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Form P7403
Edition 2
July, 1999

MAINTENANCE SECTION COVERING GEAR CASE MODULES for SERIES 150 TORQUE CONTROL WRENCHES with TRANSDUCERS

WHEN THIS MODULE IS USED WITH AN ELECTRIC POWERED TOOL

⚠ WARNING

IMPORTANT SAFETY INFORMATION ENCLOSED.
READ ALL THESE INSTRUCTIONS BEFORE PLACING TOOL IN SERVICE OR OPERATING THIS TOOL AND SAVE THESE INSTRUCTIONS.
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.

Disconnect the Power Cord from the receptacle before performing any maintenance on this tool.

This symbol is to alert the user and service personnel to the presence of uninsulated dangerous voltage that will cause a risk of electric shock.

This symbol is to alert the user and service personnel to the presence of important operating instructions that must be read and understood to prevent personal injury, electrical shock or damage to the equipment.

WHEN USING ELECTRIC TOOLS, BASIC SAFETY PRECAUTIONS SHOULD ALWAYS BE FOLLOWED TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK AND PERSONAL INJURY, INCLUDING THE FOLLOWING.

PLACING TOOL IN SERVICE

- **Use only with Ingersoll–Rand Series Controllers.**
- **Always operate, inspect and maintain this tool in accordance with all regulations (local, state, federal and country), that may apply to hand held/hand operated electric tools.**
- **Inspect tool cords periodically and if damaged, have them repaired by an authorized service facility.**
- **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.**
- **Power 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.**
- **Guard Against Electric Shock.** Prevent body contact with earthed or grounded surfaces. For example; pipes, radiators, ranges, refrigerator enclosures.
- **Don't abuse Cord.** Never carry tool by cord or yank it to disconnect from receptacle. Keep cord from heat, oil, and sharp edges.
- **Keep work area clean.** Cluttered areas and benches invite injuries.

(Continued on page 3–2)

NOTICE

The use of other than genuine Ingersoll–Rand replacement parts may result in personal injury, decreased tool performance and increased maintenance, and may invalidate all warranties.

Have your tool repaired by a qualified person. This electric tool is in accordance with the relevant safety requirements. Repairs should only be carried out by qualified persons using original spare parts, otherwise this may result in considerable danger to the user.

Repairs should be made only by authorized, trained personnel. Consult your nearest Ingersoll–Rand Authorized Servicenter.

Refer All Communications to the Nearest Ingersoll–Rand Office or Distributor.

Printed in U.S.A.

INGERSOLL-RAND®
PROFESSIONAL TOOLS

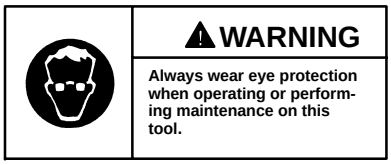
⚠ WARNING

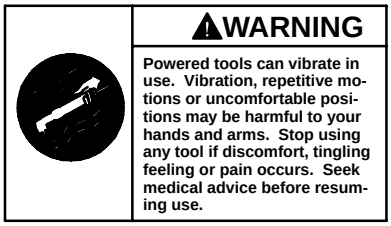
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

