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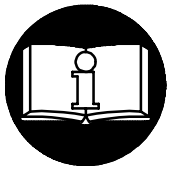
OPERATION AND MAINTENANCE MANUAL FOR MODELS EL1510N, EP1510N, EL1520N, EP1520N, EL2603N, EP2603N, EL2607N, EP2607N, EL2612N, EP2612N, ET4007N AND EP4007N ELECTRIC SCREWDRIVERS

NOTICE

Series EL, EP and ET Electric Screwdrivers are earthed (grounded) and are designed for installing threaded fasteners in light industrial and appliance manufacturing applications. Ingersoll–Rand is not responsible for customer modification of tools for applications on which Ingersoll–Rand was not consulted.



⚠ WARNING

**IMPORTANT SAFETY INFORMATION ENCLOSED.
READ ALL THESE INSTRUCTIONS BEFORE PLACING TOOL IN SERVICE OR OPERATING THIS TOOL AND SAVE THESE INSTRUCTIONS.
IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PLACE THE INFORMATION IN THIS MANUAL INTO THE HANDS OF THE OPERATOR.
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.
WHEN USING ELECTRIC TOOLS, BASIC SAFETY PRECAUTIONS SHOULD ALWAYS BE FOLLOWED TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK AND PERSONAL INJURY, INCLUDING THE FOLLOWING.**

PLACING TOOL IN SERVICE

- **Use outdoor extension leads. When tool is used outdoors, use only extension cords intended for outdoor use.**
- **Always operate, inspect and maintain this tool in accordance with all regulations (local, state, federal and country), that may apply to hand held/hand operated electric tools.**
- **Inspect tool cords periodically and if damaged, have them repaired by an authorized service facility. Inspect extension cords periodically and replace if damaged.**
- **Do not remove any labels. Replace any damaged label.**

USING THE TOOL

- **Do not operate this tool unless the Retainer Coupling (1) and Flange (2) are installed securely.**
- **Always wear eye protection when operating or performing maintenance on this tool.**
- **Power tools can vibrate in use. Vibration, repetitive motions, or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.**
- **Guard Against Electric Shock.** Prevent body contact with earthed or grounded surfaces. For example; pipes, radiators, ranges, refrigerator enclosures.
- **Don't abuse Cord.** Never carry tool by cord or yank it to disconnect from receptacle. Keep cord from heat, oil, and sharp edges.
- **Keep work area clean.** Cluttered areas and benches invite injuries.
- **Consider work area environment.** Don't expose power tools and chargers to water. Keep work area well lighted. Do not use tool in explosive or flammable atmospheres.
- **Keep bystanders and children away.** Do not permit unauthorized personnel to operate this tool, or touch tool or cord.
- **Store idle tools.** When not in use, tools should be stored in a dry, high or locked up place, out of reach of children.
- **Don't force tool.** It will do the job better and more safely at the rate for which it was intended.
- **Use the right tool.** Do not force a small tool or attachment to do the job of a heavy–duty tool.
- **Do not use a tool for a purpose for which it is not intended.** Example: Do not use a screwdriver as a drill.
- **Dress properly.** Do not wear loose clothing or jewelry. They can be caught in moving parts. Rubber gloves and non–skid footwear are recommended when working outdoors. Wear protective hair covering to contain long hair.

NOTICE

The use of other than genuine Ingersoll–Rand replacement parts may result in personal injury, decreased tool performance and increased maintenance, and may invalidate all warranties.
Ingersoll–Rand is not responsible for customer modification of tools for applications on which Ingersoll–Rand was not consulted.
Repairs should be made only by authorized, trained personnel. Consult your nearest Ingersoll–Rand Authorized Servicenter.
It is the responsibility of the employer to place the information in this manual into the hands of the operator.

Printed in U.S.A.

INGERSOLL-RAND®
PROFESSIONAL TOOLS

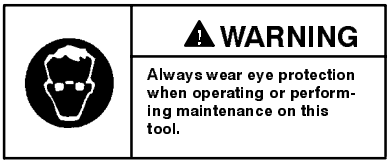
⚠ WARNING

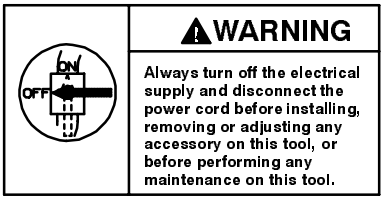
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

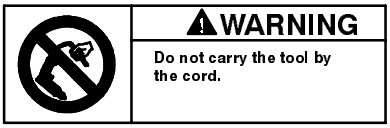
USING THE TOOL *(Continued)*

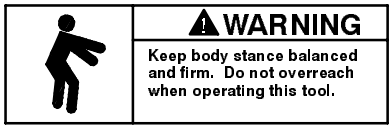
- **Secure work.** Use clamps or a vise to hold work. Operators often need both hands to perform job functions.
- **Don't overreach.** Keep proper footing, balance, and a firm grip on the tool at all times.
- **Maintain tools with care.** Keep tools clean for better and safer performance. Follow instructions for lubricating and changing accessories. Inspect tool cords periodically and if damaged, have them repaired by an authorized service facility. Inspect extension cords periodically and replace if damaged. Keep handles dry, clean, and free from oil and grease.
- **Remove adjusting keys and wrenches.** Form habit of checking to see that keys and adjusting wrenches are removed from tool before turning it on.
- **Avoid unintentional starting.** Don't carry tool with finger on switch.
- **Do not drop or abuse the tool.**
- **Whenever a tool is not being used, position the Power Switch to the "OFF" position and unplug the power cord.**
- **Stay alert.** Watch what you are doing. Use common sense. Do not operate tool when you are tired.
- **Check damaged parts.** Before further use of the tool, a guard or other part that is damaged should be carefully checked to determine that it will operate properly and perform its intended function. Check for alignment of moving parts, binding of moving parts, breakage of parts, mounting, and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced by an authorized service center unless otherwise indicated elsewhere in this operation manual.
- **Have defective switches replaced by an authorized service center.**
- **Do not use the tool if the switch does not turn it on and off.**
- **Do not drop or abuse the screwdriver.**
- **Whenever changing a bit, make certain the Forward/Reverse Switch is in the "OFF" position and the tool is unplugged.**
- **Do not allow chemicals such as acetone, benzene, thinner, ketone, trichloroethylene or other similar chemicals to come in contact with the screwdriver housing as damage will result.**
- **Do not adjust the torque setting higher than 5 on the Torque Scale.**
- **Duty cycle: 1200 rpm and 2000 rpm models –**
  MAX 0.5 sec. "ON"
  MIN 3.5 sec. "OFF"
  all other models –
  MAX 0.8 sec. "ON"
  MIN 3.5 sec. "OFF"
- **Do not tighten more than 900 tapping screws (size: 2 mm, length: 4 mm) per hour.**
- **Do not operate the Forward/Reverse Switch when the motor is running.**
- **Whenever a tool is not being used, move the Forward/Reverse Switch to the "OFF" position and unplug the screwdriver.**
- **The use of any accessory or attachment other than recommended in this manual can present a risk of personal injury.**

WARNING LABEL IDENTIFICATION



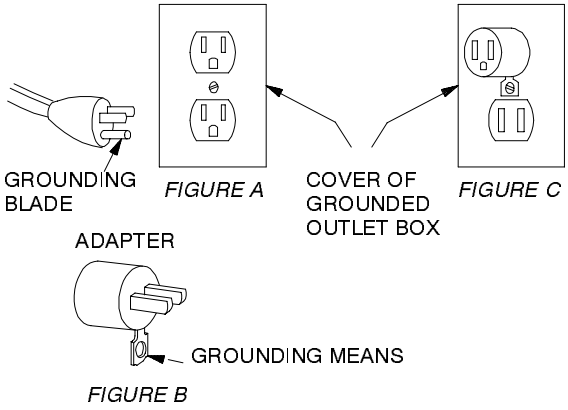






GROUNDING INSTRUCTIONS

The tool should be grounded while in use to protect the operator from electric shock. The tool is equipped with a three–conductor cord and three–prong grounding–type plug to fit the proper grounding–type receptacle. The green (or green and yellow) conductor in the cord is the grounding wire. Never connect the green (or green and yellow) wire to a live terminal. If your unit is for use on less than 150V, it has a plug that looks like that shown in Figure A.
An adapter (see Figure B) is available for connecting Figure A–type plugs to 2–prong receptacles. The green colored rigid grounding strap must be connected to a permanent ground such as to a properly grounded outlet box as shown in figure C.



(Dwg. TPD446–1)

Extension Cords

Make sure your extension cord is in good condition. When using an extension cord, be sure to use one heavy enough to carry the current your product will draw. An undersized cord will cause a drop in line voltage resulting in loss of power and overheating.
Table shows the correct size to use depending on cord length and nameplate ampere rating. If in doubt, use the next heavier gage. The smaller gage number, the heavier the cord.

Total Length of Cord in Feet			
0 – 25	25 – 50	51 – 100	101 – 150
	AWO		
18	16	16	14

ADJUSTMENTS

TORQUE ADJUSTMENT

To adjust the torque on these screwdrivers, proceed as follows:

1. Determine the torque output of the tool by checking a tightened fastener with a torque wrench.
2. Increase or decrease the torque output by rotating the Spring Adjusting Ring (37 or 39). Rotating the Ring **clockwise** to a higher number on the Torque Scale increase torque output while rotating the Ring **counterclockwise** to a lower number decreases the torque output.

NOTICE

The numbers from zero to seven on the Torque Scale are reference numbers only and are not an indication of actual torque output.

3. Check the adjustment with a torque wrench. A number of factors will affect torque output from one job to another. Final torque adjustment should be made at the job through a series of gradual increase.. Always start below the desired torque and work upward.

CAUTION

- **Do not drop or abuse the tool.**
- **Whenever a tool is not being used, position the Power Switch to the "OFF" position and unplug the power cord.**

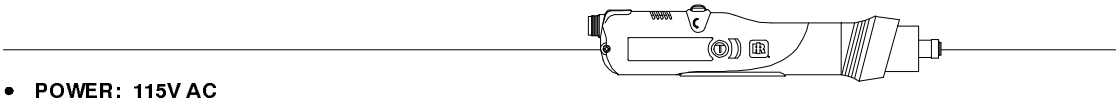
DO NOT ATTEMPT TO REPAIR THIS TOOL.

All repairs and maintenance of this tool and its cord must be performed by an authorized service center. See Form 6647 for the service center nearest you.

NOTICE

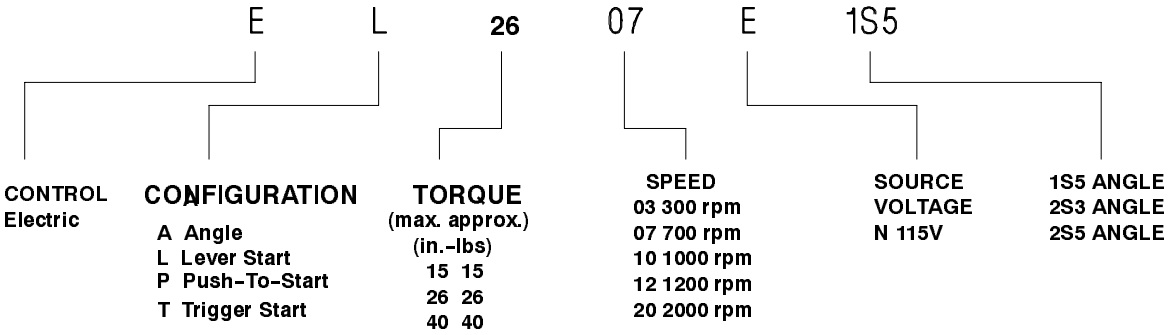
SAVE THESE INSTRUCTIONS. DO NOT DESTROY.

MODEL IDENTIFICATION



- POWER: 115V AC
- Cable Length: 8ft. Straight
- Sound: 69 dBA

  Reversible: Yes



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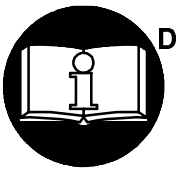
MANUEL D'EXPLOITATION ET D'ENTRETIEN DES VISSEUSES ÉLECTRIQUES SÉRIES EL, EP et ET

NOTICE

Les visseuses électriques des séries EL, EP et ET sont équipées avec prise de terre et sont destinées au montage des fixations filetées dans les applications de production industrielle légère et d'appareillage.
Ingersoll–Rand ne peut être tenu responsable de la modification des outils par le client pour les adapter à des applications qui n'ont pas été approuvées par Ingersoll–Rand.

⚠ WARNING



D'IMPORTANTES INFORMATIONS DE SÉCURITÉ SONT JOINTES. VEUILLEZ LIRE TOUTES CES INSTRUCTIONS AVANT DE METTRE CET OUTIL EN SERVICE OU AVANT D'EXPLOITER CET OUTIL, ET CONSERVEZ CES INSTRUCTIONS. L'EMPLOYEUR EST TENU DE COMMUNIQUER LES INFORMATIONS DE CE MANUEL AUX EMPLOYÉS UTILISANT CET OUTIL. LE NON RESPECT DES AVERTISSEMENTS SUIVANTS PEUT CAUSER DES BLESSURES. PENDANT L'UTILISATION D'OUTILS ÉLECTRIQUES, PRENEZ TOUJOURS LES PRÉCAUTIONS DE SÉCURITÉ NÉCESSAIRES, Y COMPRIS CELLES DÉCRITES CI–DESSOUS, POUR RÉDUIRE LES RISQUES D'INCENDIE, DE CHOC ÉLECTRIQUE ET DE BLESSURE PERSONNELLE.

MISE EN SERVICE DE L'OUTIL

- **Utiliser des rallonges appropriées pour l'extérieur. Lorsque l'outil est utilisé en plein air, utiliser seulement des rallonges à usage extérieur.**
- **Exploiter, inspecter et entretenir toujours cet outil conformément aux réglementations (locales, départementales, fédérales et nationales) en vigueur pour les outils électriques tenus/commandés à la main.**
- **Inspecter périodiquement les cordons d'alimentation, et, en cas d'endommagement, les faire réparer par un centre d'entretien autorisé. Inspecter périodiquement les rallonges et les remplacer en cas d'endommagement.**
- **Ne retirer aucune étiquette. Remplacer toute étiquette endommagée.**

UTILISATION DE L'OUTIL

- **Ne pas utiliser cet outil tant que la bague de retenue (1) et la bride (2) ne sont pas installées correctement.**
- **Porter toujours des lunettes de protection pendant l'utilisation et l'entretien de cet outil.**
- **Les outils électriques peuvent vibrer pendant l'usage. 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.**
- **Faire attention aux chocs électriques.** Éviter tout contact du corps avec des surfaces mises à la masse. Par exemple : tuyauteries, radiateurs, fours, enceintes de réfrigérateurs.
- **Ne pas maltraiter le cordon d'alimentation.** Ne jamais transporter l'outil par son cordon, et ne jamais tirer sur le cordon pour le débrancher de sa prise. Tenir le cordon éloigné des sources de chaleur, de l'huile et des arêtes vives.
- **Maintenir le lieu de travail propre.** Les zones et les établis encombrés peuvent être cause de blessures.
- **Considérer l'environnement du lieu de travail.** Ne jamais exposer les outils électriques ou les chargeurs à l'eau. Assurer un éclairage adéquat de la zone de travail. Ne jamais utiliser l'outil dans des atmosphères explosives ou inflammables.
- **Tenir les personnes et les enfants éloignés.** Ne jamais laisser du personnel non autorisé se servir ou toucher l'outil ou le cordon.
- **Ranger les outils non utilisés.** Lorsqu'ils ne sont pas utilisés, les outils doivent être rangés dans un endroit sec et fermé hors de portée des enfants.
- **Ne pas forcer l'outil.** Il effectuera sa tâche plus efficacement et en toute sécurité s'il est utilisé à sa vitesse normale.
- **Utiliser l'outil correct.** Ne jamais forcer un petit outil ou accessoire à effectuer la tâche d'un outil à usage intensif.
- **Ne pas utiliser un outil pour une tâche autre que celle pour laquelle il a été conçu.** Par exemple, ne pas utiliser une visseuse comme une perceuse.
- **Porter les vêtements appropriés.** Ne pas porter de vêtements flous ou des bijoux. Ils peuvent être attrapés par les pièces en mouvement. Des gants en caoutchouc et des chaussures antidérapantes sont recommandés pour les travaux à l'extérieur. Porter un filet protecteur pour retenir les cheveux longs.

