OPERATOR'S MANUAL

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

04576906-08
October, 2001

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SERIES RL11 AND RL12 LEVER INLINE SCREWDRIVERS

NOTICE

Series RL11 and RL12 Lever Inline Air Screwdrivers are designed for fastening applications in automotive and appliance assembly, the electronic and aerospace industries and for woodworking.
ARO is not responsible for customer modification of tools for applications on which ARO was not consulted.

⚠ WARNING

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

PLACING TOOL IN SERVICE

- **Always operate, inspect and maintain this tool in accordance with all regulations (local, state, federal and country), that may apply to hand held/hand operated pneumatic tools.**
- **For safety, top performance, and maximum durability of parts, operate this tool at 90 psig (6.2 bar/620 kPa) maximum air pressure at the inlet.**
- **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

- **Power tools produce reaction torque (force), when operated, that may be harmful to you if you hand hold this tool. This torque (force) may cause rotation of the tool in your hand, loss of control of the tool, or operator fatigue or pain. In these situations, use only with a mounting fixture or torque (force) reaction device of adequate strength.**
- **Always wear eye protection when operating or performing maintenance on this tool.**
- **Always wear hearing protection when operating this tool.**
- **Keep hands, loose clothing, long hair and jewelry away from working 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.**
- **Keep body stance balanced and firm. Do not overreach when operating this tool. Anticipate and be alert for sudden changes in motion, reaction torques, or forces during start-up and operation.**
- **Tool accessory may continue to rotate briefly after throttle is released.**

(Continued on page 2)

NOTICE

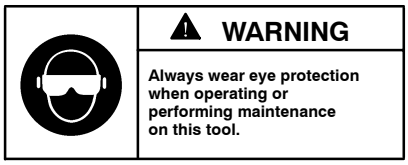
The use of other than genuine ARO replacement parts may result in safety hazards, decreased tool performance, and increased maintenance, and may invalidate all warranties.

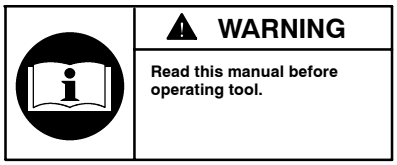
Repairs should be made only by authorized trained personnel. Consult your nearest ARO Authorized Servicenter.

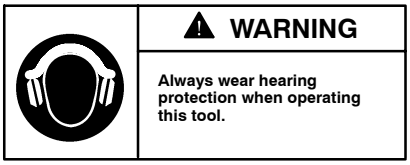
For parts and service information, contact your local ARO distributor, or the Customer Service Dept. of the Ingersoll-Rand Distribution Center, White House, TN at PH: (615) 672-0321, FAX: (615) 672-0801.

ARO Tool Products
Ingersoll-Rand Company
1725 U.S. No. 1 North ● P.O. Box 8000 ● Southern Pines, NC 28388-8000

WARNING SYMBOL IDENTIFICATION







USING THE TOOL (Continued)

- **Air powered tools can vibrate in use. Vibration, repetitive motions or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.**
- **Use accessories recommended by ARO.**
- **This tool is not insulated against electric shock.**
- **This tool is not designed for working in explosive atmospheres.**
- **Do not carry or drag the tool by the hose.**
- **Prevent exposure and breathing of harmful dust and particles created by power tool use:**
  Some dust created by power sanding, sawing, grinding, drilling and other construction activities contains chemicals known to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:
  - **lead from lead based paints,**
  - **crystalline silica from bricks and cement and other masonry products, and**
  - **arsenic and chromium from chemically treated lumber.**

  Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.

ADJUSTMENTS

CLUTCH ADJUSTMENT

WARNING

Disconnect the air supply from the Tool before proceeding.

NOTICE

The Clutch Adjusting Hole Cover has a left-hand thread. Rotate the Cover clockwise to loosen or remove the Cover.

1. Unscrew the Clutch Adjusting Hole Cover far enough to expose the clutch adjusting hole in the Clutch Housing.
2. Insert a 1/4” hex wrench into the Bit Holder and rotate the clutch mechanism until the area having an opening between the faces of the Clutch Adjusting Nut Washer and Clutch Adjusting Nut is visible.
3. Using a screwdriver that has a #1 Phillips tip, insert the tip of the screwdriver into the opening and rotate the screwdriver to adjust the Clutch. Rotate the screwdriver clockwise to decrease Clutch Spring tension and torque and counterclockwise to increase the tension and torque.

NOTICE

The most satisfactory adjustment is usually obtained by using 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 gradual progression.

PLACING TOOL IN SERVICE

LUBRICATION

IRAX No. 10

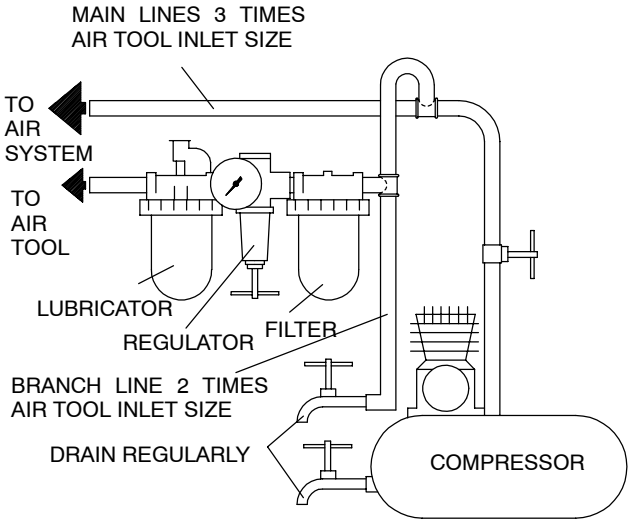
Gearing:
IRAX No. 67
Clutch:
IRAX No. 28

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

For USA - No. C08-02-FKG0-28

Whenever the tool is disassembled for maintenance or repair, lubricate the gear train with IRAX No. 67 Grease.

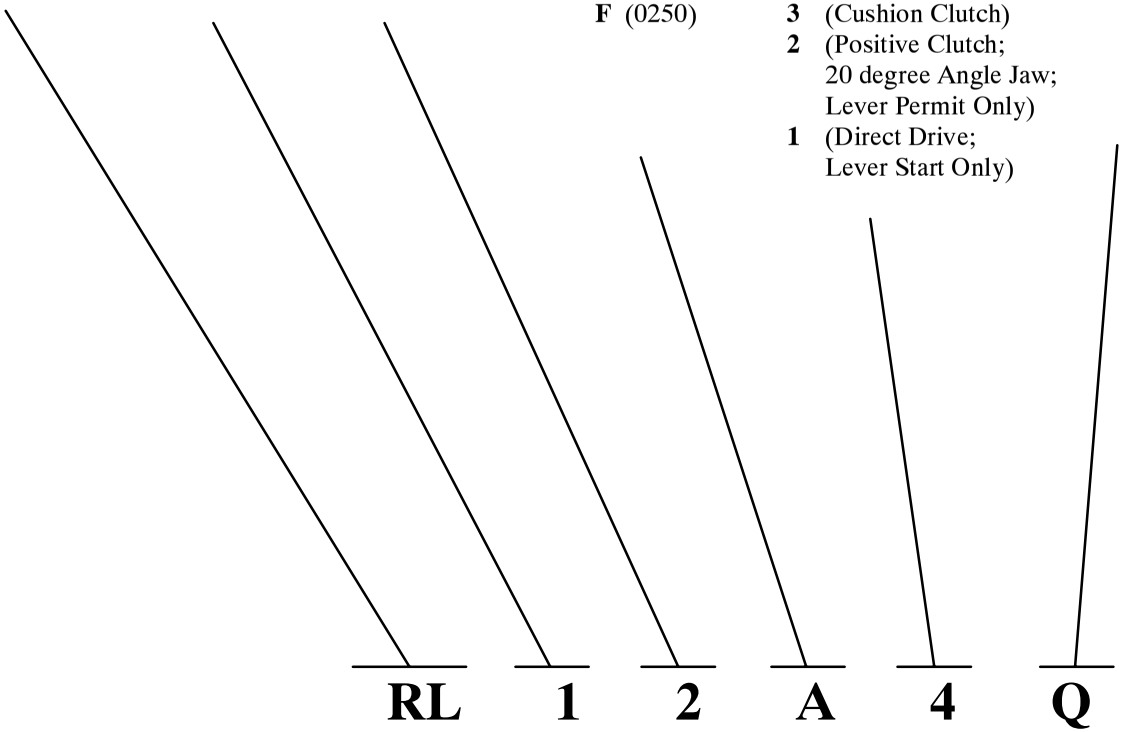
Whenever the tool is disassembled for maintenance or repair, lubricate the clutch assembly with IRAX No. 28 Grease.



(Dwg. TPD905-1)

MODEL IDENTIFICATION

Tool Style	Rotation	Throttle	Free Speed	Clutch	Bit Holder or Driver
RL (Inline)	**1** (Reversible)	**1** (Lever Start) **2** (Lever Permit)	**A** (2800) **B** (2000) **C** (1500) **D** (1000) **E** (0500) **F** (0250)	**9** (Positive Clutch; 90 degree Angle Jaw; Lever Permit Only) **4** (Automatic Shut-off) **3** (Cushion Clutch) **2** (Positive Clutch; 20 degree Angle Jaw; Lever Permit Only) **1** (Direct Drive; Lever Start Only)	**Q** (1/4" Quick Release) **F** (1/4" Bit Finder) **G** (5 mm Double End Quick Release) **H** (1/4" Double End Quick Release)



MANUEL DE L'OPERATEUR

10-2001

COMPRENANT : EXPLOITATION, INSTALLATION & ENTRETIEN

F

VISSEUSES DROITES: SERIES RL11 ET RL12

NOTE

Les visseuses pneumatiques droites des Séries RL11 et RL12 sont destinées au serrage des fixations: d'assemblage automobile, d'équipements ménagers, d'industries électroniques et aérospatiales du travail du bois.
ARO 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 ARO.

⚠ ATTENTION

D'IMPORTANTES INFORMATIONS DE SECURITÉ SONT JOINTES.
LIRE CE MANUEL AVANT D'UTILISER L'OUTIL.
L'EMPLOYEUR EST TENU À 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

- **Cet outil doit toujours être exploité, inspecté et entretenu conformément à toutes les réglementations (locales, départementales, fédérales et nationales), applicables aux outils pneumatiques tenus/commandés à la main.**
- **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.**
- **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 volatiles tels que le kérosène, le gasol ou le carburant d'aviation.**
- **Ne retirer aucune étiquette. Remplacer toute étiquette endommagée.**

UTILISATION DE L'OUTIL

- **Les outils pneumatiques produisent un couple de réaction qui pourrait être nuisible si l'outil est tenu par les mains. Ce couple peut causer une rotation de l'outil dans votre main, d'où une perte de contrôle de la machine. Dans les situations décrites ci-dessus, il est recommandé d'utiliser un système de fixation ou un dispositif anti-réactif d'une résistance adéquate.**
- **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.**
- **Gardez les mains, vêtements amples, cheveux longs et bijoux 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.**
- **Garder une position équilibrée et ferme. Ne pas se pencher trop en avant pendant l'utilisation de cet outil. Anticiper et prendre garde aux changements soudains de mouvement, couples de réaction ou forces lors du démarrage et de l'exploitation.**
- **La percussion des accessoires de l'outil peut continuer pendant un certain temps après le relâchement de la gâchette.**

NOTE

L'utilisation de rechanges autres que les pièces d'origine ARO 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 ARO le plus proche.

Pour les informations relatives aux pièces et au service, contactez votre distributeur ARO.

ARO Tool Products

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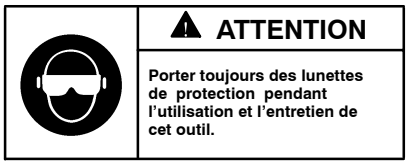
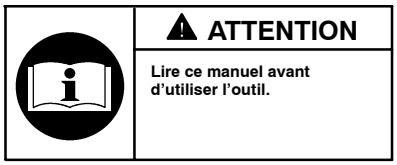
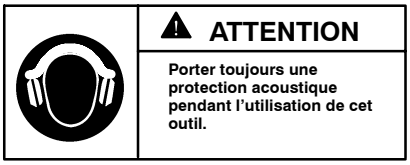
1725 U.S. No. 1 North ● P.O. Box 8000 ● Southern Pines, NC 28388-8000

SIGNIFICATION DES SYMBOLES D'AVERTISSEMENT







UTILISATION DE L'OUTIL (suite)

- **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 ARO.**
- **Cet outil n'est pas conçu pour fonctionner dans des atmosphères explosives.**
- **Cet outil n'est pas isolé contre les chocs électriques.**
- **Ne transportez pas l'outil par son flexible d'air comprimé.**
- **Evitez toute exposition et respiration des poussières et particules nocives créées par l'emploi de l'outil pneumatique:**
  Certaines poussières produites par les opérations de ponçage, sciage, meulage, perçage et autres activités de construction contiennent des produits chimiques qui sont reconnus comme pouvant causer le cancer, des infirmités de naissance ou d'autres risques à effets nocifs. Parmi ces produits chimiques on trouve:
  - **le plomb des peintures à base de plomb,**
  - **les cristaux de silice contenus dans les briques, le ciment et d'autres produits de maçonnerie, et**
  - **l'arsenic et le chrome des bois traités chimiquement.**

  Le risque présenté par l'exposition à ces poussières est fonction de la fréquence et du type de travail effectué. Pour réduire l'exposition à ces produits chimiques : travaillez dans une zone bien aérée, et utilisez les équipements de sécurité approuvés, tels que les masques à poussière qui sont spécialement conçus pour filtrer et arrêter les particules microscopiques.

