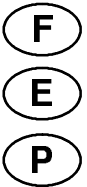


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Form P6586
Edition 11
September, 1997



OPERATION AND MAINTENANCE MANUAL FOR SERIES 5L ANGLE DRILLS AND 5RL ANGLE WRENCHES/ANGLE SCREWDRIVERS

NOTICE

Series 5L Angle Drills are designed for precision drilling in close-quarter applications. Series 5RL Angle Wrenches/Angle Screwdrivers are designed for assembly line applications where a torque range is required but precision torque is not critical.

Ingersoll-Rand is not responsible for customer modification of tools for applications on which Ingersoll-Rand 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 1/4" (6 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 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.

NOTICE

The use of other than genuine Ingersoll-Rand 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 Ingersoll-Rand Authorized Servicenter.

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

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INGERSOLL-RAND®
PROFESSIONAL TOOLS


WARNING LABEL IDENTIFICATION

⚠ WARNING


FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.


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


	⚠ WARNING
	Always wear hearing protection when operating this tool.


	⚠ WARNING
	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.

	⚠ WARNING
	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.

	⚠ WARNING
	Do not carry the tool by the hose.

	⚠ WARNING
	Do not use damaged, frayed or deteriorated air hoses and fittings.

	⚠ WARNING
	Keep body stance balanced and firm. Do not overreach when operating this tool.

	⚠ WARNING
	Operate at 90 psig (6.2 bar/ 620 kPa) Maximum air pressure.

ADJUSTMENTS

CLUTCH ADJUSTMENT

Models **5RLK2C3**, **5RLK2C5**, **5RL2C5**, **5RLN2C3** and **5RLN2C6** incorporate an adjustable clutch that can be externally adjusted within a certain range to ratchet when a predetermined torque has been delivered. To increase the adjustable torque range, two Clutch Springs are offered.

The Heavy Clutch Spring (color-coded green for identification) is suitable for the majority of applications since it will give precise adjustment from approximately 40 to 120 in-lb (4.5 to 13.5 Nm) torque.

The Light Clutch Spring (color-coded black) is for applications ranging from approximately 15 to 80 in-lb (1.7 to 9 Nm) torque.

⚠ WARNING

Disconnect the air supply from the Tool before proceeding.

To adjust the Clutch, proceed as follows:

1. Rotate the Adjusting Hole Cover on the Clutch Housing to expose the adjusting hole.
2. Rotate the output end of the Angle Head until one of the radial holes in the Clutch Adjusting Nut is visible through the slot in the Clutch Housing. Insert the Clutch Sprag Key into the elongated slot in the Clutch Housing and into the hole in the Adjusting Nut to sprag the Nut against rotation.
3. Grasp the Tool firmly in one hand and rotate the output end of the Angle Head. Rotating the output end clockwise when facing the front increases the compression on the Clutch Spring and raises the torque at which the clutch will ratchet.

NOTICE

The most satisfactory adjustment is usually obtained by use of the Tool on the actual application, and increasing or decreasing the delivered torque until the desired setting is reached. In any event it is recommended that final adjustment be made by progression.

ADJUSTMENTS

CHANGING THE CLUTCH SPRING

1. Carefully grasp the flats of the Coupling Nut in leather-covered or copper-covered vise jaws, Angle Attachment facing downward.

NOTICE

This is a left-hand thread.

2. Using a wrench on the flats of the Gear Case, loosen the Gear Case from the Coupling Nut. Remove the tool from the vise.
3. Unscrew the Coupling Nut and remove the Clutch Housing from the Gear Case.
4. Grasp the Clutch Shaft Assembly and pull the Assembly out of the Clutch Housing.
5. Grasp the spline of the Clutch Shaft Support in leather-covered or copper-covered vise jaws with the Clutch Adjusting Nut upward and the Clutch Driver against the top of the vise jaws.

NOTICE

This is a left-hand thread.

6. Using a wrench on the flats of the Clutch Adjusting Nut, loosen and remove the Nut.

CAUTION

There are twenty-four Clutch Balls located between the Clutch Driver and the Clutch Spring Seat nearest the Clutch Driver. Failure to remove the remaining components carefully may result in the Balls falling out of position and becoming lost.

7. With the assembly in the vise and while applying slight downward pressure to the Clutch Spring Seat nearest the Clutch Driver, remove the Adjusting Nut Lock, first Clutch Spring Seat, Spring Seat Bearing, second Clutch Spring Seat and the Clutch Spring from the Clutch Shaft.

8. Thoroughly grease the Bearing and Adjusting Nut Lock and, in the order named, slide the following over the Clutch Shaft: the new Clutch Spring, a Clutch Spring Seat, the Spring Seat Bearing, another Clutch Spring Seat and the Adjusting Nut Lock, indented side trailing.

NOTICE

This is a left-hand thread.

9. Start the Clutch Adjusting Nut, detent side first, onto the Clutch Shaft and run it finger tight against the compression of the Spring. With a wrench, tighten the Nut an additional one or two turns.
10. Remove the assembled Clutch from the vise.
11. Install the Clutch Shaft Assembly into the Clutch Housing with the splined end of the Clutch Shaft Support trailing.
12. Install the Clutch Housing Assembly into the Gear Case Assembly matching the spline of the Clutch Housing with that of the Gear Case.
13. Thread the Coupling Nut onto the Gear Case, hand tight. Grasp the flats of the Gear Case in leather-covered or copper-covered vise jaws and using a wrench on the flats of the Coupling Nut, tighten it to 25 ft-lb (34 Nm) torque.
14. Adjust the Clutch as directed in the section **Clutch Adjustment**.

PLACING TOOL IN SERVICE

LUBRICATION



Ingersoll-Rand No. 10



Ingersoll-Rand No. 28

Ingersoll-Rand No. 67

Always use an air line lubricator with this tool.

We recommend the following Filter-Lubricator-Regulator Unit:

USA - No. C11-03-G00

Motor

After each eight hours of operation, unless an air line lubricator is used, inject 1-1/2 cc of Ingersoll-Rand No. 10 Oil into the Air Inlet.

Gearing

After each 160 hours or 50 000 cycles, whichever occurs first, use Ingersoll-Rand No. 28 Grease and the R000A2-228 Grease Gun to lubricate the Gearing through the Grease Fitting. For **H, K or L ratios**, inject 15 or 16 strokes (6 cc) and for **M and N ratios**, inject 24 or 25 strokes (9 cc).

Cushion Clutch

Adequate lubrication is very important for satisfactory clutch life. Use Ingersoll-Rand No. 67 Grease.

1. Rotate the Adjusting Hole Cover to expose the adjusting hole.
2. Insert the Clutch Sprag Key into the adjusting hole and into one of the holes in the Clutch Adjusting Nut to keep the Nut from turning.
3. Using a wrench on the output end of the Angle Head, turn the wrench counterclockwise until the Clutch Adjusting Nut is loose or until the clicking sound stops.
4. Grasp the flats of the Gear Case and using a wrench, unscrew the Coupling Nut.
5. Remove the Clutch Housing and Angle Housing from the Gear Case.

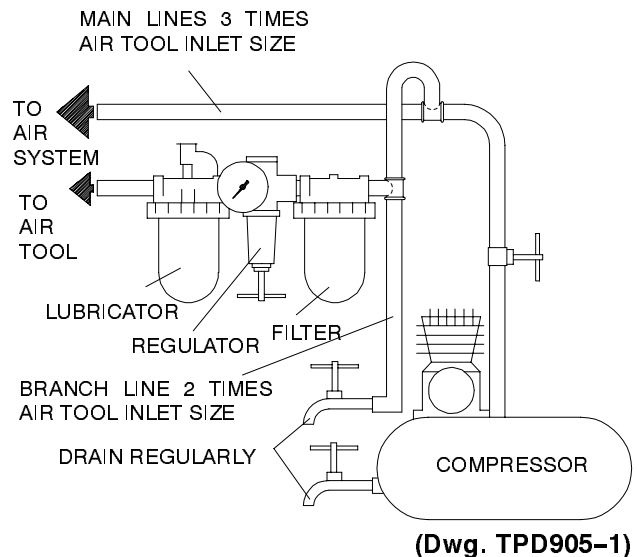
6. Grasp the Clutch Shaft Support and pull the entire Clutch Assembly from the Housing.
7. Remove the Clutch Driver and Clutch Shaft Support from the Clutch. Work a small amount of the recommended grease between the Clutch Ball Spacer and Front Clutch Jaw and three strokes of grease (1.00 cc) around the Clutch Balls of the Jaw. Work a small amount of the recommended grease between the two front clutch spring seats and around the Spring Seat Bearing. This should be done every 50 000 cycles or one month, whichever occurs first.

Angle Head

Use Ingersoll-Rand Light Grease No. 67 for lubricating the Angle Head.

For models with the **7L1A1, 7L1A3, 7L1A4, 7L1B1 or 7L1B4 Angle Attachment**, inject 0.5 cc to 1.5 cc of grease into the Grease Fitting in the Angle Housing after each eight hours of operation.

For models with the **7L2A4, 5L2C5, 5L2D5, 5L2C6 or 6L2D6 Angle Attachment**, inject 0.5 cc to 1.5 cc of grease into the Grease Fitting in the Angle Housing after each forty hours of operation.



PLACING TOOL IN SERVICE
HOW TO ORDER AN ANGLE DRILL

LEVER THROTTLE WITH 90° ANGLE HEAD AND FEMALE THREADED SPINDLE

Model	Free Speed rpm	Stall Torque		Female Threaded Spindle
		in-lb	Nm	
5LH1A1	4 800	20	2.3	1/4" -28
5LH1A4	4 800	20	2.3	9/32" -40
5LK1A1	3 000	31	3.5	1/4" -28
5LL1A1	2 200	40	4.5	1/4" -28

LEVER THROTTLE WITH 45° ANGLE HEAD AND FEMALE THREADED SPINDLE

5LH1B1	4 800	20	2.2	1/4" -28
5LK1B1	3 000	31	3.5	1/4" -28
5LK1B4	3 000	31	3.5	9/32" -40

LEVER THROTTLE WITH 90° ANGLE HEAD AND CHUCK

Model	Free Speed rpm	Stall Torque		Chuck Capacity	
		in-lb	Nm	in	mm
5LK2A41	2 000	45	5.1	1/4	6
5LL2A41	1 500	60	6.8	1/4	6
5LN2A43	700	120	13.6	1/4	6

HOW TO ORDER AN ANGLE WRENCH

NONREVERSIBLE LEVER THROTTLE STALL TYPE

Model	Free Speed rpm	Torque (Soft Draw)		Square Drive in
		in-lb	Nm	
5LL2D6	1 500	60	6.8	3/8

REVERSIBLE LEVER THROTTLE STALL TYPE

5RLK2D6	1 800	40	4.6	3/8
5RLL2D6	1 300	55	6.3	3/8
5RLN2D6	600	110	12.5	3/8

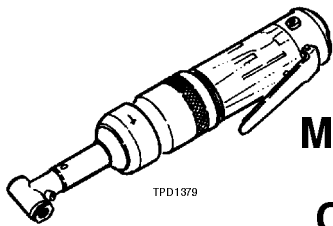
REVERSIBLE LEVER THROTTLE WITH ADJUSTABLE CUSHION CLUTCH

Model	Free Speed rpm	Torque (Soft Draw)		Square Drive in	Clutch Spring
		in-lb	Nm		
5RLK2C5	1 800	10- 40	1.1- 4.6	1/4	L
5RLL2C5	1 300	15- 55	1.7- 6.3	1/4	L
5RLN2C6	600	15-110	1.7-12.5	3/8	H

HOW TO ORDER A SCREWDRIVER

**REVERSIBLE LEVER THROTTLE WITH ADJUSTABLE CUSHION CLUTCH AND
90° ANGLE HEAD (REQUIRES 1/4" HEX DETENTED SHANK BIT)**

Model	Free Speed rpm	Torque (Soft Draw)		Clutch Spring
		in-lb	Nm	
5RLK2C3	1 800	10- 40	1.1- 4.6	L, H
5RLL2C3	700	15- 55	1.7- 6.3	L, H
5RLN2C3	600	15-110	1.7-12.4	L, H



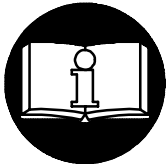
MANUEL D'EXPLOITATION ET D'ENTRETIEN DES PERCEUSES D'ANGLE SÉRIE 5L, CLÉS ET TOURNEVIS D'ANGLE SÉRIE 5RL

NOTE

Les perceuses d'angle de la série 5L sont destinées au perçage de pression dans des espaces restreints. Les clés et tournevis d'angle de la série 5RL sont destinés aux applications de chaîne de montage lorsqu'une gamme de couples est requise sans toutefois que la précision du couple soit critique.

Ingersoll-Rand ne peut être tenu responsable de la modification des outils par le client pour les adapter à des applications qui n'ont pas été approuvées par Ingersoll-Rand.

⚠ ATTENTION



**D'IMPORTANTES INFORMATIONS DE SÉCURITÉ SONT JOINTES.
LIRE CE MANUEL AVANT D'UTILISER L'OUTIL.
L'EMPLOYEUR EST TENU DE COMMUNIQUER LES INFORMATIONS
DE CE MANUEL AUX EMPLOYÉS UTILISANT CET OUTIL.**

LE NON RESPECT DES AVERTISSEMENTS SUIVANTS PEUT CAUSER DES BLESSURES.

MISE EN SERVICE DE L'OUTIL

- Toujours exploiter, inspecter et entretenir cet outil conformément au Code de sécurité des outils pneumatiques portatifs de l'American National Standards Institute (ANSI B186.1).
- Pour la sécurité, les performances optimales et la durabilité maximale des pièces, cet outil doit être connecté à une alimentation d'air comprimé de 6,2 bar (620 kPa) maximum à l'entrée, avec un flexible de 6 mm de diamètre intérieur.
- Couper toujours l'alimentation d'air comprimé et débrancher le flexible d'alimentation avant d'installer, déposer ou ajuster tout accessoire sur cet outil, ou d'entreprendre une opération d'entretien quelconque sur l'outil.
- Ne pas utiliser des flexibles ou des raccords endommagés, effilochés ou détériorés.
- S'assurer que tous les flexibles et les raccords sont correctement dimensionnés et bien serrés. Voir Plan TPD905-1 pour un exemple type d'agencement des tuyauteries.
- Utiliser toujours de l'air sec et propre à une pression maximum de 6,2 bar (620 kPa). La poussière, les fumées corrosives et/ou une humidité excessive peuvent endommager le moteur d'un outil pneumatique.
- Ne jamais lubrifier les outils avec des liquides inflammables ou volatils tels que le kérosène, le gasoil ou le carburant d'aviation.
- Ne retirer aucune étiquette. Remplacer toute étiquette endommagée.

UTILISATION DE L'OUTIL

- Porter toujours des lunettes de protection pendant l'utilisation et l'entretien de cet outil.

- Porter toujours une protection acoustique pendant l'utilisation de cet outil.
- Tenir les mains, les vêtements fous et les cheveux longs, éloignés de l'extrémité rotative de l'outil.
- Noter la position du levier d'inversion avant de mettre l'outil en marche de manière à savoir dans quel sens il va tourner lorsque la commande est actionnée.
- Prévoir, et ne pas oublier, que tout outil motorisé est susceptible d'à-coups brusques lors de sa mise en marche et pendant son utilisation.
- Garder une position équilibrée et ferme. Ne pas se pencher trop en avant pendant l'utilisation de cet outil. Des couples de réaction élevés peuvent se produire à, ou en dessous, de la pression d'air recommandée.
- La rotation des accessoires de l'outil peut continuer pendant un certain temps après le relâchement de la gâchette.
- Les outils pneumatiques peuvent vibrer pendant l'exploitation. Les vibrations, les mouvements répétitifs et les positions inconfortables peuvent causer des douleurs dans les mains et les bras. N'utiliser plus d'outils en cas d'inconfort, de picotements ou de douleurs. Consulter un médecin avant de recommencer à utiliser l'outil.
- Utiliser les accessoires recommandés par Ingersoll-Rand.
- N'utiliser que les douilles et les accessoires pour clés à chocs. Ne pas utiliser les douilles et accessoires (chromés) de clés manuelles.
- Cet outil n'est pas conçu pour fonctionner dans des atmosphères explosives.
- Cet outil n'est pas isolé contre les chocs électriques.

NOTE

L'utilisation de rechanges autres que les pièces d'origine Ingersoll-Rand peut causer des risques d'insécurité, réduire les performances de l'outil et augmenter l'entretien, et peut annuler toutes les garanties.

Les réparations ne doivent être effectuées que par des réparateurs qualifiés autorisés. Consultez votre Centre de Service Ingersoll-Rand le plus proche.

Adressez toutes vos communications au Bureau Ingersoll-Rand ou distributeur le plus proche.

