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Edition 3
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Air Screwdrivers

5 Series

Maintenance Information



Save These Instructions

IR Ingersoll Rand®

Product Safety Information

WARNING

- Failure to observe the following warnings, and to avoid these potentially hazardous situations, could result in death or serious injury.
- Read and understand this and all other supplied manuals before installing, operating, repairing, maintaining, changing accessories on, or working near this product.
- Always wear eye protection when operating or performing maintenance on this tool. The grade of protection required should be assessed for each use and may include impact-resistant glasses with side shields, goggles, or a full face shield over those glasses.
- Always turn off the air supply, bleed the air pressure and disconnect the air supply hose when not in use, before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool or any accessory.

Note: When reading the instructions, refer to exploded diagrams in Parts Information Manuals when applicable (see under Related Documentation for form numbers).

Improved Disengaging Plunger and Spring

The Adjustable Clutch Attachments have been revised to incorporate a new style Disengaging Plunger (222) and Plunger Spring (223). The new style parts in combination can be used to replace the old style. Parts are easily identified by the following descriptions.

Part	Old Style	New Style
Spring	Length- 2" (50 mm) Coils- 20 Diameter of end coils smaller than others	Length- 1-5/16" (33 mm) Coils- 15 Diameter end of coils larger than others
Plunger	Overall Length- 1-3/8" (35 mm)	Overall Length - 2-5/16" (59 mm)

Note that the position of the new style parts is transposed in comparison with the old. When assembling, insert the small diameter section of the Plunger through the bore of the Spring, then insert the Plunger, large end first, into the bore of the Bit Holder (208).

Lubrication

Each time the Series 5 Screwdrivers are disassembled for maintenance, repair or replacement of parts, lubricate the tool as follows:

1. Squirt a few drops of oil into each vane slot in the Rotor (101) after entering the Vanes (105) in the slots.
2. Work enough of **Ingersoll Rand** grease No. 28 into the Front Rotor Bearing (108) and Spindle Bearing (122) to coat the balls of the races; also heavily coat the hub on the rear of the Rotor and place as much grease as will adhere to it on the end of the hub before installing the motor assembly in the Motor Housing (1 or 51).
3. Apply a coat of **Ingersoll Rand** grease No. 28 to the Planet Gears (116 and 123), the shafts on which they rotate, the bearing surfaces on the Spindle (118) and Gear Head (115) and the teeth of the Ring Gear (112). Do not pack the gear chamber; excess grease will cause loss of power and heating.
4. Apply **Ingersoll Rand** grease No. 67 to the Clutch Jaws and for Adjustable Clutch Attachments coat the Clutch Balls (210) and Spring Seat Bearing (212A). Coat the bearing surface on the Disengaging Plunger (222 or 403) when entering it in the Bit Holder.

Disassembly

General Instructions

1. Do not disassemble the tool any further than necessary to replace or repair damaged parts.
2. Whenever 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 a subassembly 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 replacement.

Operation

Periodically, unscrew the Inlet Bushing (18 or 71) from the Motor Housing (1 or 51). Wash the Bushing in a clean, suitable, cleaning solution to clean the Screen (19 or 72). Replace the Screen if it is damaged. Do not omit the Screen. Without the Screen, a large piece of foreign material could enter and jam the Throttle Valve in the open position. Tighten the Bushing between 25 to 30 ft-lb (33.9 to 40.7 Nm) torque. The Inlet Bushing must securely clamp the Exhaust Deflector (21) or Muffler Assembly (66).

Withdraw the Exhaust Deflector (21) or Muffler Assembly (66) from the Housing. Wash the Muffler Element (23) or Muffler Assembly in a clean, suitable, cleaning solution.

Disassembly of the Tool

To service these Screwdrivers, you will need Waldes Truarc® Pliers No. 22, a stiff steel rod 3/32" (2.3 mm) diameter approximately 10" (254 mm) long, and a small probe, preferably with a hooked tip, in addition to the tools ordinarily found in a mechanic's tool box.