RÉGLAGES

REGLAGE DU LIMITEUR

⚠ ATTENTION

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

NOTICE

Le capuchon du trou de réglage du limiteur est fileté à gauche. Tourner le capuchon dans le sens horaire pour desserrer ou déposer le couvercle.

1. Dévisser suffisamment la bague pour accéder au trou de réglage du limiteur.
2. Insérer une clé hexagonale de 1/4" dans le porte-embout et tourner le mécanisme du limiteur jusqu'à ce que la zone ayant une ouverture entre les faces de la rondelle et de l'écrou de réglage du limiteur soit visible.
3. A l'aide d'un tournevis Phillips No.1, insérer la lame du tournevis dans l'ouverture et tourner le tournevis pour régler le limiteur. Tourner le tournevis dans le sens horaire pour réduire la tension du ressort du limiteur et le couple, et dans le sens antihoraire pour augmenter la tension et le couple.

NOTE

La meilleure méthode de réglage est normalement obtenue en utilisant l'outil sur l'application requise en augmentant ou en diminuant le couple fourni jusqu'à ce que le réglage désiré soit obtenu. De plus, il est toujours recommandé d'obtenir le réglage final au moyen de réglages progressifs.

MISE EN SERVICE DE L'OUTIL

LUBRIFICATION

IRAX No. 10

Pignonnerie:
IRAX No. 67

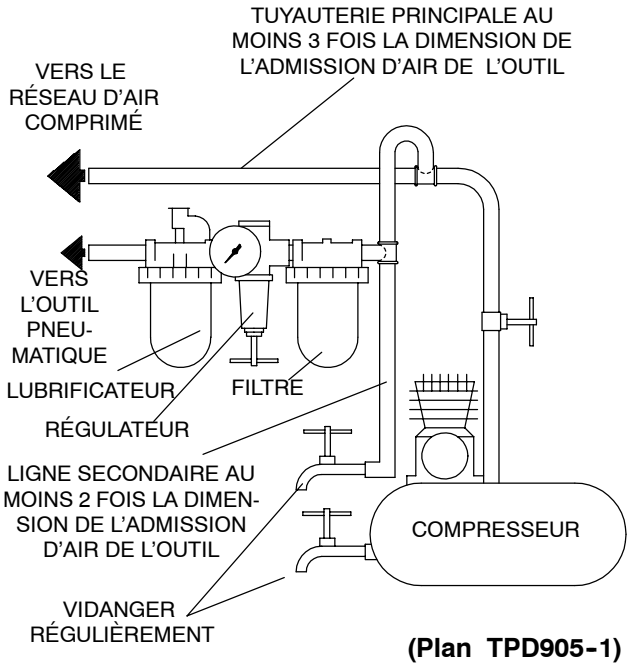
Limiteur:
IRAX No. 28

Utiliser toujours un lubrificateur avec ces outils. Nous recommandons l'emploi du filtre–régulateur–lubrificateur suivant:

É.U. – No. C08–02–FKG0–28

Lubrifier le train d'engrenages avec de la graisse IRAX No. 67 **à chaque fois que l'outil est démonté pour entretien ou réparation**.

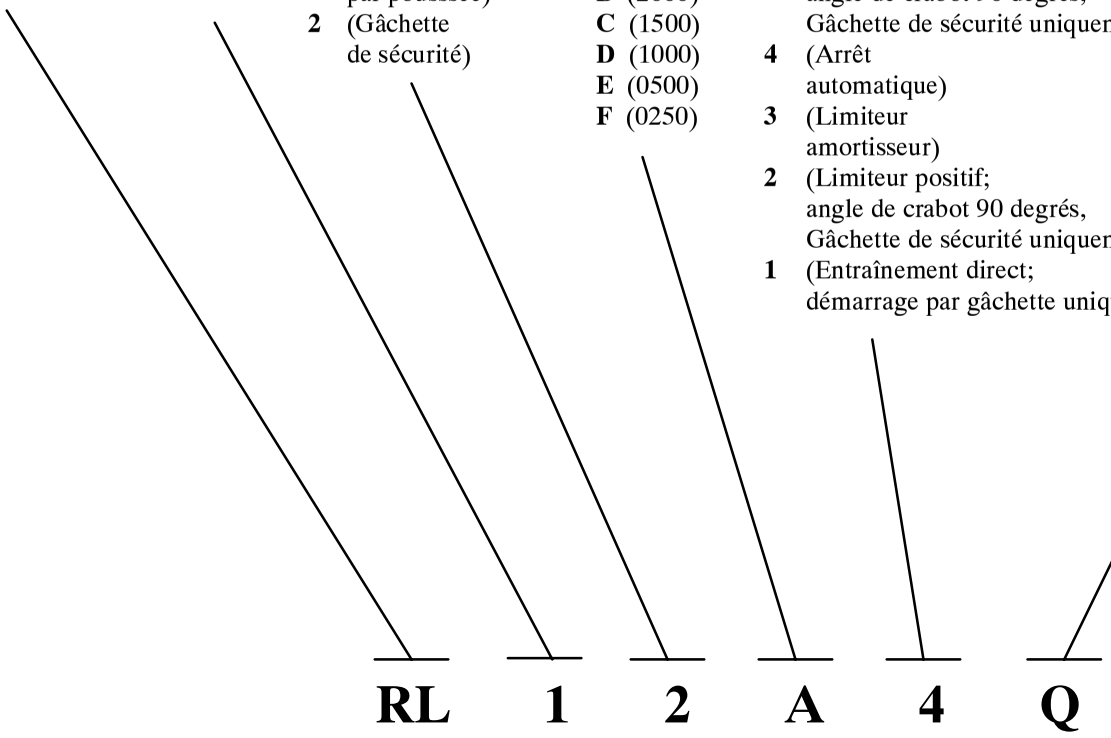
Lubrifier l'ensemble de limiteur avec de la graisse IRAX No. 28 **à chaque fois que l'outil est démonté pour entretien ou réparation**.



(Plan TPD905–1)

IDENTIFICATION DES MODÈLES

Style d'outil	Rotation	Commande	Vitesse à vide	Limiteur	Porte-embout ou entraîneur
RL (En ligne)	**1** (Réversible)	**1** (Démarrage par pousssée) **2** (Gâchette de sécurité)	**A** (2800) **B** (2000) **C** (1500) **D** (1000) **E** (0500) **F** (0250)	**9** (Limiteur positif; angle de crabot 90 degrés, Gâchette de sécurité uniquement) **4** (Arrêt automatique) **3** (Limiteur amortisseur) **2** (Limiteur positif; angle de crabot 90 degrés, Gâchette de sécurité uniquement) **1** (Entraînement direct; démarrage par gâchette uniquement)	**Q** (1/4" Changement rapide) **F** (1/4" Coiffe d'embout) **G** (5 mm Double extrémité Changement rapide) **H** (1/4" Double extrémité Changement rapide)



ATORNILLADORES RECTOS DE PALANCA DE LAS SERIES RL11 y RL12

NOTA

Los atornilladores neumáticos rectos de palanca de las series RL11 y RL12 están diseñados para aplicaciones de montaje en la industria de electrodomésticos, del automóvil, electrónica y aeroespacial, así como para carpintería.

ARO no aceptará responsabilidad alguna por la modificación de las herramientas efectuada por el cliente para las aplicaciones que no hayan sido consultadas con ARO.

⚠ AVISO

**SE ADJUNTA INFORMACION IMPORTANTE DE SEGURIDAD.
LEA ESTE MANUAL ANTES DE USAR LA HERRAMIENTA.
ES RESPONSABILIDAD DE LA EMPRESA ASEGURARSE DE QUE EL OPERARIO ESTE AL TANTO DE LA INFORMACION QUE CONTIENE ESTE MANUAL.
EL HACER CASO OMISO DE LOS AVISOS SIGUIENTES PODRIA OCASIONAR LESIONES.**

PARA PONER LA HERRAMIENTA EN SERVICIO

- **Use, inspeccione y mantenga esta herramienta siempre de acuerdo a todas las normativas (locales, estatales, federales, nacionales), que apliquen a las herramientas neumáticas de operación y agarre manual.**
- **Para seguridad, máximo rendimiento y durabilidad de piezas, use esta herramienta a una máxima presión de aire de 90 psig (6,2 bar/620kPa) en la admisión de manguera de suministro.**
- **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 accesorios dañados, desgastados ni deteriorados.**
- **Asegúrese de que todas las mangueras y los accesorios sean del tamaño correcto y estén bien apretados. Vea Esq. TPD905-1 para un típico arreglo de tuberías.**
- **Use siempre aire limpio y seco a una máxima presión de 90 psig (6,2 bar/620kPa). El polvo, los gases corrosivos y/o el exceso de humedad podrían 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.**

USO DE HERRAMIENTA

- **Las herramientas neumáticas producen un par (fuerza) de reacción cuando se utilizan que puede ser nocivo para el usuario si se sujeta esta herramienta con la mano. Este par o fuerza puede dar lugar a rotación de la herramienta en la mano, pérdida del control de la herramienta, o fatiga o dolor del operario. En estas situaciones, utilícela solamente con un soporte o un dispositivo de reacción de par (fuerza) de resistencia adecuada.**
- **Use siempre protección ocular cuando utilice esta herramienta o realice operaciones de mantenimiento en la misma.**
- **Use siempre protección para los oídos cuando utilice esta herramienta.**
- **Mantenga las manos, la ropa suelta, el cabello largo y las alhajas apartados del extremo de trabajo de la herramienta.**
- **Note la posición de la palanca de inversión antes de funcionar la herramienta para estar consciente de su dirección giratoria cuando funcione el estrangulador.**
- **Mantenga una postura del cuerpo equilibrada y firme. No estire demasiado los brazos al manejar la herramienta. Anticipe y esté atento a los cambios repentinos en el movimiento, pares de reacción u otras fuerzas durante la puesta en marcha y utilización.**
- **El accesorio de herramienta podría seguir girando brevemente después de haber soltado la palanca de estrangulación.**

NOTA

El uso de piezas de recambio que no sean las auténticas piezas ARO podría 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 serán realizadas por personal cualificado y autorizado. Consulte con el centro de servicio ARO autorizado más próximo.

Pour les informations relatives aux pièces et au service, contactez votre distributeur ARO.

ARO Tool Products

Ingersoll-Rand Company
1725 U.S. No. 1 North ● P.O. Box 8000 ● Southern Pines, NC 28388-8000

IR ARO®

IDENTIFICACIÓN DE SÍMBOLOS DE AVISO

USO DE HERRAMIENTA (Continuación)

- **Las herramientas neumáticas pueden vibrar durante el uso. La vibración, repetición o posiciones incomodas pueden dañarle los brazos y manos. En caso de incomodidad, sensación de hormigueo o dolor, deje de usar la herramienta. Consulte a un médico antes de volver a usarla otra vez.**
- **Utilice únicamente los accesorios ARO recomendados.**
- **Esta herramienta no ha sido diseñada para trabajar en ambientes explosivos.**
- **Esta herramienta no está aislada contra descargas eléctricas.**
- **No lleve ni arrastre la herramienta sujetándola por la manguera.**
- **Evite respirar el polvo y partículas nocivos que se producen al utilizar la herramienta, así como exponerse a ellos:**
  Ciertos tipos de polvo que se producen al lijar, serruchar, rectificar o taladrar y durante otras actividades de la construcción contienen sustancias químicas que son conocidos como causantes de cáncer, defectos de nacimiento y otros daños reproductivos. Algunos ejemplos de estas sustancias químicas:
  - **el plomo de las pinturas con base de plomo,**
  - **la sílice cristalina de ladrillos y hormigón y otros productos asociados con la albañilería, y**
  - **el arsénico y el cromo que produce la madera sometida a tratamientos químicos.**

  El riesgo a la persona que presenta una exposición de este tipo varia en función de la frecuencia con que se realiza esta clase de trabajo. Para reducir la exposición a estas sustancias químicas: trabaje en una zona bien ventilada y utilice equipo de protección homologado, por ejemplo una mascarilla especialmente diseñada para filtrar partículas microscópicas.