NOTICE

L'utilisation de rechanges autres que les pièces d'origine Ingersoll–Rand peut causer des blessures personnelles, réduire les performances de l'outil et augmenter l'entretien, et peut annuler toutes les garanties.
Faites réparer votre outil par un personne compétente. Cet outil électrique est conforme aux exigences de sécurité applicables. Les réparations ne doivent être effectuées que par des personnes compétentes utilisant les rechanges d'origine, sous peine de danger considérable pour l'opérateur.
Les réparations ne doivent être effectuées que par des réparateurs qualifiés autorisés. Consultez votre Centre de Service Ingersoll–Rand le plus proche.

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INGERSOLL-RAND®
PROFESSIONAL TOOLS

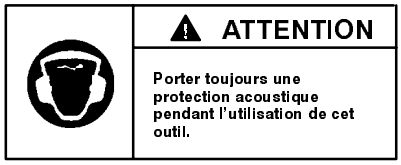
⚠ WARNING

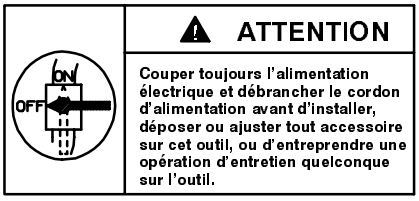
LE NON RESPECT DES AVERTISSEMENTS SUIVANTS PEUT CAUSER DES BLESSURES.

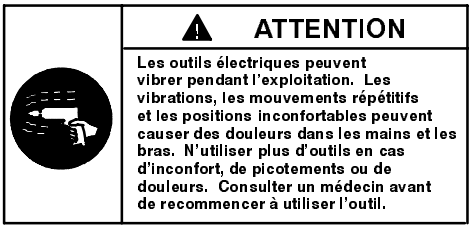
UTILISATION DE L'OUTIL *(suite)*

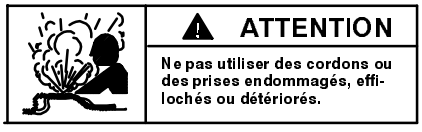
- **Fixer les pièces.** Utiliser des brides ou un étau pour fixer les pièces. Les opérateurs ont souvent besoin de leurs deux mains pour effectuer leur travail.
- **Ne pas se pencher en avant.** Conserver une position stable et équilibrée, et tenir fermement l'outil à tout moment.
- **Entretenir les outils avec soin.** Pour obtenir des performances optimales et sûres, tenir les outils propres. Observer les instructions de lubrification et de changement d'accessoires. Inspecter périodiquement les cordons d'alimentation, et, en cas d'endommagement, les faire réparer par un centre d'entretien autorisé. Inspecter périodiquement les rallonges et les remplacer en cas d'endommagement. Tenir les poignées sèches, propres et exemptes d'huile et de graisse.
- **Retirer les clés de réglage.** Prendre l'habitude de vérifier que toutes les clés de réglage et de serrage sont enlevées de l'outil avant de le mettre en marche.
- **Éviter toute mise en marche accidentelle.** Ne pas transporter l'outil avec un doigt sur l'interrupteur.
- **Ne pas laisser tomber ou maltraiter l'outil.**
- **A chaque fois qu'un outil n'est pas utilisé, placer l'interrupteur d'alimentation à la position "OFF" (ARRÊT) et débrancher le cordon d'alimentation.**
- **Rester alerte.** Etre attentif pendant le travail. Ne pas prendre de risque. Ne pas utiliser l'outil en cas de fatigue.
- **Vérifier les pièces endommagées.** Avant tout autre usage de l'outil, un carter de protection ou tout autre composant endommagé doit être vérifié pour s'assurer qu'il remplira correctement son rôle. Vérifier l'alignement des pièces mobiles, le grippage des pièces en mouvement, la cassure des pièces, leurs fixations et toute autre condition qui pourrait affecter le fonctionnement de l'outil. Sauf indication contraire dans ce manuel, tout carter ou autre composant endommagé doit être réparé ou remplacé par un centre d'entretien autorisé.
- **Faire remplacer les interrupteurs défectueux par un centre d'entretien autorisé.**
- **Ne pas utiliser l'outil si l'interrupteur n'assure pas correctement la mise en marche ou l'arrêt.**
- **Ne pas laisser tomber ou maltraiter la visseuse.**
- **A chaque fois qu'un embout est changé, vérifier que le commutateur de marche avant/marche arrière est à la position "OFF" (ARRÊT) et que l'outil est débranché.**
- **Ne jamais laisser des produits chimiques tels que l'acétone, le benzène, les diluants, la cétone, le trichloréthylène ou d'autres produits similaires, entrer en contact avec le corps de la visseuse sous peine d'endommagement.**
- **Ne pas ajuster le réglage du couple au-delà de la valeur 5 sur l'échelle de couple.**
  Taux de service : modèles 1200 et 2000 t/mn :
  MAXIMUM 0,5 seconde en MARCHE (ON)
  MINIMUM 3,5 secondes à l'ARRÊT (OFF)
  tous les autres modèles :
  MAXIMUM 0,8 seconde en MARCHE (ON)
  MINIMUM 3,5 secondes à l'ARRÊT (OFF)
- **Ne pas visser plus de 900 vis auto-taraudeuses (Ø 2 mm, longueur 4 mm) par heure.**
- **Ne pas actionner l'interrupteur marche avant/marche arrière lorsque le moteur est en marche.**
- **Lorsqu'un outil n'est pas utilisé, placer l'interrupteur marche avant/marche arrière à la position "OFF" (ARRÊT) et débrancher la visseuse.**
- **L'utilisation d'accessoires ou d'équipements autres que ceux recommandés dans ce manuel peut présenter des risques de blessure personnelle.**

SIGNIFICATION DES ETIQUETTES D'AVERTISSEMENT









RÉGLAGES

RÉGLAGE DU COUPLE

Pour régler le couple de ces visseuses, procéder comme suit :

1. Déterminer le couple produit par l'outil en vérifiant une fixation serrée à l'aide d'une clé dynamométrique.
2. Augmenter ou réduire le couple produit en tournant la bague de réglage du couple (4). La rotation de la bague **dans le sens des aiguilles d'une montre** à un chiffre supérieur de l'échelle de couple augmente le couple de serrage, tandis que la rotation de la bague **dans le sens inverse des aiguilles d'une montre** à un chiffre inférieur réduit le couple.

NOTICE

Les chiffres de 1 à 5 sur l'échelle de couple ne sont donnés qu'à titre indicatif et ne sont pas une indication de la valeur réelle du couple de serrage.

3. Vérifier le réglage à l'aide d'une clé dynamométrique. Un certain nombre de facteurs affectera le couple d'un travail à un autre. Le réglage final du couple doit être effectué sur le travail par petites étapes successives. Commencer toujours en dessous du couple désiré et augmenter le couple progressivement.

NE PAS ESSAYER DE RÉPARER CET OUTIL

Toutes les réparations et l'entretien de cet outil doivent être confiés à un centre d'entretien autorisé. Veuillez contacter le bureau de vente listé à la dernière page de cette publication.

NOTICE

CONSERVEZ SOIGNEUSEMENT CES INSTRUCTIONS. NE PAS LES DÉTRUIRE.

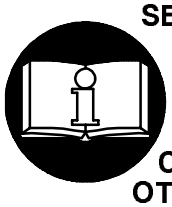
MANUAL DE UTILIZACION Y MANTENIMIENTO DE LOS ATORNILLADORES ELECTRICOS SERIES EL, EP Y ET

E

NOTA

Los atornilladores eléctricos de las series EL, EP y ET tienen conexión a tierra y están diseñados para atornillar en aplicaciones industriales ligeras y aparatos electrodomésticos.
Ingersoll-Rand no aceptará responsabilidad alguna por la modificación de las herramientas efectuada por el cliente para las aplicaciones que no hayan sido consultadas con Ingersoll-Rand.

⚠ AVISO



SE ADJUNTA INFORMACIÓN IMPORTANTE DE SEGURIDAD. LEA Y CONSERVE TODAS ESTAS INSTRUCCIONES ANTES DE PONER EN SERVICIO O USAR ESTA HERRAMIENTA. ES RESPONSABILIDAD DE LA EMPRESA ASEGURARSE DE QUE EL OPERARIO ESTÉ AL TANTO DE LA INFORMACIÓN QUE CONTIENE ESTE MANUAL. EL HACER CASO OMISO DE LOS AVISOS SIGUIENTES PODRÍA OCASIONAR LESIONES. CUANDO SE USAN HERRAMIENTAS ELECTRICAS ES PRECISO ADOPTAR SIEMPRE ENTRE OTRAS LAS SIGUIENTES PRECAUCIONES BASICAS PARA REDUCIR EL RIESGO DE INCENDIO, DESCARGAS ELECTRICAS Y LESIONES.

PARA PONER LA HERRAMIENTA EN SERVICIO

- **Utilice siempre cables de prolongación destinados a usarse al exterior. Cuando se use la herramienta al exterior sólo deben emplearse cables de prolongación especiales para uso al exterior.**
- **Utilice, inspeccione y mantenga siempre esta herramienta de conformidad con toda reglamentación (local, provincial, regional y nacional) que sea de aplicación a herramientas eléctricas que se manejan y sostienen a mano.**
- **Examine periódicamente los cables de las herramientas y, si están estropeados, encargue su reparación a un centro de servicio autorizado. Examine periódicamente los cables de prolongación y cámbielos si están estropeados.**
- **No saque ninguna etiqueta. Sustituya toda etiqueta dañada.**

UTILIZACIÓN DE LA HERRAMIENTA

- **No usar esta herramienta sin tener bien puestos el collar (1) y la brida (2).**
- **Lleve siempre protección ocular cuando utilice esta herramienta o realice operaciones de mantenimiento en la misma.**
- **Las herramientas eléctricas pueden vibrar durante el uso. La vibración, los movimientos repetitivos o las posiciones incómodas pueden dañarle los brazos y manos. En caso de incomodidad, sensación de hormigueo o dolor, deje de usar la herramienta. Consulte con el médico antes de volver a utilizarla.**
- **Protéjase contra las descargas eléctricas.** Evite el contacto del cuerpo con superficies puestas a tierra. Por ejemplo: tuberías, radiadores, cocinas o cámaras frigoríficas.
- **No abuse del cable.** No conviene llevar la herramienta cogida por el cable ni desenchufar el cable dándole un tirón. Proteja el cable del calor, aceite y cantos vivos.
- **Conserve limpio el lugar de trabajo.** Los espacios y bancos de trabajo llenos de estorbos acaban dando lugar a lesiones.
- **Examine el entorno de trabajo.** No exponga las herramientas eléctricas y aparatos cargadores al contacto con agua. Mantenga el lugar de trabajo bien iluminado. No use la herramienta en ambientes explosivos o inflamables.
- **Mantenga apartados a curiosos y niños.** No permita que personal no autorizado utilice ni toque esta herramienta ni el cable.
- **Guarde las herramientas que no se usen.** Cuando no se estén usando conviene guardar las herramientas en un lugar seco, alto o cerrado bajo llave, fuera del alcance de los niños.
- **No fuerce la herramienta.** Hará mejor el trabajo y de manera más segura utilizándola al régimen para el que ha sido proyectada.
- **Use la herramienta conveniente.** No fuerce una herramienta o accesorio pequeño a hacer el trabajo de una herramienta pesada.
- **No conviene usar una herramienta para un fin distinto del previsto.** Ejemplo: No debe usarse un destornillador como taladro.
- **Use ropa adecuada.** No use ropa suelta ni joyería, pues pueden ser atrapadas por piezas en movimiento. Se recomienda usar guantes de goma y calzado antideslizante cuando se trabaje al exterior. Si se lleva el pelo largo conviene contenerlo cubriéndose la cabeza.

NOTA

El uso de piezas de recambio que no sean auténticas de Ingersoll-Rand puede dar lugar a que se sufran lesiones, se reduzca el rendimiento de la herramienta y aumenten los cuidados de mantenimiento necesarios, así como la anulación de toda garantía.

Encargue las reparaciones a una persona capacitada. Esta herramienta eléctrica está construida de conformidad con los requisitos pertinentes en materia de seguridad. Las reparaciones sólo deben ser efectuadas por personal capacitado empleando repuestos de origen, pues de lo contrario el usuario queda expuesto a riesgos considerables.

Las reparaciones sólo se deben encomendar a personal debidamente cualificado y autorizado. Consulte con el centro de servicio autorizado Ingersoll-Rand más próximo.

Impreso en EE. UU.

INGERSOLL-RAND®
PROFESSIONAL TOOLS

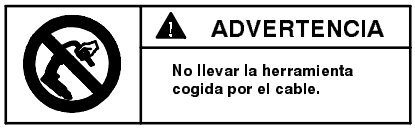
⚠ AVISO

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

USO DE HERRAMIENTA *(Continuación)*

- **Sujete las piezas.** Use mordazas o un tornillo de banco para sostener la pieza. Los operarios a menudo necesitan las dos manos para ejecutar ciertos trabajos.
- **No se estire demasiado.** Mantenga una postura del cuerpo equilibrada y firme, y tenga bien agarrada la herramienta en todo momento.
- **Cuide de las herramientas con atención.** Conserve limpias las herramientas para mejorar su rendimiento y seguridad. Observe las instrucciones para lubricar y cambiar accesorios. Examine periódicamente los cables de las herramientas y, si están estropeados, encargue su reparación a un centro de servicio autorizado. Examine periódicamente los cables de prolongación y cámbielos si están estropeados. Mantenga las empuñaduras secas, limpias y exentas de aceite y grasa.
- **Quite siempre las llaves de ajuste.** Acostúmbrese a constatar que se han quitado de la herramienta las llaves manuales de ajuste antes de conectar la corriente.
- **Evite la puesta en marcha intempestiva.** No lleve la herramienta con el dedo en el interruptor.
- **No deje caer la herramienta ni abuse de ella.**
- **Siempre que no vaya a usar la herramienta, desconecte el interruptor de alimentación poniéndolo en "OFF" y desenchufe el cable.**
- **Manténgase alerta.** Vigile lo que está haciendo. Use el sentido común. No utilice la herramienta cuando esté cansado.
- **Compruebe si hay piezas estropeadas.** Antes de seguir usando la herramienta, una guarda u otra pieza que esté estropeada conviene comprobar con atención que funcionará debidamente y realizará su función prevista. Comprobar la alineación de las piezas móviles y constatar si hay agarrotamiento de elementos móviles, rotura de piezas, su montaje, y cualesquiera otras condiciones que puedan afectar a su funcionamiento. Una guarda u otra pieza cualquiera que esté estropeada debe repararse debidamente o ser sustituída por un centro de servicio autorizado a no ser que se indique otra cosa en alguna parte de este manual.
- **Encarge a un centro de servicio autorizado que sustituya interruptores que estén defectuosos.**
- **No use la herramienta si el interruptor no conecta ni desconecta.**
- **No deje caer el atornillador ni abuse de él.**
- **Siempre que cambie un útil, asegúrese de que el conmutador de cambio del sentido de rotación está puesto en "OFF" y que la herramienta está desenchufada.**
- **No deje que entren en contacto con la carcasa del atornillador sustancias químicas como acetona, benceno, diluyentes, cetona, tricloroetileno ni otros productos químicos similares, pues se producirán daños.**
- **No ajuste el par a un valor más alto que el 5 de la escala.**
  Ciclo de trabajo: Modelos de 1200 rpm y 2000 rpm –
  MAX 0,5 seg. trabajando (ON)
  MIN 3,5 seg en reposo (OFF)
  todos los demás modelos –
  MAX 0,8 seg. trabajando (ON)
  MIN 3,5 seg en reposo (OFF)
- **No apriete más de 900 tornillos autoroscantes (tamaño: 2 mm, longitud: 4 mm) por hora.**
- **No cambie el sentido de rotación mientras el motor esta funcionando.**
- **Siempre que no vaya a usar una herramienta, ponga en "OFF" el mando de inversión del sentido de rotación y desenchufe el atornillador.**
- **El uso de cualquier accesorio o aditamiento distinto de los recomendados en este manual conlleva el riesgo de sufrir lesiones.**

ETIQUETAS DE AVISO



AJUSTE DE PAR

Para ajustar el par en estos atornilladores, proceder como sigue:

1. Constatar el par que desarrolla la herramienta comprobando un tornillo apretado con una llave dinamométrica.
2. Aumentar o reducir el par girando el anillo de ajuste del muelle (4). Girando el anillo **en sentido horario** a un número más alto de la escala aumenta el par, y girándolo **en sentido antihorario** a un número más bajo se reduce el par.