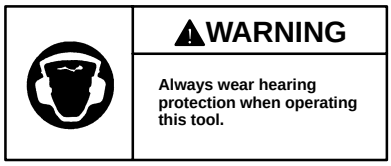
USING THE TOOL *(Continued)*

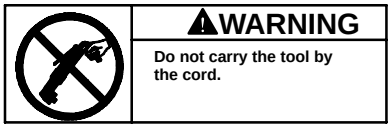
- **Consider work area environment.** Don't expose power tools and chargers to water. Keep work area well lighted. Do not use tool in explosive or flammable atmospheres.
- **Keep bystanders and children away.** Do not permit unauthorized personnel to operate this tool, or touch tool or cord.
- **Store idle tools.** When not in use, tools should be stored in a dry, high or locked up place, out of reach of children.
- **Don't force tool.** It will do the job better and more safely at the rate for which it was intended.
- **Use the right tool.** Do not force a small tool or attachment to do the job of a heavy–duty tool.
- **Do not use a tool for a purpose for which it is not intended.** Example: Do not use a screwdriver as a drill.
- **Dress properly.** Do not wear loose clothing or jewelry. They can be caught in moving parts. Rubber gloves and non–skid footwear are recommended when working outdoors. Wear protective hair covering to contain long hair.
- **Secure work.** Use clamps or a vise to hold work. Operators often need both hands to perform job functions.
- **Don't overreach.** Keep proper footing, balance, and a firm grip on the tool at all times.
- **Maintain tools with care.** Keep tools clean for better and safer performance. Follow instructions for lubricating and changing accessories. Inspect tool cords periodically and if damaged, have them repaired by an authorized service facility. Inspect extension cords periodically and replace if damaged. Keep handles dry, clean, and free from oil and grease.
- **Remove adjusting keys and wrenches.** Form habit of checking to see that keys and adjusting wrenches are removed from tool before turning it on.
- **Avoid unintentional starting.** Don't carry tool with finger on switch.
- **Do not drop or abuse the tool.**
- **Anticipate and be alert for sudden changes in motion during start up and operation of any power tool.**
- **Whenever a tool is not being used, position the Power Switch to the "OFF" position and unplug the power cord.**
- **Stay alert.** Watch what you are doing. Use common sense. Do not operate tool when you are tired.
- **Check damaged parts.** Before further use of the tool, a guard or other part that is damaged should be carefully checked to determine that it will operate properly and perform its intended function. Check for alignment of moving parts, binding of moving parts, breakage of parts, mounting, and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced by an authorized service center unless otherwise indicated elsewhere in this operation manual.
- **Have defective switches replaced by an authorized service center.**
- **Do not use the tool if the switch does not turn it on and off.**
- **Whenever the Angle Head is installed or repositioned, the Throttle Lever must be positioned so that reaction torque will not tend to retain the throttle in the "ON" position.**
- **When installing or removing the output device on any tool, ALWAYS grasp a metal component of the tool while tightening or loosening the Coupling Nut or Spindle Cap. Acceptable clamping locations include, but are not limited to, the hex on the Gear Case, the Tool Hanger, the Torque Reaction Arm or any metal Mounting Plate. NEVER grasp the composite tool body or handle in vise jaws to restrain the torque of the Coupling Nut or Spindle Cap. Such practice will result in damage to the tool.**
- **Do not use power units and gear trains that exceed the capability of the output device.**
- **The Tube Nut Attachment has an opening on the front side for construction and application purposes. DO NOT, under any circumstance place your fingers in this opening.**
- **The Torque Reaction Bar must be positioned against a positive stop. Do not use the Bar as a dead handle and take all precautions to make certain the operator's hand cannot be pinched between the Bar and a solid object.**
- **When operated continuously for long periods of time, Series D Nutrunners may become hot at the spindle end of the tool. Take all precautions necessary to avoid skin contact with the hot surfaces. Prolonged contact may result in burns.**
- **All Series D Torque Control Wrenches and Nutrunners with reverse capability have rotational arrows molded into the housing in the area of the reversing mechanism. When the direction switching device is positioned nearest the molded circular arrow with an "F" in the center, spindle rotation will be forward or clockwise direction. When the direction switching device is positioned nearest the molded circular arrow with an "R" in the center, spindle rotation will be reverse or counterclockwise direction.**
- **Use only impact sockets and accessories. Do not use hand (chrome) sockets or accessories.**

