

AIRCRAFT WHEEL & BRAKE DIVISION
PARKER HANNIFIN CORPORATION
AVON, OHIO

PARTS LIST

199-535 SEAL REPAIR KIT

FOR

15-2, 15-8, 15-9, 15-10, 15-11, 15-13, 15-14, or 15-16 SHIMMY DAMPERS

<u>PART NUMBER</u>	<u>CODE NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
095-02600	095-02600	Stat-O-Seal Washer	1
101-00300	101-00300	O-Ring, Thermal Piston (MS28775-008)	1
101-01000	101-01000	O-Ring, Piston rod –Gland (MS28775-112)	2
101-01400	101-01400	O-Ring, Piston (MS28775-116)	1
101-01500	101-01500	O-Ring, Gland (MS28775-210)	1
139-13700	139-13700	Glyd Ring, Piston	1
095-03800	095-03800	Washer	1
155-08400	155-08400	Ring, Retaining, Thermal Piston	1
155-08500	155-08500	Ring, Retaining, Main Body	1

Publication Package (P/N PP199-53500)

199-535 P/L	-----	Parts List for 199-535 Kit (This Document)	1
CM 15-2	-----	Component Maintenance Manual for 15 Series	1

NOTES:

1. This Seal Kit will overhaul one 15-2, 15-8, 15-9, 15-10, 15-11, 15-13, 15-14, or 15-16 Damper Assembly.
2. Elastomeric cure date required per ESP3620.

199-535	REV. NC	05-08-1985(276-74)
	Rev A	01-22-1988 (287-76)
	Rev B	05-15-2000 (0312-96)
	Rev C	07-30-2007 (0375-52)
	Rev D	10-31-2008 (0382-27)

OVERHAUL INSTRUCTIONS FOR SHIMMY DAMPERS

SHIMMY DAMPER APPLICABILITY:

P/N's: 15-2, 15-8, 15-9, 15-10, 15-11, 15-13, 15-14, 15-16

INTRODUCTION:

Refer to IPL, Figure 5 for component identification. A prepackaged kit (199-535) contains the rings and seals required for unit overhaul of the above noted shimmy dampers.

SPECIAL TOOLS: Tools not normally found in a Mechanics / Technician's toolbox.

- Snap ring pliers (external type) - commercial source
- O-Ring extracting tool – 199-18 Extraction Tool Set, Parker Hannifin Corp., Aircraft Wheel & Brake
- Oil pan (large enough to submerge damper)
- HeliCoil Tools (per MIL-T-21309)
- Fabricated Tools (see Figure 4)

DISASSEMBLY:

CAUTION: REMOVE ANY BURRS OR WRENCH DAMAGE FROM ENDS OF ROD TO AVOID SUBSEQUENT CYLINDER DAMAGE.

NOTE: Disassembly of snap ring (7) and floating piston (4) requires the fabrication of 2 special tools (see Figure 4)

NOTE: Remove and discard all O-rings (14, 15, 16, 17), glyd ring (11), and stat-o-seal (12).

a. Using snap ring pliers, remove snap ring (6) from cylinder body (1).

CAUTION: DAMPER IS FILLED WITH HYDRAULIC FLUID. PERFORM THE NEXT STEPS OVER DRAIN PAN.

b. Remove screw (13) and stat-o-seal (12) from body (1).

c. Gently push the piston rod (2) [with end gland (5) and piston (3)] out from body.

d. Remove end gland (5) from piston rod (2).

e. Push piston rod (2) with piston (3) the rest of the way out of the body.

NOTE: Piston (3) is locked in place on rod by way of the roll pin (10). If the piston (3) or piston rod (2) are damaged, or if the piston rod is found to be non-repairable, discard part.

f. Carefully clamp piston rod (2), with the snap ring (7) in the up position, in bench vise (with protective jaws).

WARNING: PISTON ROD IS SPRING LOADED.

g. Compress washer (9) and spring (8) using special tool (see Figure 4) and using snap ring pliers, remove snap ring (7) from piston rod groove.

h. Carefully remove washer (9) and spring (8) from rod bore.

i. Thread special tool (see Figure 4) into end of floating piston (4) and gently pull piston from rod bore.

CLEANING:

CAUTION: CARE SHOULD BE USED SO AS NOT TO REMOVE THE NAMEPLATES ON THE DAMPER BODY.