NOTA

Los números del uno al cinco de la escala de pares son sólo números de referencia y no una indicación del par realmente desarrollado.

3. Comprobar el ajuste con una llave diamométrica. Hay una variedad de factores que pueden afectar al par al cambiar de un trabajo a otro. El ajuste definitivo debe hacerse sobre la marcha mediante una serie de incrementos graduales. Conviene empezar siempre con un par inferior al deseado y aumentarlo progresivamente.

ABSTENERSE DE INTENTAR REPARAR ESTA HERRAMIENTA

Todos los trabajos de reparación y mantenimiento de esta herramienta y su cable tienen que ser efectuados por un centro de servicio autorizado. Al final de esta publicación figura la lista de centros de venta.

NOTA

GUARDE ESTAS INSTRUCCIONES. NO LAS DESTRUYA.

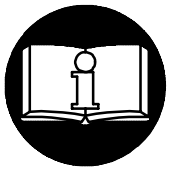
MANUAL DE FUNCIONAMENTO E MANUTENÇÃO PARA AS APARAFUSADORAS ELÉCTRICAS SÉRIE EL, EP E ET

P

AVISO

As Aparafusadoras Eléctricas Séries EL, EP e ET são ligadas à terra (massa) e são concebidas para instalar fixadores roscados em aplicações industriais ligeiras e de fabrico de aparelhos.
A Ingersoll–Rand não pode ser responsabilizada pela modificação de ferramentas para aplicações para as quais não tenha sido consultada.

⚠ ADVERTÊNCIA



IMPORTANTES INFORMAÇÕES DE SEGURANÇA EM ANEXO. LEIA TODAS ESTAS INSTRUÇÕES ANTES DE PÔR A FERRAMENTA EM SERVIÇO OU DE OPERAR ESTA FERRAMENTA E GUARDE ESTAS INSTRUÇÕES.
É RESPONSABILIDADE DA ENTIDADE PATRONAL PÔR AS INFORMAÇÕES CONTIDAS NESTE MANUAL À DISPOSIÇÃO DOS UTILIZADORES.
A NÃO OBEDIÊNCIA ÀS ADVERTÊNCIAS SEGUINTES PODERÁ RESULTAR EM LESÕES PESSOAIS.
AO UTILIZAR FERRAMENTAS ELÉCTRICAS, DEVE–SE SEMPRE SEGUIR AS PRECAUÇÕES BÁSICAS DE SEGURANÇA PARA REDUZIR O RISCO DE INCÊNDIO, CHOQUE ELÉCTRICO E LESÕES PESSOAIS, INCLUINDO O SEGUINTE:

COLOCAÇÃO DA FERRAMENTA EM SERVIÇO

- **Use cabos de extensão para o ar livre. Quando a ferramenta é utilizada ao ar livre, use apenas cabos de extensão apropriados para uso ao ar livre.**
- **Opere, inspeccione e faça manutenção nesta ferramenta sempre de acordo com todos os regulamentos (locais, estatais, federais e nacionais), que possam ser aplicáveis a ferramentas eléctricas de mão/funcionamento manual.**
- **Inspeccione os cabos da ferramenta periodicamente e, se estiverem danificados, mande–os reparar num centro de atendimento autorizado. Inspeccione periodicamente os cabos de extensão e substitua–os se estiverem danificados.**
- **Não retire nenhum rótulo. Substitua os rótulos danificados.**

UTILIZAÇÃO DA FERRAMENTA

- **Não opere esta ferramenta a menos que o Acoplamento Retentor (1) e a Flange (2) estejam instalados com segurança.**
- **Use sempre protecção para os olhos ao operar ou fazer manutenção nesta ferramenta.**
- **As ferramentas eléctricas podem vibrar durante a utilização. Vibração, movimentos repetitivos ou posições desconfortáveis podem ser nocivos às suas mãos e braços. Pare de utilizar qualquer ferramenta se ocorrer desconforto, sensação de formigueiro ou dor. Procure assistência médica antes de reiniciar a utilização.**
- **Protecção Contra Choque Eléctrico.** Impeça contacto do corpo com superfícies ligadas à terra. Por exemplo: tubos, radiadores, fogões metálicos, frigoríficos.
- **Não Force o Cabo.** Nunca transporte a ferramenta pelo cabo ou puxe–o para desligar da tomada. Mantenha o cabo afastado do calor, óleo e arestas afiadas.
- **Mantenha a área de trabalho limpa.** Áreas e bancadas atravancadas constituem um convite a lesões.
- **Considere o ambiente da área de trabalho.** Não exponha ferramentas eléctricas e carregadores à água. Mantenha a área de trabalho bem iluminada. Não utilize a ferramenta em atmosferas explosivas ou inflamáveis.
- **Mantenha afastados os espectadores e as crianças.** Não permita que pessoal não autorizado opere esta ferramenta ou toque na ferramenta ou no cabo.
- **Guarde ferramentas inactivas.** Quando não estiverem em uso, as ferramentas devem ser guardadas num local seco, alto ou trancado, longe do alcance das crianças.
- **Não force a ferramenta.** Esta realizará o trabalho melhor e com mais segurança na potência para a qual foi concebida.
- **Utilize a ferramenta correcta.** Não force uma ferramenta ou acessório pequenos para realizar o trabalho de uma ferramenta para trabalho pesado.
- **Não utilize a ferramenta para uma finalidade para a qual não foi concebida.** Exemplo: Não use uma aparafusadora como um berbequim.
- **Vista–se adequadamente.** Não use roupas soltas ou jóias. Estas podem agarrar em peças móveis. Recomenda–se usar luvas de borracha e calçado antideslizamento ao trabalhar ao ar livre. Use um chapéu ou outra protecção para prender cabelos longos.

AVISO

A utilização de qualquer peça sobresselente que não seja Ingersoll–Rand genuína pode resultar em lesões pessoais, em desempenho reduzido da ferramenta e mais necessidade de manutenção, e pode invalidar todas as garantias.

Esta ferramenta deve ser consertada por uma pessoa qualificada. Esta ferramenta eléctrica está de acordo com os requisitos de segurança relevantes. As reparações só devem ser realizadas por pessoas qualificadas, utilizando peças sobresselentes genuínas, caso contrário, poderá resultar em perigo considerável para o utilizador.

As reparações só devem ser feitas por pessoal autorizado e com formação adequada. Consulte o Representante Autorizado Ingersoll–Rand mais próximo.

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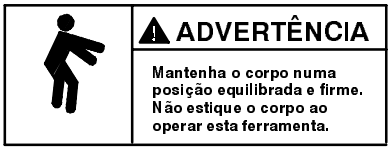
⚠ ADVERTÊNCIA

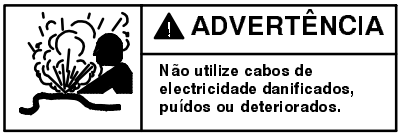
A NÃO OBEDIÊNCIA ÀS ADVERTÊNCIAS SEGUINTES PODERÁ RESULTAR EM LESÕES PESSOAIS.

UTILIZAÇÃO DA FERRAMENTA *(Continua)*

- **Fixe o trabalho.** Use braçadeiras ou um torno de bancada para segurar o trabalho. Frequentemente, os operadores precisam de ambas as mãos para executar as funções do trabalho.
- **Não estique o corpo.** Mantenha os pés numa posição equilibrada e firme e segure firmemente a ferramenta o tempo todo.
- **Mantenha cuidadosamente as ferramentas.** Mantenha as ferramentas limpas para desempenho melhor e mais seguro. Siga as instruções para lubrificação e troca de acessórios. Inspeccione os cabos da ferramenta periodicamente e, se estiverem danificados, mande-os reparar num centro de atendimento autorizado. Inspeccione periodicamente os cabos de extensão e substitua-os se estiverem danificados. Mantenha as pegas secas, limpas e isentas de óleo e gordura.
- **Retire as chaves de mandril e chaves inglesas de ajuste.** Habitue-se a verificar que as chaves de mandril e chaves inglesas de ajuste são retiradas da ferramenta antes de a ligar.
- **Evite arranques involuntários.** Não transporte a ferramenta com o dedo no interruptor.
- **Não deixe cair ou faça mau uso da ferramenta.**
- **Sempre que uma ferramenta não estiver em uso, ponha o Interruptor de Electricidade na posição "OFF" e desligue o cabo de electricidade.**
- **Fique alerta.** Preste atenção ao que está a fazer. Empregue o bom senso. Não opere a ferramenta quando estiver cansado.
- **Examine peças danificadas.** Antes de utilizar a ferramenta novamente, um resguardo ou outra peça que esteja danificada deve ser examinada cuidadosamente para confirmar que ela funcionará adequadamente e que executará a sua função pretendida. Verifique o alinhamento de peças móveis, adesão de peças móveis, quebra de peças, montagem e quaisquer outras condições que possam afectar o funcionamento da ferramenta. Um resguardo ou outra peça que esteja danificada deve ser reparada adequadamente ou substituída num centro de atendimento autorizado, a menos que esteja indicado de forma diferente neste manual de funcionamento.
- **Mande substituir interruptores defeituosos num centro autorizado de atendimento.**
- **Não utilize a ferramenta se o interruptor não a ligar e desligar.**
- **Não deixe cair ou faça mau uso da aparafusadora.**
- **Sempre que for trocar uma ponta, certifique-se de que o Interruptor de Avanço/Reversão está na posição "OFF" e de que a ferramenta está desligada na tomada.**
- **Não permita que produtos químicos como acetona, benzina, solvente, cetona, tricloroetileno ou outros produtos semelhantes entrem em contacto com a carcaça da aparafusadora, pois poderá provocar avaria.**
- **Não ajuste o valor de binário acima de 5 na Escala de Binário.**
  Ciclo de trabalho: modelos de 1200 rpm e 2000 rpm:
  MÁX. 0,5 seg. "LIGADA" ("ON")
  MÍN. 3,5 seg. "DESLIGADA" ("OFF")
  todos os outros modelos:
  MÁX. 0,8 seg. "LIGADA" ("ON")
  MÍN. 3,5 seg. "DESLIGADA" ("OFF")
- **Não aperte mais de 900 parafusos de abrir rosca (tamanho: 2mm, comprimento: 4mm) por hora.**
- **Não opere o Interruptor de Avanço/Reversão quando o motor estiver a funcionar.**
- **Sempre que uma ferramenta não estiver em uso, ponha o Interruptor de Avanço/Reversão na posição "OFF" e desligue a aparafusadora.**
- **A utilização de qualquer acessório que não esteja recomendado neste manual pode apresentar risco de lesões pessoais.**

IDENTIFICAÇÃO DAS ETIQUETAS DE ADVERTÊNCIA





AJUSTES

REGULAÇÃO DE BINÁRIO

Para ajustar a potência de binário destas aparafusadoras, proceda como segue:

1. Determine a potência de binário da ferramenta verificando um fixador apertado com uma chave dinamométrica.
2. Aumente ou diminua a potência de binário rodando o Anel de Ajuste de Mola (4). Rodar o Anel para **a direita**, para um número mais alto na Escala de Binário, aumenta a potência de binário; enquanto rodar o Anel para **a esquerda**, para um número mais baixo, diminui a potência de binário.

AVISO

Os números de um a cinco na Escala de Binário são apenas números de referência e não uma indicação da potência de binário real.

3. Verifique o ajuste com uma chave dinamométrica. Vários factores afectarão a potência de binário de uma tarefa para a outra. O ajuste final da potência de binário deve ser feito na tarefa através de uma série de aumentos graduais. Comece sempre abaixo da potência desejada e aumente gradualmente.

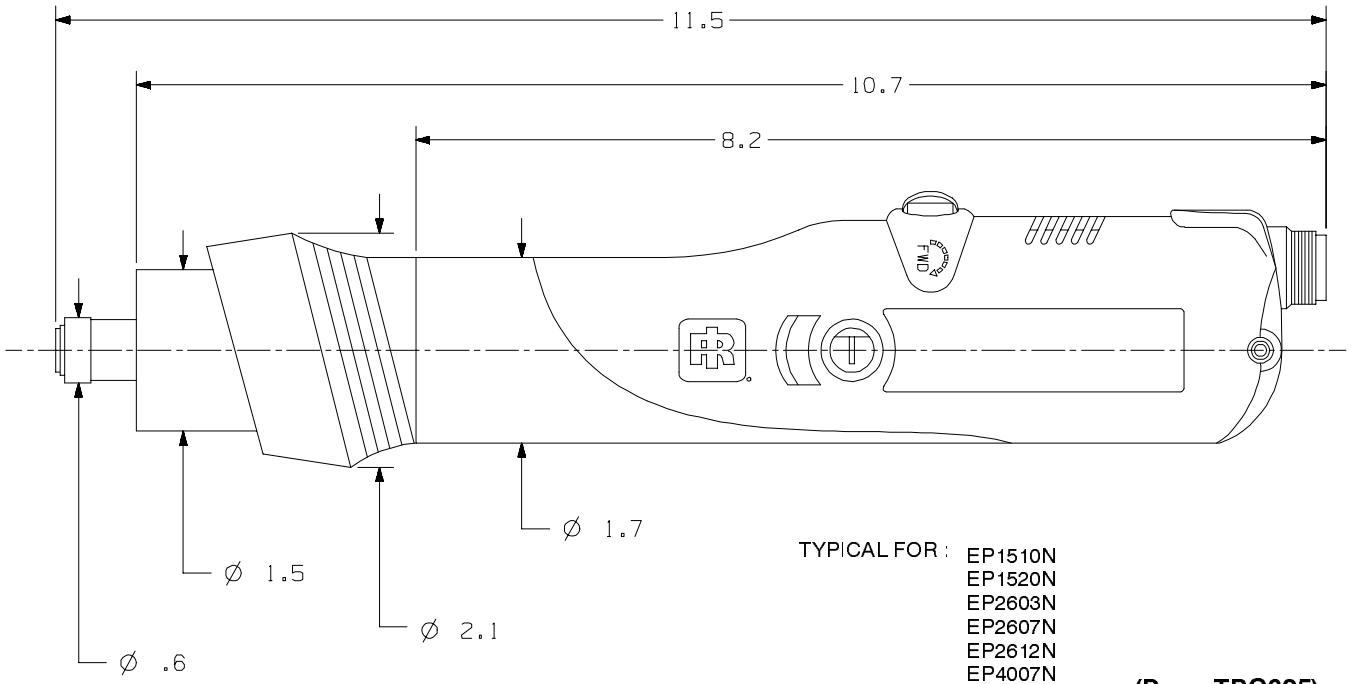
NÃO TENTE REPARAR ESTA FERRAMENTA.

Todas as reparações e manutenção desta ferramenta e do seu cabo têm que ser efectuadas por um centro de atendimento autorizado. Contacte o escritório de vendas listado na última página deste manual.