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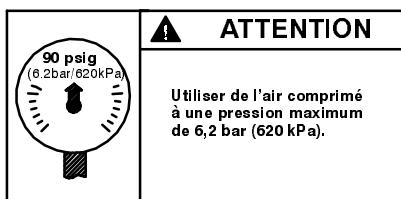
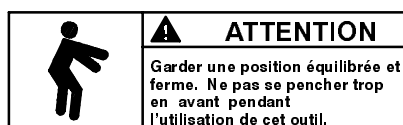
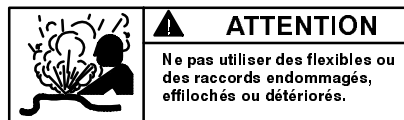
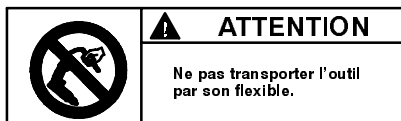
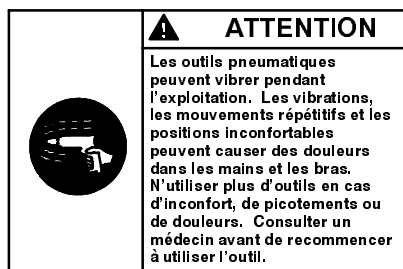
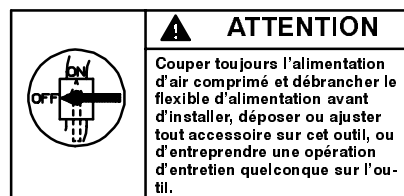
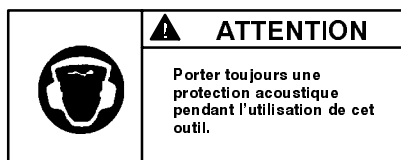
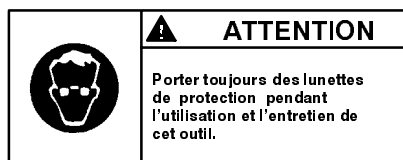
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PROFESSIONAL TOOLS

SIGNIFICATION DES ÉTIQUETTES D'AVERTISSEMENT

ATTENTION

LE NON RESPECT DES AVERTISSEMENTS SUIVANTS PEUT CAUSER DES BLESSURES.



RÉGLAGES

RÉGLAGE DU LIMITEUR

Les modèles 5RLK2C3, 5RLK2C5, 5RLL2C5, 5RLN2C3 et 5RLN2C comportent un limiteur réglable qui peut être réglé extérieurement dans une certaine gamme de manière à débrayer lorsqu'un couple prédéterminé est atteint. La gamme de réglage du couple est couverte par deux ressorts de limiteur.

Le ressort de limiteur type fort (code couleur : vert) convient à la majorité des cas puisqu'il donnera un ajustement précis de couple d'environ 4,5 à 13,5 Nm.

Le ressort de limiteur type léger (code couleur : noir) est destiné aux applications allant d'un couple de 1,7 à 9 Nm.

ATTENTION

Débrancher l'alimentation d'air comprimé de l'outil avant d'entreprendre les opérations suivantes.

Pour régler le limiteur, procéder comme suit :

1. Tourner le capot du trou de réglage du corps de limiteur pour découvrir le trou de réglage.

2. Tourner l'extrémité sortie du renvoi d'angle jusqu'à ce que l'un des trous radiaux de l'écrou de réglage du limiteur soit visible dans la rainure du corps de limiteur. Introduire la clé d'arrêt de limiteur dans la rainure du corps de limiteur et dans le trou de l'écrou de réglage pour bloquer la rotation de ce dernier.
3. Saisir fermement l'outil d'une main et tourner la sortie du renvoi d'angle. Une rotation de la sortie dans le sens des aiguilles d'une montre, lorsque vu de l'avant, augmente la compression du ressort de limiteur et par conséquent le couple de débrayage du crabot.

NOTE

La meilleure méthode de réglage est normalement obtenue en utilisant l'outil sur l'application requise et en augmentant ou en diminuant le couple fourni jusqu'à ce que le réglage désiré soit atteint. De plus, il est recommandé d'arriver progressivement au réglage final.

RÉGLAGES

CHANGEMENT DU RESSORT DE LIMITEUR

1. Serrer soigneusement les méplats de l'écrou d'accouplement dans un étau équipé de mordaches en cuir ou en cuivre, renvoi d'angle vers le bas.

NOTE

Ce filetage a un pas à gauche.

2. A l'aide d'une clé placée sur les méplats du boîtier d'engrenages, desserrer ce dernier de l'écrou d'accouplement. Retirer l'outil de l'étau.
3. Dévisser l'écrou d'accouplement et séparer le corps de limiteur du boîtier d'engrenages.
4. Saisir l'ensemble d'arbre de limiteur et extraire l'ensemble du corps de limiteur.
5. Serrer les cannelures du support d'arbre de limiteur dans un étau équipé de mordaches en cuir ou en cuivre, l'écrou de réglage du limiteur étant dirigé vers le haut et l'entraîneur du limiteur contre le dessus des mors de l'étau.

NOTE

Ce filetage a un pas à gauche.

6. A l'aide d'une clé placée sur les méplats de l'écrou de réglage du limiteur, dévisser et déposer ce dernier.

AVERTISSEMENT

Il y a vingt-quatre billes entre l'entraîneur de limiteur et le siège du ressort de limiteur le plus proche de l'entraîneur. Déposer les composants soigneusement afin de ne pas laisser tomber et perdre les billes.

7. L'ensemble étant dans l'étau, et tout en appliquant une légère pression sur le siège de ressort de limiteur le plus proche de l'entraîneur, déposer la rondelle frein, le premier siège de ressort, le roulement de siège de ressort, le deuxième siège de ressort et le ressort de limiteur de l'arbre de limiteur.
8. Graisser copieusement le roulement et la rondelle frein de l'écrou de réglage et, dans l'ordre indiqué, monter les pièces suivantes sur l'arbre de limiteur : le nouveau ressort de limiteur, un siège de ressort, le roulement de siège de ressort, un autre siège de ressort, la rondelle frein de l'écrou de réglage, côté bosselé en arrière.

NOTE

Ce filetage a un pas à gauche.

9. Visser l'écrou de réglage de limiteur, côté cranté en premier, sur l'arbre de limiteur, et le serrer à la main contre la compression du ressort. Utiliser une clé pour serrer l'écrou d'un ou deux tours supplémentaires.
10. Retirer le limiteur assemblé de l'étau.
11. Monter l'arbre de limiteur assemblé dans le corps de limiteur, extrémité cannelée du support d'arbre en arrière.
12. Monter le corps de limiteur assemblé dans le boîtier d'engrenages en engageant les cannelures du corps de limiteur dans celles du boîtier.
13. Visser à la main l'écrou d'accouplement sur le boîtier d'engrenages. Serrer les méplats du boîtier d'engrenages dans un étau équipé de mordaches en cuir ou en cuivre et, à l'aide d'une clé, serrer l'écrou d'accouplement à un couple de 34 Nm.
14. Ajuster le limiteur comme indiqué à la section **Réglage du limiteur.**

MISE EN SERVICE DE L'OUTIL

LUBRIFICATION



Ingersoll-Rand No. 10



Ingersoll-Rand No. 28

Ingersoll-Rand No. 67

Utiliser toujours un lubrificateur avec cet outil.

Nous recommandons l'emploi du filtre-régulateur-lubrificateur suivant :

USA - C11-03-G00

Moteur

Toutes les huit heures de fonctionnement, si un lubrificateur de ligne n'est pas utilisé, injecter 1-1/2 cm³ d'huile Ingersoll-Rand No. 10 dans le raccord d'admission de l'outil.

Pignonnerie

Toutes les 160 heures ou tous les 50 000 cycles, selon le cas, utiliser de la graisse Ingersoll-Rand No. 28 et le pistolet de graissage R000A2-228 pour lubrifier la pignonnerie par l'intermédiaire du raccord de graissage. **Pour les rapports H, K et L**, actionner le pistolet 15 à 16 fois (6 cm³) et pour les **rapports M et N**, actionner le pistolet 24 à 25 fois (9 cm³).

Limiteur amortisseur

Une lubrification correcte est essentielle pour une durée de vie satisfaisante du limiteur. Utiliser de la graisse Ingersoll-Rand No. 67.

1. Tourner le capot du trou de réglage pour découvrir le trou de réglage.
2. Insérer la clé d'arrêt du limiteur dans le trou de réglage et dans un des trous de l'écrou de réglage de limiteur pour empêcher la rotation de l'écrou.
3. A l'aide d'une clé placée sur la sortie de la tête de renvoi, tourner la clé dans le sens inverse des aiguilles d'une montre jusqu'à ce que l'écrou de réglage soit desserré ou que le dé clic s'arrête.
4. Serrer les méplats du boîtier d'engrenages et dévisser l'écrou d'accouplement à l'aide d'une clé.
5. Déposer le corps de limiteur et le corps de renvoi du boîtier d'engrenages.
6. Serrer le support d'arbre de limiteur et retirer le limiteur entier du corps.

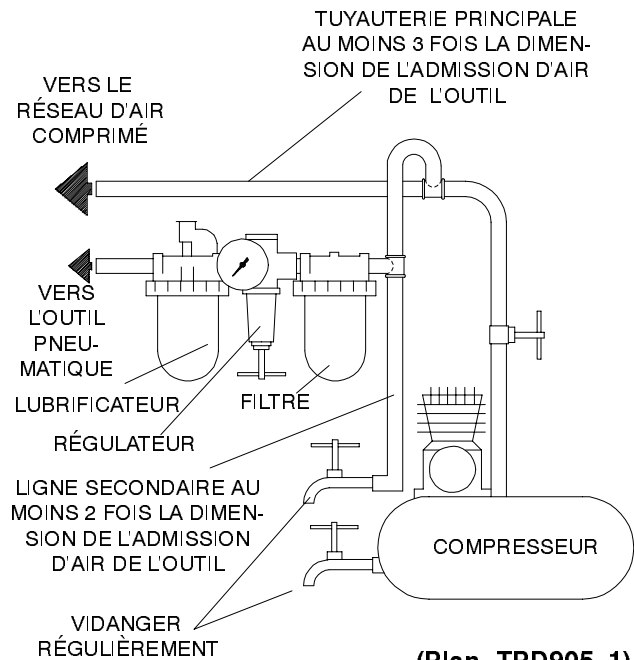
7. Déposer l'entraîneur du limiteur et le support d'arbre de limiteur du limiteur. Insérer une petite quantité de graisse entre la cage des billes du limiteur et le crabot avant et trois coups de pistolet de graissage (1 cm³) autour des billes. Insérer une petite quantité de la graisse recommandée entre les deux sièges de ressort avant et autour du roulement de siège de ressort. Cette opération doit être effectuée tous les 50 000 cycles ou tous les mois au minimum.

Renvoi d'angle

Pour lubrifier le renvoi d'angle, utiliser la graisse légère Ingersoll-Rand No. 67.

Pour les renvois d'angle 7L1A1, 7L1A3, 7L1A4, 7L1B1 ou 7L1B4, toutes les huit heures de fonctionnement, injecter 0,5 cm³ à 1,5 cm³ de graisse dans le raccord de graissage du corps de renvoi.

Pour les renvois d'angle 7L2A4, 5L2C5, 5L2D5, 5L2C6 ou 6L2D6, toutes les quarante heures de fonctionnement, injecter 0,5 cm³ à 1,5 cm³ de graisse dans le raccord de graissage du corps de renvoi.



MISE EN SERVICE DE L'OUTIL

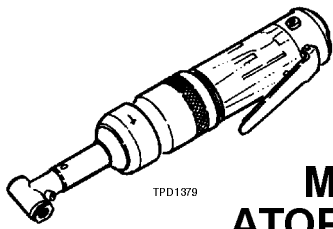
SPÉCIFICATIONS

Perceuses d'angle	Type de commande	Vitesse à vide	Couple de Calage	Broche à Filetage Intérieur
		tr/mn	pouces-lb (Nm)	
5LH1A1	Levier avec tête de renvoi à 90°	4 800	20 (2,3)	1/4" - 28
5LH1A4	Levier avec tête de renvoi à 90°	4 800	20 (2,3)	9/32" - 40
5LK1A1	Levier avec tête de renvoi à 90°	3 000	31 (3,5)	1/4" - 28
5LL1A1	Levier avec tête de renvoi à 90°	2 200	40 (4,5)	1/4" - 28
5LH1B1	Levier avec tête de renvoi à 45°	4 800	20 (2,2)	1/4" - 28
5LK1B1	Levier avec tête de renvoi à 45°	3 000	31 (3,5)	1/4" - 28
5LK1B4	Levier avec tête de renvoi à 45°	3 000	31 (3,5)	9/32" - 40
5LK1A4	Levier avec tête de renvoi à 90°	3 000	31 (3,5)	9/32" - 40
5LL1A4	Levier avec tête de renvoi à 90°	2 200	40 (4,5)	9/32" - 40
Perceuses d'angle	Type de commande	Vitesse à vide	Couple de Calage	Capacité du mandrin
		tr/mn	pouces-lb (Nm)	pouces (mm)
5LK2A41	Levier avec tête de renvoi à 90° et mandrin	2 000	45 (5,1)	1/4 (6)
5LL2A41	Levier avec tête de renvoi à 90° et mandrin	1 500	60 (6,8)	1/4 (6)
5LN2A43	Levier avec tête de renvoi à 90° et mandrin	700	120 (13,6)	1/4 (6)

MISE EN SERVICE DE L'OUTIL

SPÉCIFICATIONS

Clé d'angle	Type de commande/ Embrayage	Vitesse à vide	Couple (serrage élastique)	Carré Entraîneur Ressort Embrayage
		tr/mn	pouces-lb (Nm)	pouces, taille
5LL2D6	Levier non réversible, type à calage	1 500	60 (6,8)	3/8
5RLK2D6	Levier réversible, type à calage	1 800	40 (4,6)	3/8
5RLL2D6	Levier réversible, type à calage	1 300	55 (6,3)	3/8
5RLN2D6	Levier réversible, type à calage	600	110 (12,5)	3/8
5RLK2C5	Levier réversible avec amortisseur réglable	1 800	10-40 (1,1- 4,6)	1/4, L
5RLL2C5	Levier réversible avec amortisseur réglable	1 300	15-55 (1,7- 6,3)	1/4, L
5RLN2C6	Levier réversible avec amortisseur réglable	600	15-110 (1,7-12,5)	3/8, H
Tournevis	Type de commande/ Embrayage	Vitesse à vide	Couple (serrage élastique)	Embout à Emmanchement Hexagonal Ressort Embrayage
		tr/mn	pouces-lb (Nm)	
5RLK2C3	Levier réversible avec amortisseur réglable et tête de renvoi à 90°	1 800	10- 40 (1,1- 4,6)	Embout à Emmanchement hexagonal de 1/4", L, H
5RLL2C3	Levier réversible avec amortisseur réglable et tête de renvoi à 90°	700	15- 55 (1,7- 6,3)	Embout à Emmanchement hexagonal de 1/4", L, H
5RLN2C3	Levier réversible avec amortisseur réglable et tête de renvoi à 90°	600	15-110 (1,7-12,5)	Embout à Emmanchement hexagonal de 1/4", L, H



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MANUAL DE USO Y MANTENIMIENTO PARA ATORNILLADORES ANGULARES DE LA SERIE 5L Y LLAVES/TALADROS ANGULARES DE LA SERIE 5RL

NOTA

Los taladros angulares de la serie 5L están diseñados para taladrado de precisión en aplicaciones de distancia mínima. Los atornilladores y las llaves de la serie 5RL están diseñados para aplicaciones en cadenas de montaje donde se requiera una gama de par sin que importe tanto la precisión de par. Ingersoll-Rand no aceptará responsabilidad alguna por la modificación de las herramientas efectuada por el cliente para las aplicaciones que no hayan sido consultadas con Ingersoll-Rand.

AVISO

SE ADJUNTA INFORMACIÓN IMPORTANTE DE SEGURIDAD.
LEA ESTE MANUAL ANTES DE UTILIZAR LA HERRAMIENTA.

ES RESPONSABILIDAD DE LA EMPRESA ASEGURARSE DE QUE EL OPERARIO
ESTÉ AL TANTO DE LA INFORMACIÓN QUE CONTIENE ESTE MANUAL.

EL HACER CASO OMISO DE LOS AVISOS SIGUIENTES PODRÍA OCASIONAR LESIONES.

PARA PONER LA HERRAMIENTA EN SERVICIO

- Utilice, examine y mantenga siempre esta herramienta conforme al código de seguridad para herramientas neumáticas portátiles de la American National Standards Institute (ANSI B186.1).
- Para mayor seguridad, rendimiento óptimo y larga vida útil de las piezas, utilice esta herramienta a una presión de aire máxima de 90 psig (6,2 bar/620 kPa) con una manguera de suministro de aire con diámetro interno de 6 mm.
- Corte siempre el suministro de aire y desconecte la manguera de suministro de aire antes de instalar, desmontar o ajustar cualquier accesorio de esta herramienta, o antes de realizar cualquier operación de mantenimiento de la misma.
- No utilice mangueras de aire y racores dañados, desgastados o deteriorados.
- Asegúrese de que todos los racores y mangueras sean del tamaño correcto y estén bien apretados. El Esq. TPD905-1 muestra una disposición característica de las tuberías.
- Use siempre aire limpio y seco a una presión máxima de 90 psig (6,2 bar/620 kPa). El polvo, los gases corrosivos y el exceso de humedad pueden estropear el motor de una herramienta neumática.
- No lubrique las herramientas con líquidos inflamables o volátiles tales como queroseno, gasoil o combustible para motores a reacción.
- No saque ninguna etiqueta. Sustituya toda etiqueta dañada.

