



Tool Products

OPERATOR'S MANUAL

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

SECTION M22
MANUAL 75

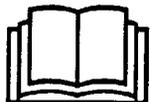
Released: 5-15-89

Revised: 6-1-95

Form: 3362-2

50 SERIES RIGHT-ANGLE DRILLS

Models: DR051B-()-()-() and DR053B-()-()-().



⚠ WARNING

READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

Pneumatic tools should always be installed and used in accordance with A.N.S.I. B186.1 "Safety Code For Portable Air Tools."

⚠ WARNING

- Operate this tool at 90 p.s.i.g. (6.2 bar) maximum air pressure at the air inlet of the tool.
- Disconnect air supply from tool before removing/installing bit, socket or device attached to tool or performing maintenance procedures.
- Keep hands, clothing and long hair away from rotating end of tool.
- Anticipate and be alert for sudden changes in motion during start up and operation of any power tool.
- Never exceed rated r.p.m. of tool.
- Wear suitable eye and hearing protection while operating tool.
- Tool shaft can continue to rotate briefly after throttle is released.
- 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.
- Use only accessories recommended by ARO.

⚠ WARNING

Repeated prolonged operator exposure to vibrations which may be generated in the use of certain hand-held tools may produce Raynaud's phenomenon, commonly referred to as Whitefinger disease. The phenomenon produces numbness and burning sensations in the hand and may cause circulation and nerve damage as well as tissue necrosis. Repetitive users of hand-held tools who experience vibrations should closely monitor duration of use and their physical condition.

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.
- ARO is not responsible for customer modification of tools for applications on which ARO was not consulted.
- Tool maintenance and repair should be performed by authorized, trained, competent personnel. Consult your nearest ARO authorized servicenter.
- It is the responsibility of the employer to place the information in this manual into the hands of the operator.

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

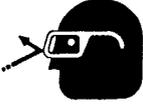
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FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

⚠ WARNING



Wear eye protection when operating or performing maintenance on this tool.

⚠ WARNING



Wear hearing protection when operating this tool.

⚠ WARNING



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

⚠ WARNING



Air powered tools can vibrate in use. Vibration, repetitive motions or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.

⚠ WARNING



Do not carry the tool by the hose.

⚠ WARNING



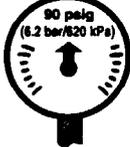
Do not use damaged, frayed or deteriorated air hoses and fittings.

⚠ WARNING



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

⚠ WARNING



Operate at 90 p.s.i.g. (6.2 bar/620 kPa) maximum air pressure.

NOTICE

⚠ WARNING

Read the manual before operating this tool.
Operate at 90 psig/6.2 bar max.



PN 48176-1 LABEL (NON-EU MODELS) **PN 49883 LABEL (-EU MODELS)**

This label must appear on the tool at all times. If it is lost or damaged, a replacement label is available at no cost.

WARNING = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

CAUTION = Hazards or unsafe practices which could result in minor personal injury or product or property damage.

NOTICE = Important installation, operation or maintenance information.

ROUTINE LUBRICATION REQUIREMENTS

Lack of or an excessive amount of lubrication will affect the performance and life of this tool. Use only recommended lubricants at below time intervals:

EVERY 8 HOURS OF TOOL OPERATION – Fill lubricator reservoir of recommended F.R.L. with spindle oil (29665). If an in line or air line lubricator is not used, apply several drops of spindle oil (29665) in air inlet.

EVERY 160 HOURS OF TOOL OPERATION – Lubricate gearing. Pack bearings, coat shafts and lubricate gears with NLGI #1 "EP" grease (33153). Gearing should contain approximately 3/64 oz. (1.3 g) of grease for single reduction and 1/16 oz. (1.8 g) of grease for double reduction. Right-angle assembly should contain approximately 1/8 oz. (3.5 g) of grease.

AIR SUPPLY REQUIREMENTS

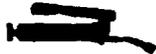
For maximum operating efficiency, the following air supply specifications should be maintained to this air tool:

- AIR PRESSURE – 90 p.s.i.g. (6.2 bar)
- AIR FILTRATION – 50 micron
- LUBRICATED AIR SUPPLY
- HOSE SIZE – 5/16" (8 mm) I.D.

An ARO® model C28231–810 air line FILTER/REGULATOR/LUBRICATOR (F.R.L.) is recommended to maintain the above air supply specifications.

RECOMMENDED LUBRICANTS

After disassembly is complete, all parts, except sealed or shielded bearings, should be washed with solvent. To relubricate parts, or for routine lubrication, use the following recommended lubricants:



Where Used	ARO Part #	Description
Air Motor	29665	1 qt. Spindle Oil
"O" Rings & Lip Seals	36460	4 oz. Stringy Lubricant
Gears and Bearings	33153	5 lb. "EP" – NLGI #1 Grease

INSPECTION, MAINTENANCE AND INSTALLATION

Disconnect air supply from the tool or shut off air supply and exhaust (drain) line of compressed air before performing maintenance or service to the tool.

It is important that the tools be serviced and inspected at regular intervals for maintaining safe, trouble-free operation of the tool.

Be sure the tool is receiving adequate lubrication, as failure to lubricate can create hazardous operating conditions resulting from excessive wear.

Be sure that the air supply lines and connectors are of proper size to provide a sufficient quantity of air to the tool.