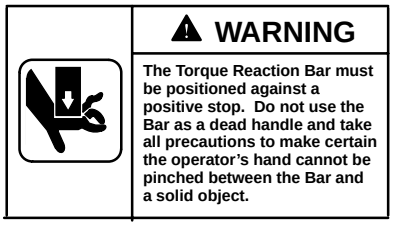
WARNING LABEL IDENTIFICATION

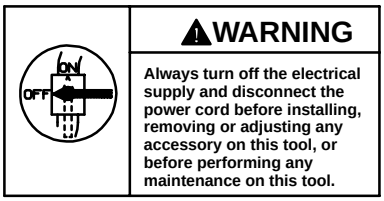


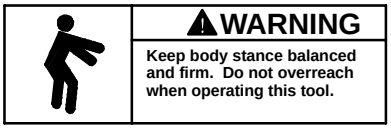












WHEN THIS MODULE IS USED WITH AN AIR POWERED TOOL

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 all regulations (local, state, federal and country), that may apply to hand held/hand operated pneumatic tools.**
- **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.**
- **Always use clean, dry air at 90 psig 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 overreach 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 Ingersoll–Rand.**
- **Use only impact sockets and accessories. Do not use hand (chrome) sockets or accessories.**
- **This tool is not designed for working in explosive atmospheres.**
- **This tool is not insulated against electric shock.**

(Continued on page 3–4)

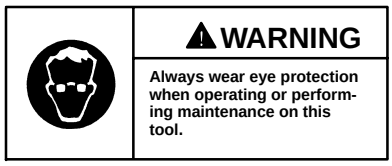
⚠ WARNING

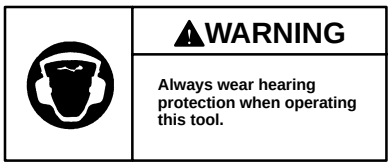
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

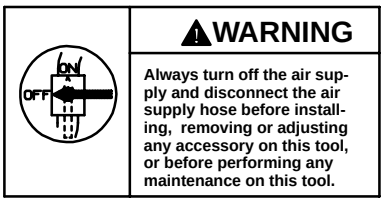
USING THE TOOL *(Continued)*

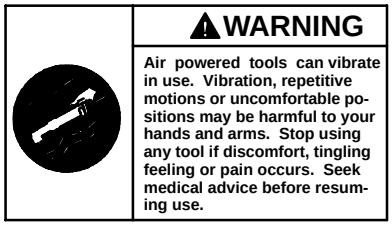
- **Do not remove the Inlet Plug without first disconnecting the live air supply.**
- **Whenever the Angle Head is installed or repositioned, the Throttle Lever must be positioned so that reaction torque will not tend to retain the throttle in the "ON" position.**
- **When installing or removing the output device on any tool, ALWAYS grasp a metal component of the tool while tightening or loosening the Coupling Nut or Spindle Cap. Acceptable clamping locations include, but are not limited to, the hex on the Gear Case, the Tool Hanger, the Torque Reaction Arm or any metal Mounting Plate. NEVER grasp the composite tool body or handle in vise jaws to restrain the torque of the Coupling Nut or Spindle Cap. Such practice will result in damage to the tool.**
- **Do not use power units and gear trains that exceed the capability of the output device.**
- **The Tube Nut Attachment has an opening on the front side for construction and application purposes. DO NOT, under any circumstance place your fingers in this opening.**
- **The Torque Reaction Bar must be positioned against a positive stop. Do not use the Bar as a dead handle and take all precautions to make certain the operator's hand cannot be pinched between the Bar and a solid object.**
- **When operated continuously for long periods of time, Series D Nutrunners may become hot at the spindle end of the tool. Take all precautions necessary to avoid skin contact with the hot surfaces. Prolonged contact may result in burns.**
- **All Series D Torque Control Wrenches and Nutrunners with reverse capability have rotational arrows molded into the housing in the area of the reversing mechanism. When the direction switching device is positioned nearest the molded circular arrow with an "F" in the center, spindle rotation will be forward or clockwise direction. When the direction switching device is positioned nearest the molded circular arrow with an "R" in the center, spindle rotation will be reverse or counterclockwise direction.**

