

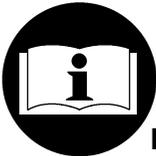
**SERIES RG12, RG13 AND RG14 AIR SCREWDRIVERS**

**NOTICE**

Series RG12, RG13 and RG14 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**

- 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.
- 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.

**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**

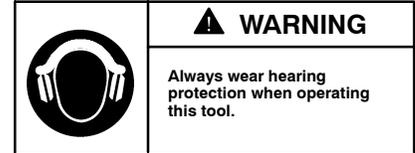
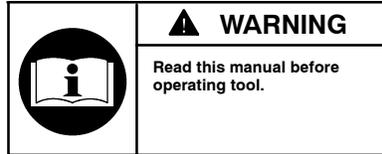
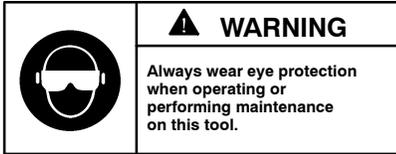
**Ingersoll-Rand Company**

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

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## WARNING SYMBOL IDENTIFICATION



## ADJUSTMENTS

### CLUTCH ADJUSTMENT

#### **⚠ WARNING**

**Disconnect the air supply from the Tool before proceeding.**

1. Rotate 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



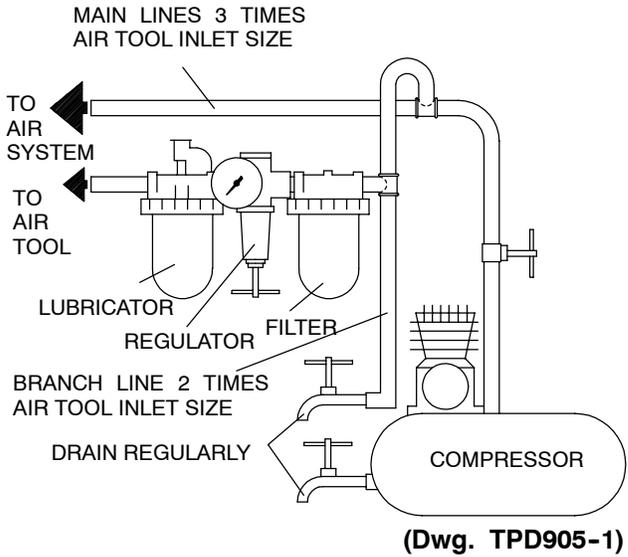
Gearing:  
IRAX No. 67  
Clutch:  
IRAX No. 28

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.



## MODEL IDENTIFICATION

Tool Style	Rotation	Throttle	Free Speed	Clutch	Bit Holder or Driver	Accessories
RG (Pistol)	1 (Reversible)	4 (Trigger Start) 3 (Push-to-Start) 2 (Trigger Permit)	A (2800) B (2000) C (1500) D (1000) E (0500) F (0250)	9 (Positive Clutch; 90 degree Angle Jaw; Trigger Permit Only) 4 (Automatic Shut-off) 3 (Cushion Clutch) 2 (Positive Clutch; 20 degree Angle Jaw; Trigger Permit Only) 1 (Direct Drive; Trigger 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)	A (Top Inlet) 2 (Small Grip)

**RG 1 3 B 4 Q A2**

**VISSEUSES PNEUMATIQUES DES SÉRIES RG12, RG13 ET RG14**

**NOTE**

Les visseuses pneumatiques des Séries RG12, RG13 et RG14 sont destinées au serrage des fixations d'assemblage automobile et d'équipements ménagers, des industries électroniques et aérospatiales et 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 SECURITE SONT JOINTES.  
 LIRE CE MANUEL AVANT D'UTILISER L'OUTIL.  
 L'EMPLOYEUR EST TENU A 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**

- 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.
- 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.

**NOTE**

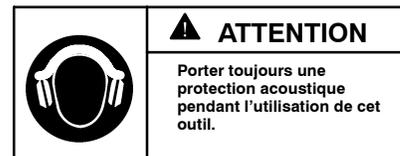
L'utilisation de rechanges autres que les pièces d'origine ARO peut causer des risques d'insécurité, réduire les performances de l'outil et augmenter l'entretien, et peut annuler toutes les garanties. Les réparations ne doivent être effectuées que par des réparateurs qualifiés autorisés. Consultez votre Centre de Service ARO le plus proche.

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

**ARO Tool Products**



## SIGNIFICATION DES SYMBOLES D'AVERTISSEMENT



## RÉGLAGES

### REGLAGE DU LIMITEUR



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

1. Tourner 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

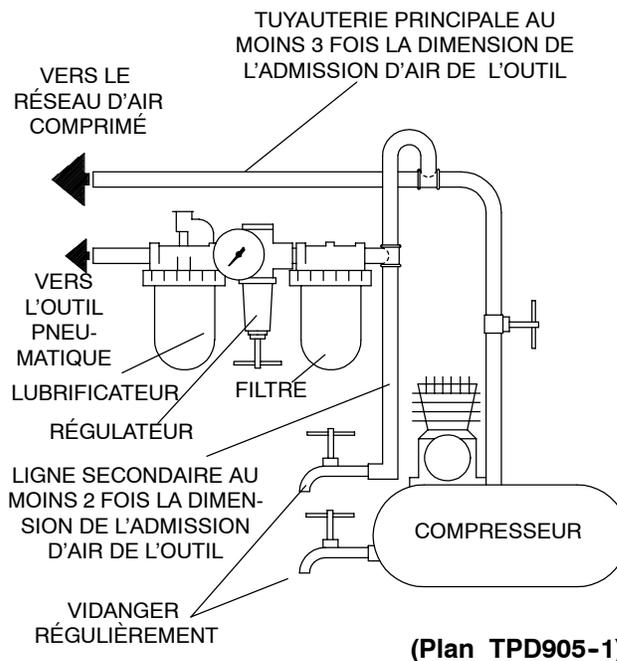
Limiteur:  
IRAX No. 28

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.**





**ATORNILLADORES NEUMÁTICOS DE LAS SERIES RG12, RG13 Y RG14**

**NOTA**

Los atornilladores neumáticos de las series RG12, RG13 y RG14 están diseñados para aplicaciones de montaje en las industrias 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.

- 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.
- Las herramientas neumáticas pueden vibrar durante el uso. La vibración, repetición o posiciones incómodas 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 conocidas 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 varía 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.

**USO DE HERRAMIENTA**

- 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.

