

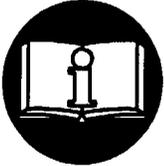
3/8" TWIN BLADE IMPULSE WRENCH

MODELS: PG347A-B1, PG247A-A5, PG397A-B1 AND PG307A-A5

NOTICE

Models PG347A-B1, PG247A-A5, PG397A-B1 and PG307A-A5 Impulse Wrenches are designed for use in assembly operations requiring consistent torque. They are ideally suited to appliance assembly and applications requiring low noise levels.

ARO is not responsible for customer modification of tools for applications on which ARO was not consulted.



WARNING

**IMPORTANT SAFETY INFORMATION ENCLOSED.
READ THIS MANUAL BEFORE OPERATING TOOL.
IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PLACE THE
INFORMATION IN THIS MANUAL INTO THE HANDS OF THE OPERATOR.
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.**

PLACING TOOL IN SERVICE

- Always operate, inspect and maintain this tool in accordance with American National Standards Institute Safety Code for Portable Air Tools (ANSI B186.1)
- For safety, top performance, and maximum durability of parts, operate this tool at 90 psig (6.2 bar/620 kPa) maximum air pressure at the inlet with 3/8" (10 mm) inside diameter air supply hose.
- Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.
- Do not use damaged, frayed or deteriorated air hoses and fittings.
- Be sure all hoses and fittings are the correct size and are tightly secured. See Dwg. TPD905-1 for a typical piping arrangement.
- Always use clean, dry air at 90 psig (6.2 bar/620 kPa) maximum air pressure. Dust, corrosive fumes and/or excessive moisture can ruin the motor of an air tool.
- Do not lubricate tools with flammable or volatile liquids such as kerosene, diesel or jet fuel.
- Do not remove any labels. Replace any damaged label.

USING THE TOOL

- Always wear eye protection when operating or performing maintenance on this tool.
- Always wear hearing protection when operating this tool.

- Keep hands, loose clothing and long hair away from rotating end of tool.
- Note the position of the reversing lever before operating the tool so as to be aware of the direction of rotation when operating the throttle.
- Anticipate and be alert for sudden changes in motion during start up and operation of any power tool.
- Keep body stance balanced and firm. Do not over-reach when operating this tool. High reaction torques can occur at or below the recommended air pressure.
- Tool shaft may continue to rotate briefly after throttle is released.
- Air powered tools can vibrate in use. Vibration, repetitive motions or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.
- Use accessories recommended by ARO.
- Use only impact sockets and accessories. Do not use hand (chrome) sockets or accessories.
- Impact wrenches are not torque wrenches. Connections requiring specific torque must be checked with a torque meter after fitting with an impact wrench.
- This tool is not designed for working in explosive atmospheres.
- This tool is not insulated against electric shock.

NOTICE

The use of other than genuine ARO replacement parts may result in safety hazards, decreased tool performance, and increased maintenance, and may invalidate all warranties.

Repairs should be made only by authorized trained personnel. Consult your nearest ARO Tool Products Authorized Servicer.

For parts and service information, contact your local ARO distributor, or the Customer Service Dept. of the Ingersoll-Rand Distribution Center, White House, TN at PH: (615) 672-0321, FAX: (615) 672-0601

ARO Tool Products

Ingersoll-Rand Company

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WARNING LABEL IDENTIFICATION

⚠ WARNING

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

	<p>⚠ WARNING</p> <p>Always wear eye protection when operating or performing maintenance on this tool.</p>
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	<p>⚠ WARNING</p> <p>Always wear hearing protection when operating this tool.</p>
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	<p>⚠ WARNING</p> <p>Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.</p>
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	<p>⚠ WARNING</p> <p>Air powered tools can vibrate in use. Vibration, repetitive motions or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.</p>
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	<p>⚠ WARNING</p> <p>Do not carry the tool by the hose.</p>
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	<p>⚠ WARNING</p> <p>Do not use damaged, trayed or deteriorated air hoses and fittings.</p>
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	<p>⚠ WARNING</p> <p>Keep body stance balanced and firm. Do not overreach when operating this tool.</p>
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	<p>⚠ WARNING</p> <p>Operate at 90 psig (6.2 bar/ 620 kPa) Maximum air pressure.</p>
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ADJUSTMENTS

TORQUE ADJUSTMENT

To adjust the torque on these Twin Blade Impulse Wrenches, proceed as follows:

1. Remove the Adjustment Hole Plug.
2. Rotate the Drive Shaft until the Torque Adjustment Screw is visible in the opening.
3. Using a 1.5 mm hex wrench, rotate the Adjustment Screw clockwise to increase the torque output and counterclockwise to decrease the torque output. Do not rotate the Oil Plug.

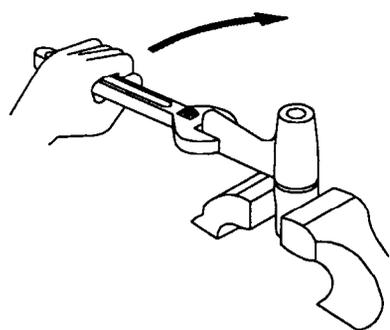
NOTICE

Make all final adjustments at the job.

4. Replace the Adjustment Hole Plug.

2. Using copper-covered vise jaws, carefully grasp the flats of the Mechanism Cover with the output end of the Drive Shaft downward.
3. Using an adjustable wrench, unscrew the the Motor Housing Assembly from the Mechanism Cover. This is a **left-hand thread**, rotate the Motor Housing **clockwise** to remove it. (Refer to Dwg. TPD1264)

CLOCKWISE TO LOOSEN



(Dwg. TPD1264)

CHANGING THE MECHANISM FLUID

To change the Mechanism Fluid in the Impulse Mechanism, proceed as follows:

1. For Model PG247A or PG307A, use a pointed probe to push the Spring Seat against the Retaining Sleeve Spring. While the Spring is compressed, use another pointed probe or thin blade screwdriver to remove the Retaining Ring. Lift the Spring Seat, Spring and Bit Retaining Sleeve off the Drive Shaft and remove the Bit Retaining Ball.