Degrease all metal components with Type 1 Stoddard Solvent (per P-D-680). Blow low pressure, clean shop air thru all internal passages and ports to ensure they are free of foreign material.

INSPECTION: Replace any damaged components.

- Visually inspect all components for excessive wear, scoring, cracks, chips, nicks, scratches, burrs, pitting, corrosion, flaws, stripped or scored or otherwise defective threads and other obvious signs of damage.
- Visually inspect the cylinder body (1) bore for nicks, scratches or signs of excessive wear or side load.
- Visually inspect the piston rod (2), piston (3), and floating piston (4) for scratches and nicks on O.D.
- Check end gland (5) for scratches or evidence of excessive side load in I.D.
- Replace nut (18) on clamp assy (14) if locking feature is damaged or destroyed.
- Inspect clamp assembly for distortion from excessive loading conditions. Check any welds for development of cracks.

REPAIR: Repair is limited to the cylinder body (1) and the piston rod (2).

Cylinder body (1): Polish out small nicks and scratches on exterior of cylinder body and bore using #400 grit or finer, wet or dry aluminum oxide paper. Finish must be 16 RMS or better in cylinder bore. Clean with a water-based cleaner/degreaser per AMS 1526 or equivalent. Treat repaired areas with alodine 1200 or equivalent per MIL-C-5541, Class 1A.

Piston rod (2): Polish or burnish out small scratches on stainless steel rod O.D. using #400 grit or finer, wet or dry aluminum oxide paper. Finish must be 16 RMS or better.

REPLACEMENT: Inserts (25) – Do not replace inserts unless damaged

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

Support clamp assembly (23) and remove damaged inserts by applying a HeliCoil extracting tool to the insert, striking the head of the tool a light blow and turning it counterclockwise, maintaining steady downward pressure.

Refer to Figure 3. Use HeliCoil tools to install inserts into lower clamp (24) such that insert is two to five threads below surface as shown. Break off tang.

ASSEMBLY: Refer to Figure 1 and applicable assembly drawing for reference.

NOTE: Setting the assembly depth of the floating piston (4) requires the fabrication of special tools (see Figure 4).

Prior to assembly, liberally coat O-rings (14, 15, 16, 17), glyd ring (11) with Dow Corning 55-O-ring Compound (not furnished in kit) to facilitate installation and sealing. Also coat bores, rod ends, and wrench flats to prevent O-ring damage. Assemble as follows:

- a. Install O-ring (16) and glyd ring (11) on O.D groove of piston (3).
- b. Install O-ring (15) in I.D. groove of end gland. Install O-ring (17) in O.D. groove of end gland (5).
- c. Install O-ring (14) on groove on the floating piston (4).
- d. Install O-ring (15) in I.D. groove of housing (1).
- e. Install stat-o-seal (12) on screw (13).
- f. Install end gland (5) on piston rod (2) and position end gland by sliding it up against the piston (3).

CAUTION: THE NEXT STEPS MUST BE PERFORMED WITH THE SHIMMY DAMPER HOUSING COMPLETELY SUBMERGED IN HYDRAULIC FLUID. THE UNIT IS SELF CONTAINED AND AIR ENTRAPMENT MUST BE ABSENT FROM THE SYSTEM.

Fill the oil pan with hydraulic fluid, enough to completely submerge the damper and continue with assembly as follows:

CAUTION: IF BLEEDER HOLE IS NOT FACING DOWN, HYDRAULIC FLUID COULD BE SQUIRTED UP INTO FACE WHEN INSTALLING COMPONENTS.

- g. Submerge shimmy damper and allow to fill with fluid. Turn so bleeder hole may face down into oil pan.

CAUTION: USE ASSEMBLY BULLET TOOL TO PREVENT THE POSSIBILITY OF CUTTING THE O-RING (15) IN THE HOUSING BORE WHEN SLIDING PAST THE CLEVIS END OF THE PISTON ROD.

- h. Thread assembly bullet into clevis end of piston rod (2) and install piston rod by inserting into housing bore, clevis end first, until the rod pushes through the housing bore and past the wrench flats.
- i. While unit is still submerged, install screw (13) and stat-o-seal (12) and hand tighten for now.

CAUTION: DAMPER IS FILLED WITH HYDRAULIC FLUID. PERFORM THE NEXT STEPS OVER DRAIN PAN.