**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**

## IDENTIFICACIÓN DE SÍMBOLOS DE AVISO



## AJUSTES

### AJUSTE DE EMBRAGUE

#### ⚠ AVISO

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

1. Gire 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



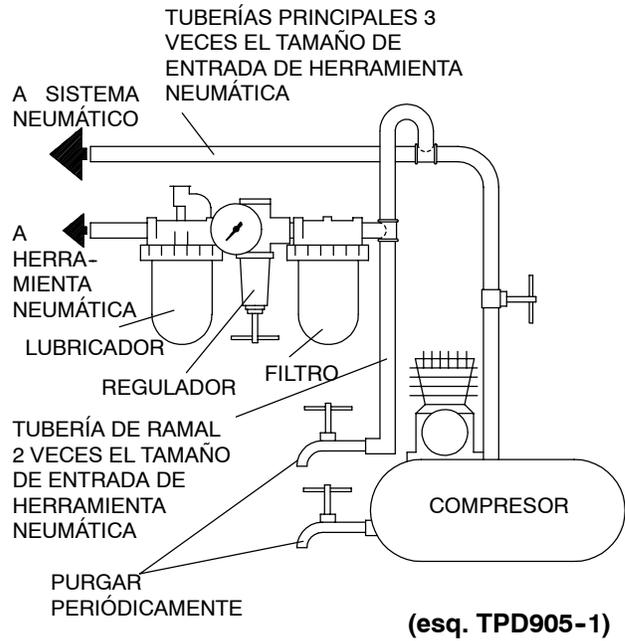
Engranajes:  
IRAX Nº 67  
Embrague:  
IRAX Nº 28

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.**



## IDENTIFICACIÓN DE MODELOS

Estilo de herramienta	Rotación	Palanca de mando	Velocidad en vacío	Embrague	Portapuntas o cuadradrillo	Accesorios
RG (Pistola)	1 (Reversible)	4 (Arranque por gatillo)	A (2800)	9 (Embrague positivo; mordaza de ángulo de 90 grados;funcionamiento por gatillo solamente)	Q (1/4" de cambio rápido)	A (entrada superior)
		3 (Arranque por empuje)	B (2000)	2 (Embrague positivo; mordaza de ángulo de 20 grados; funcionamiento por gatillo solamente)	F (localizador de brocas de 1/4")	2 (empuñadura pequeña)
		2 (funcionamiento por gatillo)	C (1500)	3 (embrague ajustable)	G (punta doble de 5 mm de cambio rápido)	
			D (1000)	4 (parada automática)	H (punta doble de 1/4" de cambio rápido)	
			E (0500)	1 (Mando directo; arranque por gatillo solamente)		
			F (0250)			

**RG 1 3 B 4 Q A2**

## APARAFUSADORAS PNEUMÁTICAS SÉRIES RG12, RG13 E RG14

### AVISO

As Aparafusadoras Pneumáticas Séries RG12, RG13 e RG14 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 SEGUINTE ADVERTÊNCIAS PODE RESULTAR EM FERIMENTOS.**

### COLOCANDO A FERRAMENTA EM FUNCIONAMENTO

- Opere, inspecione 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

- 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.
- 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.
- 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.

### 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

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## IDENTIFICAÇÃO DO SÍMBOLO DE AVISO



## AJUSTES

### AJUSTE DA EMBRAIAGEM

#### **⚠️ ADVERTÊNCIA**

**Desconecte a alimentação de ar da Ferramenta antes de prosseguir.**

1. Rode a tampa do orifício de ajuste da embraiagem 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 N° 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:

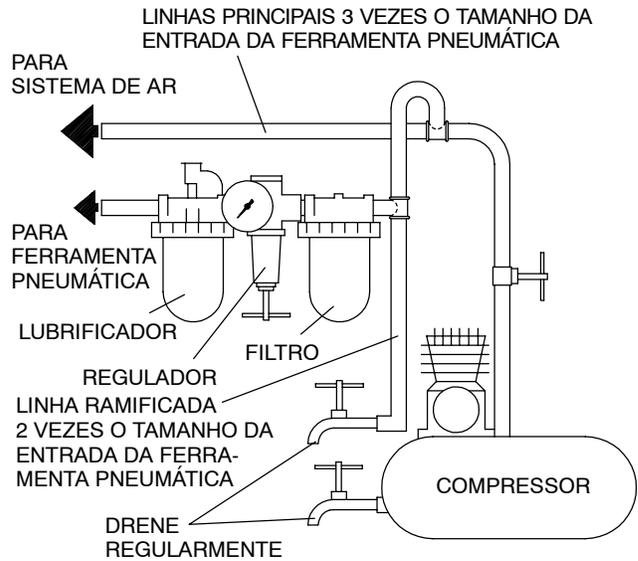
IRAX No. 28

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.



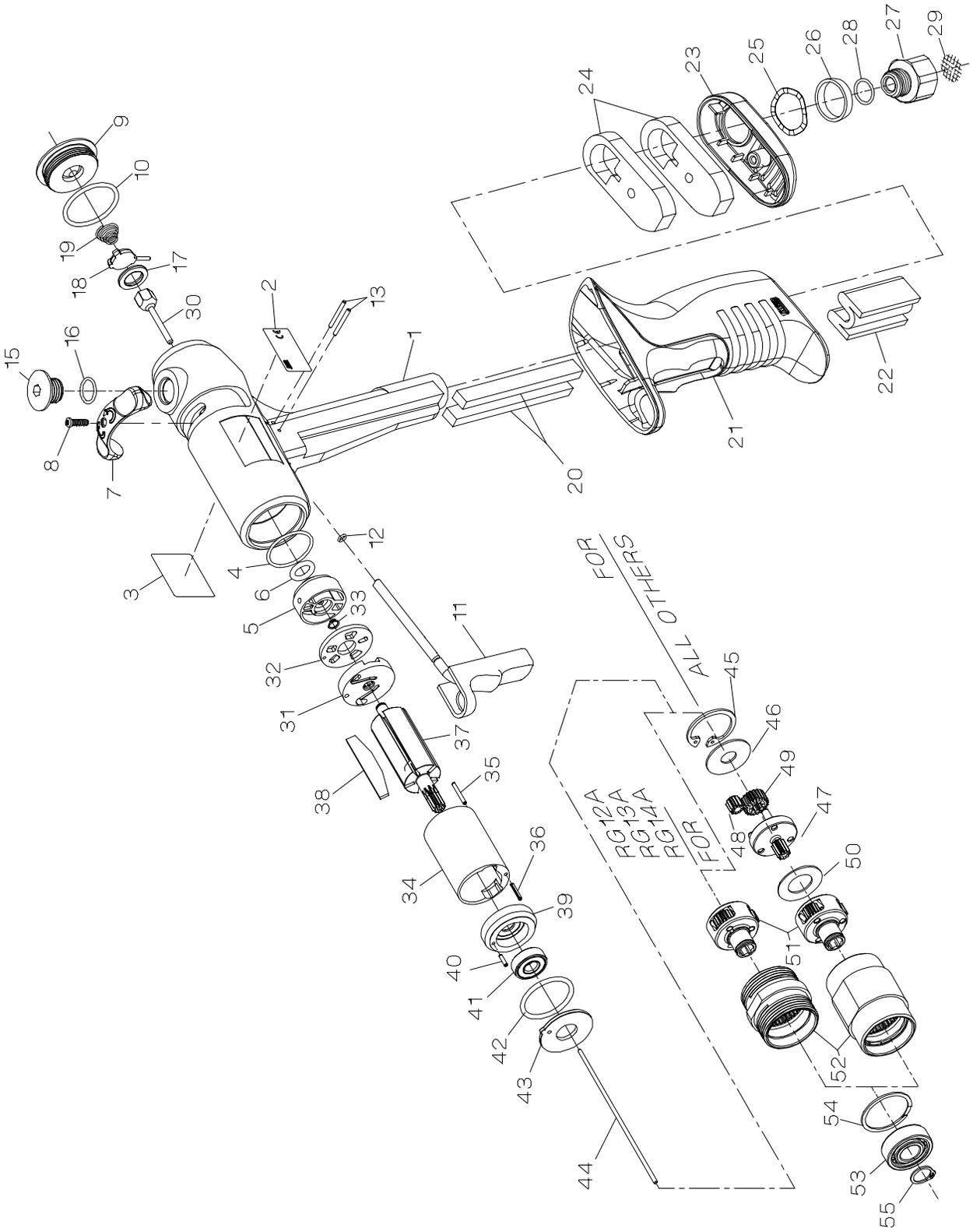
(Desenho TPD905-1)