UTILIZACIÓN DE LA HERRAMIENTA

- Lleve siempre protección ocular cuando utilice esta herramienta o realice operaciones de mantenimiento en la misma.

- Lleve siempre protección para los oídos cuando utilice esta herramienta.
- Mantenga las manos, la ropa suelta y el cabello largo alejados del extremo giratorio de la herramienta.
- Tome nota de la posición de la palanca de inversión antes de hacer funcionar la herramienta para tener en cuenta el sentido de rotación al accionar el estrangulador.
- Anticipe y esté atento a los cambios repentinos en el movimiento durante la puesta en marcha y utilización de toda herramienta motorizada.
- Mantenga una postura del cuerpo equilibrada y firme. No estire demasiado los brazos al manejar la herramienta. Pueden darse elevados pares de reacción a la presión de aire recomendada, e incluso a presiones inferiores.
- El eje de la herramienta puede seguir girando brevemente después de haberse soltado el mando.
- Las herramientas neumáticas pueden vibrar durante el uso. La vibración, los movimientos repetitivos o las posiciones incómodas pueden dañarle los brazos y manos. En caso de incomodidad, sensación de hormigueo o dolor, deje de usar la herramienta. Consulte con el médico antes de volver a utilizarla.
- Utilice únicamente los accesorios Ingersoll-Rand recomendados.
- Utilice únicamente bocas y accesorios para llaves de impacto. No utilice bocas o accesorios manuales (cromados).
- Esta herramienta no ha sido diseñada para trabajar en ambientes explosivos.
- Esta herramienta no está aislada contra descargas eléctricas.

NOTA

El uso de piezas de recambio que no sean las auténticas piezas Ingersoll-Rand puede poner en peligro la seguridad, reducir el rendimiento de la herramienta y aumentar los cuidados de mantenimiento necesarios, así como invalidar toda garantía. Las reparaciones sólo se deben encomendar a personal debidamente cualificado y autorizado. Consulte con el centro de servicio autorizado Ingersoll-Rand más próximo.

Toda comunicación se deberá dirigir a la oficina o al distribuidor Ingersoll-Rand más próximo.

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INGERSOLL-RAND®
PROFESSIONAL TOOLS

ETIQUETAS DE AVISO


⚠ AVISO


EL HACER CASO OMISO DE LOS AVISOS SIGUIENTES PODRÍA OCASIONAR LESIONES.


	<p>⚠ ADVERTENCIA</p> <p>Usar siempre protección ocular al manejar o realizar operaciones de mantenimiento en esta herramienta.</p>
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	<p>⚠ ADVERTENCIA</p> <p>Usar siempre protección para los oídos al manejar esta herramienta.</p>
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	<p>⚠ ADVERTENCIA</p> <p>Cortar siempre el suministro de aire y desconectar la manguera de suministro de aire antes de instalar, retirar o ajustar cualquier accesorio de esta herramienta, o antes de realizar cualquier operación de mantenimiento de la misma.</p>
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	<p>⚠ ADVERTENCIA</p> <p>Las herramientas neumáticas pueden vibrar durante el uso. La vibración, los movimientos repetitivos o las posiciones incómodas podrían dañarle los brazos y las manos. En caso de incomodidad, sensación de hormigueo o dolor, dejar de usar la herramienta. Consultar al médico antes de volver a utilizarla.</p>
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	<p>⚠ ADVERTENCIA</p> <p>No coger la herramienta por la manguera para levantarla.</p>
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	<p>⚠ ADVERTENCIA</p> <p>No utilizar mangueras de aire y accesorios dañados, desgastados ni deteriorados.</p>
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	<p>⚠ ADVERTENCIA</p> <p>Mantener una postura del cuerpo equilibrada y firme. No estirar demasiado los brazos al manejar la herramienta.</p>
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	<p>⚠ ADVERTENCIA</p> <p>Manejar la herramienta a una presión de aire máxima de 90 psig (6,2 bar/620 kPa).</p>
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AJUSTES

AJUSTE DEL EMBRAGUE

Los modelos **5RLK2C3**, **5RLK2C5**, **5RLL2C5**, **5RLN2C3** y **5RLN2C6** incorporan un embrague ajustable que puede ser ajustado externamente dentro de cierta gama, que actúa cuando se consiga el par predeterminado.

Para aumentar la gama de par ajustable, hay disponibles dos muelles de embrague.

El muelle pesado de embrague (codificado en verde para su identificación) sirve para la mayoría de las aplicaciones porque proporcionará un ajuste preciso de aproximadamente 40 a 120 pulg.-lb (4,5 a 13,5 Nm) de par.

El muelle ligero de embrague (codificado en negro) es para aplicaciones de aproximadamente 15 a 80 pulg.-lb (1,7 a 9 Nm) de par.

⚠ AVISO

Desconecte el suministro de aire comprimido de la herramienta antes de proceder.

Para ajustar el embrague, proceda como sigue:

1. Gire la tapa del orificio de ajuste situada en la carcasa del embrague hasta que se vea dicho orificio.

2. Gire el extremo de salida de la cabeza angular hasta que uno de los orificios radiales situados en la tuerca de ajuste de embrague sea visible a través de la ranura de la carcasa de embrague. Introduzca la llave de calzado de embrague en la ranura alargada situada en la carcasa del embrague y en el orificio de la tuerca de ajuste para evitar que dicha tuerca se mueva.
3. Sujete la herramienta firmemente en un mano y gire el extremo de salida de la cabeza angular. Si se mueve el extremo de salida hacia la derecha cuando esté de cara hacia delante, se aumenta la compresión del muelle del embrague y el par al que actuará dicho embrague.

NOTA

Normalmente se obtendrá el ajuste más satisfactorio utilizando la herramienta en la aplicación real de trabajo, e incrementando o disminuyendo el par hasta lograr la posición deseada. En cualquier caso, se recomienda que se haga el ajuste final por progresión.

AJUSTES

CAMBIO DEL MUELLE DEL EMBRAGUE

1. Sujete cuidadosamente los lados planos de la tuerca de acoplamiento en un tornillo de banco con mordazas cubiertas de cobre o cuero, con el acoplamiento angular hacia abajo.

NOTA

Ésta es de rosca hacia la izquierda.

2. Utilizando una llave en los lados planos de la caja de engranajes, afloje dicha caja de la tuerca de acoplamiento. Saque la herramienta del tornillo de banco.
3. Desenrosque la tuerca de acoplamiento y saque la carcasa del embrague fuera de la caja de engranaje.
4. Sujete el conjunto del eje del embrague y sáquelo de la carcasa del embrague.
5. Sujete la ranura del soporte del eje del embrague en un tornillo de banco con mordazas cubiertas de cuero o cobre, con la tuerca de ajuste del embrague hacia arriba y el accionador del embrague contra la parte superior de las mordazas del tornillo de banco.

NOTA

Ésta es de rosca hacia la izquierda.

6. Utilizando una llave en los lados planos de la tuerca de ajuste del embrague, afloje y saque dicha tuerca.

PRECAUCIÓN

Hay veinticuatro bolas de embrague situadas entre el accionador del embrague y asiento del muelle del embrague más próximo al accionador de embrague. Si los componentes restantes no se sacan con cuidado, las bolas pueden caerse y perderse.

7. Con el conjunto en el tornillo de banco, y mientras se aplica una ligera presión hacia abajo sobre el asiento del muelle del embrague más cercano al accionador del embrague, saque el seguro de la tuerca de ajuste, el primer asiento del muelle del embrague, el rodamiento del asiento del muelle, el segundo asiento del muelle del embrague y el muelle del embrague fuera del eje del embrague.

8. Engrase bien el rodamiento y el seguro de la tuerca de ajuste y ponga lo siguiente sobre el eje del embrague en el orden en que se citan: el muelle de embrague nuevo, un asiento del muelle del embrague, el rodamiento del asiento del muelle, otro asiento del muelle del embrague y el seguro de la tuerca de ajuste, con el lado indentado por detrás.

NOTA

Ésta es de rosca hacia la izquierda.

9. Enrosque la tuerca de ajuste del embrague, con el lado de tope por delante, en el eje del embrague y apriétela con los dedos contra la compresión del muelle. Con una llave, apriete la tuerca una o dos vueltas más.
10. Saque el embrague montado del tornillo de banco.
11. Instale el conjunto del eje del embrague en la carcasa del embrague con el extremo estriado del soporte del eje del embrague por detrás.
12. Instale el conjunto de la carcasa del embrague en el conjunto de la caja de engranajes, haciendo corresponder la ranura de la carcasa de embrague con la de la caja de engranaje.
13. Enrosque la tuerca de acoplamiento en la caja de engranaje, y apriétela a mano. Sujete los lados planos de la caja de engranaje en un tornillo de banco con mordazas cubiertas de cobre o cuero y, utilizando una llave en los lados planos de la tuerca de acoplamiento, apriétela a 25 ft-lb (34 Nm) de par.
14. Ajuste el embrague tal como se indica en la sección sobre **Ajuste del embrague**.

PARA PONER LA HERRAMIENTA EN SERVICIO

LUBRICACIÓN



Ingersoll-Rand N° 10

Ingersoll-Rand N° 28

Ingersoll-Rand N° 67

Utilice siempre un lubricador de aire comprimido con esta herramienta.

Recomendamos utilizar el siguiente conjunto de filtro-lubricador-regulador:

USA - C11-03-G00

Motor

Después de cada ocho horas de funcionamiento, a menos que se use un lubricante de línea de aire, inyecte 1-1/2 de aceite Ingersoll-Rand N° 10 en la admisión de aire.

Engranajes

Después de cada 160 horas o 50000 ciclos (lo que ocurra primero), use grasa Ingersoll-Rand N° 28 y la pistola engrasadora R000A2-228 para lubricar los engranajes a través del engrasador. Para engranajes H, K y L, inyecte 15 o 16 disparos (6 cc), y para engranajes M y N, inyecte 24 o 25 disparos (9 cc).

Embrague ajustable

Una buena lubricación es muy importante para conseguir una satisfactoria vida útil del embrague. Use Grasa Ingersoll-Rand N° 67.

1. Gire la tapa del orificio de ajuste hasta que se vea el orificio de ajuste.
2. Inserte la llave de calzado de embrague en el orificio de ajuste y en uno de los orificios de la tuerca de ajuste del embrague para evitar que gire la tuerca.
3. Utilizando una llave en el extremo de salida de la cabeza angular, gire la llave hacia la izquierda hasta que la tuerca de ajuste del embrague esté floja o hasta que no haga "click".
4. Sujete los lados planos de la caja de engranaje y, usando una llave, desenrosque la tuerca de acoplamiento.
5. Saque la carcasa del embrague y la carcasa angular de la caja de engranaje.
6. Sujete el soporte del eje del Embrague y saque el completo conjunto del embrague de la carcasa.

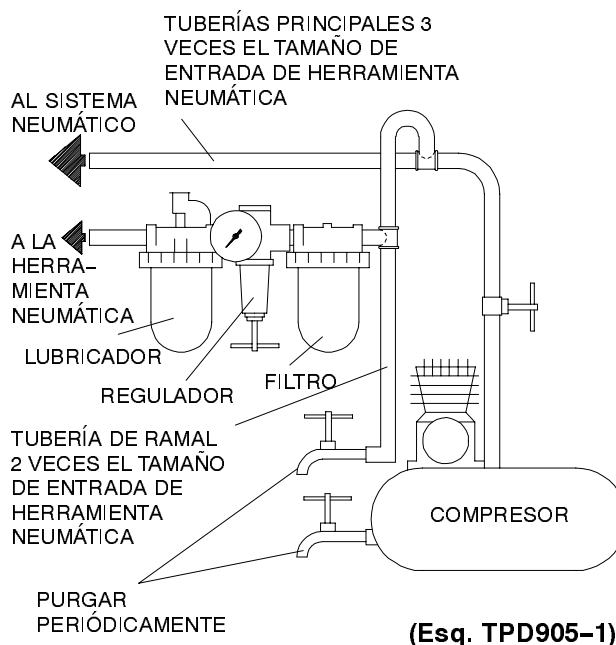
7. Saque el accionador del embrague y el soporte del eje del embrague fuera del embrague. Ponga una pequeña cantidad de la grasa ecomendada entre el espaciador de las bolas de embrague y la mordaza de embrague delantera, y tres disparos de grasa (1,00 cc) alrededor de las bolas de embrague de la mordaza. Ponga una pequeña cantidad de la grasa recomendada entre los dos asientos del muelle del embrague delanteros y alrededor del rodamiento del asiento del muelle. Esto deberá hacerse cada 50000 ciclos o cada mes (lo que ocurra primero).

Cabeza angular

Use grasa ligera Ingersol-Rand N° 67 para lubricar la cabeza angular.

Para modelos con acoplamiento angular 7L1A1, 7L1A3, 7L1A4, 7L1B1 o 7L1B4, inyecte de 0,5 cc a 1,5 cc de grasa en el engrasador situado en la carcasa angular después de cada ocho horas de funcionamiento.

Para modelos con acoplamiento angular 7L2A4, 5L2C5, 5L2D5, 5L2C6 o 6L2D6, inyecte de 0,5 cc a 1,5 cc de grasa en el engrasador situado en la carcasa angular después de cada cuarenta horas de funcionamiento.



PARA PONER LA HERRAMIENTA EN SERVICIO

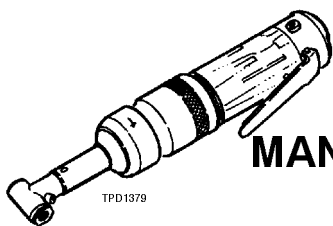
ESPECIFICACIONES

Taladros angulares	Tipo de mando	Velocidad en vacío	Par de calado	Husillo roscado hembra
		rpm	pulg.-lb (Nm)	
5LH1A1	Palanca, cabeza angular 90°	4800	20 (2,3)	1/4 pulg. – 28
5LH1A4	Palanca, cabeza angular 90°	4800	20 (2,3)	9/32 pulg.-40
5LK1A1	Palanca, cabeza angular 90°	3000	31 (3,5)	1/4 pulg. – 28
5LL1A1	Palanca, cabeza angular 90°	2200	40 (4,5)	1/4 pulg. – 28
5LH1B1	Palanca, cabeza angular 45°	4800	20 (2,2)	1/4 pulg. – 28
5LK1B1	Palanca, cabeza angular 45°	3000	31 (3,5)	1/4 pulg. – 28
5LK1B4	Palanca, cabeza angular 45°	3000	31 (3,5)	9/32 pulg.-40
5LK1A4	Palanca, cabeza angular 90°	3 000	31 (3,5)	9/32 pulg.-40
5LL1A4	Palanca, cabeza angular 90°	2 200	40 (4,5)	9/32 pulg.-40
Taladros angulares	Tipo de mando	Velocidad en vacío	Par de calado	Capacidad del portabrocas
		rpm	pulg.-lb (Nm)	pulg. (mm)
5LK2A41	Palanca, portapuntas y cabeza angular 90°	2000	45 (5,1)	1/4 (6)
5LL2A41	Palanca, portapuntas y cabeza angular 90°	1500	60 (6,8)	1/4 (6)
5LN2A43	Palanca, portapuntas y cabeza angular 90°	700	120 (13,6)	1/4 (6)

PARA PONER LA HERRAMIENTA EN SERVICIO

ESPECIFICACIONES

Llave angular	Tipo de mando/embrague	Velocidad en vacío	Par (Retirada suave)	Muelle de embrague, cuadradillo
		rpm	pulg.-lb (Nm)	tamaño, pulg.
5LL2D6	Palanca no-reversible, tipo calado	1500	60 (6,8)	3/8
5RLK2D6	Palanca reversible, tipo calado	1800	40 (4,6)	3/8
5RLL2D6	Palanca reversible, tipo calado	1300	55 (6,3)	3/8
5RLN2D6	Palanca reversible, tipo calado	600	110 (12,5)	3/8
5RLK2C5	Palanca rever-sible, embrague ajustable	1800	10- 40 (1,1- 4,6)	1/4, L
5RLL2C5	Palanca rever-sible, embrague ajustable	1300	15- 55 (1,7- 6,3)	1/4, L
5RLN2C6	Palanca rever-sible, embrague ajustable	600	15-110 (1,7-12,5)	3/8, H
Atornillador	Tipo de mando/embrague	Velocidad en vacío	Par (Retirada suave)	Muelle de embrague, broca de eje hex.
		rpm	pulg.-lb (Nm)	
5RLK2C3	Palanca rever-sible, embrague ajustable, cabeza angular 90°	1800	10- 40 (1,1- 4,6)	Broca de eje hex. 1/4 pulg., L, H
5RLL2C3	Palanca rever-sible, embrague ajustable, cabeza angular 90°	700	15- 55 (1,7- 6,3)	Broca de eje hex. 1/4 pulg., L, H
5RLN2C3	Palanca rever-sible, embrague ajustable, cabeza angular 90°	600	15-110 (1,7-12,5)	Broca de eje hex. 1/4 pulg., L, H

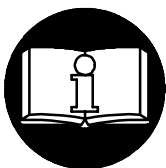


MANUAL DE FUNCIONAMENTO E MANUTENÇÃO PARA OS BERBEQUINS ANGULARES E FERRAMENTAS/APARAFUSADORAS PNEUMÁTICAS ANGULARES SÉRIES 5L E 5RL

AVISO

Os Berbequins Angulares Séries 5L são concebidos para aplicações de perfuração precisa em ângulo. As Aparafusadoras Angulares Séries 5RL são concebidas para aplicações de linha de montagem onde um intervalo de torque é necessário mas torque preciso não é crítico. A Ingersoll-Rand não é responsável por modificações, feitas pelo cliente em ferramentas, nas quais a Ingersoll-Rand não tenha sido consultada.