CAUTION: PLACE UNIT IN VISE JAWS SUCH THAT JAWS ARE IN CONTACT WITH CYLINDER BODY AND NOT PISTON ROD. BE AWARE THAT EXCESSIVE JAW PRESSURE WILL BIND PISTON AND DAMAGE UNIT.

- j. Remove unit from hydraulic fluid in upright position and place in protective jaws of bench vise being careful not to let fluid drain from piston rod bore.

NOTE: It will be necessary to loosen bleeder screw (13) slightly to relieve pressure while seating end gland. Re-tighten bleeder screw (13) after end gland is seated.

- k. Continue to push down against end gland (5) until end gland bottoms and seats against step in housing bore (refer to Figure 1).

NOTE: The use of the end gland support tool (see Figure 4) or equivalent will provide support in pushing against the end gland.

- l. Install snap ring (6) over end gland and into housing groove– sharp edge out (refer to Figure 1).

NOTE: Piston rod bore must be completely full of hydraulic fluid before installing floating piston (4).

- m. Install floating piston (4) - chamfered end first into piston rod bore.

ASSEMBLY: (continued)

NOTE: It will be necessary to loosen bleeder screw (13) slightly to relieve pressure while setting floating piston. Torque bleeder screw (13) to 25 to 30 in-lb after floating piston is set.

- n. Provide support for clevis end of piston rod (2). Install applicable sleeve onto set tool and push the floating piston (4) down to required installed depth (refer to Figure 2). See assembly drawings for reference: For all assemblies, the install height is 1.50 inches (use 1.50 inch sleeve)
- o. Install spring (8) on top of floating piston (4).
- p. Place washer (9) on spring and use spring compression tool to compress spring into piston rod bore. While spring is compressed, install snap ring (7) over washer (9) and into piston rod I.D. groove – sharp edge out (refer to Figure 1).
- q. Remove unit from vise and wipe unit dry.
- r. Test unit per testing procedure.
- s. Re-Install shimmy damper on aircraft in reverse order that unit was removed and torque clamp assy. nut (22) to torque specified in torque limits table (see IPL – Figure 5B). For the 15-14 assy, install the clamp assy (23) as follows:
 1. Snug the two screws alternately to maintain approximately the same gap between each ear of the upper and lower clamps.
 2. Tighten one screw to 5 in-lb, then the other.
 3. Repeat the process, raising the torque by 5 in-lb increments up to 25 in-lb, while maintaining approximately the same gap between each ear of the upper and lower clamps.
 4. End with 25 to 28 in-lb of final torque and approximately the same gap between each ear of the upper and lower clamps.
 5. Check to see that the body is restrained, but not restricted.

CAUTION: EXCESSIVE TORQUE ON THE SCREWS (28) IN EXCESSIVE OF 50 IN-LB MAY BIND THE PISTON IN THE BORE.

6. If the body is still free to rotate in the clamp, then the torque may be increased in 5 in-lb increments up to a maximum of 50 in-lb.

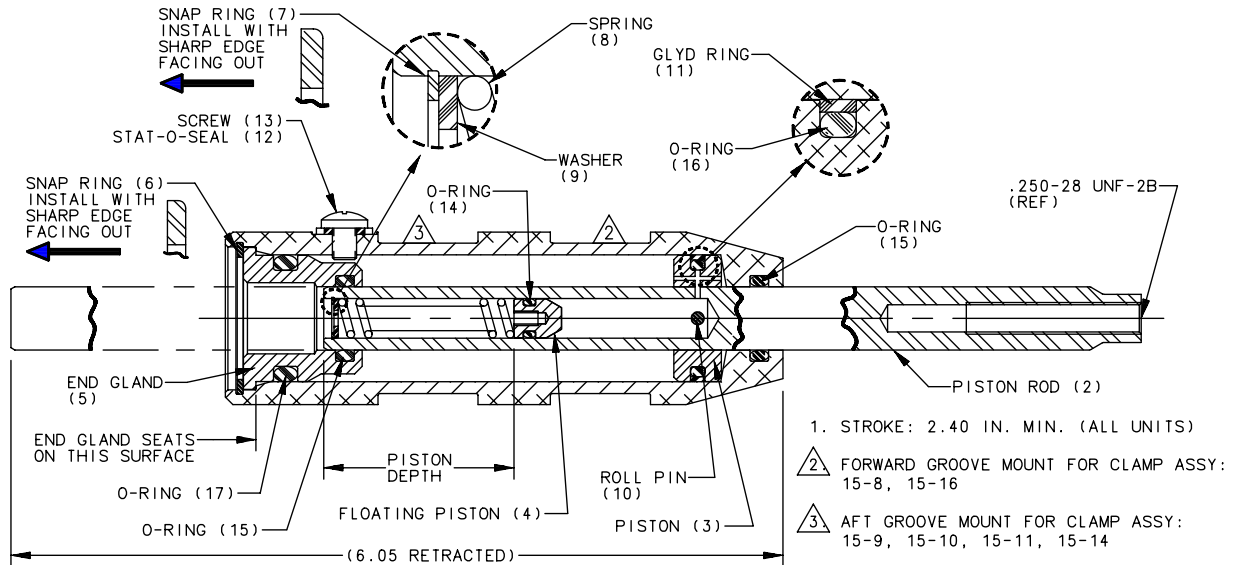
TESTING: Failure of the unit to perform any one of the following tests is cause for rejection.