## IDENTIFICAÇÃO DO MODELO

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

**RG 1 3 B 4 Q A2**

**SERIES RG12, RG13 AND RG14 MOTOR AND GEARING**



**(Dwg. ATP64)**

## SERIES RG12, RG13 AND RG14 MOTOR AND GEARING

**PART NUMBER FOR ORDERING**

**PART NUMBER FOR ORDERING**

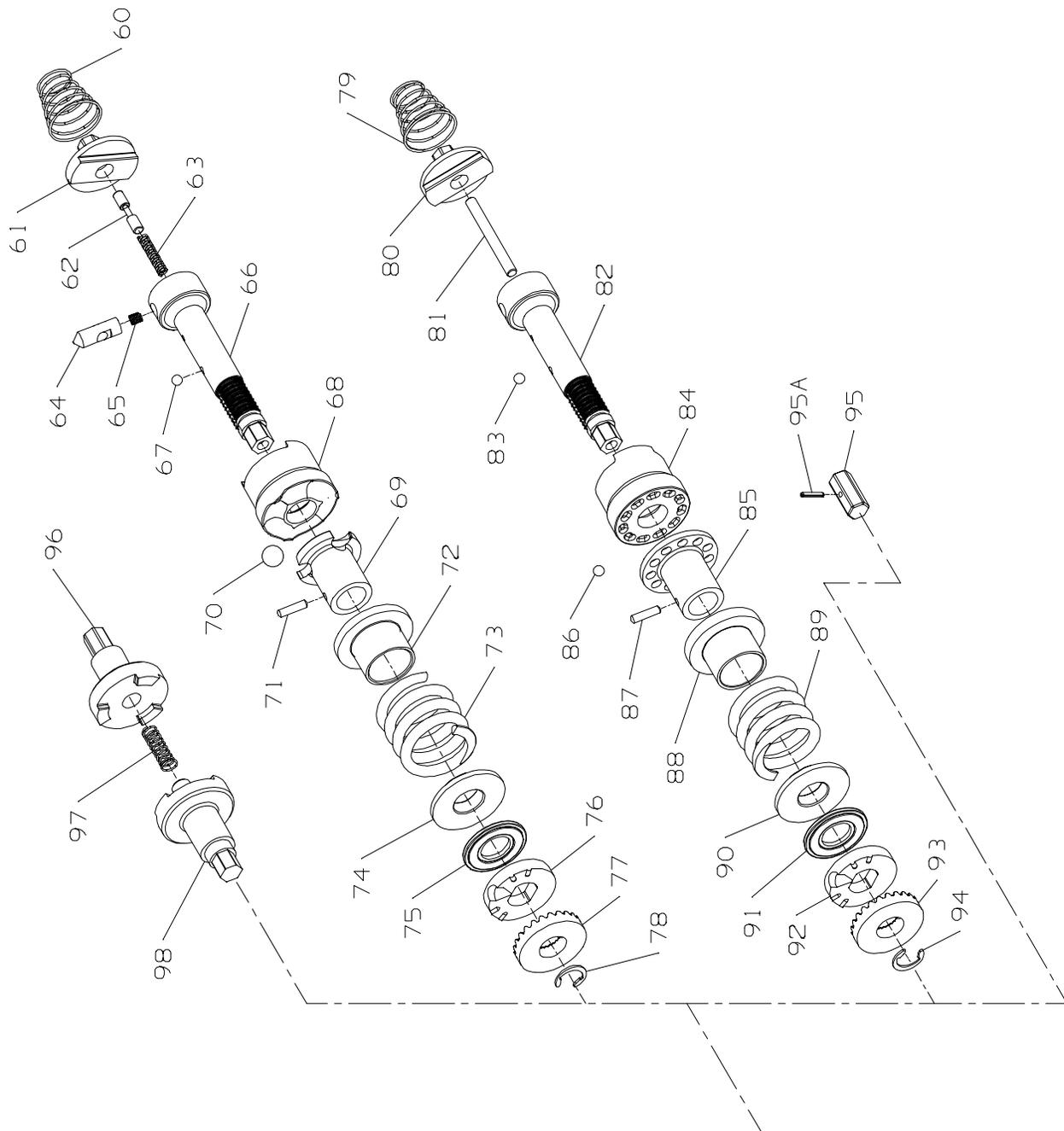
1	Motor Housing Assembly for Push-to-Start with bottom inlet except 250 rpm models ..... for 250 rpm Push-to-Start models with bottom inlet ..... for Push-to-Start with top inlet except 250 rpm models ..... for 250 rpm Push-to-Start models with top inlet ..... for non-Push-to-Start with bottom inlet except for 250 rpm models ..... for 250 rpm non-Push-to-Start models with bottom inlet ..... for non-Push-to-Start with top inlet except 250 rpm models ..... for 250 rpm non-Push-to-Start models with top inlet ..... Nameplate ..... Warning Label ..... Housing O-ring ..... Reverse Valve Assembly for models with an Automatic Shutoff Valve ..... for models without an Automatic Shutoff Valve .....		TAP-A40-P-B  TAP-A40-2P-B  TAP-A40-P  TAP-A40-2P  TAP-A40-B  TAP-A40-2B  TAP-A40  TAP-A40-2 TAH-301 TRH-99 TRH-104  TRH-A329  TRH-A3291 R1A-159 TRP-273 TRH-330 TAP-A202 TRP-158 TRP-A93 TRP-112  400-25-87-4		Inlet Plug Assembly (for models with top inlet only) ..... Inlet Plug Seal ..... Throttle Valve Seat ..... Throttle Valve ..... Throttle Valve Spring ..... Housing Muffler Element (2) ..... Housing Grip large size (standard) ..... small size ..... Grip Muffler Element ..... Grip End Cap ..... End Cap Muffler Element (2) ..... Wave Washer ..... Inlet Bushing Bezel ..... Inlet Bushing Assembly ..... Inlet Bushing Seal ..... Inlet Bushing Screen ..... Automatic Shutoff Valve for all trigger permit models and push-to-start models ..... for all trigger start models with automatic shutoff clutches ..... Rear End Plate Assembly (includes rear rotor bearing) ..... Rear End Plate Face Plate ..... Rear End Plate Assembly Retainer ..... Cylinder Assembly ..... Cylinder Rear Alignment Pin ..... Cylinder Front Alignment Pin .....		TRP-A565 TRP-103 TRP-303 TRP-A302 TRP-51 TRP-311-2  TAP-40-2 TAP-40-1 3RA-310 TAP-40-B TRP-311-1 TRP-761 TAP-123 TRP-A465 TRP-103 TRH-61  TRH-A435  TRP-A435  TRH-A12-1 TRH-12-2 8SL-305 TRH-A3 TRH-98 TRH-98-1
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**PART NUMBER FOR ORDERING** →