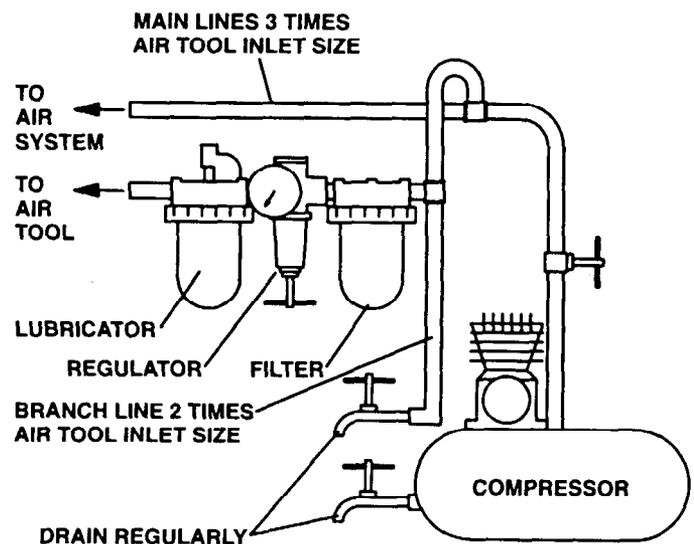
Tool maintenance and repair shall be performed by authorized, trained, competent personnel. Tools, hose and fittings shall be replaced if unsuitable for safe operation and responsibility should be assigned to be sure that all tools requiring guards or other safety devices shall be kept in legible condition. Maintenance and repair records should be maintained on all tools. Frequency of repair and the nature of the repairs can reveal unsafe application. Scheduled maintenance by competent authorized personnel should detect any mistreatment or abuse of the tool and worn parts. Corrective action should be taken before returning the tool for use.

Disassembly should be done on a clean work bench with a clean cloth spread to prevent the loss of small parts. After disassembly is completed, all parts should be thoroughly washed in a clean solvent, blown dry with air and inspected for wear levels, abuse and contamination. Double sealed or shielded bearings should never be placed in solvent unless a good method of re-lubricating the bearing is available. Open bearings may be washed but should not be allowed to spin while being blown dry.

Upon reassembling, lubricate parts where required. Use 33153 grease, or equivalent, in bearings. Use 36460 lubricant for "O" ring assembly. When assembling "O" rings or parts adjacent "O" rings, care must be exercised to prevent damage to the rubber sealing surfaces. A small amount of grease will usually hold steel balls and other small parts in place while assembling.

When replacement parts are necessary, consult drawing containing the part for identification.

Always use clean, dry air. Dust, corrosive fumes and/or excessive moisture can damage the motor of an air tool. An air line filter can greatly increase the life of an air tool. The filter removes rust, scale, moisture and other debris from the air lines. Low air pressure (less than 90 p.s.i.g.) reduces the speed of the air tool. High air pressure (more than 90 p.s.i.g.) raises performance beyond the rated capacity of the tool and could cause injury. Shown below is a typical piping arrangement.



MODEL NUMBER	R.P.M.	ROTOR (ITEM 17)	MOTOR ASSEMBLY	GEARING REDUCTION	RIGHT-ANGLE ASSEMBLY
DR051B-4-()-()	400	46470	48227-1	29.35:1	ITEM 66 (REGULAR DUTY)
DR051B-7-()-()	700	46454	48226-1	19.36:1	
DR051B-11-()-()	1100	46454	48226-1	11.76:1	
DR051B-19-()-()	1900	46470	48227-1	6.67:1	
DR051B-28-()-()	2800	46454	48226-1	4.40:1	
DR051B-36-()-()	3600	46454	48226-1	3.43:1	
DR051B-125-()-()	12,500	46470	48227-1	1:1	ITEM 67 (LIGHT DUTY)
DR053B-27-()-()	2700	46470	48227-1	6.67:1	
DR053B-41-()-()	4100	46454	48226-1	4.40:1	
DR053B-52-()-()	5200	46454	48226-1	3.43:1	

MODELS WITH -EU SUFFIX ARE "EC" COMPLIANT MODELS.

DRIVE OPTION	DESCRIPTION	SPINDLE ASSEMBLY
-A	1/4" CHUCK	ITEM 76
-B	3/8" CHUCK	ITEM 76
-C	3/16" COLLET	ITEM 86
-D	#10 - 32 FEMALE THREAD	ITEM 89
-E	5/16" - 24 FEMALE THREAD	ITEM 91
-P	3/8" - 24 THREAD	ITEM 76
-T	1/4" - 28 FEMALE THREAD	ITEM 77 OR 85

DISASSEMBLY/ASSEMBLY INSTRUCTIONS

- Never apply excessive pressure by a holding device which may cause distortion of a part.
- Apply pressure evenly to parts which have a press fit.
- Apply even pressure to the bearing race that will be press fitted to the mating part.
- Use correct tools and fixtures when servicing this tool.
- Don't damage "O" rings when servicing this tool.
- Use only genuine ARO replacement parts for this tool. When ordering, specify part number, description, tool model number and serial number.

RIGHT-ANGLE DISASSEMBLY

(REGULAR DUTY)

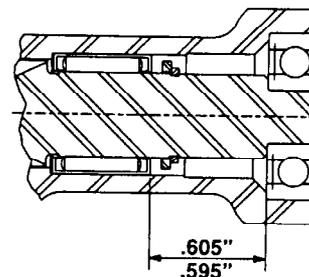
- Remove chuck (75) where applicable.
- Using wrenches on flats of ring gear and lock nut (47), unthread and remove right-angle section from tool - LEFT HAND THREADS.
- To disassemble drive section, remove lock nut (74) from housing - LEFT HAND THREADS.
- Remove lock nut (48) - LEFT HAND THREADS.
- DO NOT disassemble further unless damage is evident. To disassemble, pull pinion (54) from housing.