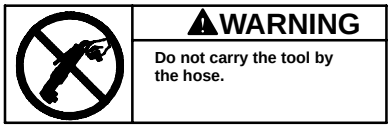
WARNING LABEL IDENTIFICATION

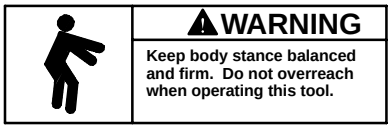


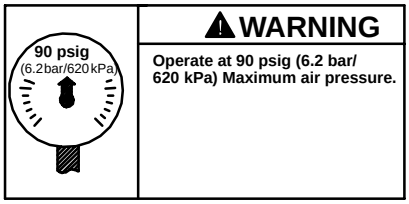


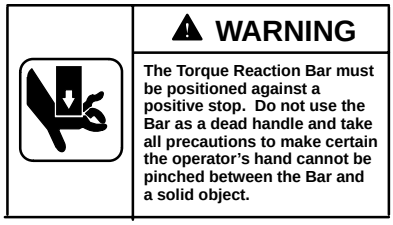






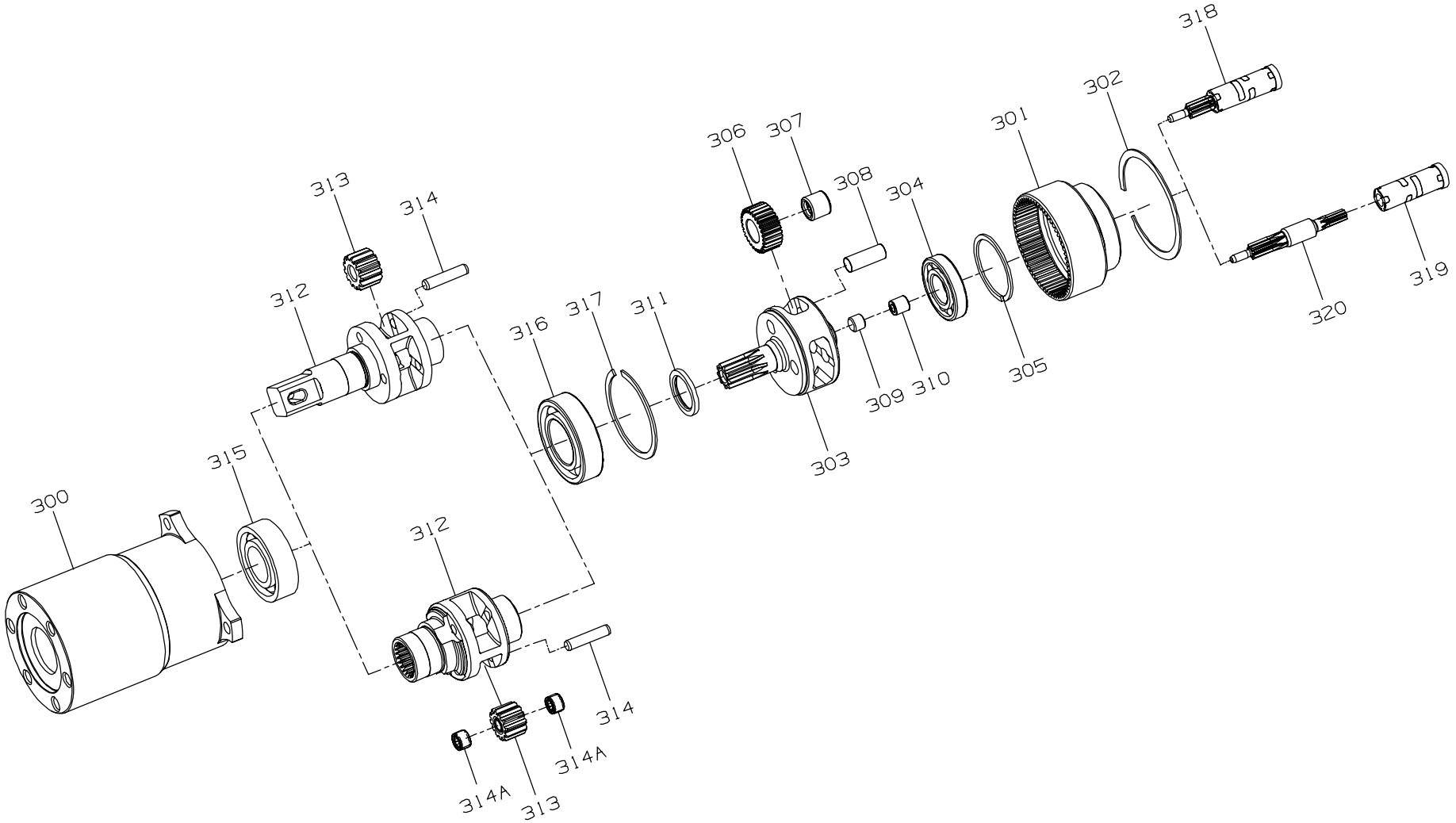






Ingersoll–Rand No. 67

Whenever the tool is disassembled for maintenance or repair, work enough ingersoll–Rand No. 67 Grease into the gearing to keep the gear train functioning properly.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(Dwg. TPC682–1)

PART NUMBER FOR ORDERING

	Gear Case Module	
	for hand–held tools; S ratio; 5/8” square drive	DEA150S–M37
	for hand–held tools; U ratio; 5/8” square drive	DEA150U–M37
	for hand–held tools; s ratio; 23 tooth internal spline drive	DEA150SS–M37
	for hand–held tools; U ratio; 23 tooth internal spline drive	DEA150US–M37
	for fixtured tools; S ratio; 5/8” square drive	DEF150S–M37
	for fixtured tools; U ratio; 5/8” square drive	DEF150U–M37
	for fixtured tools; S ratio; 23 tooth internal spline drive	DEF150SS–M37
	for fixtured tools; U ratio; 23 tooth internal spline drive	DEF150US–M37
300	Gear Case	DEF150–37
301	Ring Gear	DEF150S–406
302	Ring Gear Retainer	DEF150–153