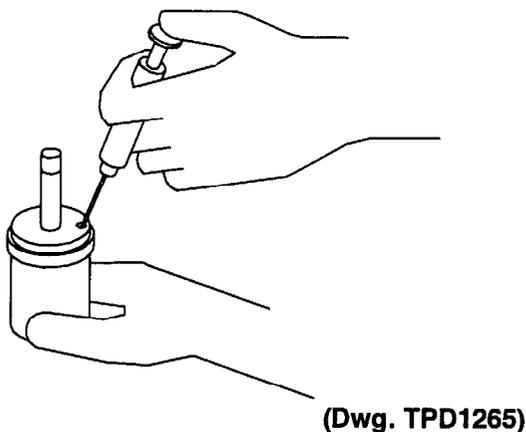
4. Lift the assembled motor off the Mechanism Cover and pull the mechanism assembly out of the Cover.
5. Using a 1.5 mm hex wrench, rotate the Torque Adjustment Screw clockwise until the Screw stops. Rotate the Screw counterclockwise until it stops or makes six complete revolutions.
6. Using the special Tee Wrench furnished in the Tool Kit (Part No. 55P-199), remove the Oil Plug and Oil Plug Seal.

ADJUSTMENTS

7. With the oil plug opening downward over a container, rotate the Drive Shaft to purge the fluid from the mechanism.
8. Using the syringe and fluid from the Fluid Replacement Kit (Part No. EQ106S-K400), fill the mechanism with the fluid furnished in the Kit. (Refer to Dwg. TPD1265)

NOTICE

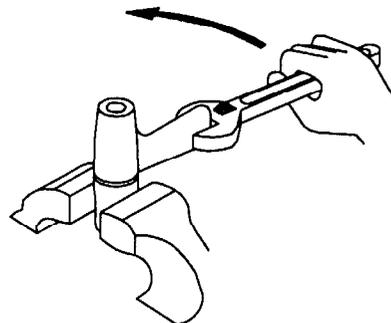
DO NOT SUBSTITUTE ANY OTHER FLUID. Failure to use the fluid provided could damage the tool, increase maintenance and decrease performance. Use only clean fluid in these tools.



9. Submerge the fill opening in the remainder of the fluid, and using a wrench, rotate the Drive Shaft to purge any remaining air from the system.
10. Thread the Oil Plug with the Oil Plug Seal into the mechanism until it is snug.

11. Using a 1.5 mm hex wrench, turn the Torque Adjustment Screw clockwise until it stops. This is the maximum torque position.
12. Wipe the outside of the mechanism dry and clean and remove the Oil Chamber Plug. Using the syringe, withdraw .25 cc of fluid from PG347A and PG247A models and .3 cc of fluid from PG397A and PG307A models.
13. Install the Oil Chamber Plug and tighten it between 20 and 25 in-lb (2.3 and 2.8 Nm) torque.
14. Insert the mechanism assembly, output end leading, into the Mechanism Cover clamped in the vise jaws.
15. Insert the hex end of the rotor shaft into the hex recess at the rear of the Drive Shaft and thread the assembled Motor Housing onto the Mechanism Cover. This is a left-hand thread. Rotate the Housing counter-clockwise to tighten it. (Refer to Dwg. TPD1266)

COUNTERCLOCKWISE TO TIGHTEN

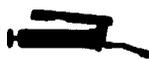


PLACING TOOL IN SERVICE

LUBRICATION



Ingersoll-Rand No. 50



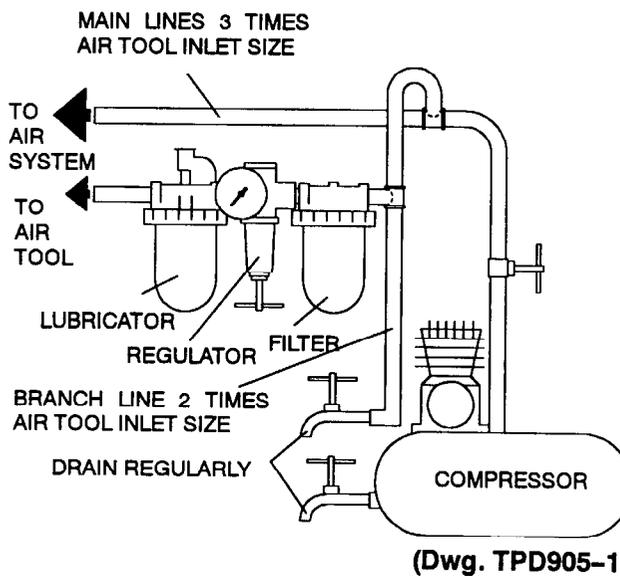
Ingersoll-Rand No. 67

Ingersoll-Rand Fluid Part No. EQ106S-400-1

Always use an air line lubricator with these tools. We recommend the following Filter-Lubricator-Regulator Unit:

For USA - No. C11-03-G00

After each 20 000 cycles, or as experience indicates, drain and refill the Impulse Unit Drive Assembly as instructed in this manual using the Fluid Replacement Kit (Part No. EQ106S-K400). Lubricate the hex drive and the output shaft before assembly.