RIGHT-ANGLE ASSEMBLY

(REGULAR DUTY)

- Lubricate bearings upon assembly.
- Assemble bearing (53) and spacer (52) to pinion (54), securing with snap ring (51). NOTE: Bearing is to be located .600" from shoulder on pinion (see illustration, next column).
- Assemble bearing (50) to pinion. NOTE: Press on inner race of bearing.
- Assemble pinion and components to housing (55). NOTE: Press on outer race of bearing.

- Assemble lock nut (48) to housing, securing bearing - LEFT HAND THREADS.
- Apply approximately 1/8 oz. (3.5 g) of grease to right-angle gearing upon assembly.
- Assemble drive assembly (76 or 77) to lock nut (74).
- Assemble lock nut and components to housing - LEFT HAND THREADS.
- Assemble lock nut (47) to housing, securing with snap ring (46).
- Assemble coupling (45) to pinion and assemble right-angle housing and components to tool, securing with lock nut (47) - LEFT HAND THREADS.



RIGHT-ANGLE DISASSEMBLY

(LIGHT DUTY)

- Using wrenches on flats of ring gear and lock nut (47), unthread and remove right-angle section from tool - LEFT HAND THREADS.
- To disassemble right-angle section, grasp housing (65) lightly in a vise. Using a wrench on flats of body (60), unthread body from housing - LEFT HAND THREADS.

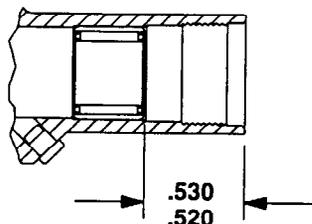
DISASSEMBLY/ASSEMBLY INSTRUCTIONS

M22
75

- **DO NOT** remove pinion from housing unless damage is evident. To remove pinion, grasp pinion in a vise and tap housing with a soft face hammer.
- Unthread and remove lock nut (48) – LEFT HAND THREADS – releasing bearing (59).
- To disassemble drive assembly, unthread lock nut (82) – LEFT HAND THREADS – and pull drive assembly from housing (65). **DO NOT** disassemble further unless damage is evident. NOTE: Drive assembly contains 22 small balls which will fall out if drive assembly is disassembled.

RIGHT-ANGLE ASSEMBLY (LIGHT DUTY)

- Lubricate bearings upon assembly.
- Assemble bearing (79) and gear (78, 83, 88 or 90) to shaft (80).
- Assemble gear and components to lock nut (82), securing balls (81) in groove in gear.
- Assemble lock nut (82) to housing (65) – LEFT HAND THREADS.
- Assemble bearing (59) to body, securing with lock nut (48) – LEFT HAND THREADS.
- Assemble bearing (63) to pinion (64).
- Assemble pinion to housing (65).
- Assemble housing to body (60) to seat needle bearing. Unthread and remove body. NOTE: Bearing (63) is to be located .525" from end of housing (65)(see illustration, below).



- Assemble shims (61 and 62) and lock nut (47) to body.
- Assemble housing (65) to body (60) – LEFT HAND THREADS.
- Assemble coupling (58) to pinion and assemble right-angle section to tool, securing with lock nut (47) – LEFT HAND THREADS.

GEARING DISASSEMBLY

- Remove right-angle section from tool.
- Remove ring gear (24 or 30) using a wrench on flats.
- Remove snap ring (29) and washer (28) where applicable.
- Remove spindle(s) and gears from ring gear. NOTE: Keep gears grouped with mating spindle when disassembling double reduction gearing.
- Do not remove bearing (27) or spacer (26) unless damage is evident.
- To remove bearing (27) and spacer (26) from ring gear, press on spacer (26) from inside splined end of ring gear.
- Do not remove gears (35 or 38) from carrier assemblies unless damage is evident. Gears (35 and 38) are press fit onto carrier assemblies.

GEARING ASSEMBLY

- Assemble spacer (26) and bearing (27) into ring gear. NOTE: Press on outer race of bearing and press to shoulder of ring gear.
- Coat shafts of spindle with ARO 33153 grease.
- Assemble gears and bearings (33) to shafts of mating spindle.
- Assemble carrier assembly to spindle assembly for models with double reduction gearing.

- Lubricate sets of gears liberally with ARO 33153 grease (see "Routine Lubrication Requirements", page 3).
- Assemble spindle(s) and gearing into ring gear. Rotate spindle(s) and gears to align gear teeth with splines of ring gear.
- Assemble washer (28) and snap ring (29) to spindle, where applicable.
- Thread ring gear (24 or 30) to tool, tightening with wrench on flats.
- Assemble right-angle section to tool.

MOTOR DISASSEMBLY

- Remove right-angle section and gearing from tool.
- Remove spacer (22) and "O" ring (21).
- Tap front edge of housing to remove motor assembly. Locating pin (23) should also come out.
- Tap drive end of rotor with a soft face hammer; motor will come apart. NOTE: Bearings are light press fit on rotor.
- Remove end plate (15) and bearing (14) from rotor.

