets P/N 105-00300 can be removed and discarded per revision 6 of this manual. Procedure for removal is as follows: (see page 17).
	11	Removed 088-00800 Insulator (item 17) & 105-00300 rivet (item 16) from exploded view drawing.
7	21	Revised wear measurement on retract stud to clarify overhaul wear dimension.
8	1-31	Revised all pertinent sections of manual that pertained to the addition of the new 111-07900 retract assembly. Deleted pg. 17A – Service Data Sheet.
9	All Pages	Generated separate 30-161 brake and 40-202 wheel overhaul manuals to replace now inactive 40-202/30-161 Maintenance Manual.

Revision No. 10 dated April 01, 1991

Rev. No.	Page No.	Description of Change
10	Introduction Page 1	Removed old 1-800 telephone number.
	Description & Operation Page 1	Paragraph 1.F - . . .Stainless steel heat shield clips on held . . . was . . . stainless steel tire heat shield is held. . .
	202	Paragraph 2.J - . . . Heat shield clips (25) . . . was . . . heat shields (25) . . . paragraph 2.K - . . . with obsolete 157-01300 heat shield assembly . . . was . . . with obsolete 157-01101 heat shield assembly . . . 199-189 heat shield kit . . . was . . . 199-166 heat shield kit. . .
	302	Paragraph 3.B - . . . heat shield clips (25) . . . was . . . heat shields (25) . . .
	506	Paragraph 6.B - . . . heat shield clips (25) . . . was . . . heat shield segments (25) . . .
	507	Paragraph 6.G – align the heat shield clips (25) . . . was align the 3 segment heat shield (25) . . . paragraph 6.G – deleted sentence – secure the heat shield to key drives . . . paragraph 6.H – deleted sentence . . . rivets should be installed starting from center . . .
	508	Completely revised graphics to show new heat shield clip and drive key configuration.
	1002	Revised graphics to show new heat shield clip and drive key configuration.
	1004	Item 25 – 157-01600 heat shield clip, qty. 9 was 157-01300 heat shield, qty. 3. Item 26 – 205-00801 drive key, qty. 9 was 205-00800 drive key, qty. 9.

Revision No. 11 dated December 11, 1993

Rev. No.	Page No.	Description of Change
11	Introduction Page 1	FAX: (216) 937-6416 -was- Telex #212527 PHAVUR
	Description & Operation Page 1	Flange of inner wheel half has nine slots that engage the drive tangs of the rotating brake discs. Steel key drives are riveted to the wheel flange to provide a hard wearing surface for the disc tangs and to prevent damage to the softer metal of the wheel. Stainless steel heat shields and heat shield clips are held in place on the outer surface of the inner wheel half flange by the same rivets used to attach the key drives to the wheel. -was- Flange of inner wheel half has nine slots that engage the drive tangs of the rotating brake discs. Steel key drives are riveted to the wheel flange to provide a hard wearing surface for the disc tangs and to prevent damage to the softer metal of the wheel. Stainless steel heat shield clips are held in place on the outer surface of the inner wheel half flange by the same rivets used to attach the key drives to the wheel.
	Description & Operation Page 2	Wheel weight (approx.): 18.9 pounds -was- Wheel weight (approx.): 17.8 pounds
	202	Fuse plugs (22), bearing cups (17 and 27), key drives (26), heat shields (28), and heat shield clips (25) should not be removed from the wheel halves unless replacement is required. -was- Fuse plugs (22), bearing cups (17 and 27), key drives (26), and heat shield clips (25) should not be removed from the wheel halves unless replacement is required.

Revision No. 11 (cont'd)

Rev. No.	Page No.	Description of Change
11	202	If wheel assembly is equipped with obsolete 205-00801 drive keys, the 40-202 wheel assembly can be updated by incorporating the 199-189 heat shield kit available through Cessna Aircraft Company or Parker Distributors. -was- If wheel assembly is equipped with obsolete 157-01300 heat shield, the 40-202 wheel assembly can be updated by incorporating 199-189 heat shield kit available through Cessna Aircraft Company or Parker Distributors.
	302	Added Note: Paint removal procedures are required only for complete overhaul which shall occur every 500 landings. If 500 landings have not been accumulated at the time of tire change, do not remove paint. All other component overhaul procedures required every tire change. Completely disassemble the wheel prior to paint removal. Remove fuse plugs (22), inflation valve (16), heat shields (28), heat shield clips (25), key drives (26) and bearing cups (17 and 27). -was- Completely disassemble the wheel prior to paint removal. Remove fuse plugs (22), inflation valve (16, heat shield clips (25), key drives (26) and bearing cups (17 and 27).
	402	Added Note: Dye penetrant procedures for wheels are required only for complete overhaul which shall occur every 500 landings. If 500 landings have not been accumulated at the time of a tire change, do not dye penetrant inspect wheels. All other component overhaul procedures required every tire change.
	403	Paragraph 3.I: Added the following: If any wheel bolts exhibits cracks, replace all nine (9) bolts.

Revision No. 11 (cont'd)

Rev. No.	Page No.	Description of Change
	506	Replacing Defective Key Drives (26), Heat Shields (28), and Heat Shield Clips (25) from Inner Wheel Half (21). -was- Replacing Defective Key Drives (26), and Heat Shield Clips (25) from Inner Wheel Half (21). Remove and discard key drives (26), heat shields (28), and heat shield clips (25). -was- Remove and discard key drives (26), and heat shield clips (25).
	507	Using one .125 dia. Cleco, fasten one 157-01900 heat shield, one 205-04400 drive key, and one 157-01600 heat shield clip to the inner wheel half as shown in Figure 503. Install one 105-09900 rivet through c'sunk side of the wheel, through the hole adjacent to the Cleco. Squeeze the rivet and inspect to insure that the .187 min. clinch dia. Requirement is obtained. Repeat this procedure to install all eighteen 205-04400 drive keys, nine 157-01900 heat shields, nine 157-01600 heat shield clips, and eighteen 105-09900 rivets. -was- Install new key drives (26) so that holes in key drive align with holes on wheel flange. A flat steel bar can be used to distribute the load evenly across the key drive while tapping the key drive into position. Align the heat shield clips (25) over the key drives so that the tabs on the heat shield engage into the slots on the wheel flange. Install rivets (24) one at a time and squeeze to the clinch diameter shown in Figure 503..

Revision No. 11 (cont'd)

Rev. No.	Page No.	Description of Change
	508	Figure 503 was altered to show the new key drive (205-04400) and the new heat shield (157-01900) geometry.
	601	If removed, install the bearing cups (17 and 27), key drives (26), heat shields (28), and heat shield clips (25) in accordance with **REPAIR**. -was- If removed, install the bearing cups (17 and 27), key drives (26), and heat shield (25) in accordance with **REPAIR**.
	1002	The Illustrated Parts List was revised to show the new key drive (205-04400) and the new heat shield (157-01900) geometry.