AJUSTES

AJUSTE DE EMBRAGUE

⚠ AVISO

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

NOTICE

La tapa del orificio para ajuste del embrague tiene rosca hacia la izquierda. Gire la tapa hacia la derecha para aflojar o quitarla.

1. Desenrosque la tapa del orificio para ajuste del embrague lo suficiente para que quede expuesto el orificio en la carcasa del embrague.
2. Introduzca una llave exagonal de 1/4” en el portapuntas y gire el mecanismo del embrague hasta que quede visible la zona que tiene una abertura entre las caras de la arandela de la tuerca de ajuste del embrague y de dicha tuerca.
3. Introduzca la punta de un atornillador con punta Phillips nº 1 en la abertura y gire el atornillador para ajustar el embrague. Gire el atornillador hacia la derecha para reducir la tensión y el par del muelle del embrague o hacia la izquierda para aumentarlos.

NOTA

Normalmente se obtendrá el mejor ajuste usando la herramienta en trabajo actual e incrementando o disminuyendo el par hasta lograr el ajuste deseado.
En cualquier caso, se recomienda hacer el ajuste final por progresión gradual.

PARA PONER LA HERRAMIENTA EN SERVICIO

LUBRICACION

IRAX Nº 10

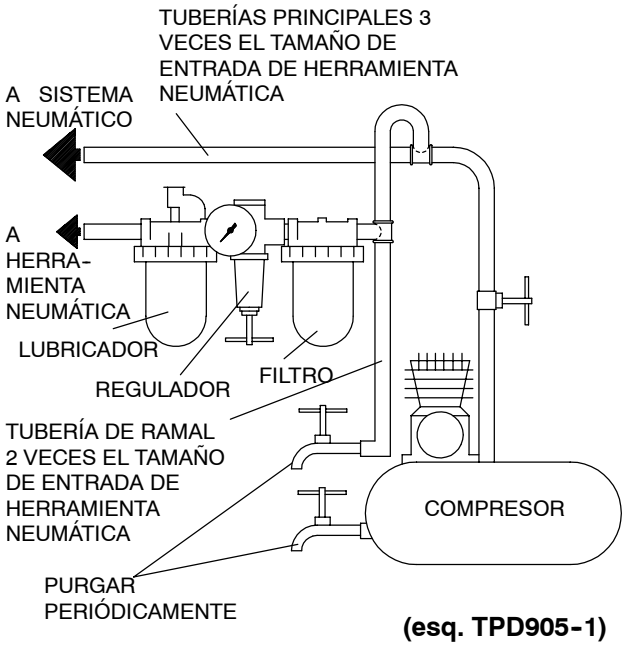
Engranajes:
IRAX Nº 67
Embrague:
IRAX Nº 28

Utilice siempre un lubricador de aire comprimido con estas llaves de impacto. Recomendamos la siguiente unidad de Filtro–Lubricador–Regulador:

EE.UU. - Nº C08-02-FKG0-28

Cada vez que se desarme la herramienta para realizarle trabajos de mantenimiento o reparación, lubrique el tren de engranajes con grasa IRAX Nº 67.

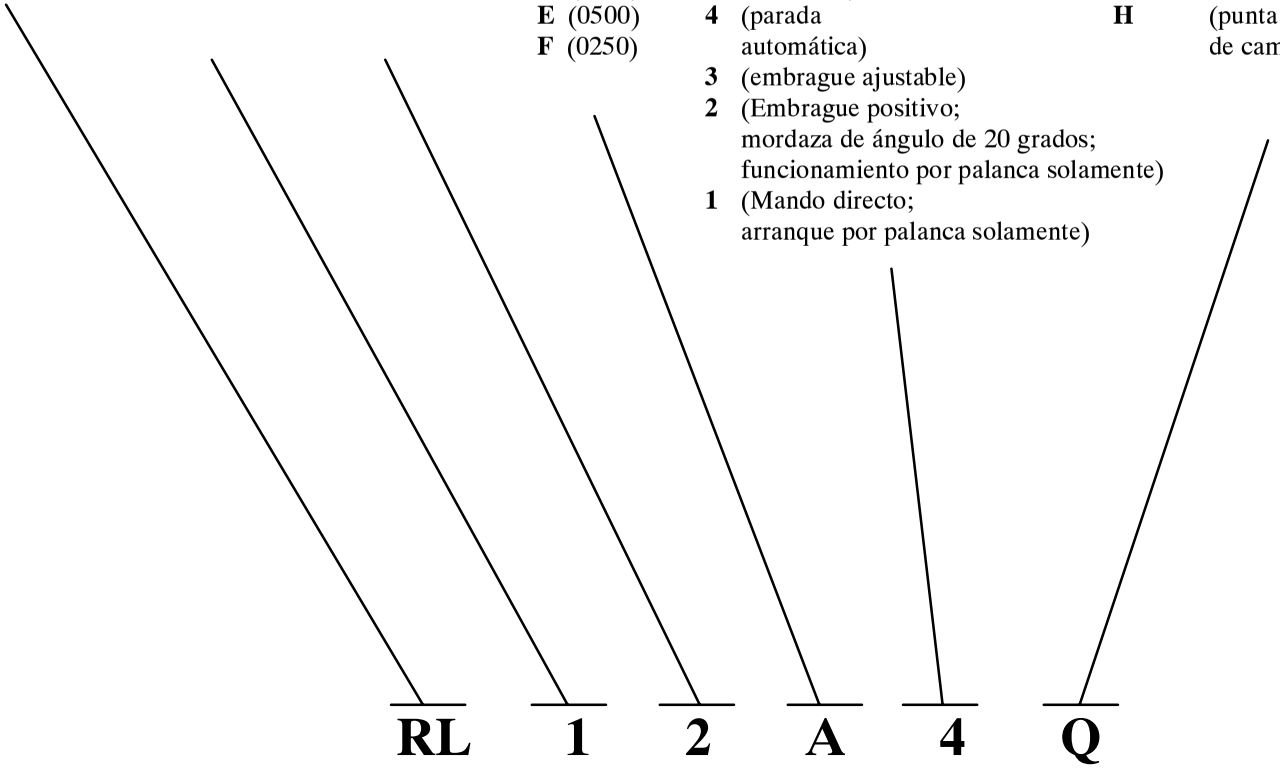
Cada vez que se desarme la herramienta para realizarle trabajos de mantenimiento o reparación, lubrique el conjunto del embrague con grasa IRAX Nº 28.



(esq. TPD905-1)

IDENTIFICACIÓN DE MODELOS

Estilo de herramienta	Rotación	Palanca de mando	Velocidad en vacío	Embrague	Portapuntas o cuadradrillo
RL (recto)	**1** (reversible)	**1** (arranque por empuje) **2** (Funcionamiento por palanca)	**A** (2800) **B** (2000) **C** (1500) **D** (1000) **E** (0500) **F** (0250)	**9** (Embrague positivo; mordaza de ángulo de 90 grados; funcionamiento por palanca solamente) **4** (parada automática) **3** (embrague ajustable) **2** (Embrague positivo; mordaza de ángulo de 20 grados; funcionamiento por palanca solamente) **1** (Mando directo; arranque por palanca solamente)	**Q** (1/4" de cambio rápido) **F** (localizador de brocas de 1/4") **G** (punta doble de 5 mm de cambio rápido) **H** (punta doble de 1/4" de cambio rápido)



MANUAL DO OPERADOR

10-2001

INCLUINDO: FUNCIONAMENTO, INSTALAÇÃO E MANUTENÇÃO

P

APARAFUSADORAS EM LINHA DE ALAVANCA DAS SÉRIES RL11 E RL12

AVISO

As Aparafusadoras em Linha de Alavanca das Séries RL11 e RL12 são concebidas para aplicações de fixação na montagem de automóveis e aparelhos, nas indústrias electrónica e aeroespacial e em carpintaria.

A ARO não é responsável por modificações, feitas pelo cliente em ferramentas, nas quais a ARO 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 SEGUINTES ADVERTÊNCIAS PODE RESULTAR EM FERIMENTOS.

COLOCANDO A FERRAMENTA EM FUNCIONAMENTO

- **Opere, inspeccione e mantenha sempre esta ferramenta de acordo com todas regulamentações (local, estadual, federal e do país), que possam ser aplicadas às ferramentas pneumáticas operadas manualmente ou seguras com as mãos.**
- **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.**
- **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

- **As ferramentas accionadas produzem um binário (força) de reacção, quando são operadas, que pode ser nocivo para si se segurar essa ferramenta com as mãos. Esse binário (força) pode provocar rotação da ferramenta na sua mão, perda de controlo da ferramenta ou fadiga ou dor no operador. Nessas situações, utilize a ferramenta apenas com um acessório de fixação ou dispositivo de reacção de binário (força) de resistência adequada.**
- **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, roupas soltas, cabelos longos e jóias afastados da extremidade de trabalho da ferramenta.**
- **Observe qual é a posição da alavanca que reverte o sentido de rotação antes de operar esta ferramenta de modo a estar atento ao sentido de rotação quando operar o regulador de pressão.**
- **Mantenha o corpo numa posição equilibrada e firme. Não estique o corpo ao operar esta ferramenta. Esteja preparado e alerta para mudanças súbitas no movimento, binários ou forças de reacção durante o arranque e o funcionamento.**
- **Os acessórios da ferramenta podem continuar a girar brevemente após a pressão ter sido aliviada.**

AVISO

O uso de peças de substituição que não sejam genuinamente da ARO 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 ARO mais próximo.

Para obter informações sobre peças e assistência, contacte o seu distribuidor local ARO.

ARO Tool Products
Ingersoll-Rand Company
1725 U.S. No. 1 North ● P.O. Box 8000 ● Southern Pines, NC 28388-8000

IDENTIFICAÇÃO DO SÍMBOLO DE AVISO

USANDO A FERRAMENTA (Continua)

- **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 ARO.**
- **Esta Ferramenta não foi concebida para trabalhos em atmosferas explosivas.**
- **Esta Ferramenta não está isolada contra choques eléctricos.**
- **Não transporte ou arraste a ferramenta pela mangueira.**
- **Evite expor-se e respirar as poeiras e partículas nocivas criadas pela utilização de ferramentas motorizadas:**

Algumas poeiras criadas por operações motorizadas de lixar, serrar, rectificar, perfurar e outras actividades de construção contêm produtos químicos conhecidos por causarem cancro, malformações congénitas e terem efeitos nocivos na reprodução. Alguns exemplos desses produtos químicos são:

- **chumbo de tintas à base de chumbo,**
- **sílica cristalina de tijolos e cimento e outros produtos de alvenaria e**
- **arsénico e crómio de madeira tratada quimicamente**

Os riscos dessas exposições varia, dependendo de com que frequência faz esse tipo de trabalho. Para reduzir a sua exposição a esses produtos químicos: trabalhe numa área bem ventilada e com equipamento de segurança aprovado, como as máscaras contra a poeira que são especialmente projectadas para filtrar partículas microscópicas.

AJUSTES

AJUSTE DA EMBRAIAGEM

⚠ ADVERTÊNCIA

Desconecte a alimentação de ar da Ferramenta antes de prosseguir.

AVISO

A tampa do orifício de ajuste da embraiagem tem a rosca à esquerda. Rode a tampa para a direita para desapertar e remover a tampa.

1. Desaperte a tampa do orifício de ajuste da embraiagem o suficiente para expor este orifício na carcaça da embraiagem.
2. Introduza uma chave sextavada de 1/4” no porta-brocas e rode o mecanismo da embraiagem até a área que tem uma abertura entre as faces da anilha da porca de ajuste da embraiagem e da porca de ajuste da embraiagem ficar visível.
3. Introduza a ponta de uma chave de fendas Phillips Nº 1 na abertura e rode a chave de fendas para ajustar a embraiagem. Rode a chave para a direita para reduzir a tensão e o binário da mola da embraiagem e para a esquerda para aumentar a tensão e o binário.

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 caso, é recomendado que o ajuste final seja feito em progressivamente.