← **PART NUMBER FOR ORDERING**

37	Rotor for models with an Automatic Shutoff Valve . . . . .	TRH-53	48	Planet Gear (3 for each Gear Head) for 250, 500 and 1000 rpm models . . . . .	TRH-10-16
	for models without an Automatic Shutoff Valve . . . . .	TRD-53		and 2000 rpm all models and 2000 rpm Cushion Clutch models . . . . .	TRH-10-12
38	Vane Packet (set of 5 Vanes) . . . . .	TRH-42-5	49	Gear Head Pinion for 1500 rpm all models	TRH-10-10
39	Front End Plate Assembly . . . . .	TRH-A11		and 2000 rpm Cushion Clutch Models . . . . .	TRH-17-18
40	End Plate Alignment Pin . . . . .	TRH-98-2		for 2000 rpm models (except Cushion Clutch) . . . . .	TRH-17-21
41	Front Rotor Bearing . . . . .	TRH-24	50	Planet Gear Head Spacer (for all models except 2800 rpm models) . . . . .	TRH-82
42	Motor Seal . . . . .	TRH-211		Spindle Assembly (includes all spindle gearing)	
43	Motor Clamp Washer . . . . .	TRH-207	51	for 250, 500 and 2800 rpm models . . . . .	TRH-A8-16
44	Push Rod (for models with an Automatic Shutoff Valve) . . . . .	TRH-425		for 1500 rpm models . . . . .	TRH-A8-12
45	Gear Retainer (for all models except 2800 rpm models) . . . . .	TRH-28		for 1000 and 2000 rpm models . . . . .	TRH-A8-10
46	Gear Head Spacer (for all models except 2800 rpm models) . . . . .	TRH-81	52	Gear Case for 2800 rpm models . . . . .	TAH-37-S
47	Planet Gear Head Assembly (includes gear shafts) for 250, 500 and 1000 rpm models . . . . .	TRH-A2169-16	53	for all other models . . . . .	TAH-37
	for 1500 rpm all models and 2000 rpm Cushion Clutch models . . . . .	TRH-A2169-12	54	Spindle Bearing . . . . .	TRH-510
	for 2000 rpm models (except Cushion Clutch) . . . . .	TRH-A2169-10	55	Spindle Bearing Seat . . . . .	TRH-208
				Spindle Bearing Retainer . . . . .	4E-6

**SERIES RG12, RG13 AND RG14 CLUTCHES**



(Dwg. ATP65-1)