1004

Figure Item	Part Number	Nomenclature	Units Per Assy
24	105-09900	Rivet (MS20426-AD4-9)	36
	-was-		
24	105-01700	Rivet (MS20426-AD4-8)	36
26	205-04400	Key Drive	18
	-was-		
26	205-00801	Key Drive	9
	-added-		
28	157-01900	Heat Shield	9

Revision M, dated November 01, 2002
DCN Number 0353-44

Highlights

Revision M contains all pages of the manual. Pages which have been added or revised are outlined below with a description of change.

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

Page No.	Description of Change
All Pages	Retyped into electronic format.
Record of Revisions	Update to show latest revision. Alpha character equivalency is being used for compliance with Parker PDM database.
List Of Effective Pages	Update to show latest page revisions.
Introduction Page 1	Contact information updated.
Check Page 406	(ADD) blank page for document formatting purposes.
Assembly Page 601	Para. 2.D. (NOW) "…Torque to 50 to 60 in-lb." (WAS) "…Torque to 35 in-lb."
Page 603	Para. 2.Q. (NOW) "Install hubcap subassemlby (3) with screws (2) on outer wheel half subassembly (14). Torque screws 25 to 30 in-lb." (WAS) "Test wheel assembly in accordance with **TESTING**." (NOW) Para. "2R. Test wheel assembly in accordance with..." (WAS) Para. "2Q. Test wheel assembly in accordance with…"
Page 604	(ADD) blank page for document formatting purposes.

Revision M, (cont'd)

Storage Instructions

Page 701

Para. 1.B. (NOW) "…temperature range is 32° to 70°F."
(WAS) "…temperature range is 32° to 75°F."

Para. 3. (ADD) "While wheels are in storage, bearing cones (9) packed with grease, specification MIL-G-81322 and grease seals (8) should be bagged separately. Hubcap subassemblies (3) should be installed loosely with three screws (2).

Page 702

(ADD) blank page for document formatting purposes.

Fits and Clearances

Page 801

Table 801, Torque Values
(NOW) for item 16, "50 to 60 in-lb. (WAS) "35 in-lb."
(NOW) item callouts for "10" and "16" (WAS) "9" and "15".

Page 802

(ADD) blank page for document formatting purposes.

Illustrated Parts List

Page 1003

Parts List,
(NOW) for item 16, inflation valve, indentation revised to show as component of wheel assembly.
(WAS) shown as subcomponent of outer wheel half subassembly.

RECORD OF REVISIONS

REV NO.	ISSUE DATE	DATE INSERTED	BY	REV NO.	ISSUE DATE	DATE INSERTED	BY
1	08-17-84	05-01-88	OM				
2	08-31-84	05-01-88	OM				
3	10-25-84	05-01-88	OM				
4	05-31-85	05-01-88	OM				
5	03-03-86	05-01-88	OM				
6	06-17-87	05-01-88	OM				
7	12-23-87	05-01-88	OM				
8	01-15-88	05-01-88	OM				
9	05-01-88	05-01-88	JW				
10	04-01-91	04-01-91	JW				
11	12-11-93	12-11-93	PK				
M	11-01-02	11-01-02	AWB				

SERVICE BULLETIN LIST

Note: 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 Wheel Assembly and Components.

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

LIST OF EFFECTIVE PAGES

TABLE OF CONTENTS

TABLE OF CONTENTS

INTRODUCTION

This manual is published for the guidance of personnel responsible for the overhaul and/or maintenance of the Parker Hannifin 040-20201 Wheel Assembly covered in this publication. The procedures outlined in this manual may be altered if better and/or more economical methods can be employed by the individual facilities. However, alternative procedures must not reduce the efficiency of operation of the assembly.

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

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

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

Phone: 1-800-272-5464
Fax: (440) 937-5409
Website: www.parker.com/cleveland

INTRODUCTION

TSO NOTICE

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

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

DATA RIGHTS

The unit charge for this manual covers reproduction and handling costs only and does not constitute purchase of the data or design contained herein, nor does it convey to the purchaser any rights, patent or otherwise, to reproduce or manufacture from said data.

DISTRIBUTORS

To obtain information as to the availability of the 040-20200 wheel assembly on component parts for overhaul, contact your local Cleveland Wheels & Brakes distributor.

DESCRIPTION AND OPERATION

1. Description and Operation

A. Main wheel assembly is designed for a 22 x 8.0-10, 12 ply tubeless tire.

B. Divided type main wheel to facilitate tire installation and removal.

C. Two wheel halves (inner and outer wheel half assemblies) fastened together with high strength bolts, washers and self-locking nuts. Wheel halves machined from aluminum alloy forgings.

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

E. Wheel assembly rotates on two tapered roller bearings. Bearings are protected by a molded type lip seal in each hub and an integrally forged spacer on the inside of the wheel prevents grease from entering the cavity between the wheel halves. Bearing cups are shrink-fitted into the hubs of the wheel.

F. Flange of inner wheel half has nine slots that engage the drive tangs of the rotating brake discs. Steel key drives are riveted to the wheel flange to provide a hard wearing surface for the disc tangs and to prevent damage to the softer metal of the wheel. Stainless steel heat shields and heat shield clips are held in place on the outer surfaces of the inner wheel half flange by the same rivets used to attach the key drives to the wheel.

G. Three equally spaced fuse plugs installed in the inner wheel half will melt and Release tire pressure in the event the wheel becomes overheated.

2. Handling Procedures

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

DESCRIPTION AND OPERATION

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

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

3. Leading Particulars

Wheel Tire Size and Type..... 22.0 x 8.00-10, 12 PlyTubeless
Material..... Aluminum Forging
Wheel Weight (Approx.)..... 18.9 lbs.
Wheel Bolt Nut Torque..... 300 Pound-Inches Lubtork
Bearing Lubricant..... MIL-G-81322

TESTING

1. General

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

2. Testing Procedures

A. Clean bearing cones (9) in dry cleaning solution, specification P-D-680, and visually check roller contacting surfaces for nicks, scratches, rust, corrosion, spalling, flat spots, pitting, heat discoloration and wear. Check bearing cage for dents or distortion and for wear of sides, corners and at ends of roller pockets. Replace bearing cones having any defects.

B. Wipe bearing cups (17) and (27) free of grease and visually check cup face for scratches, pitting, brinelling, spalling, heat discoloration, rust, corrosion and wear. Remove defective cups and install new cups per **REPAIR.**

C. Visually check grease seals (8) for cuts and wear on rubber sealing lip and bent or distorted reinforcing washer. Replace damaged grease seals.

D. Cover hub openings of wheel halves to prevent contamination of bearing lubricant. Check Check wheel hardness in accordance with **CHECK** section.

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

TESTING

F. Coat juncture around inflation valve (16), fuse plugs (22), and tire beads with soap solution. Check carefully for air leaks in the form of soap bubbles. If air leaks occur around tire bead seat, completely deflate tire and remove assembly from inflation cage. Remove tire from wheel and examine wheel bead seat and tire for damage. If wheel bead seat is scratched, nicked or pitted, repair in accordance with **REPAIR**.