NOTE: Testing of the unit (compression and stroke) requires the fabrication of a handle (see Figure 4). Refer to the assembly drawing of each applicable unit for stroke parameters.

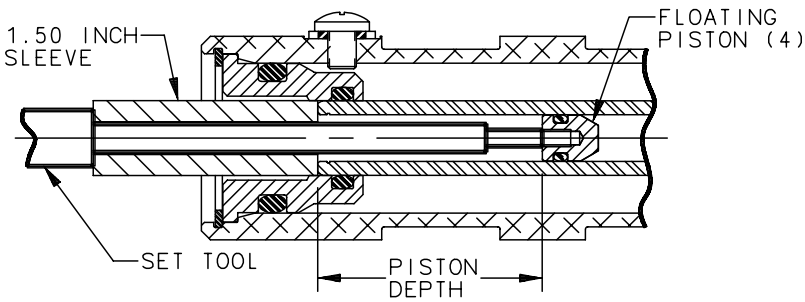
Due to the nature of the design of the unit, the only testing that is required is to hand stroke a minimum of two complete strokes to check for any leakage of fluid and any evidence of binding.

Support the unit in a test fixture or other suitable means and test as follows:

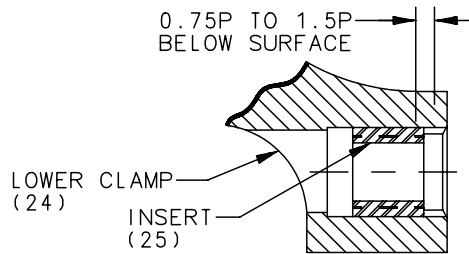
Hand stroke unit a minimum of two complete strokes to demonstrate satisfactory rod movement/or stroking. During the test there shall be no sign of lag or “dead spot” at the beginning of either the extended or retract stroke. During the test there shall be no sign of any external leakage. Rod movement must be free from any indication of binding.