COLOCANDO A FERRAMENTA EM FUNCIONAMENTO

LUBRIFICAÇÃO

IRAX No. 10

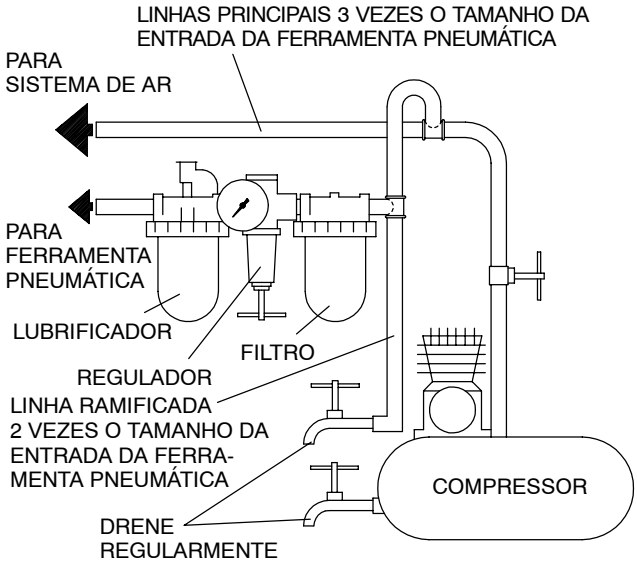
Engrenagem:
IRAX No. 67
Embraiagem:
IRAX No. 28

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

Para E.U.A. - No. C08-02-FKG0-28

Sempre que a ferramenta for desmontada para manutenção ou reparação, lubrifique o trem de engrenagens com Massa IRAX Nº 67.

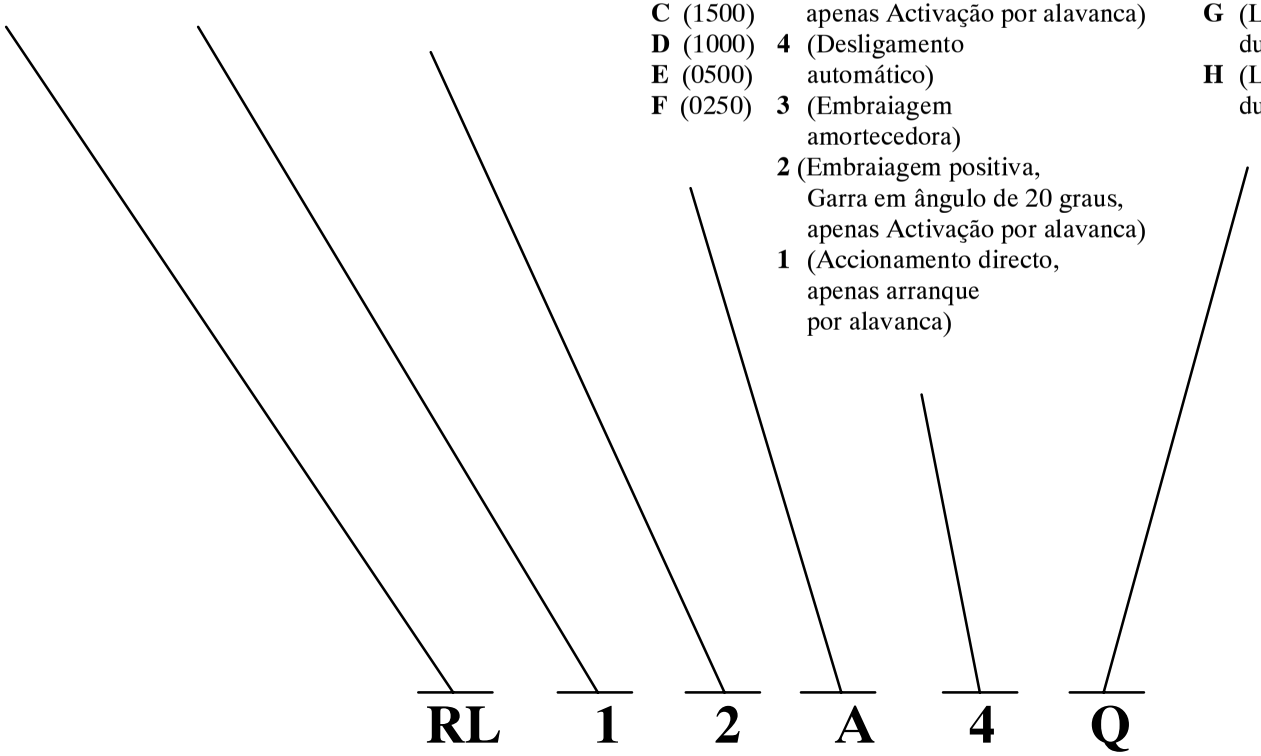
Sempre que a ferramenta for desmontada para manutenção ou reparação, lubrifique o conjunto da embraiagem com Massa IRAX Nº 28.



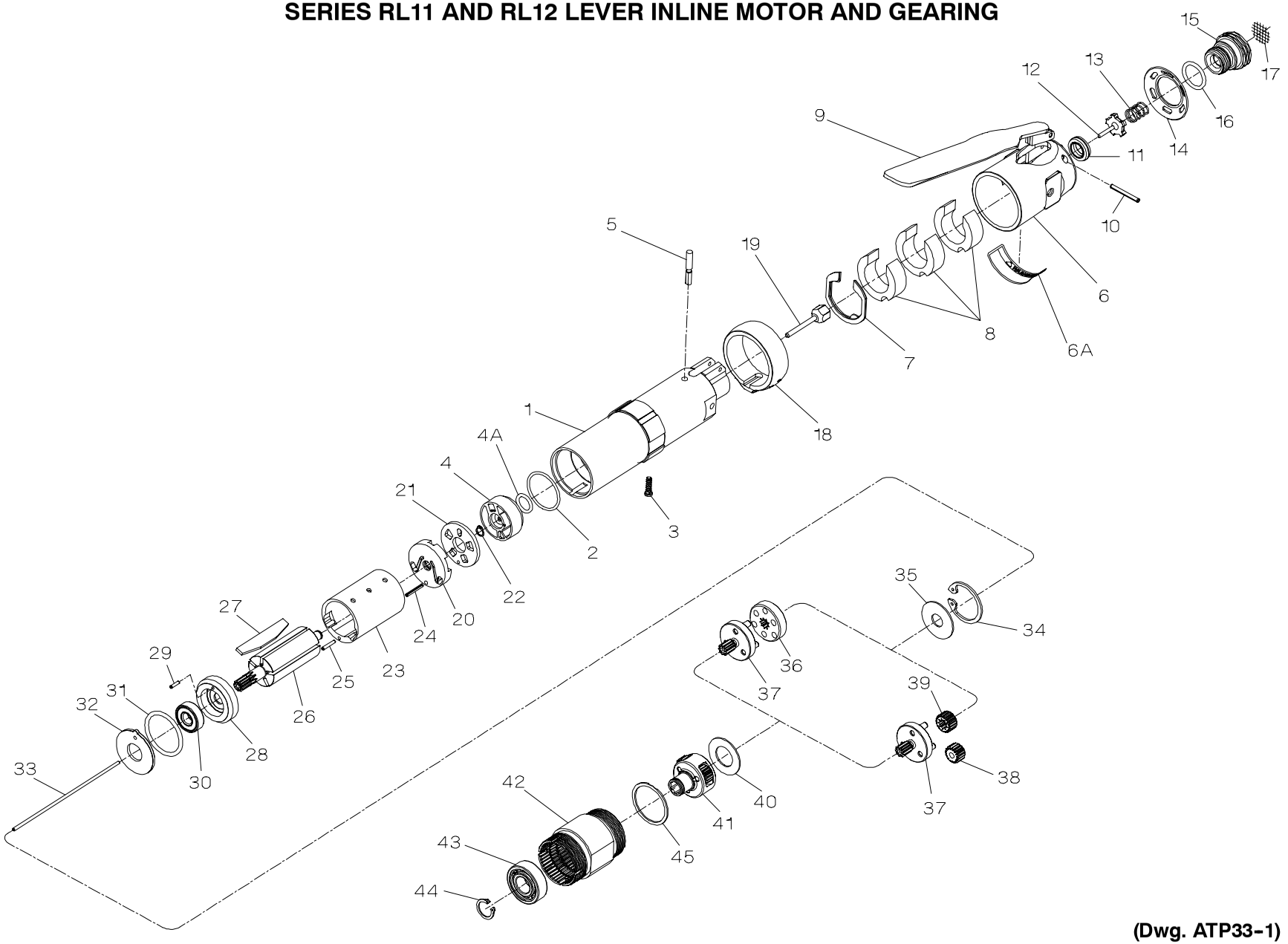
(Desenho TPD905-1)

IDENTIFICAÇÃO DO MODELO

Estilo da ferramenta	Rotação	Estrangulador	Velocidade livre	Embraiagem ou accionador	Porta-brocas
RL (Em linha)	**1** (Reversível)	**1** (Arranque por Alavanca) **2** (Activação por Alavanca)	**A** (2800) **B** (2000) **C** (1500) **D** (1000) **E** (0500) **F** (0250)	**9** (Embraiagem positiva, Garra em ângulo de 90 graus, apenas Activação por alavanca) **4** (Desligamento automático) **3** (Embraiagem amortecedora) **2** (Embraiagem positiva, Garra em ângulo de 20 graus, apenas Activação por alavanca) **1** (Accionamento directo, apenas arranque por alavanca)	**Q** (Libertação rápida de 1/4") **F** (Posicionador da ponta de 1/4") **G** (Libertação rápida de extremidade dupla de 5 mm) **H** (Libertação rápida de extremidade dupla de 1/4")



SERIES RL11 AND RL12 LEVER INLINE MOTOR AND GEARING



(Dwg. ATP33-1)

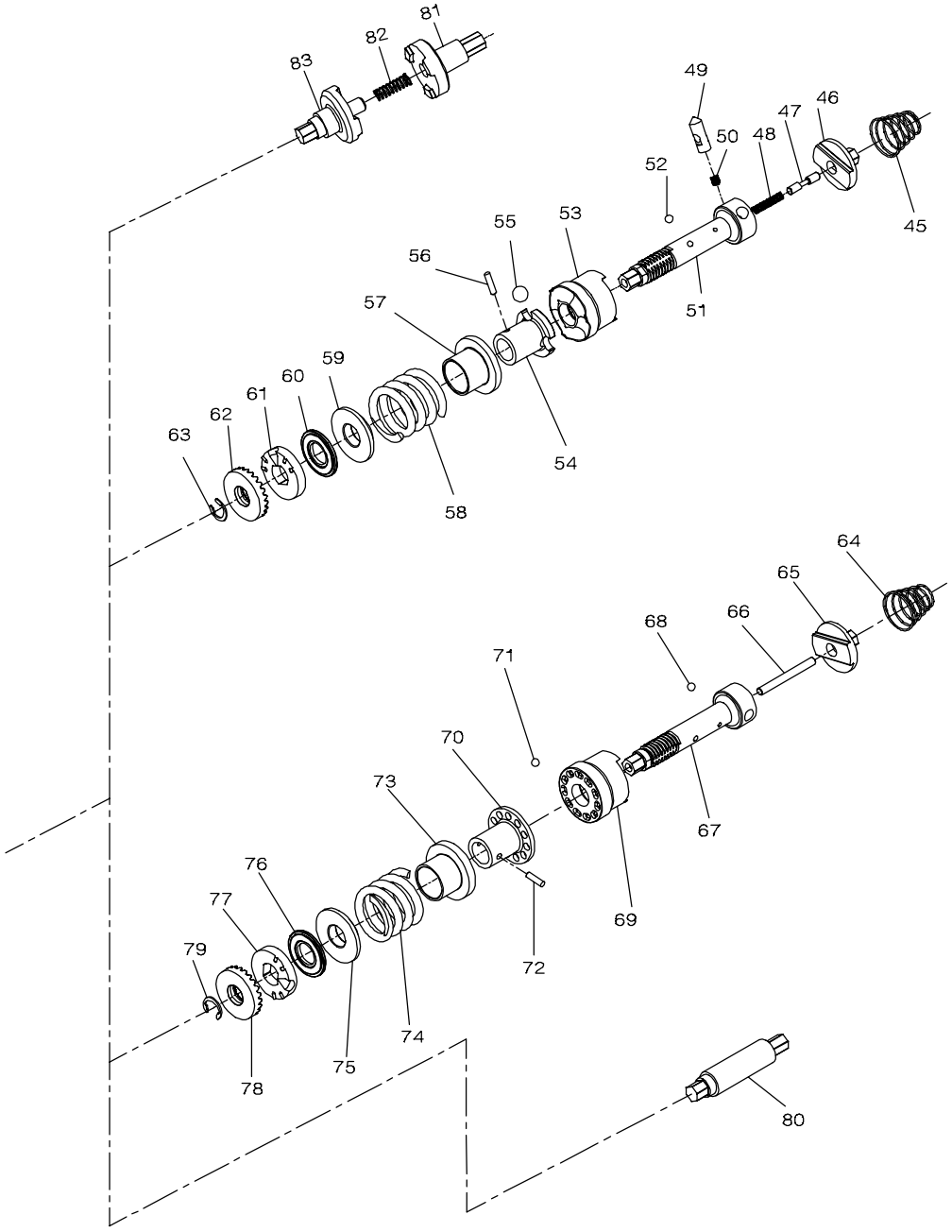
SERIES RL11 AND RL12 LEVER INLINE MOTOR AND GEARING