G. Place wheel/tire assembly in an inflation cage and inflate to recommended operating pressure. Check pressure after 24 hours. If reduction in pressure exceeds five percent of inflation pressure, replace wheel O-ring (19) and retest wheel/tire assembly in accordance with step F.

DISASSEMBLY

1. General

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

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

CAUTION: BEARING SEALS AND BEARING CONES WILL BE RELEASED WHEN WHEEL ASSEMBLY IS REMOVED FROM AIRCRAFT AXLE. CARE SHOULD BE TAKEN TO PREVENT DROPPING AND DAMAGING THESE PARTS.

2. Disassembly Procedure

A. Jack aircraft per aircraft maintenance manual until tire is clear of ground and fully deflate tire. Remove any lockwire securing screws (2) on hubcap subassembly (3).

B. Remove screws (2) and hubcap subassembly (3) from outer wheel half subassembly (14).

C. Remove and retain two screws securing axle nut and anti-skid transducer, then remove and retain axle nut and tanged washer.

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

E. Remove snap rings (7), grease seals (8) and bearing cones (9).

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

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

G. Remove nuts (10), washers (11), bolts (12) and countersunk washers (13).

H. Separate the wheel halves and remove tire.

I. Remove O-ring (19) from wheel register groove of outer wheel half (15).

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

DISASSEMBLY

J. Fuse plugs (22), bearing cups (17 and 27), key drives (26), heat shields (28), and heat shield clips (25) should not be removed from wheel halves unless replacement is required. Refer to **REPAIR** for removal and installation procedures.

NOTE: INFLATION VALVE, FUSE PLUGS, BEARING CUPS, KEY DRIVES, AND HEAT SHIELD CLIPS MUST BE REMOVED IF PAINT IS TO BE STRIPPED FROM WHEEL HALVES.

K. If wheel assembly is equipped with obsolete 205-00801 drive keys, the 40-202 wheel assembly can be updated by incorporating the 199-189 heat shield kit available through Cessna Aircraft Company or Parker Distributors.

CLEANING

1. Cleaning Materials

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

2. Cleaning Procedures

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

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

CAUTION: CLEAN BEARING CONES (9) CAREFULLY IN A SEPARATE CONTAINER OF CLEAN SOLVENT TO AVOID CONTAMINATION.

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

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

CAUTION: DO NOT SPIN BEARING CONES WITH COMPRESSED AIR.

D. Clean rubber parts in isopropyl alcohol and dry with a clean, soft cloth.

CLEANING

3. Paint Removal Procedures

NOTE: PAINT REMOVAL PROCEDURES ARE REQUIRED ONLY FOR COMPLETE OVERHAUL WHICH SHALL OCCUR EVERY 500 LANDINGS. IF 500 LANDINGS HAVE NOT BEEN ACCUMULATED AT THE TIME OF TIRE CHANGE, DO NOT REMOVE PAINT. ALL OTHER COMPONENT OVERHAUL PROCEDURES REQUIRED EVERY TIRE CHANGE.

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

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

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

B. Completely disassemble the wheel prior to paint removal. Remove fuse plugs (22), inflation valve (16), heat shields (25), heat shield clips (28), key drives (26) and bearing cups (17 and 27).

NOTE: REFER TO REPAIR FOR RETREATING AND REPAINTING WHEEL.

CHECK

1. Check Materials

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

Type	Penetrant	Developer	Supplier
Fluorescent	Zyglo ZL-16	Zyglo ZP-13 (wet) optional	Magnaflux Corp. 7310 West Lawrence Ave. Chicago, IL. 60656
	Penetrex ZL-2A with emulsifier ZE-4	Penetrex ZP-4 (dry) or ZP-13 optional	
Red Dye	Spot Check	Spot Check	
	Dy-Chek	Dy-Chek	Turco Products Division of Purex Corp. P.O. Box 6200 Carson, CA 90749
	Met-L-Chek	Met-L-Chek	Met-L-Chek Company 1639 Euclid Street Santa Monica, CA 90404

2. General (Ref. IPL Fig. 1)

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

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

3. Detailed Check

A. Check wheel halves (15 and 21) for cracks and structural damage. Take particular note of bead seat, fuse plug and valve areas. Check the underside of the wheel tubewell area paying particular attention to the critical area from the tire bead seat radius to the end of the toe of the tire.

CHECK

NOTE: DYE PENETRANT PROCEDURE FOR WHEELS ARE REQUIRED ONLY FOR COMPLETE OVERHAUL WHICH SHALL OCCUR EVERY 500 LANDINGS. IF 500 LANDINGS HAVE NOT BEEN ACCUMULATED AT THE TIME OF TIRE CHANGE, DO NOT DYE PENETRANT INSPECT WHEELS. ALL OTHER COMPONENT OVERHAUL PROCEDURES REQUIRED EVERY TIRE CHANGE.

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

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

C. Check bearing cups (17 and 27) in the wheel halves for looseness, wear, corrosion, spalling, brinelling, scratches, pitting, and heat discoloration. Replace defective bearing cups in accordance with **REPAIR**.

D. Check roller surfaces of bearing cones (9) for wear, corrosion, spalling, scratches, pitting, and heat discoloration. Check bearing cage for nicks, dents, distortion, and wear in the roller pockets. Replace bearing cones having any of the above defects.

E. Check key drives (26) on inner wheel half (21) for wear and tightness. If the measurement between any two keys exceeds 0.510 inch, replace all key drives on wheel half. Refer to **REPAIR** for proper removal and installation procedures.

F. Check the fuse plugs (22) in the inner wheel half subassembly (20) for melting of the fusible material. Replace fuse 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. Refer to **REPAIR** for replacement procedure.

CHECK

G. If any fuse plugs are blown or melted, replace in accordance with **REPAIR** and perform the following hardness check on inner wheel half (21).

1) Perform a hardness test on the inner or outer surface of the wheel drive flange as shown in Figure 401. Remove paint from surfaces to be tested and obtain three hardness readings, equally spaced. If the average value obtained is below BHN 100 as specified in Figure 402, replace wheel half.

2) If wheel half meets the above requirements, perform a second hardness test on bead seat surface as shown in Figure 401. Obtain three equally spaced BHN scale readings around the circumference. If an average value of less than BHN 100 is obtained, replace the wheel half.

3) If the inner wheel half fails the above test, the outer wheel half (15) should be checked in a similar manner. Acceptance values are given in Figure 404 and location shown in Figure 403.

H. Check self-locking nuts (10) for worn, stripped or crossed threads. Replace if any of the above damage exists. Check the nuts self-locking feature. Replace when the nut can be run down with the fingers after the locking feature engages the bolt.

