

PHD, Inc. makes no warranty as to the fitness of its products or as to the length of service life after being rebuilt or parts replaced by anyone other than authorized employees of PHD, Inc. In no event shall PHD, Inc. be liable for loss of profits, indirect, consequential, or incidental damages arising out of the use of PHD Products.

## DISASSEMBLY PROCEDURE (figures 1, 2, 3 & 4)

- 1) **CAUTION:** Care should be taken to note location and orientation of guide shaft wipers and rack cover wiper during disassembly.
- 2) Remove fasteners (32) from motor speed reducer (if present) and remove reducer from gripper.  
**CAUTION:** Drive link (30) will now be free and may fall out of reducer or gripper. See figure 4.
- 3) Remove drive link (30) from reducer (31) and pinion (6) of gripper.
- 4) Motor (if present) may be removed from reducer (31) by removing fasteners (36).
- 5) Remove fasteners (24, 25 & 26) in end plates (23) and remove end plates from base plate (1). See figure 1.
- 6) Remove rack fastener (13) from jaw assembly. **Note:** Location of fastener is not the same on the left and right jaws (Jaw A & Jaw B). **Tip:** Use presence of outer shock pad (11) to identify rack mounting fastener. See figure 1.
- 7) Remove washers (12) outer shock pads (11) and rack spacers (10), from cover (21).
- 8) Remove jaw assemblies (21 & 22) from jaw guides (19, 20).  
**CAUTION:** Inner shock pad (11) will now be free within central bore of jaw and can fall out if jaw is tilted with bore downward.
- 9) Remove jaw guides (19 & 20) from center plate (3) by pulling guides from one end through holes in center plate.
- 10) If racks (9) are to be replaced or relubricated, remove racks from center plate (3).  
**CAUTION:** Rack bearing washers (4) will now be free within central cavity of center plate and can fall out.
- 11) If pinion (6) is to be replaced or relubricated, remove spiral retaining ring (8) from center plate (3) and remove pinion (6) and bearings (5 & 7) from center plate. See figures 1 & 2.
- 12) Center plate (3) may be removed from base plate (1). Loosen fasteners (15) and press on loosened fasteners to separate center plate from base plate. Remove fasteners, center plate, and dowel pins (15, 3 & 2). See figure 1.
- 13) Remove rack cover tubes (14) from center plate (3) by unthreading cover tubes from center plate. **Tip:** Clean outer surface of cover tube of any lubricant prior to attempting removal. A strap wrench may be used to assist with unthreading.
- 14) Locate bearing washers (4) (one each located at top and bottom of center plate central cavity) and remove. **Note:** If washers cannot be located in center plate, inspect interior of rack cover tubes (14) for washers that may have fallen out during rack removal.
- 15) Inspect central bore of jaw assemblies (21 & 22) for presence of loose inner rack shock pad (14) and remove if loose. **Note:** Shock pad may be adhered to rear face of jaw cover (21G & 22G) and will be removed in next step.
- 16) Remove fasteners (21L) retaining jaw cover (21G) and remove cover.  
**CAUTION:** Inner rack shock pad (14) pad may be adhered to rear face of jaw cover and can fall off. Remove shock pad from cover if adhered.
- 17) If replacing wipers, remove cover tube wiper (21C & 22C) and guide shaft wipers (21D & 22D, 21E & 22E, 21F & 22F).

## GENERAL REASSEMBLY PROCEDURE (figures 1, 2, 3 & 4)

- 1) Be careful to avoid damaging wipers during reassembly.
- 2) Apply lubricant to all surfaces indicated in figures 1, 2, 3 & 4.  
**Lubrication guidelines:**
  - Wipers, guide shafts, rack cover tubes, rack shock pads, rack spacer: petroleum-based grease compatible with elastomers.
  - Rack, rack washer, pinion, and drive link: petroleum-based high pressure grease.
- 3) Apply removable threadlocker to all fastener surfaces indicated in figures 1, 2 & 3.
- 4) If jaw guides (19 & 20) were removed during disassembly, lubricate jaw guide holes in center plate (3).
- 5) If racks (9) were removed during disassembly, lubricate central cavity in center plate (3).
- 6) If racks (9) were removed during disassembly, lubricate bearing washers (4) and install into recesses in top and bottom of central cavity in center plate (3).  
**Note:** Lubricant will act as an adhesive to hold washers in recesses. Pack center holes in washers with lubricant.
- 7) If pinion (6) was removed during disassembly, thoroughly pack lubricant into teeth of pinion.
- 8) Slide inner pinion bearing (5) and outer pinion bearing (7) onto pinion and insert pinion with bearings into pinion bore in center plate (3).
- 9) Install retaining ring (8) into groove in center plate (3).