AVISO

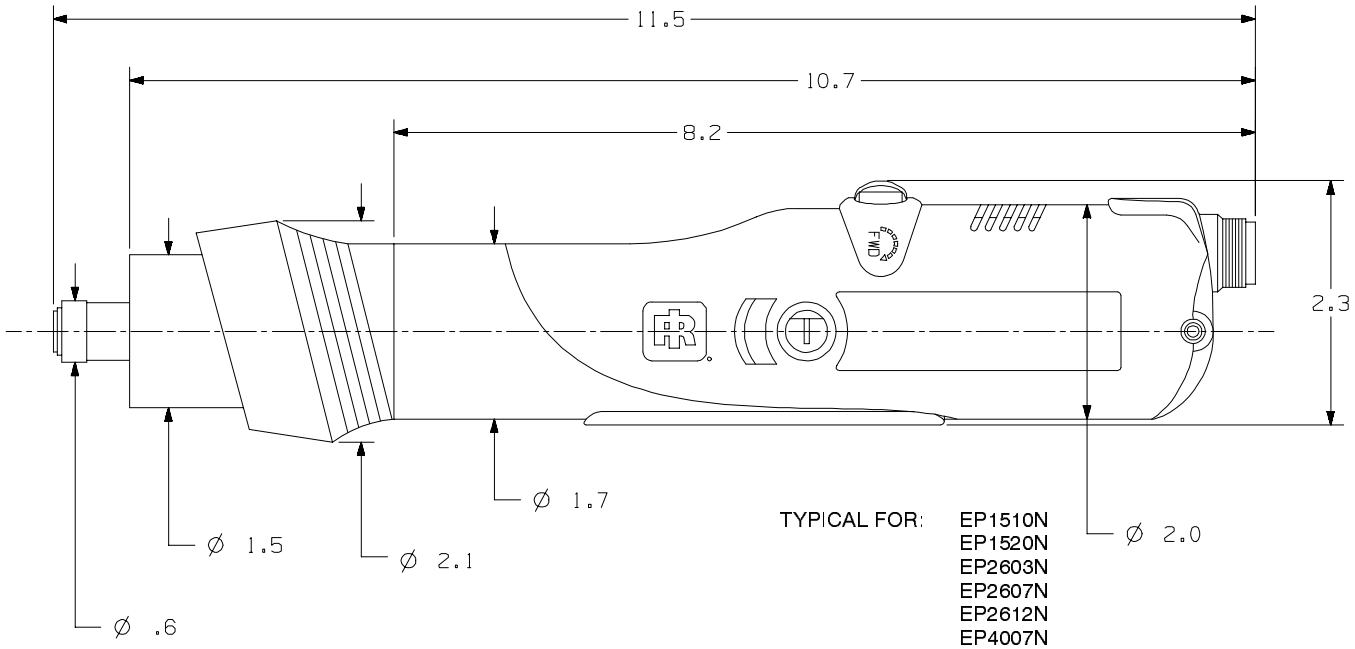
CONSERVE ESTAS INSTRUÇÕES. NÃO AS DESTRUA.

Dimensions for Series EL/EP/ET Electric Screwdrivers



TYPICAL FOR : EP1510N
EP1520N
EP2603N
EP2607N
EP2612N
EP4007N

(Dwg. TPC625)

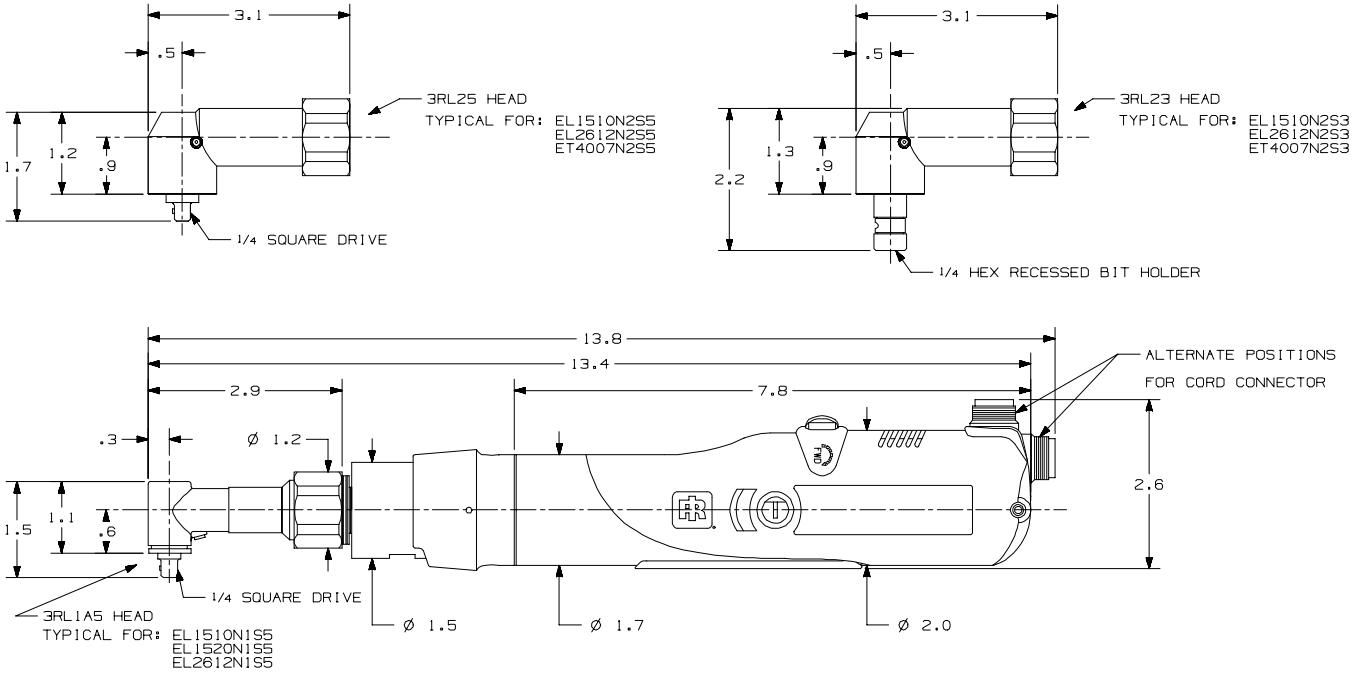


TYPICAL FOR: EP1510N
EP1520N
EP2603N
EP2607N
EP2612N
EP4007N

(Dwg. TPC626)

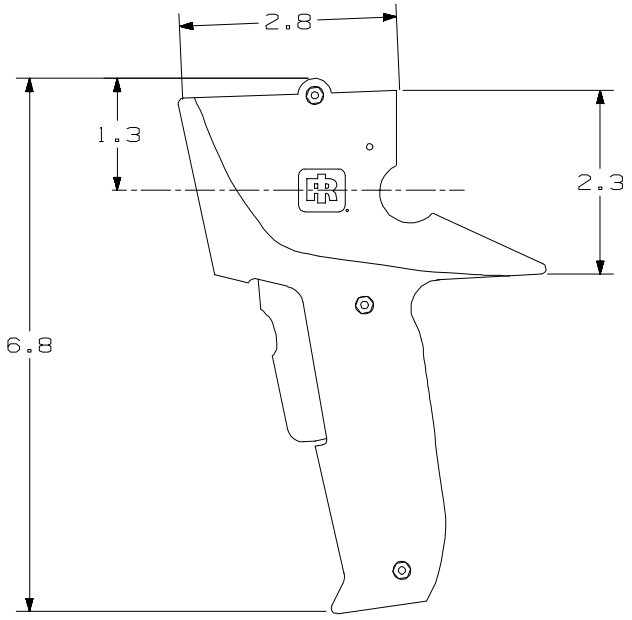
MAINTENANCE SECTION

Dimensions for Series EL/ET Angle Screwdrivers



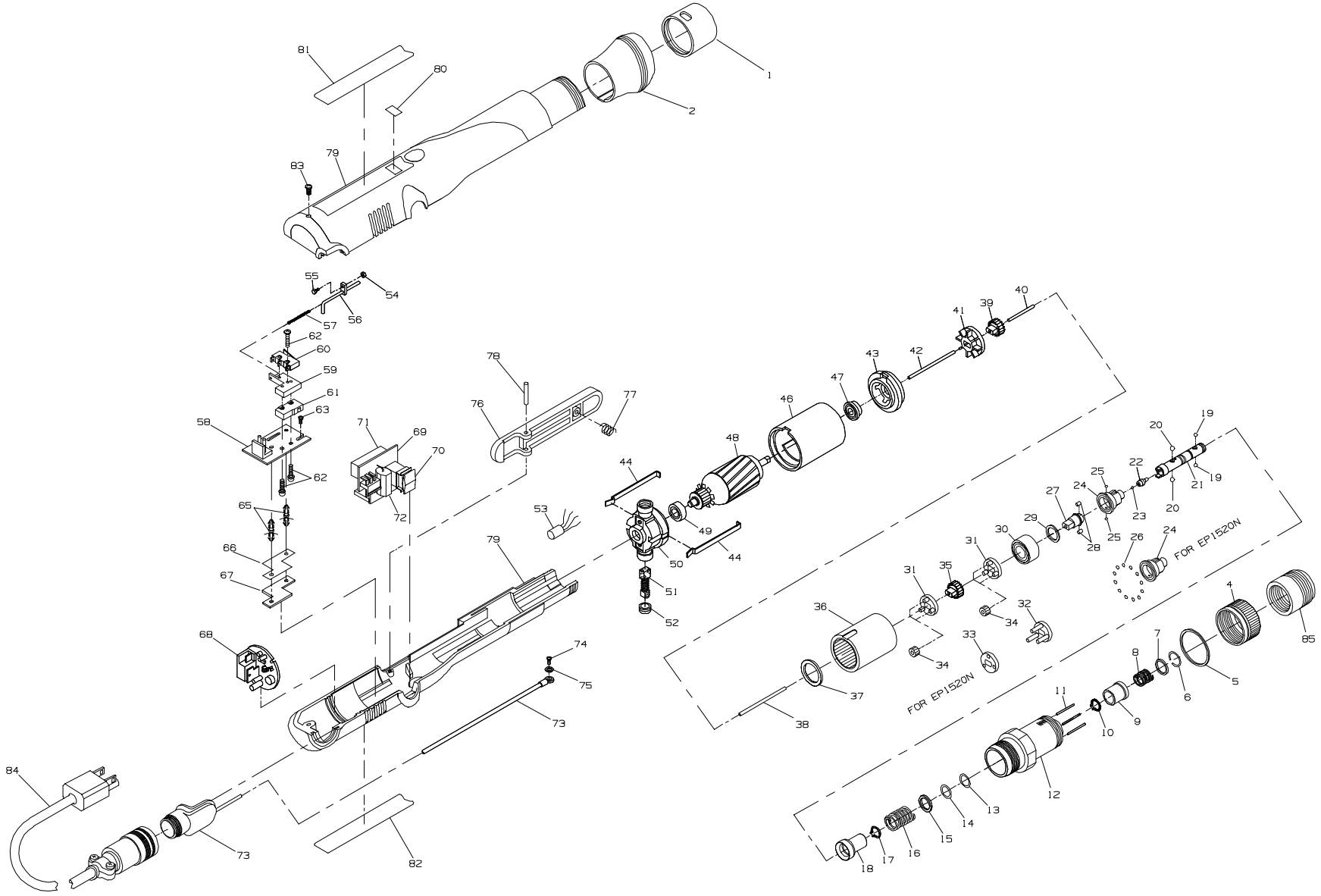
(Dwg. TPC624)

Handle for Series EL/EP/ET Electric Screwdrivers



(Dwg. TPD1829)

Models EL1510N, EL1520N, EL2603N, EL2607N, EL2612N and ET4007N Electric Screwdrivers



(Dwg. TPA1498–1)

Models EL1510N, EL1520N, EL2603N, EL2607N, EL2612N and ET4007N Electric Screwdrivers *(Continued)*

		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING
1	Retainer Coupling	EP4007N-125	26	Cam Guide Bearing Ball (23) (078"dia.) (for EL1520N)	EL1520N-510 EL1520N-510
2	Slanted Flange (standard on 1510N, 1520N, 2603N, 2607N and 2612N)	EP4007N-124	27	Cam	
*	Straight Flange (Standard on 4007N)	EP4007N-123		for ET4007N and EL2603N	EP4007N-581
4	Clutch Adjusting Ring	EP4007N-582		for all others	EP1510N-581
5	Indicator Ring	EP4007N-682	28	Cam Roller (2)	EP4007N-587
6	Bit Retainer Retaining Ring (Front) (for models ending in N only)	EP4007N-683	29	Spindle Washer for EL1520N for all others	EL1520N-509 EP4007N-509
7	Bit Retainer Collar (for models ending in N only)	EP4007N-585	30	Spindle Bearing	EP4007N-510
8	Bit Retainer Spring (for models ending in N only)	EP4007N-931	31	Spindle/Gear Head (2) (for EL1510N, EL2603N and EL2607N	EP2607N-216
9	Bit Retainer Sleeve (for models ending in N only)	EP4007N-930		for EL2612N	EP2612N-216
10	Bit Retainer Retaining Ring	EP4007N-584		for ET4007N	EP4007N-216
11	Clutch Adjusting Pin (3)	EP4007N-416	32	Gear Head (for EL1520N)	EP1520N-216
12	Clutch Housing Assembly for models ending in 1S5, 2S3 or 2S5 for all other models	ET4007N2S5-580 EP4007N-580	33	Gear Head Spacer (for EL1520N)	EP1520N-108
13	Front Shim	EL4007N-623	34	Planet Gear for EL1510N (6) for EL1520N (3) for EL2603N (6) for EL2607N (6) for EL2612N (6) for EL4007N (6)	EP1510N-10 EP1520N-10 EP2603N-10 EP2607N-10 EP2612N-10 EP4007N-10
14	Rear Shim	EL4007N-624			
15	Clutch Spring Plate	EP4007N-623			
16	Clutch Spring for EL1510N for EL1520N for EL2612N, EL2603N and EL2607N for EL4007N	EP4007N-583 EP1520N-583 EP2607N-583 EP4007N-583			
17	Taper Ring Retaining Ring	EP4007N-584	35	Gear Head Pinion Gear for EL1510N and EL1520N for EL2603N for EL2607N for EL2612N for EL4007N	EP1510N-17 EP2603N-17 EP2607N-17 EP2612N-17 EP4007N-17
18	Taper Ring Assembly for EL1520N for EL2612N, EL2607N, EL1510N and EL2603N for ET4007N	EP1520N-588 EP2607N-588 EP4007N-588			
19	Bit Retaining Ball (.094 dia.) (2) (for models ending in N only)	R000B-263	36	Gear Case for EL1510N for EL1520N, EL2603N, EL2612N and EL4007N for EL2607N	EP1510-37 EP4007N-37 EP2607N-17
20	Pilot Cam Ball (.156 dia.) (4)	2U-696			
21	Bit Holder Assembly	EP4007N-586			
22	Pilot	EP4007N-408	37	Gear Case Shield	EP4007N-207
23	Pilot Ball (.062 dia.)	EP4007N-422	38	Clutch Pilot Rod "I" (2.26" long)	EP4007N-435
24	Cam Guide for EL1520N for all others	EP1520N-681 EP4007N-681			
25	Cam Guide Ball (.156 dia.)	2U-696			

* Not illustrated.