⚠️ ADVERTÊNCIA



**INFORMAÇÃO DE SEGURANÇA IMPORTANTE EM ANEXO.
LEIA ESTE MANUAL ANTES DE OPERAR A FERRAMENTA.
É DA RESPONSABILIDADE DO EMPREGADOR COLOCAR A INFORMAÇÃO
DESTE MANUAL NAS MÃOS DO OPERADOR.**

**O NÃO CUMPRIMENTO DAS SEGUINTE ADVERTÊNCIAS PODE RESULTAR EM FERIMENTOS.
COLOCANDO A FERRAMENTA
EM FUNCIONAMENTO**

- Sempre opere, inspecione e mantenha esta ferramenta de acordo com o Código de Segurança do Instituto Americano de Padrões Nacionais para Ferramentas Pneumáticas Portáteis (ANSI B186.1).
- Para segurança, máximo desempenho e máxima durabilidade das peças, opere esta ferramenta com uma pressão de ar máxima de 6,2 bar/620 kPa (90 psig) na entrada da mangueira de alimentação de ar com diâmetro interno de 6 mm (1/4 pol.).
- Desligue sempre a alimentação de ar e desconecte a mangueira de alimentação de ar antes de instalar, remover ou ajustar qualquer acessório nesta ferramenta, ou antes de executar qualquer serviço de manutenção nesta ferramenta.
- Não use mangueiras de ar ou adaptadores danificados, gastos ou deteriorados.
- Certifique-se de que todas as mangueiras e adaptadores sejam do tamanho correcto e estejam apertados com firmeza. Veja o Desenho TPD905-1 para um arranjo típico de tubagem.
- Use sempre ar seco e limpo com pressão máxima de 6,2 bar/620 kPa (90 psig). Pó, fumos corrosivos e/ou humidade excessiva podem arruinar o motor de uma ferramenta pneumática.
- Não lubrifique as ferramentas com líquidos inflamáveis ou voláteis tais como querosene, diesel ou combustível de jactos.
- Não remova nenhum rótulo. Reponha qualquer rótulo danificado.

USANDO A FERRAMENTA

- Use sempre óculos de protecção quando estiver operando ou executando serviço de manutenção nesta ferramenta.

- Use sempre protecção contra ruído ao operar esta ferramenta.
- Mantenha as mãos, partes do vestuário soltas e cabelos compridos afastados da extremidade em rotação.
- Observe a posição da alavanca de reversão antes de operar a ferramenta de modo a estar atento ao sentido de rotação quando operando a válvula reguladora de pressão.
- Antecipe e esteja alerta a mudanças repentinas no movimento quando ligar e operar qualquer ferramenta motorizada.
- Mantenha a posição do corpo equilibrada e firme. Não exagere quando operar esta ferramenta. Torques de reacção elevados podem ocorrer na ou abaixo da pressão de ar recomendada.
- O eixo da ferramenta pode continuar a girar brevemente após a pressão tenha sido aliviada.
- Ferramentas accionadas pneumáticamente podem vibrar em uso. Vibração, movimentos repetitivos ou posições desconfortáveis podem ser prejudiciais às mãos e aos braços. Pare de usar a ferramenta caso ocorra algum desconforto, sensação de formigueiro ou dor. Procure assistência médica antes de retornar ao trabalho.
- Use acessórios recomendados pela Ingersoll-Rand.
- Use somente soquetes e acessórios de impacto. Não use chaves de caixa ou acessórios de mão (cromo).
- Esta Ferramenta não foi concebida para trabalhos em atmosferas explosivas.
- Esta Ferramenta não está isolada contra choques eléctricos.

AVISO

O uso de peças de substituição que não sejam genuinamente da Ingersoll-Rand podem resultar em riscos de segurança, diminuição do desempenho da ferramenta, aumento da necessidade de manutenção e pode invalidar todas as garantias. As reparações devem ser feitas somente por pessoal treinado autorizado. Consulte o Centro de Serviços da Ingersoll-Rand mais próximo.

Envie Todos os Comunicados Para o Distribuidor ou Escritório da Ingersoll-Rand Mais Próximo.

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INGERSOLL-RAND®
PROFESSIONAL TOOLS

IDENTIFICAÇÃO DO RÓTULO DE ADVERTÊNCIA


⚠ ADVERTÊNCIA


O NÃO CUMPRIMENTO DAS SEGUINTE ADVERTÊNCIAS PODE RESULTAR EM FERIMENTOS.


	⚠ ADVERTÊNCIA Use sempre óculos de protecção quando estiver operando ou executando algum serviço de manutenção nesta ferramenta.
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	⚠ ADVERTÊNCIA Use sempre protecção contra o ruído ao operar esta ferramenta.
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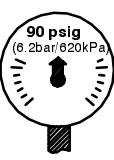
	⚠ ADVERTÊNCIA Desligue sempre a alimentação de ar e desconecte a mangueira de alimentação de ar antes de instalar, remover ou ajustar qualquer acessório nesta ferramenta, ou antes de executar algum serviço de manutenção nesta ferramenta.
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	⚠ ADVERTÊNCIA Ferramentas accionadas pneumáticamente podem vibrar em uso. Vibração, movimentos repetitivos ou posições desconfortáveis podem ser prejudiciais às mãos e aos braços. Pare de usar a ferramenta caso ocorra algum desconforto, sensação de formigamento ou dor. Procure assistência médica antes de retornar ao trabalho.
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	⚠ ADVERTÊNCIA Não carregue a ferramenta segurando na mangueira.
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	⚠ ADVERTÊNCIA Não use mangueiras de ar ou adaptadores danificados, gastos ou deteriorados.
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	⚠ ADVERTÊNCIA Mantenha a posição do corpo equilibrada e firme. Não exagere quando operar esta ferramenta. Torques de reacção elevados podem ocorrer sob a pressão de ar recomendada.
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	⚠ ADVERTÊNCIA Opere com pressão do ar Máxima de 90 psig (6,2-6,9 bar).
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AJUSTES

AJSUTE DA EMBRAIAGEM

Os Modelos **5RLK2C3**, **5RLK2C5**, **5RLL2C5**, **5RLL2C3** e **5RLN2C6** incorporam uma embraiagem ajustável que pode ser externamente ajustada dentro de um certo intervalo para embraiar quando um torque pré-determinado for exercido.

Para aumentar o intervalo de torque, duas Molas de Embraiagem são fornecidas.

A **Mola de Embraiagem Pesada** (código de cor verde para identificação) é apropriada para a maioria das aplicações já que ela fornecerá o ajuste preciso em uma intervalo de torque de 4,5 a 13,5 Nm (40 a 120 pés-lb).

A **Mola de Embraiagem Leve** (código de cor preta) é para aplicações que tenha um torque que varie de 1,7 a 9 Nm (15 a 80 pés-lb).

⚠ ADVERTÊNCIA

Desligue a alimentação de ar da Ferramenta antes de prosseguir.

Para ajustar a Embraiagem, proceda da seguinte maneira:

1. Gire a Capa de Ajuste do Furo no Corpo da Embraiagem para expor o orifício de ajuste.

2. Gire a extremidade de saída do Cabeçote em Ângulo até que um dos orifícios radiais seja visível através da ranhura no Corpo da Embraiagem. Insira a Chave Sprag da Embraiagem na ranhura alongada no Corpo da Embraiagem e no orifício da Porca de Ajuste para evitar que a Porca gire.
3. Agarre a Ferramenta com firmeza em uma mão e gire a extremidade de saída do Cabeçote em Ângulo. Ao girar a extremidade de saída no sentido horário ao estar de frente a parte frontal aumentará a Compressão na Mola da Embraiagem e elevará o torque com o qual a embraiagem funciona.

AVISO

O ajuste mais satisfatório é usualmente obtido ao utilizar a ferramenta na aplicação real e aumentando ou diminuindo o torque exercido até que o ajuste desejado seja atingido. Em qualquer evento, é recomendado que o ajuste final seja feito em progressão gradual.

AJUSTES

TROCANDO A MOLA DA EMBRAIAGEM

1. Segure cuidadosamente as pás da Porca do Acoplamento nas garras vise revestidas de couro ou de cobre.
O Acoplamento em Ângulo com a face para baixo.

AVISO

Isto possui uma rôsca à esquerda.

2. Usando uma chave nas pás da Caixa de Engrenagens, solte a Caixa de Engrenagens da Porca de Acoplamento. Remova a ferramenta do torno.
3. Desaparafuse a Porca de Acoplamento e remova o Corpo da Embraiagem da Caixa de Engrenagem.
4. Segure o Arranjo do Eixo da Embraiagem e puxe o Arranjo para fora do Corpo da Embraiagem.
5. Agarre a estria do Suporte do Eixo da Embraiagem nas garras vise revestidas de couro ou de cobre com a Porca de Ajuste da Embraiagem com a face para cima e o Comando da Embraiagem contra o topo das garras do torno.

AVISO

Isto possui uma rôsca à esquerda.

6. Usando uma chave nas pás da Porca de Ajuste da Embraiagem, solte e remova a Porca.

CUIDADO

Há vinte e quatro Esferas de Embraiagem localizadas entre o Comando da Embraiagem e o Assento da Mola da Embraiagem mais próximo do Comando da Embraiagem. O não cumprimento em remover os componentes remanescentes cuidadosamente pode resultar na queda das Esferas para fora da posição e ficarem perdidas.

7. Com o arranjo no torno e enquanto se aplica uma leve pressão para baixo sobre o Assento da Mola de Embraiagem mais próxima do Comando da Embraiagem, remova a Trava da Porca de Ajuste, o primeiro Assento da Mola da Embraiagem, o Casquilho do Assento da Mola, o segundo Assento da Mola da Embraiagem e a Mola da Embraiagem do Eixo da Embraiagem.
8. Aplique massa por inteiro na Trava da Porca de Ajuste e no Casquilho, na ordem dada, deslize o seguintes itens sobre o Eixo da Embraiagem: a nova Mola da Embraiagem, o Assento da Mola da Embraiagem, o Casquilho do Assento da Mola, outro Assento da Mola de Embraiagem e a Trava da Porca de Ajuste, com o lado dentado.

AVISO

Isto possui uma rôsca à esquerda.

9. Comece aplicando a Porca de Ajuste da Embraiagem, o lado dentado primeiro, sobre o Eixo da Embraiagem e deslize os dedos de modo a apertá-la contra a Mola. Com uma chave aperte a Porca com uma ou duas voltas adicionais.
10. Remova a Embraiagem montada do torno.
11. Instale o Arranjo do Eixo da Embraiagem no Corpo da Embraiagem com a extremidade estriada do Suporte do Eixo da Embraiagem.
12. Instale o Arranjo do Corpo da Embraiagem no Arranjo da Caixa de Engrenagem combinando a estria do Corpo da Embraiagem com a estria da Caixa de Engrenagem.
13. Rosqueie a Porca de Acoplamento na Caixa de Engrenagem com a mão. Segure as pás da Caixa de Engrenagem nas garras do torno revestidas de cobre e usando uma chave na pás da Porca de Acoplamento, aperte-a com um torque de 34 Nm (25 pés-lb).
14. Ajuste a Embraiagem como orientado na secção **Ajuste da Embraiagem**.

COLOCANDO A FERRAMENTA EM FUNCIONAMENTO

LUBRIFICAÇÃO



Ingersoll-Rand No. 10



Ingersoll-Rand No. 28
Ingersoll-Rand No. 67

Use sempre um lubrificador de ar de linha com estas ferramentas. Nós recomendamos a seguinte unidade Filtro-Lubrificador-Regulador:

USA - C11-03-G00

Motor

Depois de cada 8 horas de operação, a menos que um lubrificador de ar de linha estiver sendo usado, injecte 1-1/2 cc de Óleo Ingersoll-Rand No. 10 na Entrada de Ar.

Engrenagem

Depois de cada 160 horas ou 50 000 ciclos, o que ocorrer primeiro, use Massa Lubrificadora Ingersoll-Rand No. 28 e o Canhão de Massa Lubrificadora R0002A2-228 para lubrificar a engrenagem através do adaptador de Massa Lubrificadora. Para as **razões H, K ou L** injecte 6,0 cc (15 ou 16 medidas) de para as **razões M e N**, injecte 9.0 cc (24 ou 25 medidas).

Embraiagem de Mola (Cushion)

A lubrificação adequada é muito importante para que a vida útil da embraiagem seja satisfatória. Use Massa Lubrificadora Ingersoll-Rand No. 67.

1. Gire a Capa do Furo de Ajuste para expor o furo de ajuste.
2. Insira a Chave da Embraiagem no orifício de ajuste e em um dos orifícios na Porca de Ajuste da Embraiagem para evitar que a Porca gire.
3. Usando uma chave dinamométrica na extremidade de saída do Cabeçote em Ângulo, gire a chave no sentido anti-horário até que a Porca de Ajuste da Embraiagem esteja solta ou até que o som de clique pare.
4. Segure a pás da Caixa de Engrenagens e use uma chave dinamométrica para despertar a Porca de Acoplamento.
5. Remova o Corpo da Embraiagem e o Corpo em Ângulo da Caixa de Engrenagens.

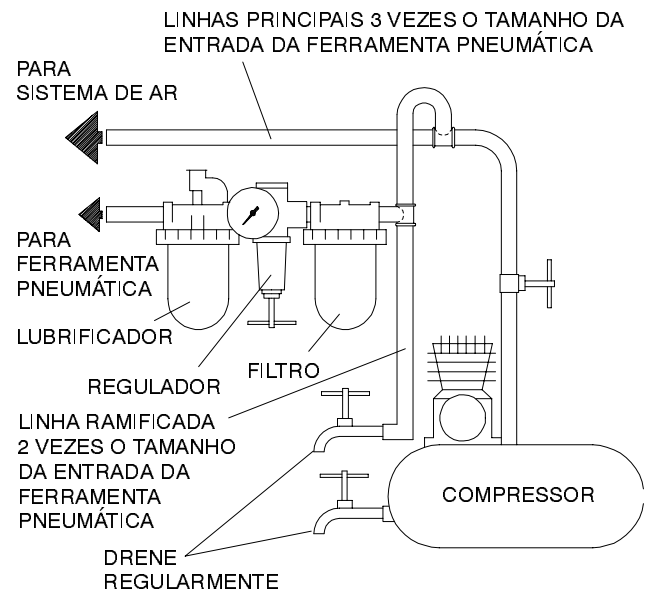
6. Segure o Suporte do Eixo da Embraiagem e puxe o Arranjo da Embraiagem inteiro do Corpo.
7. Remova o Comando da Embraiagem e o Suporte do Eixo da Embraiagem da Embraiagem. Aplique uma pequena quantidade de Massa Lubrificadora entre o Espaçador das Esferas da Embraiagem e Garra da Embraiagem Frontal e 1 cc (3 medidas) de Massa Lubrificadora em volta das Esferas da Embraiagem da Garra. Aplique uma pequena quantidade de Massa Lubrificadora recomendada entre os dois assentos de mola da embraiagem frontais e em volta do Casquilho do Assento da Mola. Isto deve ser feito a cada 50 000 ciclos ou um mês de operação, o que ocorrer primeiro.

Cabeçote em Ângulo

Use Massa Lubrificadora Ingersoll-Rand Leve No. 67 para lubrificar o Cabeçote em Ângulo.

Para Modelos com Acoplamento em Ângulo 7LA1, 7L1A3, 7L1B1 ou 7L1B4, injecte de 0,5 a 1,5 cc de Massa Lubrificadora no Adaptador de Massa Lubrificadora no Corpo em Ângulo depois de cada oito horas de operação.

Para Modelos com Acoplamento em Ângulo 7L2A4, 5L2C5, 5L2D5, 5L2C6 ou 6L2D6, injecte de 0,5 a 1,5 cc de Massa Lubrificadora no Adaptador de Massa Lubrificadora no Corpo em Ângulo depois de cada oito horas de operação.