- 10) If racks (9) were removed during disassembly, pack teeth of rack with lubricant and lubricate sides and back of rack. **Note:** Do not lubricate ends of rack.
- 11) Orient racks so that threaded hole in end of rack faces AWAY from center plate and racks are above and below pinion. See figure 1 for proper rack orientation. Insert racks (9) simultaneously through teeth of pinion.  
**WARNING: Verify that both racks protrude equal distances from centerplate and that racks are oriented properly otherwise unit will not function properly.**  
**WARNING: Verify that bearing washers (4) were not dislodged from centerplate (3) during insertion of racks.**
- 12) If replacing wipers, lubricate and insert shaft wipers (21E & 22E) into counterbores in jaw (21A & 22A). Lubricant and snap shaft wipers (21D & 22D, 21F & 22F) and cover tube wiper (21C & 22C) into undercut grooves in jaw. **Note:** Verify wipers are completely seated in grooves.
- 13) Heavily lubricate the 3 bearing bores in jaw (21A & 22A) with grease. Pack lubricant to completely fill grooves immediately behind each wiper and wide groove at center of each bore (between red colored jaw bearings). See figure 3.
- 14) Apply lubricant to chamfered end of rack cover tube (14) and insert tube through tube wiper (21C & 22C) and push tube partially into jaw. **Tip:** Rotate and slightly wobble tube while pushing tube against lip of tube wiper to help tube enter wiper. **Note:** After cover tube is inserted, verify that entire periphery of lip of wiper (21C & 22C) is visible and has not partially rolled into jaw.
- 15) Apply threadlocker to threads on end of rack cover tube (14) and while keeping tube in jaw, thread cover tube into mating threads around central cavity of center plate (3). **Note:** Do not allow tube to slide out of jaw. **Tip:** Jaw and cover tube can be rotated together or jaw can be held stationary while cover tube is rotated within jaw.
- 16) Verify that cover tubes (14) are threaded completely into center plate (3) and rotate jaws to align top of jaw with top of cover plate. **Note:** One to two threads at end of cover tube (4) will still be visible when cover tube has been completely threaded into center plate.
- 17) Push jaw assemblies (21 & 22) against center plate (3). Extend racks (9) as necessary from center plate (3) until ends of racks with threaded hole protrude beyond end of rack cover tubes (14).
- 18) If replacing jaw end cover (21 & 22), determine if cover will be used for left jaw (Jaw A) or right jaw (Jaw B). Install fastener (21H & 22H) through appropriate hole in jaw cover (21G & 22G), place washer (21J & 22J) on fastener and thread on nut (21K & 22K). Torque nut per table 1. See Jaw A and Jaw B end cover details of figure 1.
- 19) Apply threadlocker into threaded holes in ends of racks (9). Apply lubricant to outer diameter of rack spacer (10) and place spacer onto rack fastener. Apply lubricant to outer shock pad (11) and place washer (12) then outer shock pad onto spacer.
- 20) Insert fastener, spacer, washer, and shock pad assembly through appropriate hole in jaw cover (21G & 22G). See Jaw A and Jaw B end cover details of figure 1.
- 21) Apply lubricant to inner shock pad (11) and place shock pad onto portion of rack spacer (10) protruding from jaw cover (21G & 22G). **Tip:** Hold head of rack fastener (13) against jaw cover with finger to prevent rack spacer from sliding out of jaw cover when inner shock pad is installed over spacer.
- 22) Loosely thread rack mounting fasteners (13) into threaded holes in racks (9).  
**Note:** Verify that inner shock pads are present and have not fallen off during installation of jaw covers onto racks.
- 23) Slide jaw assemblies (21 & 22) away from center plate (3) until jaw covers (21G & 22G) engage mating recesses in jaws (21A & 22A). Apply threadlocker to cover mounting fasteners (21L), install fasteners into jaws and torque per table 1.
- 24) If center plate (3) was removed from base plate (1), use dowel pins (2) to align base plate (1) onto center plate. Install fasteners (5) through base plate and torque into center plate per table 1.
- 25) Lightly lubricate jaw guide holes in centerplate (3). Install jaw guides (19 & 20) through jaw assemblies (21 & 22) and through centerplate.
- 26) Torque rack mounting fasteners (13) per table 1. **Note:** Location of fastener is not the same on the left and right jaws (Jaw A & Jaw B). **Tip:** Use presence of outer shock pad (11) to identify rack mounting fastener.
- 27) Align and seat end plates (23) onto guide shafts (19 & 20) and onto raised keys on ends of base plate (1).
- 28) Apply threadlocker to fasteners (24, 25 & 26) and install through end plates into base plate (1) and jaw guides (19 & 20). Torque fasteners per table 1.