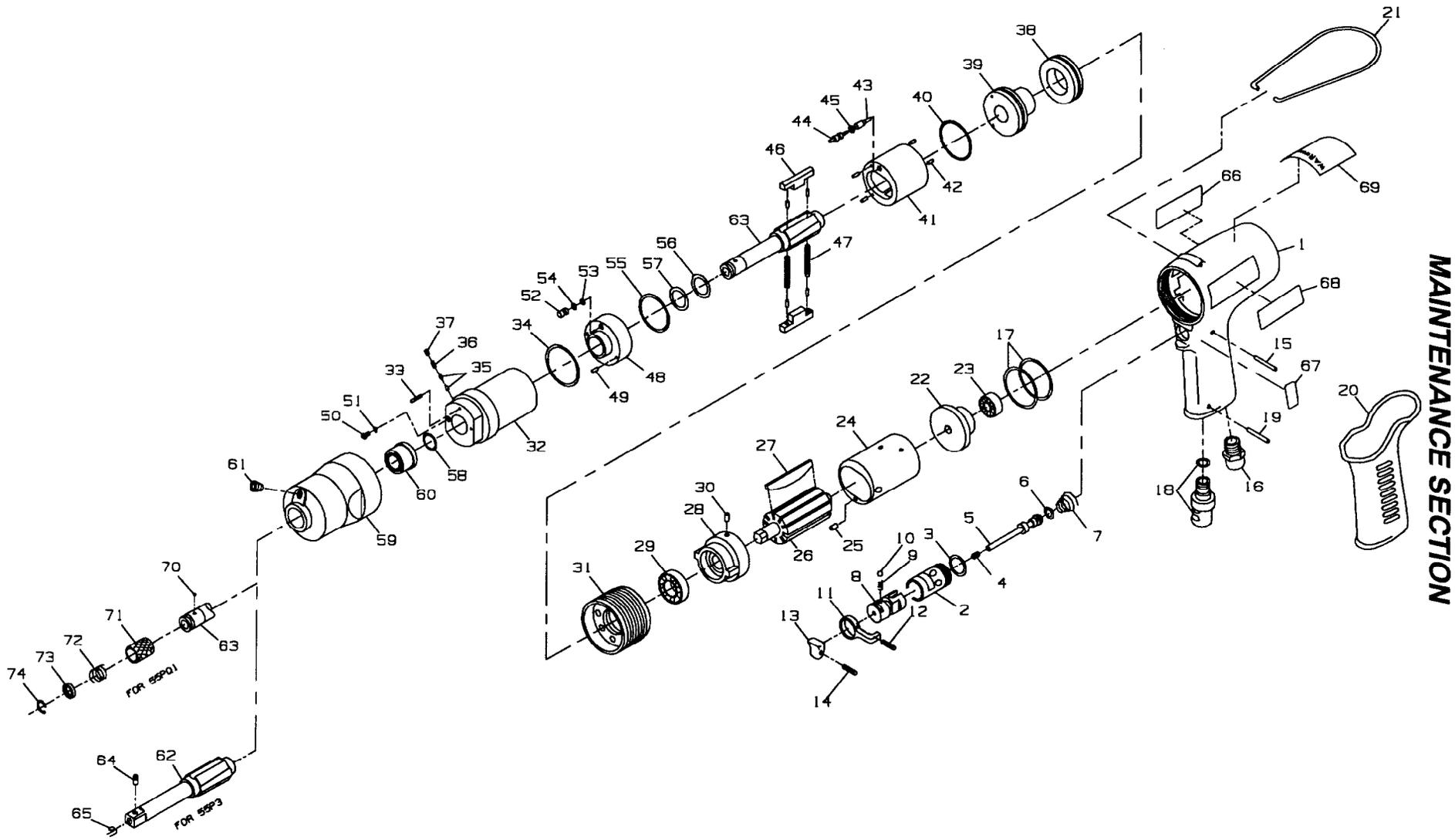


PLACING TOOL IN SERVICE

SPECIFICATIONS

Model	Type of Handle	Chuck/Drive in.	Free Speed rpm	Recommended Torque Range	
				Soft Draw ft-lb (Nm)	Hard Slam ft-lb (Nm)
PG247A-A5	pistol	1/4" insert bit	8 000	16-28 (22-38)	19-30 (26-40)
PG307A-A5	pistol	1/4" insert bit	6 600	22-30 (30-40)	21-32 (28-44)
PG347A-B1	pistol	3/8" square dr.	8 000	16-28 (22-38)	19-30 (26-40)
PG397A-B1	pistol	3/8" square dr.	6 600	22-30 (30-40)	21-32 (28-44)

MODELS PG347A-B1, PG247A-A5, PG397A-B1 AND PG307A-A5



5

PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

	Motor Housing Assembly	55P3-A40	27	Vane Packet (set of 9 Vanes)	
1	Motor Housing	55P3-40		for PG347 and PG247	55P3-42-9
2	Throttle Bushing Assembly	55P3-A503		for PG397 and PG307	60P3-42-9
3	O-ring	55P3-303		Front End Plate Assembly	
4	Throttle Rod Spring (for PG397 and PG307) .	55P3-51		for PG347 and PG247	55P3-A11
5	Throttle Rod Assembly	55P3-A302		for PG397 and PG307	60P3-A11
6	Throttle Rod Seal	100PQ-288	28	Front End Plate	
7	Throttle Spring (for PG397 and PG307).....	55P3-289		for PG347 and PG247	55P3-11
8	Reverse Valve	55P3-329		for PG397 and PG307	60P3-11
9	Reverse Lever Detent Spring	100PQ-568	29	Front Rotor Bearing	500P-22
10	Reverse Lever Detent Ball	EQ104S-929	30	Pin	380SQ-298
11	Reverse Lever	100PQ-328	31	Front End Plate Spacer	
12	Reverse Lever Pin	180SQ-152		for PG347 and PG247	55P3-10
13	Trigger	EQ106P-93		for PG397 and PG307	60P3-10
14	Trigger Pin	EQ106P-265	32	Mechanism Cover Assembly	
15	Throttle Retaining Pin	100PQ-297		for PG347 and PG247	180PQ-A31
16	Inlet	55P3-980		for PG397 and PG307	60P3-A31
17	O-ring (2)	55P3-223	33	Adjustment Screw	180PQ-230
18	Exhaust Deflector Assembly	55P3-A23	34	O-ring	180PQ-236
19	Deflector Retaining Pin	55P3-120	35	Rubber Plate (2)	
20	Rubber Grip	55P3-2		for PG347 and PG247	180PQ-283
21	Hanger	EQ106S-365		for PG397 and PG307	60P3-283
	Rear End Plate Assembly	55P3-A212	36	Spring	180PQ-219
22	Rear End Plate	55P3-212	37	Screw	500A-230
23	Rear Rotor Bearing	500A-22	38	Liner Cap	180PQ-207
24	Cylinder Assembly		39	Liner Upper Plate Assembly	60P3-A212
	for PG347 and PG247	55P3-A3	40	Liner O-ring	180PQ-273
	for PG397 and PG307	60P3-A3	41	Liner Assembly	
25	Cylinder Pin	100PQ-297		for PG347 and PG247	55P3-A203
26	Rotor			for PG397 and PG307	60P3-A203
	for PG347 and PG247	55P3-53	42	Liner Pin (4)	55P3-297
	for PG397 and PG307	60P3-53			