Models EL1510N, EL1520N, EL2603N, EL2607N, EL2607N, EL2612N and ET4007N Electric Screwdrivers *(Continued)*

		PART NUMBER FOR ORDERING
39	Fan Pinion Gear	
	for EL1510N	EP1510N-18
	for EL1520N and EL2603N	EP2603N-18
	for EL2607N	EP2607N-18
	for EL2612N	EP2612N-18
	for EL4007N	EP4007N-18
40	Fan Pilot Rod "G" (.385" long)	EP4007N-436
41	Fan	EP4007N-52
42	Motor Pilot Rod "J" (2.71" long)	EP4007N-437
	Motor Assembly	
	for EL2603N	EP2603N-A53
	for EL1510N and EL2607N	EP2607N-A53
	for EL1520N	EP1520N-A53
	for EL2612N and EL4007N	EP4007N-A53
43	Front End Plate	EP4007N-11
44	Motor Assembly Spring (2)	EP4007N-98
46	Field	
	for EL1510N, EL2603N and EL2607N	EP2607N-54
	for EL1520N, EL2612N and EL4007N	EP4007N-54
47	Front Armature Bearing	EP4007N-24
48	Armature	
	for EL2603N	EP2603N-53
	for EL1510N and EL2607N	EP2607N-53
	for EL1520N	EP1520N-53
	for EL2612N and EL4007N	EP4007N-53
49	Rear Armature Bearing	EP4007N-22
50	Rear End Plate	EP4007N-12
51	Brush Assembly (includes 10 pieces)	EP4007N-BP
52	Brush Cap (2)	EP4007N-25
53	Motor Coil	EP4007N-594
54	Adjusting Screw Nut	EP4007N-593

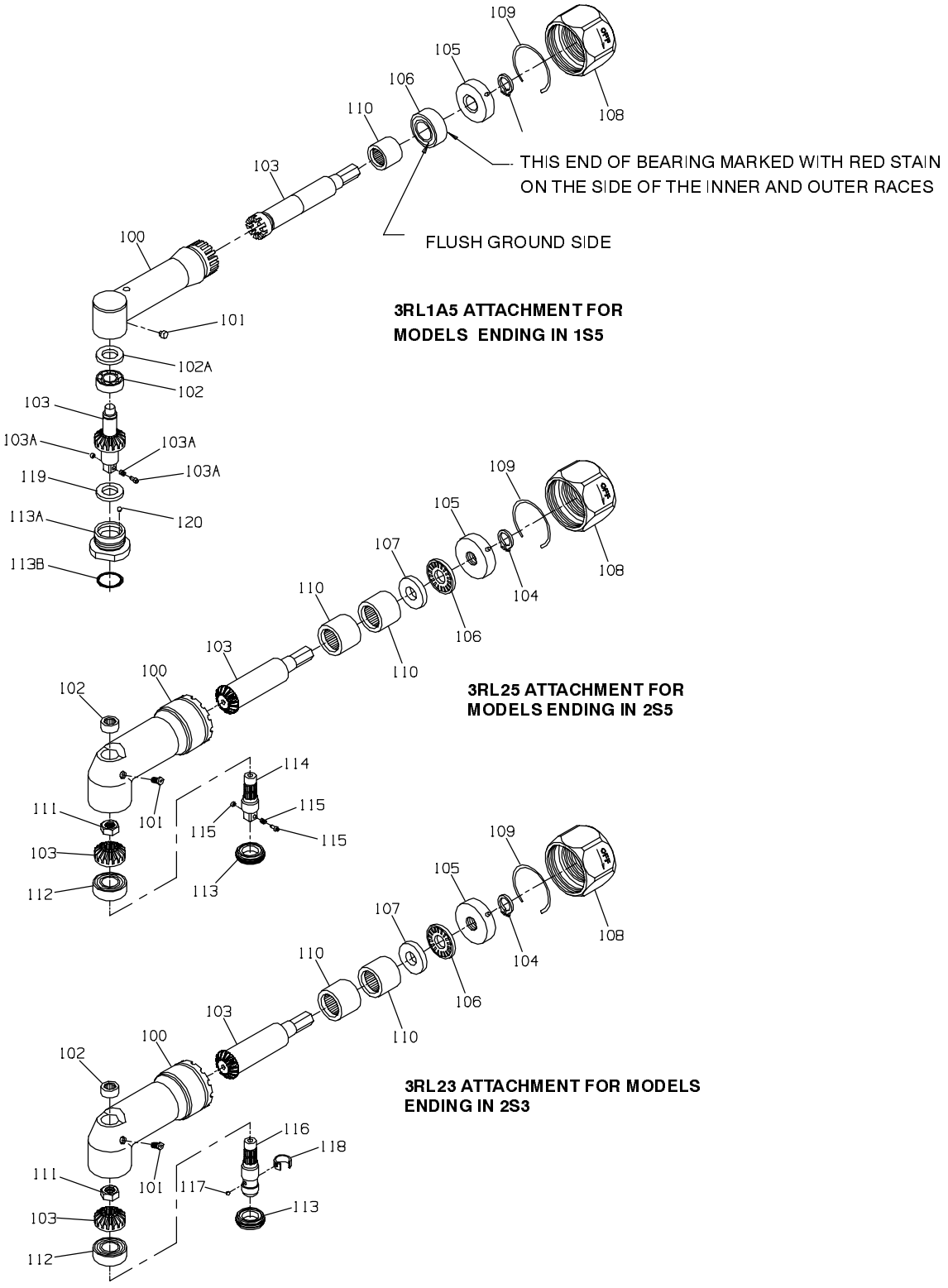
		PART NUMBER FOR ORDERING
55	Pilot Rod Adjusting Screw	EP4007N-592
56	Pilot Rod "D"	EP4007N-438
57	Pilot Rod Spring	EP4007N-595
58	Microswitch Circuit Board	EL4007N-220
59	Switch Plate	EL4007N-221
60	Shut-off Switch	EP4007N-223
61	Start Switch	EL4007N-222
62	Switch Screw (12 mm) (4)	EP4007N-224
63	Switch Base Screw (5 mm) (2)	EP4007N-226
65	Switch Base Spacer (2)	EP4007N-225
66	Insulating Film	EP4007N-227
67	Brush Light Circuit Board	EP4007N-228
68	Controller Assembly	EP4007N-424
	Reverse Switch Circuit Board Assembly	EP4007N-A229
69	Reverse Switch Circuit Board	EP4007N-229
70	Reverse Switch	EP4007N-329
*	Reverse Switch Rocker	EP4007N-330
71	Capacitor	EP4007N-230
72	Resistor	EP4007N-231
73	Receptacle Assembly	EP4007N-44
74	Ground Screw	EP4007N-42
75	Ground Screw Washer	EP4007N-43
	Housing Assembly	
	for EL1510N	EL1510N-A40
	for EL1520N	EL1520N-A40
	for EL2603N	EL2603N-A40
	for EL2607N	EL2607N-A40
	for EL2612N	EL2612N-A40
	for ET4007N	EL4007N-A40
76	Throttle Lever	EL4007N-273
77	Throttle Spring	EL4007N-274
78	Throttle Lever Pin	EL4007N-275
79	Housing Package	EP4007N-40

* Not illustrated.

Models EL1510N, EL1520N, EL2603N, EL2612N, EL2612N, and ET4007N Electric Screwdrivers

		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING
80	Brush Light Cover	EP4007N–45	*	Microswitch Adjusting Wrench Package	ES60T–MSW
81	Nameplate		*	Pistol Grip Assembly	EP4007N–48
	for EL1510N	EL1510N–301	*	Power Cord (12'; straight)	EP4007N–239–12
	for EL1520N	EL1520N–301	*	Power Cord (6'; coiled)	EP4007N–230–C6
	for EL2603N	EL2603N–301	*	Test Brush (115 V)	EP4007N–TB115
	for EL2607N	EL2607N–301	*	Switch Adjustment Gauge (for high torque models)	EP1510N–SG
	for EL2612N	EL2612N–301	*	Gear Case Jig (for high torque models)	EP1510N–J37
	for EL4007N	EL4007N–301	*	Hardware Package (includes illustrated items 6, 10, 17, 19[2], 44[2[, 52[2], 54, 55, 62[4], 63[2], 66, 74, 75, 77, 78 and 83	El4007N–HP
82	Warning Label	EP4007N–99			
83	Housing Screw (package of 10)	EP4007N–41	*	Maintenance Label	
84	Power Cord (8'; straight)	EP4007N–239–8		English	EP4007N–302
85	Angle Head Coupling (for models ending in 1S5, 2S3 or 2S5 only)	EL4007N2S5H–AHC		French	EP4007N–302F
*	Torque Adjusting Wrench	EP4007N–516		German	EP4007N–302G
*	Suspension Bail			Spanish	EP4007N–302S
	for ET4007N (fits Pistol Grip)	EP4007N–366			
	for all others (fits tool)	EP4007N–365			

* Not illustrated.


109
105
106
110
108
103
THIS END OF BEARING MARKED WITH RED STAIN ON THE SIDE OF THE INNER AND OUTER RACES
100
FLUSH GROUND SIDE
101
3RL1A5 ATTACHMENT FOR MODELS ENDING IN 1S5
102A
102
103
103A
103A
103A
119
120
113A
113B
109
105
107
108
104
110
106
103
110
100
3RL25 ATTACHMENT FOR MODELS ENDING IN 2S5
102
114
111
101
115
115
115
103
113
112
109
105
107
108
104
110
106
103
110
100
3RL23 ATTACHMENT FOR MODELS ENDING IN 2S3
102
116
118
111
101
117
113
103
112

(Dwg. TPA1514)

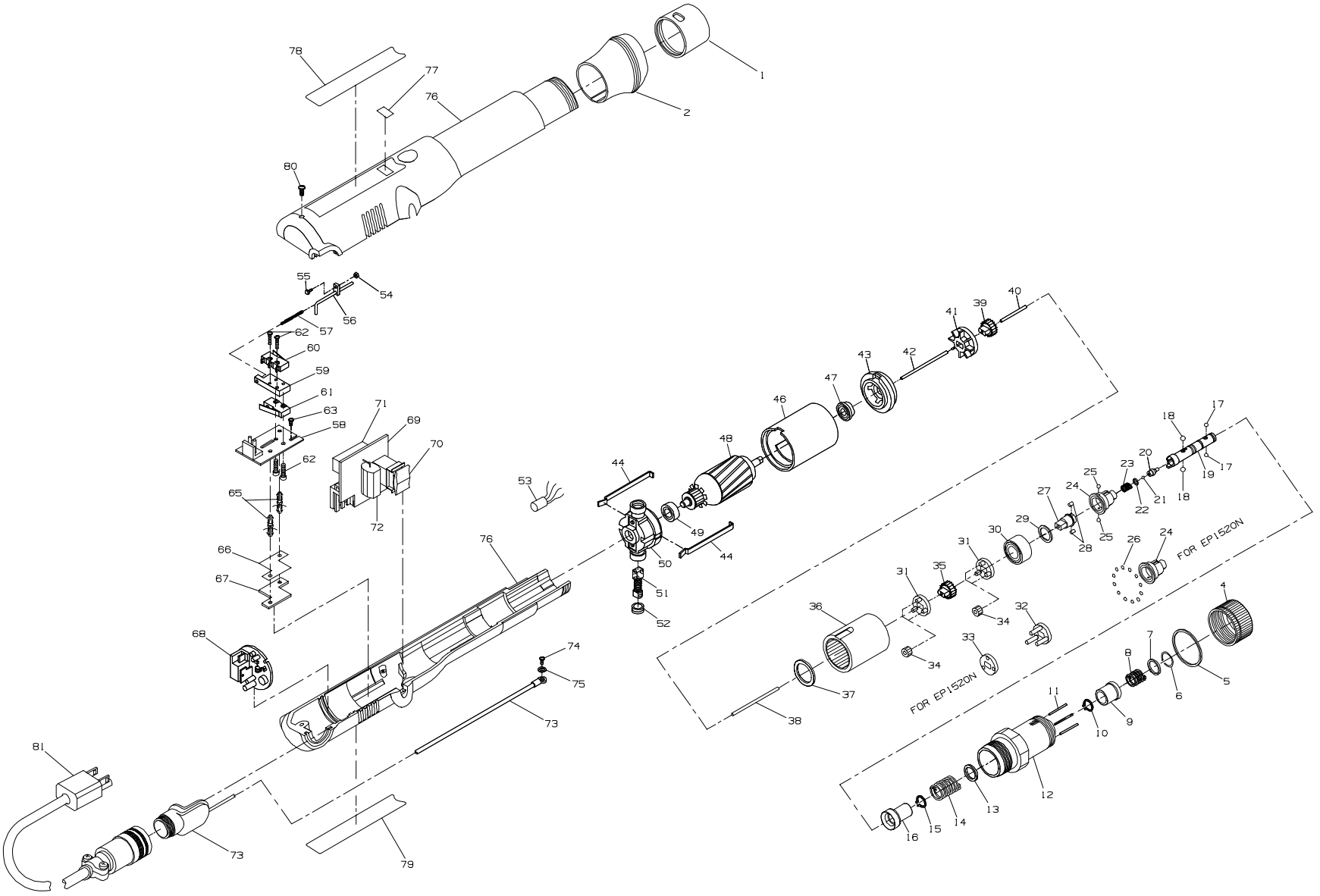
PART NUMBER FOR ORDERING

		For Models Ending in 1S5	For Models Ending in 2S3	For Models Ending in 2S5
	Angle Attachment	3RL1A5	3RL23	3RL25
100	Angle Housing Assembly	3RL1A–A550	3RL2–A550	3RL2–A550
101	Grease Fitting	D0F9–879	D0F9–879	D0F9–879
102	Spindle Upper Bearing	-----	120A4–603	120A4–603
102	Upper Spindle Bearing	7L1A–603	-----	-----
102A	Shim Packet	7L1A–P448	-----	-----
103	Matched Gear Set (Bevel Gear and Pinion not sold separately)	3RL1A5–A591	3RL2–A552	3RL2–A552
103A	Socket Retainer Assembly (consists of Plunger, Spring and Washer)	500B–816A	-----	-----
104	Thrust Bearing Retainer	3RL2–705	3RL2–705	3RL2–705
105	Rear Thrust Bearing Seat	3RL2–682	3RL2–682	3RL2–682
106	Bevel Pinion Thrust Bearing	3RL1A–514	3RL2–105	3RL2–105
107	Front Thrust Bearing Seat	-----	3RL2–683	3RL2–683
108	Coupling Nut	3RL2–27	3RL2–27	3RL2–27
109	Coupling Nut Retainer	3RL2–29	3RL2–29	3RL2–29
110	Bevel Pinion Bearing (2 for 3RL23 and 3RL25; 1 for 3RL1A5)	7AH–24	H54U–511B	H54U–511B
111	Bevel Gear Retainer Nut	-----	120A4–578	120A4–578
112	Spindle Lower Bearing	-----	120A4–593	120A4–593
113	Angle Housing Cap	-----	120A4–531	120A4–531
113A	Angle Housing Cap Assembly	3RL1A–531	-----	-----
113B	Angle Housing Cap Seal	3RL1A–513	-----	-----
114	1/4" Square Drive Spindle Assembly	-----	-----	-----
	Spindle Assembly	-----	-----	141A9–607–1/4
• 115	Socket Retainer (consists of Plunger, Spring and Washer)	-----	-----	500B–816A
116	1/4" Hex Bit Holder Spindle Assembly (for standard bits)		5L2C3–B586	-----
117	Bit Retaining Ball (0.125" diameter)	-----	AV1–255	-----
118	Bit Retaining Spring	-----	102A60–241	-----
119	Ball Race	3RL1A–532	-----	-----
120	Steel Ball (1/16" diameter) (20)	3RL1A–512	-----	-----
	Housing Cap Wrench	-----	141A12–26	141A12–26

* Not illustrated.