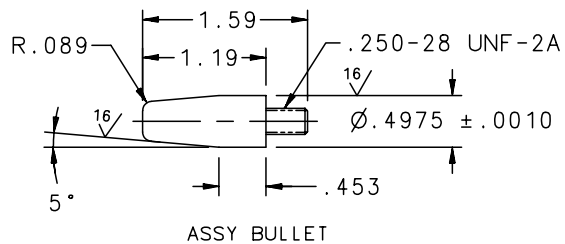
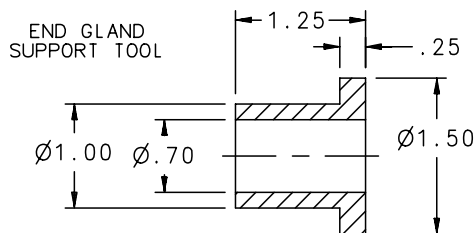
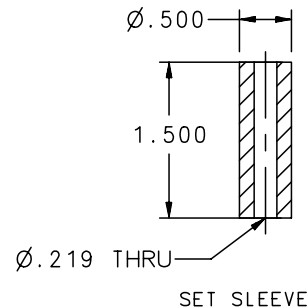
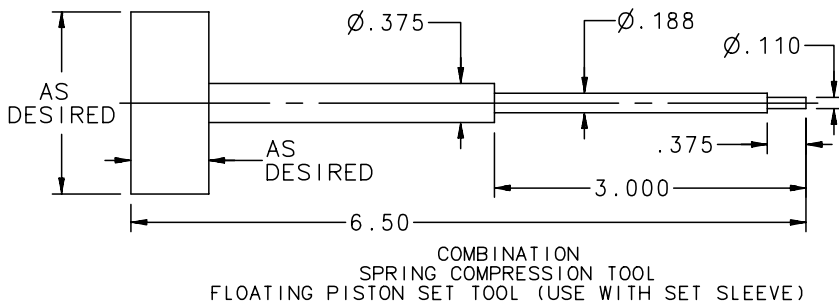
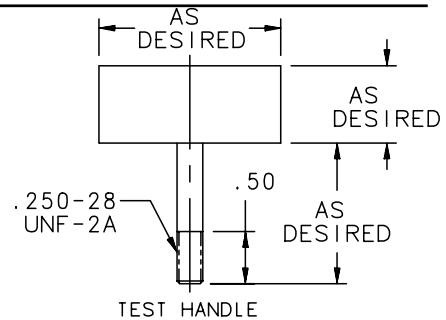
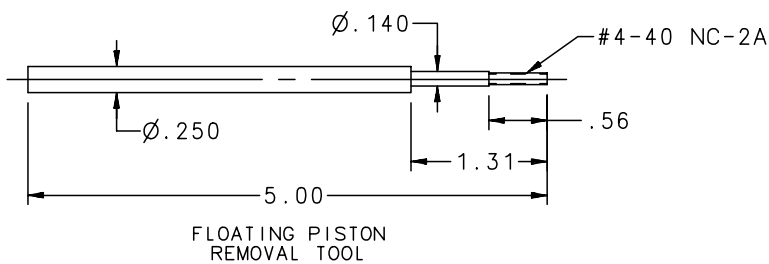
Shimmy Damper – Figure 1



Floating Piston Installation – Figure 2



Insert Installation – Figure 3



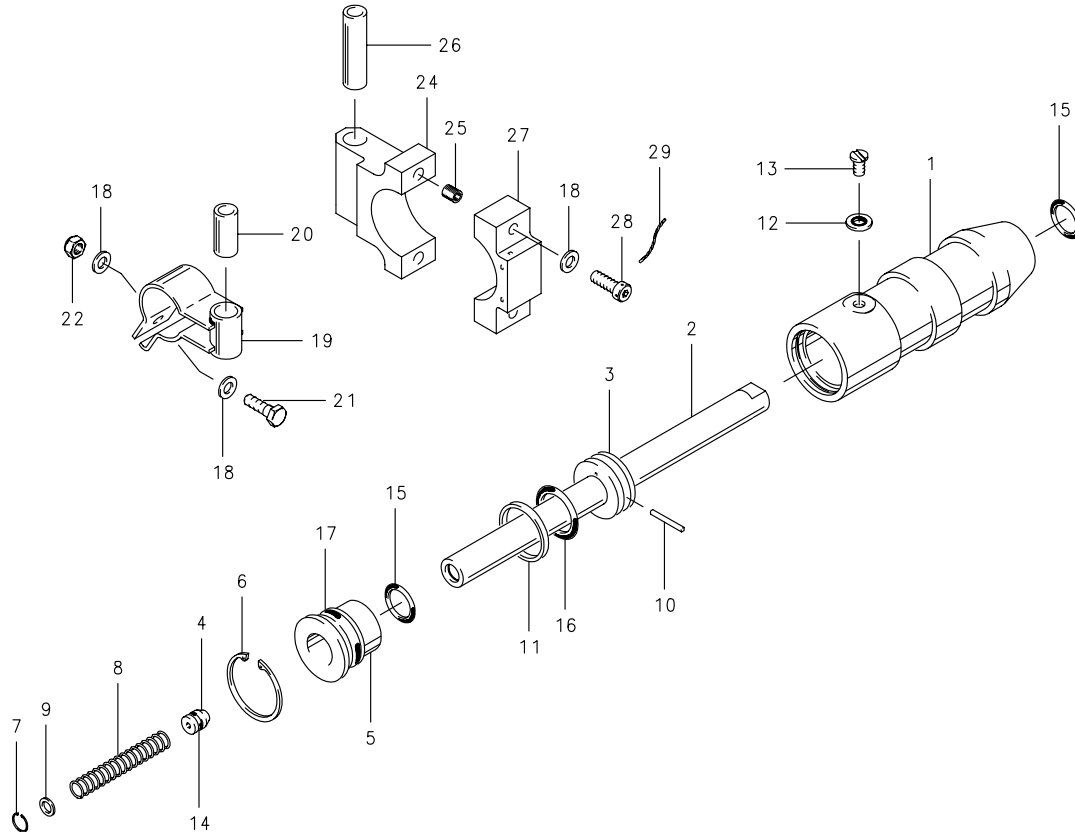
NOTES: (FOR ALL TOOLS EXCEPT ASSY BULLET)