MAINTENANCE SECTION

PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

43	Relief Valve		60	Main Shaft Bushing	55P3-641
	for PG347 and PG247	180PQ-222	61	Adjustment Hole Plug	
	for PG397 and PG307	280PQ-222		for PG347 and PG247	502-95
44	Spring Guide Assembly			for PG397 and PG307	60P3-95
	for PG347 and PG247	180PQ-A255	62	Drive Shaft	
	for PG397 and PG307	280PQ-A255		for PG347A-B1	55P3-626
45	Spring Guide Seal	180PQ-272		for PG397A-B1	60P3-626
46	Blade (2)		63	Drive Shaft	
	for PG347 and PG247	55P3-220		for PG247A-A5	55P3-726
	for PG397 and PG307	60P3-220		for PG307A-A5	60P3-726
47	Spring (2)		64	Pin 3/8" (10 mm)(for B1)	5020-716
	for PG347 and PG247	180PQ-568	65	Spring 3/8" (10 mm) (for B1)	401-718
48	Front Liner Cover Assembly	180PQ-A211	66	Information Label	55P3-99
49	Liner Cover Pin	180PQ-232	67	Rotation Label	60P3-99
50	Oil Plug	180PQ-277	68	Nameplate	
51	O-Ring	EQ110P-288		for PG347A-B1	PG347A-B1-301
52	Oil Stop Cap Assembly	180PQ-A38		for PG247A-A5	PG247A-A5-301
53	O-ring	EQ106P-288		for PG397A-B1	PG397A-B1-301
54	Backup Ring	380SQ-272		for PG307A-A5	PG307A-A5-301
55	O-ring	EQ104S-236	69	Warning Label	WARNING-22-9
56	O-ring	55P3-271	70	Ball (For A5)	EQ104S-929
57	Backup Ring	55P3-224	71	Bit Retaining Sleeve (for A5)	EQ104S-930
58	Bushing Spacer	180PQ-229	72	Retaining Sleeve Spring (for A5)	EQ104S-931
	Mechanism Cover Assembly		73	Spring Seat (for A5)	EQ104S-932
	for PG347 and PG247	55P3-A727	74	Retaining Ring (for A5)	EQ104S-933
	for PG397 and PG307	60P3-A727	75	Hexagon Wrench	55P3-900
59	Mechanism Cover		76	Hexagon Wrench	55P3-901
	for PG347 and PG247	55P3-727			
	for PG397 and PG307	60P3-727			

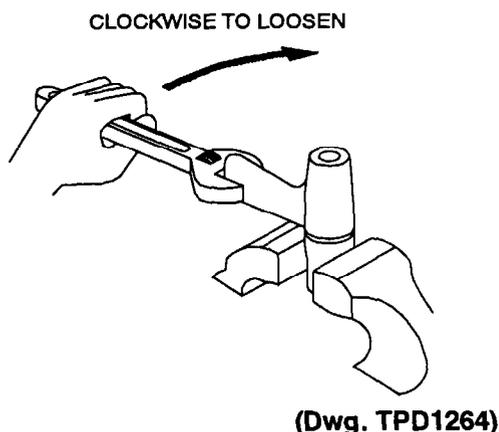
MAINTENANCE SECTION

MAINTENANCE SECTION

CHANGING THE MECHANISM FLUID

To change the Mechanism Fluid in the Impulse Mechanism, proceed as follows:

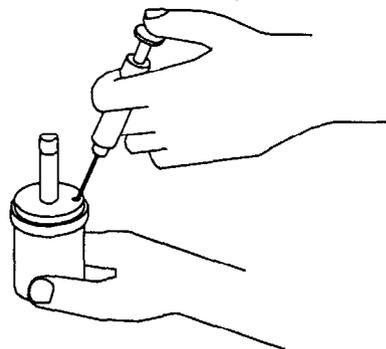
1. For Model PG247A or PG307A, use a pointed probe to push the Spring Seat (73) against the Retaining Sleeve Spring (72). While the Spring is compressed, use another pointed probe or thin blade screwdriver to remove the Retaining Ring (74). Lift the Spring Seat, Spring and Bit Retaining Sleeve (71) off the Drive Shaft (63) and remove the Bit Retaining Ball (70).
2. Using copper-covered vise jaws, carefully grasp the flats of the Mechanism Cover (59) with the output end of the Drive Shaft downward.
3. Using an adjustable wrench, unscrew the the Motor Housing Assembly (1) from the Mechanism Cover. This is a **left-hand thread**, rotate the Motor Housing **clockwise** to remove it. (Refer to Dwg. TPD1264)



4. Lift the assembled motor off the Mechanism Cover and pull the mechanism assembly out of the Cover.
5. Using a 1.5 mm hex wrench, rotate the Torque Adjustment Screw (33) clockwise until the Screw stops. Rotate the Screw counterclockwise until it stops or makes six complete revolutions.
6. Using the special Tee Wrench furnished in the Tool Kit (Part No. 55P-199), remove the Oil Plug (50) and Oil Plug Seal (51).
7. With the oil plug opening downward over a container, rotate the Drive Shaft to purge the fluid from the mechanism.
8. Using the syringe and fluid from the Fluid Replacement Kit (Part No. EQ106S-K400), fill the mechanism with the fluid furnished in the Kit. (Refer to Dwg. TPD1265)

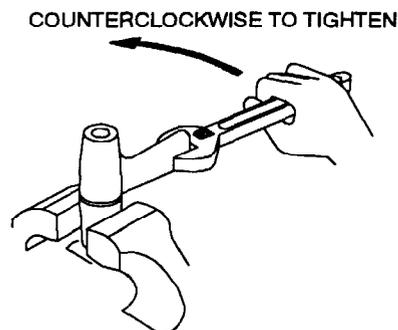
NOTICE

DO NOT SUBSTITUTE ANY OTHER FLUID. Failure to use the fluid provided could damage the tool, increase maintenance and decrease performance. Use only clean fluid in these tools.



(Dwg. TPD1265)

9. Submerge the fill opening in the remainder of the fluid, and using a wrench, rotate the Drive Shaft to purge any remaining air from the system.
10. Thread the Oil Plug with the Oil Plug Seal into the mechanism until it is snug.
11. Using a 1.5 mm hex wrench, turn the Torque Adjustment Screw clockwise until it stops. This is the maximum torque position.
12. Wipe the outside of the mechanism dry and clean and remove the Oil Chamber Plug. Using the syringe, withdraw .4 cc of fluid.
13. Install the Oil Chamber Plug and tighten it between 20 and 25 in-lb (2.3 and 2.8 Nm) torque.
14. Insert the mechanism assembly, output end leading, into the Mechanism Cover clamped in the vise jaws.
15. Insert the hex end of the rotor shaft into the hex recess at the rear of the Drive Shaft and thread the assembled Motor Housing onto the Mechanism Cover. This is a **left-hand thread**. Rotate the Housing **counterclockwise** to tighten it. (Refer to Dwg. TPD1266)



MAINTENANCE SECTION

WARNING

Always wear eye protection when operating or performing maintenance on this tool.

Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool or before performing any maintenance on this tool.

DISASSEMBLY

General Instructions

1. Do not disassemble the tool any further than necessary to replace or repair damaged parts.
2. When grasping a tool or part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.
3. Do not remove any part which is a press fit in or on an assembly unless the removal of that part is necessary for repairs or replacement.
4. Do not disassemble the tool unless you have a complete set of new gaskets and O-rings for replacements.