		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING
1	Motor Housing	TRL-40	21	Rear End Plate Face Plate	TRH-12-2
2	Housing O-ring	TRH-104	22	Rear End Plate Assembly Retainer	8SL-305
3	Housing Screw	TRH-330	23	Cylinder Assembly	TRH-A3
4	Reverse Valve Assembly		24	Cylinder Rear Alignment Pin	TRH-98
	for Models with an Automatic		25	Cylinder Front Alignment Pin	TRH-98-1
	Shutoff Valve	TRH-A329	26	Rotor	
	for Models without an Automatic			for Models with an Automatic	
	Shutoff Valve	TRH-A3291		Shutoff Valve	TRH-53
4A	Reverse Valve Seal	R1A-159		for Models without an Automatic	
5	Throttle Plunger	TRL-302		Shutoff Valve	TRD-53
6	Back Cap	TAL-231	27	Vane Packet (set of 5 Vanes)	TRH-42-5
6A	Warning Label (for direct drive and positive		28	Front End Plate Assembly	TRH-A11
	clutch models only)	TRL-99	29	End Plate Alignment Pin	TRH-98-2
7	Back Cap Gasket	TRL-A283	30	Front Rotor Bearing	TRH-24
8	Muffler Element (3)	TRL-311	31	Motor Seal	TRH-211
9	Throttle Lever	TRL-274	32	Motor Clamp Washer	TRH-207
10	Throttle Lever Pin	TRL-98	33	Push Rod (for Models with an	
11	Throttle Valve Seat	TRH-303		Automatic Shutoff Valve)	TRH-425
12	Throttle Valve	TRD-A302	34	Gear Retainer	TRH-28
13	Throttle Valve Spring	TRL-51	35	Gear Head Spacer	TRH-81
14	Exhaust Diffuser	TRH-123	36	Planet Gear Head Drive Plate (for Series	
15	Inlet Bushing Assembly	TRH-A465		RL11A and RL12A)	TRH-17
16	Inlet Bushing Seal	AF120-290	37	Planet Gear Head Assembly (includes gear shafts)	
17	Inlet Screen	TRH-61		for Series RL11F, RL12F, RL11E, RL12E,	
18	Reverse Lever	TRH-273		RL11D, RL12D, RL11A and RL12A	TRH-A2169-16
19	Automatic Shutoff Valve (for all Models with			for Series RL11C, RL12C,	
	a Shutoff Clutch and Lever Permit Models			RL11B3 and RL12B3	TRH-A2169-12
	with a Cushion Clutch)	TRH-A435		for Series RL11B and RL12B	TRH-A2169-10
20	Rear End Plate Assembly (includes				
	rear rotor bearing)	TRH-A12-1			

		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING
38	Planet Gear (3 for each Gear Head)		42	Gear Case	TAH-37
	for Series RL11F, RL12F, RL11E, RL12E,		43	Spindle Bearing	TRH-510
	RL11D and RL12D	TRH-10-16	44	Spindle Bearing Retaining Ring	120A4-588
	for Series RL11C, RL12C, RL11B3 and RL12B3	TRH-10-12	45	Spindle Bearing Seat	TRH-208
	for Series RL11B and RL12B	TRH-10-10	*	Suspension Bail	7L-365
39	Gear Head Pinion		*	Piped-Away Exhaust Kit (optional)	LG1-K284
	for Series RL11C, RL12C, RL11B3 and RL12B3	TRH-17-18			
	for Series RL11B and RL12B	TRH-17-21			
40	Planet Gear Head Spacer	TRH-82			
41	Spindle Assembly (includes all spindle gearing)				
	for Series RL11F, RL12F, RL11E, RL12E,				
	RL11A and RL12A	TRH-A8-16			
	for Series RL11D, RL12D, RL11C,				
	RL12C, RL11B and RL12B	TRH-A8-12			
	for Series RL11B3 and RL12B3	TRH-A8-10			

* Not illustrated.

SERIES RL11 AND RL12 LEVER INLINE CLUTCHES



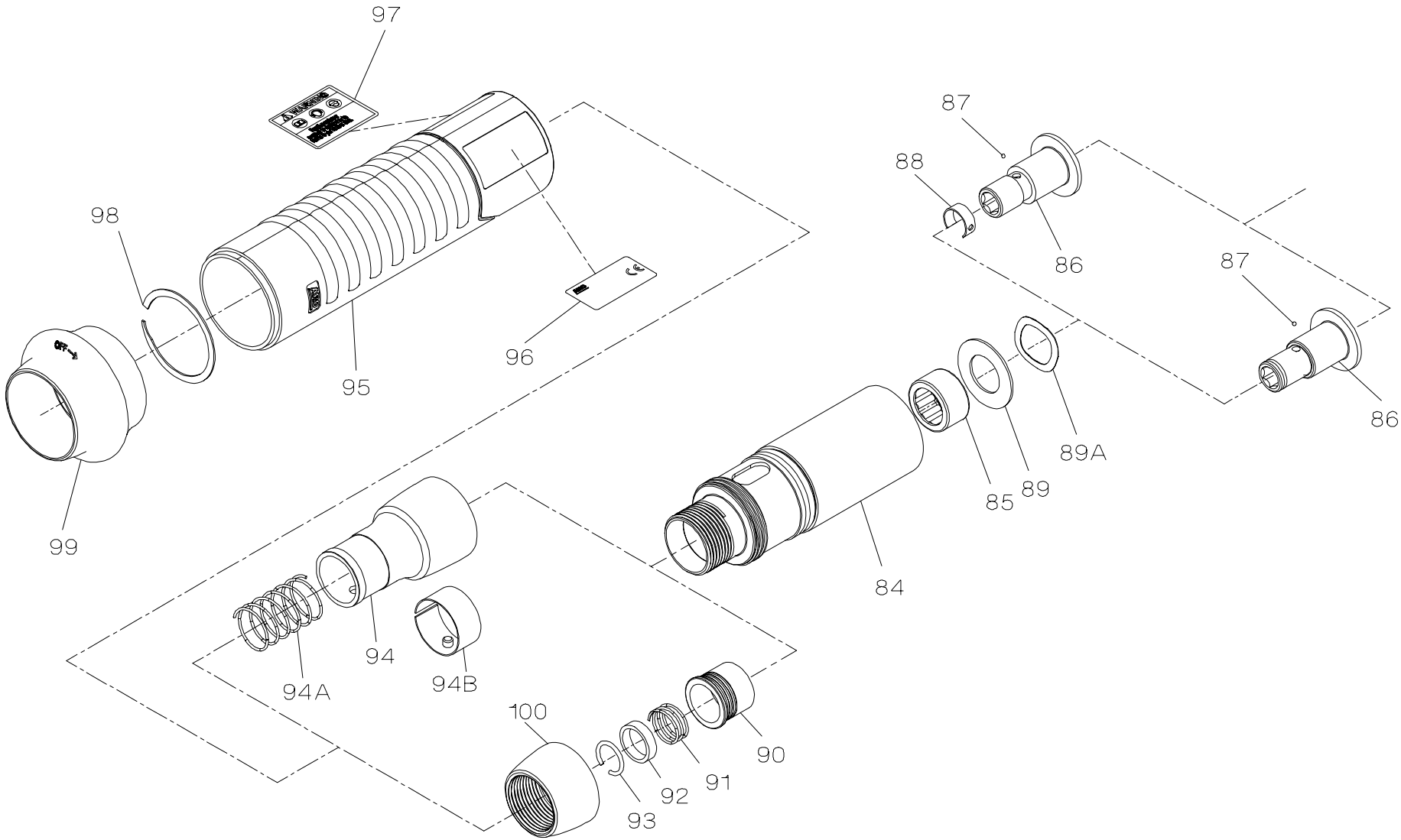
(Dwg. ATP34)

SERIES RL11 AND RL12 LEVER INLINE CLUTCHES

		PART NUMBER FOR ORDERING
	Automatic Shutoff Clutch Assembly	
	with heavy clutch spring (standard)	TRH-AH579
	with medium clutch spring	TRH-AM579
	with light clutch spring	TRH-AL579
45	Clutch Return Spring	TRH-405
46	Clutch Input Driver	TRH-103
47	Automatic Shutoff Plunger	TRH-408
48	Automatic Shutoff Plunger Return Spring	TRH-420
49	Automatic Shutoff Pin	TRH-704
50	Automatic Shutoff Pin Spring	TRH-407
51	Clutch Shaft	TRH-502
52	Clutch Ball (1/8" diameter) (12)	AV1-255
53	Cam Jaw	TRH-721
54	Clutch Cam Ball Driver	TRH-581
55	Clutch Cam Ball (1/4" diameter) (3)	4U-722
56	Clutch Driver Retaining Pin	TRH-188
57	Cam Ball Seat	TRH-627
58	Clutch Spring	
	heavy (green)	TRH-H583
	medium (red)	TRH-M583
	light (orange)	TRH-XL583
59	Spring Seat	TRH-623
60	Thrust Bearing	161A32-105
61	Clutch Adjusting Nut Washer	TRH-582
62	Clutch Adjusting Nut	TRH-588
63	Clutch Adjusting Nut Stop	3S3-701
	Cushion Clutch Assembly	
	with heavy clutch spring (standard)	TRH-AH579-C
	with medium clutch spring	TRH-AM579-C
	with light clutch spring	TRH-AL579-C

		PART NUMBER FOR ORDERING
64	Clutch Return Spring	TRH-405
65	Clutch Input Driver	TRH-103
66	Clutch Pushrod	TRH-236-C
67	Clutch Shaft	TRH-502
68	Clutch Ball (1/8" diameter) (12)	AV1-255
69	Cam Jaw	
	for Series RL11F, RL12F, RL11E, RL12E, RL11D and RL12D	TRH-721-C
	for Series RL11C, RL12C, RL11B, RL12B, RL11A and RL12A	TRH-722-C
70	Clutch Cam Ball Driver	TRH-581-C
71	Clutch Cam Ball (1/8" diameter) (11)	AV1-255
72	Clutch Cam Ball Driver Retaining Pin	TRH-188
73	Cam Ball Seat	TRH-627-C
74	Clutch Spring	
	heavy (green)	TRH-H583
	medium (red)	TRH-M583
	light (orange)	TRH-XL583
75	Spring Seat	TRH-623
76	Thrust Bearing	161A32-105
77	Clutch Adjusting Nut Washer	TRH-582
78	Clutch Adjusting Nut	TRH-588
79	Clutch Adjusting Nut Stop	3S3-701
80	Clutch Shaft (for Models with Direct Drive only)	TRH-786
81	Clutch Jaw	
	for Positive Clutch; 90° Angle	TRH-5899
	for Positive Clutch; 20° Angle	TRH-5892
82	Positive Jaw Spring	TRH-5878
83	Positive Jaw Adapter	
	for Positive Clutch; 90° Angle	TRH-A5879
	for Positive Clutch; 20° Angle	TRH-A5872

SERIES RL11 AND RL12 LEVER INLINE GRIP AND BIT DRIVERS



(Dwg. ATP35-1)

		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING
	Bit Holder Assembly		88	Bit Retaining Spring (for Bit Finder	
	with 1/4" Quick Release Bit Holder (for			Bit Holders)	TRH-241
	all Models with Lever Permit)	TRH-A580-PQ4	89	Shutoff Spacer (for all Models with	
	with 1/4" Quick Release Bit Holder (for			Lever Start only)	TRH-591
	all Models with Lever Start)	TRH-A580-NQ4	89A	Wave Washer (for all Models with	
	with 1/4" Bit Finder Bit Holder (for all			Lever Start only)	TRH-592
	Models with Lever Permit)	TAH-A580-PQ4F	90	Bit Retaining Sleeve (for Quick Release	
	with 1/4" Bit Finder Bit Holder (for all			Bit Holders)	TRH-930
	Models with Lever Start)	TAH-A580-NQ4F	91	Retaining Sleeve Spring (for Quick	
	with 5 mm Double End Quick Release			Release Bit Holders)	TRH-931
	Bit Holder (for all Models with		92	Spring Seat (for Quick Release Bit Holders)	TRH-244
	Lever Permit)	TRH-A580-PQ5MD	93	Retaining Ring (for Quick Release	
	with 5 mm Double End Quick Release			Bit Holders)	TRH-853
	Bit Holder (for all Models with		94	Non-Rotating Bit Finder (for Bit Finder	
	Lever Start)	TRH-A580-NQ5MD		Bit Holders)	TAH-873
	with 1/4" Double End Quick Release		94A	Spring (for Bit Finder Bit Holders)	102A60-242
	Bit Holder (for all Models with		94B	Finder Retaining Spring (for Bit Finder	
	Lever Permit)	TRH-A580-PQ4D		Bit Holders)	102A60-628
	with 1/4" Double End Quick Release		95	Housing Grip	TAH-40-A135
	Bit Holder (for all		96	Nameplate	TAH-301
	Models with Lever Start)	TRH-A580-NQ4D	97	Warning Label	TRH-99
84	Clutch Housing	TRH-580	98	Grip Retaining Ring	TRH-197
85	Clutch Housing Bearing	TRH-105	99	Clutch Adjusting Hole Cover	
86	Bit Holder			Cover with a flange (standard)	TAH-40-23
	for 1/4" Quick Release Bit Holder	TRH-586-H4		Cover without a flange (optional)	TAH-40-24
	for 1/4" Bit Finder Bit Holder	TRH-583-Q4	100	Clutch Housing Cap (for Quick	
	for 5 mm Double End Quick Release			Release Holders)	TAH-19
	Bit Holder	TRH-586-5MD	*	Clutch Housing Spanner Wrench	TRH-478
	for 1/4" Double End Quick Release				
	Bit Holder	TRH-586-Q4D			
87	Bit Retaining Ball				
	for metric Bit Holders	TRH-629-3M			
	for all other Bit Holders	R000B-263			

* Not illustrated.