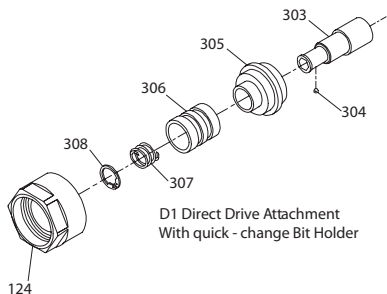
* Registered trademark of Waldes Truarc Company

Disassemble a Screwdriver only as far as required for inspection and replacement of worn or damaged parts. A single Clutch Coupling Nut (124) retains the motor and gearing within the Motor Housing as well as connecting the Attachment. However the adjustable clutch assembly of No. 5C1 or 5C3 Attachment can be removed or installed without removing the Coupling Nut. This is important because the proper squeeze on the motor is dependent on the correct tightness of the Coupling Nut. Thus being able to remove the clutch assembly without disturbing the Coupling Nut simplifies servicing the Adjustable Clutch Unit.

Disassembly of the Quick-Change Retainer

Using snap ring pliers, remove the Sleeve Spring Retainer (221A, 308 or 412). Using a small probe, work the first coil of the Retaining Sleeve Spring (221, 307 or 411) out of the groove in the Bit Holder (208, 303 or 407), and rotate the Spring on the Holder to work it free. Use care to avoid distorting the Spring. The Retaining Ball (217, 304 or 408) will drop from the Holder when the Retaining Sleeve (219, 306 or 410) is removed.

For No. 5C1 Attachment, remove the Bit Holder Stop (216) with Waldes Truarc No. 22 Pliers.

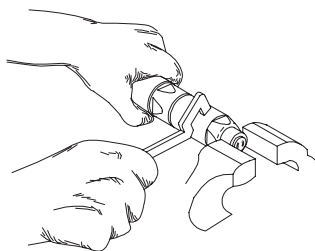


D1 Direct Drive Attachment
With quick - change Bit Holder

(Dwg. TPB6801-1)

Disassembly of the Adjustable Clutch

1. Rotate the Adjusting Hole Cover (203) to expose the adjusting hole in the Clutch Housing (201).
2. Clamp the flats on the Nose-piece (204) in a vise as shown. Do not tighten the vise enough to distort the Nose-piece.
3. Enter the pin on the No. MR-453 Spanner Wrench in the adjusting hole and rotate the Clutch Housing (and Tool) clockwise when facing the rear of the Tool (this is a left-hand thread).

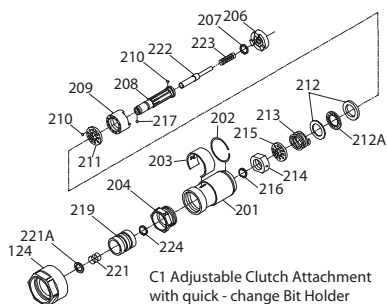


(Dwg. TPD579)

NOTICE

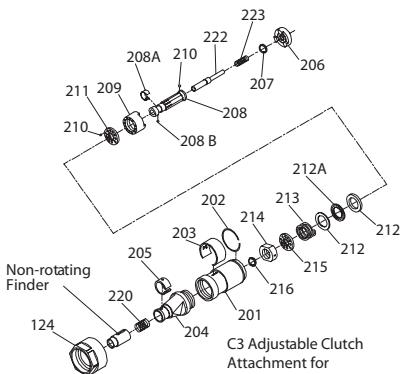
Be sure the pin on the Spanner Wrench is fully engaged with the Clutch Housing, otherwise the housing wall may be distorted or otherwise damaged.

When the Adjusting Nut (214) is positioned for very low torque, it may interfere with full engagement of the Spanner Wrench, in which case simply move the Nut as for a higher torque until the interference is eliminated.



C1 Adjustable Clutch Attachment
with quick - change Bit Holder

(Dwg. TPB606-2)



C3 Adjustable Clutch
Attachment for
Non-Rotating finder
for Flat Bits

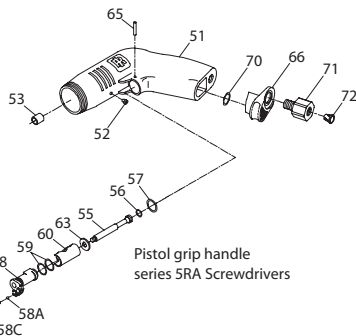
(Dwg. TPB607-1)

4. Remove the Bit Holder Stop (216) from the Bit Holder (208).
5. Clamp a 1/4" hex steel (an Allen Key is fine) horizontally in a vise and slide the Bit Holder onto it.