(Desenho TPD905-1)

COLOCANDO A FERRAMENTA EM FUNCIONAMENTO

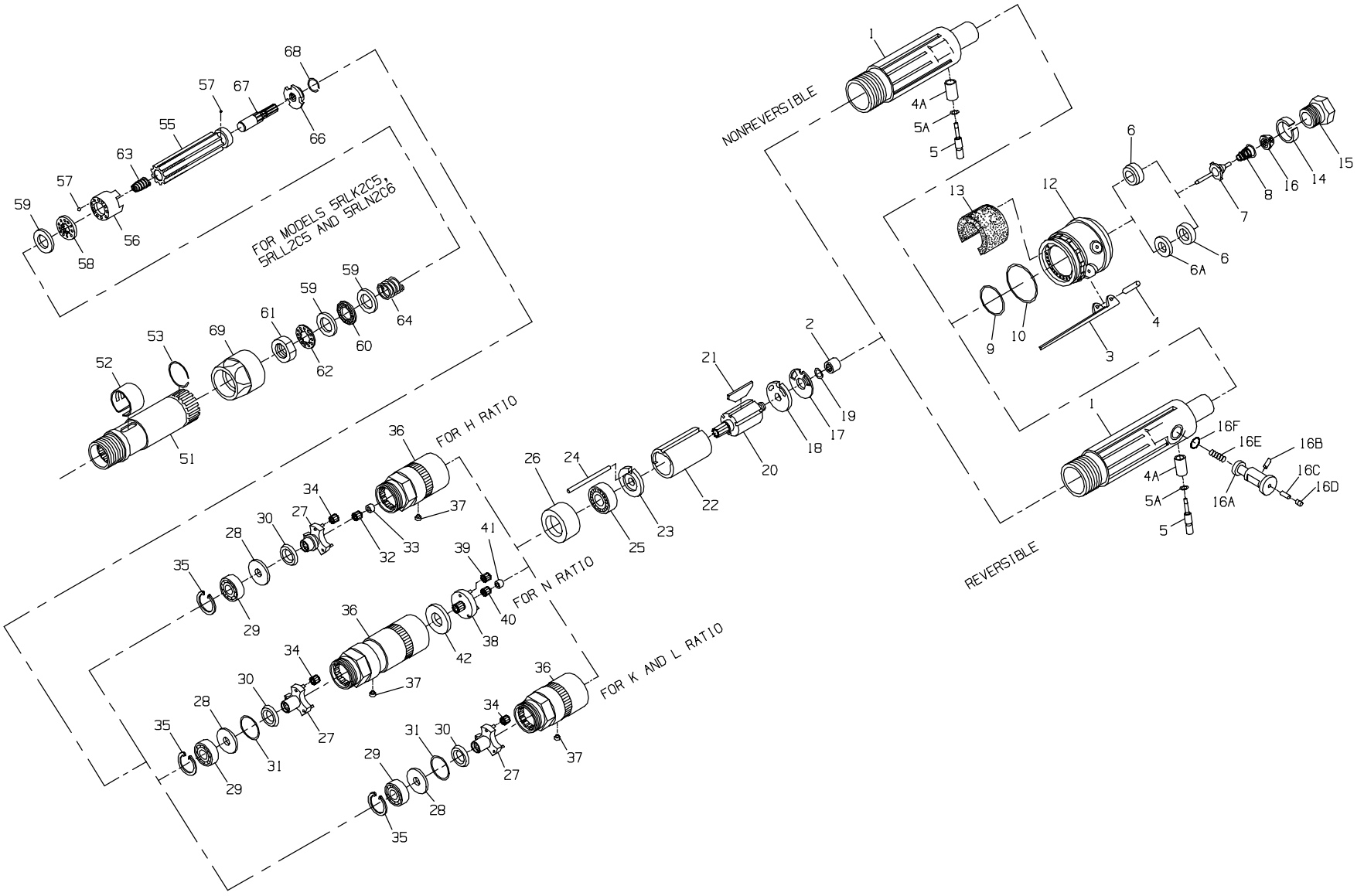
ESPECIFICAÇÕES

Perfuradoras em Ângulo	Tipo de Regulagem de Pressão	Velocidade Livre	Torque Máximo	Fuso Rosqueado Fêmea
		rpm	Nm (pol-lb.)	
5LH1A1	Alavanca, Cabeçote em Ângulo de 90°	4 800	2,3 (20)	1/4" – 28
5LH1A4	Alavanca, Cabeçote em Ângulo de 90°	4 800	2,3 (20)	9/32" – 40
5LK1A1	Alavanca, Cabeçote em Ângulo de 90°	3 000	3,5 (31)	1/4" – 28
5LL1A1	Alavanca, Cabeçote em Ângulo de 90°	2 200	4,5 (40)	1/4" – 28
5LH1B1	Alavanca, Cabeçote em Ângulo de 45°	4 800	2,2 (20)	1/4" – 28
5LK1B1	Alavanca, Cabeçote em Ângulo de 45°	3 000	3,5 (31)	1/4" – 28
5LK1B4	Alavanca, Cabeçote em Ângulo de 45°	3 000	3,5 (31)	9/32" – 40
5LK1A4	Alavanca, Cabeçote em Ângulo de 90°	3 000	3,5 (31)	9/32" – 40
5LL1A4	Alavanca, Cabeçote em Ângulo de 90°	2 200	4,5 (40)	9/32" – 40
Perfuradoras em Ângulo	Tipo de Regulagem de Pressão	Velocidade Livre	Torque Máximo	Capacidade do Encabadouro
		rpm	Nm (pol-lb.)	mm (pol.)
5LK2A41	Alavanca, Cabeçote em Ângulo de 90° e Encabadouro	2 000	5,1 (45)	6 (1/4)
5LL2A41	Alavanca, Cabeçote em Ângulo de 90° e Encabadouro	1 500	6,8 (60)	6 (1/4)
5LN2A43	Alavanca, Cabeçote em Ângulo de 90° e Encabadouro	700	13,6 (120)	6 (1/4)

COLOCANDO A FERRAMENTA EM FUNCIONAMENTO

ESPECIFICAÇÕES

Chaves Dinamométricas em Ângulo	Tipo de Regulagem de Pressão/ Embraiagem	Velocidade Livre	Torque (Aperto Ligeiro)	Mola da Embraiagem de Comando Quadrado
		rpm	Nm (pol-lb.)	pol, tamanho
5LL2D6	Alavanca Não-Reversível, Tipo Corte Automático	1 500	6,8 (60)	3/8
5RLK2D6	Alavanca Reversível, Tipo Corte Automático	1 800	4,6 (40)	3/8
5RLL2D6	Alavanca Reversível, Tipo Corte Automático	1 300	6,3 (55)	3/8
5RLN2D6	Alavanca Reversível, Tipo Corte Automático	600	12,5 (110)	3/8
5RLK2C5	Alavanca Reversível, Mola Ajustável	1 800	1,1-4,6 (10-40)	1/4, L
5RLL2C5	Alavanca Reversível, Mola Ajustável	1 300	1,7-6, (15-55)	1/4, L
5RLN2C6	Alavanca Reversível, Mola Ajustável	600	1,7-12,5 (15-110)	3/8, H
Aparafusadora	Tipo de Regulagem de Pressão/ Embraiagem	Velocidade Livre	Torque (Aperto Ligeiro)	Mola da Embraiagem do Bit da Haste Hexagonal
		rpm	Nm (pol-lb.)	
5RLK2C3	Alavanca Reversível, Mola Ajustável, Cabeçote em Ângulo de 90°	1 800	1,1-4,6 (10-40)	Bite da Haste Hex 1/4" L, H
5RLL2C3	Alavanca Reversível, Mola Ajustável, Cabeçote em Ângulo de 90°	700	1,7-6,3 (15-55)	Bite da Haste Hex 1/4" L, H
5RLN2C3	Alavanca Reversível, Mola Ajustável, Cabeçote em Ângulo de 90°	600	1,7-12,5 (15-110)	Bite da Haste Hex 1/4" L, H



PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

	Motor Housing Assembly for 90° Angle Drill models ending in -EU for all other 90° Angle Drill models for 45° Angle Drill models ending in -EU for all other 45° Angle Drill models for nonreversible Angle Wrench or Angle Screwdriver models ending in -EU for all other nonreversible Angle Wrench or Angle Screwdriver models for reversible Angle Wrench or Angle Screwdriver models ending in -EU for all other reversible Angle Wrench or Angle Screwdriver models 1 Motor Housing for 5L1UB-EU-A40 for 5L1UB-A40 for 5LK2C-EU-A40 or 5LK2D-EU-A40 for 5LK2C-A40 or 5LK2D-A40 for 5RLK2C-EU-A40 for 5RLK2C-A40 ♦ 2 Rear Rotor Bearing for nonreversible models for reversible models * Warning Label for models ending in -EU for all other models 3 Throttle Lever 4 Throttle Lever Pin	5LK2C-EU-A40 5LK2C-A40 5L1B-EU-A40 5L1B-A40 5LK2D-EU-A40 5LK2D-A40 5RLK2C-EU-A40 5RLK2C-A40 5L1B-EU-B40 5L1B-B40 5LK2C-EU-B40 5LK2C-B40 5RLK2C-EU-B40 5RLK2C-B40 5LK2C-24 5R-24 EU-99 WARNING-7-99 7L-273 7L-120		4A Throttle Plunger Bushing for 45° Angle Drills and all other nonreversible models for reversible models 5 Throttle Plunger Assembly for nonreversible models for reversible models 5A Throttle Plunger Seal for nonreversible models for reversible models ♦ 6 Throttle Valve Seat for Angle Drills for Angle Wrenches/Angle Screwdrivers 6A Throttle Valve Seat Support for Angle Wrenches/Angle Screwdrivers ♦ 7 Throttle Valve for Angle Drills for Angle Wrenches/Angle Screwdrivers ♦ 8 Throttle Valve Spring ♦ 9 Silencer Seal Ring ♦• 10 Exhaust Deflector Seal ♦ 12 Rear Muffler Assembly 13 Muffler Element 14 Inlet Bushing Spacer 15 Inlet Bushing ♦ 16 Air Strainer Screen 16A Reverse Valve (for reversible models only)	7L-91 5RLK2C-91 5LK2C-A94 5RLK2C-A94A 6LL-259 8SL-259 7AH-303 7RAK-303 7RAK-304 7AH-302 7RAK-302 7L-51 WWV100A1-43 6AH-103 6WS-A23 3RA-310 7AH-65 7L-565 R0A2-61 55RP-329
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* Not illustrated.

• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

♦ Indicates Tune-up Kit part.

PART NUMBER FOR ORDERING



PART NUMBER FOR ORDERING



16B	Reverse Valve Lock Pin (for reversible models only)	SPA102R-668	28	Grease Shield	5R-701
16C	Lock Pin Retainer (for reversible models only)	7RL-56	29	Spindle Bearing	R1L-24
16D	Retainer Setscrew (for reversible models only)	7RL-669	30	Seal Support	5RAK-5
16E	Reverse Valve Spring (for reversible models only)	55RP-515	◆ • 31	Seal (for N ratio only)	182A53-610
16F	Reverse Valve Bushing Seal (for reversible models only)	6WRS-290	32	Rotor Pinion (for H ratio) (15 teeth)	5RAN-17
◆ • 17	Rear End Plate Gasket	5RLK-739	33	Rotor Pinion Spacer (for H ratio)	5RAN-18
18	Rear End Plate	5RLK-12	• 34	Spindle Planet Gear (3) for H ratio (13 teeth)	5RAN-9
◆ 19	End Plate Retainer	5RLK-118		for K ratio (15 teeth)	5RAK-10A
20	Rotor for H, L or N ratio (6 teeth)	5RLL-53		for L ratio (17 teeth)	5RAL-10B
◆ 21	Vane Packet	R1401-42-5		for N ratio (14 teeth)	5RAN-10A
22	Cylinder for nonreversible models	5LK-3	35	Spindle Bearing Retainer	7L-28
	for reversible models	5RLK-3	36	Gear Case Assembly for H or L ratio	5LL2C-A37
23	Front End Plate	106-11		for K ratio	5LK2C-A37
24	Cylinder Dowel	106-98	37	for N ratio	5LN2C-A37
◆ • 25	Front Rotor Bearing	WWA100-97	38	Grease Fitting	D0F9-879
26	Front Rotor Bearing Support	106-13	39	Gear Head Assembly (for N ratio)	5RAN-A216
	Spindle Assembly for H ratio	5LH2A-A8	• 39	Gear Head Planet Gear (13 teeth) (for N ratio) (3)	5RAN-9
	for K or L ratio	5LK2C-A8	• 40	Rotor Pinion (for N ratio) (15 teeth)	5RAN-17
	for N ratio	5LN2C-A8	• 41	Rotor Pinion Spacer (for N ratio)	5RAN-18
27	Spindle for H ratio (marked H)	5LH2A-8	42	Gear Head Spacer (for N ratio)	5R-80
	for K or L ratio (marked K)	5LK2C-8		Cushion Clutch Attachment with Light Clutch Spring	5LK2C-AL580
	for N ratio (marked N)	5LN2C-8	51	with Heavy Clutch Spring	5LN2C-AH580
			52	Clutch Housing Assembly	5LK2C-B580
			53	Adjusting Hole Cover	5C1-415
				Coupling Nut Retainer	5C1-29

MAINTENANCE SECTION

• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

◆ Indicates Tune-up Kit part.

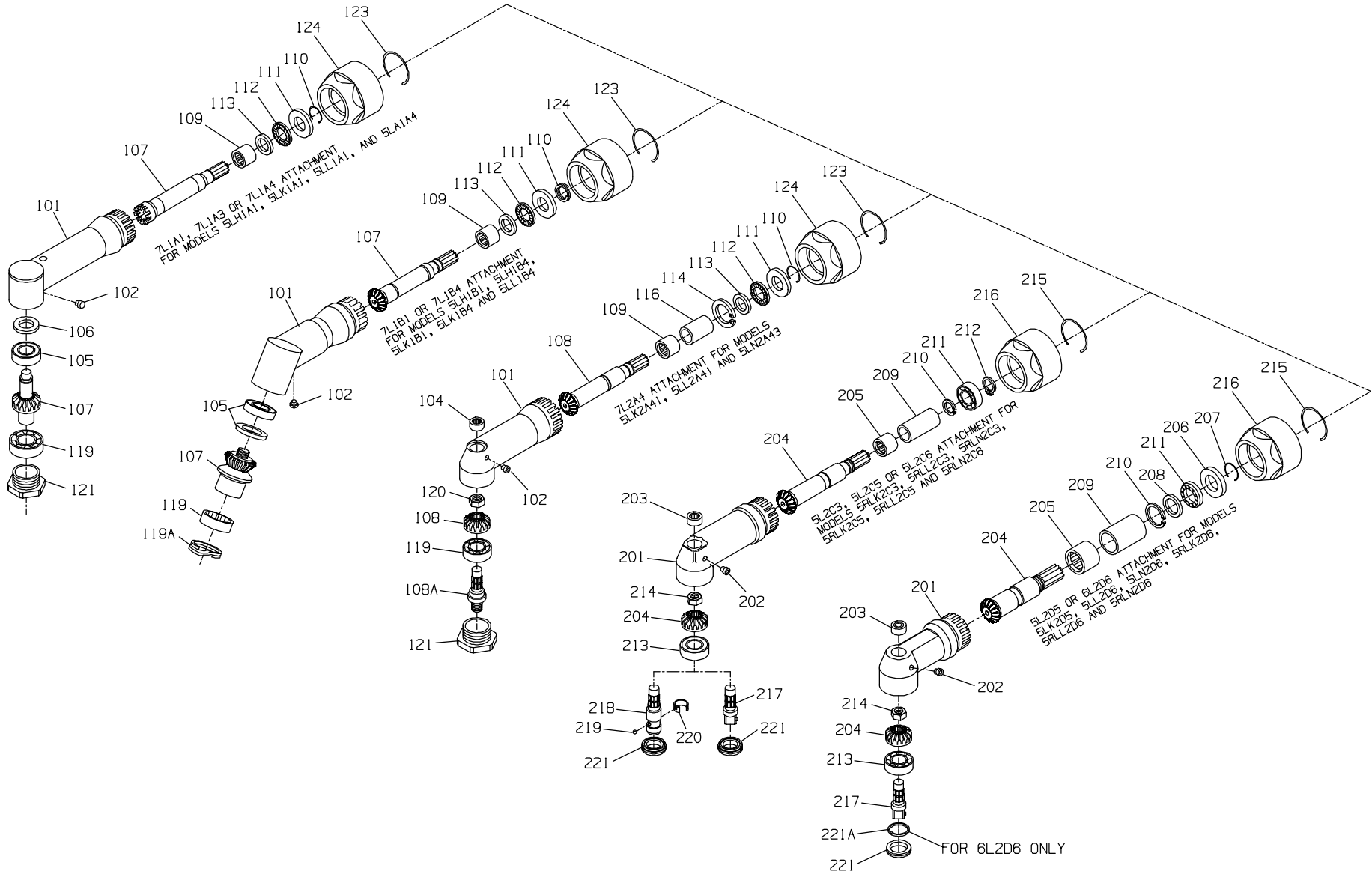
PART NUMBER FOR ORDERING 

PART NUMBER FOR ORDERING 

	Clutch Shaft Assembly		*	Grease Gun	R000A2-228
	for Light Clutch Spring	5LK2C-AL586	*	Housing Cap Wrench	141A12-26
	for Heavy Clutch Spring	5LN2C-AH586	*	Thread Retaining Compound	141A12-226
55	Clutch Shaft	5LK2C-586	*	Locking Type Throttle Lever Assembly	
• 56	Front Clutch Jaw	5C1-589A		for Model 5LH1A1 and 5LH1A4	5LH1A1-A400
• 57	Clutch Ball (24)	RX1-629		for Model 5LH1B1	5LH1B1-A400
• 58	Clutch Ball Spacer	5C1-401A		for Model 5LK1A1	5LK1A1-A400
• 59	Clutch Spring Seat (3)	5C1-627		for Model 5LK1B1 and 5LK1B4	5LK1B1-A400
• 60	Spring Seat Bearing	5C1-105		for Model 5LL1A1	5LL1A1-A400
61	Clutch Adjusting Nut	5C1-582A	*	Piped-Away Exhaust Kit	7L-K284
62	Adjusting Nut Lock	5C1-588	*	Vibra-Tite® [±] (30.0 cc)	5R-VT30
63	Clutch Engaging Spring	5LK2C-626	*	Tune-up Kit (for Angle Drills)	
64	Clutch Spring			(Includes illustrated parts 2, 6, 7, 8, 9, 10, 12,	
	Light (Black)	5C1-L583		16, 17, 19, 21, 25 and 31)	5L-NS-TK1
	Heavy (Green)	5C1-H583	*	Tune-up Kit (for Angle Wrenches/Angle	
	Clutch Driver Assembly	5LK2C-A581		Screwdrivers) (Includes illustrated parts 2, 6, 7,	
• 66	Clutch Driver	5LK2C-581		8, 9, 10, 12, 16, 17, 19, 21, 25 and 31)	5RL-NS-TK1
67	Clutch Shaft Support	5LK2C-584	*	Horizontal Hanger	6WS-366
• 68	Clutch Driver Retainer	7AH-118	*	Retainer	500B-815AX
69	Coupling Nut	7L-27			
*	Clutch Sprag Key	5C1-416			
*	Suspension Bail	7L-365			

MAINTENANCE SECTION

- * Not illustrated.
- To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.
- ± Registered trademark of ND Industries.