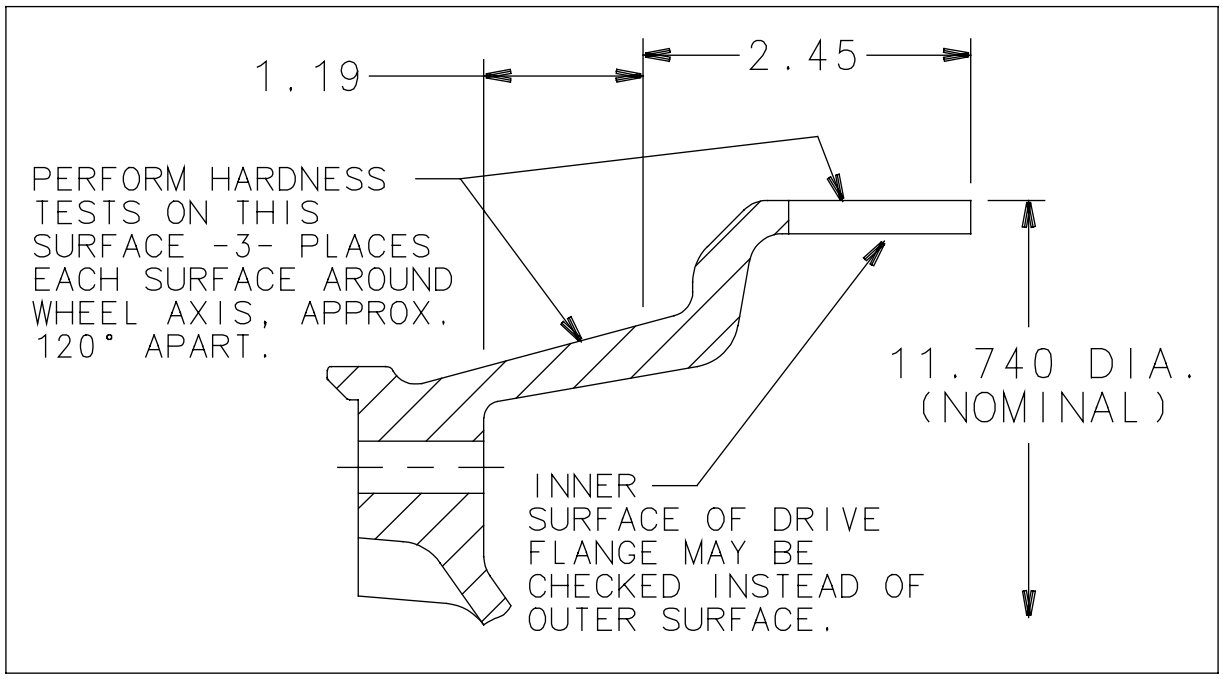
I. Magnetic particular check wheel bolts for cracks, particularly in the areas near the bolt head radius and the threads. No reworking of wheel bolts is permissible. If any wheel bolt exhibits cracks, replace all nine bolts.

J. New O-rings should be installed at each overhaul. Remove burrs or other damage on the adjoining wheel components that could cause O-ring damage.

K. Examine grease seals (8) for cuts, nicks, distortion, and other damage. Check for security of rubber-to-metal bond. Replace seals having any of these defects.

L. Replace bent or distorted snap rings (7).

CHECK

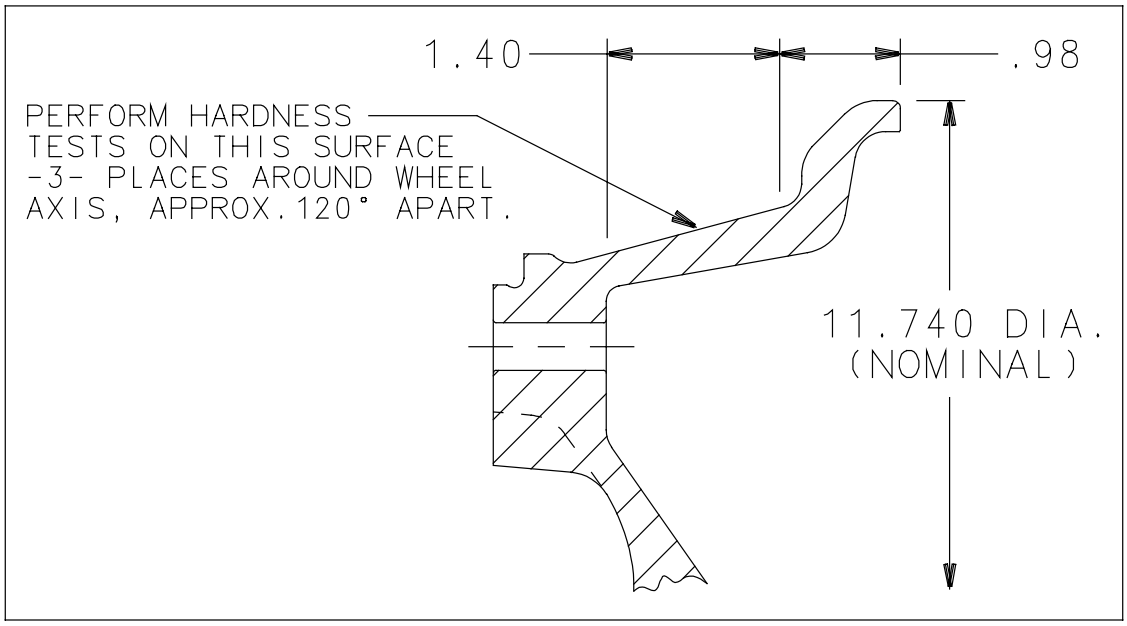


HEAT DAMAGE TESTS-INNER WHEEL HALF
FIGURE 401

ITEM	BRINELL TEST
BALL DIAMETER	10 MM.
TEST LOAD	500 kg.
NUMBER OF READINGS EQUALLY SPACED	3
ACCEPTABLE MINIMUM AVERAGE HARDNESS	100
MAXIMUM RANGE OF THREE READINGS	2 POINTS

HARDNESS TEST READINGS
FIGURE 402

CHECK



HEAT DAMAGE TESTS-OUTER WHEEL HALF
FIGURE 403

ITEM	BRINELL TEST
BALL DIAMETER	10 MM.
TEST LOAD	500 kg.
NUMBER OF READINGS EQUALLY SPACED	3
ACCEPTABLE MINIMUM AVERAGE HARDNESS	100
MAXIMUM RANGE OF THREE READINGS	2 POINTS

HARDNESS TEST READINGS (O.B. HALF ONLY)
FIGURE 404

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REPAIR

1. Repair Materials

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR ITEMS LISTED BELOW.	
Equipment/Material	Description
Dry Cleaning Solution Specification P-D-680 Stoddard Solvent	Commercially Available
Aluminum Oxide Cloth (400 Grit Wet or Dry)	Commercially Available
Chromate Conversion Coating Specification MIL-C-5541 Class 1A	Commercially Available
Epoxy-Polyamide Primer Specification MIL-P-23377	Commercially Available
Epoxy-Polyamide Topcoat Specification MIL-C-83286 Gloss Insignia White FED-STD-595 Color No. 17925	Commercially Available
Grease Dow Molykote 55M Grease	Dow Corning Corp. Box 1767 Midland, Michigan 48640

2. General (Ref. IPL Fig. 1)

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

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

REPAIR

3. Repair of Wheel Halves (15 and 21, Ref. Figure 501)

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

B. In area 1, polish out corrosion pits, scratches, and tool marks to 0.015 inch deep and 0.50 in long. Surface finish in bead seat radius should be 20 microinches RMS.