MOTOR ASSEMBLY

- Lubricate bearing (14) with ARO 33153 grease.
- Assemble bearing (14) to end plate (15). NOTE: Press on outer race of bearing.
- Assemble end plate (15) to rotor. NOTE: Press on inner race of bearing.
- Coat five rotor blades (16) with ARO 29665 spindle oil and assemble to rotor slots – straight side out.
- Coat i.d. of cylinder (18) with ARO 29665 spindle oil and assemble over rotor. NOTE: Air inlet slots in end of cylinder must be aligned with two air inlet slots in end plate (15).
- Assemble bearing (20) to end plate (19). NOTE: Press on outer race of bearing.
- Assemble end plate (19) to rotor. NOTE: Press on inner race of bearing. Be sure rotor turns without binding.
- Insert locating pin (23) into .096" diameter blind hole at bottom of motor cavity in housing.
- Align notches of end plates and cylinder and install motor into housing, aligning notches with locating pin (23).
- Grease and assemble "O" ring (21) to end plate (19).
- Assemble spacer (22) to motor.
- Assemble gearing and right-angle section to tool.

HOUSING DISASSEMBLY

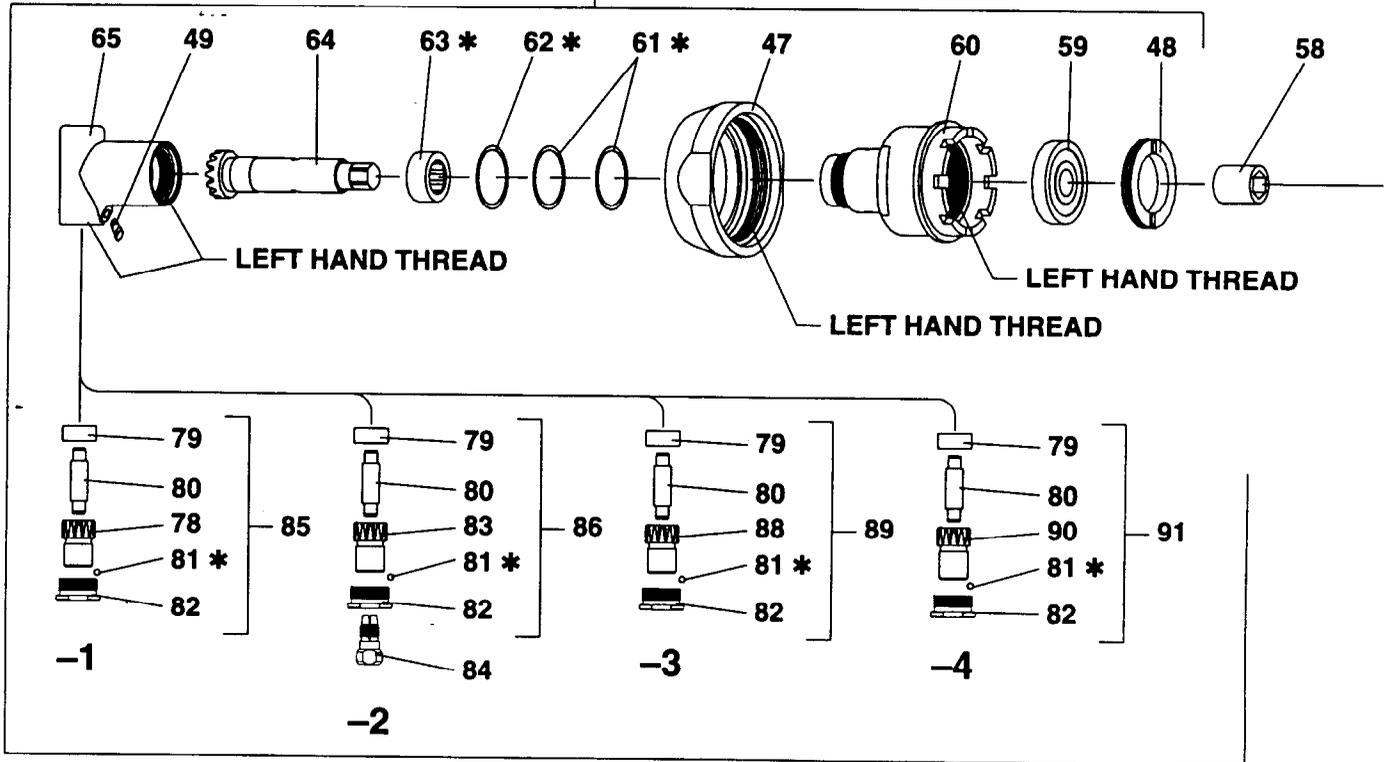
- Clamp air inlet adapter (2) in a smooth face vise.
- Unthread housing (9) with a strap type wrench.
- Remove spacer (3), washer (4), exhaust cap (5), two fillers (6), spring (7) and valve rod assembly (8). CAUTION: Do not remove or adjust rubber portion of valve rod (8), as it is preset at the factory.
- Remove screen (1) from inlet adapter (2).
- Remove throttle pin (11) and spring (10).

HOUSING ASSEMBLY

- Lubricate throttle pin (11) with ARO 29665 spindle oil.
- Install spring (10) and throttle pin (11) into housing. NOTE: Align slot in throttle pin with air inlet holes in housing.
- Install valve rod assembly (8) into housing. NOTE: Throttle pin (11) should not pull out when valve rod (8) is seated properly.
- Install two fillers (6) to exhaust cap (5).
- Assemble exhaust cap (5) to housing, aligning lever with throttle pin (11).
- Assemble spring (7), washer (4) and spacer (3) to tool, securing with inlet adapter (2).
- Clean and replace screen (1) in inlet adapter (2).