303	Planet Gear Head	
	for all S ratio modules	DEF150S–216
	for all U ratio modules	DEF150U–216
304	Planet Gear Head Bearing	4E–510
305	Gear Head Bearing Retainer	W64–118
306	Gear Head Planet Gear Assembly (27 teeth) (3)	4E–10A
307	Gear Head Planet Gear Bearing	8U–654
308	Gear Head Planet Gear Shaft (3)	8U–191
309	Pinion Coupler Spacer	DEF150–962
310	Pinion Coupler Bearing	7AJ–500
311	Gear Head Spacer	R38P–80
312	Spindle	
	for S ratio square drive	R3800P–8
	for S ratio spline drive	DEF150SS–8
	for U ratio square drive	R3801U2–8
	for U ratio spline drive	DEF150US–8
313	Spindle Planet Gear (3)	
	for S ratio (12 teeth)	R38P–9
	for U ratio (13 teeth)	R3801U2–9
314	Spindle Planet Gear Shaft (3)	
	for S ratio	R38P–190
	for U ratio	13SR–264
314A	Spindle Planet Gear Bearing (for U ratio; 2 for each Planet Gear	R3801P2–500
315	Front Spindle Bearing	
	for square drive spindles	4UA9–593
	for spline drive spindles	ET1803–593
316	Rear Spindle Bearing	R38P–97
317	Rear Spindle Bearing Retainer	FMC2–280
318	Pinion Coupler (for DEF fixture mounted modules)	DEF150S–17
319	Pinion Coupler (for DEA hand–held modules)	DEA120–17B
320	Pinion Coupler Shaft (for DEA hand–held modules)	DEA150–494