For additional technical assistance, call or visit our website:

**phd, Inc.** P.O. Box 9070, Fort Wayne, IN 46899  
1-800-624-8511  
www.phdinc.com

## MOTOR SPEED REDUCER REASSEMBLY (figures 4 & 5)

- 29) If replacing only the motor speed reducer coupling spider (31U), use the blade of a screwdriver or similar tool to pry the spider out of the coupling. Align replacement spider with the protruding fingers of coupling (31T) and press spider into coupling.
- 30) If replacing inner coupling (31T), unthread inner coupling clamping fastener plug (31V) from the reducer housing. See figure 5.
- 31) Use the blade of a screw-driver or similar tool to pry spider (31U) out of coupling (31T).
- 32) Insert a 2 mm hex driver into the unplugged access hole in the reducer housing to engage the socket in the head of the clamping fastener of coupling (31T), loosen fastener and pull coupling out of reducer (31). **Tip:** A pair of needle-nosed pliers can be used to grasp the forks of the coupling while the coupling is within the reducer.
- 33) Loosen clamping fastener in replacement inner coupling (31T) and slide coupling onto input shaft of reducer. **Tip:** A pair of needle-nosed pliers can be used to grasp the forks of the coupling to position the coupling onto the reducer input shaft.
- 34) Orient coupling (31T) so that head of coupling clamping fastener can be accessed through the unplugged access hole in the reducer housing. Position coupling (31T) so that face of coupling is flush with end of reducer input shaft.
- 35) Insert a 2 mm hex driver into the unplugged access hole in the reducer housing to engage the socket in the head of the clamping fastener of coupling (31T) and torque fastener per table 1.
- 36) Apply threadlocker to plug (31V) and reinstall flush with reducer housing.
- 37) Lubricate all surfaces of drive link (30) and insert into mating socket in pinion (6). See figure 4.
- 38) If applicable, place center extension plate (40) over locating boss of pinion (6). **Tip:** Gripper may be laid on back of jaws with pinion boss facing upwards to prevent center extension plate from falling off of pinion boss.
- 39) Place drive socket of speed reducer (31) onto drive link (3) and rotate reducer until desired set of reducer mounting holes align with holes in center plate (3) of gripper.
- 40) Install fasteners (32) through mounting holes in reducer (31) and, if applicable, through mating holes in center extension plate (40). Thread fasteners into mating holes in center plate (3) and torque per table 1.