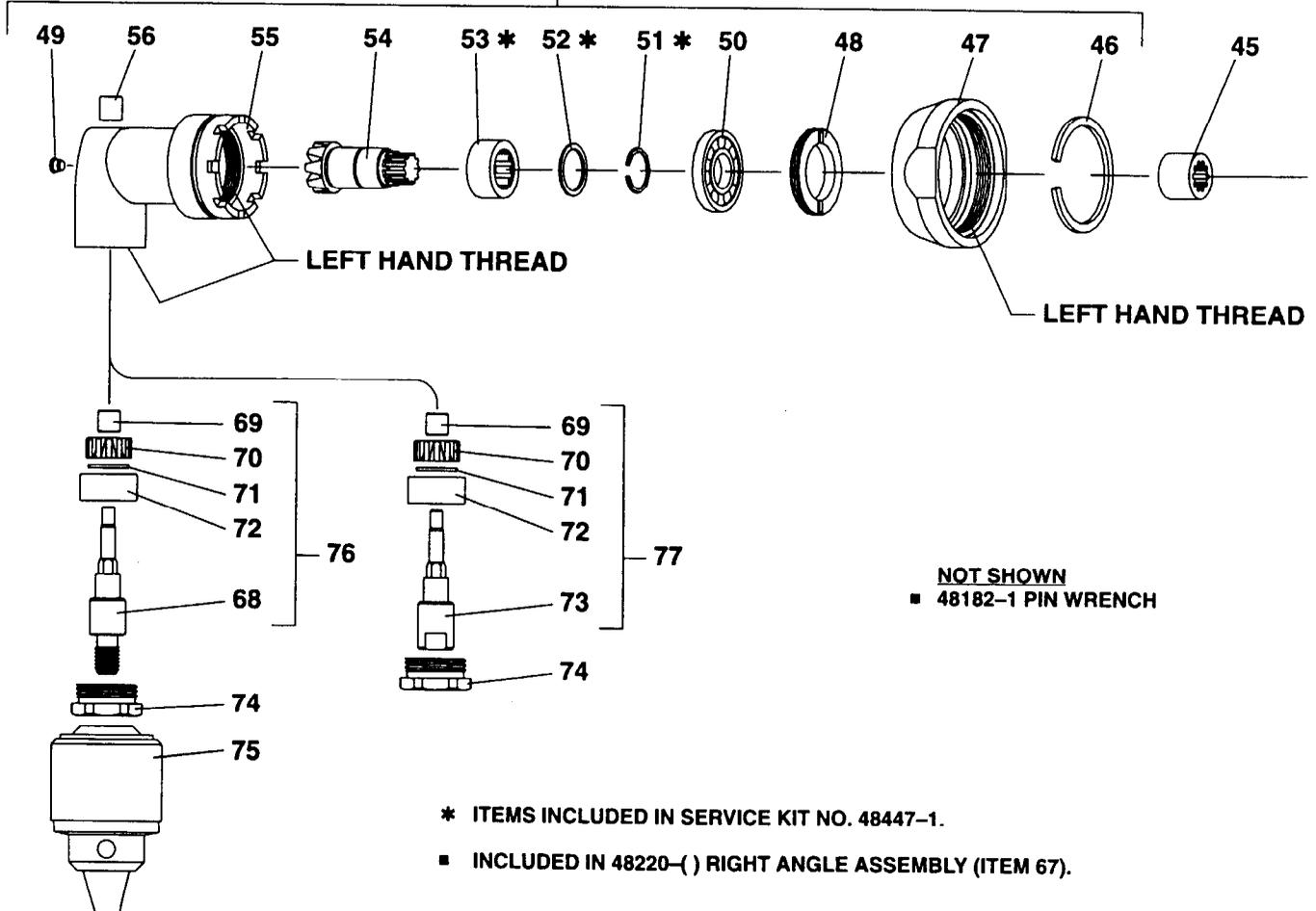
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LIGHT DUTY