C. In area 2, blend out and polish imperfections to 0.030 inch deep and 1.00 inch long. Reworked area is not to exceed 1.00 square inch. Do not remove metal if surface directly opposite was previously reworked.

D. In area 3, blend out and polish imperfections to 0.030 inch deep and 1.00 square inch in area.

E. In area 4, polish out imperfections to 0.010 inch maximum depth in register area, provided sealing qualities are maintained.

F. In area 5, blend out and polish imperfections to 0.030 inch deep and 1.00 square inch in area.

G. In area 6, rework is limited to 0.040 inch deep and 0.50 square inch in area at a maximum of two places.

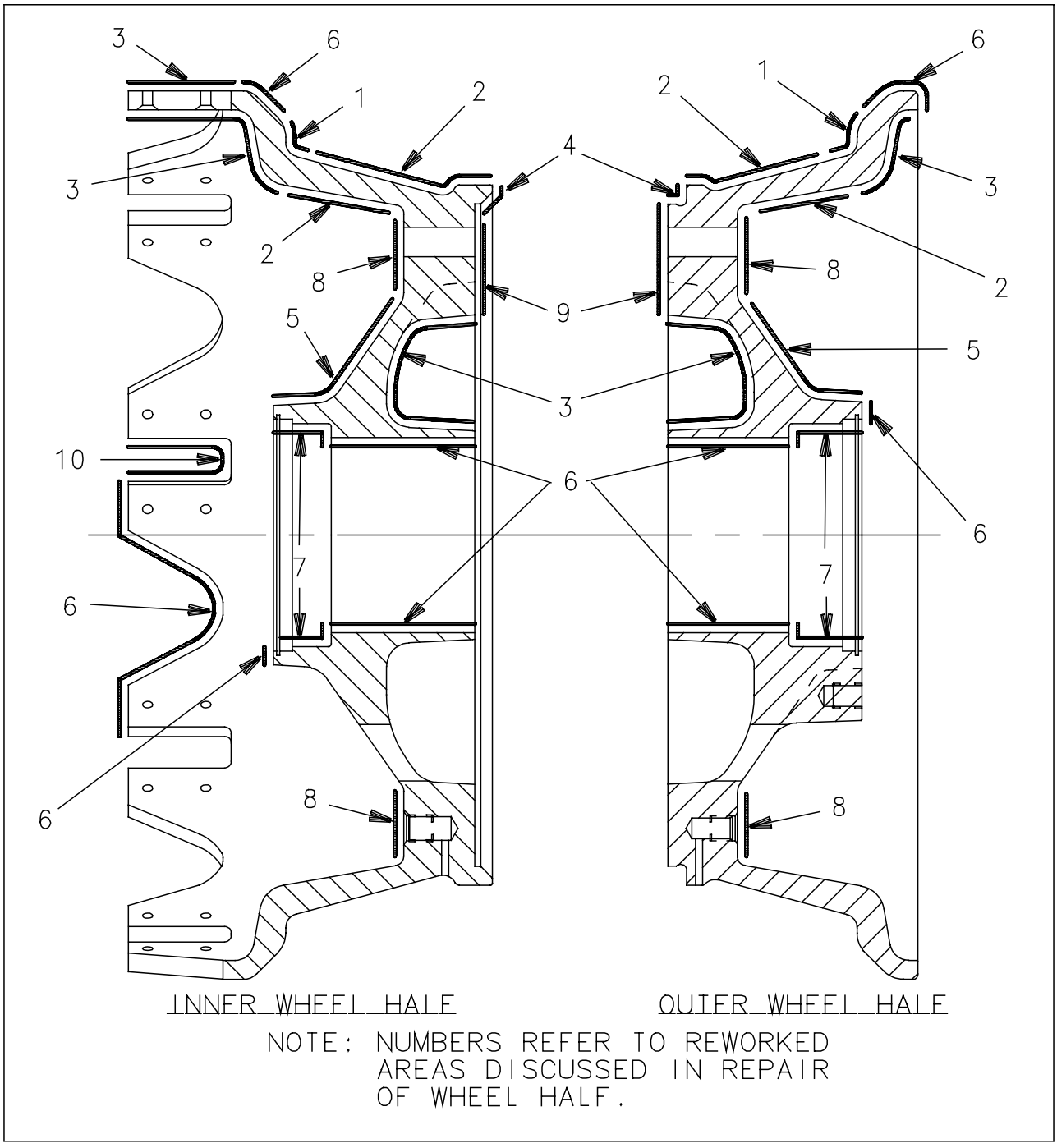
H. In area 7, rework is limited to blending out scratches and corrosion, provided bearing cup retention is not affected.

I. In area 8, rework is limited to 0.010 inch maximum depth on face of each bolt boss.

J. In area 9, the maximum repair is 0.010 inch deep and 0.50 square inch on each interface boss.

K. In area 10, blend out and polish imperfections 0.030 inch deep and not to exceed an area of 0.120 inch by 0.120 inch. Blending is not to extend across the full interface of the keyslot.

REPAIR



WHEEL REPAIR LIMITS
FIGURE 501

REPAIR

4. Repainting

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

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

B. Treat reworked areas with chromate conversion coating, specification MIL-C-5541, Class 1A.

C. Apply one coat of epoxy-polyamide primer, specification MIL-P-23377 to reworked areas.

CAUTION: DO NOT GET PAINT ON ROLLER CONTACTING SURFACES OF BEARING CUPS. PAINT ON THESE SURFACES WILL CONTRIBUTE TO BEARING FAILURE.

D. Apply two coats of epoxy-polyamide topcoat, specification MIL-C-83286, Gloss Grey FED-STD-595, Color No. 16440 to reworked areas.