NOTICE

When the Nut is loosened enough to relieve the Spring pressure, hold the assembly over a container to catch the twenty-four Clutch Balls (210) that will be free to drop out and might otherwise be lost.

6. Insert a rod into one of the radial holes in the Adjusting Nut (214) or place a wrench on the flats and rotate the Nut clockwise to remove it from the Holder.



Pistol grip handle
series 5RA Screwdrivers

(Dwg. TPB615-2)

Disassembly of the Throttle

For Pistol Grip Models

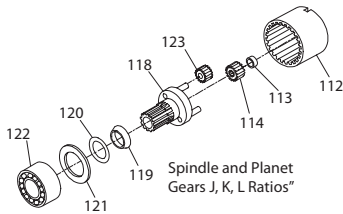
A leaking throttle is usually caused by a worn or damaged Throttle Valve Face (56), and can be corrected by replacing this small O-ring as follows: With a small pin punch, remove the Throttle Retaining Pin (65) from the Motor Housing (51), and withdraw the throttle mechanism. Carefully work the new Face over the end of the Valve (55) and into the groove. Align the notch in the Throttle Valve Bushing (61) or Reverse Valve Bushing (60) with the hole for the Retaining Pin and slide the throttle mechanism into position. Install the Retaining Pin.

For Lever Throttle Models

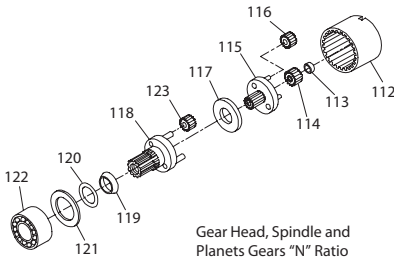
A leaking throttle is usually caused by a worn or damaged Throttle Valve Seat (12) and can be corrected by replacing this small washer type part. Unscrew the Retainer Screw (14) and withdraw the throttle mechanism from the Motor Housing (1).

NOTICE

Before proceeding, place an index mark on Valve Body and knob to assure their same relative position when reassembling. It is possible to change orientation 180° in which case performance will be adversely affected. Using a small pin punch, push the Valve Knob Retainer (9) from the Knob (7) and separate the Knob from the Throttle Valve Body (5), freeing the Spring (11) and ball type Throttle Valve (10). Withdraw the Seat and install the new one. Insert the Valve and Spring into the Valve Body, join the Body to the Knob and install the Retainer. Make certain the Retainer is installed flush with the outside of the Throttle Valve Body.



(Dwg. TPC398-2)



(Dwg. TPC399-1)

Assembly

General Instructions

1. Always press on the **inner** ring of a ball-type bearing when installing the bearing on a shaft.
2. Always press on the **outer** ring of a ball-type bearing when pressing the bearing into a bearing recess.
3. Whenever grasping a tool or part in a vise, always use leather-covered or copper-covered vise jaws. Take extra care with threaded parts and housings.
4. Always clean every part and wipe every part with a thin film of oil before installation.
5. Apply a film of O-ring lubricant to all O-rings before final assembly.
6. Check every bearing for roughness. If an open bearing must be cleaned, wash it thoroughly in a suitable cleaning solution and dry with a clean cloth. **Sealed or shielded bearings should never be cleaned.** Work grease thoroughly into every open bearing before installation.

Disassembly of the Attachment, Gearing and Motor

1. Lightly clamp the Tool, front end up, in copper-covered vise jaws. For Pistol Grip Models, clamp the vise on the handle; for Lever Throttle Models, clamp the vise over the throttle area. In either case apply only enough pressure to keep the Housing from turning. Loosen the Coupling Nut (124) with a wrench applied to the flats on the Nut.
2. **For No. 5C1, 5C3 or SP1 Attachment**, remove the Clutch Driver Retainer (207 or 405) from the groove and slip the Driver (206 or 401) from the Spindle (118).
For Screwdrivers with No. SP1 Attachment, the Clutch Driver (401) and Front Jaw (406) are released by removal of the Jaw Retainer (402) and Driver Retainer (405).
3. Grasp the end of the Spindle and pull straight forward. If the gearing and motor cannot be removed with the fingers, protect the Housing thread by running on the Coupling Nut, then bump the open face on the workbench to jar the parts loose.
4. The Spindle Bearing (122) is a moderate press fit on the Spindle (1, 18) and should not be removed unless replacement is necessary. All other parts of the gear train are free fitting and will slide apart with ease.