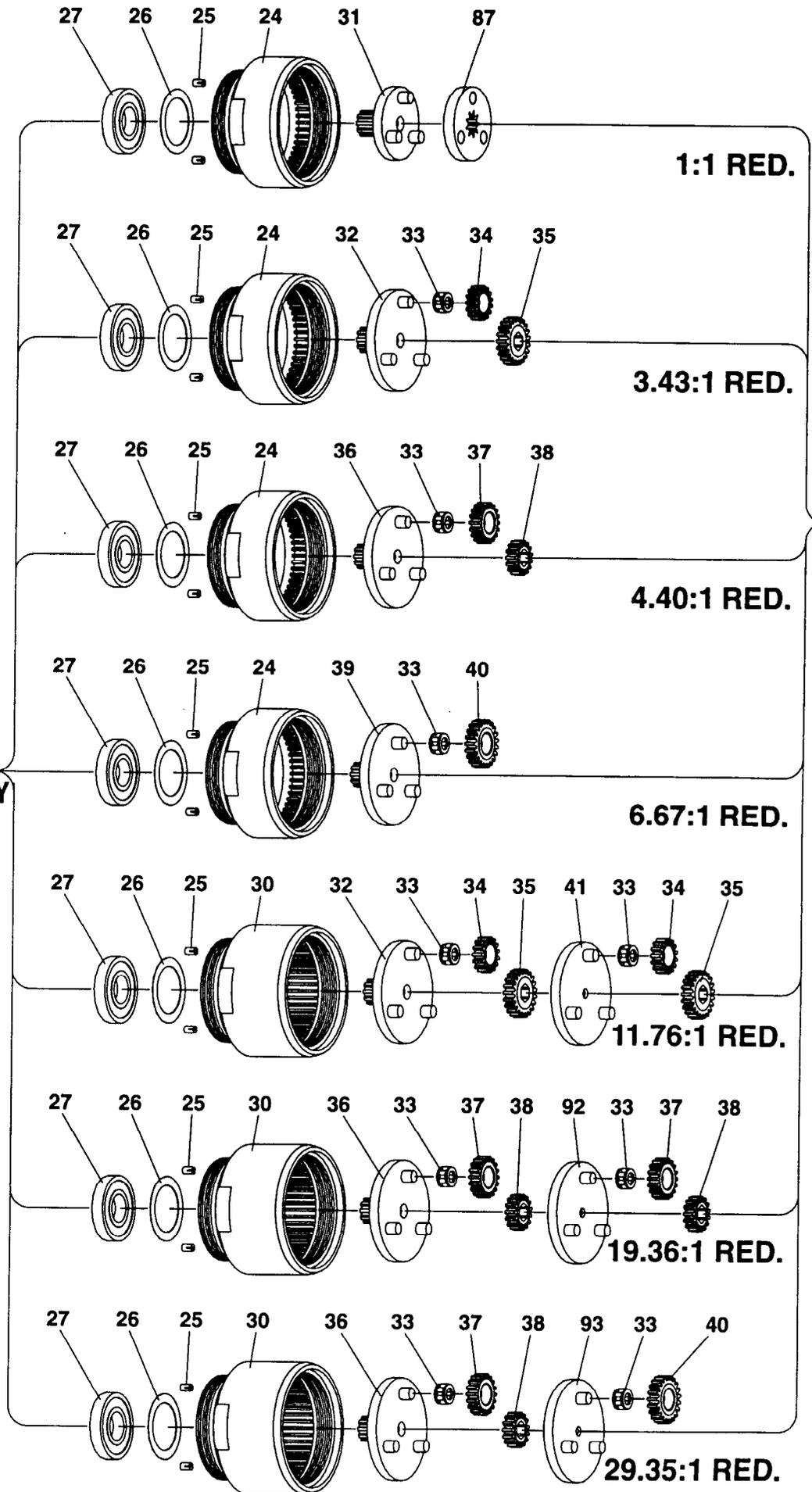


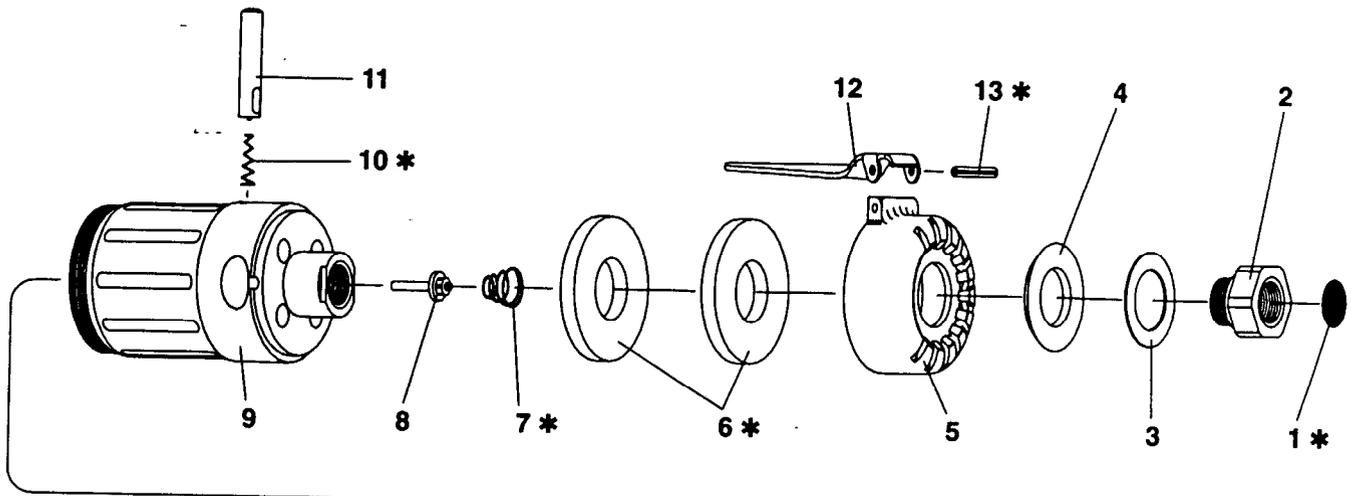
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REGULAR DUTY