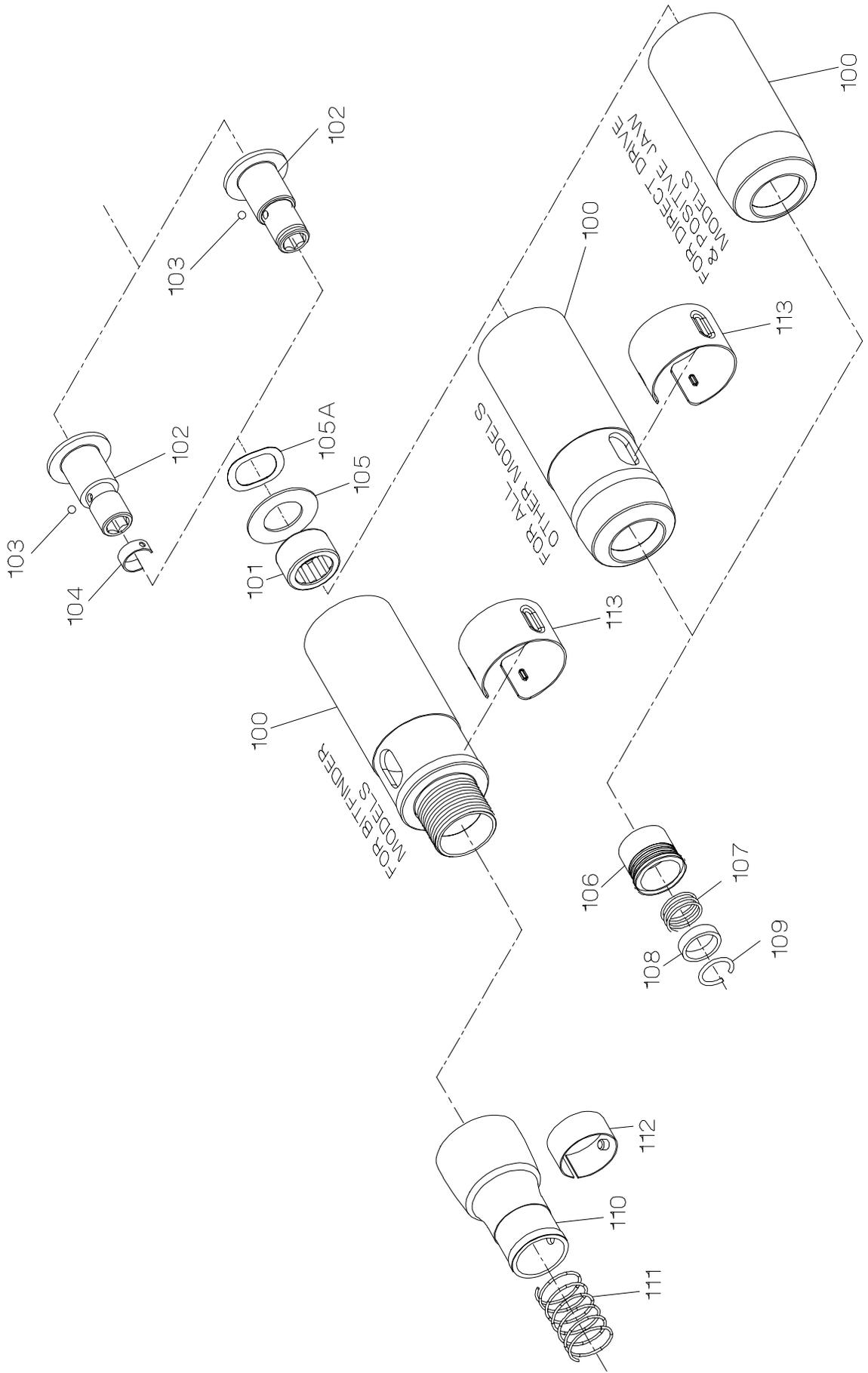
**SERIES RG12, RG13 AND RG14 CLUTCHES**

**PART NUMBER FOR ORDERING** →

← **PART NUMBER FOR ORDERING**

60	Automatic Shutoff Clutch Assembly with heavy clutch spring	TRH-AH579	79	Clutch Return Spring	TRH-405
61	with medium clutch spring	TRH-AM579	80	Clutch Input Driver	TRH-103
62	with light clutch spring	TRH-AL579	81	Clutch Pushrod	TRH-236-C
63	Clutch Return Spring	TRH-405	82	Clutch Shaft	TRH-502
64	Clutch Input Driver	TRH-103	83	Clutch Ball (1/8" diameter) (12)	AV1-255
65	Automatic Shutoff Plunger	TRH-408	84	Cam Jaw	
66	Automatic Shutoff Plunger Return Spring	TRH-420		for 250, 500 and 1000 rpm models	TRH-721-C
67	Automatic Shutoff Pin	TRH-704	85	for 1500, 2000 and 2800 rpm models	TRH-722-C
68	Automatic Shutoff Pin Spring	TRH-407	86	Clutch Cam Ball Driver	TRH-581-C
69	Clutch Shaft	TRH-502	87	Clutch Cam Ball (1/8" diameter) (11)	AV1-255
70	Clutch Ball (1/8" diameter) (12)	AV1-255	88	Clutch Cam Ball Driver Retaining Pin	TRH-188
71	Cam Jaw	TRH-721	89	Cam Ball Seat	TRH-627-C
72	Clutch Cam Ball Driver	TRH-581		Clutch Spring	
73	Clutch Cam Ball (1/4" diameter) (3)	4U-722		heavy (green)	TRH-H583
74	Clutch Driver Retaining Pin	TRH-188		medium (red)	TRH-M583
75	Cam Ball Seat	TRH-627	90	light (orange)	TRH-XL583
76	Clutch Spring		91	Spring Seat	TRH-623
77	heavy (green)	TRH-H583	92	Thrust Bearing	161A32-105
78	medium (red)	TRH-M583	93	Clutch Adjusting Nut Washer	TRH-582
	light (orange)	TRH-XL583	94	Clutch Adjusting Nut	TRH-588
	Spring Seat	TRH-623	95	Clutch Adjusting Nut Stop	3S3-701
	Thrust Bearing	161A32-105	95A	Clutch Shaft (for direct drive models only)	TRH-786-S
	Clutch Adjusting Nut Washer	TRH-582	96	Shaft Stop Pin (for direct drive models only)	TRH-98-3
	Clutch Adjusting Nut	TRH-588		Clutch Jaw	
	Clutch Adjusting Nut Stop	3S3-701	97	Positive Jaw Spring	TRH-5899
	Cushion Clutch Assembly		98	for Positive Clutch; 90° Angle	TRH-5892
	with heavy clutch spring	TRH-AH579-C		for Positive Clutch; 20° Angle	TRH-5878
	with medium clutch spring	TRH-AM579-C		Positive Jaw Adapter	
	with light clutch spring	TRH-AL579-C		for Positive Clutch; 90° Angle	TRH-A5879-S
				for Positive Clutch; 20° Angle	TRH-A5872-S

**SERIES RG12, RG13 AND RG14 BIT DRIVERS**



## SERIES RG12, RG13 AND RG14 BIT DRIVERS

**PART NUMBER FOR ORDERING**

**PART NUMBER FOR ORDERING**

<p>Bit Holder Assembly with 1/4" Quick Release Bit Holder (for Push-to-Start Models and Models with Trigger Permit) . . . . .</p> <p>with 1/4" Quick Release Bit Holder (for Trigger Start Models with Cushion or Shutoff Clutch) . . . . .</p> <p>with 1/4" Quick Release Bit Holder (for Direct Drive Models) . . . . .</p> <p>with 1/4" Quick Release Bit Holder (for Positive Jaw Clutch Models) . . . . .</p> <p>(for Push-to-Start Models and with 1/4" Quick Release Bit Models with Trigger Permit) . . . . .</p> <p>with 1/4" Bit Finder Bit Holder (for Trigger Start Models with Cushion or Shutoff Clutch) . . . . .</p> <p>with 5 mm Double End Quick Release Bit Holder (for Push-to-Start Models and Models with Trigger Permit) . . . . .</p> <p>with 5 mm Double End Quick Release Bit Holder (for Trigger Start Models with Cushion or Shutoff Clutch) . . . . .</p> <p>with 5 mm Double End Quick Release Bit Holder (for Push-to-Start Models and Models with Trigger Permit) . . . . .</p> <p>with 5 mm Double End Quick Release Bit Holder (for Trigger Start Models with Cushion or Shutoff Clutch) . . . . .</p> <p>with 5 mm Double End Quick Release Bit Holder (for Direct Drive Models) . . . . .</p>	<p>TAP-A580-PQ4</p> <p>TAP-A580-NQ4</p> <p>TAP-A580-SS-NQ4</p> <p>TAP-A580-S-PQ4</p> <p>TAP-A580-PQ4F</p> <p>TAP-A580-NQ4F</p> <p>TAP-A580-PQ5MD</p> <p>TAP-A580-NQ5MD</p> <p>TAP-A580-S-NQ5MD</p> <p>TAP-A580-SS-NQ5MD</p>	<p>with 1/4" Double End Quick Release Bit Holder (for Push-to-Start Models and Models with Trigger Permit) . . . . .</p> <p>with 1/4" Double End Quick Release Bit Holder (for Trigger Start Models with Cushion or Shutoff Clutch) . . . . .</p> <p>with 1/4" Double End Quick Release Bit Holder (for Positive Jaw Clutch Models) . . . . .</p> <p>with 1/4" Double End Quick Release Bit Holder (for Direct Drive Models) . . . . .</p> <p>Clutch Housing for Models with Bit Finder Bit Holders . . . . .</p> <p>for RG12A, RG13A and RG14A Positive Clutch Models . . . . .</p> <p>for RG12A, RG13A and RG14A Direct Drive Models . . . . .</p> <p>for all other Models . . . . .</p> <p>Clutch Housing Bearing . . . . .</p> <p>Bit Holder for 1/4" Quick Release Bit Holder . . . . .</p> <p>for 1/4" Bit Finder Bit Holder . . . . .</p> <p>for 5 mm Double End Quick Release Bit Holder . . . . .</p> <p>for 1/4" Double End Quick Release Bit Holder . . . . .</p>	<p>TAP-A580-PQ4D</p> <p>TAP-A580-NQ4D</p> <p>TAP-A580-SS-NQ4D</p> <p>TAP-A580-S-NQ4D</p> <p>TAP-A580-SS-NQ4D</p> <p>TAP-580-F</p> <p>TAP-580-S</p> <p>TAP-580-SS</p> <p>TAP-580</p> <p>TRH-105</p> <p>TRH-586-H4</p> <p>TRH-583-Q4</p> <p>TRH-586-5MD</p> <p>TRH-586-O4D</p>
	100		
			101
			102

**PART NUMBER FOR ORDERING** →

← **PART NUMBER FOR ORDERING**

103	Bit Retaining Ball for metric Bit Holders .....	TRH-629-3M	108	Spring Seat (for Quick Release Bit Holders) .	TRH-244
	for all other Bit Holders .....	R000B-263	109	Retaining Ring (for Quick Release Bit Holders) .....	TRH-853
104	Bit Retaining Spring (for Bit Finder Bit Holders) .....	TRH-241	110	Non-Rotating Bit Finder (for Bit Finder Bit Holders) .....	TAH-873
105	Shutoff Spacer (for all Models with Trigger Start only) .....	TRH-591	111	Spring (for Bit Finder Bit Holders) .....	102A60-242
105A	Wave Washer (for all Models with Trigger Start only) .....	TRH-592	112	Finder Retaining Spring (for Bit Finder Bit Holders) .....	102A60-628
106	Bit Retaining Sleeve (for Quick Release Bit Holders) .....	TRH-930	113	Clutch Adjusting Hole Cover .....	TAP-415
107	Retaining Sleeve Spring (for Quick Release Bit Holders) .....	TRH-931	*	Clutch Housing Spanner Wrench .....	TRH-478
			*	Hanger .....	TAP-A365

\* 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 RG Pistol Grip 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



**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 RG 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 (51).
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.