WARNING

Wear eye protection when prying the Retainer from the rotor hub. It is tempered steel and may fly when free.

5. All parts of the motor assembly are free fitting and will slide apart, except the Rear End Plate (102) which must remain on the Rotor (101) until the End Plate Retainer (103) is removed.

Assembly of the Quick-Change Retainer

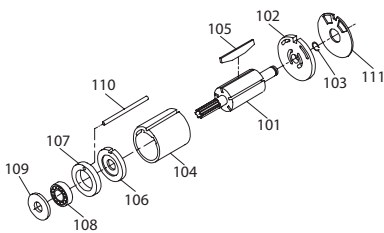
This is a direct reversal of the disassembly procedure. When installing the Spring, slide it large end first onto the Holder and rotate it while applying pressure with the fingers until the end coil snaps into the groove. Apply a thin film of **Ingersoll Rand** grease No. 67 to the Bit Holder and Bit Holder Stop during assembly.

Assembly of the Adjustable Clutch

1. Slide the Front Clutch Jaw (209), jaw end first, over the hexagon recess end of the Bit Holder (208) and move it along over the splines to the groove in the Holder.
2. Coat the grooved end with grease and insert thirteen Clutch Balls (210) between the Jaw and Holder.
3. Stand the Holder, front end up, on the workbench and slide the Clutch Ball Spacer (211) over it.
4. Enter a Clutch Ball (210) into each of the eleven holes in the Spacer, and in the order named, slide the following over the Holder: one Clutch Spring Seat (212), the Spring Seat Bearing (212A), the second Clutch Spring Seat, the Clutch Spring (213) and the Adjusting Nut Lock (215).

5. Start the Adjusting Nut (214), indented side first, onto the Holder and run it finger tight against the compression of the Spring.
6. Install the Bit Holder Stop (216) in the groove.

Assembly of the Attachment, Gearing and Motor



(Dwg. TPC400)

1. Slip the Rear End Plate (102) on the rear hub of the Rotor (101) and install the Retainer (103) in the groove.
2. Hold the Rotor vertically and clamp the short hub in leather-covered or copper-covered vise jaws.
3. Insert a Vane (105) in each slot.
4. Place the Cylinder (104), front end up, over the Rotor and onto the Rear End Plate. To determine which end of the Cylinder is the front end, hold the Cylinder horizontally, facing one end. Position the external groove for the Dowel (110) at the top as shown in the motor illustration. If the air ports through the cylinder wall are in the bottom right quadrant, you are facing the front of the Cylinder. When assembling the motor, be sure to properly install the Cylinder. The motor will not operate properly if the Cylinder is inverted.
5. Slip the Front End Plate (106) over the rotor shaft. Press the Front Rotor Bearing (108) into the Bearing Housing (107), and slide the Bearing, followed by the Retaining Washer (109), onto the shaft.
6. Obtain a stiff steel rod 3/32" (2.3 mm) diameter and approximately 10" (254 mm) long to use as an assembly dowel.
7. Align the dowel groove in the Rear End Plate (102), Cylinder (104) and Front End Plate (106) with the dowel hole through the Rotor Bearing Housing (107) and insert the rod.
8. Enter the Rear End Plate Gasket (111) into the Motor Housing (1 or 51), positioning the Gasket smoothly on the back bore so that the dowel notch in the Gasket aligns with the dowel hole in the Housing.
9. Enter the end of the assembly dowel in the dowel hole and slide the motor assembly into the Housing. This is a sliding fit and if proper alignment is maintained, the assembly will enter under only slight finger pressure. Do not drive, or otherwise force the motor into position.
10. Replace the assembly dowel with the Cylinder Dowel (110). Make sure the Cylinder Dowel is entered into and remains in the dowel hole in the Housing. When in proper position, approximately 3/32" (2.3 mm) of the Dowel protrudes from the face of the Bearing Housing. If it is not in the hole, it will protrude approximately 7/32" (5.5 mm).
11. Work the Seal Support (119), large end first, over the spindle shaft and against the gear frame face. Follow with the Seal (120) and the Grease Shield (121).
12. Install the Spindle Bearing (122), sealed side first, over the spindle shaft. Firmly support the Spindle (118) and press, do not drive, the Bearing into position using an arbor that will contact only the inner ring of the Bearing.
13. Slide the Ring Gear (112) into the Motor Housing (1 or 51), making sure the Cylinder Dowel (110) enters one of the notches in the end of the gear.
14. **For N or J ratio**, slide the Rotor Pinion Spacer (113) followed by the Rotor Pinion (114) onto the spline shaft on the Rotor (101).
15. **For N ratio**, slide a Gear Head Planet Gear (116) (13 teeth) onto each of the three gear shafts on the Gear Head (115). Enter the assembly into the Ring Gear (112) and slide it into engagement with the Rotor Pinion. Slip the Bearing Retainer Washer (117) over the spline on the Gear Head.
16. **For all ratios**, slide a Spindle Planet Gear (123) onto each of the three gear shafts on the Spindle (118) and slide the assembly into the Ring Gear and into engagement with the Rotor Pinion or Gear Head.