MAINTENANCE SECTION

PART NUMBER FOR ORDERING



		7L1A1	7L1A3	7L1A4	7L1B1	7L1B4	7L2A4
	Angle Drill Attachment	7L1A1	7L1A1	7L1A	7L1B	7L1B4	7L2A4
101	Angle Housing Assembly	7L1A-B550	7L1A-B550	7L1A-B550	7L1B-A550	7L1B-B550	7L2A-B550
107	Grease Fitting	D0F9-879	D0F9-879	D0F9-879	D0F9-879	D0F9-879	D0F9-879
• 104	Spindle Upper Bearing	-----	-----	-----	-----	-----	120A4-603
105	Spindle Upper Bearing	7L1A-603	7L1A-603	7L1A-603	7L1B-A97	7L1B-A97	-----
• 106	Upper Bearing Shim Packet (two thicknesses of Shims)	7L1A-P448	7L1A-P448	7L1A-P448	-----	-----	-----
• 107	Spindle Gear Set (includes bevel pinion and spindle gear)						
	1/4"-28 female thread	7L1A1-A591	-----	-----	7L1B1-A591	-----	-----
	9/32"-40 female thread	-----	-----	7L1A4-A591	-----	7L1B4-A591	-----
	5/16"-24 female thread	-----	7L1A3-A591	-----	-----	-----	-----
• 108	Matched Bevel Gear Set (includes bevel gear and bevel pinion)	-----	-----	-----	-----	-----	141A12-A552
108A	Spindle (3/8"-24 male thread	-----	-----	-----	-----	-----	7L2A4-791
• 109	Bevel Pinion Bearing	7AH-24	7AH-24	7AH-24	7L1B-593	7L1B-593	H54U-511B
110	Bearing Seat Retainer	W22-6	W22-6	W22-6	W22-6	W22-6	1415A12-6
111	Rear Thrust Bearing Seat	7L2A-682	7L2A-682	7L2A-682	7L2A-682	7L2A-682	7L2A-682
112	Bevel Pinion Thrust Bearing	3RL2-105	3RL2-105	3RL2-105	3RL2-105	3RL2-105	161A32-105
113	Front Thrust Bearing Seat	7L1A-683	7L1A-683	7L1A-683	7L1A-683	7L1A-683	141A12-683
114	Pinion Bearing Spacer Retainer	-----	-----	-----	-----	-----	RXA21-343
116	Bevel Pinion Bearing Spacer	-----	-----	-----	-----	-----	7L2A-165
• 119	Lower Spindle Bearing	7L1A-593	7L1A-593	7L1A-593	7L1B-593	7L1B-593	120A4-593
119A	Lower Spindle Bearing Retainer	-----	-----	-----	7L1B-28	7L1B-28	-----

MAINTENANCE SECTION

- To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

PART NUMBER FOR ORDERING



		7L1A1	7L1A3	7L1A4	7L1B1	7L1B4	7L2A4
120	Bevel Gear Retainer	-----	-----	-----	-----	-----	120A4-578
121	Spindle Bearing Cap	7L1A-531	7L1A-531	7L1A-531	-----	-----	7L2A4-531
123	Coupling Nut Retainer	5C1-29	5C1-29	5C1-29	5C1-29	5C1-29	5C1-29
124	Coupling Nut	7L-27	7L-27	7L-27	7L-27	7L-27	7L-27
*	Drill Chuck						
	0 to 1/4" capacity	-----	-----	-----	-----	-----	R0H-99
	0 to 3/8" capacity	-----	-----	-----	-----	-----	R1M-99
*	Drill Chuck Key						
	for R0H-99	-----	-----	-----	-----	-----	R1H-J253
	for R1M-99	-----	-----	-----	-----	-----	R1M-J253
*	Bearing Inserting Tool	7L1A-950	7L1A-950	7L1A-950	7L1B1-955	7L1B1-955	7L2A-950
*	Bevel Pinion Sprag Key	5C1-416	5C1-416	5C1-416	5C1-416	5C1-416	-----

PART NUMBER FOR ORDERING



		5L2C3	5L2C5 or 5L2C6	5L2D5	6L2C6
	Angle Wrench/Angle Screwdriver Attachment				
	1/4" hex recess (for standard bits)	5L2C3	-----	-----	-----
	1/4" square drive	-----	5L2C5	5L2D5	-----
	3/8" square drive	-----	5L2C6	-----	6L2D6
201	Angle Housing Assembly	5L2C-A550	5L2C-A550	7L2A-B550	6L2D-B550
202	Grease Fitting	D0F9-879	D0F-879	D0F-879	D0F-879
• 203	Upper Spindle Bearing	120A4-603	120A4-603	120A4-603	120A4-603

* Not illustrated.

- To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

PART NUMBER FOR ORDERING



		5L2C3	5L2C5 or 5L2C6	5L2D5	6L2C6
• 204	Matched Bevel Gear Set	141A12-A552	141A12-A552	141A12-A552	6L2D-A552
• 205	Bevel Pinion Bearing	H54U-511B	H54U-511B	H54U-511B	H54U-511B
206	Rear Thrust Bearing Seat	-----	-----	7L2A-682	7L2A-682
207	Bearing Seat Retainer	-----	-----	1415A12-6	1415A12-6
208	Front Thrust Bearing Seat	-----	-----	141A12-683	141A12-683
209	Pinion Bearing Spacer	AGS141-165	AGS141-165	7L2A-165	7L2A-165
• 210	Bearing Spacer Retainer	RXA21-343	RXA21-343	RXA21-343	RXA21-343
211	Bevel Pinion Thrust Bearing	120A4-97	120A4-97	161A32-105	161A32-105
• 212	Bearing Retainer	120A4-588	120A4-588	-----	-----
• 213	Lower Spindle Bearing	120A4-593	120A4-593	120A4-593	6L2D-59
• 214	Bevel Gear Retainer	120A4-578	120A4-578	120A4-578	120A4-578
215	Coupling Nut Retainer	141A12-29	141A12-29	5C1-29	5C1-29
216	Coupling Nut	141A12-27	141A12-27	7L-27	7L-27
217	Socket Adapter Spindle				
	1/4" square drive	-----	141A9-A607-1/4	141A9-A607-1/4	-----
	3/8" square drive	-----	141A12-A607	-----	6L2D-A607
*	Socket Retainer				
	(for 1/4" pin type square drive)	-----	500B-816A	500B-816A	-----
*	Socket Retaining Pin (for 3/8" square drive)	-----	5020-716	-----	5020-716
*	Socket Retaining Spring (for 3/8" square drive)	-----	401-718	-----	401-718
218	1/4" Hex Bit Holder Spindle (for standard bits)	5L2C3-B586	-----	-----	-----
219	Bit Retaining Ball (for No. 5L2C3-B586 Spindle)	AV1-255	-----	-----	-----
220	Bit Retaining Spring				
	(for No. 5L2C3-B586 Spindle)	102A60-241	-----	-----	-----
221	Angle Housing Cap	120A4-531	120A4-531	120A4-531	6L2D-531
221A	Spindle Seal	-----	-----	-----	6L2D-720
*	Socket Retainer (for 1/4" ball-type square drive)	-----	500B-815AX	500B-815AX	-----

MAINTENANCE SECTION

- * Not illustrated.
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MAINTENANCE SECTION

Additional Spindles are available for use on the 5L2C3, 5L2C5, 5L2D5, 5L2C6 or 6L2D6 Attachments as follows. Parts not listed are the same as those listed on Pages 29–31.

PART NUMBER FOR ORDERING



Spindle		
217	1/4" square drive	141A9-A607-1/4
217	3/8" square drive (for 5L2C5 or 5L2C6)	141A12-A607
	3/8" square drive (for 6L2D6)	6L2D-A607
218	1/4" hex recess (for standard bits)	5L2C3-B586
*	1/4" hex recess (for insert bits)	5L2C4-B386
*	Bit Retainer (for No. 5L2C4-B386 Spindle)	5L2C4-425
219	Bit Retaining Ball (for No. 5L2C3-B586)	AV1-255
220	Bit Retaining Spring (for No. 5L2C3-B586)	102A60-241
*	Socket Retainer (for No. 141A9-A607-1/4 Spindle)	500B-816A
*	Socket Retaining Spring (for 141A12-A607 Spindle or 6L2D-A607 Spindle)	401-718
*	Socket Retainer Pin (for 141A12-A607 Spindle or 6L2D-A607 Spindle)	5020-716

* Not illustrated.



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.

LUBRICATION

Each time a Series 5L or 5RL Angle Drill, Angle Wrench or Angle Screwdriver is disassembled for maintenance and repair or replacement of parts, lubricate the tool as follows:

1. Moisten all O-rings with O-ring lubricant.
2. Work approximately 1.5 cc of Ingersoll-Rand No. 28 Grease into the Rear Rotor Bearing (2), Front Rotor Bearing (25) and the Spindle Bearing (29).
3. Work approximately 3 cc to 6 cc of Ingersoll-Rand No. 28 Grease into the gear train. Grease the Planet Gear Bearings, the teeth on the Planet Gears (34 or 39), the gear teeth inside the Gear Case (36) and the planet gear shafts on the Spindle (27) and Gear Head (38).
4. Work approximately 0.5 cc to 1 cc of Ingersoll-Rand No. 67 Grease into the Lower Spindle Bearing (119 or 213).

5. Work approximately 0.5 cc to 1 cc of Ingersoll-Rand No. 67 Grease into the Upper Spindle Bearing (104, 105 or 203). Bevel Pinion Bearing (109 or 205) and Bevel Pinion Thrust Bearing (112 or 211).
6. For **5L2C3, 5L2C5, 5L2C6, 5L2D5, 6L2D6 and 7L2A4 Angle Heads**, apply a light coat of Ingersoll-Rand No. 67 Grease to the Bevel Gear Set (108 or 204).
7. For **7L1A1, 7L1A3, 7L1A4, 7L1B1 and 7L1B4 Angle Heads**, apply a light coat of Ingersoll-Rand No. 67 Grease to the Bevel Pinion (107) and Spindle (122).

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.

* Registered trademarks of Loctite Corporation.

MAINTENANCE SECTION

Disassembly of Angle Attachment

1. Remove the Drill Chuck, Screwdriver Bit or Socket from the Spindle.
2. Carefully grasp the flats of the Coupling Nut (124 or 216) in leather-covered or copper-covered vise jaws so that the Angle Head (101 or 201) is facing downward.

NOTICE

This is a left-hand thread.

3. Using a wrench on the flats of the Gear Case (36), loosen the Gear Case from the Coupling Nut. Remove the tool from the vise. Unscrew and remove the Coupling Nut from the Gear Case.
4. Carefully grasp the Angle Head in leather-covered or copper-covered vise jaws so that the Spindle (107, 108A, 217 or 218) is facing upward.

NOTICE

This is a left-hand thread.

5. For 7L1A1, 7L1A3 or 7L1A4 Angle Head, using a wrench, remove the Spindle Bearing Cap (121).

NOTICE

Do not remove the Spindle from the Angle Head until the Bevel Pinion (107) is pulled out against the Bevel Pinion Bearing (109). Failure to do so could damage the Spindle Upper Bearing (105), the Bearing will not be removable from the Spindle, or the Bevel Pinion will be damaged. If tightness or binding occurs, check to make sure the Bevel Pinion has been pulled outward. For 7L2A4 Angle Head, use a wrench to remove the Spindle Bearing Cap (121).

NOTICE

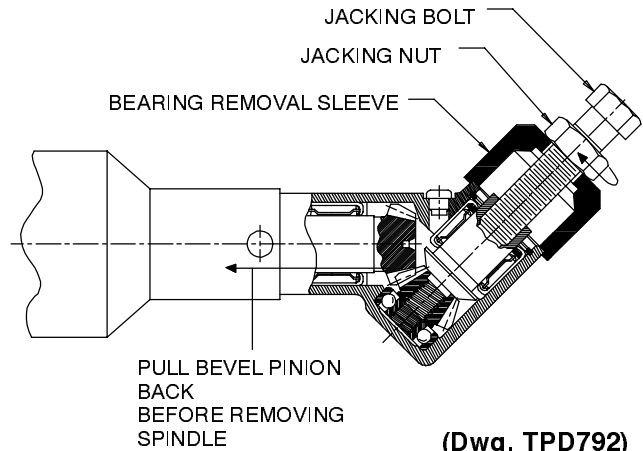
This is a left-hand thread.

Withdraw the Spindle (108A) from the Angle Head. For 7L1B1 or 7L1B4 Angle Head, use a thin blade screwdriver to pry out and under the tab of the Lower Spindle Bearing Retainer (119A). Rotate the screwdriver around the Spindle to spiral the retainer out of its groove.

NOTICE

Do not remove the Spindle from the Angle Head until the Bevel Pinion (107) is pulled outward against the Bevel Pinion Bearing (109). Do not remove the Spindle unless a new Lower Spindle Bearing (119) is available for installation. This type of bearing is always damaged during removal and the bearing must be removed with the Spindle.

Each 7LIB1-955 Bearing Inserting Tool includes tooling to remove the Spindle and Lower Spindle Bearing from the 7L1B1 or 7L1B4 Angle Head. See Dwg. TPD792.



Install the Jacking Nut on the Jacking Bolt near the head of the Bolt. Position the Bearing Removal Sleeve on the face of the Angle Head with the large open end toward the Spindle. With the Angle Head nested in the shallow counterbore of the Sleeve, screw the Jacking Bolt into the Spindle through the sleeve. While keeping the Jacking Bolt stationary with a wrench on the head of the Bolt, use another wrench to rotate the Jacking Nut clockwise pulling the Spindle, Lower Spindle Bearing and Spindle Upper Bearing (105) from the Angle Head.

NOTICE

This is a left-hand thread.

For 5L2C3, 5L2C5, 5L2C6, 5L2D5 or 6L2D6 Angle Head, use No. 141A12-26 Housing Cap Wrench to remove the Angle Housing Cap (221). Withdraw the Spindle (217 or 218) from the Angle Head.

6. Inspect the Lower Spindle Bearing (119 or 213) for looseness or roughness. If either of these conditions exists, replace the bearing as follows:
 - a. For 7L1A1, 7L1A3 or 7L1A4 Angle Head, slip the Lower Spindle Bearing from the Spindle.
 - b. For 7L2A4 Angle Head, grasp the large threaded end of the Spindle in copper-covered vise jaws.
 - c. Unscrew the Bevel Gear Retainer (120) and lift off the Bevel Gear (108).
 - d. Press the Spindle from the Lower Spindle Bearing.
 - e. For 5L2C3, 5L2C5, 5L2C6, 5L2D5 or 6L2D6 Angle Head, grasp the output end of the Spindle in leather-covered or copper-covered vise jaws.
 - f. Unscrew the Bevel Gear Retainer (214) and lift off the Bevel Gear (204).
 - g. Press the Spindle from the Lower Spindle Bearing.

* Registered trademarks of Loctite Corporation.

MAINTENANCE SECTION

NOTICE

Do not remove the Spindle Upper Bearing unless you have a new Bearing ready to install. This type of bearing is always damaged during the removal process.