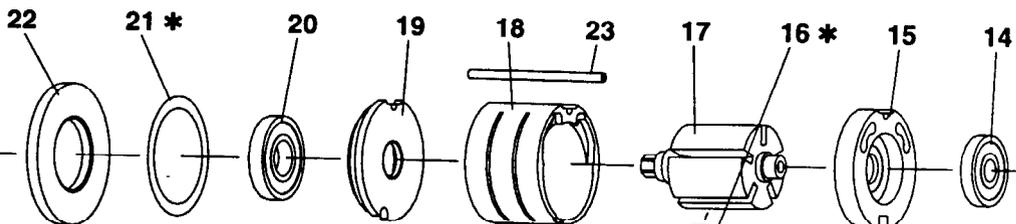


USE REGULAR
DUTY R/A ASSEMBLY



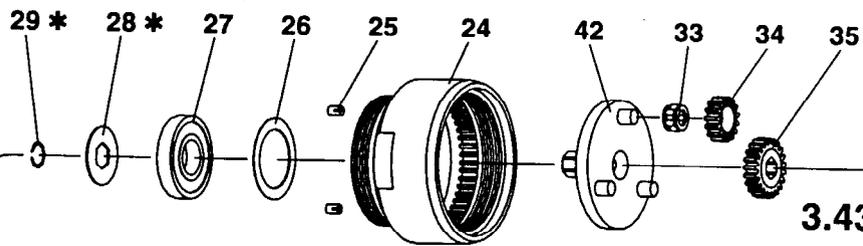


**FOR MODELS
DR051B(-)**



**FOR MODELS
DR053B(-)**

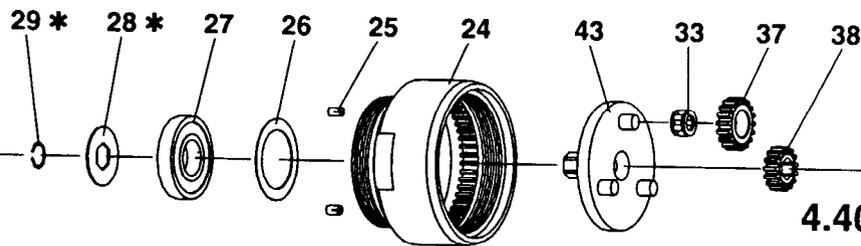
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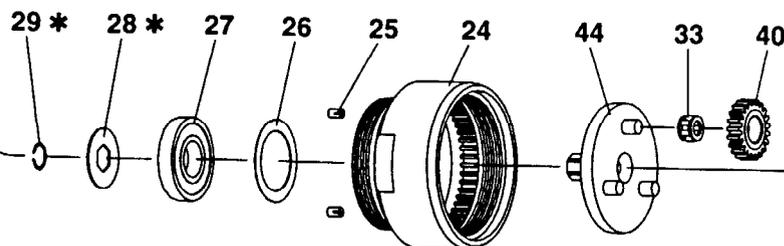
*** ITEMS INCLUDED IN SERVICE KIT NO. 48447-1.**

**USE LIGHT DUTY
R/A ASSEMBLY**



4.40:1 RED.