### CHANGING INLET LOCATION

Series RG12, RG13 and RG14 Screwdrivers with the Top Inlet feature are shipped from the factory with the air connection attached to the bottom of the handle. To use the Top Inlet connection on these tools, proceed as follows:

1. Shut off the air supply and disconnect the air supply hose, if the tool is in use.
2. Using a 3/16" hex wrench, unscrew and remove the Inlet Plug Assembly (15) from the top of the Housing (1).
3. Using a 3/4" wrench on the flats of the Inlet Bushing Assembly (27), unscrew and remove the Assembly.
4. Transfer the Wave Washer (25) and Inlet Bushing Bezel (26) from the threads of the Inlet Bushing to the threads of the Inlet Plug. Make certain the Washer is against the Grip End Cap (23) and the smaller end of the Bezel is against the Inlet Plug Seal (16).
5. Thread the assembled Inlet Plug into the bottom of the Handle and tighten it between 15 and 20 ft-lbs. (20 and 27 Nm) torque.
6. Thread the Inlet Bushing with the Inlet Bushing Seal (28) into the top of the Handle and tighten it between 15 and 20 ft-lbs. (20 and 27 Nm) torque.
7. Connect the air supply hose to the Inlet Bushing and turn on the air supply.

### 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.

## MAINTENANCE SECTION

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 RG Screwdriver is made using four modules or units including a motor housing unit, a motor unit, a clutch with bit holder unit and a combined gearing and 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 clockwise to remove it.**

1. **For models with Bit Finder Bit Holders**, unscrew and remove the Non-Rotating Bit Finder (110). **For models with Quick Release Bit Holders**, use a thin blade screwdriver to spiral the Retaining Ring (109) out of the groove in the end of the Bit Holder (102). Being careful not to loose the Bit Retaining Ball (103), slide the Spring Seat (108), Retaining Sleeve Spring (107) and the Bit Retaining Sleeve (106) off the Bit Holder.
2. Lightly grasp the flats of the Gear Case (52) in copper-covered or leather-covered vise jaws with the Clutch Housing (100) upward.

#### NOTICE

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

3. Using a strap wrench, loosen the Clutch Housing from the Gear Case and remove the assembled tool from the vise jaws. While holding the assembly over a non-damaging container or surface, finish unscrewing the Clutch Housing from the Gear Case. Remove the Clutch Return Spring (60 or 79), the Clutch Input Driver (61 or 80), the Push Rod (44), and the Clutch Assembly, the Clutch Shaft (95), or the Clutch Jaw (96), Positive Jaw Spring (97) and Clutch Jaw Adapter (98) from the Housing.
4. Push on the output end of the Bit Holder (102) to remove it from the Clutch Housing.
5. **For Models with Trigger Start**, slide the Shutoff Spacer (105) and Wave Washer (105A) off the Bit Holder.
6. If the Clutch Housing Bearing (101) must be replaced, press it from the Clutch Housing.

7. Lightly grasp the flats of the Gear Case in copper-covered or leather-covered vise jaws with the handle upward and rotate the assembled handle to loosen the assembly from the Gear Case. Remove the assembly from the vise jaws and separate the components.
8. Remove the Motor Clamp Washer (43) and Motor Seal (42) from the Motor Housing (1).
9. Tap the motor end of the Housing on a wooden block to remove the assembled motor from the Housing.

### Disassembly of the Adjustable Shutoff Clutch

1. Using a thin blade screwdriver, pry the Clutch Adjusting Nut Stop (78) off the end of the Clutch Shaft (66).
2. Insert the tip of a #1 Phillips Head Screwdriver into the adjustment opening between the Clutch Adjusting Nut (77) and the Clutch Adjusting Nut Washer (76). 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 (75), the Spring Seat (74), the Clutch Spring (73) and the Cam Ball Seat (72) off the Clutch Shaft. Allow the three Clutch Cam Balls (70) to fall into the pasteboard box.
4. The Clutch Cam Ball Driver (69) 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 (71) 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 (67) into the box, slide the Clutch Cam Ball Driver and Cam Jaw (68) 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 (64) 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 (62) protrudes slightly from the end of the Shaft. Grasp the Plunger and carefully pull it out of the Clutch Shaft.

## MAINTENANCE SECTION

7. Remove the Automatic Shutoff Pin and Automatic Shutoff Pin Spring (65) 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 (63) 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 (94) off the end of the Clutch Shaft (82).
2. Insert the tip of a #1 Phillips Head Screwdriver into the adjustment opening between the Clutch Adjusting Nut (93) and the Clutch Adjusting Nut Washer (92). 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 (91), the Spring Seat (90), the Clutch Spring (89) and the Cam Ball Seat (88) off the Clutch Shaft. Allow the eleven Clutch Cam Balls (86) to fall into the pasteboard box.
4. The Clutch Cam Ball Driver (85) 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 (87) 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 (83) into the box, slide the Clutch Cam Ball Driver and Cam Jaw (84) off the Clutch Shaft. If grease held some of the Balls inside the jaw cavity, remove them.

### Disassembly of the Gearing

1. **For Models having a Clutch**, use snap ring pliers to remove the Gear Retainer (45) from the motor end of the Gear Case (52) and remove the Gear Head Spacer (46) as well.

2. **For 250, 500 and 1000 rpm Models**, lightly rap the motor end of the Gear Case on a wooden workbench top to remove the three Planet Gears (48), the Planet Gear Head Assembly (47) and the Planet Gear Head Spacer (50).

**For 1500 and 2000 rpm Models**, lightly rap the motor end of the Gear Case on a wooden workbench top to remove the three Planet Gears (48), the Gear Head Pinion (49), the Planet Gear Head Assembly (47) and the Planet Gear Head Spacer (50).

3. Using snap ring pliers, remove the Spindle Bearing Retaining Ring (55).
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 (51), press the Spindle Assembly out of the Spindle Bearing (53).

#### 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 (54) 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 (33) from the shaft of the Rotor (37).
2. Pull the Rear End Plate Face Plate (32) and Rear End Plate Assembly (31) off the hub of the Rotor.
3. Lift the Cylinder (34) from the Rotor.
4. Remove the Vanes (38) from the Rotor.
5. Support the Front End Plate Assembly (39), as near the rotor body as possible, on the table of an arbor press and press the Rotor from the Front Rotor Bearing (41). Remove the Bearing from the Front End Plate.

### Disassembly of the Housing

1. Use a wrench to unscrew and remove the Inlet Bushing Assembly (27) from the Motor Housing Assembly (1). Remove the Inlet Bushing Bezel (26) and the Wave Washer (25).
2. Pull the Housing Grip (21) off the Motor Housing.
3. Pull or carefully pry the Grip End Cap (23) off the inlet end of the Grip and remove the two End Cap Muffler Elements (24).

## MAINTENANCE SECTION

4. Pull the Grip Muffler Element (22) out of the inlet end of the Grip and the two Housing Muffler Elements (20) out of the trigger end of the Grip.
5. **For Top Inlet Models**, use a 3/16" hex wrench to unscrew and remove the Inlet Plug Assembly (15).
6. Using a 1/4" hex wrench, unscrew and remove the Rear Housing Cap Assembly (9).
7. Remove the Throttle Valve Spring (19) and the Throttle Valve (18) from the rear of the Housing. **For Models with Automatic Shutoff**, remove the Automatic Shutoff Valve (30) from the rear of the Housing.
8. If the Throttle Valve Seat (17) must be replaced, insert a hooked tool through the central opening of the Seat and pull it from the Motor Housing.
9. Use a #2 Phillips Head Screwdriver, to unscrew and remove the Reverse Lever Screw (8) and lift the Reverse Lever (7) out of the Motor Housing.
10. Insert a 5/16" wooden dowel between 6 and 8 inches long, into the Rear Housing Cap opening and push the Reverse Valve Assembly (5) out the motor end of the Housing.
11. Use a hooked tool to pull the Housing O-ring (4) out of the Motor Housing.
12. **For Push-to-Start Models**, use a 1/16" pin punch to drift the two Trigger Retaining Pins (13) out of the Motor Housing and pull the Trigger Assembly (11) out of the Housing.  
**For all other Models**, use a 1/16" pin punch to drift the Trigger Retaining Pin (13) out of the Motor Housing and pull the Trigger Assembly (11) out of the Housing.