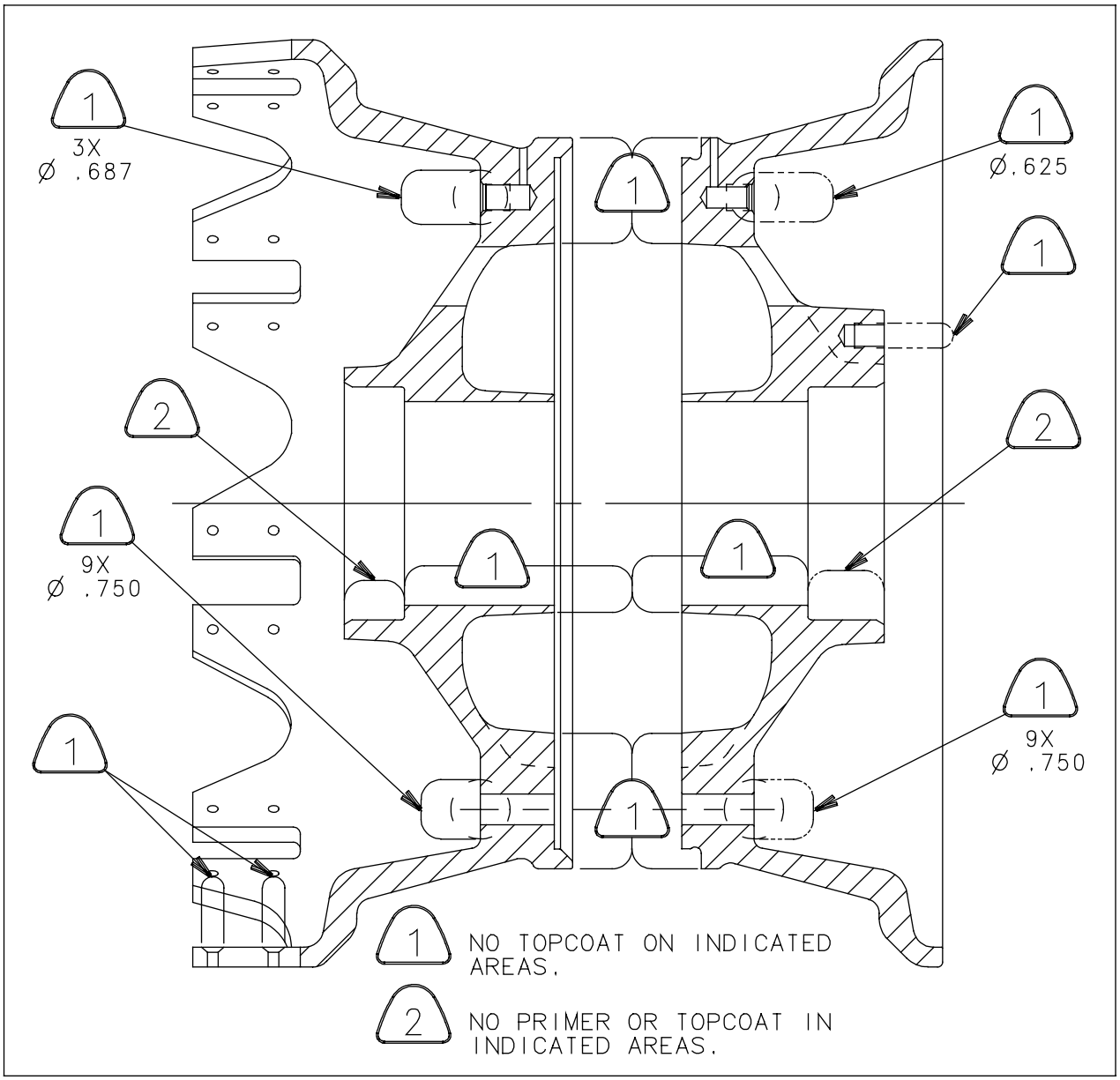
NOTE: REFERENCE FIGURE 502 FOR LOCATIONAL PAINT REQUIREMENTS.

5. Replacing Defective Bearing Cups (17 and 27)

A. Heat wheel half in an oven not exceeding 250° F for 30 minutes.

B. Remove cup from bore by tapping it out evenly with a fiber or phenolic punch. Exercise extreme care to avoid raising burrs in the hub bore.

REPAIR



PAINT REQUIREMENTS
FIGURE 502

REPAIR

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

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

D. Chill new bearing cup to be installed with dry ice.

E. Heat wheel half in oven not exceeding 250° F for 30 minutes.

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

G. Brush a wet coat (generous but not dripping) of MIL-P-23377 primer into the bearing bore.

H. Hand press the bearing cup into the coated housing making sure the backing surface of the cup mates to the shoulder of the bearing bore. Avoid cocking the cup during installation.

I. Remove excess primer compound with a clean shop towel so that a fillet of not more than 0.08 wide extends beyond the cup.

6. Replacing Defective Key Drives (26), Heat Shields (28), and Heat Shield Clips (25) from Inner Wheel Half (21)

A. Cover bearing cup to prevent contamination by fillings.

B. Grind or file off shop heads of rivets (24), being careful not to damage inner wheel half (21).

C. Punch out rivets, being careful not to enlarge or damage rivet holes in wheel half.

D. Remove and discard key drives (26), heat shields (28), and heat shield clips (25).

REPAIR

E. Blend out any scratches or corrosion on wheel half; then retreat and repaint blended areas in accordance with REPAINTING paragraph.

F. Using one ∅ 0.125 Cleco, fasten one 157-01900 heat shield, one 205-04400 drive key, and one 157-01600 heat shield clip to the inner wheel half as shown in Figure 503.

G. Install one 105-09900 rivet through the c'sunk side of the wheel, through the hole adjacent to the Cleco. Squeeze the rivet and inspect to insure that the ∅ 0.187 min. clinch requirement is obtained.

H. Repeat this procedure to install remaining 205-04400 drive keys, 157-01900 heat shields, 157-01600 heat shield clips, and 105-09900 rivets.