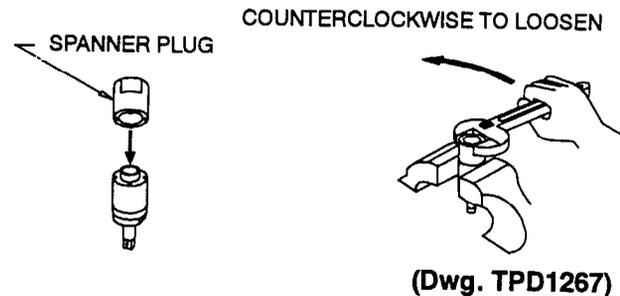
Disassembly of the Impulse Mechanism

1. For Model PG247A or PG307A use a pointed probe to push the Spring Seat (73) against the Retaining Sleeve Spring (72). While the Spring is compressed, use another pointed probe or thin blade screwdriver to remove the Retaining Ring (74). Lift the Spring Seat, Spring and Bit Retaining Sleeve (71) off the Drive Shaft (63) and remove the Bit Retaining Ball (70).

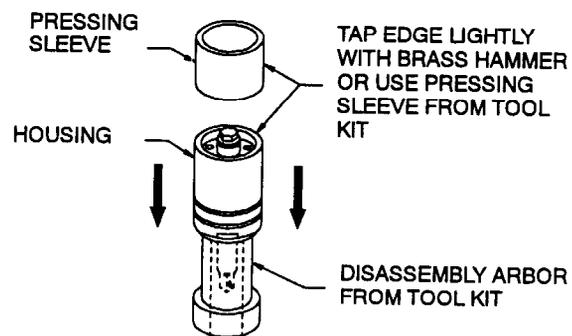
For Model PG347A or PG397A, use a hooked wire to pull the Retaining Pin Spring (65) out of the end of the Drive Shaft (62) and remove the Socket Retaining Pin (64).

2. Using copper-covered vise jaws, carefully grasp the flats of the Mechanism Cover (59) with the output end of the Drive Shaft downward.
3. Using an adjustable wrench, unscrew the the Motor Housing Assembly (1) from the Mechanism Cover. This is a **left-hand thread**, rotate the Motor Housing **clockwise** to remove it. (Refer to Dwg. TPD1264).
4. Lift the assembled motor off the Mechanism Cover and pull the mechanism assembly out of the Cover. Remove the Bushing Spacer (58).

5. Grasp the flats of the Housing Assembly (32) in vise jaws with the output end of the Drive Shaft downward.
6. Insert the pins of the spanner plug from the No. 55P-199 Tool Kit into the two holes in the Housing Cap (38). Using a wrench on the plug, unscrew and remove the Liner Cap from the Mechanism Cover Assembly. (Refer to Dwg. TPD1267)



7. Stand the disassembly arbor from the Tool Kit, large end downward, on a workbench or the table of an arbor press. Insert the output end of the Drive Shaft into the central opening and either tap the Housing downward off the components or use the pressing sleeve in the Kit to press the Housing downward off the components. (Refer to Dwg. TPD1268)

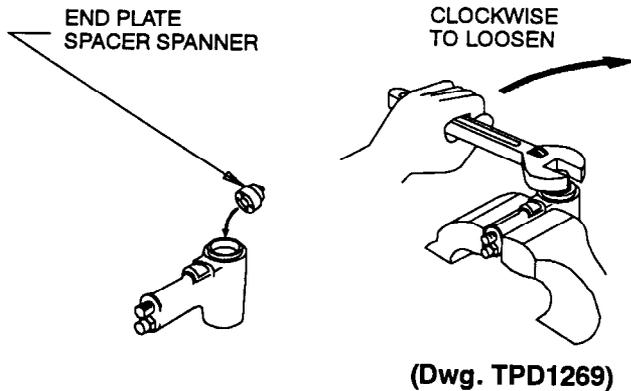


8. Disassemble the components of the mechanism in the sequence shown in Drawing TPA1603 on Page 5.

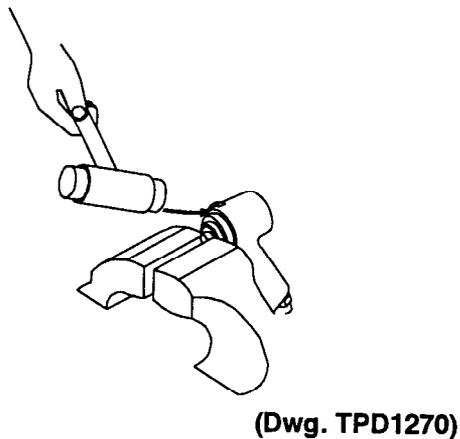
MAINTENANCE SECTION

Disassembly of the Motor

1. Grasp the Motor Housing (1) in vise jaws with the shaft of the Rotor (26) upward.
2. Insert the pins of the end plate spacer spanner into the holes in the Front End Plate Spacer (31). Using a wrench, unscrew and remove the Spacer. This is a **left-hand thread**; rotate the wrench **clockwise** to remove the Spacer. (Refer to Dwg. TPD1269)



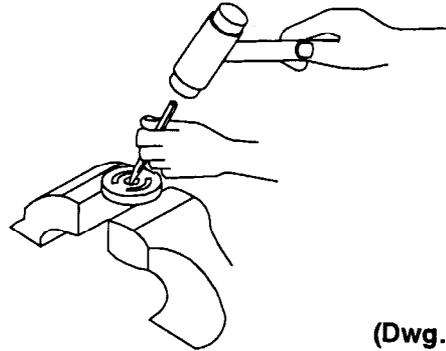
3. Reposition the Motor Housing in the vise jaws so that the vise jaws grip the end of the rotor shaft and the handle grip of the Housing is downward. Tap the edges of the Housing surrounding the motor bore with a plastic hammer to separate the Housing from the motor. (Refer to Dwg. TPD1270)



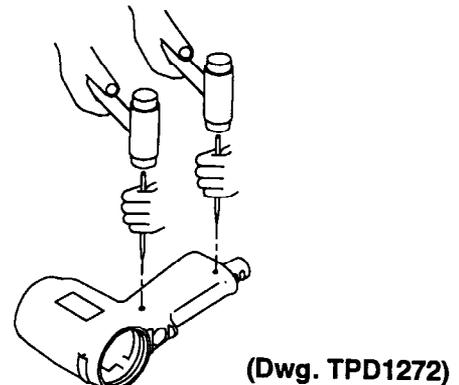
4. Remove the motor from the vise jaws and remove the Front End Plate (28), Front End Plate Bearing (29), Cylinder Assembly (24) and Vanes (27) from the Rotor.
5. On the table of an arbor press, support the Rear End Plate (22) with blocks as close to the Rotor as possible and press the Rotor out of the Rear End Plate and Rear Rotor Bearing (23).
6. To remove the Rear Rotor Bearing from the Rear End Plate, use a small drift or pin punch through the central opening of the Rear End Plate to tap the Bearing out of the End Plate. (Refer to Dwg. TPD1271)

NOTICE

Do not enlarge or damage the shaft hole in the End Plate.