Disassembly of the Gear Case

1. Using a hex wrench, unscrew and remove the six screws holding the Gear Module to the mounting plate and pull the power unit and gearing away from the mounting plate and output spindle.
2. Using a hex wrench, unscrew and remove the three screws holding the power unit and transducer to the Gear Module and separate the units.
3. Some models have a driver attached to the output end of the Spindle (312). It must be removed before continuing with the disassembly. Use a roll pin punch to tap the roll pin out of the assembly and then pull the driver off the Spindle.
4. Pull the Pinion Coupler (318 or 319) and, if necessary, the Pinion Coupler Shaft (320) out the motor end of the gear assembly, if the parts remained with the gearing. Remove them from the motor shaft if they stayed with the power unit.
5. Using a thin blade screwdriver under the narrow end, pry the Ring Gear Retainer (302) out of the Gear Case (300).
6. Grasp the hub of the Ring Gear (301) and pull the Ring Gear and assembled Planet Gear Head (303) out of the Gear Case.
7. Grasp the spline shaft of the Gear Head and pull the assembly out of the Ring Gear.
8. Pull the Gear Head Spacer (311) off the shaft of the Gear Head..
9. Using a bearing puller, pull the Planet Gear Head bearing (304) off the hub of the Gear Head.

NOTICE

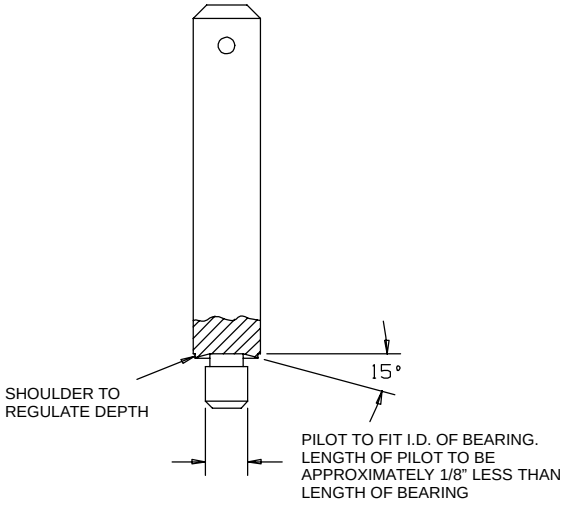
In the following step, do not remove the Pinion Coupler Bearing (310) unless you have a new Bearing available as a replacement. These Bearings are always damaged during the removal process and must be replaced.

10. Insert a rod at the spline end through the central opening in the shaft of the Gear Head and press the Pinion Coupler Bearing (310) and Pinion Coupler Spacer (309) out of the Gear Head.
11. Support the short hub of the Gear Head on the table of an arbor press and press the Gear Head Planet Gear Shafts (308) from the Gear Head. **Make certain the Shafts are pressed out toward the short hub because the holes in the Gear Head are tapered smaller toward the spindle end of the Gear Head.**
12. Remove the Gear Head Planet Gear Assemblies (306) from the Gear Head.
13. If the Gear Head Planet Gear Bearings (307) must be replaced, press them from the Planet Gears.
14. Using a thin blade screwdriver under the narrow end, pry the Rear Spindle Bearing Retainer (317) out of the Gear Case.
15. Holding the Gear Case, push the output end of the Spindle to move the assembled Spindle out the motor end of the Gear Case.
16. Using a bearing puller, pull the Rear Spindle Bearing (316) off the rear hub of the Spindle.
17. Using a bearing puller, pull the Front Spindle Bearing (315) off the front hub of the Spindle.
18. Support the short hub end of the Spindle on the table of an arbor press and press the Spindle Planet Gear Shafts (314) from the Spindle. **Make certain the Shafts are pressed out toward the short hub because the holes in the gear frame of the Spindle are tapered smaller toward the output end of the spindle shaft.**
19. Remove the Spindle Planet Gears (313) from the Spindle.
20. **For Spline Drive Models**, if the Spindle Planet Gear Bearings (314A) are worn, press them from the Spindle Planet Gears.