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

Models EP1510N, EP1520N, EP2603N, EP2607N and EP4007N



(Dwg. TPA1499)

Models EP1510N, EP1520N, EP2603N, EP2607N, EP2612N and EP4007N Electric Screwdriver

		PART NUMBER FOR ORDERING
1	Retainer Coupling	EP4007N-125
2	Slanted Flange (Standard on 1510N, 1520N, 2603N, 2607N and 2612N)	EP4007N-124
*	Straight Flange (Standard on 4007N)	EP4007N-123
4	Clutch Adjusting Ring	EP4007N-582
5	Indicator Ring	EP4007N-682
6	Bit Retainer Retaining Ring (Front)	EP4007N-683
7	Bit Retainer Collar	EP4007N-585
8	Bit Retainer Spring	EP4007N-931
9	Bit Retainer Sleeve	EP4007N-930
10	Bit Retainer Retaining Ring	EP4007N-584
11	Clutch Adjusting Pin (3)	EP4007N-416
12	Clutch Housing Assembly	EP4007N-580
13	Clutch Spring Plate	EP4007N-623
14	Clutch Spring	
	for EP1510N	EP1510N-583
	for EP1520N	EP1520N-583
	for EP2603N, EP2607N and EP2612N	EP2607N-583
	for EP4007N	EP4007N-583
15	Taper Ring Retaining Ring	EP4007N-584
16	Taper Ring Assembly	
	for EP1520N	EP1520N-588
	for EP1510N, EP2603N, EP2607N and EP2612N	EP2607N-588
	for EP4007N	EP4007N-588
17	Bit Retaining Ball (.094 dia.) (2)	R000B-263
18	Pilot Cam Ball (.156 dia.) (4)	2U-696
19	Bit Holder Assembly	EP4007N-586
20	Pilot	EP4007N-408
21	Pilot Ball (.062 dia.)	EP4007N-422
22	Pilot Push Spring Washer	EP4007N-421
23	Pilot Push Spring	EP4007N-420
24	Cam Guide	
	for EP1520N	EP1520N-681
	for all others	EP4007N-681
25	Cam Guide Ball (.156 dia.)	2U-696
26	Cam Guide Bearing Ball (23) (for EP1520N)	EP1520N-510
27	Cam	
	for EP2603N and EP4007N	EP4007N-581
	for all others	EP1510N-581
28	Cam Roller (2)	EP4007N-587
29	Spindle Washer	
	for EP1520N	EP1520N-509
	for all others	EP4007N-509
30	Spindle Bearing	EP4007N-510
31	Spindle/Gear Head (2)	
	for EP1510N, EP2603N and EP2607N	EP2607N-216
	for EP2612N	EP2612N-216
	for EP4007N	EP4007N-216
32	Gear Head (for EP1520N)	EP1520N-216
33	Gear Head Spacer (for EP1520N)	EP1520N-108
34	Planet Gear	
	for EP1510N (6)	EP1510N-10
	for EP1520N (3)	EP1520N-10
	for EP2603N (6)	EP2603N-10
	for EP2607N (6)	EP2607N-10
	for EP2612N (6)	EP2612N-10
	for EP4007N (6)	EP4007N-10
35	Gear Head Pinion Gear	
	for EP1510N and EP1520N	EP1510N-17
	for EP2603N	EP2603N-17
	for EP2607N	EP2607N-17
	for EP2612N	EP2612N-17
	for EP4007N	EP4007N-17
36	Gear Case	EP1510N-37
	for EP1510N	
	for EP1520N, EP2603N, EP2612N and EP4007N	EP4007N-37
	for EP2607N	EP2607N-37
37	Gear Case Shield	EP4007N-207
38	Clutch Pilot Rod "I" (2.26" long)	EP4007N-435

* Not illustrated.

Models EP1510N, EP1520N, EP2603N, EP2607N, EP2612N and EP4007N Electric Screwdrivers *(Continued)*

		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING
39	Fan Pinion Gear		54	Adjusting Screw Nut	EP4007N–593
	for EP1510N	EP1510N–18	55	Pilot Rod Adjusting Screw	EP4007N–592
	for EP1520N and EP2603N	EP2603N–18	56	Switch Pilot Rod "D"	EP4007N–438
	for EP2607N	EP2607N–18	57	Pilot Rod Spring	EP4007N–595
	for EP2612N	EP2612N–18	58	Microswitch Circuit Board	EP4007N–220
	for EP4007N	EP4007N–18	59	Switch Plate	EP4007N–221
40	Fan Pilot Rod "G" (.385" long)	EP4007N–436	60	Shut–off Switch	EP4007N–223
41	Fan	EP4007N–52	61	Start Switch	EP4007N–222
42	Motor Pilot Rod "J" (2.71" long)	EP4007N–437	62	Switch Screw (12 mm) (4)	EP4007N–224
	Motor Assembly		63	Switch Base Screw (5 mm) (2)	EP4007N–226
	for EP2603N	EP2603N–A53	65	Switch Base Spacer (2)	EP4007N–225
	for EP1520N	EP1520N–A53	66	Insulating Film	EP4007N–227
	for EP1510 and EP2607N	EP2607N–A53	67	Brush Light Circuit Board	EP4007N–228
	for EP2612N and EP4007N	EP4007N–A53	68	Controller Assembly	EP4007N–424
43	Front End Plate	EP4007N–11		Reverse Switch Circuit Board Assembly	EP4007N–A229
44	Motor Assembly Spring (2)	EP4007N–98	69	Reverse Switch Circuit Board	EP4007N–229
46	Field		70	Reverse Switch	EP4007N–329
	for EP1510N, EP2603N and EP2607N	EP2607N–54	*	Reverse Switch Rocker	EP4007N–330
	for EP1520N, EP2612N		71	Capacitor	EP4007N–230
	and EP4007N	EP4007N–54	72	Resistor	EP4007N–231
47	Front Armature Bearing	EP4007N–24	73	Receptacle Assembly	EP4007N–44
48	Armature		74	Ground Screw	EP4007N–42
	for EP2603N	EP2603N–53	75	Ground Screw Washer	EP4007N–43
	for EP1520N	EP1520N–53		Housing Assembly	
	for EP1510N and EP2607N	EP2607N–53		for EP1510N	EP1510N–A40
	for EP2612N and EP4007N	EP4007N–53		for EP1520N	EP1520N–A40
49	Rear Armature Bearing	EP4007N–22		for EP2603N	EP2603N–A40
50	Rear End Plate	EP4007N–12		for EP2607N	EP2607N–A40
51	Brush Assembly (includes 10 pieces)	EP4007N–BP		for EP2612N	EP2612N–A40
52	Brush Cap (2)	EP4007N–25		for EP4007N	EP4007N–A40
53	Motor Coil	EP4007N–594	76	Housing Package	EP4007N–40

* Not illustrated.

Models EP1510N, EP1520N, EP2603N, EP2612N, EP2612N and EP4007N Electric Screwdrivers *(Continued)*

		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING
77	Brush Light Cover	EP4007N-45	*	Pistol Grip Assembly	EP4007N-48
78	Nameplate		*	Power Cord (12'; straight)	EP4007N-239-12
	for EP1510N	EP1510N-301	*	Power Cord (6'; coiled)	EP4007N-230-C6
	for EP1520N	EP1520N-301	*	Test Brush (115 V)	EP4007N-TB115
	for EP2603N	EP2603N-301	*	Switch Adjustment Gauge (for high torque	
	for EP2607N	EP2607N-301	*	models)	EP1510N-SG
	for EP2612N	EP2612N-301	*	Gear Case Jig (for high torque models)	EP1510N-J37
	for EP4007N	EP4007N-301	*	Hardware Package (includes illustrated items 6,	
79	Warning Label	EP4007N-99		10, 15, 17[2], 44[2[, 52[2], 54, 55, 62[4[, 63[2],	
80	Housing Screw (package of 10)	EP4007N-41		66, 74, 75 and 80	EP4007N-HP
81	Power Cord (8'; straight)	EP4007N-239-8	*	Maintenance Label	
*	Torque Adjusting Wrench	EP4007N-516		English	EP4007N-302
*	Suspension Bail			French	EP4007N-302F
	for EP4007N (fits Pistol Grip)	EP4007N-366		German	EP4007N-302G
	for all others (fits tool)	EP4007N-365		Spanish	EP4007N-302S
*	Microswitch Adjusting Wrench Package	ES60T-MSW			

* Not illustrated.

DISASSEMBLY

⚠ WARNING

Always wear eye protection when operting or performing maintenance on this tool. Always turn off the electrical supply and disconnect the electrical cord before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.

Disassembly of the Housing

1. Unplug the Power Cord (81 or 84) from the wall socket. Unscrew the connection ring and set the cord aside.
2. Unscrew the Retainer Coupling (1) and remove the Flange (2).

NOTICE

This is a left-hand thread.

3. Lay the tool on the workbench with the Brush Light Plate (77 or 80) side down and remove the Housing Screw (80 or 83) using a #1 phillips screwdriver.
4. Insert a thin blade screwdriver into the two notches and carefully pry the two halves of the Housing Package (76) apart.
   For Throttle Lever Start Models, remove the Throttle Lever (76), Throttle Spring (77) and Throttle Lever Pin (78).

Disassembly of the Clutch Housing and Gear Case

1. Tilt the Clutch Housing (12), Gear Case (36) and Motor Assembly upward slightly and turn the Gear Case until the Ground Screw (74) shows.

NOTICE

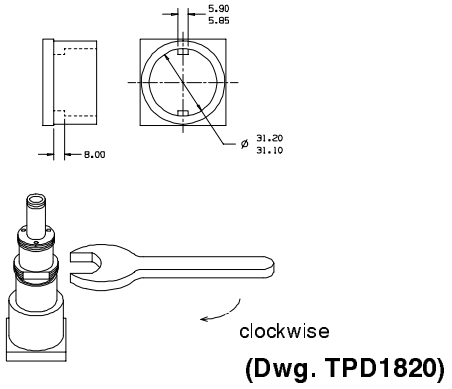
Be sure to hold the Motor Assembly and Gear Case together. Rough handling may damage the Fan Pilot Rod (40) in the Fan (41).

2. Using a phillips screwdriver, remove the Ground Screw and the Ground Screw Washer (75).
3. Remove the Clutch Housing and Gear Case from the Housing. When removing the Gear Case from the Housing, hold the Gear Case Shield (37) so that the Gears do not fall out.
4. Remove the Fan (41) and the Fan Pinion Gear (39). Remove the Fan Pilot Rod (40).

NOTICE

The Fan Pilot Rod is ceramic. Do not mishandle or drop.

5. Remove the Gear Case Shield and drop the two Spindle/Gear Heads (31) from the Gear Case.
6. Separate the Spindle/Gear Heads and remove the Gear Head Pinion Gear (35) and Planet Gears (34).
7. Fit the two notches at the rear of the Gear Case into the Gear Case Jig part no. EP1510N-J37. (Refer to Dwg. TPD1820)



(Dwg. TPD1820)

8. Using a thin blade screwdriver, remove the Front Bit Retainer Retaining Ring (6) from the Bit Retainer Sleeve (9). Remove the Bit Retainer Collar (7), the Bit Retainer Spring (8) and the Bit Retainer Sleeve.
9. Remove the two Bit Retaining Balls (17 or 19) from the Bit Holder Assembly (19 or 21) by tapping the Housing on the work surface.
10. Unscrew the Clutch Adjusting Ring (4) and remove the three Clutch Adjusting Pins (11).
11. Using external snap ring pliers, remove the Bit Retainer Retaining Ring (10).
12. Using a 29mm wrench on the flats of the Clutch Housing, unscrew and remove the Clutch Housing from the Gear Case.

NOTICE

This is a left-hand thread.

13. Remove the Clutch Spring Plate (13 or 15) and the Clutch Spring (14 or 16).
14. Remove the Taper Ring Retaining Ring (15 or 17).
15. Remove the Bit Holder Assembly and separate it from the Taper Ring Assembly (16 or 18).
16. Remove the two Pilot Cam Balls (18 or 20), the Pilot Push Spring (23), the Pilot Push Spring Washer (22) and the Pilot (20 or 22) from the Bit Holder Assembly.
17. **For Throttle Lever Start Models**, remove the Front Shim (13) and the Rear Shim (14) first. Then remove the Taper Ring Retaining Ring. Separate the Taper Ring Assembly from the Bit Holder. Remove the two Pilot Cam Balls and the Pilot (22) from the Bit Holder Assembly.
18. Remove the Clutch Pilot Rod (38) and the Cam Guide (24). Remove the two Cam Guide Balls (25) from the Guide.

19. Lift the Gear Case from the Gear Case Jig and push the Spindle Bearing (30) and Cam (27) from the Case.
20. Lift the Cam from the Spindle Bearing and remove the Cam Rollers (28).
21. Slide the Spindle Washer (29) from the Spindle Bearing.

Cleaning and Inspection of the Tool

1. Clean all of the mechanical parts in an approved safety solution in a well–ventilated area. Inspect for damage or wear.
2. Inspect the Fan. If the four corners of the hole are worn, replace the Fan.
3. Inspect the Fan Pinion Gear and Fan Pilot Rod. If they are damaged or cracked, replace them.
4. If the taper on the Pilot is worn, replace the Pilot and the two Pilot Cam Balls.
5. Inspect the Cam Guide Balls. If they are worn, replace them.
6. Inspect the Cam Guide. If its holes are worn, replace it.
7. Inspect the Taper Ring Assembly. If the internal taper is worn, replace it.
8. Inspect the Cam Rollers. If they are worn, replace them.
9. Inspect the Spindle Washer. If the surface is worn, replace it.
10. Inspect the Spindle Bearing. If it does not rotate smoothly, replace it.
11. Inspect the Gears and the Gear Case. If the teeth are worn, replace them.

Disassembly of the Electrical Components

1. Remove the Reverse Switch Circuit Board (69) from the Housing.

NOTICE

Do not touch any circuit paths if using pliers.

2. Loosen the Receptacle Assembly (73).
3. Using a #0 phillips screwdriver, remove the two Switch Base Screws (63) mounted on the Microswitch Circuit Board (58).

NOTICE

The Switch Base Screws are coated with thread adhesive. Unscrew gradually to prevent damage to the threads.

4. Remove the Motor Assembly and the Controller Assembly (68) from the Housing Package while holding both of them together.

NOTICE

Be careful not to damage the Motor Pilot Rod (42).

5. To remove the Controller Assembly, pull the three–pin connector from the Reverse Switch Circuit Board.
6. Remove the two–pin connector from the Microswitch Circuit Board.
7. Using needle nose pliers, remove the three wires from the Shut–off Switch (60).

NOTICE

Be careful not to damage the Shut–off Switch Terminals.

8. Set the Controller Assembly aside.
9. Grasp the Microswitch Circuit Board using needle nose pliers and squeeze the ends of the two white Switch Base Spacers (65).
10. Using needle nose pliers, squeeze the Switch Base Spacers and remove the Insulating Film (66).
11. Using the pliers, remove the Switch Base Spacers from the Brush Light Circuit Board.
12. Remove the two Shut–off Switch Screws (62).
13. Remove the two Start Switch Screws (62).
14. Remove the Switch Plate (59) and the Switch Pilot Rod (56) from the Switch Plate.
15. Inspect the tip of the Switch Pilot Rod. If it is bent or worn, replace it.
16. Check the Shut–off Switch for continuity. Replace it if defective.
17. Check the Start Switch (61) for continuity. If it is defective, desolder and remove it from the Microswitch Circuit Board.
18. If the Brush Light Circuit Board is defective, desolder and remove the red and blue wires.
19. If the components on the Reverse Switch Circuit Board are damaged or defective, desolder and remove the red and blue wires.
20. If the Reverse Switch (70) is damaged, desolder and replace.
21. Using an Ohm meter, check the Resistor (72) on the Reverse Switch Circuit Board. Readings should be 20 Ohm for 115V Tools and 80 Ohm for 230V Tools. Desolder and replace Resistor if necessary.
22. If the Capacitor (71) is damaged, desolder and replace it.
23. If the Motor Coil (53) is damaged, desolder the red and blue motor leads and replace the coil.

NOTICE

115V Tools have one coil and 230V Tools have two coils.

Disassembly of the Motor

1. Remove the Brush Caps (52) from the Rear End Plate (50). Using a pick, catch the terminal of the Brush Assembly (51) and pull it out of the Rear End Plate.

NOTICE

Do not damage the copper wires of the Brush Assembly. Reinstall the Brushes as they were removed unless they are replaced.

2. Remove the insulation tape around the Motor.
3. Using a thin blade screwdriver, remove the Motor Assembly Springs (44) by inserting the screwdriver between the Springs and the Rear End Plate and prying upward.

NOTICE

230V models have the two capacitors on the Motor Assembly Spring. Be careful not to damage the capacitors when removing the Spring.