7. Using a pin punch, tap the Throttle Retaining Pin (15) and the Deflector Retaining Pin (19) out of the Handle. The Throttle Retaining Pin is protected by an embossed circular pad of metal. Insert the pin punch into the middle of the pad to locate the Pin. (Refer to Dwg. TPD1272)



8. Grasp the Trigger (13) and pull the assembled throttle out of the Motor Housing.
9. Using a pin punch and without damaging the Trigger, remove the Trigger Pin (14).
10. Grasp the Reverse Lever (11) and pull the Reverse Valve (8) from the front of the Throttle Bushing Assembly. The Reverse Lever Detent Ball (10) and Reverse Lever Detent Spring (9) will fall out of the Reverse Valve. Take care not to lose them.
11. Remove the Throttle Rod Assembly (5) from the rear of the Throttle Bushing.
12. Remove the Throttle Rod Seal (6) from the Throttle Rod.
13. If it is necessary to replace the Reverse Lever or Reverse Valve, use a pin punch to tap out the Reverse Lever Pin (12) out of the Reverse Lever. Separate the Reverse Lever from the Reverse Valve.
14. Grasp the Exhaust Deflector Assembly (18) and pull it out of the Housing.
15. Unscrew and remove the Inlet Bushing (16).

MAINTENANCE SECTION

ASSEMBLY

General Instructions

1. When grasping a tool or part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.
2. Always press on the inner ring of a ball-type bearing when installing the bearing on a shaft.
3. Always press on the outer ring of a ball-type bearing when pressing the bearing into a bearing recess.
4. Except for bearings and mechanism parts, always clean every part and wipe every part with a thin film of oil before installation.
5. Wipe a thin film of mechanism fluid on all internal mechanism components before installing them in the mechanism.
6. Apply a film of o-ring lubricant to every o-ring before installation.

Assembly of the Motor

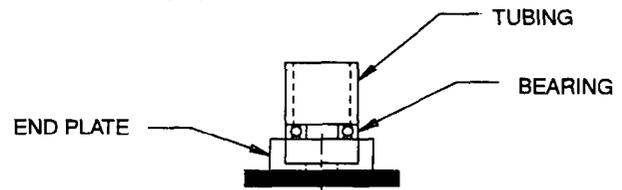
1. Thread the Inlet Bushing (16) into the bottom of the handle of the Motor Housing (1) and tighten it between 30 and 35 ft-lb (40 and 47 Nm) torque.
2. Position the Exhaust Deflector Assembly (18) in the bottom of the motor housing handle and install the Deflector Retaining Pin (19) to secure it in position.

NOTICE

It may be necessary to slide the Assembly in or out in order to align the groove in the Assembly with the pin hole.

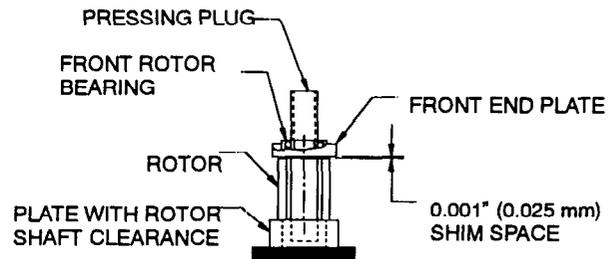
3. Install the Throttle Rod Seal (6) in the groove on the large hub of the Throttle Rod (5).
4. Put the Reverse Lever (11) on the Reverse Valve (8) and secure it with the Reverse Lever Pin (12).
5. Start the Reverse Valve into the Throttle Bushing (2). Install the Reverse Lever Detent Spring (9) in the hole in the Bushing. Set the Reverse Lever Detent Ball (10) on the Spring and while holding it in place, align the Ball with the detent hole in the Bushing. Push the Valve into the Bushing until the Reverse Lever Detent Ball seats in the detent hole.
6. Insert the Throttle Rod, shaft end first, through the rear of the Throttle bushing and through the Reverse Valve so that the hub of the Throttle Rod seats against the end of the Throttle Bushing.

7. Install the Trigger (13) on the Throttle Rod and secure it with the Trigger Pin (14).
8. Slide the assembled unit into the Motor Housing (1).
9. Install the Throttle Retaining Pin (15) in the Housing, making sure that it captures the Throttle Bushing Assembly.
10. Using an arbor press and a piece of tubing that contacts the outer ring of the bearings, press the Front End Plate Bearing (29) into the Front End Plate (28) and the Rear End Plate Bearing (23) into the Rear End Plate (22). (Refer to Dwg. TPD1274)



(Dwg. TPD1274)

11. Stand the Rotor (26) on the table of an arbor press. It should be upright on a flat metal plate having a clearance hole for the shaft. The shaft with the hex must be upward.
12. Place a 0.001" (0.025 mm) shim on the upward surface of the large portion of the rotor body. Using a piece of tubing that contacts the inner ring of the bearing, press the Front Rotor Bearing and Front End Plate, End Plate leading, onto the shaft of the Rotor until the End Plate contacts the shim. Remove the shim. (Refer to Dwg. TPD1275)

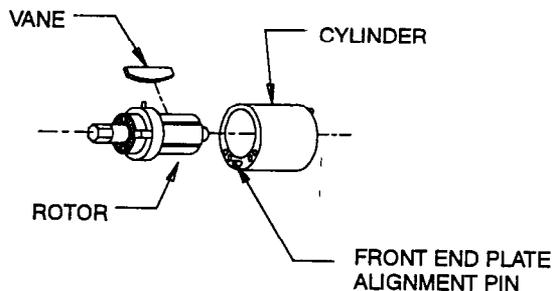


(Dwg. TPD1275)

13. Coat each Vane (27) with a thin film of oil and insert a Vane into each of the rotor vane slots with the straight edge of the Vane outward.

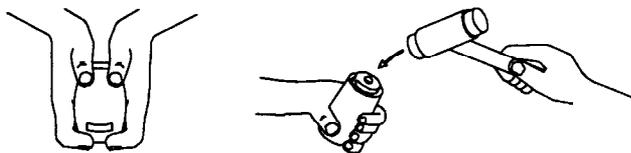
MAINTENANCE SECTION

14. Install the Cylinder (24) over the Vanes and Rotor with the end of the Cylinder having the Alignment Pin (25) in the middle of the four holes positioned toward the Front End Plate. Make certain the Pin enters the hole in the face of the Front End Plate. (Refer to Dwg. TPD1276).