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### ASSEMBLY

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#### 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 a new Trigger Shaft O-ring (12) and install it in the groove on the shaft of the Trigger Assembly (11).
2. **For Push-to-Start Models**, insert the shaft of the Trigger Assembly into the hole in the Motor Housing (1) until the flat on the shaft is aligned with the two holes in the Housing for the Trigger Retaining Pins (13). Tap the two pins into the Housing to capture the Trigger Assembly.  
**For all other Models**, insert the shaft of the Trigger Assembly into the hole in the Motor Housing (1) until the flat on the shaft is aligned with the hole in the Housing for the Trigger Retaining Pin (13). Tap the pin into the Housing to capture the Trigger Assembly.
3. Lubricate the Housing O-ring (4) with o-ring lubricant and install it at the bottom of the cylinder bore in the Motor Housing.
4. Inspect the face on the hub of the Reverse Valve Assembly (5) for nicks or damage. Replace the Assembly if any damage is evident. Examine the Reverse Valve Seal (6) for nicks or cuts and replace the Seal if it is damaged.
5. Lubricate the Reverse Valve Seal with o-ring lubricant and insert the Assembly, Seal 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.
6. Rotate the Valve inside the Housing until the threaded hole into the side of the Valve for the Reverse Lever Screw (8) is centered radially in the slot in the top of the Housing for the Reverse Lever (7).
7. Install the Reverse Lever in the slot and use a #2 Phillips Head Screwdriver to secure the Lever to the Valve with the Reverse Lever Screw.
8. Install the Throttle Valve Seat (17) in the bottom of the housing cap opening. Use a rod with a flat end and no sharp edges to push the Seat flat at the bottom face of the opening.
9. **For Models with Automatic Shutoff**, install the Automatic Shutoff Valve (30), large end trailing, through the center of the Valve Seat.
10. Install the Throttle Valve (18), flat face leading, in the opening against the Valve Seat. Place the Throttle Valve Spring (19), small end leading, into the Housing against the Valve. Encircle the hub on the Valve with the Spring opening.
11. Examine the Rear Housing Cap Seal (10) for nicks or cuts. If damaged, carefully install a new Seal over the threads of the Rear Housing Cap Assembly (9).
12. Using a 1/4" hex wrench, thread the Assembly into the rear of the Motor Housing. Tighten the Assembly between 15 and 20 ft-lbs. (20 and 27 Nm) torque.

## MAINTENANCE SECTION

13. **For Top Inlet Models**, examine the Inlet Plug Seal (16) for nicks or cuts. If damaged, carefully install a new Seal over the threads of the Inlet Plug Assembly (15).
14. **For Top Inlet Models**, use a 3/16" hex wrench to thread the Assembly into the top of the Motor Housing. Tighten the Assembly between 15 and 20 ft-lbs. (20 and 27 Nm) torque.
15. Lay a Housing Muffler Element (20) on each side of the handle rib and use a non-pointed probe to fully push the end of each Element into the recess near the body of the Housing.
16. Install the Housing Grip (21) over the Elements and onto the inlet end of the Motor Housing. Make certain the Grip is fully seated against the Housing and the Trigger Assembly works freely.
17. Fold the Grip Muffler Element (22) in half and then fold each half equally again and insert it into the bottom of the Grip.
18. Stack the two End Cap Muffler Elements (24) inside the Grip and push the Grip End Cap (23) onto the inlet end of the Grip.
19. If the Inlet Screen (29) required replacement, use a wooden dowel to carefully push a new one into the Inlet Bushing (27).
20. If the Inlet Bushing Seal (28) is nicked or damaged, carefully install a new one over the threads of the Inlet Bushing.
21. Install the Inlet Bushing Bezel (26), small end leading, followed by the Wave Washer (25) onto the threads of the Inlet Bushing against the Seal.
22. Thread the assembled Inlet Bushing through the Grip End Cap into the handle of the Motor Housing and tighten the Bushing between 15 and 20 ft-lbs. (20 and 27 Nm) torque.

### Assembly of the Motor

1. Place the Front End Plate (39) on the splined shaft of the Rotor (37) with the bearing recess away from the rotor body.
2. Place the Front Rotor Bearing (41) 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.

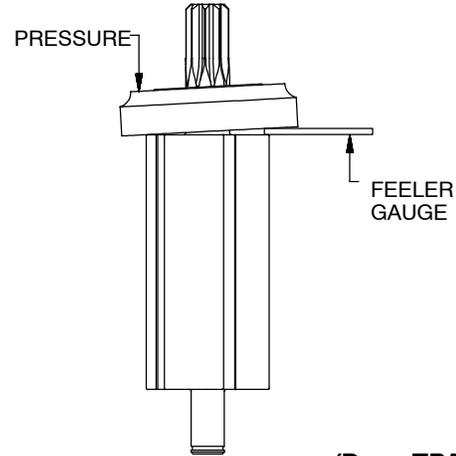
### NOTICE

**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 (38) 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 (34) 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 (36) enters the hole in the Front End Plate.
6. Install the Rear End Plate Assembly (31), flat face leading, on the rear hub of the Rotor. Make certain the Cylinder Rear Alignment Pin (35) enters the hole in the Rear End Plate.
7. Examine the Rear End Plate Face Plate (32) 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 (33) 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 (54) into the internal groove nearest the notched end of the Gear Case (52).
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 (53), press a new Bearing into the Gear Case against the Seat.
3. Lubricate the gears in the Spindle Assembly (51) with IRAX No. 67 Grease.

## MAINTENANCE SECTION

- 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.
- Using snap ring pliers, install the Spindle Bearing Retainer (55) in the external groove near the driver end of the spindle.
- For all Clutch Models**, lightly lubricate the Planet Gear Head Spacer (50) with IRAX No. 67 Grease and install it in the Gear Case against the Spindle Assembly.
- For all Clutch Models**, lubricate the shafts of the Planet Gear Head Assembly (47) 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.
- For 250, 500 and 1000 rpm Models**, lubricate the Planet Gears (48) with IRAX No. 67 Grease and install them on the shafts of the Planet Gear Frame Assembly.
- For 1500 and 2000 rpm Models**, lubricate the Planet Gears (48) and Gear Head Pinion (49) 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 all Clutch Models**, install the Gear Head Spacer (46) against the Gears and secure the assembly by using snap ring pliers to install the Gear Retainer (45) in the internal groove at the motor end of the Gear Case.