## MOTOR REASSEMBLY (figures 4, 5 & 6)

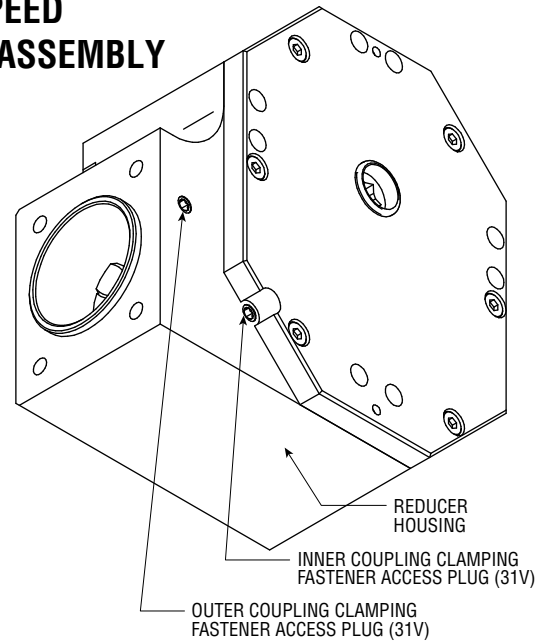
- 41) If outer coupling (33) was removed from motor shaft, place the coupling onto the motor shaft and position so that the inner face of the coupling is flush with the end of the motor shaft. See figure 6. Torque the clamping fastener on the side of the coupling per table 1.
- 42) Position the motor so that the protruding fingers of coupling (33) will engage the mating openings in the red colored spider (31U) within the reducer and slide the motor shaft into the reducer until the mounting flange of the motor contacts the motor mounting plate (34) of the reducer.
- 43) If motor will not fully contact motor mounting plate (34), leaving a gap between the motor and motor mounting plate, unthread the outer coupling clamping fastener plug (31V) from the reducer housing. See figures 4 & 5. Next, rotate the motor shaft (or the entire motor) until the head of the clamping fastener in outer coupling (33) is visible in the unplugged access hole in the reducer housing. Then, insert a 2 mm hex driver to engage the socket in the head of the clamping fastener and loosen the fastener. Push the motor against the reducer motor mounting plate (34) until no gap exists between the motor and plate. Retorque the loosened clamping fastener per table 1.
- 44) Apply threadlocker to plug (31V) and reinstall flush with reducer housing.
- 45) Rotate the motor to align the fastener holes in the mounting flange of the motor with the fastener holes in the motor mounting plate of the reducer. Apply threadlocker to fasteners (36) and install fasteners through motor and torque to the value listed in table 2 for the appropriate size of fastener. **Tip:** The motor can be installed onto the reducer with the reducer removed from the gripper to allow easier access to all motor mounting fasteners. Follow steps 29-40 to install reducer with attached motor onto gripper.

**MOTOR FASTENER - Table 2**

FASTENER SIZE	TORQUE	
	Nm	in-lb
M4	3.6	32
M5	7.3	65
M6	12.4	110
M8	30.5	270

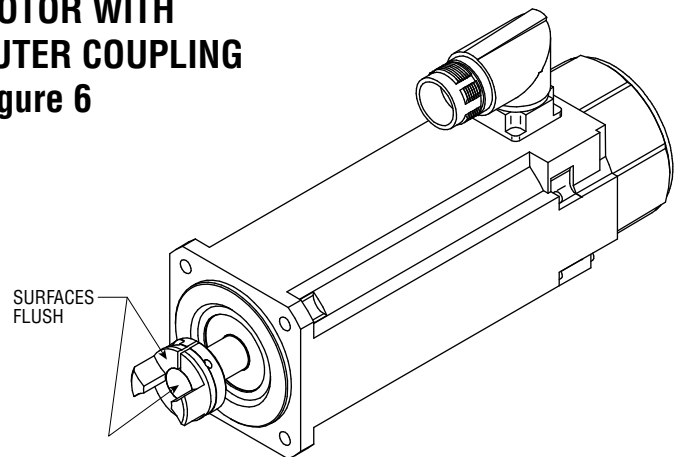
## MOTOR SPEED REDUCER ASSEMBLY

**Figure 5**



## MOTOR WITH OUTER COUPLING

**Figure 6**



**GENERAL FASTENER TORQUE - Table 1**

ASSEMBLY ITEM NO.	PART DESCRIPTION	TORQUE	
		Nm	in-lb
15	SFHCS; BASE PLATE TO CENTER PLATE	33.9	300
18	SHCS; SENSOR COVER	0.6	5
21L	SFHCS; JAW END COVER	4.5	40
21H	SHCS; JAW END COVER PLUG	16.9	150
13	LHCS; RACK	16.9	150
24, 25, 26	SHCS; END PLATE ASSY FASTENERS	33.9	300
32	SHCS; SPEED REDUCER MOUNTING	12.4	110
35	SHCS; MOTOR MOUNTING PLATE	12.4	110

For additional technical assistance, call or visit our website:

**phd**, Inc. P.O. Box 9070, Fort Wayne, IN 46899  
**1-800-624-8511**  
[www.phdinc.com](http://www.phdinc.com)

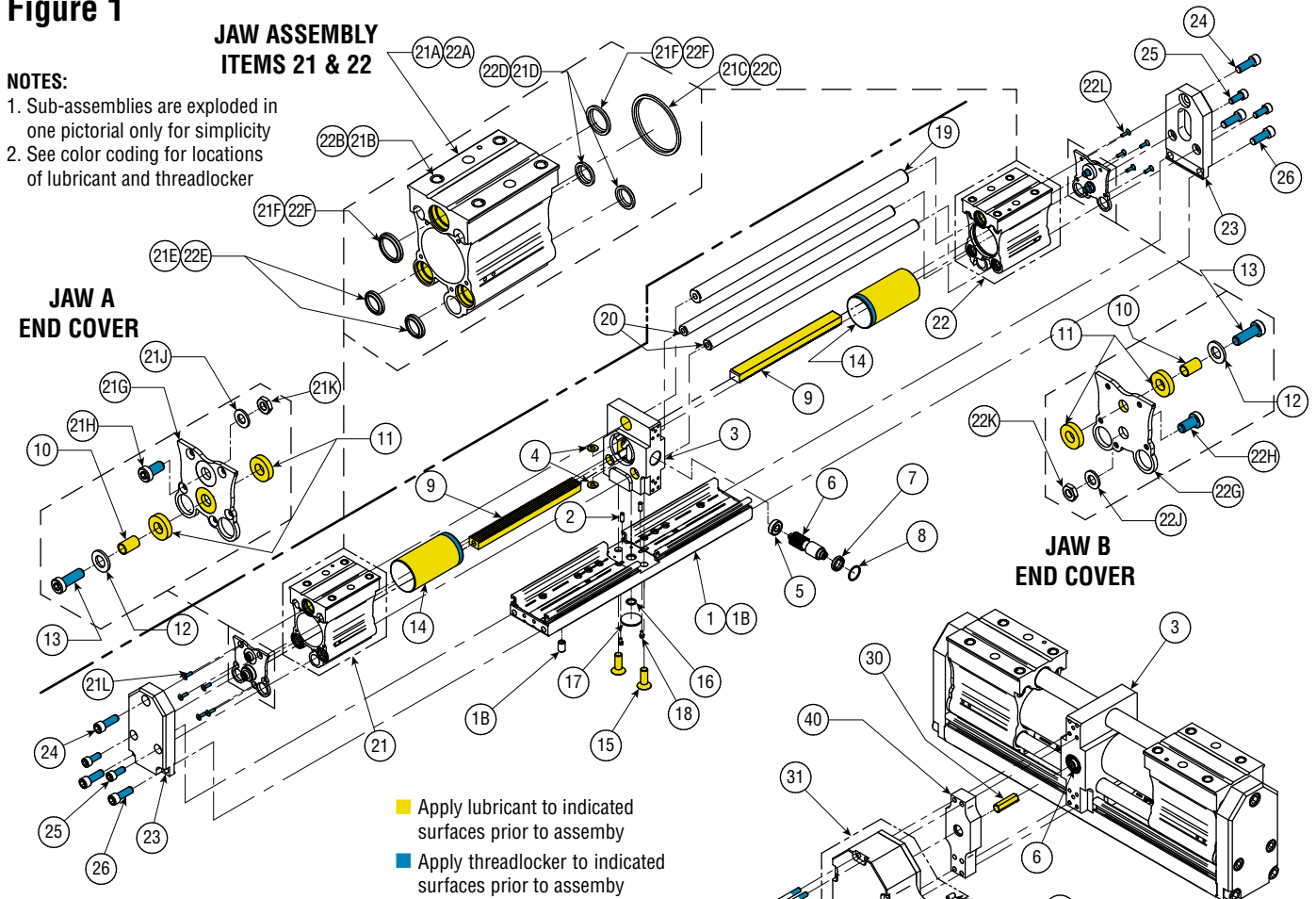


# GENERAL ASSEMBLY

## Figure 1

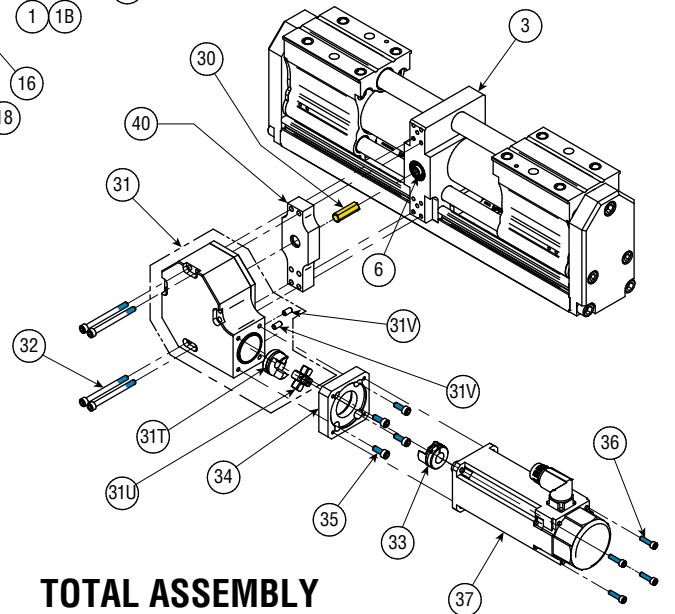
### NOTES:

1. Sub-assemblies are exploded in one pictorial only for simplicity
2. See color coding for locations of lubricant and threadlocker



### STANDARD COMPONENTS

ITEM	PART DESCRIPTION	PART NUMBER
1, 1B	Base Plate with Threaded Inserts	Full unit description required -H6100
2	Dowel Pin (Center Plate)	17831-095
3	Center Plate	88114-3
4, 9	Rack & Rack Bearing	Full unit description required -H3310
10	Rack Mounting Spacer	88154
13	LHCS (Rack Attachment)	Full unit description required -H2020
14	Rack Cover Tube	Full unit description required -H1300
15	FHCS (Center Plate)	Full unit description required -H2000
16	Base Plate Cover Seal	Full unit description required -H7400
17	Base Plate Cover	74221
18	SHCS (Base Plate Cover)	Full unit description required -H2040
19	Large Jaw Guide	Full unit description required -H4720
20	Small Jaw Guide	Full unit description required -H4710
21A/22A, 21B/22B	Jaw with Threaded Inserts	Full unit description required -H2605
23	End Plate	88115-3
24	SHCS (Large Jaw Guide)	Full unit description required -H4740
25	SHCS (Small Jaw Guide)	Full unit description required -H4740
26	SHCS (End Plate To Base Plate)	Full unit description required -H2030
30	Drive Link	Full unit description required -H9420
31	Motor Reducer Assembly	Full unit description required -H9400
32	SHCS (Reducer Assembly Mounting)	Full unit description required -H9450
37	Motor; Kollmorgen AKM33H-AND2CA100	87540-33H-AND2CA00
40	Center Extension Plate	Full unit description required -H2680



### KITS

ITEM	PART DESCRIPTION	PART NUMBER
21C/22C, 21D/22D, 21E/22E, 21F/22F	Wiper Kit	Full unit description required -H9045
21G, 21H, 21J, 21K, 21L	Jaw Cover Kit	89258
11, 12	Rack Shock Pad Kit	Full unit description required -H1840
5, 6, 7, 8	Drive Pinion Kit	89260
31T, 31U	Motor Reducer Coupling Kit	Full unit description required -H9430
33, 34, 35, 36	Motor Mounting Kit	Full unit description required -H9200

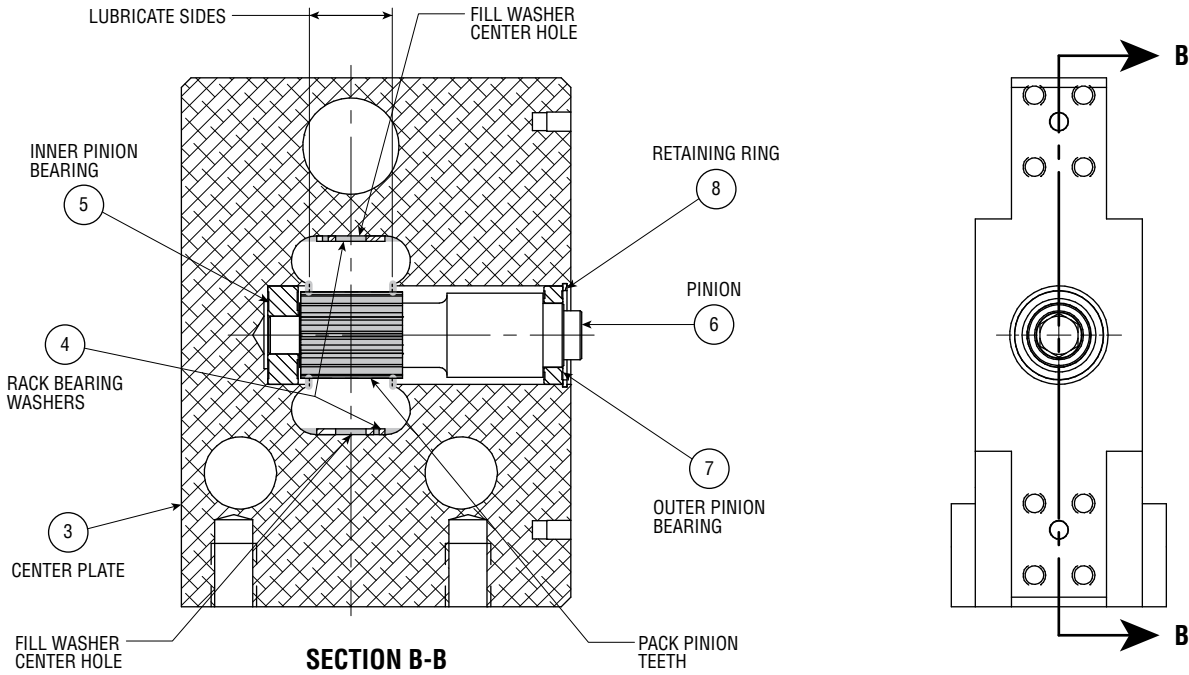
For additional technical assistance, call or visit our website:

P.O. Box 9070, Fort Wayne, IN 46899  
**1-800-624-8511**  
**www.phdinc.com**



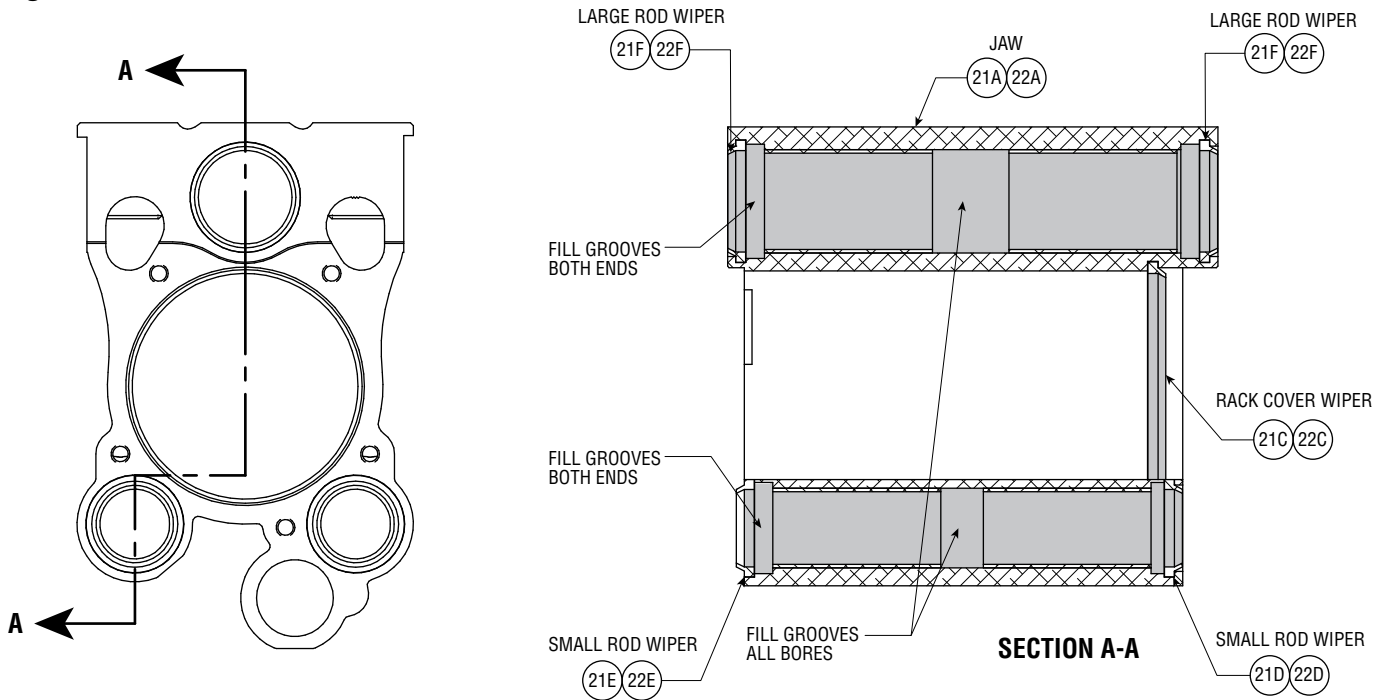
# CENTER PLATE LUBRICATION

## Figure 2



# JAW LUBRICATION

## Figure 3



For additional technical assistance, call or visit our website:

P.O. Box 9070, Fort Wayne, IN 46899  
**1-800-624-8511**  
**www.phdinc.com**