7. For 7L1A1, 7L1A3, 7L1A4, 7LIB1 or 7L1B4 Angle Head, if the Spindle Upper Bearing (105) appears rough or loose, press it off the Spindle. For 7L2A4, 5L2C3, 5L2C5, 5L2C6, 5L2D5 or 6L2D6 Angle Head, if the Spindle Upper Bearing (203) appears rough or loose, press it from the Angle Head.
8. Remove the Bearing Seat Retainer (110, 207 or 212) and slide off the Rear Thrust Bearing Seat (111 or 206), Bevel Pinion Thrust Bearing (112 or 211) and Front Thrust Bearing Seat (113 or 208) from the pinion shaft.
9. For 7L2A4, 5L2C3, 5L2C5, 5L2C6, 5L2D5 or 6L2D6 Angle Head, use snap ring pliers to remove the Pinion Bearing Spacer Retainer (114 or 210). Remove the Pinion Bearing Spacer (116 or 209).

NOTICE

Do not remove the pinion shaft and bearing unless you have a new bearing on hand.

10. Grasp the spline of the pinion shaft in copper-covered vise jaws. While pulling on the Angle Head, tap the rear face of the Angle Housing with a soft hammer to pull the Bevel Pinion and Bearing (109 or 205) from the Angle Housing.
After the Angle Head is disassembled, check all parts for damage or wear.
11. If the gear teeth on either the Spindle or Bevel Pinion are worn or chipped, replace both parts.

Disassembly of Cushion Clutch

1. Carefully grasp the flats of the Coupling Nut (69) in leather-covered or copper-covered vise jaws, Clutch Housing facing downward.

NOTICE

This is left-hand thread.

2. Using a wrench on the flats of the Gear Case (36), loosen the Gear Case from the Coupling Nut. Remove the tool from the vise.
3. Unscrew the Coupling Nut and remove the Clutch Housing from the Gear Case.
4. Pull the Clutch Shaft Assembly out of the Clutch Housing.

NOTICE

This is a left-hand thread.

CAUTION

When the Clutch Adjusting Nut (61) is loosened enough to relieve the spring pressure, hold the assembly over a container to catch the twenty-four Clutch Balls (57) that will be free to drop out and might otherwise be lost.

5. Working over a workbench, unscrew and remove the Clutch Adjusting Nut (61).
6. Remove the Adjusting Nut Lock (62), Clutch Spring Seat (59), Spring Seat Bearing (60) and another Clutch Spring Seat (59).
7. Slide the Clutch Spring (64), the third Clutch Spring Seat (59) and Clutch Ball Spacer (58) off the Clutch Shaft (55).
8. Remove the Front Clutch Jaw (56).
9. Remove the Clutch Driver Retainer (68) and slide the Clutch Driver (66) from the Clutch Shaft Support (67).

NOTICE

This is a slip fit.

10. Using needle nose pliers or a wire hook, remove the Clutch Engaging Spring (63).

Disassembly of Gearing

1. Using a pin punch and hammer, drive out the Throttle Lever Pin (4) to release the Throttle Lever (3).
2. Grasp the flats of the Motor Housing in leather-covered or copper-covered vise jaws, Gear Case facing upward, being careful not to distort the Motor Housing.

NOTICE

This is a right-hand thread.

3. Using a wrench on the flats of the Gear Case, loosen, but do not remove the Gear Case.

NOTICE

Be certain to hold the tool over a workbench so that you will not lose any parts.

4. Remove the tool from the vise and, while holding the tool horizontally, carefully unscrew the Gear Case by hand and pull it away from the Motor Housing.
5. For H or N ratio, the Rotor Pinion (32 or 40) and Rotor Pinion Spacer (33 or 41) may come out with the Spindle, or they may have remained with the Rotor (20) when the Gear Case was removed. Remove the Rotor Pinion and Rotor Pinion Spacer.

* Registered trademarks of Loctite Corporation.

MAINTENANCE SECTION

6. **For H, K or L ratio**, remove the Spindle Planet Gears (34). Position the Gear Case vertically in arbor press, planet gear end down. Using a 7/16" (11 mm) diameter brass rod against the outer rim of the Spindle, press the Spindle from the Gear Case. **For N ratio**, remove the Gear Head Planet Gears (39), Gear Head (38), Gear Head Spacer (42) and Spindle Planet Gears (34). Position the Gear Case vertically in an arbor press, planet gear end down. Using a 7/16" (11 mm) diameter brass rod against the outer rim of the Spindle, press the Spindle from the Gear Case.
7. Using snap ring pliers, remove the Spindle Bearing Retainer (35).
8. Tap the externally threaded end of the Gear Case on a workbench to remove the Grease Shield (28) and Spindle Bearing (29).
9. Remove the Seal (31) and Seal Support (30) from the Spindle.

Disassembly of Motor and Throttle

1. Remove the Front Rotor Bearing Support (26) along with the Front Rotor Bearing (25) from the Motor Housing (1).
2. Slide the Front Rotor Bearing from the Front Rotor Bearing Support. Check it for damage or roughness.
3. Grasp the splined end of the Rotor (20) and pull the assembled motor from the Motor Housing.
4. Remove the Rear End Plate Gasket (17) from the Motor Housing.

CAUTION

Make certain the End Plate Retainer (19) does not fly when it is slipped off the hub of the Rotor.

5. Using a pair of external snap ring pliers with just the tips of the pliers inserted between the ends of the End Plate Retainer, spread the retainer enough to remove it from the groove in the hub of the Rotor.
6. Remove the Rear End Plate (18), Cylinder (22) and Vanes (21).

NOTICE

Do not remove the Rear Rotor Bearing (2) unless you have a new bearing on hand for replacement. The old bearing will be damaged during the removal process.

7. Grasp the flats in the Motor Housing in leather-covered or copper-covered jaws so that the inlet is upward.

8. Using a wrench on the flats, unscrew and remove the Inlet Bushing (15).
9. Remove the Throttle Valve Spring (8) and Air Strainer Screen (16).
10. Remove the Exhaust Deflector (12), Inlet Bushing Spacer (14), Exhaust Silencer (11), Muffler Element (13), Exhaust Deflector Seal (10) and Silencer Seal Ring (9).
11. Remove the Throttle Valve (7) and the Throttle Plunger (5).
12. **For Angle Drills**, thread a 3/8"-24 thread cap screw about 3" or 4" long into the Throttle Valve Seat (6). Grasp the head of the cap screw in a vise and pull the Seat from the Housing.
13. If removal of the Rear Rotor Bearing is necessary, proceed as follows:

For Nonreversible Models:

- a. Insert a 3/8" (9.5 mm) diameter by 6" (152 mm) long, flat-faced steel rod into the air inlet until it contacts the Rear Rotor Bearing.
- b. Press the end of the steel rod to remove the Rear Rotor Bearing from the front end of the Motor Housing.

Disassembly of Reverse Valve

1. Using a 3/32" Allen Wrench, remove the Retainer Setscrew (16D).
2. Remove the Lock Pin Pin Retainer (16C).

NOTICE

Be careful not to lose the Reverse Valve Spring (16E) when removing the Reverse Valve.

3. While holding the Motor Housing horizontally with the throttle plunger hole downward, tap the top side of the Housing with a plastic hammer to dislodge the Reverse Lock Pin (16B), allowing the Reverse Valve (16A) to be withdrawn from the Housing. Remove the Reverse Valve Bushing Seal (16F).

ASSEMBLY

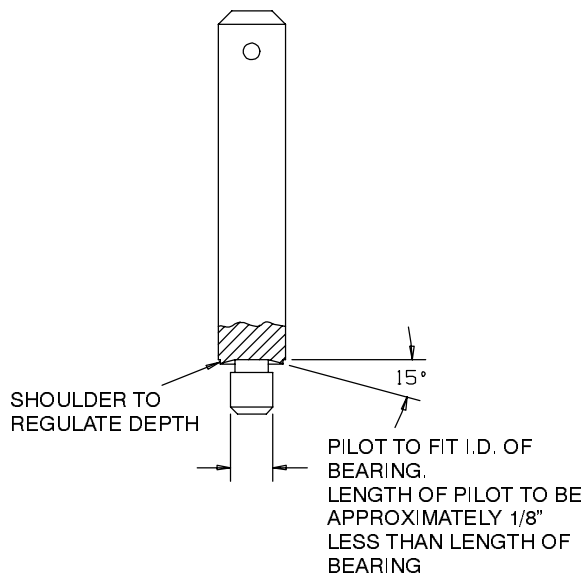
General Instructions

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.

MAINTENANCE SECTION

- 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.
- Always clean every part and wipe every part with a thin film of oil before installation.
- Check every bearing for roughness. If an open bearing must be cleaned, wash it thoroughly in clean solvent and dry with a clean cloth. **Sealed or shielded bearings should not be cleaned.** Work grease thoroughly in every open bearing before installation.
- Apply a film of O-ring lubricant to all O-rings before final assembly.
- Unless otherwise noted, always press on the **stamped end** of a needle bearing when installing the needle bearing in a recess. Use a bearing inserting tool similar to the one in Dwg. TPD786.

Needle Bearing Inserting Tool



(Dwg. TPD786)

Assembly of Motor and Throttle

- If the Rear Rotor Bearing (2) was removed, install a new one as follows:
For Nonreversible Models:
 - Using a bearing inserting tool that has a pilot extending into the Bearing, and a shoulder that contacts the outer radius on the bearing shell, press a new Rotor Bearing, closed end first, into the bearing recess of the Motor Housing (1) until it is about .050" (1.27 mm) below flush. Inject 0.5 cc of Ingersoll-Rand No. 28 Grease into the Bearing.

For Reversible Models:

- Using a bearing inserting tool as shown in Dwg. TPD786, press a **new** Rear Rotor Bearing (2) into the Motor Housing until it is about .015" (0.38 mm) below flush. Inject 0.5 cc of Ingersoll-Rand No. 28 Grease into the bearing.
- Carefully grasp the flats of the Motor Housing in leather-covered or copper-covered vise jaws, inlet end facing upward.
 - If the Throttle Valve Seat (6) and/or Throttle Valve Seat Support (6A) were removed, use a flat-faced rod 1/2" (13 mm) in diameter by 3" (75 mm) long to press the Throttle Valve Seat and/or Support into Motor Housing until it seats.
 - Install the Throttle Plunger (5) until the hole in the Plunger aligns dead center with the hole in the Throttle Valve Seat.
 - Using needle nose pliers to hold the short-stem end of the Throttle Valve (7), install the Valve, long-stem end through the hole in the Throttle Valve Seat and the Throttle Plunger.
 - Install the Muffler Element (13) by wrapping it horseshoe fashion around the inside of the Exhaust Deflector (12).
 - Snap the Exhaust Silencer (11) into the large open end of the Exhaust Deflector.
 - Install the Exhaust Deflector Seal (10) into the groove on the front end of the Exhaust Deflector.
 - Install the Silencer Seal Ring (9) over the hub of the Motor Housing and flush with the base of the hub.
 - Install the Exhaust Deflector over the hub of the Motor Housing, aligning the wide tab on the Exhaust Deflector with the throttle plunger hole in the Motor Housing.

NOTICE

Tabs on the Exhaust Deflector match notches in the Motor Housing. Do not force the Exhaust Deflector in place.

- Insert the Air Strainer Screen (16), closed end first, inside the external threaded end of the Inlet Bushing (15).
- Insert the Throttle Valve Spring, (8), large coil end first, into the Inlet Bushing, making sure it contacts the Air Strainer Screen.
- Install the Inlet Bushing Spacer (14) in the large hole in the Exhaust Deflector.
- Thread the Inlet Bushing into the Motor Housing, making certain the Throttle Valve Spring encircles the short-stem end of the Throttle Valve. Tighten the Inlet Bushing to a minimum of 25 ft-lb (33.9 Nm) torque.

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NOTICE

Note that the throttle lever pin hole in the Exhaust Deflector is larger at one end than the other.

15. Install the Throttle Lever (3), pressing the Throttle Lever Pin (4) into the large end of the pin hole.
16. Slip the Rear End Plate (18) on the rear hub of the Rotor (20) and install the Rear Rotor Retainer (19) in the groove.
17. Hold the Rotor vertically and clamp the short hub in leather-covered or copper-covered vise jaws.
18. Wipe each Vane (21) with a film of Ingersoll-Rand No. 10 Oil and place a Vane in each slot in the Rotor.

NOTICE

When assembling the motor, be sure to install the Cylinder correctly. The motor will not give proper performance if the Cylinder is inverted.

19. For 5LK1A1, 5LK1B1 or 5LK1B4, place the Cylinder (22), front end down, over the Rotor and onto the Rear End Plate.
For all other models, place the Cylinder (22), front end up, over the Rotor and onto the Rear End Plate.

NOTICE

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 (24) at the top. If the two parts through the cylinder wall are in the bottom right quadrant, you are facing the front end of the Cylinder.

20. Slip the Front End Plate (23) over the rotor shaft. Slide the Front Rotor Bearing (25) into the Bearing Support (26) until it seats.
21. Enter the Rear End Plate Gasket (17) into the Motor Housing (1), positioning the Gasket smoothly on the back of the bore so that the dowel notch in the Gasket aligns with the dowel hole in the Housing.
22. Obtain a stiff steel rod 3/32" (2.3 mm) diameter and approximately 10" (254 mm) long to use as an assembly dowel.
23. Align the dowel groove in the Rear End Plate, Cylinder and Front End Plate.
24. Place the assembly dowel in the aligned grooves so that about 3" (75 mm) of the dowel extends beyond the Rear End Plate. Insert the extension into the dowel hole at the bottom of the housing bore, and slide the motor into the Motor Housing until it seats.
25. Withdraw the assembly dowel and insert the Cylinder Dowel (24) until the Cylinder Dowel is slightly below the surface of the Front End Plate.

26. Slide the Front Rotor Bearing Support (26), bearing side first, into the Motor Housing until it contacts the Front End Plate.

Assembly of Reverse Valve

1. Install the Reverse Valve Lock Pin (16B) into the hole in the side of the Reverse Valve (16A).
2. Slip the Reverse Valve Spring (16E) into the end of the Reverse Valve opposite the reverse valve knob.
3. Hold the Motor Housing (1) horizontally with the Throttle Lever on top. Insert the Reverse Valve and Spring in the reverse valve bushing, so that the Reverse Valve Lock Pin is on top. Rotate the Reverse Valve one-half turn (180°) to allow the Lock Pin to drop into the slot in the wall of the Bushing. Release the Reverse Valve and install the Lock Pin Retainer (16C).
4. Operate the Reverse Valve to make sure it functions smoothly.

Assembly of Gearing

1. Work the Seal Support (30), large end first, over the spindle shaft and against the gear frame face.
2. **For K, L and N ratios**, install the Seal (31) over the spindle shaft against the Seal Support.
3. Install the Grease Shield (28) onto the spindle shaft.
4. Install the Spindle Bearing (29) over the spindle shaft. Firmly support the Spindle (27) and **press but do not drive**, the Bearing into position using an arbor that will contact only the inner ring of the Bearing.
5. **For H ratio**, slide the Rotor Pinion Spacer (33) followed by the Rotor Pinion (32) onto the spline shaft on the Rotor (20).
For N ratio, slide the Rotor Pinion Spacer (41) followed by the Rotor Pinion (40) onto the spline shaft on the Rotor.
6. Place a Spindle Planet Gear (34) onto each of the three shafts on the Spindle.

NOTICE

Spindles and Spindle Planet Gears are identifiable as follows:

Gear Ratio	Letter Stamped on Spindle	Number of teeth on Spindle Planet Gear
H	H	13
K	K	15
L	H	17
N	N	14

7. Work 3 cc to 6 cc of the recommended grease into the gear train.

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8. Insert the Spindle Assembly into the front end of the Gear Case (36), making certain the Assembly is seated in the recess in the Gear Case.
9. Using snap ring pliers, install the Spindle Bearing Retainer (35) in the internal groove in the Gear Case in front of the Spindle Bearing.
10. **For N ratio**, slide a Gear Head Planet Gear (39) onto each of the three gear shafts on the Gear Head (38). Slide the Gear Head Spacer (42) over the spline and flush against the face of the Gear Head. Insert the Gear Head Assembly, spline end first, into the rear of the Gear Case making certain the spline of the Gear Head properly engages the teeth of the Spindle Planet Gears.

NOTICE

This is a right hand thread.

11. Thread the assembled Gear Case onto the Motor Housing and tighten it to 30 to 40 ft-lb (40 to 54 Nm) torque.

NOTICE

Run the motor at free speed on low air pressure while tightening the Gear Case. Listen while tightening to make sure there is no scoring.

Assembly of Cushion Clutch

1. Install the Clutch Driver (66), flat side first, onto the spline end, of the Clutch Shaft Support (67) and retain with the Clutch Driver Retainer (68). Set the Clutch Driver Assembly aside.
2. Slide the Front Clutch Jaw (56), jaw end first, over the end of the Clutch Shaft (55) and along the splines to the groove at the opposite end.
3. Coat the grooved end with grease and insert thirteen Clutch Balls (9/64" dia.) (57) between the Jaw and into the groove of the Clutch Shaft. Pull the Clutch Jaw down to lock the Bearings into the groove of the Shaft.
4. While holding the Clutch Jaw firmly on the Clutch Balls, insert the Clutch Driver Assembly, spline end trailing, into the bore of the Clutch Shaft.

NOTICE

Make certain the Jaws of the Clutch Driver engage the Front Clutch Jaw.