7. Replacing Fuse Plugs

A. Unscrew and remove fuse plug (22) and O-Ring (23) from inner wheel half subassembly (20).

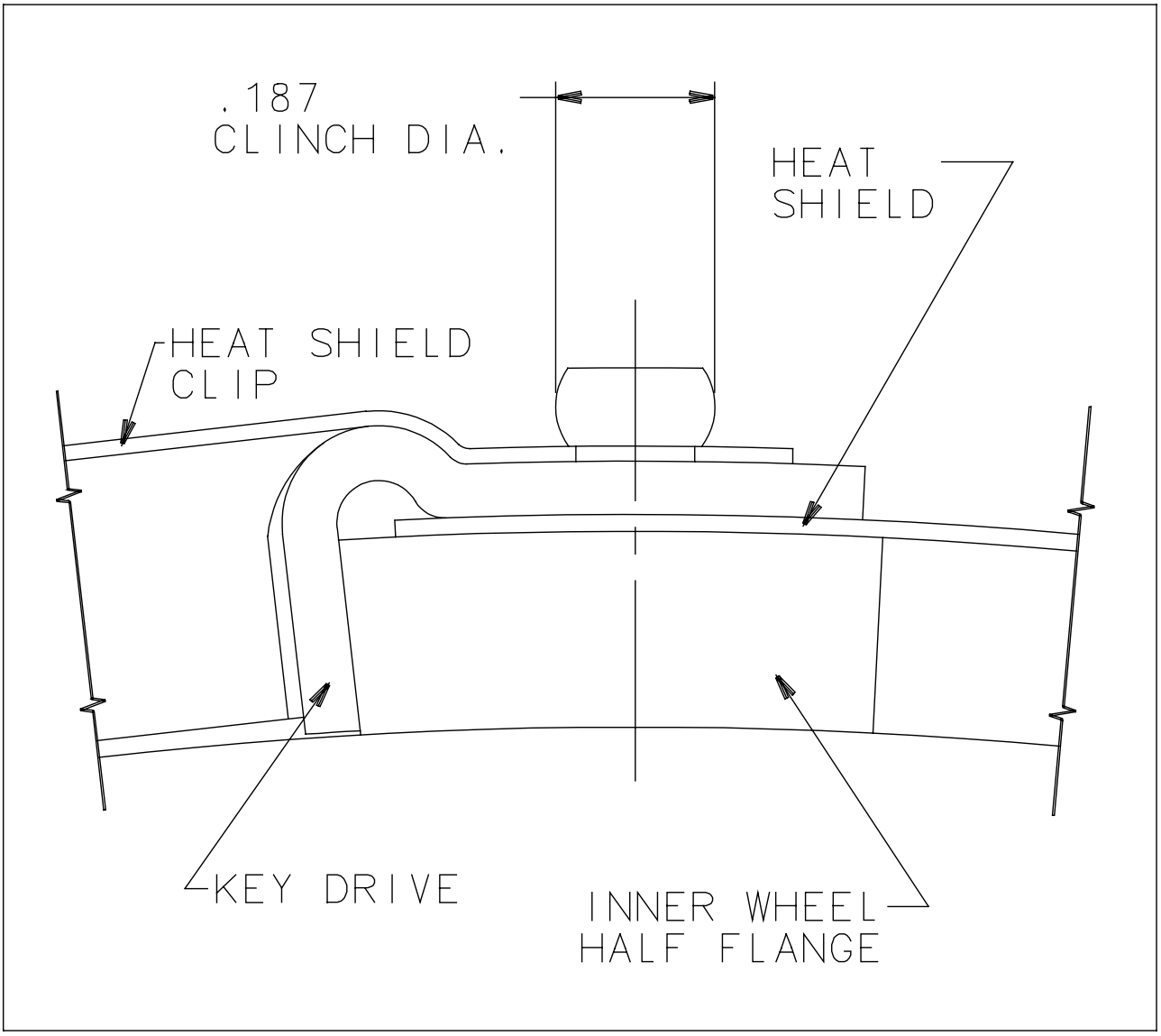
B. Check threaded holes for stripped threads, burrs, and other damage.

C. Lubricate new O-Ring (23) with Dow Molykote 55M grease.

D. Install O-Ring on new fuse plug body.

E. Install fuse plugs into inner wheel half and tighten plugs to a torque value of 30 in-lb.

REPAIR



INSTALLATION OF HEAT SHIELD CLIP
FIGURE 503

ASSEMBLY

1. Assembly Materials

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR ITEMS LISTED BELOW.	
Grease Specification MIL-G-81322	Commercially Available
Antiseize Compound (Lubtork) Specification MIL-T-5544	W.J. Ruscoe & Company 485-T Kenmore Blvd. Akron, OH 44301
Isopropyl Alcohol	Commercially Available
Silicone Grease Dow Molykote 55M	Dow Corning Corp. Box 1767 Midland, Michigan 48640

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

A. Assemble wheel on a clean flat surface.

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

C. Install Fuse Plugs (22) in accordance with **REPAIR**.

D. Install inflation valve (16) in outer wheel half (15). Apply Dow Molykote 55M to O-Ring prior to installation of inflation valve. Torque to 50 to 60 in-lb.

E. If removed, install the bearing cups (17 and 27), key drives (26), heat shields (28), and heat shield clips (25) in accordance with **REPAIR**.

ASSEMBLY

F. Place outer wheel half subassembly (14) on work surface with flange down. Clean wheel flange, bead seat, register and packing groove with a cloth dampened with isopropyl alcohol.

G. Lubricate O-Ring (19) with Dow Molykote 55M grease and install in wheel register groove of outer wheel half (15).

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

H. Place serviceable 22 x 8.0-10, 12 ply tubeless tire over outer wheel half subassembly (14).

I. Position inner wheel half subassembly (20) in tire so lightening holes in both wheel halves are aligned.

J. Lubricate bolt and nut threads and bearing surfaces of bolt (12) heads, washers (11 and 13) and nuts (10) with antiseize compound, specification MIL-T-5544. Slide a countersunk washer (13) onto each bolt, then slide bolts through inner wheel half subassembly (20).

CAUTION: COUNTERSUNK SIDE OF WASHER (12) MUST BE TOWARD THE BOLT HEAD OR BOLT FAILURE MAY RESULT. INSTALL BOLT HEADS ON INNER WHEEL HALF (21).

K. Compress wheel halves and install a washer (11) and a nut (10) on each bolt (12).

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

ASSEMBLY

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

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

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

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

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

O. Pack bearing cones (9) with clean bearing grease, specification MIL-G-81322 and install in wheel assembly.

P. Install grease seals (8) and snap rings (7).

Q. Install hubcap subassembly (3) with screws (2) on outer wheel half subassembly (14). Torque screws 25 to 30 in-lb.

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

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STORAGE INSTRUCTIONS

1. Wheels Stored with Tires Installed

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

B. The wheel/tire assembly should be stored in a clean, cool, dry storeroom out of direct sunlight. The desirable storeroom temperature range is 32° to 70° F. If this temperature range cannot be maintained, temperatures as high as 100° or even 125° F can be tolerated for short periods.

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

2. Wheels Stored without Tires Installed

A. Store without the O-Ring (19) installed between the two halves.

3. Plug or cover bearing hub area during storage to prevent contamination. While wheels are in storage, bearing cones (9) packed with grease, specification MIL-G-81322 and grease seals (8) should be bagged separately. Hubcap subassemblies (3) should be installed loosely with three screws (2).

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FITS AND CLEARANCES

ITEM NO. (REF. IPL) (FIG. 1)	NOMENCLATURE	TORQUE VALUES
10	WHEEL BOLT NUT	300 POUND-INCHES (LUBTORK)*
16	INFLATION VALVE	50-60 POUND-INCHES
22	FUSE PLUGS	30 POUND-INCHES
* LUBTORK - AT EACH INSTALLATION, LUBTORK BOLT AND NUT HEADS AND BEARING SURFACES OF NUTS, BOLT HEADS, AND WASHERS WITH ANTIZEIZE COMPOUND CONFORMING TO SPECIFICATION MIL-T-5544.		