4. Remove the Rear End Plate and the Front End Plate (43) from the Field (46).
5. Pushing the Armature (48)toward the Fan side, remove the Armature from the Field.
6. Do not damage the commutator or the windings of the Armature. Hold the rotor, not the commutator.
7. Remove the Motor Pilot Rod from the Armature and inspect it. If it is worn, replace it.
8. Remove the Front Armature Bearing (47) and the Rear Armature Bearing (49) from the Armature and inspect them. If they do not rotate smoothly, replace them.
9. Inspect the Armature, Field and End Plates. Use a piece of fine cloth to wipe away contamination. For excess build up, spray with contact cleaner and brush if necessary.
10. To clean the commutator on the Armature, spray with contact cleaner and brush if necessary.
11. Using a tester, inspect the commutator. Replace the Armature if necessary.

ASSEMBLY

Assembly of the Motor Housing

1. Install the Front Armature Bearing (47) and the Rear Armature Bearing (49) to the Armature shaft ends.
2. Apply grease to both ends of the Motor Pilot Rod (42) and insert it into the center hole of the Motor Assembly.
3. Insert the Armature through the notched end of the Field (46).

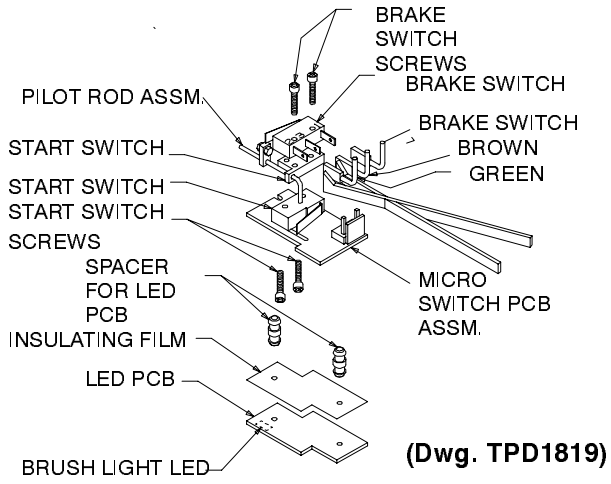
NOTICE

Be careful not to damage the commutator or the windings. Hold the rotor, not the commutator when assembling.

4. Install the Rear End Plate (50) to the notched end and the Front End Plate (43) to the Field.
5. Snap the two Motor Assembly Springs (44) over the notches of the Rear End Plate and the Front End Plate.
6. Insert the Brush Assemblies (51) into the brush holders of the Rear End Plate. Be sure the tab on the Brush Assembly slides into the notch in the holder.
7. Screw on the Brush Caps (52).
8. Wrap one layer of 3M #56 insulation tape around the Motor Assembly.
9. **For Throttle Lever Start Models**, put two additional strips of insulation tape, one upon the other, onto the Brush Light Circuit Board (67) side of the Motor Assembly. This insulates the area between the ground wire and the Field.

Assembly of the Electrical Components

1. Solder the red and blue wires to the Brush Light Circuit Board.
2. Solder the Reverse Switch (70) and the Resistor (72). Using shrink tubing 5mm long as spacers, solder the Capacitor (71) into place. Solder the red and blue wires to the Reverse Switch Circuit Board (69).
3. Solder the Start Switch (61) onto the Microswitch Circuit Board (58).
4. Insert the Switch Pilot Rod (56) into the hole in the Switch Plate (59). (Refer to Dwg. TPD1819).



(Dwg. TPD1819)

5. Mount the Switch Plate with the Pilot Rod onto the Start Switch by depressing the Start Switch lever with the Pilot Rod. Insert the Pilot Rod into the slot in the Microswitch Circuit Board and align the Switch Plate on top of the Start Switch. Insert the two Switch Base Screws (63) from the bottom of the Microswitch Circuit Board into the Switch Plate. Tighten the Screws to 1.6 KG-cm.
6. Mount the Shut-off Switch (60) onto the Switch Plate with the two Switch Screws (62). Tighten the screws to 1.6 KG-cm.

7. Position the Insulating Film (66) onto the back of the Brush Light Circuit Board. Insert the two Switch Base Spacers (65) through the Insulating Film and into the holes of the Circuit Board.
8. Install the Brush Light Circuit Board onto the back of the Microswitch Circuit Board by inserting the two Switch Base Spacers into the holes in the Circuit Board.

NOTICE

Be sure that the Brush Light LED is toward the motor side of the circuit board.

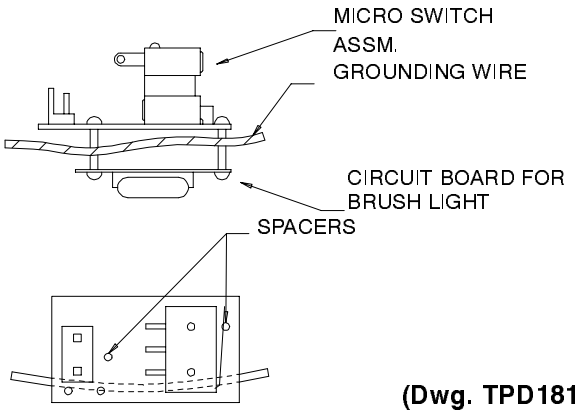
9. Using needle nose pliers, install the three connectors from the Controller Assembly (68) onto the Shut-off Switch.

NOTICE

Make sure to connect the correct color wire to the proper terminal. Refer to the wiring diagram to insure that all wires are installed properly.

10. Install the two-pin connector from the Controller Assembly onto the Microswitch Circuit Board.
11. Install the three-pin connector from the Controller Assembly onto the Reverse Switch Circuit Board.
12. Run the ground wire around the Switch Base Spacers and between the Microswitch Circuit Board and the Brush Light Circuit Board.
(Refer to Dwg. TPD1818).

ROUTE OF GROUNDING WIRE



(Dwg. TPD1818)

13. Bring the Motor Assembly and Microswitch Circuit Board together by inserting the Motor Pilot Rod into the hole in the Motor shaft and then setting both into the Housing Package (76).
For Throttle Lever Start Models, lay the ground wire between the Motor and the Housing Package.
14. Install the two Switch Base Screws and tighten to 1.6 KG-cm.
15. Install the Controller Assembly into its groove in the Housing. Place the ground wire into the notch in the Controller Assembly and align this notch with the tab in the Housing
16. Install the Reverse Switch Circuit Board into the two grooves in the Housing.
17. Install the Receptacle Assembly (73) into the Housing, making sure the ground wire is underneath the HIC. The Receptacle can be installed in either position.
18. Place the black and white Receptacle wires into the notch in the Controller Assembly.
19. Place the ceramic Fan Pilot Rod (40) into the Fan Pinion Gear (39) and then fit the Gear into the Fan (41). Now slide the Fan (41) onto the Motor shaft.

Assembly of the Gear Case and Clutch Housing

1. Apply grease to the Planet Gears (34), the surfaces of the Gear Heads (32) and the teeth of the Gear Head Pinion Gear (35).
2. Assemble the Spindle/Gear Heads, the Gear Head Pinion Gear and the Gear Head.
3. Apply grease to all the Gears.
4. Place the Gear Head onto the Spindle/Gear Heads.
5. Apply grease to the Spindle Washer (29).
6. Place the Spindle Washer, then the Spindle Bearing (30), onto the Cam (27).
7. Apply grease to the inner teeth of the Gear Case (36).
8. Insert the Cam into the Spindle Bearing.
9. Hold the Cam with needle nose pliers and insert the entire unit into the Gear Case while rotating the Cam and the Gear Case.
10. Apply grease to the gear end of the Gear Case and install the Gear Case Shield (37).
11. Apply grease to the notches of the Cam.
12. Place the Cam Rollers (28) into the notches on the Cam.
13. Apply grease to the inner surface, the holes and the grooves of the Cam Guide (24).
14. Insert the Cam Guide Balls (25) into the holes in the Cam Guide.
15. Install the Cam Guide over the Cam. Keep the Cam Balls at a 90 degree angle to the Cam Rollers to prevent the Balls from being pushed out.
16. Apply grease to the inner surface of the Bit Holder Assembly (19 or 21). Using a rod, push the Pilot (20 or 22) into the Bit Holder.
17. **For Push to Start Models**, insert the Pilot Push Spring Washer (22) and the Pilot Push Spring (23) into the Bit Holder.
Throttle Lever Start Models do not use a Push Spring and Washer.
18. Apply grease to the holes of the Bit Holder and insert the two Pilot Cam Balls (18 or 20).
19. Apply grease to the inner diameter and the tapered end of the Taper Ring Assembly (16 or 18). Insert grease between the ball bearing thrust washer and the Taper Ring Assembly, which are attached. Install the Taper Ring Assembly onto the Bit Holder.

20. Install the Bit Holder Assembly onto the Cam Guide in the Gear Case.
21. The Taper Ring Retaining Ring (15 or 17) has a round edge side and a sharp edge side. Install the Taper Ring Retaining Ring, sharp edge side first, into the groove on the Bit Holder.

NOTICE

There are four grooves on the Bit Holder. The fourth groove from the bit end is for Push to Start Models. The third is for Throttle Lever Start Models.

22. **For Throttle Lever Start Models**, place the Spindle Washers onto the Bit Holder.
23. Place the Clutch Spring (14 or 16) and the Clutch Spring Plate (13 or 15) over the Bit Holder.
24. Fit the two notches at the rear end of the Gear Case Assembly into the Gear Case Jig part no. EP1510N–J37. Screw the Clutch Housing (12) partially into the Gear Case.

NOTICE

This is a left-hand thread.

At the middle of the Clutch Housing threads, apply Loctite Threadlocker 3 Bond 1406 (R)* to about three threads. Push down and rotate the Bit Holder until it engages the Cam Guide. Hold in place. Screw the Clutch Housing in completely.

25. Using an open end torque wrench on the flats of the Clutch Housing, tighten the Clutch Housing to 28.5 Nm.
26. Apply grease to both ends of the Clutch Pilot Rod (36 or 38) and insert it into the Gear Case.
27. **For Throttle Lever Start Models**, inspect the clearance of the Bit Holder Assembly. Touch the end of the Clutch Pilot Rod and push on the Bit Holder Assembly. If the Clutch Pilot Rod is moved by the Bit Holder at this time, add additional spacers.
28. Install the Bit Retainer Retaining Ring (10), sharp edge side first, into the second groove from the bit end of the Bit Holder.
29. Apply grease to the holes of the Bit Holder and insert the two Bit Retaining Balls (17 or 19) into the holes.
30. Apply grease to one end of each Clutch Adjusting Pin (11) and insert the three Pins into the Clutch Housing.
31. Apply grease to the other end of each Clutch Adjusting Pin and the threads of the Clutch Housing. Screw the Clutch Adjusting Ring (4) onto the Housing.
32. Install the Bit Retainer Sleeve (9), the Bit Retainer Spring (8) and the Bit Retainer Collar (7) onto the Bit Holder.
33. Using a thin blade screwdriver, install the Front Bit Retainer Retaining Ring (6).
34. Unclamp the Gear Case Jig from the vise and turn it over to remove the Clutch and Gear Case Assembly. Hold the Gear Case Shield to keep the Gears in place.
35. Lift the Motor slightly and slide the Gear Case onto the Motor with the Ground Screw hole adjacent to the ground wire.
36. Attach the ground wire to the Gear Case with the Ground Screw (74) and Washer (75). Tighten to 4 KG–cm.
37. Turn the Gear Case until the notch in the Gear Case matches the tab in the Housing.
38. Completely insert the ground wire into the groove in the Housing.

Adjusting the Brake Timing

1. Insert a .65mm thick gauge or pin gauge between the Pilot Rod Adjusting Screw (55) head and the Shut–off Switch. Push the Bit Holder. **The Shut-off Switch should not click.**
2. Insert a .80mm gauge and push the Bit Holder. **The Shut-off Switch should click.**
3. Adjust the Pilot Rod Adjusting Screw if necessary using the two adjusting spanner wrenches.
4. **For Throttle Lever Start Models**, there is no need to push the Bit Holder. Slide the gauges between the Pilot Rod Adjusting Screw and the Throttle Lever (76).

Assembly of the Tool

1. **For Push to Start Models**, make sure the ground wire is inserted in the groove in the Housing.
2. **For Throttle Lever Start Models**, make sure the Ground Wire is between the Motor Assembly and the Housing.
3. Snap the Housing halves together.
4 .**For Throttle Lever Start Models**, insert the Throttle Lever Pin (78) into the Housing. Insert the Throttle Spring (77) into the Throttle Lever. While compressing the Throttle Spring, install the Throttle Lever onto the Throttle Lever Pin. Snap the Housing halves together.
5. Install the Housing Screws (80 or 83) into the Housing and tighten to 4 KG–cm.
6. Slide the Flange (2) onto the Housing. Screw the Retainer Coupling (1) onto the Housing until it clicks into place.

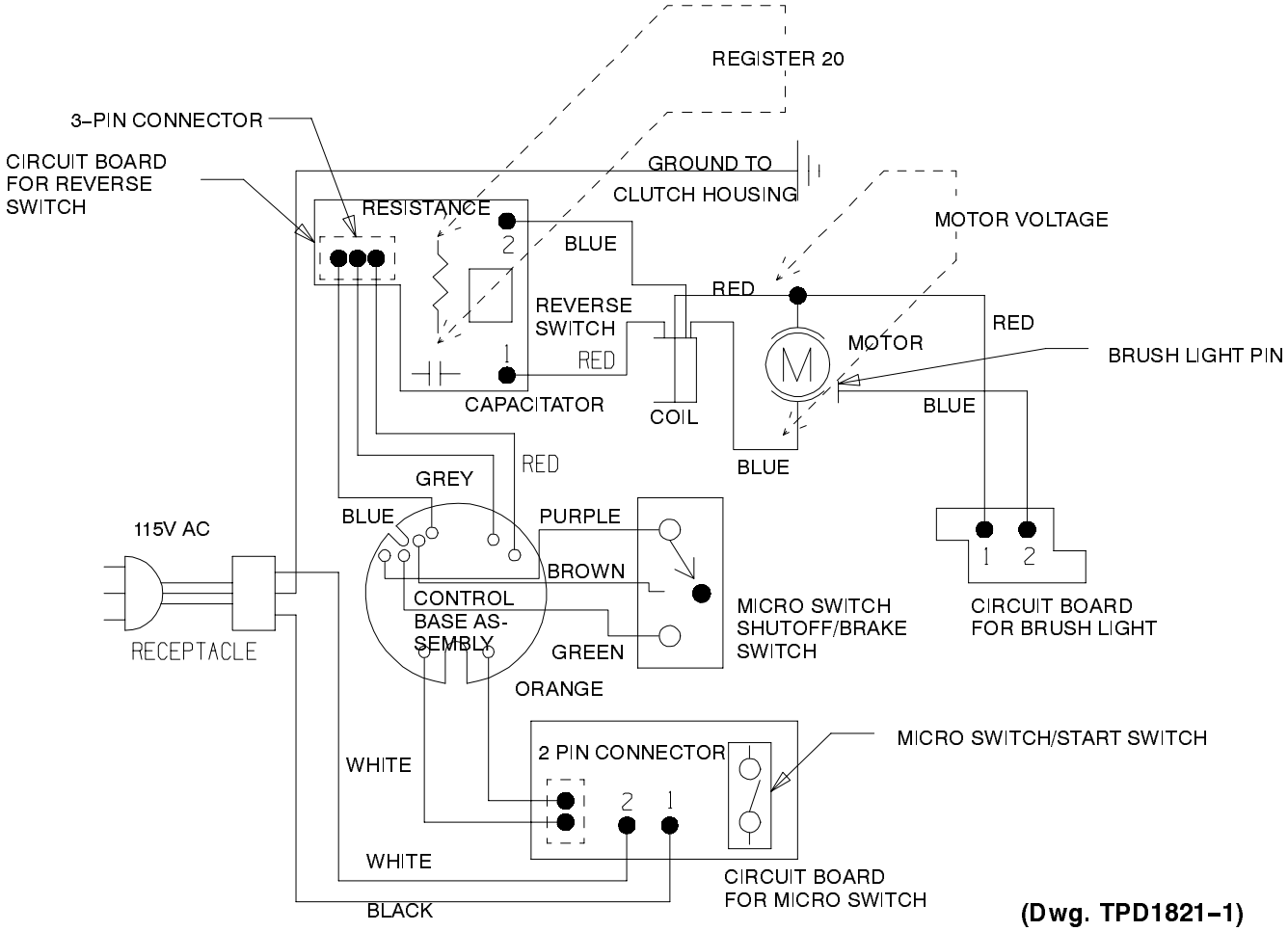
NOTICE

These are left-hand threads.