Assembly of the Gear Case

1. **For Spline Drive Models**, if the Spindle Planet Gear Bearings (314A) were removed, use a bearing inserting tool as shown in Drawing TPD786 and press a new Bearing into each end of each Spindle Planet Gear (313) until it is flush with the face at the pressing end.

Needle Bearing Inserting Tool



(Dwg. TPD786)

2. If the Spindle Planet Gears (313) were removed, support the web at the output end of the Spindle (312) on the table of an arbor press and position a Spindle Planet Gear inside the web. The holes in the webs of the Spindle are tapered and are smaller toward the output end of the Spindle. Press a Spindle Planet Gear Shaft (314) through the rear web and Gear and into the front web until the end of the Shaft is flush with the face of the rear web.
3. Repeat Step 2 with the remaining Spindle Planet Gears.
4. Stand the Spindle, output end upward, on the table of an arbor press and using a piece of tubing that will clear the Spindle, press the Front Spindle Bearing (315) onto the Spindle.
5. Invert the Spindle and without applying pressure to the Front Spindle Bearing, press the Rear Spindle Bearing (316) onto the short hub of the Spindle.
6. Apply lubricant to the gearing and shaft and insert the assembled Spindle, output end leading, into the end of the Gear Case (300). Push the assembly into the Gear Case until the Front Spindle Bearing seats in the gear case bearing recess.
7. Install the Rear Spindle Bearing Retainer (317) in the groove inside the Gear Case behind the assembled Spindle.
8. If the Gear Head Planet Gear Bearings (307) were removed from the Gear Head Planet Gears (306), use a needle bearing inserting tool as shown in Drawing TPD786 to press new Bearings into each Gear.
9. Support the web at the spline shaft end of the Gear Head (303) on the table of an arbor press and position a Gear Head Planet Gear with a Bearing in the web. The holes in the web of the Gear Head are tapered and smaller toward the spline shaft end of the Gear Head. Press a Gear Head Planet Gear Shaft (308) through the rear web and Gear and into the front web until the end of the Shaft is flush with the face of the rear web.
10. Repeat the previous step with each of the remaining Gear Head Planet Gears and Bearings.
11. Invert the Gear Head and with it standing on the end of the spline shaft, drop the Pinion Coupler Spacer (309) into the central opening in the Gear Head.
12. Using a smaller needle bearing inserting tool, press the Pinion Coupler Bearing (310) into the central opening against the Spacer.
13. Pressing on the inner ring of the Planet Gear Head Bearing (304), press the Bearing onto the hub at the motor end of the Gear Head.
14. If the Gear Head Bearing Retainer (305) was removed, install it in the internal groove of the Ring Gear (301).
15. Apply lubricant to the gearing and shaft, align the gear teeth with the spline in the Ring Gear and insert the assembled Gear Head, spline shaft end trailing, into the large opening of the Ring Gear. Push the assembly into the Ring Gear until the Planet Gear Head Bearing seats against the Retainer.
16. Install the Gear Head Spacer (311) on the spline shaft of the Gear Head.
17. Engage the teeth of the Spindle Planet Gears with the spline shaft of the Gear Head while bringing the assembled Ring Gear into the motor end of the Gear Case. Push the assembly into the Gear Case far enough to install the Ring Gear Retainer (302) in the internal groove in the Gear Case.
18. Install the Ring Gear Retainer.
19. If your model had a driver attached to the Spindle, reinstall it at this time.
20. Reassemble the Gear Case Module with the power unit and output spindle at the work site.

TROUBLESHOOTING GUIDE		
Trouble	**Probable Cause**	**Solution**
Gear case gets hot	Excessive grease	Clean and lubricate the Gear Case using less grease.
	Worn or damaged parts	Clean and inspect the Gearing. Replace worn or broken parts.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.

NOTES