NOTES: (FOR BULLET ASSY ONLY)

1. MATERIAL: 4130 STEEL
2. TOLERANCES UNLESS OTHERWISE SPECIFIED:
 .XXX ± .010 IN.
 .XX ± .03 IN.
3. BREAK UNSPECIFIED SHARP EDGES .005- .015

1. MATERIAL: ALUM 2024-T6
2. TOLERANCES UNLESS OTHERWISE SPECIFIED:
 .XXX ± .010 IN.
 .XX ± .03 IN.
3. BREAK UNSPECIFIED SHARP EDGES .005- .015

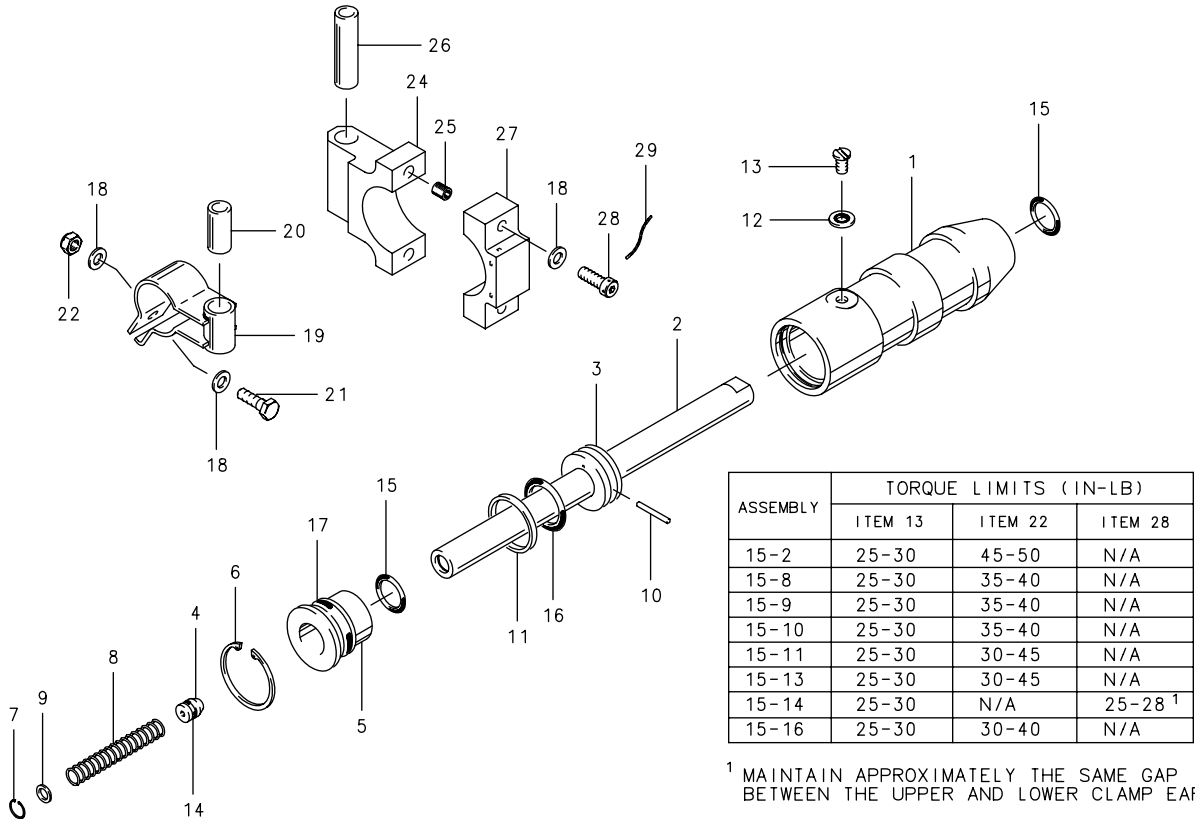
Fabricated Tools – Figure 4



Shimmy Damper Assembly
IPL - Figure 5A

DETAILED PARTS LIST (sheet 1 of 2)