5. Carefully grasp the spline of the Clutch Shaft Support in leather-covered or copper-covered vise jaws, spline end of the Clutch Shaft facing upward.
6. Lightly coat the face of the Front Clutch Jaw with the recommended grease.

7. Slide the Clutch Ball Spacer (58) over the splined end of the Clutch Shaft, aligning the holes in the Spacer with the holes in the Clutch Jaw.
8. Insert a Clutch Ball (9/64" dia.) (57) into each of the eleven holes in the Spacer, and, **in the order named**, slide the following over the Clutch Shaft: one Clutch Spring Seat (59), the Clutch Spring (64), the second Clutch Spring Seat (59), the Spring Seat Bearing (60), the third Clutch Spring Seat (59) and the Adjusting Nut Lock (62), indented side trailing. Thoroughly grease the Clutch Balls, Bearing and Adjusting Nut Lock.

NOTICE

This is a left-hand thread.

9. Start the Clutch Adjusting Nut (61), detent side first, onto the Clutch Shaft and run it finger tight against the compression of the Spring.
10. Remove the assembled Clutch from the vise.
11. Install the Clutch Shaft Assembly into the Clutch Housing (51), spline of Clutch Shaft Support trailing.
12. Install the Clutch Housing Assembly into the Gear Case Assembly (36), matching the spline of the Clutch Housing with that of the Gear Case.
13. Thread the Coupling Nut (69) onto the Gear Case, hand tight. Grasp the flats of the Gear Case in leather-covered or copper-covered vise jaws and using a wrench on the flats of the Coupling Nut, tighten it to 25 ft-lb (34 Nm) torque.

Assembly of the Angle Attachment

1. Lubricate the Bevel Pinion (107, 108 or 204) as instructed under **LUBRICATION** and insert it, **gear end first**, into the long bore of the Angle Head (101 or 201).
2. Lubricate the Bevel Pinion Bearing (109 or 205) as instructed under **LUBRICATION** and insert it, **unstamped end first**, into the bore of the Angle Head and onto the bevel pinion shaft.
3. **For 7L1A1, 7L1A3 or 7L1A4 Angle Head**, use No. 7L1A-950 Bearing Inserting Tool and press the Bevel Pinion Bearing so the stamped face is a maximum of 2.40" (61 mm), but not less than 2.38" (60.5 mm) below the end face of the Angle Head. **For 712A4 Angle Head**, use No. 7L2A-950 Bearing Inserting Tool and press the Bevel Pinion Bearing so the stamped face is a maximum of 1.65" (42.0 mm) but, not less than 1.64" (41.75 mm) below the end face of the Angle Head. Install the Bevel Pinion Bearing Spacer (116). Using snap ring pliers, install the Pinion Bearing Spacer Retainer (114). **For 5L2C3, 5L2C5 or 5L2C6 Angle Head**, press the Bevel Pinion Bearing, stamped face facing outward, using the Pinion Bearing Spacer (209).

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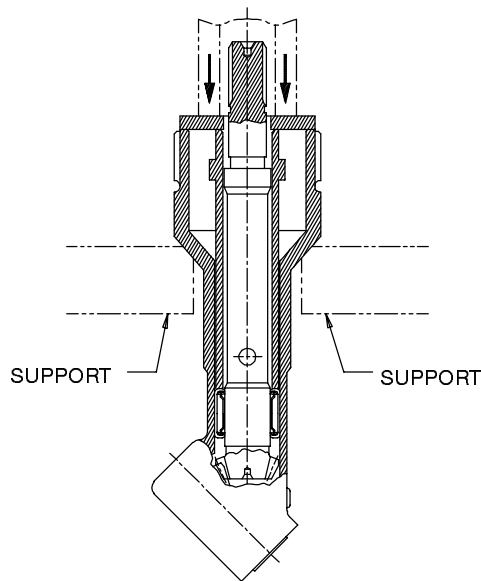
NOTICE

The outward face of the Spacer must be flush with the internal groove in the Angle Housing. Using snap ring pliers, install the Bearing Spacer Retainer (210).

For 5L2D5 or 6L2D6 Angle Head, use

No. 7L2A-950 Bearing Inserting Tool and press the Bevel Pinion Bearing so the stamped face is a maximum of 1.65" (42.0 mm), but not less than 1.64" (41.75 mm) below the end face of the Angle Head. Install the Pinion Bearing Spacer (209). Using snap ring pliers, install the Pinion Bearing Spacer Retainer (210).

For 7L1B1 or 7L1B4 Angle Head, use the long Bearing Inserting Sleeve included in the 71B1-955 Bearing Inserting Tool package and press the Bevel Pinion Bearing so the stamped face is a maximum of 2.12" (54 mm) but not less than 2.11" (53.5 mm) below the end face of the Angle Head. See Dwg. TPD793.



(Dwg. TPD793)

4. **For 7L1A1, 7L1A3, 7L1A4, 7L1B1, 7L1B4, 7L2A4, 5L2D5 or 6L2D6 Angle Head,** lubricate the Bevel Pinion Thrust Bearing (112 or 211) as instructed under **LUBRICATION**. Install in order named the Front Thrust Bearing Seat (113 or 208), Bevel Pinion Thrust Bearing, and Rear Thrust Bearing Seat (111 or 206) over the splined end of the Bevel Pinion and retain with the Bearing Seat Retainer (110 or 207).
For 5L2C3, 5L2C5 or 5L2C6 Angle Head, lubricate the Bevel Pinion Thrust Bearing (211) as instructed under **LUBRICATION**. Install the Bearing over the splined end of the Bevel Pinion and retain with the Bearing Retainer (212).

5. If the Lower Spindle Bearing (119 or 213) has been removed, use a sleeve that will contact only the inner ring of the Bearing and press the Lower Spindle Bearing, sealed side first, onto the Spindle (217 or 219).

NOTICE

The Lower Spindle Bearing is a slip fit on the Angle Drill Spindle (107).

6. Slide the Bevel Gear (107 or 204) onto the Spindle.
7. Apply Locquic®* Primer Grade T to the threads of the Bevel Gear Retainer (120 or 214) and Spindle. Allow to dry for approximately five minutes. Apply Loctite®* No. 242 to the threads of the Bevel Gear Retainer and tighten it on the Spindle to 10 ft-lb (13.5 Nm) torque.
8. If the Spindle Upper Bearing (104, 105 or 203) was removed, install a new Bearing as follows:
 - a. **For 7L1A1, 7L1A3 or 7L1A4 Angle Head,** apply a small drop of Loctite No. 601 to the small outside diameter of the Upper Spindle Bearing Shaft.

CAUTION

Do not get any Loctite in the bearing; damage to the bearing could result.

- b. Press the Spindle Upper Bearing (105) onto the Spindle (122) and allow the Loctite to cure for a minimum of 10 minutes.

NOTICE

Make sure the Bevel Pinion (108) is pulled outward toward the Bevel Pinion Bearing before inserting the Spindle into the Angle Head.

- c. Slip the Lower Spindle Bearing over the end of the Spindle and into the Angle Head recess.
- d. Insert the Spindle into the Angle Head until the Upper Spindle Bearing seats into the recess of the Angle Head.
- e. Install the Spindle Bearing Cap (121) finger tight.
- f. Spindle must turn freely.
- g. While holding the Bevel Pinion out of engagement with the Spindle, measure the amount of end play in the Spindle. Subtract .002" (.051 mm) from the reading to determine the required shim thickness.
- h. Unscrew and remove the Spindle Bearing Cap. While pulling the Bevel Pinion outward toward the Bevel Pinion Bearing (109), remove the Spindle from the Angle Head.

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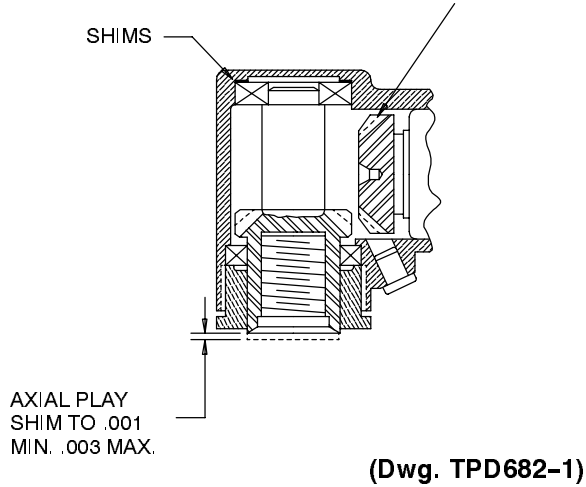
MAINTENANCE SECTION

NOTICE

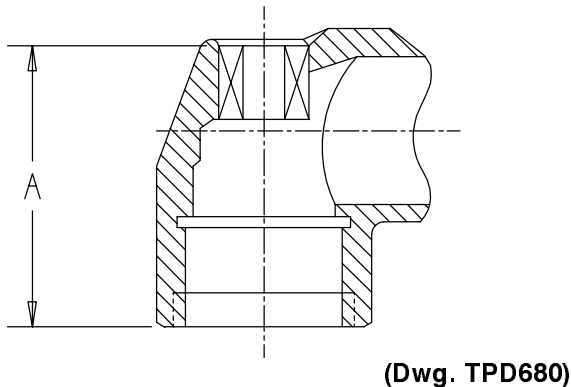
The shim Packet contains three .002" (.05 mm) shims and two .005" (.13 mm) shims.

- i. Insert the required number of shims, as determined from step (g) into the upper bearing recess of the Angle Head. See Dwg. TPD682-1.

BEVELED PINION IN DISENGAGED POSITION

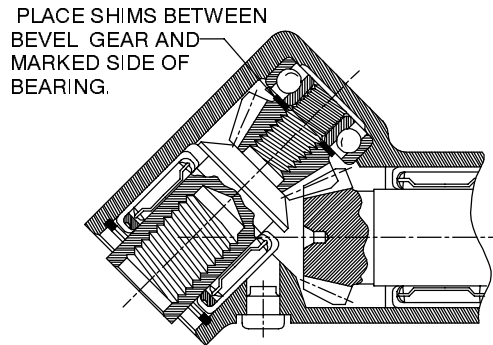


- j. Reassemble and test the Angle Head as indicated in steps (c) through (g).
- k. For 7L2A4, 5L2C3, 5L2C5, 5L2C6, 5L2D5 or 6L2D6 Angle Head, press on the closed end of a new Upper Spindle Bearing (104 or 203) entering the Bearing into the small bore opposite the threaded end of the Angle Head. See Dwg. TPD680.



Minimum Dimension "A"		Maximum Dimension "A"	
in	mm	in	mm
1.21	30.75	1.27	31.25

- l. For 7L1B1 Angle Head, install all the shims provided with each Spindle Upper Bearing on the Spindle against the Bevel Gear. See Dwg. TPD787.



(Dwg. TPD787)

- m. Apply a small drop of Loctite No. 601 to the small outside diameter at the upper end of the Spindle.

CAUTION

Do not get any Loctite in the Bearing; damage to the Bearing could result.

- n. Press the Spindle Upper Bearing, stamped side against the shims, onto the Spindle and allow the Loctite to cure for a minimum of 10 minutes.
- o. Lubricate the Spindle as instructed on Page 4 and insert the Spindle into the Angle Head until the Spindle Upper Bearing seats into the recess of the Angle Head.

NOTICE

Make sure the Bevel Pinion is pulled outward toward the Bevel Pinion Bearing before inserting the Spindle into the Angle Head.

- p. Slip the Lower Spindle Bearing, stamped end out, over the end of the Spindle and against the face of the Angle Head.
- q. Insert the smaller diameter of the Installation Sleeve Guide into the Lower Spindle Bearing until it stops against the face of the Spindle. See Dwg. TPD794-1.

CAUTION

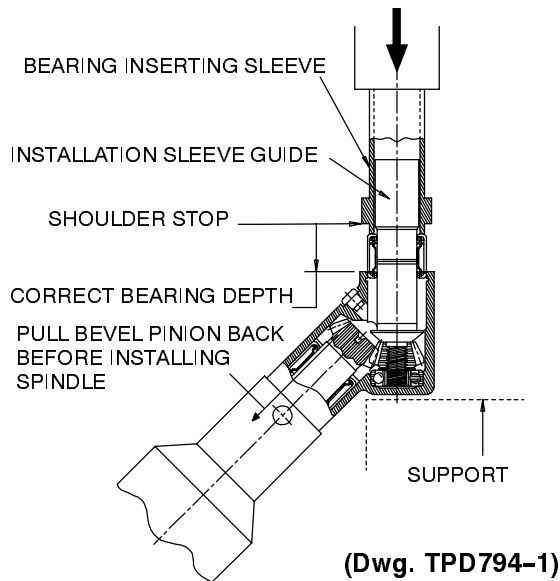
Do not attempt to press the Bearing into the housing with this guide. It is only to be used for alignment.

- r. Slide the shouldered end of the Bearing Inserting Sleeve onto the Guide until the end of the Sleeve contacts the Lower Spindle Bearing.

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- s. With the closed end of the Angle Head resting on a flat surface, press the Lower Spindle Bearing into the housing until the shoulder of the Sleeve stops against the face of the Angle Head or until the stamped face of the Bearing is a maximum of 0.113" (2.88 mm) but not less than 0.108" (2.75 mm) below the face of the Angle Head.



- t. Using a thin blade screwdriver, start one end of the Lower Spindle Bearing Retainer (119A) into the groove in the Angle Head. Rotate the screwdriver around the Spindle to spiral the Retainer into the groove.
9. Lubricate the Spindle Upper Bearing, Bevel Gear and Lower Spindle Bearing as instructed under **LUBRICATION** and install the Spindle into the Angle Head.

10. Clean the threads on the Angle Head and the Spindle Bearing Cap (121 or 218); apply a film of Vibra Tite®** VC3 to the threads.
11. **For 7L1A1, 7L1A3 or 7L1A4 Angle Head**, install the Spindle Bearing Cap and tighten the Cap to a minimum of 35 in-lb (4.0 N m) torque.
For 7L2A4, 5L2C3, 5L2C5, 5L2C6, or 5L2D5 Angle Head, install the Spindle Bearing Cap and tighten the Cap to a minimum of 15 ft-lb (20.0 Nm) torque.
For 6L2D6 Angle Head, install the Spindle Seal (221A) and Spindle Bearing Cap. Tighten the cap to a minimum of 15 ft-lb (20.0 Nm) torque.
12. Slide the Coupling Nut (124 or 216), threaded end trailing, over the splined end of the Angle Head.
13. Apply the Coupling Nut Retainer (123 or 215) to the external groove on the splined end of the Angle Head.
14. **For 5L2C3, 5L2C5 or 5L2C6 Angle Head**, engage the spline on the Bevel Pinion with the matching spline in the Clutch Shaft (55) and thread the Coupling Nut onto the Clutch Attachment. Tighten the Coupling Nut to a minimum of 25 ft-lb (34 Nm) torque. The output end of the Spindle should be on the same side of the tool as the Throttle Lever.
For 7L1A1, 7L1A3, 7L1A4, 7L1B1, 7L1B4, 7L2A4, 5L2D5 or 6L2D6 Angle Head, engage the spline on the Bevel Pinion with the matching spline in the Spindle (27) and thread the Coupling Nut onto the Gear Case (36). Tighten the Coupling Nut to a minimum of 25 ft-lb (34 Nm) torque. The output end of the Spindle should be on the same side of the tool as the Throttle Lever.

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MAINTENANCE SECTION

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 Inlet Bushing Screen or Air Strainer Screen	Clean the screen in a clean, suitable, cleaning solution. If the Screen cannot be cleaned, replace it.
	Worn or broken Vanes	Replace the complete set of Vanes.
	Worn or broken Cylinder	Replace the Cylinder if it is cracked or if the bore appears wavy or scored.
	Scoring of End Plates	Replace End Plates if they are scored.
	Improper lubrication or dirt build-up	Clean the Motor Unit parts and lubricate as instructed.
	Clogged Muffler	Clean the Muffler Element in a clean, suitable, cleaning solution. If it cannot be cleaned, replace it.
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 tool for 30 seconds to lubricate all the cleaned parts.
Scoring	Improper assembly	Make certain that all Motor or Cylinder parts are properly aligned prior to clamping the motor assembly.
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.
Angle Attachment gets hot	Excessive grease	Clean and inspect the Angle Head and gearing. Lubricate as instructed.
	Inadequate grease	Inject 0.5 to 1.0 cc of grease into the Grease Fitting.
	Worn or damaged parts	Clean and inspect the Angle Head and Gearing. If the Bevel Gear and/or Bevel Pinion is worn or broken, replace both parts as they are a matched set.
Inconsistent disengagement of Clutch Attachment	Improper lubrication.	Lubricate the Attachment in accordance with the instructions on page 4.
	Worn or damaged part	Replace the worn or damaged parts.
	Worn Clutch Spring (using a Heavy Spring on a light torque application)	Install a Light Clutch Spring in place of the Heavy Spring.
Motor stalls	Improper adjustment of Attachment or incorrect gearing ratio for the application	Check the adjustment of the Attachment and review the tool performance compared to torque requirements.
Motor shuts off before torque peak is reached	Improper adjustment of Attachment or incorrect gearing ratio for the application	Check the adjustment of the Attachment and review the tool performance compared to torque requirements.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.