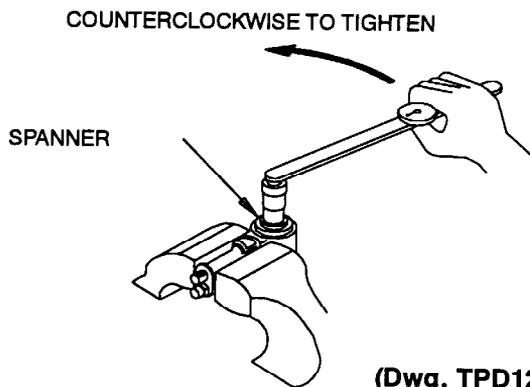
(Dwg. TPD1276)

15. Place the Rear End Plate and Bearing against the face of the Cylinder, Bearing end trailing.
16. Insert the assembly into the Motor Housing. It may be necessary to tap the assembly into position with a brass or plastic hammer. (Refer to Dwg. TPD1279)



(Dwg. TPD1279)

17. Grasp the handle of the Motor Housing in vise jaws with the rotor shaft upward. Thread the Front End Plate Spacer (31) into the Housing and using the end plate spacer spanner, tighten the Spacer to 12 ft-lb (16 Nm) torque. This is a **left-hand thread**; rotate the wrench **counterclockwise** to tighten. (Refer to Dwg. TPD1280).

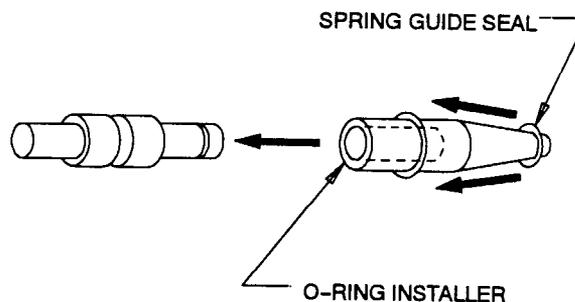


(Dwg. TPD1280)

18. After installing the Front End Plate Spacer, grasp the shaft of the Rotor and rotate it by hand. If the Rotor does not turn easily, disassemble the motor unit and determine where the assembly is binding. The motor must rotate freely before proceeding further with the assembly.
19. Install the Cover (20).

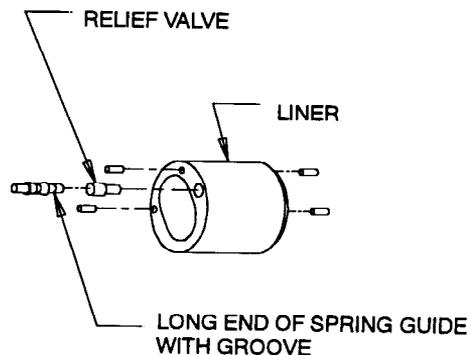
Assembly of the Impulse Mechanism

1. Insert the long shaft with the annular groove of the Spring Guide (44) into the central opening of the O-ring installer furnished with the Tool Kit (Part No. 55P-199). Place the Spring Guide Seal (45) on the tapered end of the installer and roll the Seal up the taper and into the groove on the large body of the Spring Guide. (Refer to Dwg. TPD1281)



(Dwg. TPD1281)

2. Insert the Relief Valve (43), large end trailing, into the Liner (41). Insert the assembled Spring Guide, long hub with annular groove leading, into the Liner against the Relief Valve. (Refer to Dwg. TPD1282)

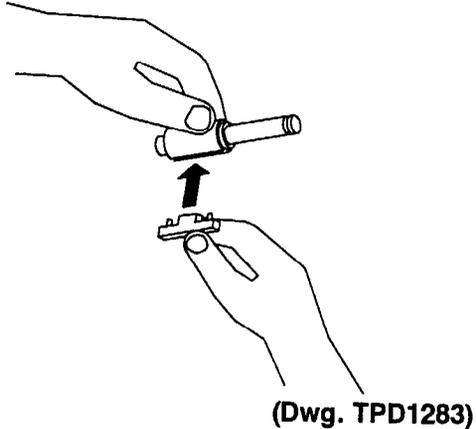


(Dwg. TPD1282)

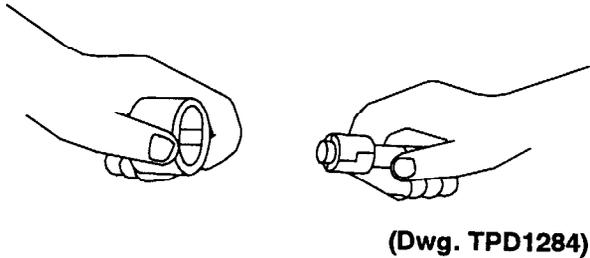
3. Place a Blade (46) into one of the slots of the Drive Shaft (62) with the blade assembly pins inward.
4. From the opposite side of the Shaft, encircle each Pin with a Blade Spring (47).

MAINTENANCE SECTION

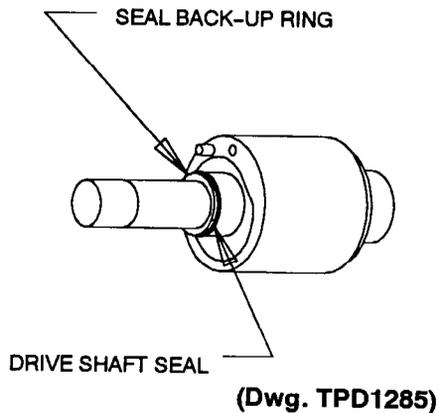
5. Install the Assembly Pins of the remaining Blade in the open ends of the Springs.
(Refer to Dwg. TPD1283)



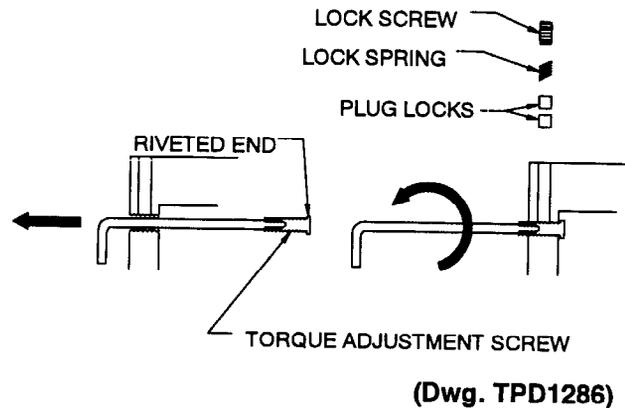
6. Compress the Springs with the Blades until both Blades are flush with the Drive Shaft and install the assembly in the Liner with the output end of the Drive Shaft protruding out the end of the Liner containing the Spring Guide. Make certain the ends of the Blades are flush with the ends of the Liner.
(Refer to Dwg. TPD1284).