Item #	Part Number	Description	Qty. Per Assembly	Qty. For 199-535
1	144-10100	Cylinder Body (15-2)	1	--
	144-08400	Cylinder Body (15-8, 15-9, 15-10, 15-11, 15-16)	1	--
	144-10000	Cylinder Body (15-13)	1	--
2	142-08600	Piston Rod (15-8)	1	--
	142-08800	Piston Rod (15-2, 15-9, 15-10, 15-11, 15-13, 15-16)	1	--
	142-10600	Piston Rod (15-14)	1	--
3	148-05000	Piston (15-9)	1	--
	148-05100	Piston (15-2, 15-8, 15-10, 15-11, 15-13, 15-14, 15-16)	1	--
4	148-05200	Piston-Floating (ALL)	1	--
5	141-05000	End Gland (ALL)	1	--
6	155-08500	Snap Ring (MS16625-1112) (ALL)	1	--
7	155-08400	Snap Ring (MS16625-1031) (ALL)	1	--
8	082-08100	Spring (ALL)	1	--
9	095-03800	Washer (ALL)	1	--
10	223-02900	Roll Pin (MS171500) (ALL)	1	--
11	139-13700	Glyd Ring (ALL)	1	1
12	095-02600	Stat-O-Seal (ALL)	1	1
13	102-20400	Screw (MS51958-59) (ALL)	1	--
14	101-00300	O-Ring (MS28775-008) (ALL)	1	1
15	101-01000	O-Ring (MS28775-112) (ALL)	2	2
16	101-01400	O-Ring (MS28775-116) (ALL)	1	1



ASSEMBLY	TORQUE LIMITS (IN-LB)		
	ITEM 13	ITEM 22	ITEM 28
15-2	25-30	45-50	N/A
15-8	25-30	35-40	N/A
15-9	25-30	35-40	N/A
15-10	25-30	35-40	N/A
15-11	25-30	30-45	N/A
15-13	25-30	30-45	N/A
15-14	25-30	N/A	25-28 ¹
15-16	25-30	30-40	N/A

¹ MAINTAIN APPROXIMATELY THE SAME GAP BETWEEN THE UPPER AND LOWER CLAMP EARS.

Shimmy Damper Assembly
IPL - Figure 5B

DETAILED PARTS LIST (sheet 2 of 2)

Item #	Part Number	Description	Qty. Per Assembly	Qty. For 199-535
17	101-01500	O-Ring (MS28775-210) (ALL)	1	1
18	095-13100	Washer (AN960C10) (ALL)	2	--
19	185-00300	Assembly, Clamp (15-2, 15-8, 15-10, 15-13)	1	--
	185-00700	Assembly, Clamp (15-9, 15-16)	1	--
	185-00900	Assembly, Clamp (15-11)	1	--
20	145-08900	Bushing (15-2, 15-8, 15-10, 15-11, 15-13)	1	--
	145-09100	Bushing (15-9, 15-16)	1	--
21	103-00100	Bolt (AN3-5A) (15-2, 15-8, 15-9, 15-10, 15-11, 15-13, 15-16)	1	--
22	094-12300	Nut (AN365-1032) (15-2, 15-8, 15-9, 15-10, 15-11, 15-13, 15-16)	1	--
- 23	111-08500	Assembly, Clamp, Lower (15-14)	1	--
24	110-10500	Clamp, Lower (15-14)	1	--
* 25	230-02900	Insert (15-14)	2	--
26	145-07900	Bushing (15-14)	1	--
27	110-10600	Clamp, Upper	1	--
28	102-01900	Bolt (MS24678-13) (15-14)	2	--
29	139-06500	Lockwire (15-13)	A/R	--
	CM15-2	O/H Instructions for P/N's: 15-2, 15-8, 15-9, 15-10, 15-11, 15-13, 15-14, 15-16)	--	1

Notes/Legend:
 - Item Not Illustrated * Do Not Remove Unless Damaged A/R: As Required