CLUTCH SPRING SELECTION CHART

Tool	Free Speed (rpm)	TORQUE RANGE (Soft Draw)		
		Light Clutch Spring (Orange)	Medium Clutch Spring (Red)	Heavy Clutch Spring (Green)
All Series RL Inline Screwdrivers	2800	1.7 to 9.7 in-lbs. (0.19 to 1.1 Nm)	---------- ----------	---------- ----------
	2000	1.7 to 9.7 in-lbs. (0.19 to 1.1 Nm)	7.9 to 22.1 in-lbs. (0.89 to 2.50 Nm)	---------- ----------
	1500	1.7 to 9.7 in-lbs. (0.19 to 1.1 Nm)	7.9 to 27.3 in-lbs. (0.89 to 3.08 Nm)	---------- ----------
	1000	1.7 to 9.7 in-lbs. (0.19 to 1.1 Nm)	7.9 to 27.3 in-lbs. (0.89 to 3.08 Nm)	13.3 to 40.0 in-lbs. (1.50 to 4.52 Nm)
	500	1.7 to 9.7 in-lbs. (0.19 to 1.1 Nm)	7.9 to 28.3 in-lbs. (0.89 to 3.20 Nm)	13.3 to 47.8 in-lbs. (1.50 to 5.40 Nm)
	250	1.7 to 9.7 in-lbs. (0.19 to 1.1 Nm)	7.9 to 28.3 in-lbs. (0.89 to 3.20 Nm)	13.3 to 47.8 in-lbs. (1.50 to 5.40 Nm)

MAINTENANCE SECTION

⚠ WARNING

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

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

LUBRICATION

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

1. Coat all exposed gears with IRAX No. 67 Grease and work some of the Grease into the gearing of the Spindle Assembly (41).
2. Work approximately 6 to 8 cc of IRAX No. 28 Grease into the ball pockets, jaws, adjusting nut lock and shaft threads of the clutch mechanism.
3. Use IRAX No. 10 Oil to lubricate the motor. Inject approximately 1 to 2 cc of oil into the air inlet before attaching the air hose to the tool.

SPEED ADJUSTMENT

In addition to adjustable clutches for controlling torque, Series RL Lever Inline Screwdrivers are furnished with the ability to precisely control speed, within certain ranges. Setting the speed requires a tachometer. Therefore, the adjustment, although simple, should only be attempted by a competent technician using the proper equipment.

The Back Cap (6) has a small, molded stud on the end face of the Cap nearest the Exhaust Diffuser (14). That stud controls the radial location of the Diffuser which controls the opening size of the exhaust ports. Take an initial reading of the tool speed by applying a tachometer with a convex tip to the inside of the Bit Holder (86). Using the procedure required to activate the motor of your particular model tool, bring the motor to maximum free speed.

After determining the actual velocity, shut off the air supply and disconnect the air line. Use a 3/4" wrench to loosen the Inlet Bushing. The longest slot in the Exhaust Diffuser will contain the molded stud on the Back Cap. Rotate the Diffuser to open the exhaust ports to increase speed or rotate it to restrict the exhaust to reduce speed. Being careful not to allow the Diffuser to damage the molded stud, tighten the Inlet Bushing to 15 ft-lbs. (20 Nm) torque. Connect the air line and restore the air supply and check the velocity again. Determine which direction you need to rotate the Diffuser to obtain the desired speed and then rotate it accordingly. Best results are achieved by using gradual increments and frequent tachometer readings. Be sure to turn off the air supply and disconnect the line when making adjustments.

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 vice 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 gaskets and o-rings for replacement.

Disassembly of the Tool

Each Series RL Lever Inline Screwdriver is made using four modules or units which include a motor housing unit, a motor unit, a clutch with bit holder unit and a combined gearing with spindle unit. The tool can be disassembled for repairs to each individual unit without disturbing the other units. To separate the modules, proceed as follows:

NOTICE

The thread in the following step is a left hand thread. Rotate the Bit Finder or Housing Cap clockwise to remove it.

1. **For models with Bit Finder Bit Holders,** unscrew and remove the Non-Rotating Bit Finder (94).
   For models with Quick Release Bit Holders, unscrew and remove the Clutch Housing Cap (100). Use a thin blade screwdriver to spiral the Retaining Ring (93) out of the groove in the end of the Bit Holder (86). Being careful not to loose the Bit Retaining Ball (87), slide the Spring Seat (92), Retaining Sleeve Spring (91) and the Bit Retaining Sleeve (90) off the Bit Holder.

NOTICE

The thread in the following step is a left hand thread. Rotate the Cover clockwise to remove it.

2. Unscrew and remove the Clutch Adjusting Hole Cover (99). There are two sets of threads with a non-threaded section between them on the Clutch Housing (84).
3. Using external retaining ring pliers or a thin blade screwdriver, remove the Grip Retaining Ring (98) from the groove in the Clutch Housing.
4. Pull the Housing Grip (95) of the front end of the tool.

NOTICE

The thread in the following step is a left hand thread. Rotate the Clutch Housing clockwise to remove it.

5. Clamp the Inlet Bushing (15) in leather-covered or copper-covered vise jaws and using a 1-1/16" wrench on the flats of the Gear Case (42) and the Clutch Housing Spanner Wrench (Part No. TRH-478) in the clutch housing slot, unscrew and remove the Clutch Housing.
6. Push on the output end of the Bit Holder (86) to remove it from the Clutch Housing (84).
7. **For Models with Lever Start,** slide the Shutoff Spacer (89) and Wave Washer (89A) off the Bit Holder.
8. If the Clutch Housing Bearing (85) is worn and must be replaced, press it from the Clutch Housing.
9. **For Models with a Shutoff Clutch**, carefully remove the Clutch Assembly, the Clutch Input Driver (46) and the Clutch Return Spring (45).
   For Models with a Cushion Clutch, carefully remove the Clutch Assembly, the Clutch Input Driver (65), the Clutch Return Spring (64) and the Push Rod (66).
   For Models with a Positive Jaw Clutch, remove the Clutch Jaw (81), the Positive Jaw Spring (82) and the Positive Jaw Adapter (83).
   For Models with Direct Drive, remove the Clutch Shaft (80).
10. Lightly grasp the flats of the Gear Case in leather-covered or copper-covered vise jaws with the Inlet Bushing upward.
11. Place a 1-3/16" open end wrench on the flats of the Back Cap (6) to prevent it from rotating, and use a 3/4" wrench to unscrew and remove the Inlet Bushing.
12. Lift the Exhaust Diffuser (14) off the Back Cap.
13. If the Throttle Valve Spring (13) did not come out of the tool with the Inlet Bushing, use needle nose pliers to remove it and the Throttle Valve (12) from the Motor Housing (1).
14. To remove the Throttle Valve Seat (11), insert a hooked tool through the central opening of the Seat and pull it from the Motor Housing.
15. Using a 1/16" pilot punch, tap the Throttle Lever Pin (10) out of the Back Cap and remove the Throttle Lever (9).
16. Pull the Throttle Plunger (5) out of the Motor Housing and remove the assembly from the vise.
17. Holding the assembly horizontally, remove the Back Cap, the Back Cap Gasket (7) and the Shutoff Valve (19) (if included with the tool).
18. If the Muffler Elements (8) need to be cleaned or replaced, pull them out of the Back Cap.
19. Grasp the flats at the inlet end of the Motor Housing in leather-covered or copper-covered vise jaws, and using a 1-1/16" wrench on the flats of the Motor Housing, unscrew and separate the Gear Case from the Motor Housing.
20. Set the assembled Gear Case on the workbench.
21. Remove the Motor Clamp Washer (32) and the Motor Seal (31) from the assembled motor in the Housing.
22. Tap the Motor Housing on a wood block to remove the Motor Assembly from the Housing.

Disassembly of the Adjustable Shutoff Clutch

1. Using a thin blade screwdriver, pry the Clutch Adjusting Nut Stop (63) off the end of the Clutch Shaft (51).

2. Insert the tip of a #1 Phillips Head Screwdriver into the adjustment opening between the Clutch Adjusting Nut (62) and the Clutch Adjusting Nut Washer (61). Rotate the screwdriver clockwise to thread the Adjustment Nut off the Clutch Shaft.

NOTICE

In the following step, the Clutch Cam Balls will be free to fall from the assembly when the Cam Ball Seat is moved. Make certain the Balls fall into a non-damaging container.

3. Holding the assembly over a small pasteboard box, slide the Adjusting Nut Washer, the Thrust Bearing (60), the Spring Seat (59), the Clutch Spring (58) and the Cam Ball Seat (57) off the Clutch Shaft. Allow the three Clutch Cam Balls (55) to fall into the pasteboard box.
4. The Clutch Cam Ball Driver (54) has a cross hole that is larger on one side than the other. Insert a 1/16" drill shank or piece of wire into the smaller hole and gently push the Clutch Driver Retaining Pin (56) out of the larger hole and out of the Driver and the Clutch Shaft.

NOTICE

In the following step, the Clutch Balls will be free to fall from the assembly when the Cam Jaw is moved along the Clutch Shaft. Make certain the Balls fall into a non-damaging container.

5. Holding the assembly over a small pasteboard box, and using care to drop the twelve Clutch Balls (52) into the box, slide the Clutch Cam Ball Driver and Cam Jaw (53) off the Clutch Shaft. If grease held some of the Balls inside the jaw cavity, remove them.
6. With the large end of the Clutch Shaft downward, depress the Automatic Shutoff Pin (49) with varying amounts of finger pressure while tapping the large end edge of the Clutch Shaft on a piece of wood until the Automatic Shutoff Plunger (47) protrudes slightly from the end of the Shaft. Grasp the Plunger and carefully pull it out of the Clutch Shaft.
7. Remove the Automatic Shutoff Pin and Automatic Shutoff Pin Spring (50) from the Clutch Shaft. The Pin Spring should remain in the pin recess when the Pin is removed. To separate the Spring from the Pin, gently rotate the Spring while pulling it from the recess to avoid elongating the Spring.
8. Using a hooked tool, reach into the opening in the end of the Clutch Shaft and carefully pull the Automatic Shutoff Plunger Return Spring (48) out of the Shaft without elongating the Spring.

Disassembly of the Adjustable Cushion Clutch

1. Using a thin blade screwdriver, pry the Clutch Adjusting Nut Stop (79) off the end of the Clutch Shaft (67).
2. Insert the tip of a #1 Phillips Head Screwdriver into the adjustment opening between the Clutch Adjusting Nut (78) and the Clutch Adjusting Nut Washer (77). Rotate the screwdriver clockwise to thread the Adjustment Nut off the Clutch Shaft.

NOTICE

In the following step, the Clutch Cam Balls will be free to fall from the assembly when the Cam Ball Seat is moved. Make certain the Balls fall into a non-damaging container.

3. Holding the assembly over a small pasteboard box, slide the Adjusting Nut Washer, the Thrust Bearing (76), the Spring Seat (75), the Clutch Spring (74) and the Cam Ball Seat (73) off the Clutch Shaft. Allow the eleven Clutch Cam Balls (71) to fall into the pasteboard box.
4. The Clutch Cam Ball Driver (70) has a cross hole that is larger on one side than the other. Insert a 1/16" drill shank or piece of wire into the smaller hole and gently push the Clutch Driver Retaining Pin (72) out of the larger hole and out of the Driver and the Clutch Shaft.

NOTICE

In the following step, the Clutch Balls will be free to fall from the assembly when the Cam Jaw is moved along the Clutch Shaft. Make certain the Balls fall into a non-damaging container.

5. Holding the assembly over a small pasteboard box, and using care to drop the twelve Clutch Balls (68) into the box, slide the Clutch Cam Ball Driver and Cam Jaw (69) off the Clutch Shaft. If grease held some of the Balls inside the jaw cavity, remove them.