TORQUE VALUES
801

ITEM NO. (REF. IPL) (FIG. 1)	NOMENCLATURE	WEAR LIMIT
26	KEY DRIVES	.510 MAXIMUM (BETWEEN ANY TWO KEY DRIVES)

WEAR LIMITS
FIGURE 802

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ILLUSTRATED PARTS LIST

1. Introduction

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

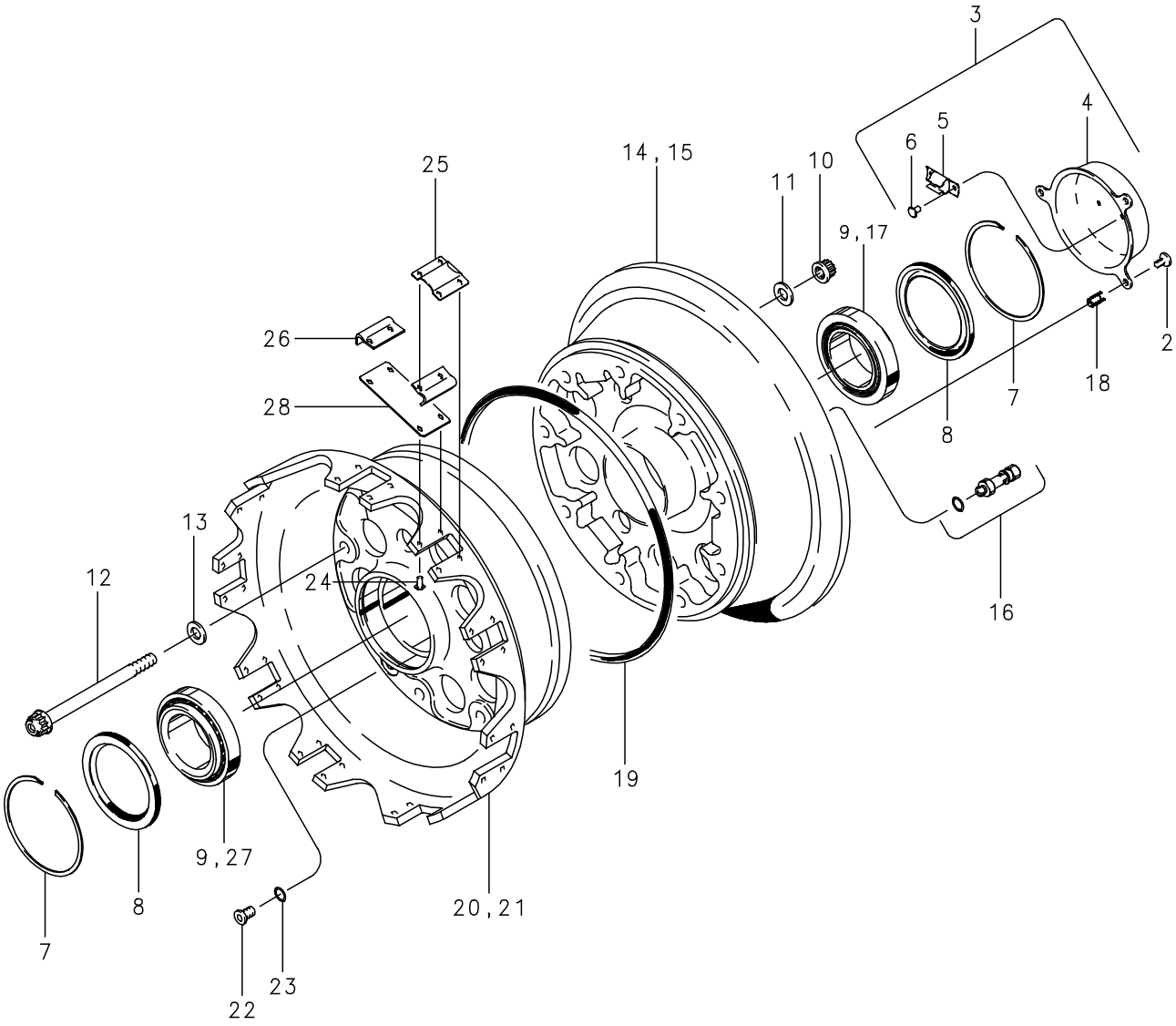
B. The Figure Item column provides the cross reference between the parts list and IPL Figure 1.

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

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

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

ILLUSTRATED PARTS LIST



Illustrated Parts List (IPL) for 40-202 Wheel Assembly
Figure 1

ILLUSTRATED PARTS LIST

2. Parts List

FIGURE ITEM	PART NUMBER	NOMENCLATURE	UNITS PER ASSY
1	40-202	WHEEL ASSEMBLY	1
2	102-07100	SCREW (AN501A10-6)	3
3	158-01501	HUBCAP SUBASSEMBLY	1
4	*	HUBCAP	1
5	*	DRIVE COUPLING	1
6	*	RIVET (MS20426AD4)	2
7	155-07500	SNAP RING	2
8	154-03700	GREASE SEAL	2
9	214-04500	CONE-BEARING (TIMKEN LM503349)	2
10	094-14900	NUT (SPS 42FLW-624))	9
11	095-03500	WASHER (MS20002-6)	9
12	103-31400	BOLT (MS21250-06-030)	9
13	095-03100	WASHER (MS20002C6)	9
14	162-11600	OUTER WHEEL HALF SUBASSEMBLY	1
15	*	OUTER WHEEL HALF	1
17	214-04600	CUP-BEARING (TIMKEN LM503310)	1
18	*	INSERT (TRIDAIR RKKA1031)	3
16	160-00700	INFLATION VALVE (DILL TR762-03)	1
19	101-24100	O-RING (MS28775-266)	1
20	161-12600	INNER WHEEL HALF SUBASSEMBLY	1
21	*	INNER WHEEL HALF	1

* PART NOT PROCURABLE

ILLUSTRATED PARTS LIST

FIGURE ITEM	PART NUMBER	NOMENCLATURE	UNITS PER ASSY
22	106-00200	FUSE PLUG	3
23	101-20700	O-RING (MS28778-2)	3
24	105-09900	RIVET (MS20426AD4-9)	36
25	157-01600	HEAT SHIELD CLIP	9
26	205-04400	KEY DRIVE	18
27	214-04600	CUP-BEARING (TIMKEN LM503310)	1
28	157-01900	HEAT SHIELD	9

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

Date: _ _/_ _/20_ _

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

To whom it may concern:

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

KIT NUMBER: 199-_____

FAA APPROVAL: 1) STC # _____

NO OTHER APPROVALS NECESSARY

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

A/C MAKE: _____

A/C MODEL_____

TAIL # _____

Regards,

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

United States of America

Department of Transportation — Federal Aviation Administration

Supplemental Type Certificate

Number SA1441GL

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

certifies that the change in the type design for the following product with the limitations and conditions thereof as specified hereon meets the airworthiness requirements of Part 25 of the Federal Aviation Regulations: See Type Certificate Data Sheet A22CE for complete certification basis.

Original Product — Type Certificate Number A22CE
Make Cessna
Model S550

Description of Type Design Change:

Installation of Cleveland Wheels and Brakes in accordance with Parker Hannifin Conversion Kit Parts List 199-177, Revision F, dated February 1, 1993, or later FAA approved revision.

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

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

Date of application: November 9, 1989
Date of issuance: January 18, 1990
Date reissued:
Date amended: November 18, 1993

By direction of the Administrator

Charles L. Smalley
(Signature)

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

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

This certificate may be transferred in accordance with FAR 21.47

FAA Form 8110-2 (10-68)