**NOT SHOWN
48176-1 WARNING LABEL (NON-EU MODELS)
49883 WARNING LABEL (-EU MODELS)**

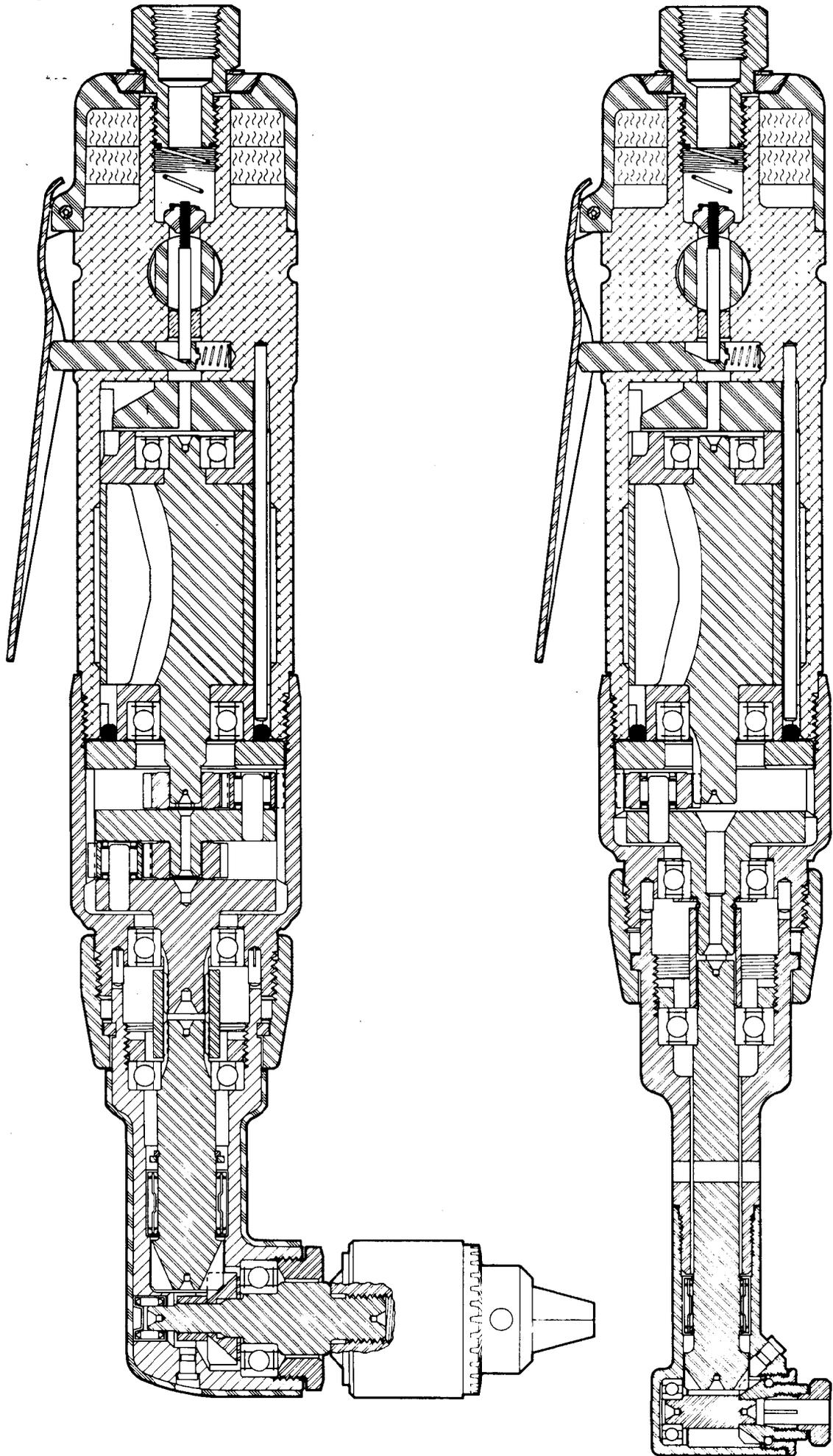


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PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

1	Screen	33911	50	Ball Bearing	32850
2	Inlet Adapter	46377	51	Snap Ring	Y110-5
3	Spacer	47139	52	Spacer	46742
4	Diffuser Washer	46449	53	Needle Bearing	48202-1
5	Exhaust Cap	46448	54	Bevel Pinion	46733
6	Filler (2 req'd)	46452	55	Right-Angle Housing	48205-1
7	Spring	41654	56	Needle Bearing	46750
8	Valve Rod Assembly	46354	57	Sleeve (not shown)	48194-1
9	Head Assembly	46723	58	Coupling	48184-1
10	Spring	46374	59	Ball Bearing	Y65-8
11	Throttle Pin	46296-2	60	Right-Angle Body	48198-1
12	Lever	46326	61	Right-Angle Shim (.005" thick)(2 req'd)	48197-1
13	Roll Pin	Y178-28	62	Right-Angle Shim (.003" thick)	48197-2
14	Ball Bearing	47724	63	Needle Bearing	46222
15	Rear End Plate	46312-1	64	Bevel Pinion	48178-1
16	Blade (5 req'd)	46413	65	Right-Angle Housing	48206-1
17	Rotor	See chart	66	Right-Angle Assembly	48212-1
18	Cylinder	48201-1	67	Right-Angle Assembly	48220-()
19	Front End Plate	47722	68	Spindle	48189-1
20	Ball Bearing	Y65-13	69	Sleeve	47600
	MOTOR ASSEMBLY (includes items 14 thru 20)	See chart	70	Bevel Gear	46735
21	"O" Ring	Y325-214	71	Washer	47694
22	Spacer	46412	72	Ball Bearing	Y65-13
23	Locating Pin	47723-2	73	Spindle (1/4" - 28 female thread)	48190-1
24	Ring Gear (single reduction)	46468-1	74	Lock Nut	48187-1
25	Pin (2 req'd)	Y124-61	75	Chuck	
26	Spacer	46496		0 - 1/4"	31330
27	Ball Bearing	Y65-13		1/16" - 3/8"	47341
28	Washer	47694	76	Spindle Assembly	48213-1
29	Snap Ring	Y142-2	77	Spindle Assembly	48214-1
30	Ring Gear (double reduction)	46467-1	78	Gear (1/4" - 28 female thread)	48179-1
31	Spindle Assembly 1:1 ratio	48366-1	79	Ball Bearing	41643
32	Spindle Assembly 3.43:1 ratio	48222-1	80	Shaft	48183-1
33	Needle Bearing (3 or 6 req'd)	42315	81	Ball (22 req'd)	32594
34	Planet Gear (3 or 6 req'd) 3.43:1 ratio (15 teeth)	46899	82	Lock Nut	48188-1
35	Sun Gear (1 or 2 req'd) 3.43:1 ratio (21 teeth)	46465	83	Gear (9/32" - 40 female thread)	48180-1
36	Spindle Assembly 4.40:1 ratio	48223-1	84	Collet Insert	43497-169
37	Planet Gear (3 or 6 req'd) 4.40:1 ratio (18 teeth)	46900	85	Spindle Assembly	48207-1
38	Sun Gear (1 or 2 req'd) 4.40:1 ratio (15 teeth)	46466	86	Spindle Assembly	48208-1
39	Spindle Assembly 6.67:1 ratio	48224-1	87	Drive Plate	46716
40	Planet Gear (3 req'd) 6.67:1 ratio (21 teeth)	46901	88	Gear (#10 - 32 female thread)	48516-1
41	Carrier Assembly 3.43:1 ratio	46521	89	Spindle Assembly	48515-1
42	Spindle Assembly 3.43:1 ratio	47752	90	Gear (5/16" - 24 female thread)	48683-1
43	Spindle Assembly 4.40:1 ratio	47753	91	Spindle Assembly	48684-1
44	Spindle Assembly 6.67:1 ratio	47750	92	Carrier Assembly 4.4:1 ratio	46522
45	Coupling	46741	93	Carrier Assembly 6.67:1 ratio	46721
46	Snap Ring	Y110-11		SERVICE KIT: includes items 1, 6, 7, 10, 13, 16, 21, 28, 29, 51, 52, 53, 61, 62, 63 and 81	48447-1
47	Lock Nut	46745			
48	Bearing Lock Nut	37105			
49	Grease Fitting	35967			





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PN 49999-109