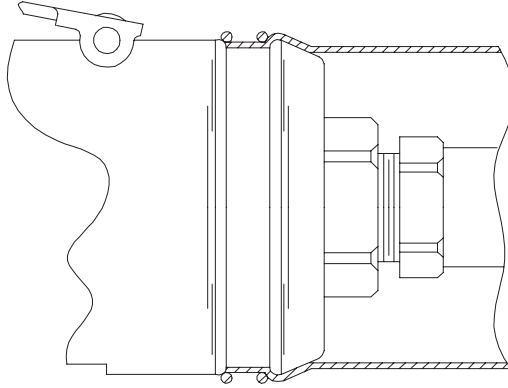
NOTICE

In N ratio, a Gear Head Planet Gear (116) has 13 teeth and a Spindle Planet Gear (123) has 14 teeth. Do not mix, mismatch or switch locations with these small gears when reassembling a Tool.

17. **For Screwdrivers with No. 5C1, 5C3 or 5P1 Attachment**, slide the Clutch Driver (206 or 401) onto the Spindle (118) and install the Retainer (207 or 402) in the groove.
For Screwdrivers with No. 5P1, Attachment, slide the Front Jaw (406) onto the Bit Holder (407) and install the Front Jaw Retainer (405) on the Bit Holder.
18. For Screwdrivers with 5C1 or 5C3 Attachments, slip the Disengaging Plunger (222) and Plunger Spring (223) into the Bit Holder (208) making sure the Plunger slides freely.
For Screwdrivers with 5P1 Attachments, slip the Plunger Spring (404) and Disengaging Plunger (403) into the Bit Holder (407) making sure the Plunger slides freely.
19. **For Screwdrivers with 5C1 or 5C3 Attachments**, enter the opposite end of the Spring into the spindle bore while entering the end of the Clutch Housing (201) into the Motor Housing (1 or 51).
For Screwdrivers with 5P1 Attachments, enter the opposite end of the Plunger into the spindle bore while entering the end of the Clutch Plunger (409) into the Motor Housing (1 or 51).
For Screwdrivers with 5D1 Attachments, slide the Bit Holder (303) onto the Spindle (118) while entering the end of the Clutch Housing (305) into the Motor Housing (1 or 51).
20. Using a wrench, snug the Coupling Nut onto the Motor Housing. Bump the back of the Motor Housing to seat the internal parts as the Coupling Nut is tightened.
21. When the Coupling Nut is snug, connect an air supply line to the Inlet Bushing (18 or 71) and check performance. If the Tool does not function properly, loosen the Nut and realign the components. If the Tool does function properly, tighten the Nut to a minimum of 25 ft-lb (33 Nm) torque.

Piped-away Exhaust

A Piped-Away Exhaust Kit is available for Lever Throttle Models. To install it, slip the spring-type clamp over the length of lightweight flexible exhaust hose, then slide the exhaust hose over the hose whip and onto the rear of the Exhaust Deflector as shown in the illustration. Apply the clamp to the part of the hose over the annular groove in the Deflector. This is easily accomplished by standing the Tool upright on a solid support and starting with the bottom coil, work around the clamp with downward pressure until it is in position.