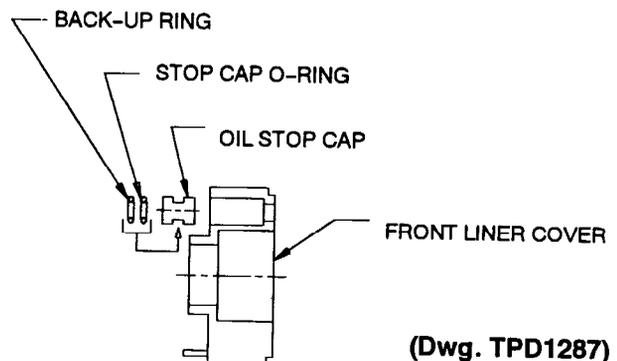
7. Install the Drive Shaft Seal (56) followed by the Seal Back-up Ring (57) on the Drive Shaft against the hub.
(Refer to Dwg. TPD1285)



8. The Torque Adjustment Screw (33) can only be installed from the liner end of the Impulse Housing (32). If the Torque Adjustment Screw was removed, proceed as follows:
- Insert a 1.5 mm hex wrench into the threaded hole for the Torque Adjustment Screw from the oil plug end of the Housing.
 - From the opposite end of the Housing, install the hex of the Torque Adjustment Screw onto the hex wrench.
 - Push the Screw and wrench toward the threaded hole until it contacts the face of the Housing.
 - While applying finger pressure to the rivet end of the Screw, rotate the wrench counterclockwise to thread the Screw into the Housing. Continue rotating the Screw until the rivet end stops against the face of the Housing.
 - Insert the two Adjustment Screw Plug Locks (35) and the Plug Lock Spring (36) into the crosshole leading to the Adjustment Screw. Thread the Plug Lock Screw (37) into the same hole to capture the components. (Refer to Dwg. TPD1286)

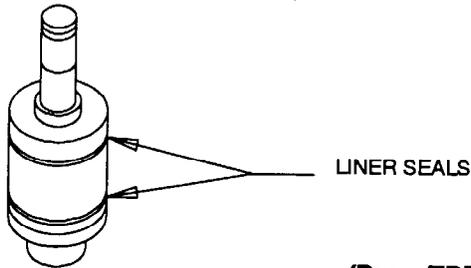


9. If the Oil Stop Cap Assembly (52) was removed from the Front Liner Cover (48), install the Stop Cap O-ring (53) and Back-up Ring (54) in the groove of the Cap and insert the assembly into the Cover.
(Refer to Dwg. TPD1287)

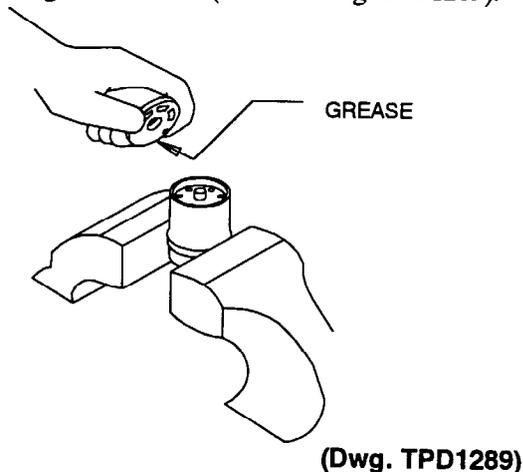


MAINTENANCE SECTION

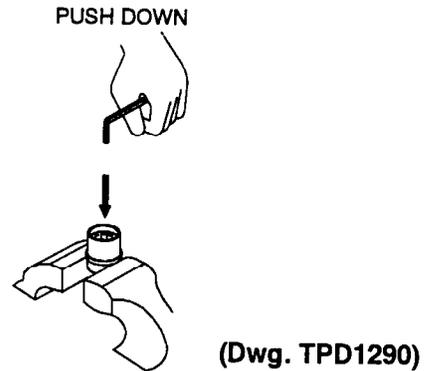
- Align the pin holes in the face of the Rear Liner Cover (39) with the two Liner Pins (42) at the rear of the Liner and place the Cover against the Liner. A groove will be formed between the Liner and Cover for the Rear Liner O-ring (40). Do not attempt to put the Seal in the groove at this time.
- Align the pin holes in the Front Liner Cover (48) with the Pins in the front face of the Liner and place the Cover against the face of the Liner. Another groove will be formed between the Liner and Cover for the Front Liner O-ring (55). Install both the Front and Rear Liner Seal in the grooves at this time and stand the assembly on the workbench with the output end of the Drive Shaft upward. (Refer to Dwg. TPD1288).



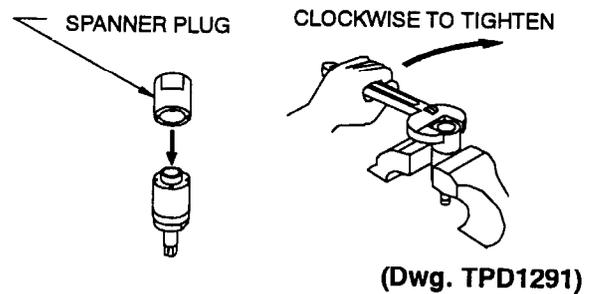
- Apply a thin film of grease to the Liner O-ring (34) and install it in the forward bore of the Housing.
- Lubricate the Front and Rear Liner Seals and after orienting the Housing to the proper position, install the Housing over the Liner.
- Grasp the flats of the Housing in vise jaws with the output spindle downward. Remove the Rear Liner Cover Assembly and put grease in the central opening of the Cover. (Refer to Dwg. TPD1289).



- Reinstall the Cover Assembly and use a hex wrench to push it below the threads at the rear of the Housing. (Refer to Dwg. TPD1290).



- Install the Liner Cap (38) and using the spanner plug furnished in the Tool Kit, tighten the Cap between 5 and 6 ft-lb (8 and 9 Nm) torque. (Refer to Dwg. TPD1291).



- Make certain the Drive Shaft rotates freely and then fill the mechanism with fluid and reassemble the tool as instructed in the section, **CHANGING THE MECHANISM FLUID**.