Disassembly of the Gearing

1. Using snap ring pliers, remove the Gear Retainer (34) from the motor end of the Gear Case (42) and remove the Gear Head Spacer (35) as well.
2. **For Series RL11F, RL12F, RL11E, RL12E, RL11D and RL12D**, lightly rap the motor end of the Gear Case on a wooden work bench top to remove the three Planet Gears (38), the Planet Gear Head Assembly (37) and the Planet Gear Head Spacer (40).
   For Series RL11C, RL12C, RL11B and RL12B, lightly rap the motor end of the Gear Case on a wooden work bench top to remove the three Planet Gears (38), The Gear Head Pinion (39), the Planet Gear Head Assembly (37) and the Planet Gear Head Spacer (40).
   For Series RL11A and RL12A, lightly rap the motor end of the Gear Case on a wooden work bench top to remove the Planet Gear Head Drive Plate (36), the Planet Gear Head Assembly (37) and the Planet Gear Head Spacer (40).
3. Using snap ring pliers, remove the Spindle Bearing Retaining Ring (44).
4. Stand the Gear Case on the table of an arbor press with the output spindle upward. Using a rod that neatly fits inside the internal hex of the Spindle (41), press the Spindle Assembly out of the Spindle Bearing (43).

CAUTION

Do not remove the Bearing in the following step unless you have a new replacement available for installation. The Bearing will be damaged by the removal process.

5. Invert the Gear Case on the table of an arbor press so that the end face having four notches makes contact with the table. Using a rod against the inner race of the Spindle Bearing, press the Bearing from the Gear Case.
6. If the Spindle Bearing Seat (45) must be replaced, use a small, thin blade screwdriver to spiral it out of the groove in the Gear Case.

Disassembly of the Motor

1. Using snap ring pliers, remove the Rear End Plate Assembly Retainer (22) from the shaft of the Rotor (26).
2. Pull the Rear End Plate Face Plate (21) and Rear End Plate Assembly (20) off the hub of the Rotor.
3. Lift the Cylinder (23) from the Rotor.
4. Remove the Vanes (27) from the Rotor.
5. Support the Front End Plate Assembly (28), as near the rotor body as possible, on the table of an arbor press and press the Rotor from the Front Rotor Bearing (30). Remove the Bearing from the Front End Plate.

Disassembly of the Housing

1. Pull the Reverse Lever (18) off the inlet end of the Motor Housing (1).
2. Using a #2 Phillips Head Screwdriver, unscrew and remove the Housing Screw (3).
3. Insert a 5/16" wooden dowel between 6 and 8 inches long, into the inlet end of the Motor Housing and push the Reverse Valve Assembly (4) out the motor end of the Housing.
4. Use a hooked tool to pull the Housing O-ring (2) out of the Motor Housing.

ASSEMBLY

General Instructions

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

Assembly of the Housing

1. Lubricate the Housing O-ring (2) with o-ring lubricant and install it at the bottom of the cylinder bore in the Motor Housing (1).
2. Inspect the face and o-ring on the hub of the Reverse Valve Assembly (4) for nicks or damage. Replace the Reverse Valve Assembly if any damage is evident.
3. Lubricate the o-ring on the hub of the Reverse Valve Assembly with o-ring lubricant and insert the Assembly, o-ring end leading, into the cylinder bore of the Motor Housing. Push the Assembly toward the bottom of the cylinder bore until it "snaps" into its proper location.
4. Rotate the Valve inside the Housing until the threaded hole into the side of the Valve for the Motor Housing Screw (3) aligns with the hole in the Motor Housing.
5. Using a #2 Phillips Head Screwdriver, thread the Motor Housing Screw into the Reverse Valve Assembly through the Housing until the underside of the screw head stops against the Housing. Back the Screw out of the Valve between 1/4 and 1/2 turn.
6. Align the open end of the slot inside the Reverse Lever (18) with the head of the Housing Screw. From the inlet end of the Housing, slide the Lever onto the Housing, making certain the screw head enters the slot, and move it along the Housing until it stops against the housing shoulder.
7. Rotate the Lever to make certain the Valve only has slight resistance.

Assembly of the Motor

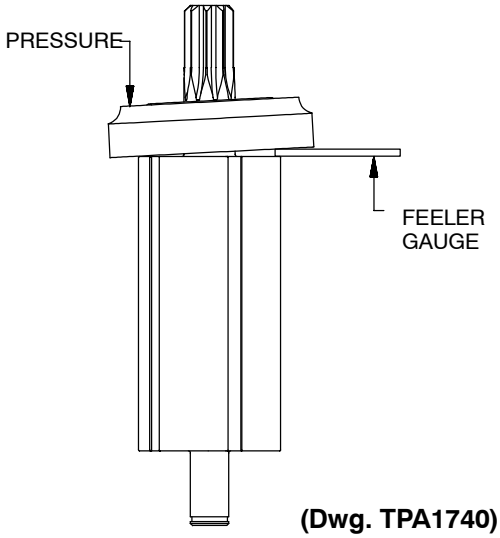
1. Place the Front End Plate (28) on the splined shaft of the Rotor (26) with the bearing recess away from the rotor body.
2. Place the Front Rotor Bearing (30) onto the shaft and using a sleeve or piece of tubing that contacts the inner race of the Bearing, press the Bearing onto the shaft until the Front End Plate nearly contacts the rotor body.

NOTICE

In the following step, the measurement must be made at the end corner of the large rotor body.

3. The clearance between the Front End Plate and Rotor is critical. While pressing down with your finger on the outer edge of the Front End Plate on the bearing side, insert a 0.004" (0.1 mm) feeler gauge between the face of the rotor body and the face of the End Plate at a point that is 180 degrees from where the pressure is applied. Refer to Dwg. TPA1740. To increase the gap, support the End Plate and lightly tap the rotor shaft with a plastic hammer; to decrease the gap, press the Bearing farther onto the rotor shaft.

Measurement of Front End Plate Clearance



(Dwg. TPA1740)

4. Wipe each Vane (27) with a light film of IRAX No.10 Oil and place a Vane in each slot in the Rotor.
5. One end of the Cylinder Assembly (23) has a notch that breaks the outer wall and end face of the Cylinder. With that end trailing, install the Cylinder Assembly over the Rotor and Vanes against the Front End Plate. Make certain the Cylinder Front Alignment Pin (25) enters the hole in the Front End Plate.
6. Install the Rear End Plate Assembly (20), flat face leading, on the rear hub of the Rotor. Make certain the Cylinder Rear Alignment Pin (24) enters the hole in the Rear End Plate.
7. Examine the Rear End Plate Face Plate (21) for scratches. If it is scratched, replace it. If it is not, slide it onto the rear hub of the Rotor and onto the Cylinder Rear Alignment Pin against the Rear End Plate. Some pressure may be required to fit the hole in the Plate onto the Alignment Pin.
8. Using snap ring pliers, install the Rear End Plate Assembly Retainer (22) in the annular groove on the rear rotor hub to secure the assembly in position.
9. Set the assembled motor aside.

Assembly of the Gearing

1. Using a small screwdriver, work the Spindle Bearing Seat (45) into the internal groove nearest the notched end of the Gear Case (42).
2. Stand the Gear Case, notched end upward, on the table of an arbor press. Using a piece of tubing that contacts the outer race of the Spindle Bearing (43), press a new Bearing into the Gear Case against the Seat.
3. Lubricate the gears in the Spindle Assembly (41) with IRAX No. 67 Grease.
4. Invert the Gear Case and using another piece of tubing that supports the inner race of the Bearing and clears the output end of the Spindle Assembly, press the Spindle Assembly into the Bearing from the motor end of the Gear Case.
5. Using snap ring pliers, install the Spindle Bearing Retaining Ring (44) in the external groove near the driver end of the spindle.
6. Lightly lubricate the Planet Gear Head Spacer (40) with IRAX No. 67 Grease and install it in the Gear Case against the Spindle Assembly.
7. Lubricate the shafts of the Planet Gear Head Assembly (37) with IRAX No. 67 Grease and install the Gear Head in the Gear Case meshing the spline on the shaft with the gear teeth in the Spindle Assembly.
8. **For Series RL11F, RL12F, RL11E, RL12E, RL11D and RL12D,** lubricate the Planet Gears (38) with IRAX No. 67 Grease and install them on the shafts of the Planet Gear Frame Assembly.
   For Series RL11C, RL12C, RL11B and RL12B, lubricate the Planet Gears (38) and Gear Head Pinion (39) with IRAX No. 67 Grease and install the Planet Gears on the shafts of the Planet Gear Frame Assembly. Insert the Gear Head Pinion in the center of the Planet Gears making certain the teeth mesh.
   For Series RL11A and RL12A, lubricate the Planet Gear Head Drive Plate (36) with IRAX No. 67 Grease and install it on the shafts of the Planet Gear Frame Assembly.
9. Install the Gear Head Spacer (35) against the Gears or Drive Plate and secure the assembly by using snap ring pliers to install the Gear Retainer (34) in the internal groove at the motor end of the Gear Case.

Assembly of the Adjustable Cushion Clutch

1. Insert the small end of the Clutch Shaft (67) into the end of the Cam Jaw (69) having the large opening and slide the Shaft about half way into the Jaw.
2. Drop the twelve Clutch Balls (68) into the Cam Jaw forming a ring around the Clutch Shaft.
3. Lay a bead of IRAX No. 28 Grease, approximately 2 to 3 cc, on top of the Clutch Balls and then bring the Clutch Shaft and Cam Jaw together capturing the Balls between them.
4. While holding the Shaft and Jaw together, slide the Clutch Cam Ball Driver (70), large end leading, onto the Clutch Shaft until it is against the Cam Jaw.

5. Rotate the Driver to align the large hole through one wall of the Driver with the comparable size opening of the cross hole through the Clutch Shaft. Push the Clutch Cam Ball Driver Retaining Pin (72) into the hole to lock the Driver in position on the Clutch Shaft.
6. Apply a coating of IRAX No. 28 Grease to each of the eleven Clutch Cam Balls (71).
7. Holding the assembled Clutch Shaft with the Clutch Cam Ball Driver upward, insert a lubricated Ball into each of the eleven ball pockets in the Driver.
8. Slide the Cam Ball Seat (73), large end leading, onto the Shaft against the Balls. Follow with the Clutch Spring (74), Spring Seat (75), Thrust Bearing (76) and the Clutch Adjusting Nut Washer (77) with the smooth face leading.
9. Thread the Clutch Adjusting Nut (78), smooth face trailing, onto the Clutch Shaft.
10. Insert the tip of a #1 Phillips Head Screwdriver into the adjustment opening between the Clutch Adjusting Nut and the Clutch Adjusting Nut Washer. Rotate the screwdriver counterclockwise and thread the Adjustment Nut onto the Clutch Shaft until the external groove for the Clutch Adjusting Nut Stop (79) is visible.
11. Install the Nut Stop in the groove.

Assembly of the Adjustable Shutoff Clutch

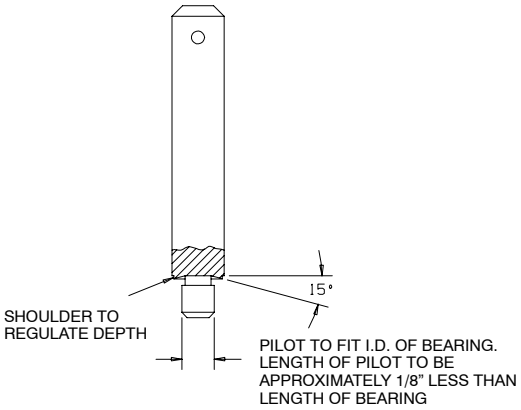
1. Hold the Clutch Shaft (51) in your hand with the large end upward.
2. Insert the Automatic Shutoff Plunger Return Spring (48) into the central opening in the large end of the Clutch Shaft. Use a 1/8" dowel to push the Spring below the cross hole for the Automatic Shutoff Pin (49).
3. Insert the Automatic Shutoff Pin Spring (50) in the end hole of the Automatic Shutoff Pin opposite the pointed end. Rotate the Spring a little to keep it in the hole.
4. Drip one or two drops of IRAX No. 10 Oil into the central hole with the Plunger Return Spring.
5. Position the Shutoff Pin, Spring leading, in the cross hole on the large end of the Clutch Shaft with the hole in the Shutoff Pin aligned with the central hole containing the Return Spring.
6. Push on the pointed end of the Shutoff Pin to depress the Spring while inserting the Automatic Shutoff Plunger (47) into the central opening with the Return Spring. The smaller center portion of the Shutoff Plunger will allow the Shutoff Pin to spring outward and capture the components within the Clutch Shaft when properly positioned.
7. Insert the small end of the Clutch Shaft into the end of the Cam Jaw (53) having the large opening and slide the Shaft about half way into the Jaw.
8. Drop the twelve Clutch Balls (52) into the Cam Jaw forming a ring around the Clutch Shaft.
9. Lay a bead of IRAX No. 28 Grease, approximately 2 to 3 cc, on top of the Clutch Balls and then bring the Clutch Shaft and Cam Jaw together capturing the Balls between them.
10. While holding the Shaft and Jaw together, slide the Clutch Cam Ball Driver (54), large end leading, onto the Clutch Shaft until it is against the Cam Jaw.
11. Rotate the Driver to align the large hole through one wall of the Driver with the comparable size opening of the cross hole through the Clutch Shaft. Push the Clutch Cam Ball Driver Retaining Pin (56) into the hole to lock the Driver in position on the Clutch Shaft.
12. Apply a coating of IRAX No. 28 Grease to each of the three Clutch Cam Balls (55).
13. Holding the assembled Clutch Shaft with the Clutch Cam Ball Driver upward, insert a lubricated Ball into each of the three ball slots in the Driver.
14. Slide the Cam Ball Seat (57), large end leading, onto the Shaft against the Balls. Follow with the Clutch Spring (58), Spring Seat (59), Thrust Bearing (60) and the Clutch Adjusting Nut Washer (61) with the smooth face leading.
15. Thread the Clutch Adjusting Nut (62), smooth face trailing, onto the Clutch Shaft.
16. Insert the tip of a #1 Phillips Head Screwdriver into the adjustment opening between the Clutch Adjusting Nut and the Clutch Adjusting Nut Washer. Rotate the screwdriver counterclockwise and thread the Adjustment Nut onto the Clutch Shaft until the external groove for the Clutch Adjusting Nut Stop (63) is visible.
17. Install the Nut Stop in the groove.