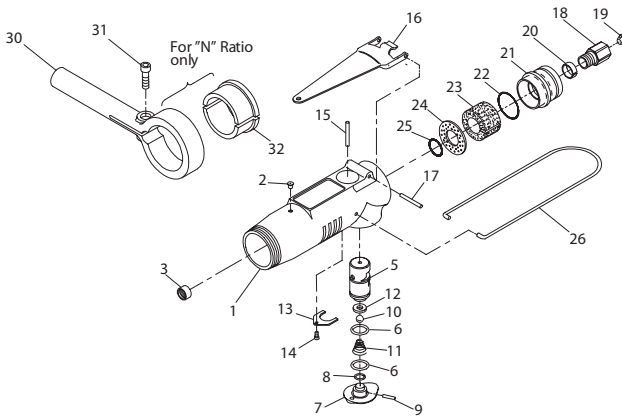
Piped - Away Exhaust for Series 5L and 5RL

(Dwg. TPD569-1)

Dead Handle

A Dead Handle (30) is offered for N ratio Tools. Its use provides the operator ample leverage to easily resist the torque reaction of this gear ratio. It is particularly desirable on Lever Throttle Models and is almost an essential on Tools with No. 5D1 Direct Drive Attachment that are used on applications that require near full torque of the Tool.

Two Dead Handle Adapters (32) are required for attaching the Handle which is retained by a single Pinch Bolt (31). This arrangement allows 360° positioning and rapid, easy adjustment of the radial position.



Lever Throttle Handle

(Dwg. TPB616-1)

Troubleshooting Guide

Trouble	Probable Cause	Solution
Loss of power	Low air pressure	Check air supply. For top performance, the air pressure must be 90 psig (6.2 bar/620 kPa) at the inlet.
	Plugged Air Strainer or Screen Inlet Screen	Clean the Air Strainer or screen in a clean, suitable, cleaning solution. If the Screen cannot be cleaned, replace it.
	Clogged Muffler or Exhaust Silencer	Clean the Muffler Element in a clean, suitable, cleaning solution. If it cannot be cleaned, replace it.
	Worn or broken Vanes.	Replace the complete set of Vanes.
	Damaged Rear End Plate Gasket	Install a new Rear End Plate Gasket.
	Worn or broken Cylinder	Replaced the Cylinder if it is cracked or if the bore appears wavy or scored.
	Improper lubrication or dirt build-up	Clean the Motor Unit parts and lubricate as instructed.
Leaky Throttle Valve	Worn Throttle Valve and/or Throttle valve Seat	Install a new Throttle Valve and/or a Throttle Valve Seat.
	Dirt accumulation on Throttle Valve and/or Throttle Valve Seat	Pour about 3 cc of a clean, suitable, cleaning solution in the air inlet and operate the tool Valve for about 30 seconds. Immediately pour 3 cc of the recommended oil in the air inlet and operate the tools for 30 seconds to lubricate all the cleaned parts.
Gear Case gets hot	Excessive grease	Clean and inspect the Gear Case and gearing parts and lubricate as instructed.
	Worn or damaged parts	Clean and inspect the Gear Case and gearing. Replace worn or broken components.
Inconsistent disengagement of Adjustable Clutch	Improper lubrication	Remove Adjustable Clutch mechanism and check. Lubricate as instructed.
	Worn or damaged parts	Remove Adjustable Clutch and examine parts. Replace worn or broken parts.
	Wrong clutch Spring (using Heavy Clutch Spring on light application)	Change to Medium or Light Clutch Spring.
Motor stalls before Adjustable Clutch ratchets	Improper Clutch adjustment or improper tool ratio for application	Check Clutch Adjustment and review tool performance vs. requirements.
	Low air pressure at the inlet	Check the air supply. For top performance, the air pressure must be 90 psig (6.2 psig/620 kPa) at the inlet.
	Insufficient Grease	Lubricate the Clutch as instructed.

Related Documentation

For additional information refer to:
 Product Safety Information Manual 04585006.
 Product Information Manual 80167273 and 80167281.
 Parts Information Manual 16574576.

Manuals can be downloaded from ingersollrandproducts.com.

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