7. Attach the Power Cord (81 or 84).

Testing the Tool

1. Test forward and reverse operation by pressing the Bit Holder against the work surface with the Reverse Switch in each position.
2. Tighten the Clutch Adjusting Ring all the way, reverse it one turn and test for proper shut off operation and maximum torque.
3. Reset the Clutch Adjusting Ring to mid scale and check for torque repeatability by cycling the tool between five to ten times.
4. For repair and troubleshooting of the high torque low voltage Controller, refer to the operation and maintenance manual.



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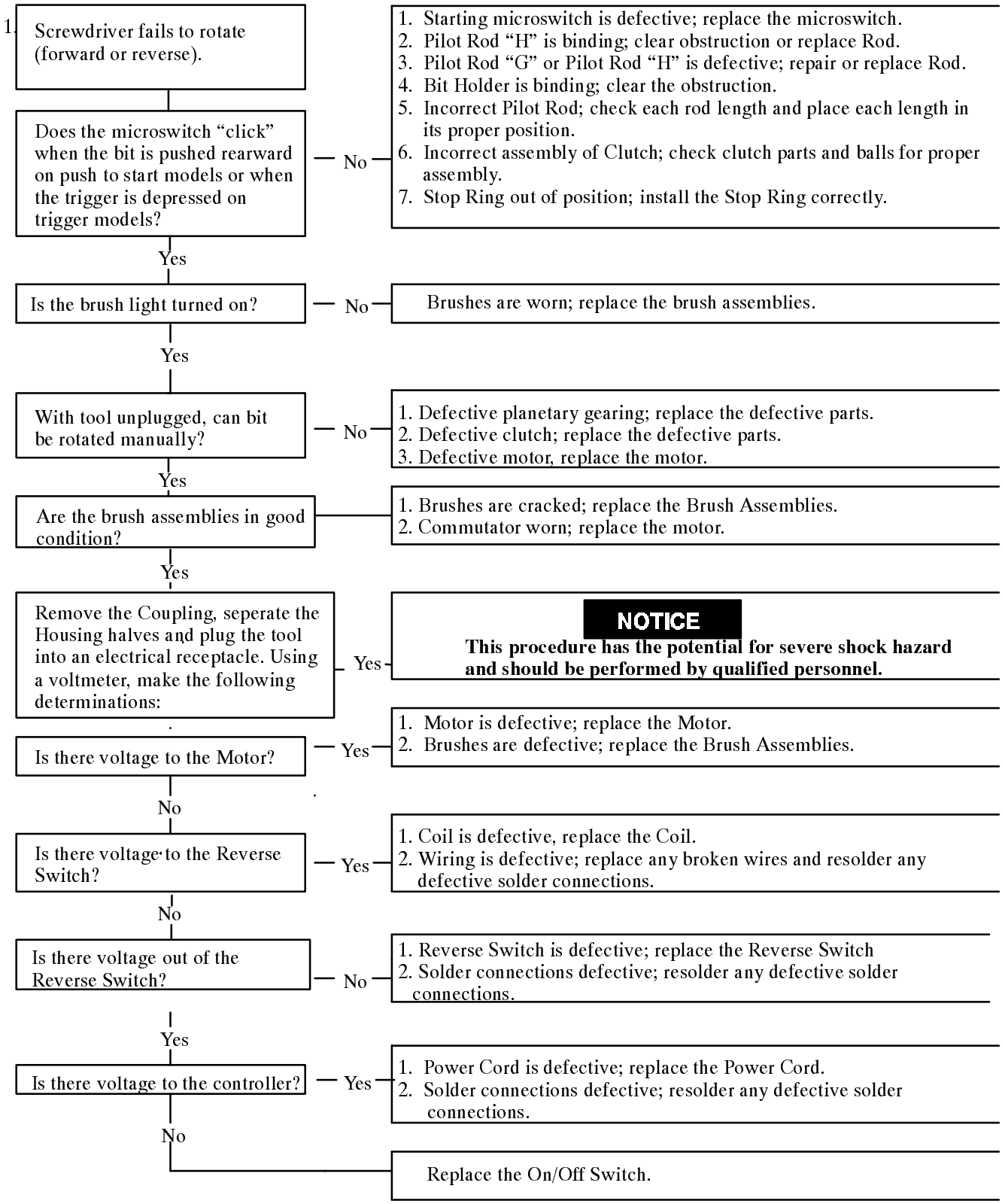
MAINTENANCE SECTION

TROUBLESHOOTING GUIDE



TROUBLESHOOTING GUIDE

2. Screwdriver operates in one direction but will not operate in the opposite direction.

- Are the wire leads in good condition?
  - No → 1. Solder connections are defective; resolder any defective solder connections.
  - Yes
- Does the "Forward–Reverse" Switch function properly?
  - No → 1. Defective "Forward–Reverse" Switch; replace the Switch.

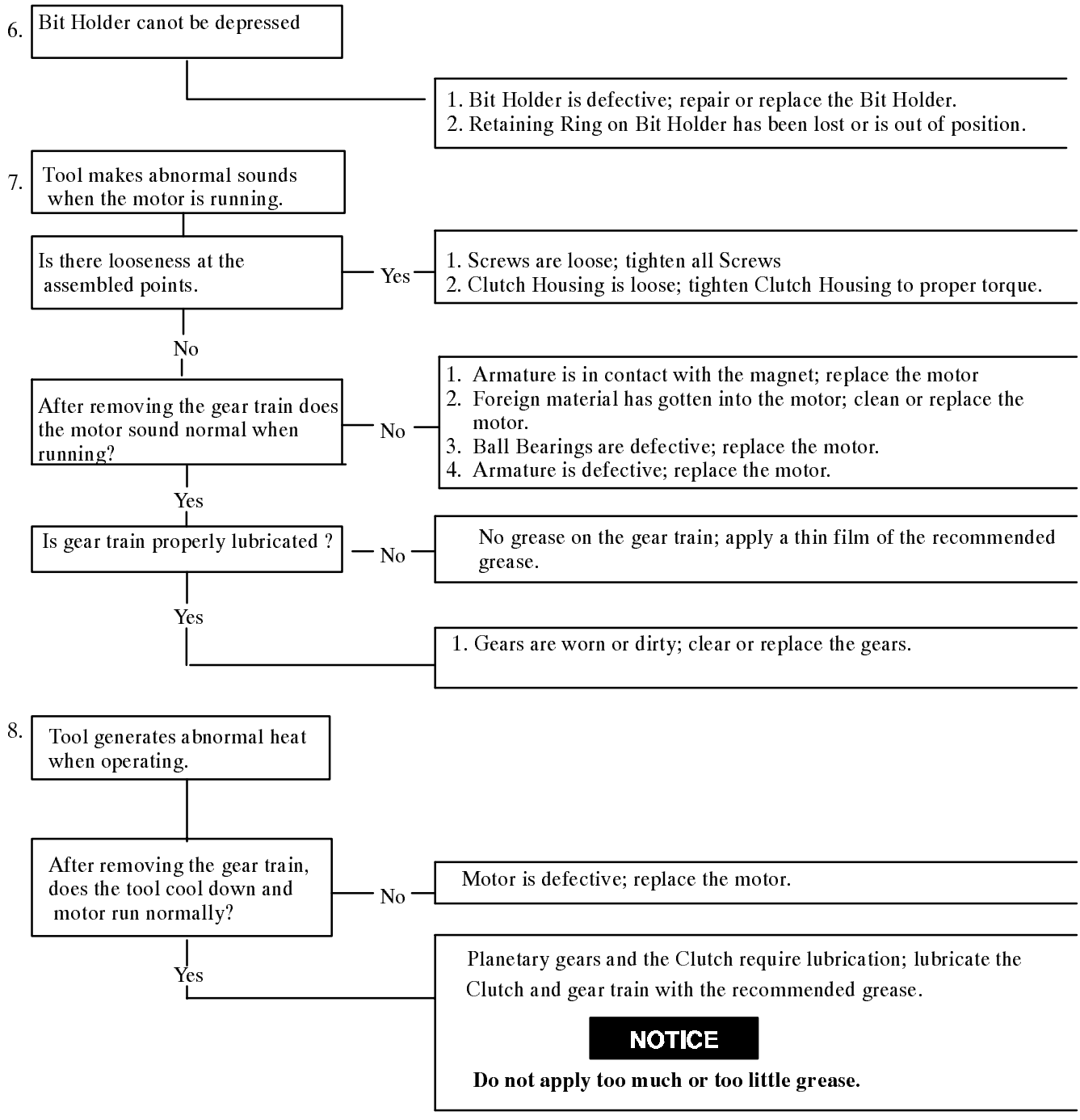
3. Bit does not rotate but motor hums.

- When the gears are removed, will the motor rotate?
  - No → 1. Armature is in contact with the magnets; replace the motor.
    2. Foreign material in the motor; clean the motor.
  - Yes
- Is the planetary gearing smooth when the bit is rotated by hand?
  - No → 1. Gears are worn or damaged; replace any defective gearing.
  - Yes → 1. Clutch Assembly is worn; replace damaged or worn parts.

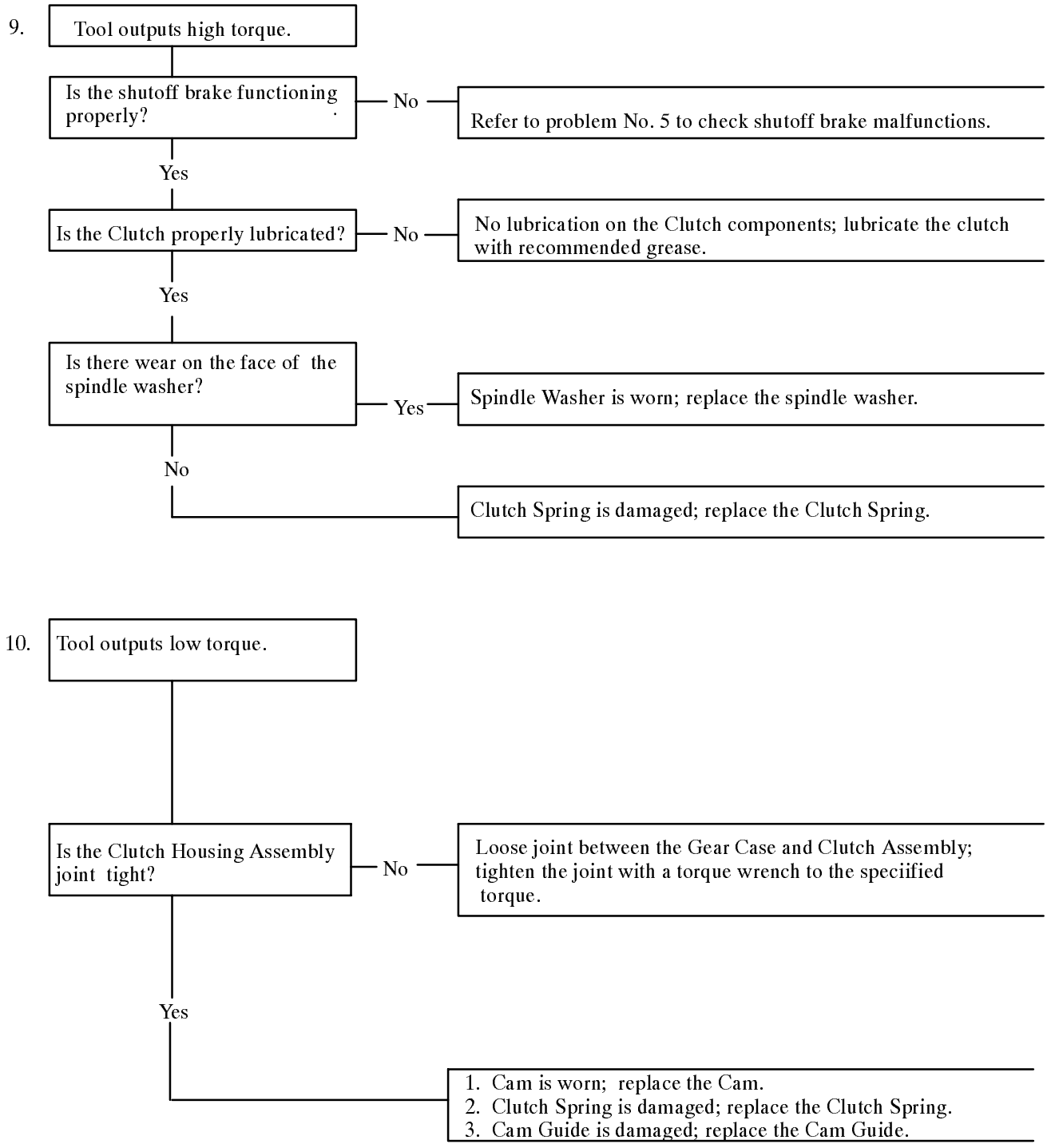
4. Motor runs but the Bit fails to rotate.
   - 1. Armature Fan is defective; replace the Armature Fan.
     2. Gears are worn or damaged; replace any defective gearing.

5. Shutoff Brake malfunctions more than one index of the Clutch.

- Does Bit speed exceed rated speed by more than 100 rpm?
  - Yes → 1. Motor magnet is demagnetized; replace the motor.
  - No
- Is Shutoff Brake microswitch functioning? (Does it click when button is depressed and does it test correctly with an ohmmeter?)
  - No → 1. Defective microswitch; replace the microswitch.
  - Yes
- Is the Shutoff Brake Switch in the "ON" position when the Bit Holder is fully depressed?
  - No → 1. Pilot Rods "H", "G" and "F" are worn; check Rod length. Replace if necessary.
    2. Pilot Rod "D" out of adjustment; readjust with Adjusting Screw.
    3. Loose Clutch Housing Assembly; tighten the Clutch Housing Assembly.
  - Yes
- When the start switch is in the "ON" position, does the motor stop when the shut–off Brake Switch turns on?
  - No → Controller package is defective; replace the controller.
- When the start switch is in the "ON" position, does the motor stop when the shut–off Brake Switch turns on?
  - No → 1. Resister is defective; replace the Resistor.
  - Yes → 1. Resister is defective; replace the Resistor.


6.
Bit Holder canot be depressed
1. Bit Holder is defective; repair or replace the Bit Holder.
2. Retaining Ring on Bit Holder has been lost or is out of position.
7.
Tool makes abnormal sounds when the motor is running.
Is there looseness at the assembled points.
Yes
1. Screws are loose; tighten all Screws
2. Clutch Housing is loose; tighten Clutch Housing to proper torque.
No
After removing the gear train does the motor sound normal when running?
No
1. Armature is in contact with the magnet; replace the motor
2. Foreign material has gotten into the motor; clean or replace the motor.
3. Ball Bearings are defective; replace the motor.
4. Armature is defective; replace the motor.
Yes
Is gear train properly lubricated ?
No
No grease on the gear train; apply a thin film of the recommended grease.
Yes
1. Gears are worn or dirty; clear or replace the gears.
8.
Tool generates abnormal heat when operating.
After removing the gear train, does the tool cool down and motor run normally?
No
Motor is defective; replace the motor.
Yes
Planetary gears and the Clutch require lubrication; lubricate the Clutch and gear train with the recommended grease.
NOTICE
Do not apply too much or too little grease.

TROUBLESHOOTING GUIDE *(Continued)*



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