Assembly of the Tool

1. Lightly grasp the flats at the inlet end of the Motor Housing (1) in leather-covered or copper-covered vise jaws with the motor bore upward.
2. Grasp the spline of the Rotor (26) in the assembled motor and after aligning the End Plate Alignment Pin (29) with the internal notch in the motor end of the housing bore, insert the assembled motor into the Motor Housing. Make certain the motor is far enough into the Housing to have the undercut below the internal housing thread visible.
3. Lubricate the Motor Seal (31) with o-ring lubricant and install it around the Front End Plate (28) and into the undercut in the Housing.
4. Align the tab of the Motor Clamp Washer (32) with the internal notch in the Housing and install it over the rotor hub and End Plate Alignment Pin against the Motor Seal. Make certain the Pin enters the hole in the Washer and the Washer is flat against the Seal.
5. Apply some IRAX No. 67 Grease to the spline on the rotor shaft.
6. Thread the assembled Gear Case (42), output spindle trailing, into the Motor Housing and using a 1-1/16" wrench, tighten the joint between 15 and 20 ft-lbs. (20 and 27 Nm) torque.
7. **For Models with a Cushion Clutch or Shutoff Clutch,** place the narrow end of the Clutch Return Spring (45 or 64) in the Gear Case against the inner race of the Spindle Bearing (43).

8. **For Models with a Shutoff Clutch or Cushion Clutch,** place the hex drive end of the Clutch Input Driver (46 or 65) on the Spring and compress the Spring until the hex on the Driver enters the hex recess in the Sprindle Assembly (41),
   For Models with a Positive Jaw Clutch, insert the hex of the Clutch Jaw (81) into the hex recess in the Spindle Assembly (41). Insert the Positive Jaw Spring (82) followed by the round shaft of the Positive Jaw Adapter (83) into the central opening of the Clutch Jaw.
   For Models with Direct Drive, insert the hex end of the Clutch Shaft (80) that does not have the step, into the hex recess of the Spindle Assembly (41).
9. If the Clutch Housing Bearing (85) was removed, stand the Clutch Housing (84) on the table of an arbor press with the smaller, externally threaded end downward.
10. Using a Needle Bearing Inserting Tool as shown in Dwg. TPD786 with a 0.030" (0.76 mm) thick washer that clears the inner bore and outer edge of the Bearing inserted between the Bearing and stop surface on the tool, press the Bearing into the Clutch Housing. The trailing end of the Bearing must be between 0.025" and 0.035" (0.63 and 0.89 mm) below the face of the bore into which the Bearing is pressed.

Needle Bearing Inserting Tool



(Dwg. TPD786)

11. **For Models with Lever Start,** slide the Wave Washer (89A) followed by the Shutoff Spacer (89) onto the hub of the Bit Holder (86) and insert the Bit Holder into the large end of the Clutch Housing (84) and push the output end through the Clutch Housing Bearing.
    For Models with Lever Permit, insert the Bit Holder (86) into the large end of the Clutch Housing (84) and push the output end through the Clutch Housing Bearing.

NOTICE

The following step has parts with a left-hand thread. Rotate the components counterclockwise to tighten them.

12. Install the assembled Clutch Housing over the clutch components and thread it onto the Gear Case. Using a 1-1/16" wrench on the flats of the Gear Case and the Clutch Housing Spanner Wrench (Part No. TRH-478) in the clutch housing slot, tighten the joint between 15 and 20 ft-lbs. (20 and 27 Nm) torque.
13. Invert the assembled tool in the vise jaws and lightly grasp the flats on the Gear Case with the inlet end of the tool upward.
14. Insert a 5/8" dowel through the opening in the Back Cap (6), and using the dowel as an alignment device, install the three Muffler Elements (8) in the cavity of the Back Cap. Make certain the notches in the outer edge of the Elements fit over the pocket in the bottom of the Cap.
15. Make certain the tab on the inside edge of the Back Cap Gasket (7) is aligned with the pocket and install the Gasket, metal face leading, in the recess of the Back Cap against the face with the cavity containing the Muffler Elements.
16. Position the gasket end of the alignment dowel against the inlet hub on the Motor Housing. Align the flats on the Cap with the flats on the Housing. Orient the Back Cap to clear the Reverse Lever (18) and slide the Back Cap Assembly off the alignment dowel and onto the Motor Housing.
17. **For all Models with a Shutoff Clutch and Lever Permit Models with a Cushion Clutch,** install the Push Rod (33) into the central hole in the inlet hub. The Rod will enter the assembled motor and disappear from view when released. Install the Shutoff Valve (19), small end first, in the same opening.
18. Being careful not to damage it, insert the Throttle Valve Seat (11) into the central opening at the inlet end of the Motor Housing at an angle until it clears the threads in the Housing. Using a rod with a flat end and no sharp edges, push the Seat to the bottom of the opening until it seats flush.
19. Using needle nose pliers, insert the Throttle Valve (12), long stem leading, into the opening against the Seat. Center the Valve in the Seat.
20. Install the Throttle Valve Spring (13) in the opening so that it encircles the Valve.
21. The Exhaust Diffuser (14) has one slot that is longer than the other five slots. The Back Cap has a short, molded stud projecting from the inlet end. Place the Exhaust Diffuser against the Back Cap with the long slot encircling the molded stud. Rotate the Diffuser counterclockwise until the wall of the slot stops against the stud. The exhaust ports are now in the full open position which will provide maximum free speed.
22. If the Inlet Screen (17) required replacement, use a wooden dowel to carefully push a new one into the Inlet Bushing (15).

23. If the Inlet Bushing Seal (16) is nicked or damaged, carefully install a new one over the threads of the Inlet Bushing.
24. Thread the Inlet Bushing Assembly through the Diffuser and Back Cap into the Motor Housing. Using a 1-3/16" wrench on the flats of the Back Cap to keep it from turning, tighten the Inlet Bushing between 15 and 20 ft-lbs. (20 and 27 Nm) torque.
25. The Throttle Plunger (5) has a lengthwise flat on the outer edge at one end of the Plunger. Insert the Plunger, flat end first, into the cross hole in the Housing. Push on the end of the Plunger to make certain it springs back from contact with the stem of the Throttle Valve.
26. Position the Throttle Lever (9) in the slot in the Back Cap and Motor Housing and using a 1/16" diameter rod, align the holes through the Back Cap, Motor Housing and Throttle Lever. While maintaining alignment, install the Throttle Lever Pin (10) in place of the rod by tapping it through all three pieces.
27. Remove the tool from the vise jaws and install the Housing Grip (95) over the Clutch Housing.
28. Install the Grip Retaining Ring (98) in the external groove on the Clutch Housing ahead of the Grip to retain the Grip on the Housing.
29. **For Models with Quick Release Bit Holders,** place the Bit Retaining Ball (87) in the hole through the wall of the Bit Holder and slide the Bit Retaining Sleeve (90), large end trailing, onto the Bit Holder. Slide the Retaining Sleeve Spring (91) and Spring Seat (92) onto the Bit Holder and secure the components by installing the Retaining Ring (93) in the external groove at the output end of the Bit Holder.

NOTICE

The thread in the following step is a left-hand thread. Rotate the component counterclockwise to tighten it.

30. Thread the Clutch Adjusting Hole Cover (99) onto the Clutch Housing against the Housing Grip and hand tighten it between 2 and 6 ft-lbs. (3 and 8 Nm) torque.

NOTICE

The following step has parts with a left-hand thread. Rotate the components counterclockwise to tighten them.

31. Thread the Non-Rotating Bit Finder (94) or Clutch Housing Cap (100) onto the Clutch Housing and hand tighten it between 2 and 6 ft-lbs. (3 and 8 Nm) torque.

TESTING THE TOOL

Before placing the tool back in service, test the tool in a run down application to determine if adjustments are necessary to satisfactorily perform the operation. Since five interrelated adjustments can affect tool performance, only experience, along with trial and error, can dictate which adjustment or combination of adjustments will provide the desired results.

The Clutch Spring (58 or 74), the clutch adjustment procedure, the exhaust flow, the length of the Push Rod (33) and the length of the Shutoff Valve (19) can individually or collectively have an effect on torque and/or speed. Always try to make adjustments before replacing or attempting to modify components.

If adjustments are unable to provide the desired torque, it may be necessary to install a lighter or heavier Clutch Spring.

If the tool ratchets when operated but fails to shutoff, it may be necessary to shorten the Push Rod. Only shorten the Push Rod in small increments. Increments between 0.005" and 0.010" (0.13 and 0.25 mm) are recommended.

If the tool stalls and does not shutoff, runs slower than normal or has low power, the Shutoff Valve may require lengthening. To lengthen the Shutoff Valve, grasp the stem between two pieces of rubber or other non-slip, non-marring material and rotate the molded nut counterclockwise. Rotating the nut one half revolution will lengthen the Valve approximately 0.009" (0.23 mm). **Should the stem of the Valve become bent, marred, nicked or damaged in any way during the adjustment process, replace it.**

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	Clean the Inlet Bushing Screen using a clean, suitable cleaning solution. If the Screen cannot be cleaned, replace it.
	Worn or broken Vanes	Replace a **complete** set of Vanes.
	Worn or broken Cylinder	Replace the Cylinder if it is cracked or if the bore appears wavy or scored.
	Exhaust control restricted	Make certain the Exhaust Diffuser against the Back Cap is in the fully open position.
	Shutoff Valve too short	Lengthen the Shutoff Valve. Refer to **TESTING THE TOOL** on page 31.
Motor won't run	Motor Clamp Washer binding	Remove the Gear Case make certain the Washer is flat and the Motor Seal is properly positioned.
	Gears binding	Clean and inspect all gearing. Replace any worn or damaged gearing.
	Push Rod worn	Install a new Push Rod.
Gear Case gets hot	Excessive grease	Clean and inspect Gear Case and gearing parts and lubricate as instructed.
	Worn or damaged parts	Clean and inspect the gear Case and Gearing. Replace worn or broken components.
Inconsistent disengagement of the Adjustable Clutch	Improper lubrication	Remove the Adjustable Clutch mechanism and examine the parts. Lubricate as instructed.
	Wrong Clutch Spring (using Heavy Clutch Spring on light torque application)	Change to Medium or Light Clutch Spring.
Motor stalls before Adjustable Clutch ratchets	Improper Clutch adjustment or improper tool ratio for application	Check Clutch Adjustment and review tool performance vs. requirements.
	Low pressure at the inlet	Check the air supply. For top performance, the air pressure must be 90 psig (6.2bar/620kPa) at the inlet.
	Insufficient grease	Lubricate the Clutch as instructed.
	Improper exhaust control adjustment	Adjust the exhaust flow to obtain the desired speed.
Tool ratchets before shutoff	Push Rod too long	Shorten the push Rod. Refer to **TESTING THE TOOL** on page 31.
Tool stalls without shutting off	Shutoff Valve too short	Lengthen the Shutoff Valve. Refer to **TESTING THE TOOL** on page 31.
Too runs slower than normal	Shutoff Valve too short	Lengthen the Shutoff Valve. Refer to **TESTING THE TOOL** on page 31.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.