### Assembly of the Adjustable Cushion Clutch

- Insert the small end of the Clutch Shaft (82) into the end of the Cam Jaw (84) having the large opening and slide the Shaft about half way into the Jaw.
- Drop the twelve Clutch Balls (83) into the Cam Jaw forming a ring around the Clutch Shaft.
- 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.
- While holding the Shaft and Jaw together, slide the Clutch Cam Ball Driver (85), large end leading, onto the Clutch Shaft until it is against the Cam Jaw.
- 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 (87) into the hole to lock the Driver in position on the Clutch Shaft.
- Apply a coating of IRAX No. 28 Grease to each of the eleven Clutch Cam Balls (86).
- 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.
- Slide the Cam Ball Seat (88), large end leading, onto the Shaft against the Balls. Follow with the Clutch Spring (89), Spring Seat (90), Thrust Bearing (91) and the Clutch Adjusting Nut Washer (92) with the smooth face leading.
- Thread the Clutch Adjusting Nut (93), smooth face trailing, onto the Clutch Shaft.
- 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 (94) is visible.
- Install the Nut Stop in the groove.

### Assembly of the Adjustable Shutoff Clutch

- Hold the Clutch Shaft (66) in your hand with the large end upward.
- Insert the Automatic Shutoff Plunger Return Spring (63) 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 (64).
- Insert the Automatic Shutoff Pin Spring (65) in the end hole of the Automatic Shutoff Pin opposite the pointed end. Rotate the Spring a little to keep it in the hole.
- Drip one or two drops of IRAX No. 10 Oil into the central hole with the Plunger Return Spring.
- 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.
- Push on the pointed end of the Shutoff Pin to depress the Spring while inserting the Automatic Shutoff Plunger (62) 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.
- Insert the small end of the Clutch Shaft into the end of the Cam Jaw (68) having the large opening and slide the Shaft about half way into the Jaw.
- Drop the twelve Clutch Balls (67) into the Cam Jaw forming a ring around the Clutch Shaft.
- 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.

## MAINTENANCE SECTION

10. While holding the Shaft and Jaw together, slide the Clutch Cam Ball Driver (69), 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 (71) 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 (70).
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 (72), large end leading, onto the Shaft against the Balls. Follow with the Clutch Spring (73), Spring Seat (74), Thrust Bearing (75) and the Clutch Adjusting Nut Washer (76) with the smooth face leading.
15. Thread the Clutch Adjusting Nut (77), 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 (78) is visible.
17. Install the Nut Stop in the groove.
3. Align the tab of the Motor Clamp Washer (43) 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.
4. Apply some IRAX No. 67 Grease to the spline on the rotor shaft.
5. Thread the assembled Gear Case (52), 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.
6. Grasp the flats on the Gear Case lightly in leather-covered or copper-covered vise jaws with the Spindle Assembly (51) upward.
7. **For Automatic Shutoff Models**, insert the Push Rod (44) into the center of the Spindle Assembly. Only a small portion of the Rod should be visible when it has correctly entered the assembled gearing and motor.
8. **For Shutoff Clutch and Cushion Clutch Models**, place the narrow end of the Clutch Return Spring (60 or 79) in the Gear Case against the inner race of the Spindle Bearing (53).
9. **For all Direct Drive Models**, insert the Clutch Shaft (95) into the hex recess of the Spindle Assembly until the Shaft Stop Pin (95A) contacts the Spindle. If the Shaft Stop Pin does not protrude equally from both sides of the Clutch Shaft, adjust it or replace it. **For Positive Jaw Clutch Models**, insert the hex of the Clutch Jaw (96) into the hex recess in the Spindle Assembly. Insert the Positive Jaw Spring (97) followed by the round shaft of the Positive Jaw Adapter (98) into the central opening of the Clutch Jaw.

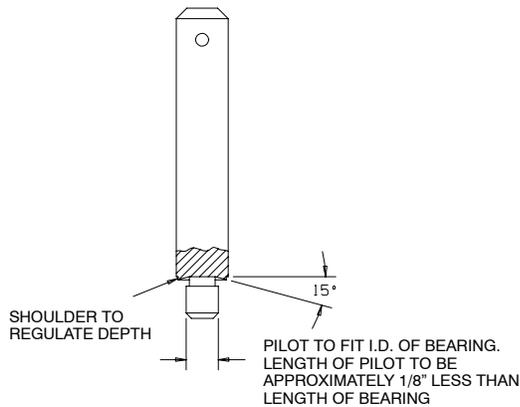
### Assembly of the Tool

1. Grasp the spline of the Rotor (37) in the assembled motor and after aligning the End Plate Alignment Pin (40) with the internal notch in the motor end of the housing bore, insert the assembled motor into the Motor Housing (1). Make certain the motor is far enough into the Housing to have the undercut below the internal housing thread visible.
2. Lubricate the Motor Seal (42) with o-ring lubricant and install it around the Front End Plate (39) and into the undercut in the Housing.
10. If the Clutch Housing Bearing (101) was removed, stand the Clutch Housing (100) on the table of an arbor press with the gear case end upward.

## MAINTENANCE SECTION

- 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 being pressed.

### Needle Bearing Inserting Tool



(Dwg. TPD786)

- For Trigger Start Models**, slide the Wave Washer (105A) followed by the Shutoff Spacer (105) onto the hub of the Bit Holder (102) and insert the Bit Holder into the large end of the Clutch Housing and push the output end through the Clutch Housing Bearing. **For Trigger Permit Models**, insert the Bit Holder (102) into the large end of the Clutch Housing and push the output end through the Clutch Housing Bearing.

### NOTICE

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

- Install the assembled Clutch Housing over the clutch components and thread it into the Gear Case. Using a strap wrench, tighten the joint between 15 and 20 ft-lbs. (20 and 27 Nm) torque.
- For Quick Release Bit Holder Models**, place the Bit Retaining Ball (103) in the hole through the wall of the Bit Holder and slide the Bit Retaining Sleeve (106) large end trailing, onto the Bit Holder. Slide the Retaining Sleeve Spring (107) and Spring Seat (108) onto the Bit Holder and secure the components by installing the Retaining Ring (109) in the external groove at the output end of the Bit Holder.

**For Bit Finder Models**, place the Bit Retaining Ball (103) in the hole through the wall of the Bit Holder and spread the Bit Retaining Spring (104) enough to slide it onto the Bit Holder and secure the Ball in position.

### NOTICE

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

- For Bit Finder Models**, thread the Non-Rotating Bit Finder (110) onto the Clutch Housing and hand-tighten it between 2 and 6 ft-lbs. (3 and 8 Nm) torque.
- Remove the tool from the vise jaws.

## 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 four 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 (73 or 89), the clutch adjustment procedure, the length of the Push Rod (44) and the length of the Shutoff Valve (30) 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 <b>complete</b> set of Vanes.
	Worn or broken Cylinder	Replace the Cylinder if it is cracked or if the bore appears wavy or scored.
	Shutoff Valve too short	Lengthen the Shutoff Valve. Refer to <b>TESTING THE TOOL</b> on page 32.
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.
Tool ratchets before shutoff	Push Rod too long	Shorten the push Rod. Refer to <b>TESTING THE TOOL</b> on page 32.
Tool stalls without shutting off	Shutoff Valve too short	Lengthen the Shutoff Valve. Refer to <b>TESTING THE TOOL</b> on page 32.
Too runs slower than normal	Shutoff Valve too short	Lengthen the Shutoff Valve. Refer to <b>TESTING THE TOOL</b> on page 32.

### NOTICE

**SAVE THESE INSTRUCTIONS. DO NO DESTROY.**





